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# The Home Team Advantage Gives Football Referees Something to Ruminare About

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## **ABSTRACT**

Observation suggests that referees significantly contribute to the home team advantage in football. The atmosphere created by the home team fans is thought to be the major contributing factor, but the extent of this influence is dependent on the referee. The Decision-Specific Reinvestment Scale was developed to identify those individuals susceptible to disrupted decision making under pressure as a result of their tendency to over-involve consciousness in decision making (Decision Reinvestment) or as a result of their tendency to ruminate upon poor decisions made in the past (Decision Rumination). We asked qualified referees to make a series of video-based decisions to examine whether the home team advantage effect was associated with a high or low tendency for Decision Reinvestment or Decision Rumination. We showed that referees categorized as high Decision Ruminators disproportionately made decisions in favour of the home team. The tendency to ruminate upon poor decisions may help explain some of the variance in the home team advantage effect shown by different referees. We conclude that aspects of personality should be considered in the development of training programs designed to improve and standardise football refereeing.

**Key words:** Association Football, Decision-Making, Home Field Advantage, Referee Bias, Performance Pressure, Reinvestment Scale, Soccer

## **INTRODUCTION**

Football referees have an unenviable task. They preside over a fast-paced and emotionally charged game and operate within guidelines that are open to interpretation. The human nature of refereeing guarantees that mistakes will be made. Some consider this part of the game's charm. What remains fundamental to the game's integrity is that referees are impartial and consistent, and that they do not favour one team over the other. However, recent investigations imply that when top referees make mistakes they are more likely to

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make them in favour of the home team [1-3]. Referees tend to issue fewer yellow cards (cautions) or red cards (dismissals) [1, 2] and award more penalty kicks [1] to home-team players. Referees also allow a greater amount of stoppage time if the home team is behind in the match [2]. Consequently, referees are said to significantly contribute to the well-documented home team advantage that is evident in football.

The reason for referee bias has been attributed to the pressure applied by the home team fans. Crowd noise [4], the crowd's proximity to the pitch [2] and crowd size [e.g., 1] have all been shown to have a bearing on the home team advantage, but the extent to which home team fans influence the referee is dependent on the individual. Page and Page [3] speculate that the ability to cope with the social pressure exerted by home team supporters may be largely responsible for the observed differences between referees. They ran a comprehensive analysis of nearly 38,000 matches, spanning 58 competitions (international and domestic) across 14 years (pre-2008) and used the size of the crowd attending a match as a yardstick of the weight of social pressure on the referee. The analysis revealed that for some referees a larger attendance led to a stronger home team advantage effect than for other referees, implying that referees cope differently with the atmosphere created by home team supporters. Refereeing experience has been suggested to play a role, with more experienced referees exhibiting less of a home team advantage effect [1, 4], but it is likely that aspects of personality also significantly contribute to the individual differences observed.

A recent line of research, which might offer insight to the role of individual personality differences in the performance of referees in pressure environments is based on the Theory of Reinvestment conceptualised by Masters and his colleagues [5, 6, 7]. The Theory of Reinvestment suggests that involving conscious processes in performance may not always be a good thing and that individuals differ in their propensity to do so. The Reinvestment Scale, for example, which was developed to determine those individuals more or less likely to involve conscious processes in performance, has proven to be an effective means of identifying individuals susceptible to 'choking' under pressure (see [6] for a review). High scores on the Scale have also been shown to relate to disrupted performance in complex cognitive tasks (i.e., mental arithmetic [8]), suggesting that reinvestment may also moderate the capacity to perform effectively in environments that require fast and accurate decision making, such as football refereeing.

