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**Analytical attractions and the techno-continuum:
Conceptualising data obsessions and consequences in elite sport**

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Abstract

The proliferation of sports science and technological innovation within performance settings has precipitated the generation of increasing volumes of data to aid athletes. Copious data production has also perpetuated the privileging of scientific information, and a ‘thirst’ for ‘more data’ as an unproblematic ‘truth’. Of significance is not merely the use of technology for the production of data-for-data’s sake, or the utility of data for a greater cause (e.g., the good of the team), but the quest for personalised data for individual athletes to be analysed, and reflected upon *ad nauseam*. Furthering scholarship on disciplining bodies, we argue that increased technological consumption, and the related excessive quantification of athletes’ bodies via data production, adds further insecurity into performance sports work. Finally, attention is given to the cultural step-change new techno-dispositions may now present.

Keywords: sport technology; data analytics; techno-criticism; organisational politics

Introduction

As several scholars have contended, increased analytically-driven practices as a means of exerting organisational authority and employee surveillance and control within the tiers of sport management are being perceived as paradoxical (and occasionally antithetical) to the established understandings of coaching as a more nuanced and dynamic practice (Jones, Armour & Potrac, 2004; Mackenzie & Cushion, 2013). Although some scholarship has respected the complexities of performance coaches as technocratic engineers (Groom, Cushion & Nelson, 2011), Mackenzie and Cushion (2013) add that the objectification of performance (and exacerbation of quantifiable measurement) still dominates in sport performance discussions. An invariable consequence is that this focus on the ‘tangible’ and ‘usable’ elements of performance has subsumed debate regarding underlying socio-cultural constructions and processes. Expressed another way, in the sustained quest to satisfy peak performance goals, data production and consumption has become *de rigueur* fashion of sport praxis (Williams & Manley, 2016).

While advances in technology have been critiqued within scholarship for many years, academic debates have also focused on the enthusiastic trends for Big Data in other realms of social life (boyd & Crawford, 2012; Feenberg, 2002; Kitchin, 2014; Trabal, 2008). Focusing on sport, scholars have noted instances where athletes have called into question the various forms of scientific performance technologies and coaches’ abilities to effectively use and filter what, at times, may be substantial amounts of data (e.g., Carling, Reilly & Williams, 2009; Laure, 1997). Moving beyond criticisms of technology interfering with the coaching process (e.g., Bampouras et al., 2012; Mackenzie & Cushion, 2013), Cronin, Whitehead, Webster and Huntley (2017) have drawn attention to ways technology is advantageously crafting contemporary coach-athlete relations. Exemplified in the experience of their coach participant, Cronin et al. (2017) identify

that technologies are not inherently problematic, but rather can be used effectively to aid athletes' learning and enhance their coach-athlete relations. In particular, and reiterating the varied positions individual take with respect to technology use, Cronin et al. (2017) stress that technology offers coaches a convenient instrument to achieve various means and ends. However, there remain instances (either through the coach's or athlete's predilections or performance demands) whereby technology becomes *the* only means individuals can understand (and *value*) their performance. Espousing similar arguments, Williams and Manley (2016) contend the privileging of scientific information that serves to monitor athletes' bodies *more* within elite sport and coaches' practices has been to an extent normalised and perpetuated. In some part, this could be the result of athletes and coaches operating within a wider context in which cultures of entitlement, accountability, mistrust, and bureaucracy are entrenched. Collectively, the concern here is with the issues that emerge at the juncture where scientific, technological and analytical obsessions and preferences meet with reservation and resistance. As indicated in the prevailing scholarship, resistance has been evidenced with individual athletes, coaches and some organisations at the elite end of the sport spectrum (Cronin et al., 2017; Trabal, 2008; Williams & Manley, 2016).

Articulating the consequences of developments within the context of elite canoe-kayak, Trabal (2008) notes technological advancements have resulted in discernible shifts in relationships between athletes and their support teams (in particular coaches and sport scientists). While, for the most part, Trabal (2008) indicates that those working in elite sport recognise the necessity of technological innovation, the varying dispositions, predilections and priorities of individuals mean that there are discrepancies in acceptance, value and use. It is in the spaces between individual's technology perceptions that there opens up possibilities for tension (occasionally construed as resistance) between coach, athlete and organisation. Resistance, Trabal (2008) suggests, may not

necessarily be detrimental to performance (indeed, it may just amount to a difference of opinion); however, there exists potential for such tension to disrupt the social elements and relations of the elite sport environment. Notably, and recognising the need to advance techno-criticism beyond prevailing sociological discussion of power, Trabal (2008) encourages a deeper appreciation for the nuances of athletes'/coaches' technological engagements. The sentiments of Trabal's (2008) argument, and the work of others such as Butryn and Masucci (2009), inform the later discussion in this paper with respect to the considerations of the techno-continuum.

