

Do judges enhance home advantage in European championship boxing?

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Abstract

There have been many examples of contentious points decisions in boxing. Professional boxing is scored subjectively by judges and referees scoring each round of the contest. We assessed whether the probability of a home win (and therefore home advantage) increased when bouts were decided by points decisions rather than knockouts. Overall, we found that bouts ending in points decisions had a significantly higher proportion of home wins than those decided by a knockout, though this effect varied across time, and controlling for relative quality of boxers was only effective when using more recent data. Focusing on these data, again the probability of a home win was higher with a points decision and this effect was consistent as “relative quality” varied. For equally matched boxers (“relative quality” = 0), expected probability of a home win was 0.57 for knockouts, 0.66 for technical knockouts and 0.74 for points decisions. The results of the present study lend general support to the notion that home advantage is more prevalent in sports that involve subjective decision-making. We suggest that interventions should be designed to inform judges to counter home advantage effects.

Keywords: *Decision-making, judging, officiating, referees, subjective adjudications*

Introduction

On 13 March 1999, the heavyweight world championship fight between Evander Holyfield and Lennox Lewis ended in a draw, despite the overwhelmingly pro-Lewis scorecards of fight commentators and the feeling of the general public that Lewis had won. This bout in particular led to the National Association of Attorneys General Boxing Task Force (NAAG, 2000) to suggest a change in the scoring system from the current “10-point must system” (described in Lee, Cork, & Algranati, 2002) to a “consensus scoring system”, where the median score of the three judges for each round is adopted (NAAG, 2000). This is certainly not the first suggested change to boxing scoring in response to concern over refereeing. Other notable examples include the introduction of two judges and a scoring referee, or three judges and a non-scoring referee, in place of the referee as the sole judge for championship contests; the mandatory eight count; the no-foul rule (relating to whether boxers can be disqualified); and the three knock-down rule (where three knock-downs in a round automatically ends the bout). A brief discussion of a variety of further rule changes can be found in Mullan (1999).

Similarly, although the current study involves only professional boxing, amateur and particularly Olym-

pic boxing have also provoked considerable controversy over officiating and have also prompted rule changes. For example, during the 1988 Seoul Olympics, highly contentious decisions led to the International Amateur Boxing Association making a number of reforms for Barcelona 1992. Perhaps the most famous controversy was that in the bout between Roy Jones Jr. and Park Si-hun. Roy Jones Jr. lost his light middleweight gold medal bout 3–2 despite thoroughly outclassing his Korean opponent Park Si-hun (Gammon, 1988). In fact, Park Si-hun was awarded a number of contentious decisions throughout the tournament, with some commentators partly attributing this to the attack upon the referee in the earlier bout between Byun Jong-il and Alexander Hristov. A full account of this and other Olympic boxing controversies can be found in Wallechinsky (2000). The embarrassment of the Seoul Olympics and particularly the Roy Jones Jr. bout led to the instigation of electronic push button scoring for Barcelona 1992 (amateur boxing only) which itself led to a number of dubious decisions (Greenberg, 2000).

Many of the most controversial decisions in both professional and amateur boxing provide notable anecdotal evidence of home advantage, specifically as a consequence of officiating. Of the above examples, Evander Holyfield and Park Si-hun were both home

boxers benefiting from questionable decisions. In view of this, the increased home advantage observed in Olympic boxing compared with objectively judged or “measures” disciplines (Balmer, Nevill, & Williams, 2003) is of little surprise.

There is considerable evidence of officiating bias in subjectively judged sports, the majority focusing on nationalistic or political bias. Nationalistic and/or political biases have been demonstrated for a range of subjectively judged events, including Olympic diving (Park & Werthner, 1977), figure skating (Campbell & Galbraith, 1996; Seltzer & Glass, 1991) and gymnastics (Ansorge & Scheer, 1988; Whissell, Lyons, Wilkinson, & Whissell, 1993). Interestingly, this bias seems to have changed little across time (Campbell & Galbraith, 1996) despite considerable interest in the issue, notably at the 1978 World Figure Skating Championships where the USSR judging delegation was suspended as a result of such bias. Furthermore, bias has been identified as a result of within-team order (Ansorge, Scheer, Laub, & Howard, 1978; Scheer & Ansorge, 1975) and as a result of prior knowledge for both subjectively judged disciplines (Ste-Marie and Lee, 1996; Ste-Marie & Valiquette, 1996) and interestingly in football (Jones, Paull, & Erskine, 2002). Recent evidence also suggests that bias in subjectively judged sports may also extend to home advantage (Balmer, Nevill, & Williams, 2001; Balmer *et al.*, 2003).