With this in mind, Kinrade et al. [9] modified the original Reinvestment Scale to create a decision-specific version. The result is a 13-item two-factor Decision-Specific Reinvestment Scale (DSRS). The first factor, labelled *Decision Reinvestment*, contains items associated with an individual's tendency to consciously monitor their decision making (e.g., "I'm always trying to figure out how I make decisions"), whereas the second factor, labelled *Decision Rumination*, contains items associated with an individual's tendency to reflect upon prior poor decisions (e.g., "I often find myself thinking over and over about poor decisions that I made in the past"). This modified scale was distributed to male and female competitors in fast paced team sports (e.g., basketball) and coaches were asked to rate each competitor's tendency to choke (i.e., make poor decisions) under pressure. The coaches' ratings significantly correlated with both the Decision Reinvestment and the Decision Rumination factor, causing Kinrade et al. to propose separate explanations to account for poor decision making under pressure. They suggested that the over-involvement of consciousness (evaluated by the Decision Reinvestment factor) may result in poor decision making by interfering with the normally automatic processing of a decision. For example, an intuitive decision about whether to pass or to shoot may be disrupted by a more conscious appraisal of the environment. Alternatively, some decisions may require conscious consideration. In

this case, ruminating over past poor decisions (evaluated by the Decision Rumination factor) may result in poor decision making as conscious processing resources are taken away from the decision at hand (e.g., the selection and implementation of a game plan).

Like competitors in fast-paced team sports, football referees operate in complex, time-constrained and often stressful environments and make a range of decisions that vary in their conscious processing demands. It is likely that the decision-making behaviour of a referee is similarly associated with the propensity to reinvest or ruminate while making decisions. To continue with this line of reasoning, decision reinvestment or decision rumination may explain the susceptibility of some football referees to the home team advantage effect [3]. For example, hostile home team support may cause those referees with a high propensity to reinvest to override ordinarily automated responses with conscious thoughts that have become biased by awareness of which player belongs to the home team. Alternatively, hostile home team support may cause those referees with a high propensity to ruminate or reflect on negative experiences in similar hostile environments. Rumination limits the resources available to consciously process an impending decision and instead the referee may respond in a manner that avoids a repeat of the negative experience (i.e., respond in favour of the home team).

The experiment reported below represents a preliminary attempt to establish whether there is a relationship between susceptibility to the home team advantage effect and the propensity of a football referee to reinvest or ruminate when decision making. To examine this possibility, we asked qualified referees to make decisions on game footage of opposing players competing for the ball. Replicating the social pressure of home team support in the form of crowd size, density and proximity is difficult in a laboratory-based experiment; however, previous analyses have shown that individual referee differences in the home team advantage effect remain when factors such as match attendance and stadium characteristics have been controlled for [3]. Therefore, we muted the audio of the footage and avoided presenting additional visual clues about which were the home team players. Instead, we simply informed the referees of which players were playing at home and expected that this would be sufficient to result in a higher proportion of decisions made in favour of the home team. More specifically, we expected that a home team bias would be most pronounced in referees with higher Decision Reinvestment and Decision Rumination scores. Finally, because conscious processing is slower than automatic processing of a decision [10], we expected that referees with high Decision Reinvestment and Decision Rumination scores would take longer to respond than those with low scores.

## **METHOD**

We recruited 28 male referees certified by the Hong Kong Football Association with an average of 8.22 years ( $SD = 6.43$ ) refereeing experience ( $M$  age = 29.00 years,  $SD = 4.37$ ). The referees were shown a series of video clips, taken from top-flight European football games, in which two players competed for possession of the ball. Each incident involved one player who was wearing an all white strip. The clips were selected from a pool of clips that had been evaluated by two Asian Football Confederation (AFC) referee instructors, as well as the second author. These three evaluators reviewed each clip and adjudged whether it showed a foul by the white team player, a foul by the non-white team player or no foul by either player. We assumed that a home-team bias was less likely to occur when the correct decision was obvious, so we selected 45 clips that only two of the three officials agreed upon; 15 of each of the 3 possible decisions. The clips were presented in a random order. To control for between-clip differences in crowd noise and intensity we chose to mute the audio on each

clip. We also attempted to limit the possibility that referees were influenced by other factors unrelated to the home advantage question. For instance, all potential fouls took place outside the penalty area, only the immediate build-up to the incident was shown and the clip was occluded to prevent observation of the players' or officials' responses to the incident.

