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Visual search strategies of elite fencers: an exploratory study in ecological competitive situation

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Introduction

Visual search strategies (VSS) have been widely studied in sports (for a review, see Klostermann et al., 2020). Experts exhibit fewer fixations of longer duration and are superior at extracting perceptual cues than novice athletes (Martínez de Quel & Bennett, 2019). Fencing experts "must assess and select the visual information provided by the opponent" to perform their own action (Roi and Bianchedi, 2008), and focus particularly on their opponents upper torso to do so (Witkowski et al., 2018). Previous studies were conducted in laboratories or with predetermined outcomes, so we studied VSS during a real fencing bout. We hypothesised that expert fencers use different gaze behaviours and focus on their opponents upper torso to assess their situation in real-world duels.

Method

We monitored the gaze of 10 world-class French fencers (6 men and 4 women, epee, sabre, and foil) with an eye tracker during a bout. Frame-by-frame analysis specified VSS with gaze location, number of fixations, and fixation duration.

Results

Expert fencers, regardless of arm or gender, used visual pivot, to gather information from the central vision, and gaze anchor, to gather information from the peripheral vision. They focused on an area between the opponents elbow, lower torso, and hip joint. Experts use these VSS to gather information from nearby but distinct areas of interest (AOI).

Discussion

This study confirms that expert fencers VSS are mostly visual pivot and gaze anchor. This study is one of the first to show expert fencers real-world visual activity. However, we should proceed with caution because we can not be sure that attention was directed on the object the fencers were looking at. Hence, we advocate merging objective and subjective data with self-confronted interviews to analyse expert behaviour.

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