Our focus is on conceptualising technology as a particular mechanism, and catalyst, that may precipitate and exacerbate concerns among some sports workers about their professional identities, organisational interactions and career security. Here we adopt the general definition offered by Roderick, Smith and Potrac (2017) who articulate sports workers as sport industry employees whose roles, predominantly, comprise direct or indirect sport production. The paper aims to contextualise the discontent over technologies' place (or lack thereof) in performance sport with wider employment uncertainties and pressures that contour sports workers' lives and careers. We present a theoretical piece that revises an idea currently at play within scholarly debates and evident in sport practice (Butryn & Mascucci, 2009). In doing so, we intend to provide a conceptual catalyst for dialogue. In unearthing new thinking, this paper nudges concerns beyond merely regarding athlete or organisational obsessions with the use of technology (in particular, scientific data) (e.g., Carling et al., 2009; Collins et al., 2017; Williams & Manley, 2016), and raises fresh consideration about the drive-for and use of data as a catalyst for wider cultural and social reactions, changes and turbulence within the immediate sport setting. We are, however, mindful that questions that lay at the heart of our examination remain open and subject to continued interrogation. We are not, for instance, advocating that a resistance to technology should replace

current practices; rather, the intention is to contribute to and encourage critical dialogue about the many and varied consequences of technology to sport and its constituents.

The paper commences by considering how technological use may potentially influence the social dimensions of sport. We then articulate a critique that draws upon techno-criticism theory (Feenberg, 2002; 2008; Osiceanu, 2015;); conceptual frameworks that examine intersections of technological progression and human experience. The discussion proceeds with consideration of the techno-continuum and implications of increased data rationalism on the relations between coach-athlete and coach-organisation. The paper concludes with a call to reconsider the range of technological use in sport and move discussion beyond prevailing surveillance debate and binary conceptualisations.

Technology and nuances of the social in sport

It is important to note the distinctions and overlaps between technologies to organise athletes' daily lives and schedule and those that are employed to specifically measure, monitor and evaluate performance. Here, we are concerned with the latter; technologies used for improving performance. Of particular interest are cases where varied perspectives and privileging of scientific practice may be read as a form of 'philosophical difference - or Trabal's words, 'resistance' - that may have consequence for an individual's employment within a team/organisation. Essentially, there is the creation of a space in which the lack of data-driven measurement for data's sake by some sports workers may be perceived as jarring with the organisational imperatives and, most significantly, athletes' own wishes (Taylor & Garrett, 2010). With technology taking on a stronger role within coach-athlete relations (and, as Kerr (2014) argues later, for athletes to afford great(er) significance to the material aspects of their work), there exists potential for some coaches' beliefs

and training strategies to be perceived (by athletes and, at times, management) as not providing ‘sufficient’ surveillance of athletes. Essentially, there are possibilities for assumptions to emerge about whether or not there is ‘enough’ sport science, and, that more science (e.g. testing, measuring, collecting, evaluating etc.) is good (Carling, Reilly, & Williams, 2009). To note, this may only apply to a small number of athletes and organisations (who we later define as techno-dependent); nonetheless, cases highlighting sports workers’ technological troubles remain significant in that they have a capacity to provoke organisational, political and cultural responses within the workspace that have discernible and substantial consequences (Trabal, 2008).

The consideration in this paper build upon Butryn and Masucci’s (2009) call for scholars to contribute to the discourses surrounding sport, the body, technology and the ways in which these discourses affect conceptualisations of various sporting practices. A persistent theme within sport literature with respect to the future of (athlete/sporting) bodies has been the ‘dehumanisation’ of sport processes, the impact upon coach-athlete relations, the roles technology plays in crafting, sustaining and challenging power relations, and the ways technology contributes to the centrality of material forms in athletes’ lives (Butryn & Mascucci, 2009; Kerr, 2014). Drawing on an interplay between Foucault and Latour, Kerr’s (2014) work within gymnastics, for example, urges us to consider that the material aspects of sport (in Kerr’s case women’s gymnastic paraphernalia and in our case data producing technologies) have consequences on athletes’ and coaches’ relationships, work and performance. Conceptualised by Kerr (2014) as a ‘nonhuman constituent’, material aspects of sport assume significance within the sporting context and should be recognised for their capacity in exerting discernible power over training and performance regimes. The danger in recognising nonhuman power constructions with sport coaching, Kerr asserts, is that therein lies a potential for the material aspects to replace (or act in place of - however temporarily) human

actors. While Latour (1992) has already drawn attention the consequences of this in wider context, Kerr's examination moves us beyond prevailing discussions of surveillance to provide pause for thought in how the implications are already evident within sport and bringing profound changes to coaching practices. The ideas here go against scholars who have been continually advocating for the relational dimensions of coaching (Jones, Armour & Potrac, 2004; Nash & Collins, 2006). Such work has emphasised a necessity to acknowledge the notion of *craft* as fundamental to (read also, as the essence of) coaching. Moreover, debates here have reiterated that in response to various contextual forces, there is a need for a restoration of humanity within the role (e.g., coaches who care, are empathetic, and exercise degrees of emotion and subjectivity) (Lindgren & Barker-Ruchti, 2017; Jones & Turner, 2006).