In sports where officials have less input, findings are far less conclusive. Some evidence of home advantage has been identified in cross-country running (McCutcheon, 1984) and World Cup alpine skiing (Bray & Carron, 1993). In contrast, home advantage was not found to influence either performance or psychological states in Junior alpine skiing (Bray & Martin, 2003) and, once quality of athlete had been accounted for, home advantage was negligible in “grand slam” tennis and “major” golf tournaments (Nevill, Holder, Bardsley, Calvert, & Jones, 1997), as well as Olympic athletics and weightlifting (Balmer *et al.*, 2003). Holder and Nevill (1997) confirmed these findings, suggesting that any apparent home advantage is a result of exaggerated numbers of home competitors. Having accounted for this imbalance, the authors suggested that lack of home advantage might stem from objective scoring and relatively little subjective input from officials.

Olympic boxing was classified as a subjective event by Balmer *et al.* (2003), since the majority of Olympic bouts are decided by officials rather than knockout (approximately 86%; see Lyberg, 1999). Professional boxing, however, has far more knockouts and provides an opportunity to examine the source of home advantage within a single sport (50% of the European championship bouts used in the present study were decided by points decisions). By

comparing the probability of a home win between knockouts and points decisions, we hoped to determine whether input from officials increases home advantage. Moreover, having controlled for quality of competitor, we wished to assess whether home advantage exists when bouts end by knockout. The present study uses all European championship bouts over the last 100 years, also allowing assessment of whether home advantage differences between knockouts and points decisions are consistent over time. First, we hypothesized that bouts ended by points decision rather than knockout significantly increased the probability of a home win, and that the probability of technical knockouts (for more modern data only) fall between that of knockouts and points decisions in terms of home advantage (as officials have some input). Second, we hypothesized that having controlled for relative quality of boxers, bouts ending by knockout exhibit little or no home advantage. These effects were expected to remain constant over time.

Methods

Data

We collated all European championship bouts from March 1910 to June 2002 across all weight divisions. Data were taken from the boxing records archive, available online at www.boxrec.com. Evidently, to be useful in analysis, bouts required a home and an away competitor. Home competitors were defined as those whose nationality matched the location of the bout, which we acknowledge may be a crude measure in some cases (for example, where nationality does not correspond to country of abode). Bouts where both boxers were of the same nationality, or where the bout took place at a neutral venue, were removed. Drawn bouts and bouts with no outright winner were also removed, as home advantage could not be inferred from drawn bouts and knockouts were not possible. European championship bouts were chosen above World title fights as European bouts tend not to be so dominated by a single nation (i.e. USA in world titles) and bouts are generally contested in the home country of one of the boxers (many world title fights are fought in the USA, regardless of the nationality of the boxers). This left a sample of 788 bouts across all years and weight divisions.

Analysis

Data were analysed using binary logistic regression, with home win versus away win as the dependent variable. “Outcome type” (points versus knockout) was entered as a categorical predictor, and “relative

quality” (a comparison of each boxer’s career record for each bout) was entered as a continuous covariate. Introduction of the “relative quality” covariate was important given that superior competitors are more likely to secure home bouts (i.e. it is likely that a current champion would fight at home). This was confirmed by a simple Wilcoxon test comparing home and away boxers’ career records. Home boxers’ career records (in terms of proportion bouts won) were significantly better than those of away boxers ($z = 9.54, P < 0.001$). Evidently, failure to control for quality could result in illusory home advantage where home boxers were simply superior. The “relative quality” covariate was simply the difference in the proportion of wins of all career bouts for each of the two boxers in each bout (based on final career records, again obtained from www.boxrec.com). A significant outcome type main effect would show whether home competitors were more likely to win if bouts progressed to points decisions. Entering the interaction of “outcome type” with “relative quality” allowed us to assess whether the comparative ability of competitors had a bearing upon any difference in probability of a home win between outcome types.

