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More Than Meets the Eye: Investigating Imagery Type, Direction, and Outcome

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The effects of imagery direction on self-efficacy and performance in a dart throwing task were examined. Two imagery types were investigated: skill-based cognitive specific (CS) and confidence-based motivational general-mastery (MG-M). Seventy-five novice dart throwers were randomly allocated to one of three conditions: (a) facilitative imagery, (b) debilitative imagery, or (c) control. After 2 imagery interventions, the debilitative imagery group rated their self-efficacy significantly lower than the facilitative group and performed significantly worse than either the facilitative group or the control group. Efficacy ratings remained constant across trials for the facilitative group, but decreased significantly for both the control group *and* the debilitative group. Performance remained constant for the facilitative and the control groups but decreased significantly for the debilitative group. Similar to Short et al. (2002), our results indicate that both CS and MG-M imagery can affect self-efficacy and performance.

The applied model of imagery use (Martin, Moritz, & Hall, 1999) represents how athletes use different types of imagery to achieve a variety of outcomes across different sport situations. According to the model, five types of imagery are prevalent in sport, and athletes should use the type that is most related to the desired outcome. For example, skill-based cognitive specific (CS) imagery is suggested to be most helpful for skill acquisition and performance. By contrast, the model suggests that for enhancing confidence, motivational general-mastery (MG-M) imagery is best because it consists of images concerned with mastery experiences. In line with this model, athletes reporting greater use of MG-M imagery have been found to have higher levels of self-efficacy or self-confidence (Beauchamp, Bray, & Albinson, 2002; Mills, Munroe, & Hall, 2001; Moritz, Hall, Martin, & Vadocz, 1996; Vadocz, Hall, & Moritz, 1997). Moreover, MG-M imagery based interventions can raise

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self-efficacy perceptions (Callow, Hardy, & Hall, 2001; Feltz & Riessinger, 1990; Jones, Bray, Mace, MacRae, & Stockbridge, 2002), and CS imagery can be effective for enhancing learning and performance (Driskell, Copper, & Moran, 1994; Durand, Hall, & Haslam, 1997; Hall, Schmidt, Durand, & Buckolz, 1994). Thus, there is little doubt that MG-M imagery may be useful for self-efficacy enhancement and that CS imagery may be useful for skill improvement in sport.

However, not all research examining the imagery type—outcome relationship has yielded results as clear cut as those just mentioned, in particular when considering the types of imagery that may be used to enhance self-efficacy. Bandura (1986, 1997) has argued that imaginal experiences are a source of self-efficacy. He states that "Seeing or visualizing other similar people perform successfully can raise self-percepts in observers that they too possess the capabilities to master comparable activities" (1986, p. 399). This clearly refers to the self-efficacy source of vicarious experience (a sense of having *seen it done* perfectly). It is also plausible that imaging oneself performing a skill perfectly (CS imagery) could also provide past performance information (a sense of having *done it* perfectly before), which is another source of self-efficacy. This point has been argued previously by several authors (e.g., Abma, Fry, Li, & Relyea, 2002; Callow & Hardy, 2001; Feltz, 1984; Martin & Hall, 1995; McKenzie & Howe, 1997; Moritz et al., 1996; Short et al., 2002), and findings from studies employing qualitative as well as quantitative research designs suggest that CS imagery may influence self-efficacy (Calmels & Fournier, 2001; Garza & Feltz, 1998; McKenzie & Howe, 1997; Short et al., 2002; White & Hardy, 1998). Similarly, other imagery types (e.g., MG-M) might also produce performance benefits (Short et al., 2002). Clearly the relationship between imagery types and outcomes is not a straightforward one, and we agree with Short and colleagues (2002) that there is a need for further clarification.

Imagery Direction

In addition to what an image may depict with regard to skills, confidence, or otherwise, image content is also colored by imagery direction. Imagery direction may be thought of as the degree to which an image assists performance (facilitative imagery) or hurts performance (debilitative imagery; Short et al., 2002). To date, research examining imagery direction has produced inconsistent findings, with some studies documenting a facilitative effect on performance when using "positive imagery" and a corresponding debilitative effect on performance when using "negative imagery" (Powell, 1973; Shaw & Goodfellow, 1997; Short et al., 2002; Woolfolk, Parrish, & Murphy, 1985). In comparison, others only found that the latter produced debilitative effects (Beilock, Afremow, Rabe, & Carr, 2001; Taylor & Shaw, 2002; Woolfolk, Murphy, Gottesfeld, & Aitken, 1985), and some studies found no effect at all on performance (Epstein, 1980; Meyers, Schleser, Cooke, & Cuvillier, 1979).

