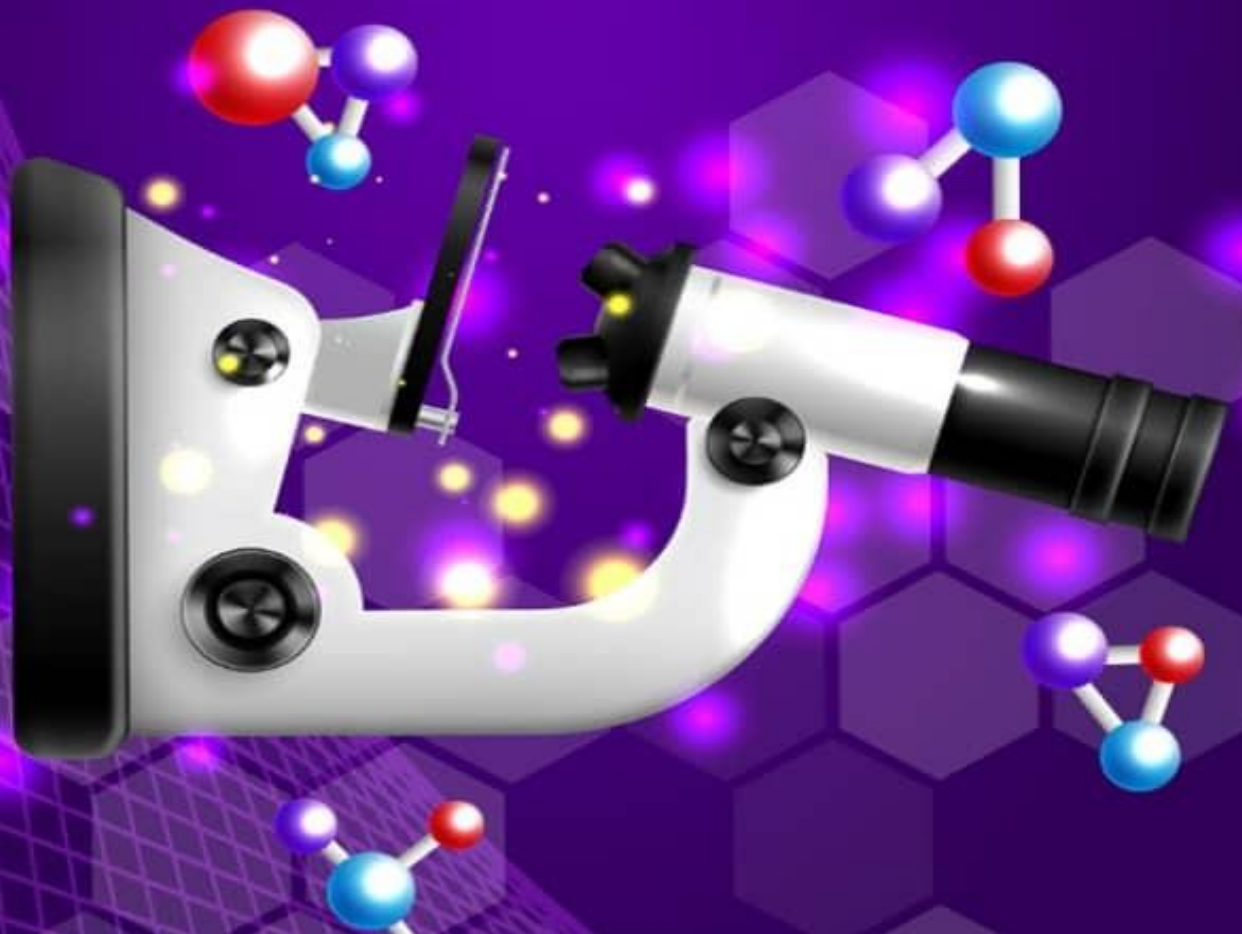# FOS

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PSYCHO-PHILOSOPHICAL CRITIQUE OF TECHNOLOGY USE IN SPORTS FOR BETTER SPORTS PERFORMANCE, PARTICIPATION AND COMPETITION

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Abstract

The need to draw a critique on technology use in sports through psycho-philosophical lens provoked this work. The marriage between sports and technology came to the fore with the crave of the great industrial revolution for a shift of societies from agrarian economy to manufacturing economy where producing products were no longer left with the hand alone but also the machine. Till date, it has come to stay and no time soon can anybody predict otherwise as it is increasingly difficult if not practically impossible to imagine sport and sport science without technology. From athletes to coaches, athletic officials, spectators and other significant actors in the sports ecosystem, technology has proven the capacity to genuinely revoluntionalize sports. Today, by leveraging on technology, athletes better themselves in more than one way; coach's job has been made easier, safer and broader; athletic officials become more accurate in their decisions during some difficult moments in competitions; and spectator fast becoming active, rather than passive viewers in sporting events. However, a circumferential view through psycho-philosophical lens has started prompting the quest for deeper insights into the modern technology paradigm among sport science and educational team who now ask and reflect on some tough questions of the current applications of technology in sport. Answers to queries as to how the present technology use would detract from the inherent values of sports through displacing human agency by way of allowing practitioners no opportunity for sense of agency, overall experiential knowledge, self-efficacy, and control, would better situate awareness on the contrivances of current technological applications in sports. This is what the present work has attempted.
Keywords: Sport technology, technological devices, human agency, experiential knowledge, psychological well-being, affordances, self-efficacy, and fairness in competition.

