How interacting constraints shape emergent decision-making of national level football referees

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Abstract

Here we sought to add to understanding of how and why football referees make decisions. A grounded theory methodology was undertaken to tap into the experiential knowledge of 9 national level referees (aged 23 to 35 yrs). Results indicated that referee decision-making actions were not predominantly aimed at traditional notions of decision-making accuracy (e.g., correctly identifying rule transgressions), but were instead focussed on meeting two overarching task goals: maintaining control and preserving the integrity of the competitive game. These objectives were, in part, informed by co-invested task outcomes which referees perceived that players, spectators, coaches and fellow referees had about 'how the game should be played'. Analysis revealed ‘four pillars’ used to meet these expectations, which were conceptual notions of: safety, fairness, accuracy and entertainment. These findings showed that: (i) referees co-construct the game with players, and that (ii), referee decision-making is an emergent process of the performer-environment relationship nested within task goals. It was concluded that: (i) decision-making accuracy should be viewed very much within the context of a competitive match, and (ii), distinctions should be made between types of bias and the complex strategies that referees use to manage the game.

Introduction

It is perhaps not surprising that with rising spectator, media and economic interest in sport, the decisions that referees and umpires make have attracted greater scrutiny (Ticher, 2016). Accordingly, many studies have focussed on evaluating the decision-making 'accuracy' of referees with the intention to reduce mistakes, underscored by a general belief that the primary role of officials is to 'determine whether the laws of the game have been breached by a player, and if so, apply the appropriate course of action' (Elsworthy, Burke, Scott, Stevens & Dascombe, 2014, p. 3502). As such, a popular way of evaluating refereeing expertise has been to create foul recognition tasks in carefully controlled laboratory settings to explore whether a performer is able to arrive at the same (single) correct decision as pre-determined by an expert panel (e.g., Catteeuw, Helsen, Gilis & Wagemans, 2009; Elsworthy et al., 2014; Fuller, Junge & Dvorak, 2004). The tacit goal of such approaches has been to minimise ambiguity by developing uniform responses to video incidents as a means of understanding 'consistency' amongst decision-makers (e.g., Schweizer, Plessner, Kahlert & Brand, 2011; Schweizer, Plessner & Brand, 2013).

Some research, however, has been critical of the assumption that officials follow a set of prescriptive protocols in order to arrive at a putative, single 'correct' decision; particularly as performance environments, unlike laboratory settings, are characterised by 'limited time, uncertainty, high stakes, vague goals and unstable conditions' (Klein, 2008, p. 457). This closed loop approach was originally influenced by the economic rationalisation model of decision-making, which also suggested that an optimal decision exists in a given instance (Davids, 2008). This view was questioned in studies of sport expertise from an ecological dynamics approach (e.g. Araújo, Davids & Serpa, 2005; Passos, Araújo, Davids & Shuttleworth, 2008), which revealed evidence that performers 'rely on a range of perceptual

variables that specify relevant properties of a performance environment for achieving a task goal' (Seifret, Komar, Araújo & Davids, 2016, p. 160).

Essentially, advocates for ecological dynamics view sporting environments as complex systems, fusing ideas and concepts from ecological psychology and dynamic systems theory (see Araújo, Davids & Hristovski, 2006; Araújo, Davids & Passos, 2007) to explore how individual-environment synergies act to shape the intentions, perceptions and actions of elite performers (Renshaw, Davids & Savelsbergh, 2010). The theoretical ideas of ecological dynamics have underpinned the 'constraint-led' methodology (e.g., Davids, Button & Bennett, 2008; Newell, 1986), which posits that individual, task and environmental constraints interact to define invitations for affordances (opportunities or invitations from the surrounding environments) to shape decision-making actions of individuals. Two key ideas in this approach suggest that skilled performers: (i) generate behaviours that are tightly coordinated with environmental events and specific performance goals (Araújo & Davids, 2016) and, (ii) are more capable of exploiting information about their environmental and task-related constraints to utilise affordances (Gibson, 1979; Seifret et al., 2016).

Since the turn of the century an array of empirical studies have evaluated - what, why and how – constraints have influenced referee decision-making. For example, Mascarenhas et al. (2009) investigated the individual constraint of referees' fitness levels (i.e., locomotor demands) on performance. Investigators found no direct relationship between fitness indicators and the likelihood of predicting incorrect decisions. However, they did note that reported accuracy agreement levels (between expert panels and game day decisions) were worst in the first 15 minutes of each half at 51%, compared to 70% at all other times. Given that fitness levels would be expected to have less influence at the beginning of games and more impact at the end of each half, it suggests that factors acting on individual referee

decision-making are a complex and multi-factored relationship between task constraints (e.g., game time) and specific environmental conditions.

