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The Effects of Individualized Imagery Interventions on Golf Performance and Flow States

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ABSTRACT

The primary aims of this study were to investigate the effects of an imagery intervention on the intensity and frequency of flow states and golf performance. A secondary purpose was to examine participants' experiences of the delivery of the intervention. Adopting a single subject ABA research design, individualized imagery interventions were delivered over a 12-week period to four high-performance amateur golfers (one female, three male, aged 20-23 years). Golf performance was assessed via a participant-selected golf skill. Flow experiences were measured by the Flow State Scale-2, and the Dispositional Flow Scale-2 (Jackson & Eklund, 2002). Results suggested that three of the four participants increased mean global flow intensity, and all four golfers increased mean global flow frequency and performance during the intervention and post intervention period in comparison to baseline. The participants also perceived that their imagery ability had improved because of the intervention.

Introduction

The primary construct examined in this study is flow, which Csikszentmihalyi (1990) described as an optimal psychological state that typically occurs when a person perceives a balance between the challenges associated with a situation and his/her own capabilities to accomplish these demands. In addition to the skill-challenge balance, flow is described by a further eight dimensions. *Action-awareness merging* is when the athlete ceases to be aware of themselves as separate from their action and experiences a feeling of oneness with the activity. *Clear goals* occur when goals are clearly defined and the athlete has a strong sense of what they are going to do. *Unambiguous feedback* involves immediate and clear feedback, which is

received from the activity, enabling the athlete to know how successfully they are completing their set goal. *Concentration on the task at hand* is when the athlete has complete focus on their task and is the clearest indication of a flow state. During flow the athlete experiences a sense of control, without trying to exert any control. *Loss of self-consciousness*, is when concern for the self disappears during the flow state. *Transformation of time* is when the perception of time by the athlete alters by either speeding up or slowing down. The final dimension of flow is *autotelic experience*, which has been described as an intrinsically enjoyable state. The mindset accompanying flow not only pushes athletes to their maximum performance limits but is also said to be rewarding for its own sake (Jackson & Csikszentmihalyi, 1999).

Flow is theoretically described as an optimal mental state (Csikszentmihalyi, 1990), and therefore flow is expected to be associated with optimal athletic performance as well as providing an optimal human experience (Jackson, Thomas, Marsh, & Smethurst, 2001). Accordingly, in the sport psychology literature flow has generally been associated with peak performance states (e.g., Jackson, Kimiecik, Ford, & Marsh, 1998; Jackson & Roberts, 1992). In the sport of golf, flow experiences have been strongly associated with peak performances (Cately & Duda, 1997; Cohn, 1991). Despite this initial evidence, Jackson et al. (2001) observed that "more research is needed to empirically examine the relationship between flow and performance in sport" (p. 130).

From the early descriptive work examining flow in sports (e.g., Jackson, 1995, 1996), attention has now turned to consider how flow experiences can be manipulated and enhanced (e.g., Jackson & Csikszentmihalyi, 1999; Pates & Maynard, 2000; Pates, Oliver, & Maynard, 2001). For example, psychological skills such as the ability to control attention may be required to attain flow states (Csikszentmihalyi, 1990). To date, there have been few published studies examining the influence of psychological skills training programs on flow and performance. Notable exceptions include the work of Pates and colleagues, who have examined the effects of hypnosis on flow states and sporting performance (Pates & Maynard, 2000; Pates, Oliver, & Maynard, 2001; Pates, Cummings, & Maynard, 2002). In Pates and Maynard's first study, (Pates & Maynard, 2000) a single subject experimental design was adopted to assess the influence of a hypnotic intervention with three amateur golfers with handicaps of 18 to 24. Results indicated that the hypnotic intervention resulted in higher flow intensities in two of the three participants. All three participants increased their performance on the golf-chipping task during the intervention in comparison to the baseline. This intervention was replicated with similar results for a golf-putting task (Pates et al., 2001). Overall, the results of these investigations indicate that hypnotic interventions can improve athletes' flow intensity and performance.

Pates' and colleagues work has been important in establishing the potential influence of psychological interventions on flow and performance in sport. However, Pates et al. (2001) acknowledged that these experiments were conducted under controlled laboratory conditions. Flow intervention research conducted in ecologically valid sport settings would make an important contribution to the developing research base in this area.

