Can Associative and Dissociative Strategies Affect the Swimming Performance of Recreational Swimmers?

Roger T. Couture, Wendy Jerome, and Jeno Tihanyi
Laurentian University

This study examined the effects of association and both internal and external dissociation on the performance, perceived fatigue, and rate of exertion of recreational swimmers during two swimming trials. Before the first swim, 69 participants completed a self-report questionnaire. After the first swim, participants were assigned to one of four groups equated with swim performance times: control, associative, internal dissociative, and external dissociative groups. After completing both the first and second swims, participants completed the Rate of Perceived Exertion, Perceived Fatigue Test, and Subjective Appraisal of Cognitive Strategies. Results showed that the group assigned to the associative strategy swam significantly faster ($p < .05$) than the control group. No changes were found in perceived fatigue and perceived rating of exertion among the groups between the first and second swim. These findings support the position that associative thinking is an important cognitive strategy in timed performances.

Recreational distance swimming is commonly used as a fitness activity and is becoming increasingly popular. However, dropout rates related to fitness programs and exercise activities are an important concern. Franklin (1988) has summarized the major program factors attributed to dropout as comprising two major areas: (a) administrative logistics and (b) participants' perceptions. Administrative logistics refers to factors such as time and location, cost, leadership, and schedules. Participants' perceptions of the program refers to high-intensity exercise, exercise boredom, discomfort, and perceived exertion.

Research in the area of attentional strategies indicates that the cognitive style employed by an athlete may affect both discomfort and perceived exertion (Pennebaker and Lightener, 1980; Schomer, 1986; Tammen, 1996). Although most of this work has involved participants in endurance running events, it is possible that similar results might be found with distance swimmers.

Roger T. Couture, Wendy Jerome, and Jeno Tihanyi are with the School of Human Kinetics at Laurentian University, Sudbury, Canada, P3E 2C6.
Attentional strategies are considered a cognitive process directed toward a specific sensory stimulus while disregarding other inputs (Martens, 1987). Such strategies encourage the individual to focus attention where it is most beneficial, either to improve performance or to lessen discomfort. Schomer (1990) has demonstrated that it is possible to teach distance runners to make use of specific strategies to enhance their performance. This was accomplished by having coaches use two-way radios to communicate with their athletes regarding the appropriateness of the cognitive strategies being used at different race intervals. If effective cognitive strategies could be identified for distance swimming, perhaps swimming instructors, with this information, could be trained to teach the use of effective attentional strategies. If these strategies can reduce discomfort and modify perceived exertion in recreational distance swimmers and fitness enthusiasts, perhaps the dropout rate could be reduced.

Although little has been done to examine cognitive strategies for improving distance swimming, there is a developing body of literature studying the impact of associative and dissociative strategies on performance in other endurance activities. In their landmark study of marathoners, Morgan and Pollock (1977) conceptualized two cognitive strategies: associative and dissociative. They described associators as those who internalize their attentional focus and attend to the body’s feedback signals and the task at hand. Dissociators tend to block out feedback from the body and focus their attention away from the actual activity. Morgan and Pollock (1977) concluded that world-class marathoners applied predominantly associative strategies during their races. Masters and Lambert (1989) also examined marathon runners. They employed a questionnaire and a marathon race diary to obtain data on cognitive strategies used and found that the majority of the runners (93.75%) chose to apply associative strategies. Similar findings were reported by Gill and Strom (1985).

**Associative and Dissociative Thinking**

**Associative Thinking**

Schomer (1986) attached lightweight tape recorders and microphones to 31 marathon runners of varying abilities. At predetermined intervals during their runs, the participants recorded information regarding their thoughts, the cognitive process being used at that time, and their level of perceived exertion. Schomer found a strong relationship between associative thinking and perceived rate of exertion for all levels of runners. The harder the run became and the higher the perceived exertion, the more associative was the thinking. This linear relationship between associative thought processes and exertion was also reported by Tammen (1996).

In 1988, Morgan, O’Connor, Ellickson, and Bradley reported on a study that looked at whether or not elite distance runners used the same cognitive strategies for both training and competition runs. Their results indicated that, although none of the runners reported exclusive use of the dissociative strategy during competitive runs, 72% reported they were associators. The remaining 28% reported use of both strategies. A different picture emerged when training runs were evaluated, with 43% recording exclusive use of dissociation and 36% using both. Only 21% of the runners reported using an exclusive associative strategy while training. Morgan et al.’s (1988) conclusion, that most elite runners use an associative strategy
when competing and dissociative when training, was supported by Masters and Lambert (1989) and Kirkby (1996).