Task constraints found to have impacted on refereeing decisions, include: previous decisions during a game (e.g. Plessner & Betsch, 2001) and state of the game (e.g. MacMahon & Starkes, 2008). For example, MacMahon and Mildenhall (2012) described how referees use prior knowledge (e.g. player profiling) to make an assessment on the authenticity of foul play when faced with high pressure time constraints. How environmental constraints influence decision-making include physical conditions (e.g. poor weather effecting visibility) and socio-cultural constraints such as home team bias (e.g. Balmer et al., 2007; Downward & Jones, 2007), sanction frequency linked to nationality (e.g. Dawson & Dobson, 2009) and gymnastics judges scoring certain garment colours higher on identical routines (e.g. Ste-Marie, 2003). The degree of influence that these task and socio-cultural environmental constraints *should* and *do* have on referee decision-making actions - particularly in terms of 'objectivity' and perceived 'bias' – has been contentious among researchers (e.g. Anderson & Pierce, 2009; Brand, Schmidt & Schneeloch, 2006; MacMahon & Starkes, 2008; Mascarenhas, Collins, Mortimer & Morris, 2005; Plessner & Betsch, 2001; Schwarz, 2011; Unkelbach & Memmert, 2008).

To elaborate, a particularly divisive topic has been sequential biasing (see 'art v craft' discussion Mascarenhas, Collins & Mortimer, 2002; Plessner & Betsch, 2002) and whether it compromises a referee's key capacity to officiate 'fairly' (Anderson & Pierce, 2009). Plessner and Betsch (2001) exemplified sequential biasing in an increased probability of awarding a 'penalty kick' to one team if the opposition had already been awarded the same. The authors argued that 'earlier decisions in the match should have no influence on a "penalty" decision' because this represented undesirable sequential decision-making bias (p. 254). Mascarenhas et al. (2002), disputed this viewpoint, suggesting 'without a thorough

analysis of the participant's reasons, it is unclear whether decisions were due to a contrast effect… or to some other more game management focussed rationale' (p. 330).

Attempting to address this discord, Brand and colleagues (2006) investigated sequential effects in basketball refereeing decisions, to determine whether 'bias' was spontaneous and without control or, a game-management related phenomenon. Their results indicated that when referees viewed a sequence of foul-clips in their original condition (i.e., in the order they occurred during an actual match), it led to less rigorous and more diverse sanctions than when viewing the same incident in isolation. This finding implied that referees consciously related decisions as a game-management strategy rather than constituting negative unconscious bias. Similarly, MacMahon and Starkes (2008) reported that umpire decisions for the same borderline pitch changed as a function of what they had viewed in a preceding pitch (e.g. whether it was a ball or strike). The authors concluded, therefore, that bias and accuracy were not mutually exclusive, as there were 'no correct agreed upon decisions for borderline pitches in this study… illustrat[ing] that context is used for difficult decisions, with direct vision of preceding stimuli a particularly salient source of information' (p. 759-760).

In line with these findings, support for the research and training of elite level referees in naturalistic paradigms has been championed as a more comprehensive and meaningful way to understand how referee decision-making occurs in real-world environments (e.g. Mascarenhas et al., 2005). However, rather than truly capturing contextual effects in well-designed naturalistic studies, there has been a tendency for designing quasi-naturalistic simulations of isolated incidents (e.g. video interactive studies), where a putative 'correct' decision has been collectively agreed upon in advance by an expert panel. Such approaches are somewhat questionable. They have led to reported accuracy measures varying dramatically, ranging from as low as 50% (Mascarenhas et al., 2005), 64% (Mascarenhas et

al., 2009), 65% (Gilis, Weston, Helsen, Junge & Dvorak, 2006), 70% (Fuller et al., 2004), 72.4% (Catteeuw et al., 2009), 80% (MacMahon & Starkes, 2008) to 84% (Elsworthy et al., 2014). Given that these studies investigated elite, international or FIFA level referees, it is somewhat concerning that reported accuracy agreement rates are as low and as varied as reported, consequently, portraying referees as poor and inconsistent decision-makers. The immediate question that springs to mind is – how can the best referees in the world be wrong so often? Additionally, as researchers, how can our analyses of their decision making accuracy vary so much?

One potential explanation for these 'poor' outcome measures in elite referees is that, in line with traditional cognitive approaches examining athlete expertise, the methodology adopted in such studies fails to capture the true nature of their expertise (van der Kamp, Rivas & van Doorn, 2008). Accordingly, rather than the absence of a decision-making intervention representing inaccuracy or an error in judgement (Askins, 2001; Grunska, 2001), it may instead relate to game management techniques, wherein the referee deliberately opts to "allow the game to flow, …so [not] adversely affect[ing] the tempo or temper of the game" (Mascarenhas et al., 2002, p. 329). Essentially, it may not be the methodological approaches *per se* that are problematic, but rather the underlying assumptions that: (i) the accurate identification of fouls is the primary performance aim of the referee, and (ii), only one *correct* decision-making option is available to the referee at any given moment.