Introduction

All through the history of sports has remained the hard truth that technology is no stranger since there is hardly any sporting event through the millennia that does not involve handling implements. Granted that these implements were clumsy and unsophisticated in the remote past, the great industrial revolutions transformed sports through the development of technology. Sports technology is understood as any tangible, conceptual, or procedural element of modern sport and exercise aimed at progress (Miah in Omoregle, 2016). Over the years, the sports world has been taking notice of the subtle and steady changes and advancements in sports. From photo finish to radio broadcast, electrical scoring systems, television broadcast, instant replay systems, virtual reality, automated timing systems, referee microphones, virtual first down line systems and live stream technology, Anderson (2018), in what looks like a chronological evolutionary trend, presented a chronicle of the evolution of technology in sports where according to him, in 1881, photo finish became the first sport technology in sport used in horse racing, and in 1920, the first widespread radio

broadcast came on board airing a baseball event. Sixteen years later, in 1936, came the first electrical scoring system used in a fencing event followed by sport television broadcasting of baseball in 1939, and instant replay system being first used in the sport hockey in 1955. Back then in 1957, a not-too-good-looking virtual reality was first invented followed by fully automated timing system that could track time down to the hundredth of a second and first used in the 1968 Mexico Olympics. Then in 1975, referee microphone, used just to explain to the fans what the call is and what happened in the field, was first used in the American National Football League (NFL). Barely thirteen years after, in 1988, the virtual first down line technology, merely used in the NFL, was utilized to mark where the first down is on television, and in the year 1995, Microsoft invented the first live stream technology used in live streaming all sports. A circumferential look at these earlier forms of technology reveals them as mere instruments purposed for sustaining sports as they were originally and inherently defined. Put differently, they were assistive only to the point of telling in-venue spectators as well as an imaginable number of outside viewers the stage by stage play proceedings. The interplay between technologies and the users could then best be understood as a stimulus-response interaction with a quantum of their managerial control majorly under the users.

In recent developments, technology has come the revolutionary way, changing the entire landscape of sport and exercise science. The fact that the history of sports parallels the hunger for modern athletes to overcome whatever drives a wedge between their physical and mental limitations on one part, and peak performance on the other part, has sets a stage for sport technology manufacturers and designers to consume themselves over whose products and brands top others for the awaiting athletes. This echoes Chao's (2016) statement that as of today, it is not just enough for an athlete to simply possess superior strength or talent but to rise above competition by training intelligently, using the most innovative techniques to out fox opponents. This has informed the steady and sometimes, impulsive designs and upgrading of sporting equipment, clothing and wearables, facilities, competition adjustments, media communication and as well, performance analytics. In its most advanced format; technology as we know it today has impacted the athletes, coaches, sport officials as well as spectators in most scarcely credible manners.

Using some of these recent technological device paradigm beyond the normal sports tradition is a cause for worry as what is certainly not known today is where its modern use may likely disengage with everybody in the sport ecosystem or the degree to which it would guarantee fair play, ethical practices, and athletes' psychological health in its cut-edge bid for superhuman sport performance. The worry is gradually opening up a new way of thinking about its application in sports as people are now beginning to raise and reflect on some tough questions as to its possibility or otherwise of subtly disengaging educators, sport scientists and even athletes away from performance environment. However, in the most unlikely event that technology does not achieve that, the protection and preservation of human agency of those who communicate knowledge in or about sports becomes sacrosanct if technological devices, presumed to support aspects of practice, are continually integrated into the sporting landscape (Woods, Araujo, Davids & Rudd, 2021). On this basis, this paper became developed under the following subheadings: technologies in sport, theories of technology and psycho-philosophical assumptions, and sport technology use vis-a-vis psycho-philosophical theories and assumptions.

Technologies in Sport

The sports landscape has changed over the years with advances in technology as the driving force and which may most likely continue to be so into the unforeseeable future. At a larger scale, the technologies in sport can conveniently fall into a loose typology presented as self-technology, landscape technology, implement technology, movement technology, rehabilitative technology, database technology, and assistive technology. This typology is not however mutually exclusive since in some cases, some technologies can fit into multiple categories.

