

Thesis Proposal: Experts' and Fans' Beliefs about Penalty Shootouts in Football

Project ID: Penalty_Shootout_Beliefs

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Penalty shootouts often determine the outcome of important football matches and provide a unique setting in which to examine decision-making under pressure. Previous research suggests that penalty kicks taken during shootouts are converted less frequently than penalties taken during regular match play. While in-game penalty conversion rates are commonly reported to be approximately 80–85%, shootout conversion rates are often lower, at around 70–76% [9]. This difference appears to be primarily associated with reduced performance by penalty takers rather than improved goalkeeper performance [6, 5].

Several explanations have been proposed for this decline in performance. These include increased psychological pressure and choking [6, 2], avoidance-oriented behaviour in negative-valence situations [6], differences in the selection of penalty takers, and structural characteristics of the shootout format (e.g., alternating ABAB order, sudden-death dynamics, and first-mover effects) [1, 3].

The situational consequences of an individual penalty may also influence performance. Previous descriptive studies have reported higher conversion rates when scoring would immediately secure victory and lower conversion rates when missing would immediately result in defeat [7, 6]. This asymmetry has frequently been interpreted using concepts from behavioural economics, particularly prospect theory and loss aversion [9]. However, the extent to which these effects are consistent across competitions and samples remains uncertain.

Further debate concerns the order in which teams should assign their penalty takers. One study, based on approximately 2,700 penalties from 262 shootouts, reported that the team taking the first penalty won around 60% of shootouts [1]. However, subsequent studies showed mixed findings regarding the magnitude and robustness of this first-mover advantage [8, 3]. Research on optimal shooting order has also suggested that placing the strongest

penalty taker in the fifth position may not always be beneficial, because more than 40% of shootouts are decided before the fifth round and the player may therefore never take a penalty [9].

Although the empirical literature on penalty-shootout performance is growing, less is known about *practitioners' and fans'* attitude towards these phenomena. In particular, it remains unclear whether their beliefs about psychological pressure, shooting order, first-mover advantage, and decisive penalties are consistent with the available evidence. Understanding this potential gap between beliefs and evidence is relevant for both sports science (e.g., to identify misconceptions that may inform training and decision-making) and behavioural economics (because penalty shootouts provides a clean natural experiment for studying high-stakes decisions under pressure).

Research questions. The thesis will design, conduct, and analyse a survey that targets multiple populations (professional players and coaches, amateur players, sports scientists/analysts, and football fans) to investigate the following questions:

- **RQ1 – Conversion-rate beliefs.** Do respondents believe that penalty conversion rates are lower in shootouts than in regular match play? How accurate are their numerical estimates compared to the empirical benchmarks (in-game $\approx 80\text{--}85\%$ vs. shootout $\approx 70\text{--}76\%$) [6]?
- **RQ2 – Mechanism beliefs.** Among respondents who believe that penalty conversion rates differ between in-game penalties and penalty shootouts, which mechanisms do they perceive as explaining this difference (e.g., psychological pressure / choking, avoidance motivation, selection bias of takers, goalkeeper anticipation, fatigue, public visibility)?
- **RQ3 – Valence asymmetry.** Do respondents believe that penalty-conversion probability differs between kicks taken to avoid defeat (negative valence) and kicks taken to secure victory (positive valence)? To what extent are these beliefs consistent with the loss-aversion pattern reported in previous research [6, 7]?
- **RQ4 – Order strategy.** Do respondents believe that better takers should shoot earlier or later in the sequence? How do their preferences compare with theoretical arguments regarding optimal penalty-taker order [4] and findings on the first-mover advantage [1, 3]?

Methodology. The student will (i) review the relevant literature on penalty shootouts from the field of sports science and behavioural economics, (ii) design a survey that examines both qualitative beliefs and quantitative estimates (e.g., predicted conversion rates), (iii) recruit respondents from the four target groups (professional players/coaches, amateur players,

sports scientists/analysts, fans) via the chair's network and online channels, and (iv) analyse the data using appropriate statistical methods (e.g., descriptive statistics, group comparisons via non-parametric tests, calibration analyses comparing beliefs to empirical benchmarks, and regression models controlling for demographic and expertise variables). Optionally, empirical benchmarks for calibration can be derived from publicly available datasets, e.g., FBref¹, Transfermarkt², and shootout compilations used in prior academic work [1, 6].

Expected contribution. The thesis will produce (a) the first systematic comparison of expert and fan beliefs about penalty-shootout phenomena across multiple expertise levels, and (b) a quantification of belief-evidence gaps for the four research questions.

Supervisor: Juni.-Prof Pascal Bauer

Scope: Master Thesis

Recommended prerequisite: Basic knowledge of survey methodology and statistics

Declaration of AI usage: This proposal was drafted with the assistance of Claude AI.

References

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¹<https://fbref.com>

²<https://www.transfermarkt.com>

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