Technologies' roles within coach-athlete relations have also been critiqued Butryn and Mascucci (2009). Within this work there has been particular interest in not just the blurred links between human, nature and technology, but also on the relative and highly individualised nature of technology use within athletes' lives and sport settings (Butryn, 2003; Butryn & Mascucci, 2009). Acknowledging existing debates that have centred of cyborg/post-human developments encroaching on sporting practices, Butryn and Mascucci (2009) consider how continued research has highlighted the tensions between an 'essential'/'natural' configuration of the (athletic/sporting) body and the assumed/alleged transgressions that the progression and future of technology impose on the nature of human existence. In order to understand athlete-technology relations, Butryn and Masucci (2009) present the notion that athletes operate along technological boundaries and that individual athletes' positionality along the boundary reflect their predilections about their body, their sport and the roles of technology in shaping their training and performance. Technological positionality needs to be contextualised within and across the specific sporting contexts in which

athletes (and, by default, coaches) operate and the meanings they ascribe to the ‘purity’ and ‘naturalness’ of their body and its performance. Butyrn and Masucci’s (2009) assertions are of value in this paper in underscoring the issue within sport of the apparent need to moderate the use/imposition of technologies within particular contexts so as to retain an ‘acceptable standard’ of ‘purity’, ‘naturalness’ and ‘humanity’ within the ethos and practicalities of the sport.

To reiterate, there is an inherently close relationship between coaching practice, technology usage and surveillance practices (Denison & Mills, 2014; Kerr, 2014). By its very nature sport coaching necessitates intricately managing athletes’ progress to meet performative agendas (Denison & Mills, 2014). To this end, coaches may organise the intricacies of athletes’ training schedules, the minutiae of individual sessions, the use of particular performance measures and data sets, and could implement further control on athletes’ bodies (e.g. nutrition, physiology and weight). Coaches’ (and their sport science supports’) use of technologies and practices of data collection, in this way, serve as a ‘necessary’ surveillance that contributes to an obedience and respect-based culture that may be amenable to producing success (Claringbould, Knoppers & Jacobs, 2015; Cushion & Jones, 2006; Denison & Mills, 2014). Extrapolating the assumptions and implications further; coaches (and other trainers) who do not subscribe to (particular) new technologies and/or provide ‘enough’ data, the ‘right’ kind of data, or ‘data-on-demand’ run a risk of potentially being construed as ineffective, difficult to work with, unwilling to satisfy the needs of athletes and organisation, not adhering to the organisation’s aims, agendas, philosophy and mission, or, effectively, not doing their job (or at least ‘the job’ as conceptualised in the minds of significant others). The underlying sentiment here is that the coach is not working for the athlete as effectively as the athlete believes the coach should. Moreover, there may be an inherent

assumption that athletes have recourse (and power) to say what is or is not of value to them in their particular sports contexts.

Additional work within the sociology of sport and sport coaching has drawn upon notions of power, coach-athlete interaction, and scientific rationalism to problematise and conceptualise the use of data and technology within the professional sport industry (Collins et al., 2017; Kerr, 2014; Williams & Manley, 2016). This scholarship has been instrumental in building critique of the proliferation and consequences of technology within the sport industry and challenging what technologies are and do, who they might be for, and the contemporary and enduring implications it may have for sport cultures and their constituents. Such work has indicated that we appear to have arrived at a precarious juncture, where the deployment of advanced technological instruments (and resultant data) supersedes human interaction noted as instrumental to recent conceptualisations of the coach (e.g. Cassidy, Jones, & Potrac, 2009; Trabal, 2008; Williams & Manley, 2016). The embrace of technologies and data production can serve as a marker of professional and personal difference between stakeholders and different sports workers in the industry (e.g., coaches, athletes and the organisation). The interest in technologies and data to drive and manage peak performance, measure progression, and assess workers in sport is, however, consistent with other employment sectors.

Conceptual scaffolding

Scholarship has demonstrated the prevalence of organisational contexts and cultures within sport that have afforded privilege to the value of quantitative performance mechanisms (Manley & Williams, 2016). Though such measurement is necessary to account for and advance athletic and team performance, the emphasis on data production and analytical measurement speaks to the entrenched promotion of a techno-informed discourse that has become central to rationalising sport

organisation's practice and, influenced approaches to labour relations and work pressures. Organisational attractions to technology are not necessarily distinct to sport, but are symptomatic of prevailing social and cultural tendencies toward technocracy (technology modernity) and consumption behaviours where data/analytical information has become commodified and commodifiable (able to be produced, packaged, and marketed for consumer purposes) (Kitchin, 2014; Roessler & Mokrosinska, 2015). We respect that this may be considered as normalised practices inherent within the marketisation of sports more generally.

The work of various foundational theorists (e.g., Marx, Marcuse, Habermas, Foucault and others) laid the important groundwork for contemporary critiques of technology/ies and technologies of production. Such work has drawn attention to structural inequities, the mechanisation, exploitation, alienation and dehumanising effects of technologically driven labour, subjugation and subjectification, and notions of power and agency. Admittedly, we acknowledge numerous points of disjuncture and distinction within these theoretical approaches to techno-criticism. It is not the intention of this paper to address the varied nuances within these particular classical theoretical traditions. Rather, we highlight here that a discernible thread of their argument recognises that while prevailing global political and economic practices may have rendered the technologisation of modern life a *fait accompli*, its proliferation and encroachment on human society, civic values and individual liberties should not go unchecked or unprotested (Dusek, 2006; Postman, 1992). Contemporary academia has reignited a wariness toward society's technological underpinning and the digital era/revolution (Feenberg, 2002; Kitchin, 2014). In particular, practical, political and ethical discomforts around Big Data and globally pervasive surveillance measures have provided scholars one focal point around which to orient their techno-criticism (boyd & Crawford, 2012).

