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MENTAL IMAGERY IN ROWERS DURING PRE-COMPETITION PERIODS

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ABSTRACT

A sample of 16 rowers (eight male and eight female) participated in the study. The Sports Imagery Questionnaire was administered seven days, three days, 24 hours, and three hours prior to competition. The study aimed to investigate changes in the use of five types of imagery, over four time-periods preceding a competitive event using the Sport Imagery Questionnaire (SIQ). Results indicated no significant difference between sexes on all measures of mental imagery. Furthermore, results demonstrated that imagery use in all the five areas of imagery increased as the time to compete drew closer, with a greater use of motivational general imagery than cognitive imagery and motivational specific imagery. These results provide support for previous research in the area of imagery use, as well as extending previous knowledge on imagery use prior to a competition.

Key words: Mental imagery; Rowing; Sport psychology.

INTRODUCTION

During the past 15 years, mental imagery has been among the three most frequently researched areas of sport psychology (Biddle, 1997). These studies have collectively shown that imagery of particular sports skills improve performance in, and learning of these skills (Hall *et al.*, 1990; Murphy, 1990; Gould & Krane, 1992; Murphy, 1994; Perry & Morris, 1995; Gould & Damarjian, 1996; Hardy *et al.*, 1996; Moran, 1996; Biddle, 1997; Martin *et al.*, 1999).

Pavio's functional model of mental imagery has been operationalised in the taxonomy developed by Hall and his colleagues in the form of the Sport Imagery Questionnaire (Hall *et al.*, 1998). The model proposes that imagery plays both a motivational and cognitive role in mediating sport related behaviour, each capable of being targeted toward either general or specific behavioural goals. The functional distinctions between the types of imagery are reflected in differences in imagery content. Motivationally, imagery can represent control of emotion-arousing situations as well as specific goals and goal-oriented behaviours. Cognitively, imagery can focus either on performance-related aspects of the situation such as strategy, or on the motor skills necessary for the performance (Hall *et al.*, 1998).

In their review of the relevant literature of the differential effects of types of imagery used in various sporting domains, Martin *et al.* (1999) have noted specific applications for the five types of imagery measured by the Sport Imagery Questionnaire (SIQ). These applications include skill and strategy learning, modifying athlete's thoughts and beliefs, and regulating arousal and competitive anxiety. In a more recent development of this model, using qualitative methodology with elite athletes, Munroe *et al.* (2000) have suggested further refinements to the functions of the five types of imagery. Cognitive specific (CS) and cognitive general (CG) imagery are seen to

serve skill and strategy *development*, as well as skill and strategy *execution*. Motivational specific imagery (MS) comprises *performance* and *outcome* imagery. Motivational general arousal imagery (MG-A) was found to be associated with *excitement (psyching up), control and maintaining composure*, and *for remaining relaxed* in pre-competition phases. Finally, motivational general mastery imagery (MG-M) performed the function of ensuring *mental toughness, maintaining focus, enhancing self-confidence* and *maintaining a positive attitude* before and during competition.

A question that has not been fully addressed is whether imagery use changes during an expanded pre-competition period, and whether specific types of imagery take on more significance as the competition approached. The period prior to competition has been identified as an important phase for mental preparation in athletes, particularly for the use of mental imagery (Barr & Hall, 1992; Dick, 1997; Martin *et al.*, 1999; Munroe *et al.*, 2000). Dick (1997) has proposed that the pre-competition period be divided into three smaller time units. He labels them as follows: the "long pre-start conditions and mental state" that occurs weeks, days and hours prior to the competition; the "short pre-start conditions and mental state", occurring minutes and hours prior to competition; and the "start conditions" which refers to the mental state seconds prior to the competition.

The present study was designed to assess the reported imagery use by rowers over four time-periods prior to competition. The time-periods selected were equated to Dick's (1997) long and short pre-start conditions. More specifically, the study investigated how the use of the five types of cognitive and motivational imagery as measured by the SIQ, changed over the four time-periods in two teams of rowers prior to a major competition. The findings from a study of this nature could assist in further understanding the use of imagery as the competition approached. The relative use of cognitive and motivation imagery could shed further light on the nature of mental states of the athletes as they prepared for competition. Furthermore, the findings could provide guidelines for further research as well as for more phase-specific mental imagery interventions.

