

Body Like a Rocket:

Performing Technologies of Naturalization

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The LZR Racer bodysuit covers the swimmer's body from calf to collarbone in black and grey space-age fabrics engineered to facilitate peak athletic performance in the pool. Speedo unveiled the latest in elite swimwear technology on February 12, 2008 at a press conference covered widely by media outlets internationally (Wilson 4D). Some of the best swimmers in the world, including Olympic medallists and world-record holders, Michael Phelps and Natalie Coughlin, modelled the superhero-like sport couture. This suit was designed to cut through water like a rocket and help the greatest swimmers in the world—in prime shape for the 2008 Summer Olympics in Beijing—break records at an unprecedented level. With 38 of 42 world records smashed at the 2008 Olympics by athletes wearing the LZR Racer, the suit was a rousing success (“Making No Waves” 100). In order to assure a ‘level playing field,’ the company made this new swimwear technology available to all swimmers in the 2008 Beijing Summer Olympics by order of the International Olympic Committee (IOC) and many swimmers snubbed their corporate sponsors such as TYR, Nike, and Arena to wear the new Speedo suit instead of the competitors’ technologically-stunted alternative (Fitzsimmons 3). With such a startling rise in the prowess of the world’s top swimmers, opponents of the new Speedo suit, most notably competing swimwear companies, worried that this suit might be a high-tech form of cheating referred to as “technology doping” (“Making No Waves” 100; Wood 1). Supporters, including many of the athletes swimming in the suit, lauded the LZR Racer as a technological innovation allowing athletes to reach their full potential (Fitzsimmons 3; Wood 1). The tenor changed a year later when competitor companies introduced even more advanced bodysuits, such as the Italian-manufactured Jaked and Arena’s Powerskin X-Glide. At the 2009 World Championships in Rome, records fell like dominos and evoked little more than polite applause from the audience. Swimming wonder Michael Phelps, an eight-time gold medallist in the 2008 Olympics, lost out to Alan Biedermann, a fifth-place finisher in Beijing (Crouse para.2). The difference? The suits. This shake-up in the swimming world led the Fédération Internationale de Natation (FINA), the international swimming governing body, to ban the whole lot of innovative swimwear technologies, implementing new rules effective January 2010.

This rapid movement from permissible to prohibited provides an exemplary case study for exploring the ways technologies and professional athletics shape conceptions of naturally equitable bodies. In this article, I argue that technologies actually produce the

‘natural,’ rather than changing or polluting a pre-existing material reality. It is with bodies that technologies act, and it is technologies that make bodies legible. This argument builds upon the work of numerous scholars across interdisciplinary fields of feminist theory, science and technology studies, critical sport studies, and disabilities studies who articulate the porous divide between nature and culture, or natural phenomenon and technological innovation (Balsamo; Barad; Butryn & Masucci; Cole, “Addiction, Exercise, and Cyborgs”; L. Davis, *Enforcing Normalcy*; Grosz; Haraway, “Manifesto for Cyborgs”; Pronger; Rail; Serlin; Thomson). By bringing these potentially disparate conversations together, I illustrate how divisions between acceptable technology and unfair enhancement are mobile and depend upon shifting material and ideological configurations of what constitutes a ‘natural’ body.

In modern sport, like other areas of culture, some technologies become naturalized as part of an acceptable human form, while others become labelled as deviant. Analysis of historical circumstances and current events dictating who can play and who is rejected from sport’s pre-eminent games—the Olympics—provides ample evidence of the role of technologies in determining what constitutes natural athletic bodies. Racially biased research and biological determinism, gymnasiums and training regimes, gender verification testing and drug testing have all utilized science and technology to dictate who could compete and who could not (Beamish & Ritchie; Cole, “Bounding American Democracy;” Green 181-216; Hoberman, *Darwin’s Athletes* 149-232; Magdalinski; de la Peña 15-49). Close attention to these historical moments reveals that the process of utilizing technologies to define the natural and the deviant is not neutral, but moves through the actions of powerful groups, nations, and corporations invested in forwarding values and belief systems complementary to their own interests. Crucially, such divisions move not only through ideological configurations, but also through material technologies and the performances of bodies. A close analysis of the LZR Racer suit reveals the role of the suit in continuing this tradition and the importance of paying attention to materials and the webs of connection woven into the fabric of this new technology.

Athletes embody and perform technologies in ways that reshape the ‘natural’ human form to the benefit of narratives of human progress and improvement. Myths of progress tell a teleological tale of movement toward a utopian future that American studies scholar Joel Dinerstein argues is centred in the “self-control, self-mastery, and perfectibility” of the body aided by technological intervention (20). The combination of extreme bodily discipline and tailored prosthetic devices in sport provides quantifiable proof of progress toward this goal in the form of record-breaking performances. By historicizing the role of technologies in the Olympics and engaging in a case study of the LZR Racer suit, I demonstrate how technologies create ‘natural’ bodies that allow both the athlete and the viewing community to imagine a narrative of athletic and human progress that is both separate from—and reliant on—technological enhancement. The sporting event becomes simultaneously a performance of the natural abilities of the

human body and a commercial for the physical enhancement of human ability made possible by a high-tech product available to anyone with enough capital.

The mythology of the “natural” athletic body—pure and untainted—remains crucial to the Olympic dream, despite the ubiquitous presence of technologies in athletic performances and growing critiques of this ideology in critical sport studies (Cole, “Testing for Sex or Drugs”; Hargreaves & Vertinsky 1-24; Lenskyj; Pronger). In a twist of logic, the same scientific discourses that produce cyborg athletes also neutralize the unnatural by making strategic cuts between permissible and prohibited technologies. The process of naturalizing technologically-enhanced athletic bodies depends on the unquestioned belief in science as capable of objectively revealing ‘truth,’ a conviction critiqued in science and technology studies (Barad; Haraway, “Situated Knowledges”; Harding; Latour). Sport competition follows the scientific logic of controls and impartiality. The contest depends upon the illusion of equitable bodies crouched at the starting blocks testing ‘natural’ abilities through the objective arbiter of the stopwatch. This twin fetishization of science and sport as objective measures of truth and ability allows the supposedly equal and natural bodies of athletes to metonymically symbolize the potential of all human subjects to advance themselves and outstrip their fellow citizens. According to this myth of progress and equity, any technological advantages are naturalized and ‘the best man wins.’ Unfortunately, these symbols are not meant to speak to all people, but primarily to those already benefiting from unjust and unequal systems of capital.