In terms of considering the psychological skills that are likely to have an influence on flow, it has been suggested that imagery may be useful for facilitating flow experiences. Hall, Mack, Paivio, and Hausenblas (1998) developed a taxonomy for classifying the different types of images used by athletes based on Paivio's (1985) model of imagery effects. Motivational-Specific

(MS) imagery represents specific goals and goal orientated behaviors. Motivational General-Mastery (MG-M) imagery represents effective coping and the mastery of challenging situations, such as imaging being mentally tough, confident and focused during competition. Motivational General-Arousal (MG-A) imagery represents feelings of relaxation, stress, arousal, and anxiety in conjunction with sport competition. Cognitive Specific (CS) is imagery of specific sport skills such as putting in golf. Cognitive General (CG) is imagery of strategies such as a baseline game in tennis. The majority of imagery studies in sport have investigated the use of CS imagery on the acquisition and performance of motor skills. However, more recently other types of imagery have also been examined. For example, Callow, Hardy, and Hall (2001) showed that elite badminton players increased or stabilized their confidence levels following a MG-M imagery intervention. Moritz, Hall, Martin, and Vadocz (1996) demonstrated that immediately prior to sport competition, self-confidence was positively related to the use of MG-M imagery but not with CS imagery among experienced players.

In a qualitative investigation Munroe, Giacobbi, Hall, and Weinberg (2000) found that athletes used motivational imagery to access flow. Despite this anecdotal evidence, there are no published studies to date that have demonstrated the efficacy of imagery interventions for facilitating flow experiences. It is hypothesized that imagery interventions designed to enhance the ability of the athlete to use MG-M or MG-A imagery may enhance flow states. For example, MG-M imagery represents images of having the skills or ability to achieve or master different challenges. These types of images relate to the athlete seeing that they can master the task they are confronted with. This type of imagery is therefore very closely related to the skills-balance aspect of flow, which if optimal, involves the athlete feeling they have the necessary skill to meet the challenge they are confronted with. The flow literature (Csikszentmihalyi, 1990; Jackson & Csikszentmihalyi, 1999; Jackson 1995) indicate that skills-balance appraisal by the athlete is the most important factor for achieving flow states. It could therefore be argued that a MG-M intervention would have a positive effect on flow states. MS imagery represents images such as specific goals, which is also related to the flow experience, as clear goals are an important aspect of the flow experience (Csikszentmihalyi, 1990; Jackson & Csikszentmihalyi, 1999). An MG-A imagery intervention could affect the flow experience as it could have an effect on the sense of control and the loss of self-consciousness dimensions in particular. This is because calmness is an important factor in achieving these elements of the flow experience (Jackson & Csikszentmihalyi, 1999).

Imagery has been shown to have a positive influence on golf performance on a putting task (Woolfolk, Murphy, Gottesfelt, & Aiken, 1985), and for enhanced emotional control and self-talk among experienced golfers (Kirschenbaum, Owens, & O'Connor, 1998). Additionally, research shows that golfers who use imagery techniques (compared to golfers who infrequently use imagery) spend more time practicing, set higher goals for themselves, have more realistic self-expectations, and adhere to their training programs better (Martin & Hall, 1995). Overall, research suggests that imagery is an appropriate psychological skill for positively influencing both golf performance and flow states. However, empirical evidence is required to corroborate this assertion (cf. Jackson et al., 2001; Jackson et al., 1998; Kimiecik & Jackson, 2002).

In sport psychology, more research is required to demonstrate the efficacy of interventions (Biddle, 2000; Nicholls, Holt, & Polman, 2004; Nicholls, Holt, Polman, & James, in press).

Athletes have reported that imagery may enhance their flow experiences (Munroe et al., 2000), but the influence of imagery training on flow and performance has yet to be extensively examined. Specifically, research is required to experimentally investigate the effects of psychological skills such as imagery on flow and performance in real-life competitive situations (Jackson & Csikszentmihalyi, 1999; Jackson et al., 2001; Kimiecik & Jackson, 2002). The primary aims of this study were to investigate the effects of an imagery intervention on the intensity and frequency of flow states and golf performance. The hypotheses were that the imagery intervention would have a positive effect on (a) the intensity of flow states, (b) the frequency of flow states, and (c) golf performance. A secondary purpose was to examine participants' experiences of the delivery of the intervention.

Method

Participants

The participants were four high-performance golfers (3 males, 1 female, aged 20 to 23 years old). They will be referred to as Vicky, Tom, Andrew, and John. The golfers had a handicap of either scratch or +1. All golfers were Caucasian and had represented their county for at least one year. One golfer represented England and had been national amateur champion, and another participant represented British Universities. None of the participants had prior formal experience in the use of imagery. Ethical approval was obtained and each participant completed standard informed consent procedures.