Rowing has been described as "an internally focused sport where individual balance, timing and sequencing of movement *by the entire team* (sic) is crucial to hull speed" (Barr & Hall, 1992: 256). In their investigation, Barr and Hall found that rowers used imagery more in competition than in training, and mostly in preparation for a race. Furthermore, the authors found that rowers frequently used images of winning. These authors suggest that imagery was used for motivation as well as for enhancing self-confidence. At the time of this study, the SIQ had not been developed and there was no investigation of the changes in imagery use in an extended pre-competition period, thus providing the justification for the present investigation.

METHOD

Subjects

Two experienced rowing crews (eight male, and eight female subjects) from a university student rowing club participated in the study. The mean age of the 16 subjects was 20.18 (SD=1.64) with ages ranging from 18 to 24 years. The subjects varied according to experience with rowing having been actively involved in the sport for a minimum of six months, and a maximum of 108 months (M=34.6 months).

The competitive event for which the teams were preparing was the most important regatta of the year at national level. The boat race is an endurance event with a 6.5 km race for men, and a 4.5 km race for women.

Instrument: The Sport Imagery Questionnaire (SIQ)

Hall *et al*. (1998) developed the SIQ to assess the motivational and cognitive functions of imagery as proposed by Paivio's analytic framework of imagery effects. The scale consists of 30 items representing cognitive and motivational imagery content to which the participants respond, to the degree they use imagery, on a 7 point Likert scale ranging from 1 (rarely) to 7 (often). There are four sub-scales including cognitive general (CG) and specific (CS), and motivational general (MG) and specific items (MS). The motivational general subscale was also found to consist of two further sub-scales viz. mastery (MG-M) and arousal control (MG-A) (Hall *et al.*, 1998). Cronbach alpha coefficients for the sub-scales cited by Hall *et al.* (1998), were 0.87 for CS, 0.77 for CG, 0.82 for MS, 0.76 for MG, 0.75 for MG-M, and 0.75 for MG-A. In the present study the Cronbach alpha coefficients based on the pre-event scores were found to be (N=15): 0.69 for CS, 0.70 for CG, 0.92 for MS, 0.75 for MG-M, and 0.71 for MG-A.

The rowers were required to complete the SIQ under the supervision of the junior author at four time-periods. These time-periods were selected according to the guidelines provided by Dick (1997) to provide information on mental imagery use during long and short pre-start conditions, i.e. 7 days, 3 days, 24 hours, and 3 hours prior to competition. The immediate pre-start period was not used as it was believed that this would not only interfere with the mental focus of the rowers, but also not provide reliable information as a result of resistance from the rowers to spend time filling in a questionnaire.

RESULTS

The results of a MANOVA revealed no significant differences between men and women in the use of the five types of imagery over and during the four time-periods. It was thus decided to treat the two teams as a homogenous group for statistical analysis of the data.

Means and standard deviations for the five sub-scales of the SIQ over the four time-periods are reflected in Table 1 below. Furthermore, a graphic representation of the change over the four time-periods is provided in Figure 1. As can be seen from the means and standard deviations, motivation specific (MS) imagery had the lowest mean and the largest standard deviations throughout the four time-periods. Motivational general mastery (MG-M) showed consistently high means and lower standard deviations.

A Friedman's two-way ANOVA was used to investigate the significance of changes in the use of cognitive and motivational imagery over the four time-periods preceding competition.