Despite the important progress of previous research, an over-focus on video-based studies has also led to key voices being missed: that is, the referees themselves. Thus, adopting a grounded theory approach (Charmaz, 2003, 2006; Glaser & Strauss, 1967; Strauss & Corbin, 1990) provides an opportunity to enrich our understanding of their performance role, by asking referees' themselves what beliefs and perceptions they hold about their own decision-making practice. This type of knowledge could help enhance the design of referee

training programmes. The aims of this study were, therefore, to better understand: (i) why referees make decisions; and (ii), the nature of perceptions that inform their decision-making judgements. The analysis ultimately aims to generate a new substantive theoretical perspective on referee decision-making practice, so that researchers, players, coaches, spectators and referees themselves, have a better understanding of 'how and why' referees make decisions.

Methodology

This study, primarily using interviews, used grounded theory methodologies to investigate the perceptions referees have about their own decision-making practice during football matches (for an in-depth explanation of grounded theory techniques see Charmaz, 2006, 2008; Glaser & Strauss, 1967; Strauss & Corbin, 1990).

Participants

Prior to undertaking interviews with the referees, ethical approval was granted from FFA (Football Federation Australia) and the local university ethics committee. Participants provided written consent pertaining to the conditions of involvement, with their anonymity preserved at all times throughout the process. The final interview group comprised 9 national level referees (aged 23 - 35yrs), with data collected between 2010-2013.

Interview procedure

Open-ended interviews were conducted (usually lasting between 30 - 45 minutes), with questions directed towards answering our stated aims: (i) why do referees make decisions at all, and (ii), what perceptions inform their decision-making judgements. Initial interview questions focussed on developing a rapport with the referees and covered topics

such as: what do you enjoy about refereeing and why do you referee? As the interview progressed, more purposeful questions ensued, such as: what do you think makes a good referee? and, in your opinion, what is your role? These questions were not a direct translation of the research aims but rather *points of departure* that allowed the research intent to be exploratory; encouraging participants to share and discuss 'incidents' (e.g., match-scenarios that involved decision-making) during football matches (Maxwell, 1998). This is particularly important to the success of *constant comparison* method (Glaser & Strauss, 1967), as it ensured that a diverse range of decision-making incidents and situations were discussed to provide data, which were then coded into as many categories for analysis as possible. The existence of such a broad range of analytical categories and their properties necessitated their comparison, and thus integration, which ultimately '…forces the analyst to make related theoretical sense out of each comparison' (Glaser & Strauss, 1967, p. 109).

Data analysis

Upon completion of an interview, the lead author (who was also an experienced referee) conducted and transcribed the interview verbatim to ensure implicit meanings and contextually specific language was not overlooked (Seve, Poizat, Saury, & Durand, 2006). Once transcribed, *line-by-line open coding* (in conjunction with memo-writing) was undertaken, a process which facilitates identifying tacit assumptions, explicating actions with meanings, comparing data with data, and noticing gaps in the data (Charmaz, 2006). These lower level categories emerged quickly and comprised two types: those which were extensions of language used by the research participants and those that the lead researcher developed. Each was important, as codes resembling language used by participants offered imbued meaning and descriptions of actual decision-making processes the referees undertook. Whereas codes constructed by the researcher represented the drawing of those

actions and processes together to explain behaviours in conceptual terms (Glaser & Strauss, 1967).

Once concepts (and their properties) started to take shape, *focussed coding* occurred (Charmaz, 2008; Glaser & Strauss, 1967). This involves the most significant and/or frequent earlier codes being used to sift through remaining data. Conceptual mapping and memo-writing was included in this process as well, as it helped to clarify logic and remove non-relevant properties, allowing higher-level overriding and integrating conceptualisations to crystallise and thus theory to be formulated with a smaller set of higher level concepts (Glaser & Strauss, 1967). As these conceptual ideas were forming (and being finalised), they were often discussed and reviewed with research team members for *trustworthiness* (Shenton, 2004). Additionally, *member checking* (Charmaz, 2008) occurred with participants, wherein the lead researcher discussed key topics that had emerged from the interview with referees. These processes provided an opportunity to explore and evaluate intricacies and tensions surrounding proposed interpretations and allowed cross-checking of individual ideas and knowledge of the data, so that theoretical ideas were richer, more complex and consequently theoretically denser (Glaser, 2003). Together, these techniques ensured a proportioned view of the evidence, which allowed the lead researcher to be more *reflexive* about their contribution to theory development, since during comparison, biases of particular people and methods tend to reconcile themselves (see Etherington, 2004; Gouldner, 1971; Horsburgh, 2003).

It is important to recognise that at every stage of the process, whether it was during data collection or analysis, the data were receiving some kind of interpretation. Therein, the conceptual categories presented in the Results section are not simply the sum of a collection of incidents, but rather a progressive, cumulative, reflexive and constructive process created uniquely between both the researcher and the participant (Mills, Bonner, and Francis, 2006).

To this extent, we did not aim to solely tell the participants' stories but instead present emergent categories that were more robust than any individual incidents or facts that gave rise to them. Finally, should it turn out that a single incident or piece of evidence (i.e., data) itself is not 'accurate beyond a doubt', the concepts presented undoubtedly offer a relevant theoretical abstraction of 'why referees make decisions at all', as their accumulating interrelations can explain, describe and predict referee decision-making behaviour.