Prior to viewing the 45 clips, participating referees were simply informed of which of the two players involved in the incident was playing at home. To help control for the possible influence of football strip colour [11] or other clip idiosyncrasies on decision making, half of the referees were informed at the start of the clips that the white team was playing at home and half of the referees were informed that the white team was playing away. The referees were asked to imagine that they were officiating in a game and to decide (by responding with a keyboard press) whether the incident was a foul by the white team (press v), a foul by the non-white team (press b) or no foul by either team (press n). The referee's decision and response time (clip occlusion to key press) was logged by E-Prime software and used for later analysis. To evaluate whether the referees disproportionately favoured the home team we conducted two analyses. First, we compared the number of incidents judged to be a foul by the away team (home team favoured) and the number judged to be a foul by the home team (away team favoured). The corresponding analysis of response-time data was also conducted. Second, because referees can also favour the home team by *not* awarding a foul when it was likely that a foul was committed by the home team, we also compared the prevalence of this 'no foul' form of bias in favour of the home team with that in favour of the away team. Referees completed both the Decision Reinvestment and Decision Rumination factors of the Decision-Specific Reinvestment Scale [9]. The Scale required the referees to rate how each of 13 statements reflected their own decision-making process from 'extremely characteristic' to 'extremely uncharacteristic' on a 5 point scale (0-4). In order, to assess the association between a referee's Decision Reinvestment or Decision Rumination predisposition and their decision making, we categorised referees as high ( $n = 10$ ) or low ( $n = 13$ ) Decision Reinvestors and high ( $n = 13$ ) or low ( $n = 12$ ) Decision Ruminators based on a median split of the two factors (Decision Reinvestment factor median score = 17/24, Decision Rumination factor median score = 16/28).

## RESULTS

Overall, our data showed that on average the participating referees agreed with 58.73% ( $SD = 8.79$ ) of the decisions made by two of the three evaluators and average response time was 3180.13 ms ( $SD = 599.45$ ). The referees favoured the home team (foul by the away team) in 31.83% ( $SD = 7.82$ ) of their decisions and the away team in 29.05% ( $SD = 6.68$ ) of their decisions. A univariate analysis showed that the difference between decisions in favour of the home and away teams approached significance ( $F(1,27) = 3.85, p = .06, \eta_p^2 = .13$ ), but the average response time for decisions that favoured the home team ( $M = 3143.89$  ms,  $SD = 669.42$ ) and decisions that favoured the away team ( $M = 3041.55$  ms,  $SD = 647.64$ ) was not significantly different ( $F(1,27) = 2.30, p = .14, \eta_p^2 = .08$ ). With regard to the no-foul form of bias, the referees gave a no-foul response to 34.29% ( $SD = 15.79$ ) of the incidents in which it was likely that the home team player committed the foul compared to 29.53% ( $SD = 14.68$ ) of the incidents in which it was likely that the foul was committed by the away team; however, a univariate analysis showed that the difference was not significant ( $F(1,27) = 1.91, p = .18, \eta_p^2 = .07$ ).

To examine whether the overall tendency to favour the home team was associated with referee's predisposition for Decision Reinvestment or Decision Rumination, we conducted separate Group (high or low predisposition) x Response (home or away team favoured)

