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Presentation Title

A Comprehensive Analysis of Soccer Penalty Shootout Designs

(with László Csató)

Abstract

The standard design of soccer penalty shootouts has received serious criticism due to its bias towards the team that kicks the first penalty. The rule-making body of the sport has decided in 2017 to try an alternative mechanism. Although the adoption of the new policy has stalled, academic researchers have recently suggested some other designs to improve fairness. This paper offers an extensive overview of seven such soccer penalty shootout mechanisms, one of them first defined here. Their fairness are analysed in three different mathematical models of psychological pressure. We also consider the probability of reaching the sudden death stage, as well as the complexity and strategy-proofness of the designs. Some rules are found to be inferior as they do not lead to a substantial gain in fairness compared to simpler mechanisms. Our work has the potential to impact decision-makers who can save resources by choosing only theoretically competitive designs for field experiments.

Keywords

OR in sports; fairness; mechanism design; penalty shootout; soccer

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