The analysis had four stages. First, we examined the influence of “outcome type” alone on the probability of a home win. Second, we introduced “relative quality” of boxers and the interaction of “relative quality” with “outcome type” into the model. Third, we split the analysis into three time periods of approximately 30 years each to assess whether the model was consistent over time. Fourth, using only the most recent time period, we introduced a third outcome type, technical knockout, and compared its influence upon probability of a home win to both knockouts and points decisions.

Results

Outcome type

First, using home versus away win as a dependent variable, and dichotomous outcome type (knockout versus points decision) as a predictor, we found that a home win was significantly more likely if bouts ended

in a points decision (Wald statistic, $W_1 = 7.80$, odds ratio, $\exp(\beta) = 1.57$; $P = 0.005$). Entering coefficients for outcome type (and the constant) was used to calculate the estimated probability of a home win (hw) for bouts ending in both knockouts and points decisions.

$$p(hw) = \frac{e^{0.727+0.448(outcome)}}{1 + e^{0.727+0.448(outcome)}}$$

where 1 = points decision and 0 = knockout for outcome type. This result demonstrates that for bouts decided by a knockout, the expected probability of a home win was 0.67. For bouts decided by a points decision, this probability rose to 0.76.

Relative quality of competitors

Second, we entered the continuous covariate “relative quality of competitors”, and its interaction with “outcome type”, into the model. As expected, “relative quality” was a significant predictor of whether the bout was won by home or away boxers ($W_1 = 25.59$, odds ratio, $\exp(\beta) = 13.40$; $P < 0.001$). More importantly, the influence of outcome type was found to vary with relative quality of competitor ($W_1 = 6.75$, odds ratio, $\exp(\beta) = 0.14$; $P = 0.009$). Binary logistic regression output can be found in Table I.

Using a formula of the same form as above, and entering coefficients (B) from Table I, we plotted the probability of a home win for both knockouts and points decisions, as the relative quality of competitors varied (see Figure 1). This showed that while in general points decisions increased the probability of a home win, this was not the case where home boxers were clearly superior (i.e. relative quality tended towards 1).

Time considerations

Third, given that we were using almost 100 years of data, there was some concern regarding the accuracy of earlier data, particularly with respect to boxers’ career records. As a consequence, we split analyses

Table I. Results of the binary logistic regression analysis for all data, 1910–2002

	B	SE	W_1	d.f.	P	$\text{Exp}(\beta)$
Points decision	0.640	0.181	12.465	1	< 0.001	1.896
Relative quality	2.595	0.559	21.588	1	< 0.001	13.398
Relative quality × points decision	-1.962	0.755	6.751	1	0.009	0.141
Constant	0.451	0.121	13.936	1	< 0.001	1.569

Note: The dependent variable is home win as compared to baseline away win, and points decision is compared to baseline knockout. Abbreviations: SE = standard error, d.f. = degrees of freedom.