Self-technology: There is today, a huge influx of self- technologies. In sports, self- technology describes all available medications, surgical procedures, bionic or prosthetic limbs, sports psychology interventions and gene doping (i.e. ingesting genetically engineered muscle-building vaccine capable of increasing an athlete's overall muscle mass by way of mapping all the genes in the human athlete). A recent sport self- technology is the neuroscience for brain preparation like the Halo-Tech and the Brain-Computer Interface (BCI). The Halo-Tech that emerged in 2017 is a neuroscience designed to prepare the brain of the athlete to training and work together and achieve complete focus. Going further, Hefferman stated that the 2019 version of it was seen to cause significant better athletic performance by putting it on one's head just 20mins before physical activity. On the other hand, the Brain-Computer Interfaces involves transmission of brain activities into neural signals that are fed into a decoding algorithm which then translates the signals into measurable outputs (Millan, 2019). In this case, the transcranial direct current stimulation (tDCS) considered non-inversive is used to apply sufficiently low-amplitude current (10-20mins) via scalp electrodes to modify neuronal transmembrane polarization and achieve critical excitability changes in humans (Nitshe and Paulus, 2000). The direction of the current is crucial for the modulatory effects of the tDCS; for example, while anodal stimulation produces excitability effect, cathodal stimulation has the opposite, inhibitory effect. In healthy subjects, anodal tDCS over the motor context has proved effective in motor learning (Reis, Schambra, Cohen, Buch, Fritsch and Zarahn, 2019).

Implement Technology: A range of sport equipment and facilities that were previously analogous have gradually given way for the modern digital ones. From modern helmets, pads, gloves, shoes, suits and apparels to treadmills and dumbbells, technology has proven the capacity to revolutionalize sports. Sensors are often the driving force behind sport equipment and athletic gears. Depending on their various functionalities, we now witness an era where sensors fitted into sporting equipment transform the equipment into a more comfortable and high performance tool. Attestation to this is the influx of high performance track shoes that are equally light with superior grip; apparels with the capacity to measure body and performance parameters; clothing that can checkmate perspiration; special suits with the capacity to not only mobilize muscle groups but help with weight loss, muscle tone and rehabilitation; treadmills like Peloton treadmills and bikes that can generate reliable performance data for monitoring and correcting workout routines plus allowing an individual play safe.

With many years of accumulated accurate data management, sport equipment manufacturers have been able to design helmets, glasses, and other gears that provide athletes better comfort without compromising their performance standard. Solo glasses have since been in use in monitoring performance, navigating routes, and carrying out advanced analytics among professional cyclists, car racers, hikers and runners. Smart digital technology has also "transformed some large scale sport

facilities such as stadiums, racing trucks, skating rinks into smarter and more sustainable spaces that provide athletes and audience with excellent conditions for sport events" (Digiteum, 2023).

Landscape Technology: From the modern multiple sport complexes, Jumbo Tron retractable drones, soaring cameras to Mondo tracks and artificial grass existing today as products of technology, the sport landscape cannot be anything less comforting for players, coaches and spectators. With Tron retractable drones, any field or track athlete can begin to monitor their opponents based on the captures the drones make of their competitors' performance styles and maneuvers. High-stadiums are also in place and much interesting in often attempt to replicate the atmosphere of other traditional style stadiums (Omoregle, 2016). Of greater interest, the sports world is today taking notice of how technology is subtly shifting sport landscape from overt training and performance environments to even covert ones in form of visual reality (VR) and motor imagery (MI). Visual reality is a modern high-tech computer system that stimulates human feeling through programming enabled by its integration of other technologies like stimulation technology, multimedia technology, sensory technology, artificial intelligent, computer graphics, and parallel processing parameters. By stimulating all the primary sense organs as well as other sensory organs, an athlete is made to engage in sporting events in a sporting environment that is visual only on computer screen. Much like the VR is the motor imagery which Guilot and Collet in Jeanet, Hauw and Mulan (2020) conceptualized as the mental training procedure that relies heavily on mental representation of an action without any concomitant body movement. Though it has limited propensity for immediate feedback on how it influences athlete's sensorimotor rhythm (SMR), its use continues to gain popularity among sport scientists who are motivated by the use of the brain-computer interfaces technology paradigm that provides the needed concrete and quantifiable neurofeedback.

Rehabilitative Technology: Modern sport technology has also taken on a supportive position for athletes and persons who have less access to training centers due to various conditions by making remote coaching possible. Telefitness technology is one of such which according to Digiteum (2023) ranges from the popular video conferencing tools and mobile Apps to smart mirrors. Too often, the elder persons, athletes who are recovering from injuries, as well as those who have accessibility issues to fitness gyms like illness or restricted movement due to COVID-19, find this technology most useful.

Movement Technology: Determining the exact body positioning, ball flight, ball-line crosses and placement in major athletic meets had been a difficult moment for sport officials but today, thanks to modern movement technologies that have succeeded in resolving such situations where fallible humans may not. Such technologies come in handy as the Video Assistant Referee (VAR), Automated Ball-strike System (ABS), RFID chips, Hawkeye technology, Global Positioning System (GPS), and replay technology. With VAR, a team of referees located in the control room analyze and correct every missed calls, or non-calls in the game, along with goals, penalty calls, and cases of mistaken identity" (Omoregle, 2016).

