Visual expertise and the Quiet Eye in sports – comment on Vickers

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TA COMMENTARY

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ABSTRACT

Research on the Quiet Eye (QE) has progressed brightly over the past years. Fixating on a task-relevant location before movement onset has been identified as a significant correlate of expert performance in many sport domains. In this commentary, we propose that visual expertise, including the QE, is socially mediated. Studying social mediation opens the opportunity to conceptualize expertise as a relational phenomenon that is accomplished through interactions with other people and with changing environmental affordances. Drawing on examples from basketball, soccer, and golf, we elaborate on this situational interpretation and propose that visual expertise in sports is contingent on the social dynamics of the game; is reflexively aligned to the social group; and changes as the social context changes. Future QE research can extend units of analysis to study how trajectories of expertise are socially mediated and unfold over time.

Keywords:
visual expertise – Quiet Eye – fixation – sports – expert performance – social mediation

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Introduction

Since 1992, Joan Vickers has been very successful in establishing a lively and productive research tradition that examines the Quiet Eye (QE) in sports (Vickers, 1992). The Quiet Eye is the critical period when the eyes remain relatively still (within 3° of visual angle) before an athlete executes a movement, for example, when elite basketball players fixate the front of the rim before finally shooting a free throw (Vickers, 2016). Numerous studies indicated that QE correlates with high performance in a number of tasks (see the meta-analysis by Mann, Williams, Ward, & Janelle, 2007). In our own meta-analysis of visual expertise (Gegenfurtner, Lehtinen, & Säljö, 2011), in which we tested the predictive validity of expertise theories, QE is missing as a conceptual framework – a mistake perhaps. Our study demonstrated meta-analytically that expertise changes the amount, the speed, and the visual span of information processing in domains such as sports, medicine, and transportation. Experts compared to novices had more fixations of longer duration on task-relevant areas; fewer fixations of shorter duration on task-redundant areas; shorter times to first fixate task-relevant areas; and a longer saccadic length (Gegenfurtner et al., 2011). QE complements and extends these expertise differences with a particular focus on the temporality of attentional resource allocation in visuo-motor coordination; it highlights how significant a few milliseconds of gaze can be before an action is executed.

Visual expertise research is, to some extent, reductionist. We isolate a particular process or variable as unit of analysis from the larger expert activity to make expert performance research-

able (Säljö, 2009; Szulewski, Gegenfurtner, Van Merriënboer, & Howes, 2016). For example, we use an eye tracker to define constantly occurring micro-movements of our eyes as a singular "fixation" and then study the frequency of fixations, their durations, or the time between fixation onset and the initiation of a movement (Panchuk, Vine, & Vickers, 2015). The underlying assumption is that visual expertise is an individual capacity that resides inside the mind or brain of an elite performer (Gruber, Jansen, Marienhagen, & Altenmueller, 2010; Seppänen & Gegenfurtner, 2012; Szulewski, Roth, & Howes, 2015). In recent years, there has been an increasing interest in studying the social and cultural sources that correspond with individual displays of expert performance (Gegenfurtner, Siewiorek, Lehtinen, & Säljö, 2013; Stoeger & Gruber, 2014). In such situated interpretations of expertise, professional vision is conceptualized as a relational phenomenon, accomplished through interactions with other people and with environmental affordances (Goodwin, 1994). In this commentary, we would like to offer a few reflections on QE, and on visual expertise more broadly, as it relates to the social context within which the practices of elite athletes are situated. Drawing on examples from basketball, soccer, and golf, we propose that visual expertise is contingent on the social dynamics of the game; is reflexively aligned to the social group; and changes as the social context changes.

