Self and Consciousness: Possible Implications for Mental Imagery Use in Sport Psychology

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Mental imagery has been reported to be one of the most frequently and widely used techniques in applied sport psychology (Biddle 1997; Hall 1998; Martin, Moritz & Hall 1999; Perry & Morris 1995). The technique has been used successfully in a variety of applications, including skills acquisition and maintenance, in the form of mental practice, performance enhancement, preparation for competition, arousal control, building self confidence and pain management (Hall, Rodgers & Barr 1990; Martin, Moritz & Hall 1999; Murphy 1994; Murphy & Jowdy 1992). The scientific study of mental imagery in sport is still in its relative infancy, having started in ernest about 20 years ago, and critics have pointed to methodological shortcomings as well as unsubstantial theoretical underpinnings for explaining the above positive research findings (Hall 1998; Martin *et al.* 1999; Moran 1993; Murphy 1994; Suinn 1993). In their summaries of the research findings, Perry and Morris (1995) and Murphy (1994), contend that although mental imagery does improve performance, the details of the processes and mechanisms involved in mental imagery and sport performance have not as yet been fully explicated.

Mental imagery as a topic of research interest in mainstream psychology is firmly entrenched in cognitive psychology, cognitive science and more recently, cognitive neuroscience. Damasio (1999a:9) positions mental imagery as the centre feature of human mental processing and consciousness by stating that: 'one might argue that images are the currency

of our minds'. Like all mental processes, imagery is in all respects a subjective phenomenon intricately bound up in the issues of the hard and easy problems of consciousness (Damasio 1994; 1999a; 1999b; Edelman & Tononi 2000; Marks 1990). Any study of the phenomenon has to rely on inferences drawn from self-reports, observations and psycho-physiological data. Mental images are fundamentally temporally ordered and thus not accessible to being 'frozen' for thorough analysis. Psycho-physiological measures such as EEG and brain mapping techniques provide important avenues to support psychomotor theories, but they do not fully address the subjective, conscious and emotional dimensions of imagery use. According to researchers in the field, no matter how sophisticated brain science methodology becomes, the subjective nature of inner experience will never be accessible to exact external measurement (Edelman & Tononi 2000).

The aim of this paper is to provide a perspective on the nature of mental imagery and its use in sport settings. In particular the paper will address some of the above issues by drawing on recent developments in cognitive neuroscience, in particular theories of consciousness, self and emotions that may expand the understanding of the nature and processes involved in mental imagery. The origins of the study of imagery in mainstream and sport psychology will create an historical context for the arguments that follow. Issues of definition and the nature and function of mental imagery will be dealt with to illustrate how the study of consciousness, self and emotions may shed light on the complexity of the phenomenon. Current theories that explain how mental imagery impacts on sport performance will be briefly discussed and current cognitive and neurobiological theories of mental imagery will be introduced to expand on these theories. Guidelines for re-conceptualising mental imagery for both research and intervention will be extracted, itemised and briefly discussed.

Historical Perspectives on Mental Imagery

Interest in mental imagery as a broad psychological phenomenon has a long history probably stemming from the ideas of the Greek philosophers. In *de Anima* Aristotle claimed that imagery was central to all thought processes of the soul (Aristotle 1986), also suggesting that imagery played an important function in mediating between bodily senses and the rational mind

(Boschker 2001). Plato proposed a wax tablet metaphor of memory in which he asserted that perceptions and thoughts are copied or imprinted as images in the mind (Morris & Hampson 1983). These authors claim that Plato's perspective laid the foundation for later stimulus-trace theories of memory. During the latter part of the 19th century, scientists such as Wundt and Titchener were instrumental in developing a systematic study of mental imagery using introspection as the method if investigation (Morris & Hampson 1983; Solso 1998). Interest in and inquiry into mental imagery disappeared during the dominance of behaviourism with its rejection of the concepts of mind and mental states initiated by Watson in 1913 (Morris & Hampson 1983). A resurgence of interest in the subject occurred in the 1960's with the advent of the so-called cognitive revolution along with the notion that, although mental processes could not be observed directly, it was possible to study them by other means (Tye 1991). The work of Cooper and Shephard was seminal in that it provided the first documented evidence of the ability of humans to rotate imaged objects. In the early 1970's, Pavio was instrumental in establishing the scientific credibility of studies in mental imagery and greatly improved the understanding of mental imagery to the extent that it has now become an important area of study in cognitive psychology (Kosslyn 1994; Morris & Hampson 1983; Solso 1998). Steven Kosslyn has been a noteworthy pioneer in developing a theory of mental imagery based on brain functions. His research into the cognitive neuroscience of mental imagery has formed a substantial basis for current views on the topic (Kosslyn 1991; 1994).