The feedback from VAR provides referees with such more accurate information than their subjective human judgment that is vulnerable to debates and unfair play with potentials for violence. Umpires in baseball continue to struggle against possible replacement by the "robot" umpire or the Automated Ball-striking System (ABS) which is a sport high-tech that can "measure the exact points that a ball passes over home plate, providing an accurate ball or strike call without the influence of how the catcher frames the pitch or how a particular umpire views the strike zone" (Jobs-in-

sports.com, 2022). Today, the sport world has also been introduced to RFID Chips which are miniature devices with in-built antennas that relay wireless signals to tracking stations where both broadcasters and viewers can track the exact locations of contestants of interest during racing events. In this manner, the technology becomes a useful tool for fans and judges who are ready to evaluate performance and success in the most accurate manner. Then enters the Hawkeye technology. In 2019, Hawkeye technology, an electronic computer system began to be used to track moving ball and displays on the screen, its path and bounce as a moving 3D image which will allow everyone to see what happened on the court and correct wrong calls (Heffernam, 2021). In cricket, apart from using this technology in analyzing sound to determine if the ball was smashed into the bat before it was caught, it also has the predictive capacity of determining the probable placement of the ball if it has not hit a player's foot. Similarly, using laser beams, tennis sensor tools can now determine whether tennis ball went out of bounds or not. Movement technology is also gaining popularity in gymnastics. As observed by SMD.com (2012), "The 2019 World Artistic Gymnastic Championships unveiled the first artificial intelligent system (AIS) designed to judge form, speed, and technical accuracy in gymnastics". In this event, the AIS, by using 3D lasers, was able to determine the angles of the athletes' positions, frame-by-frame as they twisted and tumbled. The Global positioning system (GPs) has also been impactful for hikers and others involved in various physical activities because by using satellite and ground stations, GPs can calculate all geographical locations as well as tracking specific activity. With a portable GPs unit, hikers can readily be provided with vital data relating to distance, time, average velocity, attitude, uphill and downhill paths. Used in conjunction with accelerometers, GPs can assess and monitor physical activity (Troped, Oliveira, Mathews, Cromcey, Melly and Craig in Omoregle, 2022). For every game played today, replay technology provides streams of flashback for clarity and better judgment. This is because as Jobs in Sports (2022) stated, after a difficult play, officials will often utilize this technology and slow down the replay, which allows them to evaluate what happened during a play more closely.

Database and Timing Technology: A major leap in sport technology is the database technology that assists in record keeping, tuning performance strategies and determining performance time to the least fraction of a second. Determining accurate performance time in races, swimming, biking and other explosive events where large fractions of a second can separate winners from losers is no longer a duty for stopwatches but for the new electric automated timing system. While in swimming, a touch pad placed at the finish lanes provides precise performance time, laser beams and photographs are used in determining winners in racing events. In some cases, start pistols are linked to a clock which instantly starts timing a race simultaneously with the pistol shot, leaving no time gap between the shot and the start. Other athletic tracking systems have been able to provide data that coaches and athletes rely on in making informed training decisions. Football clubs like Manchester United, arsenal, Liverpool now invest more in STAT Sport which is an athletic training platform that generates data that determine opportunities and lapses necessary for upgrading and adjusting their training for better performance. Modern day database technology uses sensors of different functionalities to track everything down from athlete's health and biometrics to real-time performance results on the score boards. While such health data generating technology like Heart rate monitors track pulse and breathing patterns, and sleep trackers that have sleep pattern monitoring capacity, there are others that track athletic performance. These are the likes of inertial sensors that precisely perform human motion analysis, the accelerometers and gyroscopes that monitor a range of sport performance parameters like rotation,

acceleration and speed, and the pressure sensors that determine not just the accuracy but the frequency of how strikes or footballs are landing.

Data related to physical training is as important as that for training and improving mental cognition. A spectacular technology that has been developed for training cognition is reflection technology, for instance, the Edge technology. This is a mobile device which when mounted to a wall becomes a digital tool that athletes can use to train their cognition by its capacity touch screen providing meaningful performance data about reaction time and as well, identify strengths, weakness and other adaptive sport training information necessary for improvement. Apart from bridging the gap between the physical and mental aspects of sport, Jobsinsports.com, (2022) affirmed that Edge technology is also "a critical recovery that may be able to help athletes rehabilitate from concussions and head injuries".