TABLE 1. **MEANS FOR IMAGERY USE AT DIFFERENT TIMES PRIOR TO COMPETITION**

Time Prior to Competition	MS		MG-A		MG-M		CS		CG	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
7 Days	4.61	1.52	5.48	0.79	6.06	0.87	5.43	0.79	5.07	1.00
3 Days	4.99	1.28	5.94	0.64	6.34	0.54	5.75	0.76	5.44	0.93
24 Hours	5.19	1.55	6.36	0.64	6.58	0.46	6.26	0.73	6.00	0.71
3 Hours	5.73	1.36	6.69	0.38	6.61	0.45	6.19	0.99	6.01	0.72

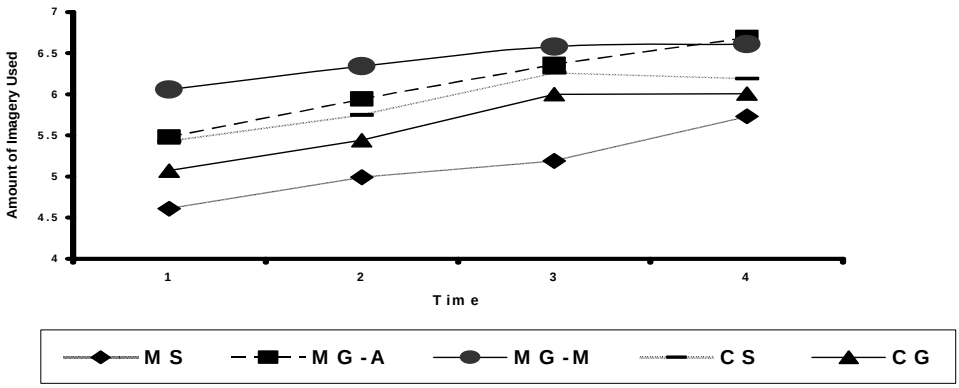

FIGURE 1. **SIQ SUB-SCALE SCORES IN THE FOUR TIME-PERIODS PRIOR TO COMPETITION**

All five types of imagery showed a statistically significant increase in their reported use over the four time-periods. As can be seen in Figure 1, there is a steady linear trend towards more imagery use for all five types of imagery over the four time-periods. The two cognitive sub-scales were a slight exception and had their highest mean scores 24 hours prior to competition. A statistically significant difference over time was found for the following sub-scales of the SIQ: Cognitive General (H^2=20.34, p<.001), Cognitive Specific (H^2=14.34, p=.002), Motivational Specific, (H^2=11.45, p=.01), Motivational General Mastery (H^2=19.36, p<.001), and Motivational General-Arousal (H^2=29.70, p<.001).

Comparison of types of imagery used at each time-period:

A Friedman two-way ANOVA was used to assess differences between the five types of imagery use during the four time-periods prior to competition. A significant difference was found between

the means of the five SIQ sub-scales seven days prior to competition, (H^2=22.73, p<.001). The mean score for Motivation General-Mastery (M=6.06, SD=0.87) was higher than CG and MS (M=.07, SD=1.00 and M=4.61, SD=1.52, respectively).

A significant difference was found for the mean SIQ scores three days prior to competition (H^2=27.86, p<.001). The mean score for Motivation General-Mastery (M=6.34, SD=0.54) was greater than that for Motivation Specific (M=4.99, SD=1.28).

Twenty-four hours before the competitive event, the SIQ scores were also statistically significantly different (H^2=25.85, p<.001). The mean score for Motivation General-Mastery (M=6.58, SD=0.46) was greater than that for Motivation Specific (M=5.19, SD=1.55). The means for the other four sub-scales were all evenly high at this stage.

Finally, there was a significant difference for the SIQ factors as measured on the morning of the competition, thee hours prior to the competition (H^2=21.81, p<.001). The mean scores for Motivation General-Arousal and Motivational General- Mastery respectively (M=6.69, SD=0.38 and M=6.61, SD=0.45), were greater than the mean for Motivation Specific (M=5.73, SD=1.36), whereas the mean scores for Cognitive Specific and Cognitive General were not significantly different.