Results

Analysis revealed decision-making actions were used strategically (and in a connected way) to accomplish two overarching task goals, to: (i) maintain control of the game, and (ii), preserve the integrity of the game. How participants' decision-making actions satisfied these task demands could be conceptually organised into four distinct categories (which we have termed the 'pillars' of the game) - *safety, fairness, accuracy and entertainment* – which varied in importance depending on the state and context of the game.

Each category begins with a conceptual definition, which is then explicated with its relevant properties to exemplify 'what informed their decision-making process'. The overarching task goals of the referees, to 'maintain control and preserve the integrity of the game', are higher-level, integrating conceptualisations, and are thus evidenced constantly throughout the categories rather than as separate categories. In this respect, these goals are not, therefore, always voiced explicitly by participants, as they instead reflect theoretical abstractions from the data that explain and identify how and why referees make decisions (Glaser, 1998). To assist with being as transparent as possible, actual quotes are presented within each concept to help *contextualise* their true significance and relationship with the overarching task goals. Pseudonyms (instead of names) are used to retain data anonymity and to allow the characters to form their own identities to the reader (Stake, 1995).

Safety

The theme of ensuring player 'safety' was a key pillar underpinning the referee's decisions. Christian explains how he believed that players, spectators and coaches (the football community) considered it a central responsibility of the referee to 'take control' in order to protect players from injury or harm throughout a match:

> The players want the referees in control. The players do not want their legs broken, or their ankles broken, the players want the referee to be in charge. The players want the referee to clamp down on certain types of fouls (Christian).

He then contends that to avoid circumstances spiralling (e.g., the broken legs mentioned) the referee must *demonstrate* control of the player's safety. Michael clarifies that decisions in the first ten to fifteen minutes are critical in this regard, as they work to construct a framework of 'safe play' for the entire match:

> So I think that if the referee can set a good grounding in the first ten to fifteen minutes, then ninety-five times out of a one hundred he will set the scene for the rest of the game. And, it is building that rapport and trust with the players, between the players and the referee that they are going to be protected, because if a player feels like they are going to get snapped every ten seconds because the referee is not acting on it… that is when the quality of the game breaks down, because the player starts focusing on their wellbeing as opposed to concentrating on what they are going to do next (Michael).

Like Michael, Patrick suggests that these decisions made (in the early parts of the game) are crucial formative periods for players to understand what actions are safe and which are not. He elaborates:

> I guess it starts right from the start… if there is a really bad tackle in the first minute and you don't do anything about it, well, it really sets the tone for the rest of the match (Patrick).

Colin, Patrick, Christian and Michael all share similar concerns about how the game will evolve if the referee does not clearly communicate the standard of safety expected, through their early decision-making actions. Colin explains:

> In any game the first ten minutes is crucial, don't get me wrong, but the importance of setting the standard.... the standard does vary for each game depending on how the players want to play football. Okay so if they want to come out and kick the hell out of each other that is where I take over. Then, the game is going to be on a really short leash. So if the first tackle of the game is a leg-breaker style tackle then they are going to have no room from me as a referee (Colin).

When Colin uses phrases like 'short leash' and 'no room', he is referring to how much he is willing to adapt his ideas of what constitutes a foul, by letting the players have some 'say' in the way the game is played. However, Michael like Colin clarifies that, if this sovereignty is not respected then the match will be tightly controlled from thereon:

> If they are going to play silly and just go crazy, you start blowing the whistle until such time that the players are starting to understand where you are coming from and then you can sort of relax and let the game flow a bit more (Michael).

In summary, Christian, Michael, Colin and Patrick have all indicated that how the players end up interacting with each other during the match (whether safely or dangerously), is conditional on how successfully the referee is able to instil a faith in the players that they will be protected by the referee. This faith is quite often achieved early in the game, with decision-making actions in the first ten to fifteen minutes laying a framework for what actions are deemed acceptable (safe) for the rest of the game. In essence, these decision-making actions - invested in keeping the players safe - also act as important chances for the referee to impress their authority on the players (i.e., to maintain control of the match) and reinforce that they are protecting them effectively so that players do not take matters into their own hands (i.e., preserving the games integrity).

Fairness

'Fairness' can be described as ensuring that the players do not prosper from unlawful actions during the game. How players come to understand what is fair and what is not fair, relies in part on the decision-making choices of the referee. Greg begins:

> I think you keep it moving until you get a situation where a player is endangered or is dispossessed of the ball or, not given a fair opportunity to get the ball. I mean if there's little challenges here and there, I suppose what we'd call fifty-fifty; you've just got to keep it going and let them go. But if it's clear that a player has been unfairly stopped from getting the ball or has the ball unfairly taken away from them, you've got to pull it up. That's what I'm looking for, that's what's going through my head all the time. I come back to in my head - it's always the words 'is it fair'? If it's fair I'm going to keep it going, if it's not, I'm going to pull it up (Greg).