While scholarly scepticism toward Big Data may be warranted (particularly in advocating for individual privacy, autonomy and agency), attention on the consequences of micro-data production and fetishism is also necessary. At the foundational level, individuals (and their performative and consumptive acts) are the objects of data collection processes, and, individuals (with increased e-ffectations; which we playfully define as an emotional attachment to technologies) are complicit in perpetual data (re)productions. Examples may include, for instance: various technologies employed to collect an overabundance of scientific data, much of which may be of questionable value to enhancing performance; the inappropriate use of timing data collection (particularly in terms of competition and training schedules); and, instances where organisations are drawn into cultures of scientific monitoring mimicry in which data collection is based on perceptions and assumptions of gaining competitive advantage irrespective of the legitimacy of the underlying knowledge base. These concerns extend to an inability of some athletes and coaches to extract meaningful information from the data; and, athletes potentially losing an innate sense of their body and its capacities beyond and at the exclusion of measurable data (Laure, 1997; Cronin et al., 2017).

Scholarship has been critical of the integration of technology in people's lives and the embodiment of technology (Feenberg, 1996; 2002; 2008; Osiceanu, 2015). Techno-criticism theory is, therefore, useful in advancing conceptualisations and debates about technology beyond the prevailing surveillance discourse. The work of Feenberg (1996; 2002; 2008), in particular, returns us to fundamental philosophical questions about synergies and disconnects between technological progression in society, individual agency and social interactions and their consequences. Debate has also continued to highlight the (ir)reconciliability between technology and humanity, and frames technology, in various ways, as a threat to human agency. Where

classical theorists such as Habermas, Derrida and Foucault, established critical scepticism toward technological imposition and its roles in human disembodiment, contemporary scholars have offered new interpretations and understandings that are reflective of new everyday realities (e.g. Feenberg, 2002; Osiceanu, 2015). The utility of this work is that it focuses attention not merely on the existence and prevalence of technologies, but on the increasing uncritical acceptance and normalisation of technology, its products (i.e., data), and individuals'/organisations' engagements thereof.

Literature in sport has similarly developed robust arguments vis-à-vis surveillance and power (e.g. Collins et al. 2017; Jones, Marshall & Denison, 2016, Williams & Manley, 2016). Yet, theoretical reconfigurations can move the argument in a different direction. Such scholarship has argued that the performative and organisational cultures of sport have become frequently orientated around disciplinary technologies that have impeded athletes' and coaches' respective freedoms and shaped the nature of their contemporary relationships and working practices. This viewpoint has been useful in recognising the constraining and enabling influences of technologies of the body, notions of the self, and coach-athlete power relations. However, there is scope to develop the argument beyond discourses of surveillance and consider the political and practical complexities and ramifications for athletes, coaches, organisations and work cultures of sport that emerge at the intersection of technophilia and technophobia/discomfort.

Contemporary theoretical work highlights the ethical, social and pragmatic concerns that arise from to blindly accepting technology as rational (Osiceanu, 2015). The danger, Feenberg (2008) reminds us, is that personal or structural subservience to technological (read also as scientific or data) rationalism may inhibit our ability to determine, control, and define parameters of human existence; which, at the very extreme, may be averse to the essence of our humanity.

Beyond setting up such existential questions, techno-criticism theory is predicated upon not perceiving technology use and its presence as a binary, but rather as more of a continuum with varying levels of engagement (Oscieniu, 2015). Individuals and organisations may have legitimate and pragmatic reasons for embracing and embedding technology in their praxis. While Oscieniu (2015) does not provide significant elaboration, some further nuance to the continuum can be added/considered here.

At one end of the spectrum are phobic individuals who possess personal and/or cultural resistance and/or reluctance to engage with particular technologies (including, though not limited to, those that advance or work to the betterment of their existence). Techno-phobic/sceptic individuals are not, to note, necessarily entirely adverse to technologies but rather assume that there exist perceived or actual boundaries to their use or effectiveness (Osiceanu, 2015). While particular technologies/technology-use may sit uncomfortably with such individuals, it is possible that positions, opinions and use may be altered as social, cultural, political and economic circumstances and context change (Boehme-Neßler, 2011; Osiceanu, 2015; Trabal, 2008). In contrast, are the techno-philics who reside toward to opposite end of the spectrum. Individuals at this end may exhibit more positive tendencies toward technology use and/or may embrace new technologies willingly and more favourably (Osiceanu, 2015). By nature of the continuum, techno-philics may be more amiable to adopting technologies to improve many aspects of the lives and working practices. However, at the extreme end where by such individuals may exhibit techno-mania, it needs to be recognised that there is also the potential for individuals to discern some of the adverse dehumanising effects technologies may have. Under Osiceanu's (2015) techno-criticism framework, athletes' and coaches' digital predispositions will alternate along particular points on the continuum depending on their cultural values, personal opinion and circumstances