Although most research has focused on the more elite runner, Wrisberg and Pein (1990) reported that among recreational runners the cognitive strategy of choice seems to be related to the level of experience. Less experienced recreational runners were more likely to report using an associative strategy; the more experienced adopted a dissociative style. Wrisberg and Pein hypothesized that the less experienced runners had not yet learned to dissociate. These results directly dispute an earlier study of beginning marathon runners (Summers, Sargent, Levey, & Murray, 1982), which found that beginning marathoners prefer dissociative strategies during training, a result consistent with the findings of Morgan et al. (1988). Cox (1998) has suggested that marathon runners may, on occasion, need to make use of dissociative strategies in order to psychologically distance themselves from the discomfort inherent with prolonged physical exertion.

**External and Internal Dissociative Thinking**

Dissociative strategies can be classified as either internal or external. Internal dissociative strategies could include such things as mentally working on math problems, repeating poetry, singing to yourself, and so on. External dissociative strategies include a focus on almost anything in the environment, such as the scenery, spectators, and light posts.

Pennebaker and Lightner (1980) examined performance differences associated with focusing on internal and external cues. They found that participants listening to traffic noises (external distraction) reported less fatigue and fewer discomforting symptoms than those listening to their amplified breathing or to nothing (control group). The group listening to their amplified breathing (a form of association) reported the highest levels of fatigue symptoms. Harte and Eifert (1995) found that listening to one’s heartbeat while running resulted in increased emotional stress. This could be perceived as higher levels of fatigue than may have otherwise been experienced.

In a second study, Pennebaker and Lightner (1980) divided 24 participants into two groups. Participants ran 1,600 m for 10 days, either on an exterior lap course or on a cross-country course. Though no between-group differences were found in reported fatigue levels, a significant change was evident in performance, specifically, running time. Times were much faster on the cross-country course than on the lap course. It is suggested that inexperienced cross-country runners must make a conscious effort to attend to uneven trails with the occasional obstructions (i.e., roots, rocks, branches). They were required to focus externally more on their running paths for safety reasons. In Pennebaker and Lightner’s view, the external distraction led to faster times as it enabled a better performance without increasing levels of fatigue.

It might be argued that a focus on running paths for the sake of safety is associative rather than dissociative. In less experienced runners this may be true. The less experienced runner usually makes a concerted effort to attend to the trail so that a conscious adjustment to stride might be made to avoid a fall. If, however, the runner has reached the point where this awareness of danger and alteration of stride takes place at a less conscious level, then the focus is probably correctly classified as external dissociation. Beginners might also be classified as external dissociators if, as they run, they enjoy the scenery without careful regard for changes
in the terrain that require stride modification. A shift to association might occur only after a first fall or injury. Pennebaker and Lightner’s (1980) participants were inexperienced and might well be considered in the beginner category.

Similar results were found by Padgett and Hill (1989) when participants on stationary bikes performed significantly better when dissociating externally than when associating. The dissociators also perceived the cycling task to be significantly shorter than the associative thinkers. In a second study, Padgett and Hill also found that the external distraction group was fastest, followed by the internal dissociative group, and finally the control group. Gill and Strom (1985) examined a distraction strategy for improving the timed duration of a leg-extension performance. They, too, found that external focusing on a collage was preferred to internal focusing and accounted for a better performance.

Morgan, Horstman, Cymerman, and Stokes (1983) investigated the efficacy of an internal distraction (meditation) for increasing endurance time on a treadmill. While the groups listening to the sound of their heart beat and the group hearing no sound did not improve, Morgan et al. (1983) found a 32% increase in endurance time for the dissociative group.

Cognitive strategies appear to have varying effects on performance, depending on the type of activity, the level of experience, and the skill of the performer. However, very little research has been done to examine how these strategies can affect participants in a water environment. Although it may seem obvious that the implementation of associative and internal dissociative strategies would be the most suitable cognitive approaches for swimmers, the role of external distraction should not be ignored (Gill & Strom, 1985). It is the purpose of this study to examine the effectiveness of both associative and dissociative strategies on the performance, exertion, and perceived fatigue of recreational distance swimmers.

Method

Participants

Sixty-nine physical education students (36 male and 33 female, all White) with a mean age of 19.7 years were asked to perform two 500-m freestyle swims. All participants were registered in an aquatics course and were comfortably able to swim 500 m.