The area has not been without its major theoretical debates, the most important of which was that initiated by Pylyshyn in the early 1970's (Morris & Hampson 1983). Pylyshyn was critical of the pictorial assumptions of previous theories and suggested that mental imagery could comprise more abstract structures such as propositions. The debate between the pictoralists and propositionalists has extended for several decades, however current views tend to support a position that embraces both possibilities, depending on the nature of the circumstances (Damasio 1999a; 1999b; Kosslyn 1994).

A Brief Overview of Research into Mental Imagery Use in Sport

Weinberg and Gould (1999) contend that although athletes have been using mental imagery for some time, the systematic investigation of the effectiveness and potential use of mental imagery has only been practiced in the past two decades. Experimenters have shown extensive interest in the use of mental imagery in sport and motor skill performance since the 1930's, although these reports are mostly anecdotal and primarily descriptive in nature (Hall, Rodgers & Barr 1990; Feltz & Landers 1983; Wollman 1986). The conclusions from these early studies were that mental practice is 'clearly superior to no practice', but that it is not necessarily more effective than physical practice (Cox, Qui & Lui 1993). The assessment of imagery had its roots in the psychophysics of Fechner and Galton in the 1860's and 1880's respectively (Solso, 1998). Development in this area progressed through the work of Betts in the early 1900's, to the subjective assessment techniques of individual differences in visual imagery and movement imagery by Isaac, Marks and Russell, (1986). Recent applications of Paivio's theory to sport psychology have introduced multidimensional perspectives on imagery use in sport persons as well as the development of a self-report questionnaire (Hall, Mack, Paivio & Hausenblas 1998). Watts and Morris have developed a sport specific measure of individual differences in mental imagery ability that has potential value for refining and expanding the measurement of mental imagery in sports settings (Watt & Morris 2001; Watt, Morris, Lintunen, Elfving & Riches 2001). The major areas of focus in mental imagery in sport are experimental studies of the effectiveness of various types of imagery, individual differences in imagery use and ability, and the relationship between mental imagery and other aspects of sporting performance such as competitive anxiety (Hall 1998; Martin *et al.* 1999; Watts & Morris 2001). Recent studies and model development by Hall and his associates have extended the conceptual bases to include selected personal meanings and contextual variables associated with imagery use (Cumming & Hall 2001; Munroe, Giacobbi, Hall & Weinberg 2000).

The Definition, Nature and Function of Mental Imagery

Although definitions of mental imagery abound and are regarded as

'notoriously ambiguous' (Kosslyn 1994), there is consensus that imagery is a subjective conscious phenomenon, and that it is functionally equivalent to perceptual processing (Kosslyn 1994; Marks 1990). In addition there are functional and structural links to sensory, memory, emotional and self-representation systems that enables imagery to be an important transmitter of significant information about the person and his or her adaptive processes (Damasio 1999a; Horowitz 1989; Kosslyn 1994; Suler 1996). The definition provided by Richardson (1969) is the one most frequently used by current researchers:

Mental imagery refers to all those quasi-sensory or quasi-perceptual experiences of which we are self consciously aware and which exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts (pp2-3).

Boschker (2001) points out that this definition encompasses three significant characteristics of mental imagery, viz. that imagery is equivalent to actual sensory, motor or perceptual experiences; that mental imagery is a conscious experience that can be reported by the individual; and that the generation of an image takes place without a direct stimulus being present. Boschker (2001) argues that motor imagery is a distinct category of mental imagery that involves voluntary imaginal control and manipulation of objects, rather than simply attending to objects (Annett 1995), This form of mental imagery involves mental simulation of motor actions (Boschker 2001).

Damasio (1999a:319) represents the opinions of a new era of cognitive neuroscientists. He identifies an image as 'a mental pattern in any of the sensory modalities', underscoring the somato-sensory modality as an indispensable component. Mental patterns are conceptualised as important conveyers of the physical properties of the object or experience being imaged, the viewer's response and attitude to the object/experience and finally the experience of self-as-viewer or owner of the object/experience. In other words Damasio argues that an image is not a perceptual facsimile of the object, but that the essence of the image lies in the construction of a personalised mode of reaction to the object. He defines the concept of *object* broadly in that it could be a physical external entity as well as an internally experienced state, such as an emotion. These dimensions are important additions to and expansions of Richardson's definition, in that they

emphasise the embodiment of imagery as well as the subjectively constructed nature of the phenomenon.