within the sport (a point we develop later with respect to coach-athlete relations). While the phobic and philic extremes of the continuum may be easily crafted, we acknowledge that the pendulum swings along a complex range of values and engagements. For instance, in reference to the sporting context points along the continuum are not fixed. Rather, at varying points within athlete's careers there may be variations in individual's phobic and philic positions which correspond with different points in training and/or competition. The dispute is not where individuals or organisations may fall respectively along the spectrum, but that rationalisation may lead to an uncritical normalisation of practices and perspectives, and, that this may have adverse consequences if there is incongruence between stakeholders' differing positions on the continuum. Sports organisations, for example, may advocate data-driven Key Performance Indicators that do not align with coaches' regular approaches to data usage. Additionally, some athletes may perceive the coaches' approach as not sufficient in monitoring athlete performance (this will be discussed later).

Drawing conceptually on techno-criticisms offered by Osiceanu (2015) and Feenberg (2002; 2008), the complexities we focus on relate to the ways technology and data driven cultures within professional sport possibly undermine the athlete-coach-organisation relationships. The use of technology here may also, potentially, question the innate human nature/'craft' of coaches' work in the first instance. It is necessary, however, to recognise that athlete-coach-organisation relationships exist within the organisational culture and institutional processes which are precipitated by both historical and social factors (Jones & Wallace, 2006; Purdy, Kohe & Paulauskas, 2017). For example, there may be generational differences and gaps within the team that may predispose some athletes to favouring and desiring technology and scientific data, while others may either reject or exhibit a scepticism toward the overuse or increased encroachment of technology. Adopting a techno-critical sentiment in the manner of Trabal (2008), for the most part

positional differences along the continuum may be of little consequences as there may be a generally accepted range of ‘normal’ techno-practices. Coaches’ positions on the continuum are not necessarily problematic. It may not be, for instance, that some coaches abhor technology in their practice, or fail to appreciate the advantage that statistically informed performance and training science provides (indeed, many coaches actively embrace technological innovation and underscore their work with scientific rigor). Instead, coaches may be focused on the ‘craft’ of their work and be selective in their uses of technology and more confident and direct in their assertions about the fundamentals of the sport that do not necessarily rely on the use of technology (or data production).

Techno-critics would stress (Feenberg, 2002; 2008; Osiceanu, 2015), that issues lie in instances where there are outliers or extremes to the normative range, and/or disjuncture within definitions of what constitute ‘normal’ within the context. In the context of this paper, questions can be raised about coaches’ and athletes’ technological habits and how and where they may ‘draw the line’ with respect to what is acceptable and what is too much. One discernible consequence is the potential for athletes’ data affectations to usurp/disrupt established the coach-athlete relationship and destabilise or jeopardise the coach’s position within the organisation. Resultant scenarios include situations in which the coach is positioned as a ‘poor-fit’ because of the advanced technophilic preferences and data-driven obsessions of the athlete(s) and the organisation.

The crux of the argument is that the proliferation of technophilia within sport cultures (Kerr, 2014; Millington, 2018), concomitant with some athletes’ and organisations’ uncritical consumptions, has the potential to erode coaching practices and destabilised conventional ‘trust’ in coaches’ craft. Moreover, this could lead to organisational discomfort with the ‘craft’ coach because their ways are not ‘measurable’ in a clear (read complex scientific) sense. Echoing techno-

critics (e.g. Feenberg, 2002; 2008; Osiceanu, 2015), such scenarios may present a challenge to potential assumptions about an essential humanity of individuals who coach, and to the innate art of organic social interactions and behaviours therein. While these incidents may be infrequent in some organisations, the athlete voice (and its calls for scientific measurement and rationalisation) is afforded considerable currency because their concern resonate and are in harmony with the sports bodies' own quantitatively driven, evidence-based, performance imperatives.

Athlete and Organisational Implications

As outlined above, modern sport has witnessed the emergence of the 'techno-dependent' athlete (e.g., one who uncritically embraces and exhibits an obsession for technological-based testing beyond the immediately identifiable performance or training needs as determined by the coach and/or the performance programme). While cultural shifts may be an accepted part of the modernisation of professional sport, in certain sports the evolution of practices have also heightened and exposed latent fears and insecurities with regards to sports workers' welfare, protecting interests, and authenticity of trust within the work space (Henry, 2013; McMahon & Penny, 2013). Insecurities are also exacerbated by the intensification and commodification of the professional sport industry in which workers are replaceable and whose employment 'value' is explicitly tied to their performance credentials (Roderick, 2006; 2014). Such precarity may be accepted by those in the system (Smith & Stewart, 2010; Storm, Neilsen & Thomsen, 2016), however, there is a possibility that it may lead to individual protectionism, organisational distrust, and closer stakeholder accountability (Greenwood & Van Buren III, 2010).