Procedure

Prior to the first swim, and after the study was explained, participants were asked to sign a consent form. They were assured of total confidentiality and were informed that they were free to leave the study at any time without prejudice. After the study was explained, a Prewim Questionnaire was administered. After completion, the participants swam 500 m as fast as comfortably possible without forgetting to pace themselves. They were reminded that this swim was not a race. A total of 8 swimmers (1 per lane) swam at any one time. There were staggered starts between the swimmers (1 min apart) to lessen the “motivation” variable of competition against peers. This enabled the swimmers to use dissociative strategies if they so wished. A red board was waved underwater to notify each swimmer that he or she was approaching the end of the swim. This procedure was chosen to minimize potential disruptions to swimmers who had not yet finished their swim.
Immediately after the swim, participants scored their Rating of Perceived Exertion (RPE) and completed the Perceived Fatigue Questionnaire (PFQ) and Subjective Appraisal of Cognitive Strategies (SACS). Using the times recorded on the first swim, participants were assigned to one of four groups based on performance time (equal number of slow, medium, and fast swimmers in each group). The four groups were each assigned one of the following cognitive strategies: association (n = 17), internal dissociation (n = 16), external dissociation (n = 19), and no strategy (control group n = 17).

The second 500-m swim was performed 1 week later. The three experimental groups were provided with an instruction sheet related to their category (Weinberg, Smith, Jackson, & Gould, 1984). After being briefed and given an instruction sheet, the swimmers were asked to perform the designated cognitive strategies throughout their swim. The control group was asked to swim as fast as comfortably possible, as they had done the previous week. After the second swim, all participants again completed the RPE, PFQ, and SACS.

**Instruments**

The swimmers’ performances were timed during both swims with stopwatches, accurate to 1/100th of a second. Timers were briefed on the proper procedures and were familiarized with the stopwatches prior to the study.

The Prewim Questionnaire identified both the reasons that people swim distances and their general cognitive thought patterns when swimming. This information helped substantiate the results of the SACS scores and provide more descriptive data on recreational swimmers’ cognitive thinking preferences.

The RPE scale is a 15-point instrument, with the points ranging from 6 to 20 (Borg, 1982). The instrument has an identifier at each uneven number (e.g., 7 = very very light and 19 = very very heavy). The Borg Scale is an appropriate measurement for this study because it is a good indicator for the degree of physical strain (Borg, 1982). The RPE scale was printed on a large piece of cardboard and shown to the swimmers immediately after each swim. The participants were asked to identify the number on the scale that most closely described their effort.

The PFQ was used to assess the changes in perceived fatigue between Swim 1 and Swim 2. The PFQ contains 10 physiological symptoms related to fatigue (dizziness, sore eyes, headache, etc.), which are measured on a scale from 1 to 100 (Pennebaker & Lightner, 1980). For each symptom, participants mark with a slash how they feel (e.g., 0 = not at all dizzy, 100 = the worst feeling of dizziness ever). All scores are summed to provide a total symptom index of fatigue. A Cronbach’s alpha coefficient of .75 suggests that the symptom scales are reliable. Furthermore, correlations were made between symptom reports and actual somatic change. More scalar properties of these symptoms are found in Pennebaker and Skelton (1978).

The SACS (Schomer, 1986) was used to identify which cognitive strategy was used most frequently during the swim. The SACS consists of 10 categories, in which each descriptor relates to a specific cognitive attentional style (associative or dissociative). Participants are asked to circle all the descriptors that came to mind while swimming. Depending on the number of associative or dissociative descriptors, participants were identified as preferring a particular style of cognitive thinking if their preference was 51% or more of that strategy.

Schomer (1986) established the reliability and validity of the statements by examining 109 recordings taken from marathon runners, four times per month.
After transcribing runners' personal conversations, Schomer (1986) inspected the scripts for recurrent thoughts on task-related and task-unrelated material. Categories were proposed and rationalized based on a pronounced attentional focus. Reliability and validity of 10 subclassifications emerged (Schomer, 1986).

We conducted a pilot study with 20 swimmers to examine the construct validity of the categories as outlined by Schomer (1986). Results indicated that comprehension of the subclassification titles was poor for the swimmers involved. Consequently, we reworded the titles in a general context while using the same descriptive content and examples employed by Schomer (1986). For example, "Feelings and affect" and "Personal problem solving" were changed to "How I feel in a general way" and "Trying to solve personal problems."

Description of the Cognitive Strategies

Participants in each of the four groups were provided with the following instructions as per group assignments.

**Association.** While you are swimming, I want you to try to think of the word *air* every time you inhale. Try to think of nothing else but the word *air*. Some studies have shown that this simple technique can make a positive difference when performing endurance activities. It is important that you focus your attention only on this word but still try to maintain your optimum pace for the entire swim. Remember, think only about the word *air* and on every breath you take. Try to ignore, as much as possible, your feelings of exertion, without compromising your pace.