There are several reasons why such inconsistencies may exist. One explanation concerns the conceptualization of imagery direction. Typically, positive imagery has been associated with positive outcomes and negative imagery with negative outcomes (Short et al., 2002). According to Short et al. (2002), the problem with this approach is that there are instances when a seemingly negative outcome, such as missing the basket in basketball, may not be considered negative by the individual. In the basketball example, imaging a ball being thrown from a distance further from the basket than normal and being close to hitting the basket could be considered a fairly good performance by the athlete. Likely, the interpretation will depend on self-efficacy for the task and performance standard. In particular, novice performers, the most common participants in imagery research, may be likely to perceive a near miss as a positive outcome. A second issue is the pervasiveness of direction in imagery scripts. Typically, previous studies kept the bulk of the script positive (facilitative) or neutral in nature and only added a small debilitative component for the debilitative conditions. Thirdly, the personal interpretation of imagery content that individuals make has not previously been considered in imagery direction studies. Murphy and Martin (2002) report several instances where the meaning of the image to the participant was completely different to what was intended by the experimenter. An appreciation for individual differences in meaning is also the basis of Ahsen's ISM triple code model of imagery (Ahsen, 1984). For this reason, manipulation checks were employed to establish, among other things, the extent to which participants used the imagery and their perceptions of imagery direction.

A final possible reason is that self-efficacy has not always been considered. It is possible that any effects of imagery on performance are mediated by self-efficacy (Feltz, 1984; Taylor & Shaw, 2002), or governed by it (Bandura, 1997; Beauchamp et al., 2002). An early study that included self-efficacy found no relationship with imagery direction (Woolfolk, Murphy et al., 1985). This finding has been attributed to the use of a CS imagery intervention (Martin et al., 1999; Denis, 1985), but the study also included an outcome-only imagery condition, which could be described as motivational specific (MS) imagery (i.e. images of goal achievement; see e.g., Hall, 2001 for a description of imagery types). In a more recent study on imagery direction and self-efficacy, Taylor and Shaw (2002) found the "negative imagery" group to be less confident than control participants or participants in a "positive imagery" group. The type of imagery employed was very similar to Woolfolk, Murphy et al.'s (1985) outcome-only imagery (i.e. MS). Finally, Short et al. (2002) found that both CS and MG-M imagery affected self-efficacy.

Summary and Aims

In sum, the applied model of imagery use (Martin et al., 1999) suggests that "what you see is what you get" (Flip Wilson; Martin et al., 1999; Short et al., 2002), but there seems to be instances when certain types of imagery can produce more than one outcome. The present study, therefore, aimed to further examine the influence of imagery direction on self-efficacy and performance of a motor task (dart throwing). In addition, we investigated whether any differences existed between CS imagery (imagery of the dart throw) and MG-M imagery (imagery of being self-confident) on these same outcome variables. It was hypothesized that performance and self-efficacy will, compared to a control group, increase for the facilitative group and decrease for the debilitative group, following both CS and MG-M imagery. Manipulation checks were employed to establish participants' perceptions of imagery direction. Because imagery ability and imagery perspective may affect the relationship between imagery type and outcome (for reviews, see Hall, 2001; Martin et al., 1999; Murphy & Martin, 2002), both were assessed in the present study. Our design also provided an opportunity to test whether self-efficacy mediated the effects of imagery intervention group on performance. The findings may facilitate athletes', coaches', and sport psychologists' understanding of how imagery scripts are best written as well as how imagery can be used most effectively.

Method

Participants

The participants were 75 students, most of which were sports science undergraduates who received course credit for their participation. Both females (*n* = 48) and males (*n* = 27) participated in the study with ages ranging between 19 and 40 years and a mean age of 21.45 (*SD* = 3.48). All participants were beginner or novice dart-throwers.

Equipment

A Harrows Official Competition dartboard and Harrows Combat Precision Steel tip darts were used for the dart throwing task. The dartboard had metal wire dividing the original circles, but paint was used to create additional circles to simplify scoring. The radii of the different circles were as follows: .75 cm (Bull's eye: 8 pts); 1 cm (7 pts); 4.5 cm (6 pts); 3.5 cm (5 pts); 1 cm (4 pts); 5.5 cm (3 pts); 1 cm (2 pts); 5.5 cm (1 pt). The unequal radii present a somewhat less than ideal scoring situation, but this was necessitated by the design of the dartboard. A wooden oche was placed on the floor at six feet (1.83m) from the dartboard to mark the distance from which the practice trial was performed. This distance was determined following consultation with an experienced dart-thrower and refined through pilot testing.