Greg's comments highlight how even though some actions may be considered outside the laws of the game. He uses his understanding of what is 'fair' (i.e., acceptable or not) before intervening, by judging the outcome of the action within the current context of the game. Jasper's elaborates:

> For me the spirit of the game is… I guess it is playing the game and to ensure that fair play flourishes and that a skilled player can play. The spirit of the laws are 'why the laws were there in the first place', not necessarily black or white. But why are the laws are there? Like kicking the ball away and delaying the restart. It is not just in the laws of the game for when someone kicks a ball away and you book em'. Delaying the restart is in the laws of the game so that attacking play can flourish and you can have quick free kicks and you can score more goals (Jasper).

Jasper's comments illustrate how referees determine if something is 'unfair' by considering to what degree does the individual action more broadly impacts on how the game 'should be played' (e.g., keeping it flowing, ensuring attacking play flourishes) rather than just considering the action-type in isolation. Brenton goes on to explain that what constitutes 'fairness' is specific to the game taking place, with the referee's decisions during the game contributing to the construction of what is 'fair':

> We talk about the see-saw. They will compare back to other incidents. If they think it is unfair, and that you're not giving the ball back when they feel it has been taken unfairly, they will retaliate if the referee is not going to take action. They will take matters into their own hands (Brenton).

In summary, Brenton's remarks reinforce how fairness is important for maintaining the integrity of the game, as the players (to some degree) understand what they can and cannot do due to the decision-making of the referee, which influences the nature of the contest (e.g., how fairly it is ultimately played). In this sense, Brenton (and the others) highlight how fairness and safety are contingent on one another, because if players are seen to prosper from foul-play without reprimand, players may take justice into their own hands; ultimately compromising the referee's capacity to maintain control of the match and keep players safe.

Accuracy

'Accuracy' refers to the apparent 'correctness' of the referee's decision rather simply whether a decision was right or wrong. It was important for referees to be perceived as accurate, as perceptions surrounding wrong decisions attracted controversy and thus reflected an 'inappropriate' influence by the referee on the outcome of the game (i.e., a manifestation of inaccuracy). Greg starts:

> I want to make sure there's no controversy. I want to make sure that all my decisions are correct and that when I look back through the video, I haven't made any major mistakes (Greg).

Jasper suggests that the whole football community (not just referees) share Greg's underlying sentiment; ultimately no-one wants the referee to decide the result of a game because of a poor decision:

> I think all these people want us to do is to get decisions right. They don't care who we are, what we are like… all they want is for us to get decisions right. And at the end of the day, getting decisions right is what these guys play for.... they come off from a game and say 'he got it wrong and this cost us the game' (Jasper).

Patrick goes on to suggest that the ideal game for fans is the belief that the players were entirely responsible for the how the game transpired:

> I think the goal is always to go out there and get through the game without having an influence on the match, or sorry, to be *seen* to be having an influence on the match. I mean obviously the referee is having influence all the time …but you know I guess it is the old cliché: if the referee is not seen or heard then fantastic. If they are talking about the match [not the referee] afterwards then that is great. I think the referee goes out there to avoid any controversy (Patrick).

Patrick's comments indicate how controversial decisions could describe times when the actions of referee *appear* to have had a tangible impact on the final outcome of the match (i.e., the direct opposite of what the players, fans and referee's hope for). Kit elaborates on this point, by showcasing how the burden of proof (i.e., the need for the decision to be perceived as 'absolutely correct') is heightened depending on where the incident occurs on the field:

> Well, when you're giving a decision in the box for a penalty or a major decision - that has to be absolutely correct - because people don't forget it. If you give a decision in the middle of the field, then people might be a bit annoyed at that particular time but nobody really cares and nobody will care tomorrow. But if you give a decision and it's a penalty, especially if it's a crucial penalty, then people don't forget it. It then becomes a very important aspect of that game. So those sorts of decisions are absolutely crucial, you must get it right, you must have a position on it. Because even if you don't give a penalty, it's slightly better than giving a penalty and getting it wrong (Kit).

What Kit has outlined here is that when a referee makes a decision that significantly impacts on the game, the referee's decision is then inextricably added to the context of what the player's action 'means'. That is, instead of the action simply being a dangerous tackle, it is also a penalty awarded by the referee and a likely change in the outcome of the match. In this sense, Kit's comment that 'even if you don't give a penalty, it's slightly better than giving a penalty and getting it wrong' shows how the significance of accuracy is nested within the

responsibility that the referee has to preserve the integrity of the game - as an incorrect penalty essentially makes the referee an 'accessory' to the player who has prospered from their crime of foul – a major breach of social expectations regarding how the game should transpire.

Referees explained that perceptions surrounding their decision-making accuracy are not a simple matter of whether the actions undertaken by the player involved actually represented a foul or not, but rather, the referee's actions throughout the game also contribute to what everyone considers to actually *be* a foul. Jasper explains:

> I think great referees have an ability to colour people's perceptions so much that even when they are wrong, people assume they are right. So what I have drawn here [participant drew what a good referee looks like] is just a grandstand and field with people wearing rose coloured glasses, and every decision the referee makes, even if he is wrong, the crowd thinks he is right. And not just the crowd, but the players more importantly, and I guess whether the decision is right or wrong the players accept that he is right because he has coloured their perception so much that they think he is a great referee that they respect his decision in a way (Jasper, 2010).

