

## **Visual Focus and Sports Performance**

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### ABSTRACT

The connection between how a physical movement is processed in the brain to how the body physically completes the task is significant in the sports world. Information from the environment must be observed and processed in order to develop a resulting course of action for particular athletic skills. More specifically, the brains of soccer players must smoothly adjust between internal and external cognitive pathways when making sports related decisions thousands of times during games and practices. A study by Wood and Wilson revealed that gaze coordination and aiming accuracy are closely related (2010). The current study extended this study to examine other factors that affect accuracy with and without a keeper under controlled conditions. The aim of the study was to find the connection between visual focus patterns and the development of sports performance execution. Through analyzing the visual focus patterns of participants, compared to how accurate the participants were penalty kicks, we were able to enhance our understanding of how the internal and external cognitive network assigned to making and executing decisions regarding sports related activities could be advanced. It is hypothesized that when gaze coordination exhibits greater external focus, there will be less interference among internal action signals resulting in more accurate performance. Participants completed a series of 24 penalty kicks, performing 6 penalty kicks within each of four conditions: No Keeper/No Target, Keeper/No Target, No Keeper/Target, and Keeper/Target. Having a target indicates that the participant was required to look at a red cardstock (RC) posted to the center of the crossbar before completing their penalty kick. Eye movements were recorded and analyzed alongside the quality of their penalty kicks. Kick quality was measured using velocity of the kick, distance of the shot from the center of the goal, and whether the goal was scored. Eye movement patterns were collected using TOBII eyeglass equipment, which recorded fixation duration, fixation count, visit duration, and visit count measurements among various areas of interest on the goal. There were 7 areas of interest, 6 areas dividing the goal: Top Left (1), Bottom Left (2), Top Center (RC) (3), Bottom Center (4), Top Right (5), Bottom Right (6) and one area of interest for the ball (7). Repeated-measures ANOVA revealed that participants were more accurate when there was no keeper present and when they were required to focus on an external target (RC). In examining eye movement patterns, it was found that the greater the external focus, either on the target or the ball, as indicated by number of fixations, duration, and visits, the greater the accuracy of the kick. Based on the study's results, increased gaze coordination (focusing on a target external to the participant) increased the accuracy of the kick. Consistent with our hypothesis, this suggests that by focusing on a target before performing a penalty kick occupies a participant's external cognitive pathway, creating a purer internal cognitive signal that allows for higher quality penalty kicks to result.