DISCUSSION

The results of this study suggest that there is preliminary support for a time related change in the use of the types of mental imagery measured by the SIQ in the period prior to competition. There was a statistically significant linear increase in the use of all five types of mental imagery as the competition time approached. These findings lend further support for the importance of mental imagery as a means of managing both the mental and skill-related demands that competition makes on athletes prior to competition. Mental imagery activity increased as rowers prepared themselves in the short and long pre-start phases of competition. The Munroe *et al.* (2000) study, that proposes a model for the function of the five types of mental imagery measured by the SIQ, provides some guidelines for interpreting these findings. It is thus possible that during the week and hours prior to competition, cognitive and motivational imagery both serve the purpose of mentally preparing rowers by increasing their self-confidence, focus, motivation, control, skill and strategy execution, and goal directedness (Munroe *et al.*, 2000). This finding provides preliminary support for, and adds to the understanding of, the differential use of pre-competition mental imagery reported in previous research using the SIQ (Barr & Hall, 1992; Hall *et al.*, 1998; Martin *et al.*, 1999; Munroe *et al.*, 2000).

More specifically, at each time interval, it was found that there was a greater use of motivational general-mastery and arousal imagery (MG-M and MG-A), followed by cognitive-specific, cognitive-general and motivational-specific imagery. The rowers from the outset used significantly more motivational general-arousal imagery. This suggests that controlled psyching up to ensure optimal levels of arousal was very important for mental preparation in this rowing event (Munroe, *et al.*, 2000). The corresponding use of motivational general-arousal imagery also suggests that imagery was used to ensure that mental toughness was maintained in the pre-competition period. In addition, it is suggested by the Munroe *et al.* (2000) model that this type of imagery probably assisted these rowers to remain focused on the task ahead as well as to increase their confidence to row efficiently as a team. One could also argue that three hours before the competition, rowers

could have used this type of imagery to ensure that they activated and maintained a "flow state" to enable the crew to work as a synchronized machine (Barr & Hall, 1992; Munroe *et al*., 2000).

Imagery that focused on rehearsing skills and strategies specific to rowing was also reported to be used by the rowers with increasing frequency until three hours prior to the race when there was a significant decrease in the use of skill-related imagery. Munroe *et al.* (2000) suggest that the focus in this type of imagery is in skill rehearsal in training and in skill execution during competition. One could speculate about the reason for the decrease in the use of this type of imagery in the three-hour period prior to competition. It could be that the rowers were focusing on skill rehearsal and execution during the build-up to the competition in focused training sessions, and that as information relative to the reality of the competition became the conscious mental content, skill rehearsal became less important than maintaining control over internal states relative to maintaining control and focus.

The finding that motivational specific imagery was generally not used as much as the other four types of imagery in the three initial time-periods is worth noting. This is particularly relevant as there was a statistically significant increase in the use of this type of imagery three hours prior to the competition starting, relative to the other three time-periods. The rowers appeared to become more aware of the importance of imaging their performance and the outcome of the performance as they prepared for the event and as the mental and physical demands of the competition entered consciousness more frequently. These findings are similar to those reported by Hall *et al.* (1998), who found a greater use of motivational than cognitive type imagery with competition (when it was too late to get any better by cognitive learning, but where performance and goal seeking was maximized). These findings also suggest that when teams or individuals are compared for the use of mental imagery prior to competition, time needs to be controlled as an important independent variable. All athletes would thus need to be assessed at the same time-period prior to competition.

The relatively small sample size used in this study limits the generalisability of the results to other rowing teams and other sport types. However, the finding that a linear trend in the use of the five types of mental imagery measured by the SIQ could be used to test this finding with larger samples and in different sport types. It was also not possible in this study to obtain data at a time interval much closer to the competition than three hours. Furthermore there is yet no adequate method of evaluating an athlete's subjective experience *in the process* of competition. Therefore, the true pattern and shifting patterns of mental imagery use in competitive situations remains elusive and dependent on retrospective recall. The effect of practice on the reporting of imagery use is also a variable that will need to be considered in future research that investigates time-related changes in imagery use. It may well be that the repeated use of the same questionnaire could have lead to a priming effect and that as a result, more imagery is reported to be used.

Finally, the difficult question is whether imagery during and before competition is generated deliberately or automatically, and whether there is a subsequent differential effect on performance. Annett (1995) has indicated that the relationship between imagery use and performance has not been clearly demonstrated and there is definitely room for a more complete understanding of the complex and essential relationship between body-mind states and imagery generation as a response to organismic homeostasis.

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