ANOVA's for each factor. The analysis of the Decision Reinvestment factor showed no significant main effect of Group ( $F(1,21) = 1.63, p = .22, \eta_p^2 = .07$ ) or Response ( $F(1,21) = 2.44, p = .13, \eta_p^2 = .10$ ) and no significant interaction ( $F(1,21) = .60, p = .45, \eta_p^2 = .03$ ). In contrast, the analysis of the Decision Rumination factor showed no significant main effect of Group ( $F(1,23) = .24, p = .63, \eta_p^2 = .01$ ), but did reveal a significant main effect of Response ( $F(1,23) = 5.63, p = .03, \eta_p^2 = .20$ ) and a significant Group x Response interaction ( $F(1,23) = 6.29, p = .02, \eta_p^2 = .22$ ). Further analysis indicated that while the Low Decision Rumination group did not disproportionately favour the home or away team ( $t(11) = .08, p = .94$ ), the High Decision Rumination group adjudged a significantly greater number of fouls to be committed by the away team ( $t(12) = -4.14, p = .001$ ), thus favouring the home side (see Figure 1). The corresponding analysis of the response-time data and the analysis of the no-foul form of bias showed no significant main effects or significant interactions for either factor (all  $p$ 's > .15).

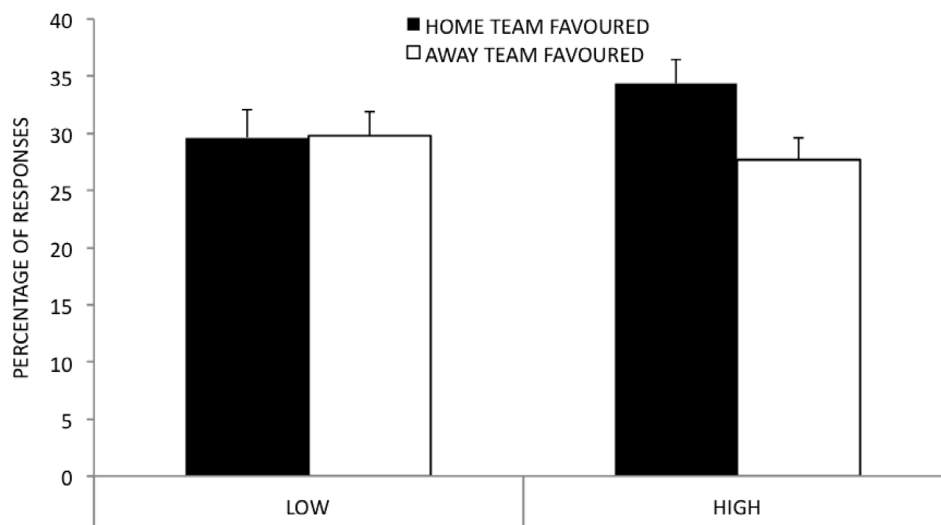


Figure 1. Percentage of Responses in Favour of the Home Team and the Away Team by Referees Categorized into Low and High Decision Rumination Groups

## DISCUSSION

Recent research has uncovered individual differences in football referees' tendency to favour the home team [3]. We identified the propensity to reinvest or ruminate while decision making as personality traits that may be associated with the home team advantage effect. Our preliminary findings were supportive. Overall, our group of qualified referees gave responses that tended toward favouring the home team; however, it became apparent that it was those referees with a predisposition for decision rumination who significantly contributed to this effect. Referees categorised as high decision ruminators made a significantly greater number of decisions in favour of the home team, whereas referees categorised as low decision ruminators showed no such bias.

In development of the Decision-Specific Reinvestment Scale, Kinrade et al. [9] proposed that an increased tendency to reflect upon past poor decisions may distract conscious

processing resources away from the task at hand, resulting in poorer decision making. We speculate that, in this experiment, an increased tendency to reflect upon past poor decisions resulted in home-team biased decision making. One explanation for this effect is that knowledge of which player was the home team player triggered rumination about past poor decisions made in which the home team players behaviour was key. Such thoughts may have reduced the availability of conscious processing resources for decision making, leaving time for only a few of the most pertinent features of the incident to be processed [12-14]. With limited computational resources available, the identity of the home-team player may have sometimes emerged as the most pertinent feature upon which to make a decision. Alternatively, rumination may occupy resources needed to override any preconditioned and unconscious bias the referee might bear in favour of the home team [13].

