'How perception guides action: Examples from sport and health'

Abstract
James Gibson’s (1966) ecological approach to visual perception provides a theory within which to understand the nature of the meaningful, direct relationship that exists between an actor and its environment. Lee (1976) took this theory further to show how information embedded in our relationship with the environment could be used to guide our actions. To begin this talk I will briefly outline how information guides action and provide some theoretical examples of how we catch a baseball or putt a golf ball. I will show theoretically how the same principles of action guidance may apply.

I will then explain why virtual reality provides the perfect adjunct to study perception/action in sport. I will show how virtual reality is a sophisticated, interactive and immersive human-computer interface where a sensory environment is simulated by a computer (perception) and is controlled by the interactive behaviour of the user (action). I will then show how virtual reality allows us as psychologists to control and vary the visual information available to the players (e.g. the ball trajectory and/or the run-up of the attacking/defending player) and measure how it influences their decisions about when and how to act (Bideau et al, 2010; Craig et al, 2006; Craig et al, 2009). A specific example in football will be given where we tried to understand how a ball that bends influences a goal-keeper’s ability to anticipate where the ball is going. Does this deviation in the ball's trajectory, caused by spin, make it more difficult to anticipate where the ball is going and subsequently stop the ball (Dessing and Craig, 2010)?

The second example will be from rugby. Here I will present two examples. One is a 1 versus 1 situation where an attacking player is trying to use a side-step to beat the defender. What information does the defender tune into in the movement of the attacker’s body to anticipate the direction he will run? How does this information guide action (Brault et al, 2012; Brault, 2010)? I will also briefly talk about how virtual reality can allow us to look at how different players of different levels of expertise ‘see space’ or opportunities for action for themselves and others (Correia et al, 2012).

In the final section I will give some practical examples of how our knowledge of perceptual guidance of action can be exploited to help improve movement performance. I will briefly present a golf putting device that externalises the temporal information necessary for action control to help reduce putt distance variability. I will also show how auditory information of ecological events can help improve gait in people with Parkinson’s and I will finish off by showing how computer based games that have been interfaced with the Nintendo Wii balance board can be used to train and improve balance in older adults (Young et al, 2011).
References


Correia, V; Araujo, D; Cummins, A; Craig, C (In press) "Perceiving and acting upon spaces in a VR rugby task: Expertise effects in affordance detection and task achievement" Journal of Sport and Exercise Psychology