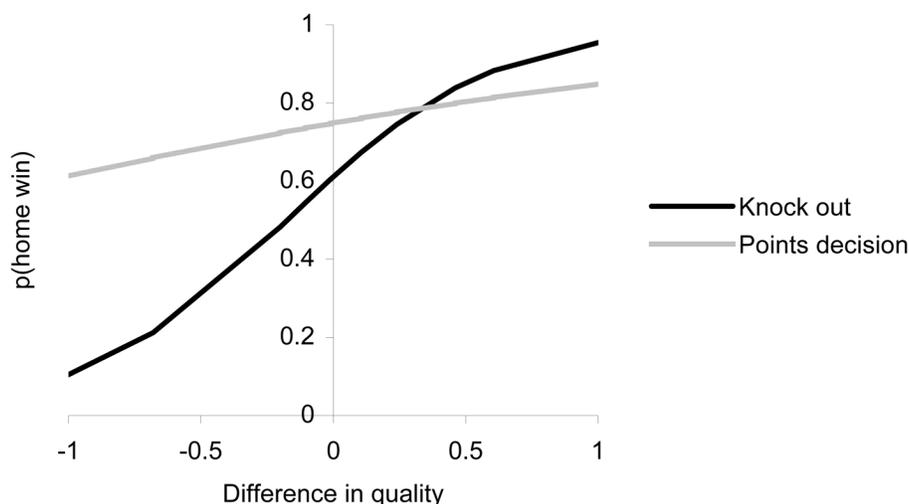


Figure 1. Probability of a home win for bouts ended by a knockout or points decision as relative quality of competitors varies. A difference in quality of minus one indicates the home competitor has lost all of his bouts and the away competitor has won all of his, and vice versa.

by time into groups of approximately 30 years (1910–1939, $n = 94$; 1940–1969, $n = 216$; 1970–present, $n = 478$). For the first of these groups (1910–1939), neither “outcome type”, “relative quality” nor their interaction had a significant influence upon the probability of a home win (see output in Table II).

As well as a non-significant interaction with “outcome type” ($W_1 = 0.78$, odds ratio, $\exp(\beta) = 0.14$; $P = 0.38$), “relative quality” was surprisingly ineffective alone in predicting probability of a home win ($W_1 = 1.10$, odds ratio, $\exp(\beta) = 7.35$; $P = 0.30$). This suggests that the “relative quality” covariate may be of limited use here and may reflect inaccuracies in the reported records of boxers for early bouts. Importantly, for these early records, “outcome type” had no bearing upon probability of a home win ($W_1 = 0.007$, odds ratio, $\exp(\beta) = 0.95$; $P = 0.93$).

Again for the second of the time groups (1940–1969), neither “relative quality” ($W_1 = 1.59$, odds ratio, $\exp(\beta) = 3.48$; $P = 0.21$) nor its interaction with “outcome type” ($W_1 = 3.19$, odds ratio, $\exp(\beta) = 0.11$; $P = 0.074$) had a significant influence upon probability of a home win. In this case, however, there was clear evidence that bouts ended by points decisions as opposed to knockouts significantly increased the probability of a home win ($W_1 = 8.61$, odds ratio, $\exp(\beta) = 2.72$, $P = 0.003$). Binary logistic regression output for data from 1940 to 1969 can be found in Table III.

For the final time period (1970–present), which presumably is most accurately generalized to the present day, we found that “relative quality” had a highly significant influence upon the probability of a home win ($W_1 = 19.96$, odds ratio, $\exp(\beta) = 27.28$;

$P < 0.001$). More importantly, we continued to observe a significantly greater probability of a home win when bouts progressed to a judges’ decision ($W_1 = 4.97$, odds ratio, $\exp(\beta) = 1.72$; $P = 0.026$). Interestingly though, this “outcome type” effect was consistent, regardless of the “relative quality” of boxers ($W_1 = 0.003$, odds ratio, $\exp(\beta) = 0.93$; $P = 0.96$). Binary logistic regression output for data from 1970 to 2002 are presented in Table IV.

The probability of a home win is plotted for knockouts versus points decisions as “relative quality” changes in Figure 2 (using only data from 1970 onwards and with coefficients calculated from a model without the insignificant interaction term). Using a formula of the form presented earlier, for equally matched boxers (i.e. “relative quality = 0), the expected probability of a home win was 0.62 for knockouts and 0.74 for points decisions.

Technical knockouts

Finally, again focusing only on the most recent data (1970 onwards), we introduced an additional category of outcome type, technical knockout (TKO). The reasons we used only data from 1970 onwards were as follows: (1) the results would be generalizable to the present day; (2) technical knock-outs become increasingly rare as we go back in time; and (3) previous analyses (see Tables II and III) indicated that the “relative quality” covariate was ineffective for earlier data. As with the 1970–present day results using the dichotomous outcome type variable, there was no interaction between relative quality and outcome type (see output in Table V) and the interaction

Table II. Results of the binary logistic regression analysis using only data from 1910 to 1939

	<i>B</i>	SE	W_1	d.f.	<i>P</i>	Exp(β)
Points decision	-0.050	0.588	0.007	1	0.932	0.951
Relative quality	1.995	1.904	1.097	1	0.295	7.352
Relative quality \times points decision	-1.945	2.199	0.782	1	0.376	0.143
Constant	0.958	0.481	3.968	1	0.046	2.606

Abbreviations: SE = standard error, d.f. = degrees of freedom.

