



The Good, The Bad, and The Biometric

Fitness-Tracking Technology Used By Athletes

William Trout
Faculty Mentor: Robin Barrow-Nichols
Department of English
University of Tennessee, Knoxville



Abstract

This is a classroom project for English 298. Sports technology constantly develops to allow more competitive performance from athletes. Newer, more efficient materials have been an important theme in athletic technology for a long time, but new innovations in biometric technology stand to be the “next big thing” in sports. Biometric fitness-trackers keep a digital log of metrics like heart rate and GPS location, then use that data along with robust algorithms to measure a user’s physical condition. Athletes from many disciplines are finding uses for biometric fitness-trackers: from NBA players to Tour de France contestants. For this project, three veteran cyclists were interviewed who shared information about the critical role fitness trackers play in biking. The goals of this project are to highlight important sports technologies and whether or not they live up to their potential, and to analyze indirect benefits to athletics that biometrics provide, including increased security, a reduction in unsportsmanlike conduct, and better protection for athletes’ health.

User view of the TDF Pro while cycling (Pro-Form, n.d.). Stationary bicycles like this are used by Tour de France cyclists to prepare for the race, according to Steve Bacon.



Methods

Secondary Research:

Scholarly articles and primary sources led to the development of questions that allowed for more extensive research and discussion opportunities for interviews. Also, since primary research was focused on cyclists, secondary research allowed for a broader approach to the subject of biometrics in athletics.

Primary Research:

Three experienced male cyclists living in Knoxville were asked several questions about their experience with cycling biometrics:

- Gary Chambers, a mountain biker who works at Bike Zoo, a Knoxville bike store.
- Steve Bacon, the owner of Bike Zoo who actively cycles and has an extensive knowledge of cycling technology due to his management experience in the industry.
- Dave Thomas, an extremely serious cyclist and expert on cycling biometrics/technology.

Bibliography

- Cummins, P. (2016, December 20). TBI and NFL Culture: Can Players Autonomously Refuse Biometric Monitoring? *American Journal of Bioethics*, 17(1), pp.75–77. doi:10.1080/15265161.2016.1251645.
- Gold, S. (2012, March). Biometrics fit to secure the London Olympics. *Biometric Technology Today*, 2012(3), pp.5-8. doi: 10.1016/S0969-4765(12)70072-3.
- Menaspà, P., & Abbiss, Chris R. (2017, November 9). Considerations on the Assessment and Use of Cycling Performance Metrics and their Integration in the Athlete's Biological Passport. *Frontiers in Physiology*. doi: 10.3389/fphys.2017.00912.
- Pro-Form: TDF Pro*. (n.d.). Retrieved from https://www.proform.com/exercise-bikes/tdfpro?gclid=EAIaIQobChMlrZWx3POj4QIVhuDICH0SmgrOEAQYAIABEglthFd_BwE.
- Profile: Science behind Lance Armstrong's training. (2005, July 12). Morning Edition. Retrieved from: http://link.galegroup.com/apps/doc/A160134991/GPS?u+tel_a_utl&sid=GPS&xid=1e58608d.
- Prototype Experts Help Whoop Take Major Step Forward. (2017, December). Assembly, 60(13), 18+. Retrieved from: http://link.galegroup.com.proxy.lib.utk.edu:90/apps/doc/A543991371/ITOF?u=tel_a_utl&sid=ITOF&xid=c3f56a31.

Findings

Biometrics make athletes more fit

- Whoop, a personal fitness-tracker development company, develops its products with highly active athletes in mind; these devices recharge without being taken off, and they “[measure] an athlete's heart rate, heart-rate variability, ambient temperature, motion, movement and skin response” (Prototype, 2017, p.18).
- Interviewees agreed on the most important data their biometric devices report:
 - VO2 max - volumetric oxygen flow processed by the athlete’s lungs.
 - Power output - amount of work performed on the pedals over time.
 - Lactic acid levels - a measurement of fatigue.

Biometrics help athletes with form

- Staff members at Bike Zoo watch a cyclist pedal on a stationary unit using special cameras. This allows employees to change pedal lengths, adjust the seat, and personalize bikes to prevent long-term damage to customers’ joints.
- In a lab and carefully monitored by scientists, world-famous cyclist Lance “Armstrong would [wear] a heart monitor and [use] a mouthpiece to measure the oxygen going in.” This helped him sharpen his skills at a safe and effective rate (Profile, 2005).

Biometrics protect athletes

- In the 2012 Olympics, biometric analyzers were implemented which allowed for a higher level of security at the events; only athletes, assistants, and other authorized staff could access areas locked down with biometric security (Gold, 2012, p.5).
- Biometrics can scan brain waves and keep athletes from competing when they may intentionally or unintentionally participate with concussions (Cummins, 2016, p.76).

Biometrics promote athletic integrity

- Steve Bacon: “cyclists could have a good or bad day where their perceived effort is really very different from their actual energy expenditure.”
 - Using fitness-trackers makes workouts more exact and records actual exertion.
- Biometrics offer a potential solution to doping (drug use) in sports:
 - “It is extremely important to know if the performances were truly maximal” because biometric data from a cyclist competing in a shorter sprint race would not match his or her performance in a longer race where the cyclist is saving energy by not sprinting (Menaspà and Abbiss, 2017).

Conclusion

Biometrics are essential tools in modern athletics. They help athletes become more physically fit and improve their form, they protect athletes’ health and safety, and they promote athletic integrity. Biometrics are the next big step in athletic technology development; Bike Zoo employee Gary Chambers indicated that biometric data collection has become a priority over materials science in cycling equipment. According to Chambers and store owner Steve Bacon, biometrics have become a bigger focus in the cycling industry than materials used in bike construction. They believe that this is because biometrics offer a more cost-effective benefit to cyclists than a more expensive, lighter frame. Focusing research and resources on developing new biometrics will likely lead to better performance by athletes.