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Implicit perceptual training: How, when, and why?

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Abstract

The perceptual skills underlying anticipatory movement in sport have been the focus of much research over the past 20 years. Methods for training such skills have tended to emphasise explicit specification of discriminative cues and the rules linking changes in the perceptual field with required responses. Recently, researchers have begun to examine less prescriptive methods of training. In the present paper, we examine conceptual, methodological, and practical issues associated with whether such skills can or indeed should be trained implicitly. The implications of two ways of conceptualising the explicit–implicit distinction for the methods used to promote implicit learning and the tests used to assess the nature of learning are considered. Finally, potential advantages of implicitly learned skills relating to task complexity and robustness under stress are discussed.

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1. Introduction

Perceptual skills are central to the performance of many tasks in different domains, including everyday activities such as driving (Horswill, Waylen, & Tofield, 2004) and reaching and grasping (Goodale, Westwood, & Milner, 2003), as well as in the military (Endsley & Smith, 1996), medical (Sowden, Davies, & Roling, 2000) and sporting (Abernethy, 1987) domains. Perceptual learning refers to the relatively long-lasting change to an organism's perceptual system that improves its ability to respond to its environment (Goldstone, 1998). At a behavioural level, perceptual learning refers to improvements in complex perceptual-based skills as a result of training (Sowden et al., 2000). Explanations of perceptual learning have been sought from a cognitive perspective through mechanisms such as attentional weighting, stimulus imprinting, differentiation and unitization (Goldstone, 1998), and from an ecological perspective through emphasising the direct tuning of action to information embedded in the optic array (Gibson, 1979). Researchers have historically focussed upon a reasonably restricted range of topics with perceptual development in infancy, perceptual adaptation, picture perception and the development of cognitive maps being particularly prominent. While reviews of perceptual learning frequently cite examples of expert perceptual skills (e.g., see Goldstone, 1998), there has been relatively little direct theorising about, and experimental examination of, the perceptual skills supporting movement in “real-world” experts. This is surprising given that this domain may provide a unique perspective within which to examine fundamental issues in perceptual learning.

The focus of the current paper is on how the perceptual processes underlying skilled anticipation may be trained. We focus on the sporting domain; however, the issues we address are relevant to other domains, particularly those in which skilled performance is characterised by sensitivity to changes in a complex visual environment, such as driving and flying. Specifically, we focus on the explicit–implicit nature of anticipation training in an attempt to highlight conceptual, methodological, and practical issues surrounding proponents of less-directed training procedures. We begin by providing an overview of the expert advantage in sport tasks requiring rapid decision-making and then examine the methods that have been traditionally employed to train such skills. The potential benefits associated with less-directed approaches to training are then considered, first, by reviewing conceptual issues relating to the definition of implicit learning and, second, by outlining different procedures for minimising the contribution of explicit processes to learning. Finally, practical issues regarding possible advantages of less-directed approaches to training are discussed. Throughout, research on implicit perceptual training and discovery-learning techniques within the sporting domain are critically appraised in the context of the broader debate about implicit learning. Where appropriate, consideration is also given to the training of other perceptual-based skills and to research on implicit motor learning.

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