Visual expertise is contingent on the social dynamics of the game

Basketball is a team sport. Each match is different. Within a match, the players on the court need to quickly and aptly react to a multitude of situations. Some of these situations require a QE. For example, Harle and Vickers (2001) indicated that QE is critical when shooting free throws as shooting accuracy significantly improved when participants were trained to fixate one spot on the hoop before shooting a free throw. The allegedly best QE in the US American National Basketball Association (NBA) of all time has Steve Nash, "who sunk 90.4 % of his free throws" (Vickers, 2016, p. 2). Perhaps unsurprisingly, Nash was voted Most Valuable Player in 2005 and 2006. The Most Valuable Player in 2000, Shaquille O'Neal, was famous for performing poorly in free throw situations; although he allegedly trained to fixate one spot on the hoop before shooting a free throw, his shooting accuracy was relatively low. His expertise was evident not in free throw situations, but in offense situations, in which he frequently scored field goals with a right-handed jump hook shot. The Most Valuable Player in the years 1987, 1989, and 1990, Earvin "Magic" Johnson, was famous for yet another kind of visual expertise: his no-look passes. Without looking at his fellow teammates, he passed the ball at incredible speed, a skill that can be attributed to superior parafoveal processing. Our point here is not to compare Nash, O'Neal, and Johnson, but that different levels of speed and interactional complexity during the game require different adaptations of visual expertise (Klostermann, Kredel, & Hossner, 2013; Szulewski, Fernando, Baylis, & Howes, 2014). The practices of expertise are situationally contingent on the social dynamics as the player interacts with his or her teammates on the court.

Visual expertise is reflexively aligned to the social group

Practices of visual expertise are not only situationally contingent on the dynamics within a game. They also vary between games, competitions, and seasons. For example, one of the best soccer players of all time is Lionel Messi (Vickers, 2016) who was voted the world's best player five times between 2009 and 2016. He is the most successful scorer in Spain's Primera División, where he scored more than 300 goals for this team FC Barcelona. Scoring such a high number of goals as a striker suggests he has the ability to use visual cues of the defenders' and goal keepers' movement patterns. Extrapolating this information from the array of visual stimuli on the field helps anticipate opponents' intentions and future events (Mann et al., 2007). When playing in the Spanish league, Messi scores consistently high even if the opponents, his teammates, the match tactics, the head coach, weather conditions, or the pitch condition change. When playing for the national team of Argentina, however, Messi scores fewer goals per match. Indeed, there are many examples of players who performed very well for one team and rather poorly for another team. One possible reason for those performance differences is the big-fish-little-pond effect (Marsh & Seaton, 2015). Other possible reasons relate to different social affordances when team contexts change. Excellence tends to cluster in groups; in soccer and other team sports, this includes supporting staff such as managers, physical therapists or managers (Stoeger & Gruber, 2014) which can promote the emergence and continual display of outstanding performance. As Stoeger and Gruber (2014) indicate, exceptionally high performing professionals typically have support staff who are exceptionally good themselves in their supporting roles. These networks of athletes and support teams form a rich social platform for professional excellence. The practices of visual expertise are thus reflexively aligned to the social group within which they are enacted.

Visual expertise changes as the social context changes

The observation that changes in the social group can create changes in the way elite athletes perform leads to our last reflection: expertise changes when the social context changes (Gegenfurtner, 2013; Lehtinen, Hakkarainen, & Palonen, 2014), not only in team sports, but also in individual sport disciplines such as golf. Tiger Woods is the most successful golf player of all time. Between 1998 and 2009, he was 11 years the number one in the official world golf ranking. Among others, his exceptional performance in putting can be attributed to his QE on the

green (Frank, Land, & Schack, 2016; Vickers, 1992). Over an exceptionally long time, Tiger Woods was able to outperform other golf players. In November 2009, his social context changed dramatically when he was involved in scandals and therapies. In the months and years after, his golf performance was considerably lower than in former years – until 2013, when he stabilized his performance and was again ranked as the world's best golfer. This case tends to indicate that expertise is not an isolated event inside the mind; rather, individual perceptions of how stable and psychologically safe one's social context is shape lifetime trajectories of expert practices (Gegenfurtner & Seppänen, 2013; Lahn, 2011; Laine & Gegenfurtner, 2013; Lehtinen et al., 2014).

Conclusion

QE research has been very productive and lively since 1992 (e.g., Vickers, 1992; 2016). In this commentary, we proposed that the practices of visual expertise, including keeping a QE, are intrinsically a social activity and mediated by the situational and contextual affordances within which expert performance unfolds. Extending cognitive units of analysis to examine how the trajectories of expertise are socially mediated can be a useful strategy for further lines of inquiry as QE research heads into a bright and prosperous future.

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Competing Interests

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Data Availability Statement

All relevant data are within the paper.

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