To achieve this, Nathaniel suggests that communicating clearly can contribute to establishing what a foul is and what a foul is not, throughout the game. He says that often making a fast decision aids the referee in appearing to have made the correct call, rather than deliberating and appearing uncertain. He also suggests that how confident the referee looks, assists in making the decision look accurate and therefore prevents others from questioning whether it is right or not:

> You have got to make it obvious and clear to the people that are looking at you, so if you put your arm out firmly then everyone knows that that's the way it is and that's the way the throw in is. You make a quick sharp decision and half the time no-one will argue with you because you look so confident in doing it… I think you can get away with making the wrong decision if you are looking confident, if for whatever reasons you are in the wrong position and you may not see it but if you look confident than half the battle is done (Nathaniel).

Jasper then makes the simple but interesting observation about the perception of accuracy, when he reflects on how the accuracy of a decision would be interpreted differently depending on who is delivering the decision:

> If a little kid went out and refereed and he makes the same decisions as you or me, he is going to be perceived differently (Jasper).

In summary, what each of the referees has suggested is that the notion of accuracy is defined not simply by making the 'right' call but also relates to the referee's capacity to appear to have made the correct decision(s). To this extent, they explain that referees can refine the way players, coaches and spectators perceive incidents, by using specific techniques to add to the believability of a decision so that participants will behave accordingly (which allows them to maintain control of the match). When decisions by the referee are perceived as accurate, this ultimately reinforces to all invested parties that the game integrity has been preserved, as the players themselves feel they have decided the competitive outcome.

Entertainment

Entertainment refers to the understanding that referees have about the expectations that they themselves, players, coaches and spectators hold for the way the game should be expressed. The referees believed, therefore, that how entertaining the match could be was contingent on their decision-making choices. This is because he/she has the capacity to stop and start play and thus render certain types of actions unacceptable throughout the match and equally encourage the prevalence of certain more favourable behaviours. In the following comment, Christian describes how the referee may identify an infringement (that may also be potentially unsafe or unfair in nature), yet opts not to intervene in the interests of entertainment:

> But for the trifling fouls or those little fouls, a referee can enhance the game by seeing the outcome as a fantastic advantage. So instead of pulling the

> game up to penalise a minor infringement which he can play on and deal with later, instead it is a little foul, a little free kick and the spectacle is ruined. Whereas if you can enhance the game and convey that you have seen a little foul but we have got a better chance of scoring the best goal the A-League has seen, that to me would be the biggest way to enhance it, just allowing the game to flow and then remain a spectacle, so allowing the football to take place (Christian).

Greg goes on to explain that this approach to decision-making is not limited merely to isolated instances of grand success but rather, that the referee is attending to the notion of entertainment in some capacity with every decision he/she makes:

> Yeah, because there were little nudges and pushes and this that and the other, but you just let those go because you don't want to upset the flow of the game. If you start pulling all those little things up you'll find that players get more aggressive toward you, because they want to play. They're happy to ride some of those fouls at that level (Greg).

Greg's comments reflect how the emergence of a referee's decision is driven by key understandings that the referees themselves have about how players, spectators, coaches and their colleagues have regarding how the game should be characterised. Michael explains that what is allowed is contextually situated, and thus, is different from game to game; requiring the referees to adapt and refine their decision-making to best serve the unique circumstances of each match:

> You need to be able to adapt to the game that is front of you, because you know, no two games are the same. There are different pressures, the atmosphere in the match, the crowd size, the fact that one team is looking for a semi-final berth, can change the way the game is played (Michael).

What Michael and the other officials are alluding to, is that in order to effectively 'manage the event' and uphold the notion of 'entertainment', the referee is often required to use various discretionary tactics to address fouls, rather than treating all fouls in the same way every time. Patrick elaborates:

> You know I think that you learn to read situations a lot better and apply your own emotions to it I guess, when you are dealing with the decisions. So,

> whether you need to be forceful with a player in a certain situation or whether you need to perhaps back off and maybe not talk to a player in a certain situation. You know, when a player's a little bit volatile, maybe you don't want to create a confrontation with that player and it might escalate things and then on from there... So the experience is a big factor in identifying those sorts of situations (Patrick).

Patrick goes on to explain that sometimes, despite the referee's best efforts to manage the event and prevent matters from escalating, instances do arise where the referee is forced to intervene, and for example, issue a red card:

> We talk about managing the event … it would be great if we could have no controversy, no send offs, two teams just play and the best team wins so to speak… I think the referee goes out there to avoid any controversy and I mean sometimes that is just unavoidable. So, even though he probably would have made the 100 percent correct call, the commentators and the spectators would perceive it as being the referee who has influenced the match unfavourably which has detracted from the spectacle. When in an ideal world they would say, the players been sent off because he has done this, and the focus being put back on to the players and the team. But as you know that is not always the case (Patrick).