In order to more fully develop my argument, this paper will first discuss the construction and performance of normalcy and natural bodies as explored by scholars in the fields of feminist and queer theory, science studies, critical sport studies, and disability studies. By talking across these fields, I seek to reveal how technologies always already affect the constitution and definition of natural bodies in a process I call technologies of naturalization. I historicize this process by drawing together the work of scholars studying the relationship between body norms, new technologies, and systems of power, and link these connections to the creation of the modern Olympics. Idealized athletic bodies and cultural politics intimately affect technologies permitted in sport competition, a trend that continues in the case of the Speedo LZR Racer suit. The saga of the suit’s re-categorization from permissible to prohibited technology reveals the entangled networks of athletic bodies, economic and cultural capital, and scientific expertise involved in gendering and racializing the myth of technologically-enhanced human progress.

Tangling Technologies and Normalcy

Critical sport studies scholars, Ted Butryn and Matthew Masucci, call on scholars to account for the unreasonable importance of the “natural” in the “posthuman” world of

athletics (141). Close examination of the processes that constitute natural/artificial divides reveals why the mythology of natural bodies remains crucial in sport. The boundary-making practices of sport are not arbitrary, but calculated divisions designed to privilege some bodies over others. This approach builds on research that deconstructs the nature/culture divide, de-legitimizes the reign of normalcy, and critiques scientific knowledge production. This foundation allows me to account for how the cyborg discursively disappears and renders the body “natural” despite the material and ideological intervention of technologies.

Discourses of modernity, steeped in the Cartesian dualism, insert a division between mind and body, creating a power-laden binary that aligns the mind with culture, the rational, and masculinity. The body comes to represent nature, unpredictability, and femininity (Haraway, “A Cyborg Manifesto” 177; Grosz 14; Merchant 133). The incursion of technologies into bodies troubles these essentializing distinctions. The figure of the cyborg, as theorized by Donna Haraway, demonstrates the hybridity of machine and organism always present in the subject (“A Cyborg Manifesto” 150). This model generates ambiguity around dualisms such as nature/culture, human/machine, and natural/artifice (152). The cyborg blurs boundaries by inhabiting both natural and technological categories simultaneously and confusing the details of “who makes and who is made in relation between human and machine” (177). The very origin and existence of the cyborg transgresses myths of biological and technological determinism, demanding that we take responsibility for the relations fostered or denied by science and technology in relation to bodies (151-154, 180-181). Haraway’s work has inspired a whole sub-field of cyber studies, including the theorization of the cyborg athlete, as demonstrated by the work of Ted Butryn, C. L. Cole, Brian Pronger, and Debra Shogan.

Complementing cyber-theory work is a critique of the assumed ‘normal’ body that pre-exists modern technologies. Disability studies scholars actively rework norms and critique the dependency of normalcy upon designating others as deviant and disabled (L. Davis, *Enforcing Normalcy*; Kudlick; McRuer; Thomson). Lennard Davis, in *Enforcing Normalcy: Disability, Deafness, and the Body*, suggests that disability emerges as a socially salient category through the invention of statistics, the bell curve, and the construction of mathematical averages during the Enlightenment (23-49). Thus, the creation of disability allows for and depends upon the constitution of normalcy under the rubrics of science (6). Cultural ideals of beauty also shape what constitutes normalcy, according to Rosemarie Garland-Thomson. Technologies such as surgeries, external body-shaping devices, and rehabilitative services all function as a reaction against disability to restore normalcy and beauty (Garland-Thomson 12). One particularly intriguing normalizing technology is the prosthetic. Disability scholars are quick to point out the dual nature of prosthetics to both naturalize and queer the human body (Smith & Morra). The prosthetic is an “interconstitutive” part of human bodies in that it articulates

the edge of what constitutes a proper “supplement” to the body in the sense of both addition and removal (Smith & Morra 7; L. Davis, “Stumped by Genes” 93).

Body-modifying technologies often stand at the crossroads between gender norms. Feminist sport studies scholars such as Heywood & Dworkin and Wesley demonstrate the fluidity of gendered norms and natural bodies through the poignant example of female bodybuilders who use technologies to simultaneously challenge and reinforce traditional notions of femininity. Queer theory and trans studies expand on this critique of normalcy by troubling the supposed natural categories of sex and exploring the intersectionality of gender, sex, and sexuality. Judith Butler suggests that gender arises from acts and gestures performed on the surface of the body, making identity a fabrication arising from embodied acts and discursive meanings (*Gender Trouble* 136). She likens the concept of “the normal” to Fredric Jameson’s pastiches, an original that is a copy, “an ideal that no one *can* embody” (138-9). And yet, the norm requires the body of another to mediate the relationship between the ideal and the self (*Undoing Gender* 28). While the norm must always remain other, the act of sport performance presents a compelling representational copy of embodied idealization.

Modern sport is a nexus of sociocultural forces reflecting dominant ideologies and mediating cultural anxieties through the bodies and performances of athletes. Numerous scholars have documented the role of physical fitness in reinforcing or challenging gender norms and enacting conflicts around race, ethnicity, and sexuality (Bloom & Willard; Burstyn; Cahn; Hargreaves & Vertinsky; Heywood & Dworkin; Young). The work of Michel Foucault has inspired many in critical sport studies to engage in genealogical investigations of power and knowledge and to theorize the athletic body as disciplined, docile, and subject to normalizing technologies (Andrews; Butryn; Cole “Resisting the Canon”; Markula & Pringle; Shogan). This work provides a platform from which to argue that elite sport performances demonstrate positive material and ideological ‘proof’ for the constitution of norms and ideal bodies. If, as Markula and Pringle argue, the fit body is the ideal body in dominant discourse, then the fittest bodies become the epitome of perfection. In sport, fitness is often measured objectively on the individual and competitive scale. Individually, bodies are subject to surveillance and disciplinary practices in the form of precise measurements of body composition, energy output, and movement efficiency. In competition, measurement often occurs via the stopwatch—the impartial mediator of victors and losers.