Edelman and Tononi (2000) add a further dimension by proposing that a conscious state (and by implication, a mental image) has the following fundamental properties: Firstly it is an integrated state that is private, unique, unified and coherent; secondly, that by virtue of the state being conscious and immediately present, it has been selected in preference to a multitude of competing potential states. In the words of these authors this conscious state 'represents information that *makes a difference*' (Edelman & Tononi 2000: 29) in terms of potential and available thoughts, feelings and actions. In other words it has significant consequences for the individual.

These perspectives on mental imagery as unified, integrated and constructed states that encompass the perceptual dimensions of the object as well as a subjectively constructed state in response to the object go beyond the earlier definitions that tended to view mental imagery as a special form of sensory perception. This view of imagery dispenses with the need for concepts such as external reality or external vs. internal perspectives. The most important feature is that the internal construction contains all the essential information that is necessary for exploring the content and meaning of an image. Innumerable personalised perspectives and meanings can be accessed and explored by using instructions to shift attention to salient aspects of the image. Meaning is thus inherent in the image by virtue of the manner in which the image has been constructed. The mental image includes information on the imaged object and the self as experiencing state, relative to that object contained in a fully integrated experience. This perspective is substantially more holistic and integrates concepts such as perceptual, sensory-motor modalities and conceptual modalities such as self. This is a substantially more complex and dynamic notion, than that proffered by theorists during the era of cognitive psychology and cognitive science.

Contempory views emanating from cognitive neuroscience suggest that the function of imagery is inextricably linked to the processes of consciousness, self and emotions (Damasio, 1999a; Edelman and Tononi 2000).The general consensus amongst these researchers and theorists is that the function of imagery is intimately related to the evolution of brain, mind and consciousness. The foundation of this premise is that survival is at the base of most of the biological functions in organisms. Fundamental actions

to ensure organismic survival such as finding energy resources and protecting the integrity of the organism are claimed to be guided by mental images (Damasio, 1999a; 1999b). A conscious image is seen as providing the organism with the opportunity to optimize options, for feedback on choices already made, and for inventing new actions in the interests of survival (Damasio 1999a; 1999b; Edelman & Tononi 2000).

Marks (1990) offers a similar perspective and contends that although there is still uncertainty about the biological and evolutionary survival perspective on mental imagery, it is central to an understanding of intra- and interpersonal body-mind relationships. He suggests that the basic function of mental imagery is to simulate actions in order to enhance the exploration of possible outcomes in actual action—a sort of safety check to facilitate reflective adaptive information processing and problem solving.

Current Theories Explaining how Imagery Assists Sporting Performance

Given the above definitions and functions of mental imagery from a fairly broad perspective it would be appropriate to briefly examine theories that are currently used to explain how the use of mental imagery enhances sporting performance. Boschker (2001) identifies the following four major theories that have been proposed to explain the positive effects of motor imagery on subsequent performance:

Psycho-neuromuscular Theory

The psycho-neuromuscular theory is based on the observation that the same muscles that are activated during an overt execution of a movement are also activated during imagery of that movement. The magnitude of the activation during movement imagery is only a fraction of that during actual movement, and it thus causes little or no observable movement (Boschker 2001). The neuromuscular feedback from this minimal muscular activity is thought to be sufficient to support learning, thus explaining the performance improvements gained from mental imagery of motor movements (Annett 1995).

Symbolic Learning Theory

Symbolic learning theory holds that different features of a motor action are symbolically encoded and rehearsed, and that it is these cognitive aspects of the skills that benefit from mental rehearsal (Annett 1995). This symbolic coding allows for cognitive rehearsal of task components, planning of movement execution and mental simulation of task characteristics, potential problems and goals (Boschker 2001). This theory predicts that imagery will be more effective for predominantly cognitive actions than for purely motor actions, and it focuses on the use of imagery for learning motor tasks rather than for rehearsal of well-established movement patterns (Boschker 2001).

Attentional/arousal-set Hypothesis

This hypothesis states that there are individual differences in optimal states of arousal, and that individuals' optimal arousal level varies depending on the task being performed (Boschker 2001). Movement imagery may be useful in regulating arousal levels prior to competing, which provides an explanation for the effects of pre-competition focusing and psyching-up imagery (Boschker 2001).