Measures

Imagery Ability. The Movement Imagery Questionnaire, Revised (MIQ-R; Hall & Martin, 1997) was employed to measure imagery abilities. The MIQ-R is an 8-item questionnaire asking participants to first physically perform, and then visually or kinesthetically image four simple movements. The participants are then asked to rate their ability to visually or kinesthetically image the movement on a 7-point Likert scale ranging from 1 (*very hard to see/feel*) to 7 (*very easy to see/feel*). The items are averaged to form a visual and a kinesthetic subscale. Both subscales had acceptable levels of internal reliability, the Cronbach alpha coefficients being .76 (kinesthetic subscale) and .85 (visual subscale; Nunnally, 1978).

Performance. Scores were determined from where the dart landed on the dartboard. The dartboard was divided into eight sections, represented by the concentric circles on the dartboard, and darts landing in the circle representing the center of the board (the bull's eye) was awarded the maximum score of eight points. Points then decreased as the circles moved away from the center, with darts landing outside of the dartboard receiving 0 points.

Self-Efficacy. A self-efficacy measure was constructed following recommendations made by Bandura (1997). The measure assessed both the level and the strength of participants' beliefs about their abilities to perform the dart-throwing task. Items were based on the question "I believe I can score 8 (the maximum score) on x of the next 24 throws." The question was repeated a total of 12 times, each question representing a progressively harder goal with the first question referring to two throws and the last referring to all 24 throws. This increase of two throws was made to illustrate the increasing complexity of the task without burdening the participants with the unnecessary repetition that would result from asking about every throw. Participants indicated the strength of their belief in each statement with a percentage, 0% meaning "I am very certain I cannot do this," 50% corresponding to "I am unsure—it could go either way," and 100% indicating "I am very certain I can do this." Cronbach alpha coefficients indicated excellent internal reliabilities with values ranging between .93 - .94 for the three times the questionnaire was completed.

Post Trial Manipulation Check. At the end of Trial 1 and 2, participants in the facilitative and debilitative imagery conditions were asked to complete a manipulation check, created based on recommendations previously made in the literature (e.g., Cumming & Ste-Marie, 2001; Murphy & Martin, 2002; Shaw & Goodfellow, 1997; Short et al., 2002; Taylor & Shaw, 2002). First, imagery perspective was assessed via the following item: "During the last trial of 24 throws, did you see yourself from an outside view (i.e., as if watching yourself on video) or from an inside view (i.e., as if you are actually inside yourself)?" and was rated on a Likert scale ranging from 0 (*completely inside*) to 10 (*completely outside*). Second, the ability of the participants to image the content of the scripts was assessed on a Likert scale similar to that of the MIQ-R (Hall & Martin, 1997), with scores ranging from 1 (*very hard to see/feel*) to 7 (*very easy to see/feel*). Two separate questions assessed the relative ease of visual and kinesthetic imagery, and a follow-up question asked participants who scored 1-3 why they found it hard to image. Third, participants were asked whether they had used the imagery as instructed and fourth, whether they had been trying to get the dart as near the center of the board as possible. Both of these questions were assessed on a Likert scale ranging from 0 (*not at all*) to 4 (*yes, throughout*). Finally, participants were asked whether they perceived the imagery as being facilitative or debilitative to their dart throwing performance. This last question was also assessed on a Likert scale, ranging from 1 (*entirely debilitative*) to 5 (*entirely facilitative*).

Post Experimental Manipulation Check. On completion of the experiment, all participants were asked to report whether they had employed any mental strategy other than what had been assigned to them (Taylor & Shaw, 2002). In contrast to Taylor and Shaw, however, common mental strategies were listed (e.g., self-talk, own imagery, goal-setting) and multiple responses were allowed.

Procedure

Participants were first given an information letter and completed a consent form. A short definition of imagery was provided (White & Hardy, 1998) and participants completed the MIQ-R (Hall & Martin, 1997). Next, each participant was randomly assigned to either a facilitative imagery group, a debilitative imagery group, or a control (no imagery) group. Participants then performed a practice trial of nine throws from a distance of six feet (1.83m). During this practice trial, participants were all given the same basic information regarding dart-throwing technique. Based on practice trial results, participants were allocated to an appropriate distance from the dartboard for the remainder of the experiment. The possible range of scores was 0-72. Based on pilot testing, a score of 0-24 points was designated a distance of five feet (1.52m), 25-48 points a distance of six feet (1.83m), and 49-72 points a distance of seven feet (2.13m). This was done in an attempt to reduce ceiling effects in the experiment and has been used successfully in previous experiments employing a golf-putting task (Short et al., 2002; Woolfolk, Murphy et al., 1985; Woolfolk, Parrish et al., 1985). No participants scored below 24 points, 47 participants scored 25-48 points, and 28 participants scored 49-72 points. Thus, the majority of participants remained at the initial distance of six feet (1.83m).

