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The Effect of Visual Manipulation on Running Stability

Eaves, D.L.*, N.J. Hodges, and A.M. Williams. *University of Teesside; Liverpool John Moores University

Mechsner and colleagues (2001) suggested that the visual/spatial characteristics of movement are those that dominate interlimb stability, rather than constraints inherent in the motor system. Moreover, Schmidt et al. (1990) showed how the underlying principles of within-person interlimb coordination are also applicable to between-person coordination. In both studies, coordination was an emergent rather than an enduring property of the visual display. The objective in this study was to explore the implications of being visually coupled with a dynamic symmetrical image (i.e., a mirror image), a dynamic asymmetrical image (a reverse mirror image in the medial sagittal plane), and a static image while running on a treadmill. Recreational runners (N = 8) were assessed using three indicators of movement stability: movement economy (metabolic energy expenditure and heart rate), reaction time (RT), and movement kinematics, as well as subjective reports of perceived physical exertion and mental effort. They ran each of their three experimental runs at 60% VO2 max for 15 min and then the speed was increased to 80% VO2 max for the final 5 min. Repeated-measures ANOVA revealed that a greater level of movement stability was afforded when runners were coupled symmetrically, compared to when they were visually coupled with a reversed and static image. Significant differences in metabolic energy expenditure were observed across the three conditions at 80% VO2 max. Furthermore, RT and subjective reports indicated that the cognitive and mental effort required was greater when runners were coupled with a reversed visual image in comparison to symmetrical and static images. It appears that running while coupled symmetrically (i.e., in-phase), rather than with a reversed or static image, affords a more cognitively and physiologically efficient movement profile, especially at fast speeds.

Thinking Outside the Box: The Role of Environmental Adaptation in the Acquisition of Expertise in Sport

Eccles, D.W. Florida State University

Current theories of expertise in sport postulate that experience and practice lead to increased domain-specific knowledge, which in turn leads to cognitive adaptations to the target domain. These adaptations are in the form of cognitive strategies that increase information-processing efficiency and effect a circumvention of processing limitations. Recent research has shown how domain-specific knowledge also leads to environmental adaptations to the target domain (Kirsch & Maglio, 1994). These adaptations are in the form of environmental strategies that decrease the onset of cognitive work and thus effect a circumvention of processing limitations. In orienteering, evidence has been presented of how experts develop cognitive strategies, such as attentional scheduling strategies, to circumvent the attentional bottleneck that results from a key task constraint, which is the requirement to attend visually to the map, features in the terrain, and running, simultaneously (Eccles, Walsh, & Ingleedew, 2002). The present study used interview data obtained from 20 expert orienteers to demonstrate how environmental strategies are also used to circumvent the bottleneck. One strategy includes folding the map around the area displaying the orienteering course so that when the orienteer has to attend to the map, visual location of his or her present position on the map is made easier through a reduction of the spatial area requiring visual search. Another strategy is “thumbing,” which involves gripping the map such that a thumb is placed on the map and points to the orienteer’s position. This makes visual location of this position easier by introducing a perceptual singleton into an otherwise detailed visual display. The implication of this research for the understanding of expertise is that the