Record-breaking performances serve as supposedly irrefutable evidence that humanity is improving thanks to a delicate balance of technological and biological evolutionary processes designed to ‘optimize’ human performance. Extending Lennard Davis’s analysis of the bell curve, exceptional sport performances stretch one end of human possibilities slightly further, symbolically upping the average for all of humanity. These advances are simultaneously attributed to both “pure” athletic ability (Lenskyj 7) and scientific advances commodified by private industry. The “Olympic industry”

depends upon corporate partnerships and the technologies provided by these companies for both its financial success and ideological potency (Lenskyj; Simson & Jennings). Crucial to maintaining this precarious balance of purity and politics is scientific discourse. By linking sport to scientific objectivity, the modern sport movement weds notions of normalcy and progress through the naturalized athletic body. However, as Hargreaves and Vertinsky point out, this “natural” body is a myth (4). This mythic body depends on maintenance of a normal/deviant binary propped up by fantasies of scientific objectivity (Cole, “Addiction, Exercise, and Cyborgs” 264-265).

In order for the symbolism of sport to work, the accomplishments of athletic bodies must be read as natural performances—signs of the outer limit of what it is possible for human bodies to do. Tara Magdalinski, in *Sport, Technology and the Body: The Nature of Performance*, analyzes sport technologies such as the Speedo suits to prove her point that authentic sport performances must be “an accurate expression or measure of an athlete’s actual physical capacity, a record of what the performer’s body can genuinely do when, unaided, it is pushed to its absolute limits” (109-127; 64). The high value placed on hard work and bodily discipline in late capitalism dictates the contours of the division between legitimate technologies, such as training techniques, and illegitimate technologies, such as chemical substances, according to Magdalinski (65). She suggests that the many rules and regulations of sport seek to protect “the ‘purity’ of the sport, in terms of its quest to determine the absolute most the human body can do” in a pseudo-experimental setting that removes as many external or internal influences as possible (161). Extending her argument, the line between what constitutes a technology or a natural innovation intimately depends on the measurement and maintenance of able-bodiedness as a meaningful category and an unquestioned belief in the ability of scientific experimentation to provide legitimate knowledge. Rob Beamish and Ian Ritchie similarly argue that the lines between permissible and prohibited technologies are arbitrary at best and ignore the finance-driven engine of sport in favour of a mythology of amateurism and fair play that died decades ago, if it ever existed in the first place. Their focus on the influence of capitalism and nationalism in modern sport complements Magdalinski’s thesis, and creates a space from which to interrogate the role of sport and science in constructing a natural body rooted in the performance of able-bodiedness.

Technologies always already affect how we define the limits of bodies, a process I call *technologies of naturalization*. Technologies of naturalization address the material-discursive processes of creating cuts that matter between natural and deviant bodies. These ‘cuts that matter’ refer to active boundary-making practices that work to divide nature-culture entanglements. Like other forms of cutting, this act can do damage when it severs important ties or relationships. Borrowing from Foucault in *History of Sexuality*, these technologies are tools or techniques deployed toward particular ends in relational and active practice. Technologies are both a ‘doing’ and a thing that requires utilization and manipulation in their most specific, concrete forms—such as the keyboard—and their

most abstract, fluid forms—such as gender (de Lauretis 1-30). Technologies are *technes*, from the Greek root meaning art or craft, an application of knowledge, the knowledge itself, the resulting object, and even the maker herself, centred on a process shaping and shaped by material and discursive manifestations. Technologies of naturalization rely upon creating divisions between clean and impure, normalized bodies and deviant bodies. Mary Douglas discusses how categories of dirty and clean and practices around purity relate intimately to cultural needs for order and the containment of danger. In the case of sport performance, her ideas prompt us to ask ‘what sort of order is arranged, and what form of danger is being contained’? The polluted bodies of sport are those who exceed the norm, burst the boundaries of what constitutes a culturally defined ‘natural’ body. In the history of modern sport examined through the lens of the Olympics, polluted bodies have included working class bodies, female bodies, Communist bodies, and disabled bodies—an assertion I will elucidate in the course of this article. In each of these cases, sporting bureaucracies have deployed scientific discourses to render some technologies unnatural, such as performance enhancing drugs, prosthetic legs, or bodies that test outside gendered norms. A historical reckoning of technologies of naturalization in the Olympics reveals the importance of seriously considering sport in determining the constitution of bodies that matter (Butler, *Bodies that Matter*).

Traditions of Technologies of Naturalization in Sport

The eve of modern sport, exemplified by the initiation of the modern Olympic movement, mediated cultural anxieties associated with industrialization, changing gender roles, and the changing migratory patterns in the United States. A burgeoning working class toiled in new factories springing up in urban centres, while the emerging bourgeoisie traded in ploughs for pens to work in sedentary office jobs. “American nervousness” or “neurasthenia,” with symptoms including anxiety, indistinct pain, sleeplessness, and despondency, plagued the new urban population of “brain workers” (Green 137-140). Women such as Jane Addams, Charlotte Perkins Gilman, and Elizabeth Cady Stanton led the early women’s rights movement and pushed for more equitable rights in education, mobility, and property ownership alongside the right to vote (Dubois & Smith; Elshtain; Gilman & Lane). The “nervousness” of women (described with the same symptoms as males) and the problem of race suicide were laid at the doorstep of these early activists for women’s rights, with critics claiming that their public presence and intellectual work destroyed their reproductive systems and undermined their rightful place as mothers (Green 140). The “imagined communities” of nations linked the moral, physical, and economic fitness of its constituent bodies with the health of the national body (Anderson; Hoberman, *The Olympic Crisis*). Alongside a growing population of immigrants, eugenics arose as a nationalist program in the United States and abroad, with ‘scientific’ evidence serving to justify discriminatory behaviour against certain ethnic and

racial groups, and health practices geared toward avoiding “race suicide” in the Anglo population (Green 219-282; de la Peña 28-29).