Table III. Results of the binary logistic regression analysis using only data from 1940 to 1969

	<i>B</i>	SE	W_1	d.f.	<i>P</i>	Exp(β)
Points decision	1.001	0.341	8.607	1	0.003	2.721
Relative quality	1.247	0.989	1.590	1	0.207	3.480
Relative quality \times points decision	-2.243	1.256	3.190	1	0.074	0.106
Constant	0.190	0.245	0.600	1	0.438	1.209

Abbreviations: SE = standard error, d.f. = degrees of freedom.

Table IV. Results of the binary logistic regression analysis using only data from 1970 to 2002

	<i>B</i>	SE	W_1	d.f.	<i>P</i>	Exp(β)
Points decision	0.540	0.243	4.965	1	0.026	1.717
Relative quality	3.306	0.740	19.958	1	< 0.001	27.276
Relative quality \times points decision	-0.072	1.275	0.003	1	0.955	0.930
Constant	0.491	0.147	11.203	1	0.001	1.634

Abbreviations: SE = standard error, d.f. = degrees of freedom.

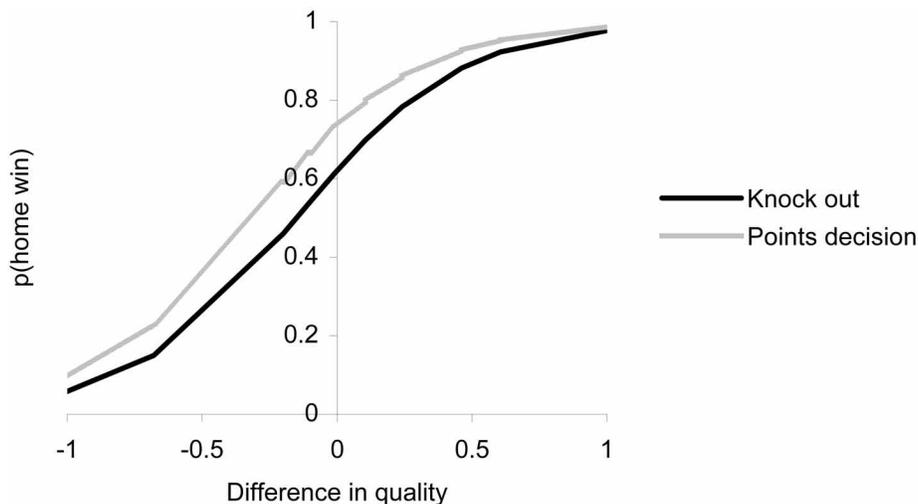


Figure 2. Probability of a home win for bouts ended by a knockout or points decision as relative quality of competitors varies. Only data from 1970 onwards are modelled.

term could be removed at little cost (change in scaled deviance [$-2 \times \log$ likelihood], $\chi^2_2 = 0.37$, $P = 0.83$).

Using knockout as the baseline category, points decisions significantly increased the likelihood of a home win ($W_1 = 6.18$, odds ratio, $\exp(\beta) = 2.05$;

$P = 0.013$). Technical knockouts fell between the other two outcome type categories; however, while technical knockouts were more likely to result in home wins, they were not significantly more likely than knockouts ($W_1 = 1.13$, odds ratio, $\exp(\beta) = 1.37$; $P = 0.29$).

The probability of a home win is plotted for knockouts, points decisions and technical knockouts as “relative quality” changes in Figure 3 (using only data from 1970 onwards and with coefficients calculated from a model without the insignificant interaction term). For equally matched boxers (i.e. “relative quality = 0), the expected probability of a home win was 0.57 for knockouts, 0.66 for technical knockouts and 0.74 for points decisions.