After the distance assignment, the baseline self-efficacy measure was completed, followed by a baseline trial of 24 throws. Next, the first imagery intervention took place for participants in the facilitative and debilitative imagery conditions, who received either a MG-M or CS imagery script, in a counterbalanced order. Scripts (available from the authors upon request) were adapted from those of Short et al. (2002) for use in dart-throwing and were scrutinized by an experienced dart-thrower to ensure correct technical content. The control group did not receive an imagery intervention but were instead instructed to count backwards out loud and in steps of seven, starting with a large four-digit number (5678). This was to ensure that the control group received the same amount of rest between trials as the imagery intervention groups, while engaging them in a mental task to prevent spontaneous mental practice. The task was presented as an unassessed "concentration task," and the participants could receive help if they found the task to be difficult.

After the first imagery intervention or control task, participants were asked to complete a second self-efficacy measure and perform 24 throws (Trial 1). In an attempt to minimize the influence of demand characteristics (i.e., participants conforming to perceived expectations of the experimenter), participants were instructed that the center of the board was their target at all times. Imagery group participants were asked to recreate the images from the scripts throughout the trial, and reminders were given before the 6th, 12th, and 18th throws. Following Trial 1, the participants in the imagery intervention conditions were asked to complete the post trial manipulation check.

Trial 2 followed the same procedure as did Trial 1. Participants were taken through the second imagery intervention (CS or MG-M, depending on which one was already received) or the distraction task. Next, the third self-efficacy measure was completed and the dart-throwing commenced (Trial 2). After Trial 2, imagery intervention participants completed post trial manipulation checks. Lastly, all participants completed the post experimental manipulation and were debriefed.

Data Analyses

Before proceeding with the main analyses concerned with our primary research questions, preliminary analyses were conducted. These established whether variables other than the imagery interventions were affecting our results and included (a) baseline differences in imagery ability and imagery perspective between the three experimental groups; (b) gender differences in baseline performance and self-efficacy, as previous research has sometimes found such differences (Epstein, 1980; Shaw & Goodfellow, 1997; Short et al., 2002); and (c) differences between the imagery intervention groups on the manipulation check variables. One-way between-groups ANOVAs were used for all the above analyses, and Bonferroni corrections were applied to reduce the possibility of type I error where appropriate. A mixed-design ANOVA was used to examine gender differences in performance across trials, and chi-square analyses explored whether differences existed between groups in their use of a certain imagery perspective or additional mental strategies.

Our main analyses were concerned with investigating whether any differences existed between the three experimental groups (facilitative imagery group, debilitative imagery group, and control group) on measures of performance and self-efficacy. Effects of imagery direction on self-efficacy and performance across trials were investigated via mixed-design ANOVAs, and Tukey HSD post-hoc tests were used for follow-up analyses. We were also interested in testing the predictions of the applied model of imagery use (Martin et al., 1999). Specifically, we investigated whether CS imagery had a greater impact on skill execution than did MG-M imagery, and whether MG-M imagery had a greater impact on self-efficacy than did CS imagery. Therefore, one-way between-groups ANOVAs were employed to examine any differences in performance and self-efficacy between those receiving MG-M imagery first and those receiving CS imagery first. Again, a Bonferroni correction was applied. Such differences were only of interest in Trial 1 (after the first intervention), because in Trial 2 (after two interventions), both CS and MG-M imagery had been given to all imagery participants and any differences between the two types would be clouded by the additive effects of having received two interventions. Thus, the outcome variables in the imagery type analyses are self-efficacy ratings after the first imagery intervention and performance in Trial 1, respectively.

The ANOVAs for gender differences as well as the main analyses were conducted with a mixed design (mixed between-within subjects ANOVA, or sometimes called a split-plot ANOVA; SPANOVA). This involves using the General Linear Model in SPSS and yields multivariate tests, which is the reason for reporting Pillai's trace in these analyses.

Lastly, three linear regressions explored whether performance changes following the imagery interventions were mediated by self-efficacy. Following the recommendations of Baron and Kenny (1986), a series of three linear regressions were calculated. Scores from Trial 2 were used for both self-efficacy and performance, and dummy variables were used for the categorical variable of group membership (Pedhazur & Schmelkin, 1991).