Muscular Christianity, a movement linking physical prowess with moral uprightness, swept the nation as organizations such as the Boy Scouts and Young Men’s Christian Association (YMCA) grounded their philosophies on its bedrock (Green 181-216; Burstyn 46-50). In this milieu of cultural upheaval, Muscular Christianity provided a foundation upon which to rearticulate white, middle/upper-class masculinity, traditional social values, and a capitalistic meritocracy through sport and competition. This movement utilized a variety of technologies—from weight machines to sportswear—to naturalize the supremacy of white Western European middle to upper-class men in embodied athletic practices (de la Peña; Burstyn). Exercise machines in gymnasiums aimed to reshape the bodies of those with disposable income and leisure time. In *Body Electric*, Carolyn de la Peña documents the importance of exercise machines in transforming the ideal of embodied manhood and health from a working-class “strongman” aesthetic to an idealization of the “balanced bodies” of gymnasium-conditioned leisure class men (15-50). De la Peña describes how the philosophy and inventions of Dudley Sargent, physical education instructor at Harvard University, utilized new scientific evidence and created weight machines to quantify and develop privileged male bodies through comprehensive systems of bodily improvement (50-88). This complex of practices, machines, and ideals exemplified a shift in technologies of naturalization by aligning the ideal shape of natural and healthy male bodies with the interests of the privileged proponents of Muscular Christianity. Particularly under Theodore Roosevelt’s leadership, Muscular Christianity provided a moral justification for the United States, a nation of fit bodies, to undertake a ‘civilizing’ mission of militaristic conquest of other, less ‘fit’—and therefore less civilized—groups of people (Pope). This imperialistic turn demanded a significant increase in the U.S. military and cemented bonds between militarization and athletics that remain strong today. Sport became a clean, moral microcosm of war, glorifying the same aggressive and dominating behaviours that led to organized, state-sanctioned violence (Pope 124-125).

In this turn of the century moment, Pierre de Coubertin, the founder of the modern Olympics, described the spirit of the Olympic movement as, “the solemn and periodic exaltation of male athleticism, based on internationalism, by means of fairness, in an artistic setting, with the applause of women as a reward” (Coubertin 713). He promoted the Olympics as a site for a peaceful meeting of nations, gathered together to celebrate the great accomplishments of humanity (Hoberman, “The Olympic Crisis” 29; Müller 38). In his vision, the physical and mental striving associated with sport was a great “pacifier” that neutralized political strife while simultaneously promoting a cooperative, implicitly hierarchical system of democracy (Hoberman, “The Olympic Crisis” 34-35). Coubertin’s configuration of the Olympics was highly influenced by his exposure to U.S. sport culture in a visit to the United States in 1889, where he met Theodore Roosevelt,

current U.S. Civil Service Commissioner and a great advocate of “the strenuous life” (Guttman 10). The modern Olympic movement mimicked an exclusionary principle of amateurism designed to exclude those of the working class from the sports of their social “betters”—white men of Western European descent of the leisure class, with sufficient income and time to partake of the “gentlemanly” pursuits of sport (Guttman 12; Pope). Coubertin believed that the Olympics should be reserved for men, citing women’s involvement in the Olympics as “impractical, uninteresting, ungainly and [...] improper” (Coubertin 712-713). Non-white and working class athletes found themselves excluded from competition through access to facilities and training opportunities, amateur rules, and explicit segregation in sport. Which bodies represented the fitness of nations and humanity mattered greatly, and sporting administrators turned to science to legitimize or discredit athletic bodies.

In subsequent Olympic years, technologies of naturalization remained crucial in determining which bodies were fit for competition and which were objectionable, with scientific discourse and testing serving as arbiter and judge. When over half the field collapsed in the first women’s 800-meter race at the 1928 Olympics, for example, scientists declared the spectacle proof of women’s biological limitations rather than critiquing women’s lack of access to proper training (Guttman 47; Kluka 260). When women from the Eastern Bloc dominated the Cold War Olympics with their “muscles pop(ping) through the iron curtain” the International Olympic Committee (IOC) introduced both drug testing and gender verification testing (Cole, “Bounding American Democracy” 156-7). When athletes challenged the validity of the gender verification test, the IOC took refuge in chromosomal testing (Cole, “Addiction, Exercise and Cyborgs”). When drugs threatened the “purity” of the Olympics, the IOC sought more rigorous and advanced testing procedures (Beamish & Ritchie 31-45). When the International Athletic Foundation’s Work Group on Gender Verification denied the ability of science to concretely determine sex, the IOC sought out other scientists to improve and standardize laboratory-based testing (Cole, “Bounding American Democracy” 159).

The Olympic industry continues to perpetuate an ideological system of meritocracy based in the supposed purity of the athletic body (Lenskyj 99). This idealistic rhetoric requires believers to maintain an unquestioned faith in the ability of science and technology to reveal truth. Technologies of naturalization develop at nexuses of class/race/gender and political machinations while relying upon the guise of science to dictate acceptable technological enhancements to natural abilities. If athletes represent the peak of human physical achievement, the performances of bodies labelled deviant are excluded from narratives of human development. These bodies’ abilities disrupt the proper bell curve of human achievement because they violate culturally constructed ideals of normalcy. Such ideals of normalcy rely upon technology to define what is natural and what is not, a trend that continues in the contemporary sport movement, as exemplified in the case of the swimwear controversies.

Swimming Like Sharks and Rockets

While the Olympics remain a global event with clear political investments from different nations, the corporate presence looms larger than ever, demanding the loyalties of athletes and their bodies in exchange for access to new technologies developed by private industry (Lenskyj; Simson & Jennings). At times, the athlete's devotion to the company can trump devotion to country, as seen in the actions of U.S. "Dream Team" basketball player, Michael Jordan, at the 1992 Olympics. Rather than sport the Reebok logo of the U.S. team warm-ups, Nike-sponsored Jordan draped the United States flag over his shoulder to cover the Reebok logo, utilizing the appearance of national pride to maintain corporate fidelity (LaFeber 101). In the world of swimming, brand loyalty can dictate who ends up on the medal stand. This incursion of corporate nationalism into sport shifts the political investments of individuals using the technologies and those developing the technologies, as demonstrated by Speedo's LZR Racer suit, its predecessors, and its competitors. Through the research and design process and the accomplishments of athletes, new technologies of naturalization link the progression of human abilities as manifested in record-breaking performances and gold medals to an expensive piece of technology manufactured by private corporations. The profits of these designer suits were minimal when compared to the company's investment in research and design. In the case of Speedo's LZR Racer suit, estimated sales at 80,000 units by the end of 2009 at British £500 each did not make the product profitable (Mullman S-18). The suits instead served as a marketing tool for brand promotion. Even if everyday athletes cannot afford or do not need the high-tech Speedo bodysuits, the performance of the suits in the Olympics, coupled with their technological design, cultivated a consumer desire to integrate wearable technologies into the body. Consumers could satiate this desire by purchasing related Speedo products available in an array of colours and styles on the company's website or at the local swim shop. This fetishization of high-tech swimwear did not happen overnight, but resulted from Speedo's careful development of swimwear technologies over the years. A historical review of Speedo's bodysuit innovations will contextualize the development of the LZR Racer suit.