**Internal Dissociation.** While you are swimming, I want you to imagine yourself doing something that is pleasant but unrelated to strenuous exercise. Different people like to concentrate on different scenes, so just think about whatever might be fun and enjoyable to you. It might be lying on the beach, solving mathematical problems, building a house, or thinking about someone you care about. Some studies have shown that this simple technique can actually make a positive difference when performing endurance activities. It's important that you focus your attention on these thoughts and images but still try to maintain your optimum pace for the entire swim. Concentrate your attention on a pleasant but unrelated scene, ignoring as much as possible your feelings of exertion. Do not compromise your pace.

**External Dissociation.** While you are swimming, I want you to focus on the ends of the pool. Every time you approach one end, you will notice either one, two, or three large geometric shapes (square, circle, or triangle). Your task is to add the number of squares, circles, and triangles seen throughout the swim. Try not to lose count. Your score will be requested at the end of the swim. Some studies have shown that this simple technique can actually make a positive difference when performing endurance activities. It is important that you focus your attention particularly on this task while still trying to maintain your optimum pace for the entire swim. Remember, count all geometric shapes during the swim without compromising your pace.

**Results**

To determine reasons for participating in recreational swimming, the Preswim Questionnaire asked, "Why do you enjoy distance swimming?" Forty-two percent indicated that they enjoyed the fitness aspect, and another 19.3% indicated that they found swimming relaxing. A number of participants (17.5%) indicated that
they did not enjoy distance swimming but were swimming because they were enrolled in an aquatics course. The remaining participants gave either answers like “it allows me some time to be with friends” or “no response.” When asked to explain “what motivated them to do distance swimming in their spare time,” 58.6% said they wanted to improve their personal fitness. For 22.5% of the swimmers, other reasons such as recreation, competition, and relaxation received limited endorsement. The remaining 18.9% indicated that they did not normally swim in their spare time.

The Preswim Questionnaire also examined the cognitive thinking strategies used by the participants prior to the introduction of the experimental strategies. An overwhelming 76.5% indicated that associative-type thinking tended to predominate during their long-distance swims, whereas 13.2% indicated that their cognitive patterns comprised relatively equal amounts of associative and dissociative thoughts. The remaining 10.3% identified their cognitive thoughts as predominantly dissociative.

The swimmers were initially compared on time, exertion, and fatigue measures in light of their preferred cognitive strategy (association, dissociation, or relatively equal use of both strategies) prior to the first swim. One-way analyses indicated no significant differences among these groups for 500-m swim times, perceived exertion, or perceived fatigue.

All subsequent statistical analyses were performed on the four experimental groups: associative, internal dissociative, external dissociative, and control. Mean differences in performance times between the first and second swims were analyzed using a 4 × 2 (Group × Time) repeated-measures MANOVA with an alpha level set at .01. Differences in the RPE and perceived fatigue for both swims were also analyzed using a 4 × 2 repeated-measures MANOVA. The only significant difference was on the performance (time) measure, $F(3, 64) = 3.82, p < .01$. An analysis of main effects identified a significant difference between the performance times, $F(3, 65) = 2.8, p = < .04$. Using a post hoc Scheffé test, it showed that the difference was between the association and control groups. The association group swam the second 500 m an average of 54.5 s faster than the first 500 m. This compared to 7.5 and 1.1 s faster for the control and internal dissociation groups, respectively, and 0.2 s slower on the second swim for the external dissociation group. Mean times for the first and second swims and the mean differences between the two swims for each group are illustrated in Table 1.

### Table 1: Descriptive Statistics for Swimming Times in the First and Second 500-m Swims (in seconds)

<table>
<thead>
<tr>
<th>Groups</th>
<th>First Swim</th>
<th></th>
<th>Second Swim</th>
<th></th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Internal dissociation</td>
<td>723.50</td>
<td>150.06</td>
<td>722.38</td>
<td>145.65</td>
<td>1.13</td>
</tr>
<tr>
<td>Association</td>
<td>715.65</td>
<td>129.25</td>
<td>661.12</td>
<td>113.40</td>
<td>54.54</td>
</tr>
<tr>
<td>External dissociation</td>
<td>727.26</td>
<td>134.26</td>
<td>727.47</td>
<td>108.46</td>
<td>-0.21</td>
</tr>
<tr>
<td>Control</td>
<td>732.06</td>
<td>103.82</td>
<td>724.59</td>
<td>93.52</td>
<td>7.47</td>
</tr>
</tbody>
</table>
When participants in the experimental groups were asked whether they had been able to use their assigned strategy throughout the entire second swim, 30.4% indicated they had. Another 24.6% indicated they had used their assigned strategy most of the time, and 21.7% reported using the strategy part of the time. Only 2 participants (1.4%) reported they did not use the assigned strategy.

