

# A score-dependent alternating order is fairer than ABAB or ABBA in penalty shootouts, finds new research

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Alternating the order in a score-dependent way that a football team takes their penalties in a shootout is a fairer way than using the ABAB or ABBA system to come to a game's conclusion, according to new research from Durham University Business School.

It has been long debated whether or not the traditional ABAB system (where players from opposing teams take it in turns) or the ABBA system (where the order of turns is mixed), which has been recently introduced into the English EFL Cup, was the fairest and most unbiased way to conduct a penalty shootout.

Previous studies have suggested that the team shooting first in an ABAB system was much more likely to win. However, in an ABBA system, though the first shooting team is also more likely to win, the odds are reduced.

In a new study, Professor Nejat Anbarci at Durham University, together with colleagues from Deakin University and Boston College, Professors CJ Sun and Utku Unver, tested a new method of penalty shootouts against both the ABAB and ABBA system. One variant of the new method allowed for completely random ordering between both teams for the five penalties, and also in the event of sudden death scenarios. More interestingly, in another variant of the new method, the team which is behind at the end of a round goes first in the next round; this makes it a score-dependent method.

To test this, the researchers created a model which simulated the penalty kicks in all three types of penalty structure, in order to conclude which of the methods was the fairest and most equal.

The researchers found that their proposed "score-dependent alternate order" penalty shootout was both fair and equal in both regular penalties and sudden death, whilst an ABBA system was only fair and equal in sudden death, and an ABAB system was not fair or equal in either.

Professor Anbarci says,

"Economists have long recognized the effect that the order of actions in sequential contests can have on the performance of contestants. Penalty shootouts in football offer a very clear, and real-life example of this sequences, showcasing whether the order effects the probability that a specific team is likely win.

This research showcases the best possible structure for penalty shootouts, in order to make them as fair and equal as possible – therefore ensuring that no team in a shootout has an unfair advantage over the other.

Though score-dependent alternate ordering is the fairest and most equal way in which to conduct a penalty shootout, as proven by the findings, the researchers understand the difficulties around implementing this type of structure into an actual penalty shootout, no matter how equal it would be. To that end, the

authors hope to conduct major field studies to compare their score-dependent alternate order penalty shootout vis-à-vis ABAB and ABBA which may open the door to the widespread use of their shootout system in major football championships in the future.