Assistive Technology: Differently challenged fans and athletes have had periods of difficulty in assessing sport venues as well as inclusion in participation. New technologies have succeeded where the analogous ones could not offer them such opportunities. From modern audio playback, mechanical prosthetics, e-ticketing, in-seat services to infrared beams and ultrasonic technologies, the differently disabled fans and athletes who struggled with inaccessible aspects of games and venues are now on almost equal platforms with the non-disabled in sport participation and spectatorism. Whereas audio playback affords blind fans the motivation to attend professional sport events, the Descriptive audio, a new technology that combines live ball position data with spatial sound effects, gives fans a wholly immersive experience (SMD.com, 2012). There are also the mechanical prosthetics that level off amputee athletes' condition to help them engage in the same movements needed to compete. Some later advancements even have prosthetics with microprocessors that not only yield data for different performance parameters, but can be adjusted to user's stride. In swimming, assistive technologies like infrared beams and ultrasonic devices have made the day for the visually impaired athletes. Unlike in the past when they had to rely on tappers that signaled the time to turn, infrared beams and ultrasonic technologies are the digital devices used today to transmit such signal to their goggles in the most convenient and efficient way.

Theories of Technology and Psycho-philosophical Assumptions

Philosophers and psychologists, nonetheless, sport and exercise ones, almost always guide their thoughts and base their decisions in line with plausible theories and common sense assumptions ever present in their professional practices. Perhaps, the instrumentalist, the deterministist, the substantivist, and the critical theories of technology could inform how differently technology is viewed. For the instrumentalist theorists, technology is a neutral object and its neutrality is such that it stands ready to serve whichever purpose the user deems necessary; in other words, it is "a tool, largely under human control, that can be used for either positive or negative purpose" (Omoregle, 2016). For the determinist theorists, technology is a force which on its own does not evolve gradually under human control but through a series of revolutionary leap, allowing no opportunity for human control. However, taken on moral ground, the determinist theory presents determinists who are having either radically utopian opinion on technology (i.e. that technology is a positive force that drives society towards an ever utopian existence) or radically dystopian opinion (i.e. that technology is an inherent evil, a de-humanizing force that drives society and mankind towards wholistic destruction). The basic tenet of

substantivist theory is that technology is an autonomous force which once unleashed, restructures the natural social order to entirely new pattern that can hardly be reversed. A modified table tennis bat as a new technology, for instance, produces a higher level of performance efficiency but abandons the finesse in the game as previously known. In this regard, technology would then determine what sport to play and how it should be played. For the critical theorists, technology is an object with uncertainties as being suspended between different possibilities that ought to be put to a more open debate as to its legality, prospective users, and the long-term effects.

No known generation of scholars (e.g. sport philosophers and psychologists) had objected to the use of technology to improve sport performance. That technology plays a critical leading role in bringing about improved sport performance even informed some psychological procedures, interventions, and technological applications being left to the best effort of sport psychologists just as sport philosophers envision gaining insight and understanding of the basic principles, assumptions, values, ideas and skills that can put athletes at high performance levels. They therefore adopt the utopian determinists opinion on technology with the bottom-line assumption that a technology is commendable only to the degree it promotes performance while upholding the virtues and values of sport. And one among the many values of sport is fairness in competition. Further to this is the view that it ought to promote, rather than demote the health of sport persons and provides them the capacity to cease every unpredicted opportunities like affordances characterizing most sports and games.

A sense of fairness is created when in line with the critical theory, an athlete uses a technology in a manner that is overtly and covertly considered permissible by the extent laws of the sport organization on standards of usage, especially a technology not offering any undue advantage to any competitor. Technology allowing for affordances is understandable. Affordance is understood as the possibility of an unexpected opportunity for action in sporting environment that is ecologically dynamic. For example, a dribbler in an invasion game who though aiming to launch a shot but suddenly notices a teammate in an open space, may decide between taking the shot himself or pass to the teammate depending on his current mood, the distance to the goalpost, and the number of close defenders. A good technology, in this sense, is then the one that takes an athlete along in dynamic, rather than a stereotypic line of training or performance.

Of equal importance is the assumption that a good sport technology is also one that not only promotes health, but provides for security and safety of its users. To promote health, it should support both the optimal physiological functioning as well as the psychological well-being of the users. The psychological well-being is seen to be promoted when a technological device is such that it does not de-humanize or de-contextualize sport practitioners in the performance environment which happens only when it enables them have sense of human agency, and feelings of self-efficacy. While human agency is "an individual's **capacity** to determine and make meaning from their environment through purposive consciousness and reflective and creative actions (Houston, 2010), sense of human agency is the **experience** of being the initiator of one's own voluntary actions and through them, influencing the external world (Beck, DiCosta and Haggard, 2017). According to Bandura (2015), a theory of human agency raises the issue of freedom and determinism because absence of sense of agency connotes a sort of either limited freedom to or a total detachment of an individual from the environment. Sense of agency in technological application therefore becomes such an important channel for expressing humanness because not only that individuals are etymologically different with unique power to shape their life circumstances but that it keeps individuals on the know that their own body, by moving under

intentional control, achieved a goal state such as happens when one drives a car and cognitively **perceives** the car turning after moving the steering to the point that one can confidently say "**I control the car**". By this, the individual feels that they are contributors in the courses their life take, and not just products of them.