Dependent Variables

Individual golf performance measure. Two of the participants (Andrew and John) wanted to improve their chip shots hit from within 20 yards of the pin to an area within 4 feet of the hole. Vicky's golf performance measure was shots hit from 60-100 yards to within 15 feet. Finally, Tom's performance measure was tee shots hit using a driver, or three-wood on par fours and par fives onto the fairway. The participants recorded the number of attempts and successful shots on their personal performance measure for each round. The performance measure was calculated as a percentage of successful shots (because the overall number of performance indicator shots varied between the participants and from round to round).

Flow analysis. After each round of golf the intensity, and the frequency of the flow experienced by the golfers was assessed using the Flow State Scale-2 (FFS-2) and the Dispositional Flow Scale-2 (DFS-2) (Jackson & Eklund, 2002). The FFS-2 measures the intensity of the flow states experienced and is a 36-item questionnaire self-scored on a 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree' on the nine subscales of flow e.g., "I made the correct movements without trying to do so". The DFS-2 also consisted of 36 questions and the same nine flow subscales. The DFS-2 measures how often participants experienced each flow characteristic which participants rate on a 5-point Likert scale ranging from 1 = 'never' to 5 = 'always' e.g., "I am challenged but I believe my skills will allow me to meet the challenge". For both the FFS-2, and the DFS-2, acceptable reliability, internal consistency (alphas 0.80 to 0.90), and factorial validity for the 9-order factor model and the higher order global model have been reported (Jackson & Eklund, 2002). In the present study, a global measure of flow was used

to provide an examination of the total flow experience (Jackson, 1999; Pates et al., 2001).

Experimental Design

A single-subject replication reversal (ABA; Kratochwill, 1978) research design was used in this study to examine the influence of an imagery intervention on golf performance and the frequency and intensity of flow experiences. This type of design allows participants to serve as their own source of control for the experiment (Barlow & Hersen, 1984; Hrycaiko & Martin, 1996). Baseline 1 was assessed during four competitive rounds of golf over a two-week period. The intervention phase of the study consisted of 20 competitive rounds of golf over an eight-week period. After the completion of the intervention phase, the baseline was reinstated. The second baseline involved a further four competitive rounds of golf over a two-week period. Thus, data in this research were collected from four participants for 28 competitive rounds of golf over a 12-week period, starting at the beginning of June, two months into the golf season. This design was selected for a number of reasons. Although researchers (Pates and colleagues) have suggested that ABA designs are not suitable for mental skills training interventions, because the participants will continue to use the mental skills learned in the second baseline, after the withdrawal of the intervention, clear guidelines exist for data analysis and interpretation for such an approach. Secondly, a mixed multiple-baseline design would have involved some of the golfers only being on the intervention phase of the study for a short time. As this study was carried out during the peak of the season for the high-level participants, ethically it was decided that all of the participants should spend the same and the maximum amount of time using the imagery, whence the selection of an ABA design.

Pre-Intervention Assessment

Prior to the intervention, the four participants were individually interviewed to assess their strengths and weaknesses from a technical (i.e., driving, putting, chipping, etc.) and mental (i.e., anxiety, confidence, etc.) perspective. The information gathered in these interviews was used to devise an individual imagery intervention tailored to each participant's needs (Martin, Moritz, & Hall, 1999). By chance, all four participants cited a lack of confidence as their mental weakness. Prior to the study, it was expected that each golfer would require different types of imagery interventions. However, because the assessment revealed that all four golfers were concerned with confidence, each received an MG-M intervention. This intervention was then tailored to each participant's technical performance needs. The technical aspect each golfer cited as an area for improvement was used as the dependent performance variable.

Mental Imagery Intervention

Mental imagery training took place after the completion of the baseline phase. An imagery script was created based on previous imagery interventions (e.g., Cumming & Ste-Marie, 2001; Short et al., 2002; Vealey & Greenleaf, 2001). The script included the following MG-M images: during pre-shot preparation, hitting the shot, two and a half minutes silence to image hitting shots and the feelings of confidence and mental toughness, practicing refocusing ability after playing a poor shot, and imaging arriving at the course (see Appendix A). The performance element of each imagery script (i.e., hitting the shot) was tailored to each individual's specific performance

concerns. The intervention was administered to the four participants separately in a quiet and comfortable room at their own house and lasted for around eight and a half minutes. The live session was recorded onto an audiocassette and the participants were asked to practice the technique by listening to the tape before they played golf at least five times a week throughout the intervention phase. The golfers were contacted twice a week to monitor their adherence.