Bio-informational Theory

This theory uses an information-processing model of imagery and assumes that an image is a functionally organised, finite set of propositions stored by the brain (Murphy & Jowdry 1992). Each image contains three classes of information, namely stimulus propositions (information about the stimulus context), response propositions (assertions about the imager's behavioural response to the stimulus) and meaning propositions (information about the significance of stimulus and response events) (Boschker 2001). It is assumed that these propositions form instructions for overt responding on the part of the imager, and thus that images form a template for behavioural responses to specific contexts (Murphy & Jowdry 1992).

The above theories have provided important foundations for research and application in mental imagery in sport, nevertheless the reliance on uni-dimensional models of human information processing to explain complex systems has limited explanatory power. In the above theories the nature of information carried by a mental image, it's fundamental function for

organismic survival, the nature of conscious experience and of self processes and emotions have not been factored in. Kremer and Scully (1994), suggest that alternative theories such as those of Paivio, Kosslyn, Lang and Ashen that attempt to integrate other aspects of human information processing, such as meaning systems and emotions with imagery, are worthwhile avenues to pursue in the future.

Directions Emerging from Cognitive Science and Cognitive Neuroscience

When discussing the issues around a definition of mental imagery in a previous section, it was argued that the theoretical and empirical directions emanating from the fields of cognitive psychology, cognitive science and cognitive neuroscience, address a variety of core issues in mental imagery (Aylwin 1990; Damasio 1999a; Hampson & Morris 1990; Kosslyn 1994). These include aspects such as the processes involved in the construction of images relative to high level visual processing, the structure and function of images, the functional equivalence between imagery and perception, the cortical location of processes involved in imagery generation and their relation to motor pathways, and the relation between imagery, somato-sensory processes, action and emotions. Cognitive processes that are fundamental to these issues are memory and consciousness, consciousness and self, emotions and bodily experience.

Consciousness and Memory

Current views on consciousness stemming from neurobiological theory and research have important implications for understanding the nature and function of mental imagery. A mental image is by its essential nature a conscious event, and the person assumes the role of an agent in that they are *aware of being aware* of the image. In other words one could say that: 'I am the one who is experiencing this image that I have generated' How the image arrives in consciousness and the role that memory pays in constructing the image are important questions that have implications for research and intervention into the phenomenon in sport psychology.

Current constructivist views of memory processing conceptualise memory as non-representational (Edelman & Tononi 2000). In 'recalling' an

image, the activity that occurs during the process is not the recall of a complete picture of a previously experienced event, but rather a form of 'constructive *recategorization*' (Edelman & Tononi 2000:95) that occurs as the person experiences the image. These authors suggest that it is the capacity of distributed neural activity or neural maps to *re-enact* their dispositional, ordered sequence of activity in response to incoming internal and external signals that results in a particular conscious mental output, in this case a mental image. The concept of working memory introduced by Badderly in the 1970's has been used to explain how mental content is held in memory for examination and exploration. The mental construction emanates from two main memory systems, a conscious, explicit, declarative memory system and an unconscious implicit, procedural memory system (Le Doux 1996). A mental image thus contains both explicit and implicit information that directs behavioural outcomes. The manifest content is thus only one dimension of an image with a large proportion of the latent content being less accessible to immediate conscious processing. This latent content is nonetheless very useful for understanding the somatic and psychological foundations that have played an essential role in the construction of the mental image. In addition, procedural memory would contain information on how information is to be used that is possibly developmentally faithful. This means that the manner in which the memory is acted on will be faithful to the level of conceptual and linguistic development present at the time of the encoding of the memory information.

Kosslyn's (2001) recent perspective highlights the significance of the inherently dynamic properties of a mental image that carries the potential for transformation and explication of important non-conscious organismic information. This stands in sharp contrast to a conceptualization of a mental image as a picture-like static and exact replication of an experienced event. He argues that the conscious experience of a visual image is the product of multiple processes that include higher cortical feedback processes. These latter processes are not highly organized and lead to poor resolution in the conscious representation of the image. What the person is conscious of are the properties of representations that are at the point of being encoded into another type of representation. This implies that a conscious visual image is in a nascent form, ready for transformation. Damasio (1999a:321) also clarifies the non-static nature of an image in describing the phenomenon as

being constructed out of a 'set of correspondences between physical characteristics of the object and modes of reaction of the organism'. These modes of reaction are what Damasio refers to as transient neural maps that are constructed by a creative brain system. The conclusion is that the transient nature of the neural maps precludes any actual static mental pictorial representation. Furthermore, it is important to remember that some of the content of an image could include procedural information that might be inappropriate for the current developmental task that could lead to what appears as irrational responses by the individual.