Data acquisition, we respect, is an inherent part of information gathering. However, the athlete's actions have potential political implications in precipitating a division and possible culture of conflict between the coach and their other internal colleagues, or external providers. Here, technophilia may precipitate actions by athletes who circumvent coaches and challenge conventional lines of communication and authority by privileging other stakeholders (e.g. physiologists, biomechanists, performance analysts). An invariable consequence of which is that other stakeholders may experience role uncertainty and insecurities as a result of athletes' usurping of coach's practices. All of which have the potential to undermine solidarity and creation of a trusting organisational culture. Scholars such as Potrac and Jones (2009) may emphasise this as a micro-political drama played out between the coach and athletes. While such a reading may be accurate, the point we draw out here is that this disconnect between athlete, coach, sport scientist and organisation, may have the capacity to generate critique and challenge of the coach's practices and, in extreme cases, the coach's 'fit' with measurement-based performative imperatives of the organisation.

Sport organisations may endeavour to equally value both coach and athletes' needs and interests (Donnelly, 2015, Ferkins & Shilbury, 2015; Geeraert, Alm, & Groll, 2014; Hassan & O'Boyle, 2017); however, this is not always the case. Some organisations may acquiesce and prioritise athletes' demands first and foremost and effectively 'buy into' the idea that athletes believe that they have the sense, ability and knowledge to know what they need, when they need, and why they need it (such a point speaks to prevailing discourse within academic and areas of the sport industry that argue athlete empowerment is a desirable aspect of good governance) (Ferkins & Shilbury, 2015; Geeraert et al., 2014; Thibault, Kihl & Babiak, 2010). Whether this represents a cultural shift in performance sport (underpinned by athlete-driven consumerism and drive toward

greater advocacy and representation) may be debatable, yet there are advantages to sport organisations interjecting into coach-athlete relations and destabilising coaches' 'expertise' as part of the normative practices of sustaining the effectiveness and outcomes of their performance programmes (Purdy et al., 2017). For the organisation, it may be possible to explain the existence of techno-dependent athletes, or the failure to provide athletes with the 'necessary' data and/or scientific feedback, as an issue that resides with the coach. An aversion to certain technologies (techno-phobia) or extra-scientific testing may be read as coaches' inflexibility to adapt to both their athletes' needs and the broader trends within the sport industry. Such a position is not necessarily misplaced, however, what matters is that this position has not adequately considered that the athlete may be the impetus and at the heart of the matter.

Thus, to rehearse our central thesis, the concern is not with the presence and permeation of the technology itself, rather that it has served as a catalyst for wider culture shifts and political clashes between the athletes, coaches and their organisations. Framed via techno-criticism, it is not that the coach's practices are necessarily poor, or the coach's use of technology without reason, but in this instance the coach's work is deemed technologically ineffective or deficient, and not in accord with organisational 'norms' (or performance orientated expectations). Irrespective of whether or not a coach's techno-tendencies trend toward the normative centre of the continuum, the difference between the coach's practice and organisational expectations (whether actual or assumed) is enough to call into question the coach's autonomy over their work. This seems to stem from an inability to quantify in measurable data what the coach effectively does. Distrust of the coach's control over the 'art' of their work can be read, theoretically, as part of a more disconcerting erosion of humanity in the process of coaching (Day, 2013). In the most extreme cases, a reluctance by the coach to subscribe to the same level of techno/data-philia as their athletes

and/or their organisations may have served as a pretext to problematize their position, coaching practices and adherence to the collective cause and vision. Consequently, coaches may either lose jobs or fear losing their employment if they cannot adjust their working practices and/or successfully negotiate their professional ideals, identities and values. Here it is possible to conceptualise the consequences of techophilia on coaches within the broader context (and related scholarly debates) in performance sport that have drawn attention to complexities that perpetually threaten the precarity of workers' lives and their professional and career identities (e.g., coach change/turnover, owner and agent interference, and organisational shifts) (Purdy et al., 2017).

While bureaucracy, administration and elements of control have long been embedded within modern sport practices, recent observations have evidenced the acceleration and proliferation that are increasingly audit-driven, performance orientated imperatives that are closely aligned to corporate stakeholder relations and external accountability pressures (Hassan & O'Boyle, 2017; Kohe & Purdy, 2016). The intertwining of professional sport management approaches with commercial and state agendas has become normalised and is thus accepted as 'the system'. As has been witnessed across a number of professional sports, of prime importance to the organisation is to protect its reputation, brand and performance record; which is often directly or indirectly often linked to justifying the organisations economic underpinnings (e.g., Olympic funding or commercial sponsorship) (Garcia, 2009; Hassan & O'Boyle, 2017; Sotiriadou & Shilbury, 2009). From the sport organisation's perspective then, the use of technology, science, and/or data can be read merely as a *means* to facilitate effective business in way that is congruent with accepted industry norms.

Of interest are the questions, concerns and consequences that (athlete extremism toward) technophilia have upon organisational-coach incongruence. Within professional sport, it is easy to

appreciate that the athlete may be considered the most important resource to the organisation; indeed, they are central to the performance programme, the *raison d'être* of the underpinning commercial enterprises, and integral to the profile of the sport and reflected reputation of the sport body. Though with the day-to-day running of a large-scale performance sport programme, individual coach-athlete issues may be of a marginal significance, they still have the potential to affect the organisation reputation, brand and image. Although accurate, in the global sporting arms race fueled by strategic, and ruthlessly competitive, performance missions (de Bosscher, Bingham, Shibli, van Bottenburg, & de Knopp, 2008), organisations are often faced with decisions over their loyalties toward the athlete or the coach; though ultimately both coach and athlete may be replaceable.