Results

Preliminary Analyses

Imagery Ability. No differences in general imagery ability were found between the three experimental groups for neither the visual nor the kinesthetic subscale (see Table 1). Thirty-three participants scored below 5 on average (a criterion used by Short et al., 2002), whereas 42 participants scored an average of 5 or higher. Those scoring 5 or higher were classified as having "high imagery ability," and those scoring lower than 5 were classified as having "low imagery ability." Two ANOVAs were performed with self-efficacy and performance serving as the dependent variables ($p = .025$). The high and low imagery ability groups did not differ significantly in either their performance, $F(1, 74) = 0.63$, $p = .43$, or their self-efficacy ratings, $F(1, 74) = 4.09$, $p = .05$. On the basis of these results, all participants were retained in the sample for further analyses.

Imagery Perspective. Participants were classified as being internal imagers, external imagers, or switchers (i.e., neither completely internal nor completely external) following the criterion adopted by Cumming and Ste-Marie (2001). Specifically, participants who scored between 0-2 on both manipulation checks were identified as internal imagers, participants who scored between 8-10 were identified as external imagers, and participants who scored between 3-7 were identified as

Table 1 Imagery Ability and Manipulation Check Tests: Scores and Results of ANOVA Tests of Differences Between Groups

	Scores						Differences between groups[a]			
	Facilitative group		Debilitative group		Total sample					
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*df*	*F*	*p*	η^2
MIQ-R (visual)	5.29	1.11	5.29	1.12	5.25	1.12	2,72	.09	.91	.00
MIQ-R (kinesthetic)	4.81	.93	5.14	.83	4.99	.96	2,72	.76	.47	.02
Specific imagery ability (visual)	4.50	1.35	4.26	1.00	4.38	1.18	1,49	.51	.48	.01
Specific imagery ability (kinesthetic)	4.14	1.17	4.24	1.00	4.19	1.07	1,49	.01	.76	.00
Assigned imagery use	3.01	.74	3.07	.49	3.04	.62	1,49	.09	.77	.00
Aiming for the center	4.00	.02	3.74	.54	3.87	.40	1,49	5.56	.02	.10
Perceptions of direction	3.85	.65	2.21	.79	3.03	1.10	1,49	64.35	< .01	.57

Note. [a]ANOVAs were performed for all three experimental groups on the MIQ-R, but for the two intervention groups only in the case of the remaining variables. This is because the latter were part of the manipulation check, which was only completed by intervention group participants.

switchers. There were 14 "internal imagers," 35 "switchers," and only 1 "external imager." A chi-square analysis indicated that no differences existed between the imagery intervention groups (facilitative and debilitative imagery groups) in the proportion of participants using a certain imagery perspective, $\chi^2(2, N = 50) = 1.31, p = .52$.

Gender Differences. Two ANOVAs explored whether gender differences existed in baseline performance and self-efficacy ($p = .025$). No differences were found between males and females on self-efficacy, $F(1, 74) = 0.00, p = 1.00$, but males performed significantly better than females, $F(1, 74) = 21.859, p < .01, \eta^2 = .23$. A subsequent mixed design ANOVA revealed no main effect for trial, Pillai's trace = .02, $F(2, 72) = .64, p = .53$, and no interaction between gender and trial, Pillai's trace = .02, $F(2, 72) = .86, p = .43$. The lack of a significant interaction revealed that males and females did not respond differently to the imagery interventions. Therefore, we collapsed the data across gender for the main analyses.

Manipulation Check. All means, standard deviations, and one-way between-groups ANOVA tests of difference are presented in Table 1, with the scores presented being averages from the two manipulation checks. Because five ANOVAs were conducted, the significance level was set at $p = .01$. With respect to specific imagery ability, no difference was found between the groups in how easy or difficult they found it to employ the images they were instructed to use. Similarly, no difference was found between groups in assigned imagery use prior to each throw. The means indicated that both groups used the imagery "most of the time." By contrast, the facilitative group tried harder to get the dart into the center of the board than did the debilitative group. A rating of 3 corresponds to "most of the time," whereas 4 corresponds to "throughout." Thus, both groups were closest to the rating of aiming into the center "throughout." The facilitative imagery group and the debilitative imagery group also differed in how they perceived the imagery. Mean scores revealed that the facilitative imagery group perceived their imagery to be "somewhat facilitative," whereas the debilitative imagery group perceived their imagery to be "somewhat debilitative." Thus, the manipulation of imagery direction was successful.