Discussion

The present study aimed to quantify home advantage in European championship boxing, specifically by assessing whether home advantage was greater when bouts ended in points decisions rather than by knockout. In addition, we aimed to determine whether bouts ending in a technical knockout also enhanced home advantage (compared to knockouts), and whether any enhanced home advantage due to outcome type was consistent over time. Importantly, we also attempted to control for relative quality of

boxers, particularly since superior boxers are likely to secure more home bouts.

Overall, the probability of a home win (rather than an away win) was significantly higher where bouts ended in a points decision rather than a knockout. The significant interaction between relative quality of boxers and outcome type suggested that this discrepancy was most apparent when away boxers were superior to home boxers, though splitting the analysis into time periods showed our measure of relative quality to be ineffective for bouts fought between 1910 and 1969. For these time periods, the accuracy of the “relative quality” measure was questionable, as can be seen in Tables II and III. No such interaction was present for the most recent, and presumably most reliable, data. For the most recent data (1970 onwards), the probability of a home win was significantly higher for points decisions than knockouts, with this discrepancy remaining consistent irrespective of relative quality of boxers. As hypothesized, the probability of a home win for technical knockouts fell between that of

Table V. Results of the binary logistic regression analysis using only data from 1970 to 2002 and including technical knockout (TKO) as an “outcome type” (previously part of the knockout group)

	<i>B</i>	SE	W_1	d.f.	<i>P</i>	Exp(β)
Knockout			6.295	2	0.043	
Points decision	0.717	0.288	6.184	1	0.013	2.049
TKO	0.313	0.294	1.131	1	0.287	1.368
Relative quality	2.788	1.047	7.088	1	0.008	16.244
Relative quality \times knockout			0.370	2	0.831	
Relative quality \times points decision	0.446	1.474	0.092	1	0.762	1.562
Relative quality \times TKO	0.912	1.500	0.370	1	0.543	2.489
Constant	0.314	0.214	2.143	1	0.143	1.368

Note: Points decision and technical knockout are compared to baseline knockout.

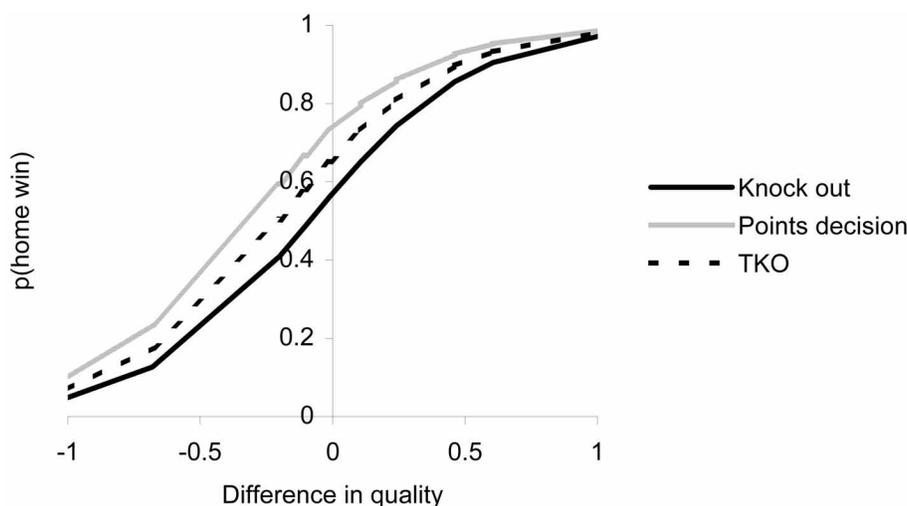


Figure 3. Probability of a home win for bouts ended by a knockout, points decision or technical knockout as relative quality of competitors varies. Only data from 1970 onwards are modelled.

points decisions and knockouts, with expected probabilities of 0.57 (knockout), 0.66 (technical knockouts) and 0.74 (points decisions) for equally matched boxers.