Given the fragility of athlete-coach-organisation tensions, and the political necessity of sports bodies protecting their funding, organisations' recourse to a 'trusted' and 'dependable faith' in scientific rationalism is understandable. The issue is that sport organisations are noticeably choosing what data to 'listen to' and whose data it is (Johansson & Fahlén, 2017). In these times of doubt, in some cases, the coaches' scientific knowledge and expertise may supersede that of the athlete and/or other staff or external 'experts'. Though it may not be a case of the organisation solely relying on the athlete, on some occasions their voice is increasingly powerful in being able to precipitate outcomes to their advantage. That some sport organisations may placate and pacify their athletes (Purdy, Jones & Cassidy, 2009), is perhaps, unsurprising given the increased politicisation and centrality of athlete advocacy in performance sport, and the growing efforts to imbue athletes with greater power and representation within sport management structures and decision-making processes (Thibault et al., 2010). The rise of athlete unions, athlete advocacy groups, commissions, networks and resources, for example, are all evidence of this shift. While

this had been advantageous in many respects in championing athletes' rights and demanding greater accountability and transparency among sport organisations, it may have also contributed, in part, to a confidence amongst some athletes to challenge managerial and coaching practices (such challenges have been evidenced elsewhere (see: Purdy, Potrac & Jones, 2008; Purdy, Jones & Cassidy, 2009). In such situations, the data/techno/science is being used to work in the athlete's favour; particularly in terms of aiding and advancing their social capital within their sport. Although not within the scope of this paper, the subject of athlete entitlement is one that warrants further investigation.

Creating compromises along the techno-continuum

The episodes of techno-turbulence (i.e. tensions over the use of technology) seen in some performance settings are useful in crystallizing complexities of the environment and the intersections of sport organisations and sports workers. We are not arguing here that sport organisations' ways in this regard are necessarily flawed or misplaced (indeed, in many cases, such approaches may be entirely appropriate and yield favourable outcomes). Rather, the concern is that instances where there is potential for techno-phobic or sceptic coaches to be at odds with techno-philic athletes (and, we respect, vice versa) questions may be raised that challenge coaching practice, and put either the coach or athlete relations in difficult situations. The shift within some sport organisations toward an, invariably, unchecked technophilic culture causes pause for thought about whether or not there may be still room for a vanguard of coaches whose methods differ. Previous scholars have conceptualized this as coaches who do not adopt a 'cookie-cutter' approach that is promoted by formulaic and restrictive coach education programmes and/or organizational expectations (Cassidy, 2010; Denison, 2010). Irrespective of whether the influence is via education

or organizational channels, the issue here is that technology and data are simply the means utilised to effect change. Moreover, such examples draw attention to the sport organisation's roles in shaping coach-athlete relations and the performance context.

As some of the examples drawn upon above indicate, it may be clear that this is not purely or simply about sport organisations using technology to drive coaches out, that coaches are resisting technology, or that athletes are intentionally antagonistic. As scholars elsewhere have articulated (e.g. Collins et al. 2017; Jones, Marshall & Denison, 2016, Williams & Manley, 2016) there is more going on and these instances are part of a broader picture in which cultures of entitlement, accountability, mistrust, and bureaucracy are entrenched within modern sport. Given the prevailing economic forces that dictate the terms of performance sport, the incoming technolite may be ultimately accepted without question. Nonetheless, it is helpful to understand the characteristics of the context, interconnectedness of concerns therein, and the invariable consequences for individuals.

To rehearse the overarching intention of this paper, the focus is not with the nature and use of the data/technology per se. Rather, data/technology have become a means to help normalise institutional processes, behaviours and cultures (e.g. the maintenance of hierarchical relations, the exercise of power, the curtailing agency, protection of 'paramount' performance and/or commercial interests, employee insecurity). Notwithstanding debates about whether neoliberal management cultures are an appropriate model for the effective, efficient and ethical running of contemporary sport (Schulenkorf & Frawley, 2016), this is the current culture within which sports constituents have to work. For sports workers, particularly those who may find themselves at odds with the organisation's agenda, the question also seems to be one of cultural disjuncture whereby individual ideals about job roles and approaches may conflict with management expectations and

obligations. Consequently, those within ‘the system’ (i.e. head coaches) are expected to ‘fit’ in accordance with the overarching management structures and organisation ethos and vision. In order to align with the managerial culture sports workers will, to a greater or lesser degree, accept and oblige monitoring practices. In doing so, such practices become normative mechanisms that lead to compliance.