In summary, entertainment refers to the degree to how *every* decision that the referee makes is aimed at meeting properties that define 'entertainment' such as: 'having no sendings off', 'keeping the game flowing and exciting', 'managing the event' and 'enhancing the spectacle'. Whilst at times the referee is forced to make contentious decisions that are match altering (e.g., a send-off) or controversial (e.g., penalty), this merely reflects that players have a different set of goals to that of the referee (e.g., most notably – winning) and, therefore, may attempt to undertake actions to achieve their goals that do not align with the referee's vision for the match. This is true of all four pillars, with the referee's choice to intervene, ultimately always representing intersections between aims relevant to the pillars (e.g., scoring a goal *and* keeping a player safe) nested within their overarching task objectives: to maintain control and preserve the integrity of the game.

Discussion

Despite growing evidence that the referee's decisions are influenced by a range of task and socio-cultural environmental constraints, research to date remains divided on whether these factors help or hinder decision-makers in making 'correct' decisions. Our study aimed to address these tensions by asking national level football referees themselves: (i) why do referees make decisions, and (ii), what informs their decision-making process. The analysis revealed that referees coordinate decisions toward accomplishing two overarching task goals to: (i) maintain control of the game, and (ii), to preserve the integrity of the game. How these decision-making goals are achieved was conceptually organised into four categories (that we have termed the 'pillars' of the game) - *safety, fairness, accuracy and entertainment*. In the following discussion, we will contend that these results offer two key findings concerning referee decision-making, these are: (i) interacting constraints shape emergent referee decision-making nested within task goals, and (ii), referees co-construct the game with players in a cyclic relationship underpinned by intentionality constraints (i.e., the four pillars).

Interacting constraints shape emergent decision-making

Previous studies have asserted that referee decisions are 'supposed to be as *accurate* as possible', predicated on an assumption that the actions of players occur *independently* of the referee. Thus, with training and feedback, referees can learn to discriminate and respond to specific actions in predictable ways (Schweizer et al., 2011, 2013). Our findings, however, offer an alternative perspective to these assumptions, that is, that interacting constraints shape emergent referee decision-making framed by overarching intentionality constraints. On this account, a referee's intentions for the game (i.e., for it to be played in line with the values of the four pillars) can be considered a key constraint that frames the referee's perception of

players' actions during the match (i.e., how the referee perceives an incident) (Seifert & Davids, 2012). For instance, in this study, when Jasper considers cautioning a player for 'kicking the ball away', his deliberations are rooted in whether the act contravenes *fairness;* did the offending player gain an advantage from the act (i.e. did they prevent an attacking play from occurring)? His capacity to determine this issue requires him to attune to key task (e.g., where on the field the incident happened, how much time is left in the game) and environmental constraints (e.g., are other players immediately available to support a quick attack) to contextualise the extent attacking play was diminished. Therefore, in a similar instance in a competitive game context, evaluating the referee's *accuracy* (i.e., whether a caution should or should not be awarded) could only be determined by ascertaining whether *fairness* was appropriately preserved in relation to interacting constraints acting on a referee at the time.

In addition, constraints acting on the referee 'at the time' may also include how similar incidents have been treated previously (see Brenton on *fairness*) and how effective varying decision-making actions may be in managing the player's behaviour throughout the game. As such, deciding whether to give a yellow card not only relates to making an 'accurate' decision (yes, that action does constitute delaying the restart of play), but is also as a game management technique related to the referees task aims to avoid other unwanted outcomes in the game (e.g., will this decision contribute to preventing the delay of the restart *ongoing* or will this decision inflame the situation and lead to a 'send-off'). The evident connectedness and goal-orientation of the referees decisions, offers an explanation as to why 'snapshot' assessment protocols that evaluate decision-making accuracy only in terms of 'right or wrong' or in terms of a single 'correct' decision, have generally yielded both lower and more varied accuracy scores than would be expected from elite level referees (e.g., Fuller et al., 2004; Gilis et al., 2006; Mascarenhas et al., 2005).

Referees co-construct the game in a cyclic relationship with players

Previous research has advocated that referees 'use context' as a type of 'gap-filling' technique to contend with difficult decisions in ambiguous situations, as an 'adaptive use of information' (MacMahon & Mildenhall, 2012). Whilst our findings support the notion of 'using context' to make and support decisions, significantly, our results indicate that referees strategically use decisions to '*make* context'. This is illustrated by Michael in this study, who described how referees undertake specialised decision-making behaviour during the formative periods of the first half to 'set the scene for the rest of the game', by aiming to achieve multiple goals simultaneously, such as protecting player safety as a means to developing conditions for a free flowing match. To elaborate, referee decisions during the first fifteen minutes act in a similar way to how field markings or the goal-posts can constrain player behaviours in team sports (Headrick et al., 2012; Renshaw & Gorman, 2015). On the one hand, the referee's decisions 'make context' by offering tangible demarcations (in the form of decisions) which are intended to channel the emergence of intended behaviours from players (Araújo, & Davids, 2016). On the other, decisions offer contextual meaningfulness to the actions of the players, acting as informational constraints invested in evolving the game in line with co-invested task values expressed in the four pillars.