In the months leading up to the 2000 Summer Olympics in Sydney, Australia, Speedo announced the creation of the FastSkin suit, a bodysuit that mimics sharkskin in order to let swimmers take advantage of the streamlined qualities of sharks (Thilmany 68). In a four-year research project, Speedo collaborated with the Natural History Museum's fish experts in London to learn the unique properties of sharkskin in an attempt replicate it and reduce drag caused by contact between human skin and water. By linking cutting edge fabric technology innovations to a natural phenomenon—sharkskin—in a process of "biomimetics" (Teeri et al. 199), Speedo grafted an artificial prosthesis to nature. This biotech-mimicry served as a 'second skin,' while still clearly

revealing the natural human form beneath, thus allowing spectators to reconcile this post-evolutionary innovation with the natural human form. While this new technology only transferred to an advantage of a few hundredths of a second, that is all many professional swimmers needed in a sport where swimming experts say athletes are reaching their genetic limit. Despite the fact that the suit was only available to Speedo-sponsored teams in its debut year, the International Olympic Committee ruled the suit a permissible technology. At the 2000 Olympics, athletes wearing the new Speedo suit won 83% of the medals (FastSkin History para.3). As a follow-up to the success of the 2000 FastSkin release, Speedo launched the FSII for the 2004 Athens Olympics and the FastSkin FS-Pro in 2007, all of which capitalized on the technology-nature nexus in the research and design (FastSkin History para.4-5).

The practice of biomimicry is a growing trend in applied material sciences, a process in which scientists attempt to mimic desirable qualities in nature through laboratory research. Janine Benyus describes nature as the “in vivo genius” (6) from which we can model new innovations in an ethical and responsible way, provided we also model nature in recognizing the importance of limits in nature (7). Feminist science studies scholar, Karen Barad, points out how the practice of biomimicry “actively reworks the boundaries between nature and culture,” by utilizing advanced laboratory techniques to “make” nature and manipulate matter such that lines between what is grown and what is manufactured shift (368). In the case of the new Speedo technology, the full bodysuit camouflages the body, covering human skin in a dark, sleek coating of advanced polymer material fitting tightly to the body’s shape. Capitalizing on the ambiguity generated by biomimicry, this prosthetic skin is both fully natural and fully artificial. Intense focus on research and design naturalized through biomimetics facilitates its acceptance and detracts attention from other processes of the suit, such as production and distribution. The research and design process appears profusely in material science, textiles, and engineering trade publications (Curtis and Carré 19; Rodie 66; Thilmany 68; Wood 1), as well as in mainstream publications (Hamilton et. al. 84; Ho 10; “Making No Waves” 100; Thurow & Rhoades A14), turning the suit into a fetishization of the technology while simultaneously erasing its production. Importantly, since Speedo is a subsidiary of privately owned conglomerate, Pentland Group LLC, patents protect the technical specifications of the suit and virtually all information on the suit funnels through the company. Much of the material published in popular and trade publications mirrors the language on the Speedo website (Development: The LZR Racer Concept). This centralized control of information enables the company significant power to craft a consistent message that glorifies the technology even as it naturalizes it.

In preparation for the 2008 Olympics, Speedo announced the release of the LZR Racer, which claims to be 10% faster than the previous generation of bodysuits and incorporates NASA aerospace technology, sport physiology research, and the latest in bioengineering (Features: Speedo LZR Racer Suit). Speedo contracted a Hollywood

special effects company, Cyber FX, to laser-scan the bodies of 400 elite athletes to contribute to the cut of the suit (Curtis & Carré 19). This process explicitly creates a certain type of body that should wear this suit and delineates who can engage in this sort of sport performance. It is important to recognize that rather than moulding the suit to the body, the athlete must mould her body to the suit. Even elite athletes spend around twenty minutes forcing their bodies into the confining, un-elasticized material of the LZR Racer (“Making No Waves” 100). The process of donning the suit is so complex that the Speedo website featured a five-minute video tutorial explaining how to properly put on the suit (Speedo LZR Racer Fitting Guide and How to Put On!). This process, according to the Speedo instructions, requires care, persistence, and the assistance of two close friends.

The restrictions of the suit improve bodily performance. For example, the “core stabilizer” technology utilizes a corset-like construction to encourage proper swimming form and reshapes the lungs to increase the body’s natural buoyancy (“Making No Waves” 100). The “pulse” technology of polyurethane panels compresses the muscles, increasing blood flow and power output of the muscles (Features: Speedo LZR Racer Suit para.2). Mesh material at points of articulation contrast with the tightness of the rest of the suit, allowing for full range of motion to complete the necessary swim strokes (Features: Speedo LZR Racer Suit para.5). All of these features of the swimsuit utilize clothing construction to enhance the body’s ability to engage in a certain type of physical performance—efficient, powerful swimming.

This technology marks a change in the locus of control and discipline on active bodies. Traditionally, sport clothing has moved toward being less restrictive, allowing freedom of movement through loose-fitting designs and the integration of Lycra, Spandex, or other synthetic elastic materials. Proper coordination of efficient movement and posture fell upon the shoulders of the individual to develop through training, muscle development, and discipline, an articulation of Foucault’s disciplinary practices discussed by critical sport studies scholars (Foucault *Discipline and Punish*; Markula & Pringle; Pronger; Shogan). A muscular abdomen became the new corset, demonstrating bodily discipline from the inside out (Steele 163). Speedo’s clothing once again optimizes bodies through external structures capable not only of modifying appearance, but also changing the physical capabilities of the body—increasing blood flow, maximizing lung capacity, and compressing muscles to increase proprioception.

