Introduction

Motor imagery is a popular cognitive simulation technique defined as “a symbolic sensory experience that may occur across different mental models” (Hardy et al. 1996, p.28). One of its key applications is in mental practice (also known as a ‘motor imagery’), or the use of mental imagery to rehearse skills covertly, without executing the movements involved. Having evaluated the efficacy of mental practice in laboratory settings, imagery researchers have gradually turned to sport (Macintyre et al. 2013), exercise (Thøgersen-Ntoumani et al. 2012) and rehabilitation (Grangeon et al. 2012) contexts. Arising from these studies, a significant evidence-base has accumulated on imagery mechanisms and applications (Guillot & Collet, 2010). The present paper provides an expert statement on optimal imagery use in exercise, sport, and rehabilitation encompassing the evidence from different contexts.

Background and evidence

The following principles have emerged from recent research on imagery processes. First, imagery is now widely acknowledged as a multi-dimensional, multi-modal construct. Second, there are close parallels between the imagining, perceiving and motor control (planning and executing) of actions. Discovery of these parallels led to the ‘functional equivalence’ hypothesis (e.g., Jeannerod, 1994) or the proposition that mental imagery shares, to some degree, certain representations, neural structures, and mechanisms with like-modality perception and with motor preparation and execution. This functional equivalence approach led to the development of the PETTLEP model of motor imagery, which provided a guiding framework for the application of imagery in the context of the one that was limited in several respects (see Wakefield et al. 2013).

Third, motor imagery processes can be measured objectively using the ‘modal approach’. The logic here is that if imagined and executed actions rely on similar motor representations and activate common brain areas, then the temporal organisation and actual actions should also be similar. Consequently, there should be a close correspondence between the time required to mentally perform a given action and that required for its actual execution.

Fourth, the discovery that athletes often move slightly while engaged in mental practice has spawned interest in ‘dynamic imagery’ (see Guillot & Collet, 2010), which challenges the traditional assumption that imagery requires the athlete to be static and/or relaxed. Fifth, recent research on ‘meta-imagery’ processes and the consequence of debilitative imagery in sport (MacIntyre et al. 2013) provided early findings that indicated that athletes had sophisticated understanding of how to employ mental imagery effectively (White & Hardy, 1998).

Figure 1. Applied recommendations for mental imagery. Finally, theoretical models of imagery use have been developed for exercise and sporting domains (Guillot & Collet, 2008).

Conclusions and recommendations

Based on the evidence adduced above (see Figure 1), we can cautiously assert that practitioners should consider the following 12 recommendations to optimise the use of mental imagery by their clients in a variety of sport, exercise and rehabilitation contexts. Furthermore, in order to minimise risks to client groups and to reduce any unwanted effects, we have highlighted possible contraindications where relevant, but these are merely generalised examples and may not always apply.

Modality: Practitioners should encourage clients to use multi-modal imagery, focusing especially on the sensory modalities that are most relevant to the skill in question. Also, the advantages and disadvantages of using different imagery perspectives (e.g., first-person/third-person) should be considered. These factors are influenced by individual preferences and task characteristics. For example, the use of an external visual imagery viewpoint in a morphological task (e.g., gymnastics routine) may be more advantageous as it may enable the movement form to be analysed.

Contraindication: Engaging in imagery using sense (e.g., taste, smell) that are irrelevant to the task may diminish the working memory resources required for image generation.

Temporal equivalence: To improve the efficacy of mental practice interventions, practitioners should encourage clients, where possible, to try to achieve congruence between the duration of their imagined and actual actions. Contraindication: Slow-motion imagery may produce involuntary modifications of movement time.

Imagery direction: Where possible practitioners should recommend facilitated rather than debilitative imagery, unless the goal is specifically to enhance an adaptive emotional response to an event (e.g., increase resilience). If the client unintentionally engages in imagery of performance failure then she should be encouraged either to restructure it or to generate a positive alternative image. Contraindication: Ideal performance images may be unrealistic and lead to heightened expectations.

Activation: The optimal use of imagery requires congruence between the clients’ arousal state and the physiological activation level required for the task. If the imagery is intended to enhance motor skills, it is important that the client’s arousal state matches that required by the performance. Dynamic imagery may be useful as it may assist in matching the level of activation. Contraindication: Uncertainty of desired outcome from imagery and its correlates in older adults. Psychology of Sport and Exercise, 13, 19-25.

Imagery outcomes: Practitioners should clarify the precise outcomes that are desired from any given imagery intervention and, where possible, seek to devise and implement an individualised imagery script for the client. Typical (but not exclusive) outcomes include performance enhancement, improvement of preparatory processes (e.g., motivation) and rehabilitation of muscular movements.

Contraindication: Uncertainty of desired outcome from imagery may gradually turn to sport (MacIntyre et al., 2012) and exercise (Thøgersen-Ntoumani et al., 2013). In the context of sport performance, ‘meta-imagery’ processes are close parallels between the imagining, perceiving and motor imagery (Eds.). Oxford: Oxford University Press.

The neurophysiological foundations of mental and Imagery: A review and theoretical investigation of motor imagery use. International Review of Sport and Exercise Psychology, 6 (1), 105-121.

The BASES Expert Statement on the Use of Mental Imagery in Sport, Exercise and Rehabilitation Contexts

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