Consciousness and Self

Antonio Damasio (1994; 1999a; 1999b) has advanced theoretical principles that have been regarded by some as convincing neurobiological accounts of consciousness and self. A word of caution by Damasio is however worth noting, namely that the 'current description of neurobiological phenomena is quite incomplete' (Damasio 1999b:76), He is nevertheless confident that the underpinnings of the human mind and conscious experience are neurobiological. Damasio's point of departure is the biological nature of the human organism and the changing representations of core organismic systems in brain and mind. His comprehensive theoretical constructions based on extensive clinical and empirical investigation into brain-behaviour relationships, posit a multi-level system comprising three hierarchically organised consciousness and self-systems.

Damasio (1999) proposes a theory of self that is linked to consciousness through the activation of neural maps that enable the systematic emergence of the core features of conscious experience viz. feelings, images, and self. He proposes three self-systems, a *proto-self, core self* and *autobiographical self.*

The *proto-self*, a non-conscious, non-verbal, neural self-state represents the imaged moment-by-moment biological state of the organism. The somato-sensory system is the centre of this signalling system and includes the internal milieu and viscera, the vestibular and musculoskeletal system (proprioceptive and kinaesthetic sensations) and the fine touch system that is primarily responsive to external cues (Damasio 1999:149). The signalling system includes both neural as well as the transmission of information through biochemical secretions into the bloodstream.

The *core self* and *autobiographical self* are conceptualised as emerging out of conscious states of mind. The core self, relates to what Damasio denotes as core consciousness. This state is an imaged property of mind that results from the interaction of the proto-self with experienced external or internal objects. One aspect of this state is an awareness of knowing an object (external physical or internal experiential object such as an emotion) more clearly, and the other important dimension is that of knowing that you are the knower and experiencer of the object. Damasio (1999:175) describes the core-self as being 'continuously generated' and as a result has the appearance of being 'continuous in time'. These states are often experienced as fleeting moments of intense self-awareness that may not necessarily be articulated as a concept through the medium of language, but that carry significant information about the present state of the ongoing transactions between the organism and its internal and external environment. This state is akin to what Neisser (1992; 1998) refers to as the perceptual-self or the ecological-self.

The *autobiographical self* is an inherent property of what Damasio refers to as extended consciousness. This self-state is based on records of core-self experiences that have accumulated over time as implicit memories of past experiences and anticipated future states. These states can be transformed into explicit images in conscious awareness if and when required. Important characteristics of this autobiographical-self are firstly that it is conceptual and linguistically based, and secondly that the memories have dispositional qualities that form the essence of what is normally referred to as personality or identity. There is some similarity between this state and what Neisser (1992; 1998) refers to as the conceptual-self. It would appear that most of the research into mental imagery has focused on this conceptual, linguistic aspect of mental life, and that the 'imaged, nonverbal narrative of core consciousness' that occurs swiftly and almost silently has eluded definitive scientific investigation (Damasio 1999:187).

An important meaning that emerges from this recent perspective is that a mental image or a self-system may not necessarily have conceptual and linguistic origins, and may have emotional and bodily sensations as the core defining features of conscious representation. The second important aspect is that the autobiographical-self is constructed from proto- and core-self information and contains significant perceptual *and* conceptual

information on past and future perspectives of self. It is therefore important to pay attention to fleeting conscious experiences or aspects of the mental image that are reported by the person as apparently unimportant but present. Furthermore the subtleties of emotional tone and valence would need a refined appreciation to extract significant information on core and proto-self information that may have relevance to the sport person's response to competition, success and failure.

It is important to note that the neuro-biological underpinnings of the above constructs have been spelt out in detail in the relevant texts and readers are referred to them for a more thorough coverage of this topic (Damasio 1994; 1999; Edelman & Tononi 2000; Le Doux 1998).