Other features of the swimsuit replace the human body in a prosthetic-like fashion. The “second skin” of the polyurethane LZR panels repels water much more effectively than human skin (or recreated sharkskin for that matter), decreasing the “drag” or resistance of the body moving through water (Features: Speedo LZR Racer Suit para.3). NASA created these panels not out of sharkskin technology, but from newly developed materials capable of repelling water on its surface, reducing passive drag (the resistance between the swimmer’s surface and the water) by ten percent (Features:

Speedo LZR Racer Suit para.3). This suit is ultrasonic bonded along three seams, designed to reduce passive drag even further by making the three panels of the suit one (Features: Speedo LZR Racer Suit para.5). Designers decided where to place these panels on the body by using computational fluid dynamics, a field also used to improve materials for yachts and auto racing (Curtis & Carré 19). A company called ANSYS-Fluent based out of Canonsburg, Pennsylvania undertook the computer-based modelling of the swimmer in action in order to maximize the swimmer's use of this new technology (Rodie 66). Finally, both the University of Otago and the Australian Institute of Sport collaborated to test the suits on the bodies of actual athletes, such as Olympians Michael Phelps and Natalie Coughlin (Curtis & Carré 19). Here, the athletes would test different prototypes of the suits under varying extreme conditions (Wood 1).

From start to finish, both the literal and recreated bodies of the athletes served as the point of departure and centre for the creation of the suit. These bodies were the carefully selected Speedo company-sponsored swimmers hailing primarily from the United Kingdom, home of the company's headquarters, Australia, and the United States. Through comprehensive batteries of biometric testing, scientists quantified these athletic bodies, making facts that normalized the swimming body. Then, the company created a suit to match those facts. This process created the appearance of an objective, data-driven process. However, this logic denies the influence of nation, race, and gender that went into the creation of the normative body on which the suit was based. White bodies from these three countries dominated the design production and marketing materials for the suits, racializing swimming as predominantly white. While women were present in the marketing and design, their place is clearly secondary to men, as illustrated in the placement of women to the side or behind men in nearly all of the marketing pieces.

The bodies represented in the Speedo LZR Racer website (Athletes) and in the press debut of the suit, particularly the body of Michael Phelps, paradoxically reference discourses of the timeless, natural human form and the technologically enhanced body simultaneously. The most ubiquitous picture in the LZR Racer campaign that greeted visitors on the suit's homepage privileges not only whiteness but masculinity as well. Michael Phelps stands positioned in a perfect simulation of the Da Vinci Vitruvian man—a symbol of the symmetry of the human form and the unity of art and science (LZR Racer). This connection between aesthetics and science recalls Speedo's alliance with *Comme des Garçons* in creating a design for a limited quantity of the LZR Racer suits incorporating the Japanese character *Kokuro*, meaning “heart, mind and spirit” (*Comme des Garçons* para.1) and de Coubertin's allegiance to the arts as crucial to the modern sport movement symbolized in the Olympics. This move appeals to a myth of universal humanism proselytized in the Olympic movement, which seeks to erase the gendering and racialization of the suit. Feminist scholar Anne Balsamo points out how the advanced technological body is the male body, making gender a tool to order power relations of bodies and technologies (9). Phelps clearly continues this tradition. Behind

Vitruvian-man Michael Phelps, a blinding white light emanates from a circular corridor reminiscent of a high-tech sterilized ventilation system. Next to him, we read the words, “100,000 years of evolution, 80 years of development, 14 years of training and all that counts is the next 1:43.86” (LZR Racer para.1). These words place the athletic performance of this white, male athlete at the peak of a teleological techno-biological determinism, inserting not only the body of Phelps, but also the company of Speedo into the trajectory of this post-evolutionary narrative. This story imagines the sport performance as proof of progress mediated by technology.

If we accept world records as the equivalent of human progress, the claims may seem justified. Athletes in the suit won 94% of the gold medals in Beijing (Phelps Secures his Place in the History Books para.1). The apparent superiority of this suit over competitor versions led the International Olympic Committee to declare the suit only permissible if all athletes had access to the technology (Fitzsimmons 3). This decision supports the company’s claim about the suit’s ability to enhance performance while also perpetuating Olympian myths of equal ability and access. It is imagined that by providing each swimmer with a new LZR Racer suit, any advantage bestowed by the suit is equalized. This ideal ignores two things. First, it ignores the sociocultural conditions under which the suit was made—a process that significantly favoured the bodies of particular nations and identities. Secondly, this decision erases the importance of the embodied technique of the technology, from the arduous process of putting on the suit to the bodily adjustment necessary to acclimate movement to a new piece of equipment.

Competitor companies raced to bring their latest version of swimwear technology to the market, but failed to capture the attention of top swimmers or the popular media at the greatest sport commercial of them all—the Olympics. Arena’s grand release of the Powerskin R-Evolution on March 17, 2008 (just a month after Speedo’s release of the LZR Racer) proved quite a production, with an auditorium full of supporters and reporters treated to a dramatic show featuring special effects lighting and smoke machines. Global Marketing Director, Giuseppe Masciacchio described the suit as “the fastest, the lightest, the smoothest” suit on the market and claimed the suit can help athletes “go beyond their human limits” (Eindhoven). The website described how Arena worked with universities in Italy and France to utilize the same fluid dynamics and flume testing capabilities highlighted by Speedo and used by race car and speed boat development teams (Scientific Validation para.1-2). Their next edition, the Powerskin X-Glide, debuted in 2009 and appeared dedicated to proving itself ‘better’ than the highly successful LZR Racer. Instead of three seams, the X-Glide has no seams. The suit similarly compresses muscles, improves swimming posture, and reduces drag (Power X-Glide Features). One-upping the Speedo suit, the X-Glide utilizes a three-layer fabric construction that can do everything the competitor suit can, but better. The use of a fully polyurethane material effectively expands the definition of ‘fabric’ beyond the stretch of imagination, an innovative move that would be the centre of the controversy to come.

The Arena's suit, and an array of other competitor suits soon found themselves subject to scrutiny and approval by FINA, the international swimming federation. Shortly after their release, FINA announced that the Arena Powerskin suits, and 136 other innovative new suits, required modification before they could be legally worn in competition. They claimed that the suits created "air trapping effects," contributing to the buoyancy of the swimmer (PR 37 para.4). Arena unhappily made the requisite changes, but protested that the decisions of the governing body were not made uniformly among companies (Arena Company Position para.6-7). The company went so far as to finance the same tests on buoyancy done by FINA-endorsed researchers at the University of Bologna-Italy to disprove the original test results. The battle of expertise had begun.