Post Experiment Manipulation Check. Forty-seven participants (62.7%) reported using at least one strategy other than that given to them by the experimenter. Own imagery was used by 8 participants (10.7%); 24 participants (32%) used goal setting; 30 participants (40%) reported using positive self talk; 9 participants (12%) used negative self-talk; and 7 participants (9.3%) used some strategy other than those mentioned on the post-check. Chi-square analyses explored whether any differences existed between groups in their use of these strategies. The only difference found was for the use of positive self-talk, with control group participants reporting using this strategy more than imagery intervention group participants, $\chi^2(2, N = 75) = 6.33, p = .04, \phi = .08$.

Main Analyses

Imagery Direction. To examine whether differences in self-efficacy or performance existed between the experimental groups across trials, two mixed-design ANOVAs with a 3(group) × 3(trial) design were employed ($p = .025$). Group (facilitative, debilitative, or control) served as the between-groups independent variable and trial (baseline, Trial 1, Trial 2) as the within-groups independent variable. Self-efficacy ratings or performance served as the dependent variables. Means and standard deviations are presented in Table 2.

When self-efficacy served as the dependent variable, no main effect was found for group, but a significant main effect was found for trial, Pillai's trace = .31, $F(2, 71) = 15.56$, $p < .001$, $\eta^2 = .31$. Furthermore, a significant interaction between trial and group was found, Pillai's trace = .16, $F(4, 144) = 3.07$, $p = .02$, $\eta^2 = .08$, indicating that the three groups differed in their self-efficacy ratings across trials. Tukey HSD post hoc tests were calculated to determine which means changed across trials and in relation to each other. To this end, 18 comparisons were calculated. Results indicated that the facilitative imagery group did not change in self-efficacy across trials, and the control group did not change their self-efficacy ratings between baseline and Trial 1, or between Trial 1 and Trial 2. However, the control group did significantly decrease their ratings for self-efficacy between baseline and Trial 2 (effect size = .61). Furthermore, the debilitative imagery group had significantly decreased their self-efficacy ratings from baseline to Trial 1 (effect size = .71) and Trial 2 (effect size = .88). There were no differences between the three groups at baseline. However, the facilitative imagery group scored significantly higher for self-efficacy than did the debilitative imagery group in both Trial 1 (effect size = .63) and in Trial 2 (effect size = .69) and higher than the control group in Trial 2 (effect size = .58).

When performance served as the dependent variable, no main effect was found for trial or group. There was, however, a significant interaction between trial and group, Pillai's trace = .23, $F(4, 144) = 4.56$, $p < .01$, $\eta^2 = .11$, suggesting that the groups differed in their performance across trials. Tukey HSD post hoc tests were calculated to determine whether the means for each experimental group changed across trials and in relation to each other. Again, 18 comparisons were calculated. Results revealed that the facilitative imagery group and the control group did not change in performance across trials. By contrast, the debilitative imagery group significantly decreased their performance between baseline and Trial 1 (effect size = .47) as well as Trial 2 (effect size = .66). No differences existed between the three groups at baseline, but the facilitative group scored significantly higher than the debilitative imagery group in both Trial 1 (effect size = .58) and in Trial 2 (effect size = .90). The control group also scored significantly higher than the debilitative imagery group in Trial 2 (effect size = .68).

Imagery Type. To examine whether MG-M imagery affected self-efficacy more strongly than did CS imagery, and whether CS imagery affected performance more strongly than did MG-M imagery, two one-way between-groups ANOVAs were performed ($p = .025$). The data file was split so that results were calculated separately for the facilitative and the debilitative imagery groups ($n = 25$ for each group). Such a split was necessary as scores were anticipated to go in opposite directions for the facilitative and debilitative groups. Type of imagery intervention delivered first (CS or MG-M; $n = 13$ and $n = 12$, respectively) served as the independent variable, and self-efficacy ratings or performance in Trial 1 served as the dependent variables. Means and standard deviations are presented in Table 3. There was no effect of imagery type on self-efficacy or performance for either the facilitative or the debilitative imagery groups. Thus, CS and MG-M imagery did not seem to relate differently to the efficacy ratings subsequently given by participants, or to their performance.

Table 2 Means and Standard Deviations for Group (Facilitative Imagery, Debilitative Imagery, and Control Groups) for Self-efficacy and Performance, by Trial

	Baseline				Trial 1				Trial 2			
	Self-efficacy		Performance		Self-efficacy		Performance		Self-efficacy		Performance	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Facilitative imagery	18.37	12.78	5.34	.46	18.06	14.32	5.45	.43	17.01	14.54	5.51	.38
Debilitative imagery	18.19	11.77	5.40	.47	10.29[a,b]	10.47	5.12[a,b]	.71	8.34[a,b]	10.70	4.97[a,b,c]	.82
Control	17.26	13.83	5.31	.50	13.15	12.21	5.37	.47	9.80[a,b]	10.48	5.40	.44

Note. a = significantly lower than the same group at baseline. b = significantly lower than the facilitative group in the same trial. c = significantly lower than the control group in the same trial.

