UNDERSTANDING SITUATION AWARENESS: INVESTIGATING THE VISUAL SCANNING OF ASSOCIATION FOOTBALLERS DURING MATCH-PLAY USING WEARABLE TECHNOLOGY

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Abstract

Introduction:
Visual exploratory action, commonly known as scanning in applied settings, is an important skill in football as it supports the situation awareness of players in their 360-degree environment. Indeed, extensive scanning prior to receiving the ball is strongly related to improved performance with the ball (Jordet et al., 2013; McGuckian et al., 2018a). Despite the value of this visual perception skill, visual exploration in match-like situations is relatively under-investigated (McGuckian et al., 2018b). Here, we add to the visual exploratory action research by utilizing wearable technology to quantify the scanning actions of football players during 11v11 match-play. Relationships between scanning and on-ball performance were investigated, as was the influence of playing position, pitch position and phase of play on scanning actions.

Methods:
Across two studies, 48 male footballers competed in 11v11 match-play. The frequency and excursion of players' exploratory head movements were quantified with inertial measurement units, pitch position was quantified with GPS units, and actions with the ball were quantified using notational analysis. Analyses investigated the influence of scanning before ball possession on actions with the ball, and the influence of playing position, pitch position and phase of play on scanning actions.

Results & Discussion:
When players explored more extensively before receiving the ball, they were more likely to turn with the ball (OR range = 1.14 to 2.45), play a pass in the attacking direction (OR range = 1.15 to 2.33), and pass to an area that was different to the area the ball was received from (OR range = 1.20 to 3.09). Analyses revealed central midfield players explored more extensively than other positions (*ES(d)* range = 0.03 to 0.29), however with large within-position variability. Players explored less during transition phases of play than during offensive and defensive phases (*ES(d)* range = 0.31 to 0.56). Players also visually explored differently according to the area of the pitch they occupied. This increased understanding of scanning behaviour, along with the newly developed data collection methods, can assist in more informed efforts to develop players' situation awareness.

Conclusions:
A growing body of evidence suggests that the development of visual exploration should be a priority for applied practice. Given the time-efficiency, accuracy and reliability of wearable technology for quantifying visual exploratory action, they present a suitable option for research and applied work that is interested in meeting this need.

References:
Jordet, G., Bloomfield, J., & Heijmerikx, J. (2013). The hidden foundation of field vision in English Premier League (EPL) soccer players. *MIT Sloan Sports Analytics Conference*. Boston.

McGuckian, T. B., Cole, M. H., Chalkley, D., Jordet, G., & Pepping, G.-J. (2018a). Visual exploration when surrounded by affordances: Frequency of head movements is predictive of response speed. *Ecological Psychology*, 1–19. https://doi.org/10.1080/10407413.2018.1495548

McGuckian, T. B., Cole, M. H., & Pepping, G.-J. (2018b). A systematic review of the technology-based assessment of visual perception and exploration behaviour in association football. *J Sports Sci*, *36*(8), 861–880. https://doi.org/10.1080/02640414.2017.1344780