The suits debuted on the international stage in the summer of 2009 at the world swimming championships. The suits—or should I say the athletes wearing the high-tech Arena suits—performed well. Paul Biedermann, a German Arena-sponsored athlete, shattered two world records and easily beat standout Michael Phelps, to whom Biedermann finished fifth in the same race in Beijing. A frustrated Phelps said, "[The new suits] changed the sport completely [...] Now it's not swimming. The headlines are always who's wearing what suit" (Crouse para.6). Coming from the poster-child for the record-shattering LZR Racer suit, the statement is bitterly ironic. At the same time as the games in Rome, FINA officials met to discuss the proper place of space-age technologies in swimming. In the midst of the world championships, FINA ratified a new rule essentially banning much of the new suit technology, including the Arena suit and the LZR Racer suit as of January 2010. Key factors in the new requirements for legal suits include its size, its buoyancy, and its material makeup (PR 59 para.4-6). Suits can no longer extend above the waist or below the knees for men, nor past the shoulders, neckline, and knees for women. Suits cannot trap air, or increase the swimmer's natural buoyancy. Most provocatively, suits must be made of textile material. This last point is perhaps most controversial, as it potentially bans the polyurethane material used by companies such as Arena for their entire suit, and by Speedo for the special "pulse panels" designed to compress muscles and reduce passive drag. At the time of this writing, the details of what constitutes a "textile" hang in limbo pending the decision of a committee of material science experts. The new rule went into effect January 2010, leaving these suits pool-legal for the championships in Rome, while simultaneously questioning the validity of the morass of records broken wearing the now-illicit devices. Shall these records stay, but with a small asterisk—a visual caveat qualifying the greatness of the performance? Should they stand unadulterated? Will they be broken anytime soon, or ever? Will swimmers with different technological interventions deemed more natural rise to the level of the technology-doping era of polyurethane swimsuits?

Most importantly, what changed? What made the technological advancement of swimwear cross the line from permissible to prohibited technology so rapidly? Why did FINA, most pro swimmers, and fans embrace the Speedo LZR Racer only to reject the

innovations of competing companies? I would answer that the stakes implicated in these technologies of naturalization changed. When controversies regarding the suits drew a greater crowd than record-breaking performances, the “cyborgification” of the athlete became difficult to mask (Butryn & Masucci 125). When the fairness of athletic technological interventions is questioned, myths of bio-based human progress in sport become difficult to sustain. Narratives of techno-bio evolutionary progress depend upon controlling controversies regarding the processes of technologies of naturalization. Technologies of naturalization work best when they are “black boxed”—that is, sealed off as an unproblematic and unquestioned tool of science and sports (Latour 21-29). It is only when controversy arises that the black box ceases to work and must be opened. Opening the black box of technologies of naturalization reveals the processes of its production—a complex nexus of ideologies of fair play, capital production, narratives of progress, and idealized athletic bodies. It is scientific expertise and objectivity that help close the box and perpetuate its functionality.

The sport-industry complex exploits science to construct the lines between technology and nature. By invoking science, sport industries seek to make the cultural performances of technologies of naturalization into unbiased facts backed up by objective, impartial data analyzed by neutral professionals. Companies utilize the visual graphics of fluid dynamics and studies performed by university scientists to make their products legible to their audience. This legibility does not depend upon scientific literacy to understand the studies or analyze the visual graphics, but instead relies upon the discursive work of a scientific objectivity that we imagine to be capable of logically dividing the natural from the artificial and utilizing technology to ‘maximize’ human potential. Repeatedly, in online discussions of the suits, pundits call for scientific expertise: “a panel of experts who understand fabrics and suit construction and the application of those to competitive swimming” that come not from manufacturers, but from the academy or other ‘impartial’ spaces (Lord para.15). This belief in the power of science assumes a separation of scientific fact from human influence as well as the acceptance of an *a priori* ‘natural’ world from which we can draw the meaning of natural athleticism. What this recourse to expertise ignores is both the pressure of funding sources, cultural norms, personal biases, and behind-the-scenes politics upon scientific practice, and the crucial role of human intervention in defining the natural world. The production, practice, and material configurations of scientific objectivity constitute a crucial technology of naturalization that preserves the authority of scientific expertise to legitimize boundary-making practices between the natural and artificial. Straddling this border are athletic bodies—both human and super-human in their abilities and access to technologies. These athletes are our real-life superheroes.

Cyborgs and Superhero Deviants

The superheroic style of the Speedo bodysuits found explicit articulation at the 2008 special exhibit, “Superheroes: Fashion and Fantasy,” at the Metropolitan Museum of Art in New York. This exhibit featured the Speedo racing suits alongside Hollywood-designed superhero costumes and superhero-inspired haute couture. Aspects of the exhibit explored the tensions around extraordinary athletic performance, superheroes and fashion. By juxtaposing superhero costumes with high-performance sport couture such as the LZR Racer suit and high fashion, the exhibit posited that these styles served as an avenue of fantasy. Andrew Bolton, curator of the exhibit writes, “The fashionable body and the superhero body are sites upon which we can project our fantasies, offering virtuosic transcendence beyond the moribund and utilitarian” (9). However, these fantasies have a tricky way of slipping into reality. The exhibit points to the uncanny resemblance between the skin-tight costume of superhero Flash, gifted with super-speed, and the Speedo bodysuit, similarly designed to imbue the wearer with swiftness of stroke (Bolton 113-127).

What precisely are the fantasies exercised in the superhero-like athletic body? I suggest that we project visions of progress onto the superbodies of athletes, particularly in countries that dominate in Olympic competitions. These techno-bio evolutionary dreams adhere best to particular athletic bodies deemed most ‘fit’ to enact goals of progress. Athletes perform feats that fans and viewers can only dream of doing. Through consumption of the performance of athletes with whom target markets identify (whether by race, nationality, or gender), consumers can attach themselves to these otherwise unachievable feats of human prowess. Technologies of naturalization serve a vital role in this process, particularly in the case of technologies that help the everyday individual to ‘transform’ into the super-athlete. Athletes must remain imaginable as inherently human in that their abilities and prostheses are ostensibly available to all. This rhetoric suggests that with the right balance of hard work, positive attitude, and scientific gadgets, anyone can become a super-athlete. Indeed, Speedo has announced plans to create a version of the LZR Racer for triathlon racing, a popular amateur sport for affluent weekend warriors with ample disposable income to spend on expensive sport technologies (O’Driscoll 11). The Speedo sales team thus allows the affluent weekend warrior athlete enough capital to connect with world-record performances by buying the same outfit. Those less actively-inclined can consume the images of professional swimmers on television, on the Internet, or in print media, and imagine themselves donning the speedsuit, cutting through the water like a shark, a speed boat, or a space-age rocket. By consuming the same merchandise as professional athletes—either through purchase or voyeurism—we become a part of the performance.