The present study provides strong support for research demonstrating increased officiating bias, of various types, in sports that involve subjective decision-making, specifically with regard to judging outcome (e.g. Ansoerge & Scheer, 1988; Ansoerge *et al.*, 1978; Campbell & Galbraith, 1996; Park & Werthner, 1977; Scheer & Ansoerge, 1975; Seltzer & Glass, 1991; Ste-Marie & Lee, 1996; Ste-Marie & Valiquette, 1996; Whissell *et al.*, 1993). In addition, the significantly greater home advantage for points decisions supports the hypothesis that subjectively judged sports enjoy greater home advantage (e.g. Balmer *et al.*, 2001, 2003) without the need to compare across sports. Evidently, the use of a similar approach in future research is restricted to a handful of sports with both objective and subjective measures of outcome (e.g. ski jumping, equestrian events and other combat sports). The findings are certainly likely to be applicable also to amateur boxing, especially given the high levels of home advantage observed in Olympic competition (Balmer *et al.*, 2003). Future research could examine officiating bias in Olympic boxing, as well as assess the impact of a number of often controversial rule and scoring changes.

Interestingly, even for bouts decided by a knockout, there was some evidence of home advantage (e.g. expected percentage of home wins = 0.57 for equally matched boxers). Counter to our hypothesis, this appears to suggest that some home advantage remains, even where judges/referees do not decide the outcome. This may again in part be attributed to the sensitivity of our measure of relative quality, as high-level boxers may have comparable records but be of a quite different standard. Future research could more accurately assess home advantage by refining the measure of relative quality (e.g. by incorporating rankings or bookmakers' odds and assessing the quality of previous opponents).

Boxing is a sport that has acknowledged the issue of difficulties in scoring contests. The consensus scoring system proposed for boxing (NAAG, 2000), as well as systems designed to combat bias in other subjective sports (e.g. International Skating Union, 2000), are typically aimed at combating single rogue judges rather than an underlying home advantage. Therefore, if judges were equally influenced by a partisan crowd, rogue decisions would not be detected.

The development of strategies designed to counter home advantages should consider the reasons why the advantage occurs initially. Recent research has explored the mechanisms proposed to underlie

the home advantage effect (Balmer *et al.*, in prep.). Balmer *et al.* (in prep.) suggest that crowd noise is associated with increased anxiety and effort, and that increased effort is focused on dealing with crowd noise by giving a decision in favour of the home team. The authors propose that referees tend to avoid the potentially stressful decision of giving a contentious decision in favour of the away team. In boxing, it could be argued that a similar effect occurs and that the home boxer tends to be awarded closely fought rounds more often than the away boxer.

We suggest that there is a need to develop interventions to counter the home advantage phenomenon. The opportunity to fight in prestigious contests is linked to the boxer's record, with title contests between two unbeaten boxers tending to be the biggest draw. It is important for a boxer to maintain an unbeaten record. However, it is also important that boxers learn to compete in a variety of different venues, as evidence shows that competing away is associated with increased anxiety (Terry, Walrond, & Carron, 1998). Thus, there are good reasons to counter the effects of home advantage that derive from biased decisions.

Interventions designed to counter home advantage in boxing should focus on teaching coping skills and anxiety management skills to judges and referees. At present, boxing officials learn such skills through experience, with the more experienced officials tending to work on the most important contests. While research findings demonstrate that experience is associated with reduced anxiety (Gould, Petlichkoff, & Weinberg, 1984), quantifying the amount and type of experience needed before a referee would give decisions independent of location has not been explored. Furthermore, it is known that some individuals have better coping skills than others, something that appears more related to personality than experience (Carver & Scheier, 1994; Carver, Scheier, & Weintraub, 1989; Giacobbi & Weinberg, 2000). The protocol used by Balmer *et al.* (in prep.) and Nevill, Balmer and Williams (2002), in which referees observe video footage with and without crowd noise to assess its influence on performance, could be used as a method of identifying officials at risk of giving home-town decisions. In addition, assessing measures of coping and anxiety could offer insight into the extent to which biased decisions favour the home boxer. Clearly, the videotape would need to be adapted to boxing, but this approach offers a standardized method of assessment and allows referees to develop coping skills in an environment in which poor decisions do not affect a boxer's career.

In conclusion, the findings of the present study lend support to the notion that home advantage is

more prevalent in sports that involve subjective decision-making. We suggest that interventions should be designed to help judges to counter home advantage effects.

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