A comparable assumption is that technologies used in sports should guarantee users' feelings of self-efficacy. Self-efficacy as an index of psychological well-being is understood simply as one's intrinsic and extrinsic belief in one's ability to perform a task success fully. An athlete with substantial level of self-efficacy would act and persist on a task only if they believe that they can produce desired effects by their own action while its absence would cast shadow on their decisional process as to whether executing an action would be ascribed to their own ability or to that of a technological device.

Having sense of agency and feelings of self-efficacy and of being in control come to a head only when a technological device avails the users the opportunity of experiential knowledge of its operation. This is the type of knowledge which according to Woods et al (2021), the eminent philosopher, John Dewey had called for when arguing for primary, firsthand experience in all the life phenomena. In sports, having such experiential knowledge of a technological device would situate an athlete where he directly perceives and discovers what a technological device actually means by way of its functional mechanism. The Gibsonian differentiation of knowledge **of** and knowledge **about** the world in ecological psychology clearly amplifies this view. According to Gibson in Woods et al. (2021), while to have knowledge about the environment is to indirectly perceive it, gaining a type of abstract knowledge that is shared through a variety of differently represented formats like pictures and symbols, having knowledge of the environment is to directly engage with and understand a performance environment where he is defined by such an environment in terms of perception – action in an environment that is developed by actively exploring and interacting within one's niche. For a technology to lend itself for such experiential knowledge, it must neither be objectified nor be commodified. Commodities according to Borgmann in Woods et al. (2021) can be understood as "highly reduced entities that only offer abstractions about the environment given that they are free of local and historic ties. A technological device so commoditized is what Norman in Woods et al. referred to as an internally represented technology as it is designed in a manner that does not enable users the capacity to discern how it functions. On the contrary, a more sustainable view is that technologies used in sports should rather be surface represented for athletes who want to be better as such enables the users to identify how they work by directly observing their physical properties in a way that they focus the users on the engagement between the devices, their functions and the environment. In this way, the users would neither feel disengaged from the performance environment, nor their sense of agency, feelings of self-efficacy and of being in control being compromised.

Sport Technology Use vis-a-vis Pycho-philosophical Theories and Assumptions

A position taken through a decisional process as to whether technology use in sports is innocuous or disruptive becomes sustainable if it is congruous with some psycho-philosophical theories and assumptions; and the present effort at that is sacrosanct as according to Woods et al. (2021), a critique of some contemporary technological devices are yet to be considered in detail by applied sport scientists and physical educators. Unambiguously, one impertinent position is that all forms of sport technology used within the ambit of sport organizations extant laws and regulations are justified since over time, they have been seen to have pushed the boundaries of sports performance up

to where it would not have been possible without them. It is one among other innovations that have improved the safety and performance of all stakeholders in the sports ecosystem: athletes, coaches, officials and fans. Athletes are, for instance, better equipped with high performance wearable technologies that also have high promises of safety and analytics for proper adjustment of strengths and weaknesses. The coach's job is equally made easier, safer, and broader as they can now use some technological devices to measure and track athletic progress in real-time, thereby obliging everyone the opportunity to see not only how but how well athletes are performing at every point in a workout and or competition (Ross, 2021). In more than one way, it has helped sports officials shape the way they manage performance. With sensor technology, every spectator can track individual athletes and easily match their current and past performance based on information emitting from analytic data. Nothing can be far from this position!

However, a look at the current or contemporary technological application in sports through the psycho-philosophical lens and a sort of abstruse line of enquiry, has started prompting the quest for deeper insights into the device paradigm among sport science and educational team who now ask and reflect on tough questions of the current practice: To what extent has technological application promoted fairness in competitions? Is the practice supporting the psychological well-being of the practitioners? Are the devices structured in a manner that permits experiential knowledge of the users? Beyond the benefits of technology in sports, exists a compelling evidence of how some modern technological applications undermine or challenge the spirit of fair play and fairness in sport competitions. Granted that while equipment such as prostheses or wheelchairs are fundamental for some people with a disability to carry out their daily living, advances in technology such as energy storing prosthetic foot gives an amputee athlete an undue advantage by making their gait faster and more efficient than others without similar limb (Czemiecki, 2022). History seems to have been made in 2012 when according to Staff (2021), Oscar Pistorius became the first double-leg amputee to compete at the London Olympics even though he was preciously in 2008 considered ineligible for the event by International Amateur Athlete Association (IAAA) that discovered that prosthetic limbs gave him an advantage over other athletes not using them. Again, Markus Rehm is a single amputee German paralympic long jumper champion whose 8.62m distance in 2021 was achieved by using a type of prosthetic blade that gave him an illegal competitive advantage (Staff, 2021). This was a situation that Helmut Digel, a former IAAF chairman was quoted at a saying that "it is in nobody's interest if we come to a situation where able-bodied athletes and disabled athletes using technical aids are considered equal in competition". Such is a type of technological doping that has spread across sporting landscapes and considered a necessary evil given the many other reported athletes caught while concealing such practice.