Ecological Perspectives on Self-constructions

James Gibson proposed theories of direct perception that emphasise that perception is an 'ongoing ecological event' reciprocally constructed by organism and environment. Ulric Neisser (1992) draws on Gibson's affordance theory for his ecological perspective on self-representation, that may have potential heuristic value for sport psychology research and practice. He suggests that self-representation initially occurs in relation to the perceptual planes, surfaces and angles of the physical world. Those aspects of the physical world around one provide the person with meaning contexts that contain possibilities for action, such as the 'walk-on-ableness' (Neisser 1992:4), of a floor. This construction implies that a person would have a prototypical self-representation system that is automatically and unconsciously activated in relation to the physical properties of the context in which they are at the time. These properties would include the affordances offered by planes, surfaces, and angles of the physical environment for utility, support and opportunities for action (Eilan, Marcel & Bermudez 1995). Boschker (2001) argues for an ecological approach to understanding movement imagery in which perception is a function of the interaction of the environment and the actor and not fundamentally a cognitive representational phenomenon. Boschker draws on Tamboer's contention (cited in Boschker 2001) that movement imagery and action are primarily directed at a displacement of the body and body parts into environmental space. It could be said that motor imagery is a function of the interaction between present, past and future positions of the body or it's parts to achieve

an imaged goal—e.g. walking towards or away from an object. Whether this constitutes a distinctive domain of ecological imagery and embodied imagery is still to be settled.

Imagery interventions based on ecological-self principles could be used to facilitate efficient and economical attunements to the affordances and constraints of the sporting domain (Basson 2001). This would in turn activate well-rehearsed motor information relevant to expert performance. By highlighting these imagined salient features of the physical environment, as well as elaborating and expanding on them it is proposed that expert action would be better controlled and therefore enhanced (Basson 2001).

Conclusion

Recent developments in the field of cognitive science and cognitive neuroscience present sport psychology with perspectives on mental imagery that may have value for research and intervention. Previously held views on the nature of mental imagery based on the early developments in cognitive psychology and cognitive science appear to have resulted in a static pictorial view of mental imagery. Recent research has advanced a more dynamic, holistic and transient perspective on mental imagery that contains rich, salient organismic information. The complexity of the organisation of this information is seen in the theoretical perspectives on consciousness and self advanced by writers such as Damasio (1999a; 1999b), Edelman and Tononi (2000) and Le Doux (1994). Although direct application of these insights are still at an embryonic stage, research developments in the use of mental imagery in sport and other performance settings could well benefit from addressing the following issues that arise from these perspectives.

1. Mental images ought to be treated as unified, coherent and informative wholes that convey a single 'point of view' (Edelman & Tononi 2000). This very interdependent whole cannot be reduced to component parts without changing the essence of the meaning of the image to a new perspective.

2. The image that is generated needs to be conceived of as an integrated internal construction containing both implicit and explicit memory content, emotions, somato-sensory information such as visceral, vestibular and

musculoskeletal cues and possibilities for action as well as information about the core and autobiographical self. Therefore concepts such as internal and external perspectives in imagery, the distinction between imagery rehearsal and performance enhancement, the difference between motor imagery, visual and kinaesthetic imagery and other forms of imagery may not be as distinct as has been previously conceptualised. They may draw on different specialist processors whilst still maintaining the core feature of an integrated 'point of view'.

3. The implication of point 2 above is that theories of why mental imagery bring about a change in behaviour might need to be integrated and modified into a more holistic theoretical perspective. A theory of change will need to incorporate theoretical principles of consciousness, self and emotions as they relate to performance in sport settings.

4. The core meaning and point of view of the image needs to be retained while directing attention to various salient aspects of the image. Instructional cuing can be used to enhance systemic interaction to improve figure-ground resolution of specific aspects of a mental image necessary for the specific sporting activity, skill or task being imaged. This would mean that image scripting would need to be geared to the individual rather than be general and prescriptive.

5. To improve on the rapid access to imagery for the sport person it appears that some from of priming would be advisable and that the instruction ought to begin with a physical and emotional context that is very familiar to the athlete. This also applies to the evaluation of imagery use, where a priming instruction or condition such as a video clip of an actual sporting experience could be utilised prior to the assessment procedure.

6. The role of mood dependent memories on the generation of an image is a significant focus not to be ignored.

7. In formulating interventions that are multi-sensory or systemically informed such as the common practice of using a wide spectrum of sensory images to improve vividness and ease of recall of important images in

mental practice and intensity control and attentional focusing.
8. Attention to physical attributes of the physical environment to generate a greater sense of spatial locatedness needs to be further investigated.
9. The importance of the interpersonal context when generating an image as well as the information on interpersonal-self states need to be factored into research and intervention procedures in the area of mental imagery.

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