This interpretation conceivably explains why Mascarenhas et al. (2009) found decision-making 'accuracy' during the first 15 minutes of each half to be 50%, compared with 70% accuracy at all other times. This study suggested that differences were probably not due to intentional strategies by the referee to 'set the standard', because there was no predictable pattern of 'errors' (i.e., referees at times over-penalised and at other times under-penalised players). We contend that this unpredictability (inconsistently over- or under-penalising players) is due to the unique co-adaptive relationship (Passos Araújo & Davids,

2016) created between the players and the referee, ‘depending on how the players want to play football’ (Colin) in any given competitive game. In this sense, the acceptable boundaries of behaviour developed within a game are a *co-construction*, wherein scenario-specific functional patterns of behaviour emerge as a product of a competitive and cooperative relationship between referee’s decisions and the actions of players to enhance each parties respective functionality in the game (Araújo et al., 2006; Passos et al., 2016; Pinder, Davids, Renshaw & Araújo, 2011).

Summary and implications

Previous studies that have provided evidence that referees are influenced by context, have generally portrayed this influence negatively, as a type of unconscious sequential biasing effect (e.g., Plessner & Betsch, 2001) or positively, as a ‘gap filling’ technique to infer the ‘right’ decision when faced with missing information (e.g., MachMahon & Mildenhall, 2012). In both instances, the assumption is that the players actions: (i) emerge independently of the referee's interventions, and (ii), provide *all* the necessary information for a decision, either on their own, or in relation to a competitive context. Our findings suggest that this portrayal is inaccurate, and that both, how the football match evolves (e.g., nature and style of football), and how the players, coaches and spectators perceive and understand incidents (e.g., what constitutes a foul and fair play), are *necessarily* contingent and connected to the decisions of the referee. This interpretation offers insight into a long-held cultural view that ‘if the referee is not seen or heard then fantastic’; often mistakenly synonymised with a belief that the referee should not be ‘having an influence on the match’ (Patrick).

To this extent, there is some merit in Brand and colleague’s (2006) suggestion that ‘accuracy’ should not solely be used to measure expertise, particularly as non-representative

(non-naturalistic) video ‘snapshots’ of isolated incidents do not capture the true expertise of referee decision-making. As such, philosophies underpinning research design, practical testing, and interpretation of decision-making actions, should move towards evaluating referee decisions in terms of their ‘appropriateness’: that is, how faithful or effective the decision was in achieving the referee's goal-orientated intentions (i.e., the four pillars), nested within the context of the whole event (Davids 2008). This fundamental change of approach highlights that the appropriate scale of analysis to study referee expertise is the individual-environment synergy (Gibson, 1986). This perspective has interesting implications for studies that undertake statistical work on refereeing decision-making accuracy, founded on the assumption that decisions are ‘independent’ of each other during the match (e.g., that a penalty is as likely in the first minute as the thirtieth or the ninetieth). This novel viewpoint suggests that distinctions should be made between ideas of bias and the complex strategies referees use to manage the game.

Future work and limitations

This study sought to record the 'missing voice' in referee decision-making - the referees themselves - by sampling the views of national level football referees. However, given that context dependent decision-making is a crucial part of expertise (Renshaw & Gorman, 2015), caution should be applied to generalising these findings across football leagues around the world and to competitions in other sports. Consequently, further work is needed to explore how referees from different nations are influenced by socio-cultural constraints and in what ways they influence the emergence of both decisions and subsequent game-styles. Additionally, as data in this study are primarily related to personal reflections from the referees themselves, it would be valuable to examine if any differences exist between decision-making strategies undertaken during an actual match and those which have

been described in this study. For instance, key task constraints that emerged as shaping decisions - such as time in the game, foul location and game score - could be verified by analysing game incidents in conjunction with referee feedback. Furthermore, referees in this study highlighted the co-construction of a game, along with the other key participants, including the players. This observation indicated that much of the referees' interpretation of incidents relies on meeting expectations that are shared by players, coaches, and spectators. As such, there is a need to investigate the perspectives of players, coaches, and spectators regarding the referee's decision-making role, as this would enable referees to better calibrate their decision-making in line with key stake-holders. Future research that incorporates expert opinions from refereeing coaches would also enhance and complicate our understanding of decision-making practice of referees.

Conclusions

In conclusion, this work indicates that the decision-making actions of referees, in conjunction with the players, co-contribute to the emergent match product. In this respect, rather than decisions representing 'pure reactions' to incidents or even 'responses' to context, referee decisions are: (i) strategic attempts to co-construct the game with players in line with important culturally co-invested task values expressed in the four pillars; and (ii), emergent and nested within task goals, being continuously shaped by interacting constraints. As such: (i) decisions should be viewed in the context of a competitive match, and (ii), distinctions should be made between effects on decision making of types of personal bias and the complex strategies that referees use to manage the game.

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