

Motion extrapolation in Sport Expertise: Representational Momentum and Representational Gravity in Volleyball Athletes

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The perceived offset location of a moving object which suddenly disappears has been found to be displaced forward, in the direction of motion, and downward, in the direction of gravity. These phenomena, coined respectively Representational Momentum (RM) and Representational Gravity (RG), are acknowledged to reflect internal models of physical invariants which aid in the extrapolation of future states of a dynamic event. Concurrently, Sports Sciences has consistently highlighted that at the core of sports expertise lie heightened perceptual and cognitive skills, rather than simply physical prowess. At least in some sports, where athletes are subjected to temporal pressures to successfully intersect fast moving balls, such expertise would presumably reflect on relevant perceptual phenomena such as RM and RG. This study aimed to explore these hypotheses by focusing on Volleyball as a context of expertise. Volleyball athletes and non-

athletes performed a spatial localisation task to indicate the perceived offset location of a smoothly moving circular target. The latter depicted either a volleyball embedded in a background picture of a volleyball court or a neutral circle moving on an otherwise blank background (see Figure 1). Outcomes revealed for athletes, but not for their non-athletic counterparts, a significant trend to misperceive targets moving along the left diagonal (as revealed by a discrete Fourier decomposition procedure of the mislocalisations for the set of motion directions) to be further displaced forward, beyond what would be expected due to RM alone, but solely when the stimuli depicted a volleyball context (see Figure 2). This finding was discussed in relation to the natural statistics of Volleyball games, where crossed ball trajectories, particularly by the outside hitter, are more prevalent, fast, and offensive, requiring better anticipation to be efficiently dealt with.

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FIGURE 1

Schematic representation of the structure of trials, contextual backgrounds and target stimuli for both conditions.

FIGURE 2

Distribution and average direction of the individual fundamental terms for both contexts separately for athletes and non-athletes (control).