Technologies of naturalization tend to flow around particular actors and enact strategic cuts that naturalize and idealize certain types of bodies that “matter” more based on the interests of dominant powers (Butler, *Bodies that Matter*). In a culture of corporate nationalisms, Speedo relies upon normalizing bodies that perpetuate the target market of

predominantly white, affluent athletes who want to be and look like Michael Phelps. The imagined target market wants to be the Vitruvian Man, the rocket, the shark, the future of humanity's potential, all wrapped up into one. Joel Dinerstein suggests that technology supports the twin Euro-American myths of progress and white, Western superiority (18). He posits that "so long as cyborgs are imagined as superhuman male bodies [...] then the posthuman dream of evolving into cyborgs both perpetuates the mythic triumphalism of progress and constitutes a refusal to acknowledge the limits of an individual body and an individual life" (35). This suit and its bodies seek to naturalize a gendered and racialized vision of human and technological evolution, proof that we have gotten 'somewhere' without close inspection of where that somewhere might be.

Alienated from this vision of progress is anyone who lacks the privilege of well-to-do white males. The racialized 'other' trails behind, benefiting from the pioneering successes of the white techno-body. This disturbing narrative resonates with the representation of race and nation in Speedo's video of the distribution of free LZR Racer suits to all Olympic swimmers (Speedo Beijing LZR Racer Distribution). The camera fixates on African and South American athletes who otherwise might not don such an expensive suit—athletes who will also finish behind the white bodies that make it to the medal stand. Many of these athletes lacked access to a whole host of training technologies made available to Speedo-sponsored athletes. Garbing all athletes in the same technologically advanced suit creates an image of technological equity that ignores the unequal access to resources.

Female swimmers find their bodies androgynized by the suit. Representations of female athletes tend to polarize their bodies as either provocatively sexual or overly masculine—both which threaten to diminish the accomplishments of talented athletes and serve as a tool to reassert male dominance (Schultz; Heywood & Dworkin). This response is constructed through reactions to both physique and attire (Schultz). In a sport where most suits for males and females differ significantly in cut due to conventions of modesty, dressing men and women in identical uniforms renders gender ambiguous. The compression qualities of the suit flatten women's chests and hips, causing any excess flesh to bulge from the sides of the suit. Traditional markers of womanhood are minimized, a trend reinforced when swimmers don caps hiding long hair or the iconic ponytail. In the attempt to dissolve gender, the suit creates female bodies that are defeminized and sexualized simultaneously. This complex gender representation both challenges and reinforces divisions between male and female embodiment similarly to the ways in which female bodybuilders rework gendered ideals by decorating highly muscled physiques with make-up, long hairstyles, and even breast implants (Balsamo 41-55; Heywood & Dworkin). In swimming, that which marks femininity—specifically full breasts and hips—becomes excessive in the suit, a materialization of sexuality repressed yet bursting at the seams. In both cases, the convergence of athletic performance and sexuality is marked by an excess of flesh whose meaning is ambiguous. Playboy

magazine editors exploited this ambiguity when they photographed models in various Speedo suits for their 2008 issues (Playboy Evolution). Under the new FINA rules, men's and women's suits will follow different cuts, with the female version covering the upper torso. This return to material differentiation acknowledges the social differentiation of male and female bodies, and the sexualization of female bodies. Though elements of gender ambiguity remain, uniform differentiation reinforces the distinct gender binary upon which modern sport depends.

The use of increasingly advanced technologies in sport depends on more than just projecting female and non-white bodies as 'other'; the technologies of naturalization perpetuated depend upon implied bodies incapable of normalization. These are the bodies of lack and excess, the bodies of disabled athletes, the bodies polluted by performance enhancing drugs. Contemporary examples abound; the prosecution of Marion Jones (Schmidt & Wilson), the controversy over Oscar Pistorius's participation in the Olympics (Robinson & Schwarz), and debates over Caster Semenya's gender (Dreger) are just three foils to the idealized cyborg athlete. These bodies use technologies as well, but in a manner that queers the human. For Judith Butler, the body is the key to anchoring the fantasy to a new reality. As she observes, "the body is that which can occupy the norm in myriad ways, exceed the norm, rework the norm, and expose realities to which we thought we were confined as open to transformation" (*Bodies that Matter* 217). The athlete stands at the edge of technology and performance. She steps into the liminal space of performance, the contradiction of a never-ending teleology of human progress. But this is an impossible space that can only be imagined—a mythic way of being that must remain unattainable. When dealing with the myth of progress and superior fitness of some bodies over others, the body is key to neutralizing the compelling power of the dream. Built into the dream is the desire for the forbidden and unattainable—the infinitely improving body. However, as any athlete who has attempted to push her limits knows, ultimately, the body will falter. If the idealized athletic body fails, then so does the cyborg of techno-bio evolutionary dreams. Though myths of natural athletic bodies actively deny the cyborg in the athlete, narratives of technological progress rely upon the cyborg human. Natural bodies are always already defined by and through technology, particularly in an age where technologies shape even the in vitro fetus (Haraway, *Modest Witness* 174-212). This cyborg body is not innocent, but it can seek to account for its own production. By attending to the material and discursive production of cyborgs, we might begin to follow Haraway's imperative to be more responsible for the bodies and worlds we create and find pleasure (rather than anxiety) in the confusion of borders ("Manifesto for Cyborgs" 150). It is crucial to pay close attention to specific cyborg configurations and to the work they do to naturalize some bodies while alienating others, a project requiring the attention not only of those bodies at the devalued margins or the less favoured end of the bell curve, but also those bodies at the centre of societal striving, occupying the far end of 'excellence' in the mythic bell curve of human progress.

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