In a stack contradiction to the view that technology should promote psychological well-being of sport persons, evidence is fast emerging on the tolls some modern technological devices are taking on athlete psychological health. Mann (2023) for example, has since taken a sort of documentary notice of how unmonitored speech on social media platforms, in particular, cyber bulling, resulted in toxic comments that have registered psychological trauma on athletes targeted at in sporting activities like gymnastics, swimming, footballing and tennis; for example, Gymnast, Gabby Douglass for not putting her hands on her chest during the national anthem at the 2016 Rio Olympics; Swimmer, Dyan, for fabricating a story about being robbed; National Football League (NFL) All Star Lexeon Bull, for allegedly pursuing a rap career over his sports career and other cases where fan who place individual or

team performance statistics on bet to achieve personal accolades have expressed their toxicity and unleashed their anger, frustration and even threats on a player and or his family when their player or team do not perform well. The criticism and threat could be so harrowing and frightening that the effect may go beyond causing significant psychological health problems to making the athlete call it a quit like "the women's tennis All Star, Naomi Osaka who pulled out of the French Open tournament in 2021, citing social media and pressure from media interview as her main driving point for mental health issues" (Staff, 2021).

Experiential knowledge of a technological device operation is one among the assumptions that could impact one's psychological well-being, in particular, self-efficacy and feeling of being in control as it enables sense of agency that defines the user as a human being with the capacity to be initiator and contributor in the course his life takes, not just product of it. The sense of agency has however been challenged because with the peoples hunger to overcome their physical and mental limitations as to what the human body is and what it can do (Migle, 2020), the practice has paradigmatically shifted from using technology to improve (supplement) skills, to using technology to substitute human skills through technological implantation or augmentation. Such contemporary applications involving artificial intelligent, robotics, biotechnology and nanotechnology is what Migle described as disruptive technology as they substantially modify the usual way of operating. Also, according to Lopez Frias (2018) such a shift has prompted bioconservatives as well as other pro-human conservatives to argue that such would clash with the idea of normalcy of human athletes by altering their individual experiences and feelings. This resonates with Ahmad's (2023) argument that rapid progression in application of technology in such disruptive manner is one significant downside of technology that ought not to be ignored, just as Omoregle (2016) earlier affirmed that the contemporary technology use in sports is tainted with frustration and ambivalence because it has in many ways changed what is thought of as athletic body. The augmented technology therefore raises challenge for sense of agency as it makes it increasingly difficult for an athlete to determine the dividing line between his own sense of agency and that of a technological gadget in a sport performance scenario where the action executed by his own body is a product of shared agency between them and the augmented device. This is so as the implanted device communicates directly to the athlete's sense rather than trough symbolic, stimulus-response representation (Cross and Ramsey, 2020).

At other times, a technological device may not be augmented or physically implanted on athlete's body but still produces the same effect as has been demonstrated in auto play features (Lukoff, 2017). Notice has also been taken where the device assists or works on human behalf even when the human is not attending them, such as the AI systems in autonomous driving which always prompt the user to make an action, in which case, there is a joint action and agency (Farooq and Grudijn, 2016). In this form, the human sense of agency becomes blurry or totally lost as the user is at a loss as to how his own agency comes to bear in the performance output of the drive. The worse is even awaited as contemporary practice involves robots in a manner suggesting that robots are subtly and dangerously sliding towards the substantivist theory where they may restructure sport participation into entirely irreversible new pattern. Robocup, an international research initiative, has for instance, successfully produced not only soccer-playing robots that participate in competition, but also rescue robots, home application robots, and unmanned aerial operation vehicles. According to Mahroum (2020), the General Chair of the Robocup was in 2016 quoted at saying that the ultimate goal of Robocup is even to develop humanoid soccer-playing robots that can beat the FIFA World

Championship team. Whether Robocup will live up to this optimism, is a matter that all stand and await. But in the unlikely event that it happens, then humans would be reduced to mere spectators in sporting events involving only robots!

An athlete's diminished sense of agency through the contemporary technological applications is the same fate that befalls their feelings of self-efficacy where the device is used in a manner that suggests overreliance on the device as can be observed in a hiker whose motivation for the hiking trails, rather than being built on his perceived self-efficacy, is coming from the coordinates sent to their wrist watches from a GPS, indicating the ultimate route mapped out in advance. This implies that with the current practice, we have now come to be in a world where self-efficacy, an index of psychological well-being (e.g., **I can navigate the route myself**) has been sacrificed to a GPS efficacy (e.g., **I can follow the GPS guide as presented**) which does not only dis-skill but also de-humanize humans.