Without further insight into the referee's thought processes (e.g., use of self-report), the occurrence, extent and impact of rumination on on-line decision making is open to speculation. It does appear that if rumination was impeding decision making, it did not lengthen response time, as the analysis of the response time data did not differentiate high from low decision ruminators. Intuitively, it seems that more than just an awareness of the identity of the home team player is needed to trigger ruminating thoughts that prolong and sway decisions. Social pressures on the field, such as the ever-present potential for a hostile reaction from the home team fans, probably are required to provoke such a response.

A more likely explanation, therefore, is that the home team advantage effect shown was a by-product of refereeing experience. Partisan home team fans tend to question refereeing decisions regardless of whether the referee is correct or not. Continually experiencing a hostile reaction to decisions ensures high decision ruminators have a lot to ponder over and this process may begin to nurture an unconscious bias toward the home team. When the correct decision is not clear cut, mere awareness of the identity of the home team player may then be enough to evoke this conditioned home-team biased response.

A home team bias when decisions are not clear cut fits with the concept of error management [15]. Error Management Theory argues that when there is potential for making errors with disproportionate consequences, people are more likely to choose the error with the least detrimental outcome. For a referee, when the correct decision is not clear (e.g., doubt as to whether a challenge warrants a yellow card, which player last touched the ball), the decision that does not aggravate a biased and potentially hostile home team crowd, as opposed to one that does, is the least detrimental.

In this first attempt to investigate the relationship between a football referee's Decision-Specific Reinvestment profile and their susceptibility to the home team advantage effect, we have of course simplified what is a complex issue. We presented referees with isolated incidents, on video, that took place in neutral areas of the pitch (i.e., outside the penalty area). We also occluded the visual and auditory responses of the players and the crowd and the decisions were uncomplicated by judgements of the severity of the incident or the effect the decision might have on the game. Future investigations may show such factors to moderate or exacerbate the relationship implied by this experiment.

Individual differences, other than those indexed by the Decision-Specific Reinvestment Scale, may further contribute to the home team advantage effect. For example, the capacity to store, recall and use knowledge (in working memory [16]) has been linked to individual differences in the ability of undergraduates to solve problems when subjected to social pressures [17]. It is possible that the problem of making a correct and unbiased decision under social pressure may also be linked to working memory capacity.



## CONCLUSION IMPLICATIONS

Publically, football's governing bodies would not look favourably on the contribution of referees to the home team advantage effect; however, eradicating the effect is a difficult challenge. One suggestion is to simply make referees aware of their role in creating a home advantage [1]; however, instructions to not favour the home team may actually provoke refereeing behaviour that is the opposite of the referee's intention (ironic processing [18]) or alternatively, provoke a conscious or unconscious over-compensatory effect (implicit overcompensation [19]) that results in an away-team advantage. Governing bodies responsible for the training of referees perhaps need to be more subtle in their handling of this matter. Another possibility is to train referees susceptible to decision rumination to minimise reflections stimulated by the reaction of the home team support. At present, an important component of referee training is conscious reflection on decisions in post-match debriefing sessions or game simulation training. As in most domains, this is seen as a way for referees to learn from their mistakes. Our findings suggest that high decision ruminators should be encouraged not to reflect on decisions fervently questioned by home fans as it may cause them to develop a home-team bias. Instead, they could be trained to replace reflections on past poor decisions with reflections on good ones (thought-switching) or stop reflections completely by distracting attention away (thought-stopping) whenever they recognise that they might be about to ruminate on decisions questioned by home fans [20].

Suitable training programs could also be designed and developed to help referees to combat pressure by overcoming the potentially disruptive impact of reinvestment (e.g., Masters and colleagues' implicit learning approach ([5, 21, 22])). Potentially, the Decision-Specific Reinvestment Scale predicts which referees are less likely to handle big game pressure or most likely to be influenced by the atmosphere created by home team supporters. It may, therefore, serve as a diagnostic tool to signal how best to tailor training to the individual referee. Such measures should help improve and standardise football refereeing 'for the good of the game'.

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