If we accept that integration of data/technology is not only here to stay, but will likely be exacerbated over time, what new ways might be needed to assist sport organisations in their tripartite relations with coaches and athletes? There is still scope for sport organisations to mediate/negotiate coach-athlete relations in ways that are more transparent, accountable, ethical and democratic. One area for consideration regards the implications that organisational and athlete technophilia have for recruitment, employment security and career and professional identity. Following Feenberg (2002; 2008) and Osiceanu’s (2015) sentiments, sport organisations may be able to resurrect an essential humanity within their social relations and appreciation of the art of individual (coach and athlete) practice. In the first instance, when it comes to hiring coaches and also recruiting athletes, sport organisations should foster productive and open dialogue about the interplay between humanistic practice and quantified scientific rationalism with the professional performance framework. Such work would likely involve: having more explicit discussions about the rationale for, and privileging of, scientific data, technology and measurement; affording coaches trust to work across the spectrum with athletes without fear of reprimand or career insecurity; and making the management of expectations, philosophies and cultures within the team a participatory process for all. Initial discussions may be orientated around questions such as: what place the coach assumes within the organisational hierarchy; the definition and extent of the coach’s autonomy; the ability and space for coaches to exercise their individuality, creativity, and

techno-proficiencies without trepidation; and, coaches' professional ideals and values will be respected and that they can maintain confidence in an open and trusting relationship with the athlete and organisation.

We appreciate that some (maybe even most) sport organisations are already doing so, or may be working toward this end. However, at a time of Big Data drives and questions in sport (Baerg, 2016; Fried & Mumcu, 2016; Hutchins, 2016), the proliferation of information and mass consumption of technologies, and the heightened specificity and individuality of data available within the performance context, these issues will need to feature more prominently on sport organisation agendas. In conjunction, coaches may need to consider their position and craft, and draw attention to where athlete techno-philic 'outliers' may exist that present a threat to the established trust between the coach, team and the organisation. Athletes also may need to understand that with the power afforded to them, on occasion, by sport organisations' athlete-centred approaches comes a need to appreciate and respect the specific roles and responsibilities of all those within the system. While affording all stakeholders an equal and legitimate place and voice may be thought of as 'good' governance (Brown & Marsden, 2013; Geeraert & Groll, 2014; O'Boyle & Bradbury, 2013), their varied positions, roles, philosophies, contributions and practices mean that this is not often realised or indeed a practical reality. As such, the quest for improved democracy at present appears antithetical to the nature of performance coaching and sports teams.

Conclusion

As frequent media reports (e.g. Brown, 2016; Millar, 2016; Reidy, 2017) indicate, the development of sport data analytics and coaching technologies is progressing at pace and has become normalised. This has contributed to assumptions that data and technology reduce the

‘complexity’ of elite sport environments and make work ‘easier’. The purpose of this paper, therefore, was to examine the athlete-coach-organisational relationship from a new angle; in this case, focusing on the roles of technology rationalism and the pursuit of quantitative data as catalysts of turbulence within sports work. Drawing upon techno-criticism, we extended theoretical discussions beyond the prevailing discourses of power and surveillance that have come to characterise scholarly debate. In particular, techno-criticism was appealing as it enabled us to draw attention to the intertwined, and largely inescapable, connections between social practices, technological advancement and the privileging of scientific knowledge. Conceptually, the theory makes a contribution for deconstructing binaries around technophilia and technophobia, acknowledging that individuals’ techno-preferences can be located across a continuum, rehearsing existential questions about the nature of humanity, and reiterating the value of the person (e.g., the athlete, the coach) in the process. We acknowledge that our consideration may only apply to a small number of individuals within elite sport, and that we only raised some preliminary concerns with respect to how technological issues may manifest within the context of coach-athlete relations. It is evident that other scholars are also beginning to contribute to moving techno-criticism beyond surveillance discourse and explore alternate explanations that transcend power and micro-political rationalism (e.g. Cronin et al. 2017).

With regards to professional sports work, techno-criticism enabled us to examine the potential and actual consequences that may stem from the privileging of scientific data, and the resultant employment insecurities this may have on coaches in particular. While precarity, technologically-driven or otherwise, may be a feature of labour in performance sport contexts, some athletes and organisations have demonstrated an ability to mobilise data to place doubt

upon the coach's craft, or 'fit', with the organisational culture. However, the reasons behind organisation's reactions may be invariably more complex. For instance, the extent of a coach's use of technology may be linked to a wider analysis of the longer-term success of the coach and/or success of the programme. Further scholarly investigations or anecdotal evidence may emerge that indicates that if the coach is reputable there may be less of a willingness to question the 'art' of her/his work so long as the results keep coming and the athletes perform as expected. We appreciate, that it also may be possible to read the situation in light of inherent generational differences where athletes have emerged via different educational systems, may be more digitally literate, and, have different preferences in terms of data consumption.

The increasing over-reliance upon data appears to have the potential to erode the trust between the coach, the athletes, and/or the organisation as well as challenge the coach's assumptions about their autonomy. Such occurrences may be viewed as unresolvable and result in contract termination which may be framed as 'philosophical differences' with the organisation. While some coaches may make some compromises in their work and in their relationship with the organisation, and also be willing to accept elements of scientific rationalism that are a part of performance programmes, further investigation may reveal the extent to which these episodes of techno-turbulence are demonstrative of a persistent uncertainty over what a coach is, what they do, and how they go about their work.

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