All these flaws are attributable to technological design errors. Contrary to the philosophical view that sport technological devices be surface represented, they continue appearing as internally represented with the accompanying intent of producing superhuman athletes. This is what Reeds in Woods et al. (2021) referred to as machining of the mind where unfortunately, the information available from the machines and the actions the receivers are allowed to take on the basis of that information, comes increasing from computers and programs, not through the receivers' own understanding of situations. A technology so commodified simply ends at dishing out the type of knowledge that Gibson in Woods et al. referred to the knowledge **about** and not knowledge **of** the environment. A similar scenario appears where one by processing a copious volume of data extracted from motion tracking devices is only simply prompted to be engaged through "looking glass" with questions like "What does the data tell? (Ingolo, 2016) or mutterings like "they are not working hard enough" only after looking at indirect indices in the shape of performance statistics in absence of context which is everything from an ecological perspective (Juarrero, 2016).

Simply put, some modern technologies replace and intervene in a person's direct human-action interaction with the environment; a situation a phenomenologist Malpa alluded to by stating that under the reign of such technological modernity, a person's relatedness to place is though not obliterated, but is covered over, ignored, and invisible (Woods et al., 2021). In some situations where total technological failure even happens, the consequential catastrophe may better be imagined than felt. In sum, the use of technology in a reliant, compliant, and conformist manner forms the base for the argument that such modern trend do risk separating sport performance community from context, plus dampering the experiential knowledge of the coaches who may most likely be psyched down and surrender to the control of a technological device in shaping their perceptions about some putative state of performance.

Conclusion

There is both anecdotal and uncontestable evidence that supports sport technology as an innocuous thing that has ever happened in the world of sport because it obviously impact sports in much positive ways as can be seen in improved sport performance standard and, athletes, coaches, officials and fans getting better in their various sport capacities and callings. However, there also exists comparable evidence that implicate its contemporary application as a disruptive snag that also compromise peoples psychological health, fairness in competitions, and as well, de-skill and de-contextualize athletes and coaches in performance environment. Instructively, sport technology in

itself should not be understood as a bad thing; it is its use or application modality that raises concerns and criticism. Therefore, the present critique ought not be seen as being anti- technology but a pro-human one that raises awareness on how its contemporary use could be disruptive by compromising a whole lot of things about a sport practitioner. After all, no matter how hard sport technology manufacturers try to produce human prototypes like the soccer-playing robots, it is most unlikely that such technology could replace humans in sports as even the latest soccer playing robots with all the codings still lack fluidity in kicking the ball and cannot automatically access field positioning and affordances ever present in a game they were not programmed for in advance. Aside that, is also the possibility of technological failures where games and matches become disrupted, leaving whatever happens next to the best effort of human sport performance staff. We therefore posit that even though the spate of sport technology revolution may be hasty, its application modalities should be slowly at that with the practitioners on guard for moderation.

Recommendations

In order to exploit the best that technology can offer in sports, and to scale up opportunities for licit sport development, defined by proper application of technology, some recommendations structured into two - technological design and technological use, as presented could be highly helpful:

(A) **Technology Design:** As technological design is the strongest precursor for technological misapplication, an idea therefore reasonably suggests itself that there is the need for big sport organizations to periodically interface with big time sport technology manufacturers on production of technologies that would address most identified problems with the use, such as:

(i) Technologies that are not de-humanizing and that can count on the users sense of agency, self-efficacy and being in control. More directly, technologies that have indicators for their identifiable ability in producing results on one part, and indicators for stop-gaps as when occurrence of affordances did not permit a sports trainee's completion of action at the device imputed timing. This stop-gap information apart from opening up a new line of inquiry which would factor in; say a coach's sense of agency by requiring him to engage the athlete on how best to handle such affordances, would also inform the coach's decisions on the athlete's performance based on the athlete's circumstances (affordances) rather than on the device output timing that simply tells that an athlete is not "working hard enough" with no discernable proof for that.

(ii) Technologies that have great appeal for the users experiential knowledge of them such as the surface represented technologies that would enable users to be on the know of their physical properties and as well direct the users' focal lens towards what goes on between the operation or functioning of a technology and the environment. This knowledge would even put an athlete on the guard as to when there is an incursion into his agency, self-efficacy and control.

(B) **Technology Use:** Sports federations and organizations should come up with strong legislations and advocacy on:

(i) Protecting against the psychological health issues associated with digitalizations in the sport community especially through standardization of technologies used in sports on one part, and regulation of technology applications, in particular, cyber bulling common among sport fans on the other hand.

(ii)   Protecting against humanoid athletes; especially robotics because in instances where robots become unchallenged in competitions, it will be in nobody's interest again to feature human athletes in major athletic meets which has overriding unpalatable consequences. Instead, robots should more, be used in non-competitive scenarios such as in scouting, catching doping cheats and other related offenses in sports.

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