Discussion

A significant body of literature is available on the cognitive styles of endurance runners. It is generally accepted that the elite endurance runner employs associative mental strategies during competition and prefers dissociative techniques when training. However, information regarding preferred cognitive strategies of those involved in other elite-level endurance sports and those involved in recreational-level endurance activities is less clear.

The findings of this study show similarities between these recreational swimmers and Morgan and Pollock’s (1977) marathoners, in that the majority of the swimmers reported a preference for associative strategies during performance. One might contend that this occurs because the participants were all university physical education students, many with a substantial training background in fitness activities. Even though 61% of the participants reported they participated in swimming for reasons of fitness and relaxation, in fact many recreational athletes compete against tangible evidence of their efforts while engaged in the activity (i.e., lower heart rate, faster pace, better skills, etc.).

As a significant number of participants (76.5%) in this study indicated that they preferred the associative mental strategy while swimming long distances, it is possible that these participants, in the context of their status as physical education students, have acquired a “general experience and sensitivity” in demanding motor tasks that allows them to be more interpretive of bodily cues.

However, one could also hypothesize that recreational swimmers and beginning athletes in any sport may have similar cognitive strategies. The strategy of choice, according to Wrisberg and Pein (1990), would be association. Contradictory evidence found with marathoners (Summers et al., 1982) may be unique to that sport. The extreme and prolonged demands made on the body by marathon training might necessitate the use of dissociation for survival in the sport. Studies of iron man competitors may show similar results to those of the marathon.

To examine the effectiveness of the different preferred cognitive styles on swimming performance, the mean times for the first swim for groups with different mental strategies were compared. The major participation goals for most recreational participants include not only maintaining good form, attaining relaxation, and enjoying the process but also often the achievement of high performance. One might expect the followers of each of these different objectives to employ different mental strategies to attain their goals. If this assumption is correct, then one might expect to see performance differences among different cognitive styles. With these recreational swimming participants, this is not the case. Examination of the results of the first swim detected no significant differences between the groups who preferred either associative, dissociative, or equal cognitive (no mental strategy preference) styles. One might infer from these results that recreational practitioners, without regard to mental focus, are only interested in the accrued benefits of the activity and not in the concept of tangible achievement.
The strength of the associative strategy became apparent when the groups were assigned to different experimental groups and asked to swim 500 m a second time. Every group was presented with an explanation of its specific cognitive strategy in a process similar to that used by coaches in precompetitive briefings. With the exception of the control group, the swimmers were reminded of the specific tactical procedure they were to use during the activity. No significant differences were found between groups of different cognitive styles in reported fatigue levels or in the RPE. Contrary to Pennebaker and Lightner's (1980) findings, external or internal dissociative focus for recreational swimmers did not help to achieve faster times. Only the performance time of the associative group was significantly faster during the second 500-m swim.

The majority of the participants in this study (76.5%) preferred using associative strategies. It could be argued that assigning associative strategies could only benefit those already preferring the technique. And, in fact, brief instruction on how to use a single associative strategy resulted in a highly significant 60-s reduction in performance time. However, if this was so, one could also assume that assignment of the dissociative strategies would interfere with performance of the majority of swimmers in those groups. There were no significant changes in time, fatigue, and exertion in the two dissociation groups, nor in the control group, so this obviously did not occur.

Cognitive strategies, unlike what was expected, did not significantly reduce discomfort or modify perceived exertion in recreational distance swimmers. Perhaps, for distance recreational swimmers and exercise enthusiasts, the dropout rate could be reduced by informing participants that their swim or workout could be improved with the use of effective attentional strategies. It could be suggested that associative thinking encourages people to become more efficient in their training.

**Conclusion**

Swimmers are confined to a relatively secluded environment during performance of that activity. Associative cognitive strategies appear to be the cognitive strategy of choice for the majority of recreational swimmers. This study provides no evidence that dissociative focusing improves performance in a water-based environment nor that it could help lessen the dropout phenomenon. Rather, it reinforces speculation that the unique hardships associated with swimming (i.e., coping with waves, water splashing into one’s face, the difficulty in breathing, blurred vision) may be most effectively controlled by an associative mental focus. Efficiency may depend on remaining focused on task performance. Finally, a pretrial associative strategy briefing seems to enhance swimming performance.

**References**


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