Table 3 Means and Standard Deviations for Self-efficacy Ratings and Performance at Baseline and Trial 1, Depending on First Imagery Intervention Type

	Baseline				Trial 1			
	Self-efficacy		Performance		Self-efficacy		Performance	
First intervention	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Facilitative CS	16.27	15.25	5.47	.31	17.97	15.98	5.48	.44
Facilitative MG-M	20.22	10.29	5.18	.55	18.09	13.10	5.30	.56
Debilitative CS	15.43	10.74	5.26	.48	8.72	8.94	4.93	.79
Debilitative MG-M	21.17	12.55	5.56	.44	11.99	12.08	5.32	.58

Note. CS = Cognitive Specific imagery, MG-M = Motivational General-Mastery imagery.

Does Self-Efficacy Mediate the Effect of Group Membership on Performance? First, the effect of group membership on self-efficacy was assessed, and this model was significant, $F(2, 74) = 3.73$, $p = .03$, $R^2 = .09$, revealing a positive link between facilitative group membership and self-efficacy ($\beta = .28$, $p = .04$). Second, the effect of group membership on performance was investigated. This model was also significant, $F(2, 74) = 5.78$, $p \leq .01$, $R^2 = .14$, indicating a negative relationship between debilitative group membership and performance ($\beta = -.34$, $p = .01$). However, the third regression, albeit significant, $F(3, 74) = 3.80$, $p = .01$, $R^2 = .14$, indicated that self-efficacy did not affect performance ($\beta \leq .01$, $p = .99$). As the proposed mediator must affect the dependent variable in the third regression equation (Baron & Kenny, 1986), we conclude that self-efficacy did not mediate the effects of imagery group membership on performance.

Discussion

The aim of the present study was to investigate the effects of imagery direction and imagery type on dart-throwing performance and self-efficacy. We predicted that performance and self-efficacy would, compared to a control group, increase for the facilitative group and decrease for the debilitative group, following both CS and MG-M imagery.

Imagery Direction

Only the results of the debilitative imagery group were consistent with our predictions for self-efficacy. One explanation is that debilitative imagery may have a stronger effect on self-efficacy, or it simply works quicker than facilitative imagery. Based on Bandura's (1986) social cognitive theory, it has been suggested that self-efficacy enhancement may follow a temporal lag and that experimental interventions have not been long enough to raise self-efficacy beliefs (Martin & Hall, 1995). Indeed, several previous imagery experiments have found that self-efficacy has not been enhanced by imagery as predicted (Callow et al., 2001; Martin &

Hall, 1995; Shambrook & Bull, 1996). It is possible that the length of our imagery intervention was too short for any measurable increases in self-efficacy to occur.

It was unexpected to find that the control group decreased their self-efficacy ratings across trials. However, Martin and Hall (1995) also found similar decreases in self-efficacy ratings across trials and argued that this might be due to a floor effect experienced by novice performers and the use of self-efficacy measures not sensitive enough to detect differences between groups. Because we used a similar self-efficacy measure, this might also explain our findings. Specifically, most participants reported efficacy ratings of zero as the items referred to achieving an increasingly difficult score, indicating that a floor effect might indeed exist. Moreover, it is possible that participants experienced an inflated level of self-efficacy for the dart-throwing task following the practice throws, and these ratings were made more realistic as more performance feedback was obtained across the trials. A longer practice trial and a more sensitive self-efficacy measure could help resolve these problems in future studies. From an applied perspective, establishing the impact of intervention length on self-efficacy, as well as performance, would also be most valuable for practitioners. At present, the only recommendation that can be made regarding the length of an imagery intervention is that more than one imagery session is probably necessary for obtaining meaningful effects, and the more imagery the better (Hall, 2001).

Although facilitative group participants did not report increased self-efficacy, it seems that their imagery intervention buffered them from the self-efficacy decrease experienced by the control group. Feltz (1984) has contended that imagery can bias a person's interpretation of performance feedback, serving to sustain efficacy beliefs even in the case of negative performance feedback. Similarly, Landau, Libkuman, and Wildman (2002) have established that imagery rehearsal of a physical task inflates estimates of ability for that same task. This suggests that even when faced with negative feedback, perhaps during a competition, athletes may use imagery to keep their self-efficacy high. In sum, our facilitative imagery appears to have been a source of efficacy information, as predicted by self-efficacy theory (Bandura, 1986, 1997). Bandura also suggested that one way that positively framed imagery may enhance self-efficacy is by blocking the appearance of negatively framed images that may otherwise appear when a person is starting to doubt their ability at a task (Bandura, 1997).

Contrary to expectation, the facilitative imagery group did not differ in performance from the control group. Overall, however, our results are consistent with similar studies (Beilock et al., 2001; Taylor & Shaw, 2002; Woolfolk, Murphy et al., 1985). That is, use of debilitative imagery led to a poorer performance compared to that of a control group or facilitative imagery group. When comparing the performance of each group across trials, it was found that participants in the debilitative imagery group performed progressively worse. In comparison, participants in both the facilitative imagery group and the control group performed consistently across trials.

As pointed out by Woolfolk, Murphy et al. (1985), debilitative imagery appears to have a profound effect on performance, and again our results suggest debilitative imagery to have a stronger and/or quicker effect than facilitative imagery. A possible explanation for this difference may be found in the clinical imagery literature. Hirsch, Mathews, Clark, Williams, and Morrison (2003) have hypothesized that debilitative imagery may have stronger effects than facilitative imagery due to the cognitive load it places on participants. Because debilitative images may create anxiety, this might place an additional load on the working memory, preventing valuable cognitive resources from being directed to the task at hand. For athletes, this means that not only can debilitative images make you feel less efficacious about an upcoming task, but independent of this effect, it can also truly worsen your performance.

Our control group's performance also deserves some mention. It is curious that their performance stayed constant across trials whereas their self-efficacy decreased significantly. Other authors have acknowledged that self-efficacy can mediate the effect of an intervention on performance (e.g., Feltz, 1984; Taylor & Shaw, 2002), but this was not found to be the case here. A possible explanation is that our control group simply became more realistic in their performance expectations and based their efficacy ratings on performance outcomes. In comparison, both of the imagery groups probably based their efficacy ratings partly on the imagery used as well as on performance (Feltz, 1984; Landau et al., 2002).

Imagery Type

Contrary to the predictions made by the applied model of imagery use (Martin et al., 1999), but similar to what was found by Short and colleagues (2002), no differences were found between how CS and MG-M imagery affected performance and self-efficacy. That CS imagery influenced self-efficacy also supports Bandura's (1986) proposal that imaginal experiences can be a source of self-efficacy. Furthermore, the effect of MG-M imagery on performance may be explained by considering individual skill level. Indeed, Callow and Hardy (2001) have argued that the type of imagery that works best for achieving specific outcomes may vary depending on skill level. It should also be noted that an athlete might image a skill without any accompanying mastery feelings (CS only) or image being confident without imaging any skill execution (MG-M only). Another common scenario is for the athlete to image performing a skill confidently (CS + MG-M). Thus, performing skills well in one's mind can, in fact, represent mastery experiences. For the applied model of imagery use (Martin et al., 1999), this means that the function served by any given image will vary depending on the precise content of the image (e.g., imaging skill with or without feelings of confidence) as well as the meaning of the image for the individual (Ahsen, 1984).

Limitation

The facilitative and debilitative imagery groups differed in the extent to which they were trying to throw at the center of the dartboard, suggesting that demand characteristics (participants conforming to perceived experimenter expectations) might account for the performance differences between groups. Specifically, participants in the debilitate imagery group might have guessed what the expected results of the study were and were trying to be "good participants." Alternatively, the debilitative imagery might have served to decrease their motivation to perform their best by lowering their self-efficacy, in turn causing lower expended effort (Bandura, 1997). There are two main reasons why we do not believe that demand characteristics explain our findings. First, participants were informed that the center of the dartboard was their target at all times. Had our participants just tried to be "good," they would not have reported trying for the center "most of the time" but tried to throw the dart outside the board, as imaged. Second, several authors have established that demand characteristics can not fully account for performance changes following imagery interventions (Landau et al., 2002; Shaw & Goodfellow, 1997; Taylor & Shaw, 2002).

Conclusions

In sum, it appears that debilitative imagery can have profound effects on both performance and self-efficacy, whereas facilitative imagery might serve to buffer the effects of negative performance feedback on self-efficacy and maintain a consistent performance. Athletes, coaches, and applied practitioners need to be aware of these effects and use imagery interventions accordingly. Second, it appears that the imagery type—outcome relationship predicted by the applied model of imagery use (Martin et al., 1999)—may not be as simple as "what you see is what you get." Based on the similar effects of CS imagery and MG-M imagery on performance and self-efficacy, it seems that at least in some situations, certain types of imagery might reward you with more than what first meets the eye.

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