Post-intervention Interviews

Two weeks after the completion of Baseline 2, all of the participants were interviewed regarding their perceptions of the imagery intervention. An interview guide was developed based on the practical assessment questionnaires previously employed to establish the efficacy of intervention techniques (Pates & Maynard, 2000; Pates et al., 2001). Questions were arranged within the interview guide into the following sections: the perceived influence of the intervention on emotions; perceived effects of the intervention on golf performance; the overall effectiveness of the imagery tape itself; and, possible improvements to intervention. The purpose of the post-intervention interview was to understand more about the internal experiences of the participants, which could then be compared to the performance and flow data (cf. Pates et al., 2001).

Data analyses

Flow and performance data. The performance scores, global FFS-2 scores, and global DFS-2 scores for each participant were idiographically plotted onto a series of graphs. Experimental effects were analyzed through a visual inspection of the plotted data based on the guidelines put forward by Hrycaiko and Martin (1996). They suggested that the treatment had an effect when: (a) baseline performance is stable or in a direction opposite to that predicted for the effects of treatment; (b) the greater the number of times that an effect is replicated both within and across subjects; (c) the fewer the number of overlapping data points between baseline and treatment phase; (d) the sooner the effect occurs following the introduction of treatment; and, (e) the larger the size of the effect in comparison to baseline.

Interview data. Interview data were subjected to inductive analysis procedures following Maykut and Morehouse (1994). This rigorous process involved the following steps: (a) all data were transcribed verbatim; (b) each data set (i.e., each participant's transcript) was subjected to inductive line-by-line analysis to identify individual meaning units; (c) alike meaning units were grouped together as either positive or negative perceptions of the intervention; (d) an individual profile was created for each participant reflecting the key issues that emerged from their interview data; (e) another member of the research team subjected the data analytic processes to scrutiny; and, (f) completed individual profiles were returned to the participants who were then engaged in a member-checking interview to verify they had been accurately represented (Lincoln & Guba, 1985).

Results

Golf Performance

Figures 1, 2, 3, and 4 show the performance scores for each of the golfers over 28 rounds of

golf. Table 1 shows the mean golf performance, global flow intensity, and global flow frequency for the four golfers. The results reveal that Vicky (see Figure 1) increased her mean performance in Baseline 1, from 39.5% of balls hit from 100 to 60 yards of the pin to within 15 feet, to 40.9% in the intervention. Vicky's performance increased in Baseline 2 to 41.6% of balls hit to within 15 feet. Tom (Figure 2) improved his performance from a mean of 34% of fairways hit from the tee to a mean of 42.6%. This increased performance was maintained in Baseline 2 with a mean of 42.5%. Andrew (Figure 3), and John (Figure 4) both increased their mean percentage of chip shots from within 20 yards hit to less than 4 feet. Andrew's mean performance increased from 38.3% in Baseline 1 to 42% in the intervention, whilst John's increased from 43.5% to 46.2%. Both Andrew (45.8%) and John (82.3%) increased their mean performance scores in Baseline 2 (see Table 1 for mean golf scores).

Figure 1. Golf performance scores for Vicky.

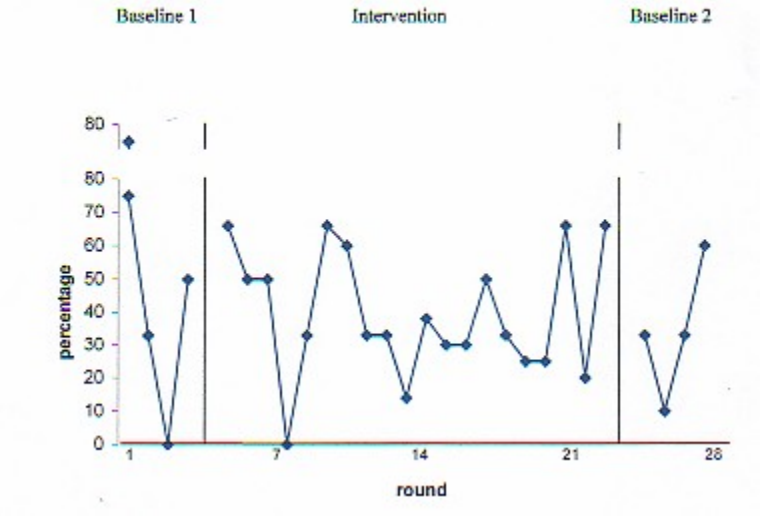


Figure 2. Golf performance scores for Tom.

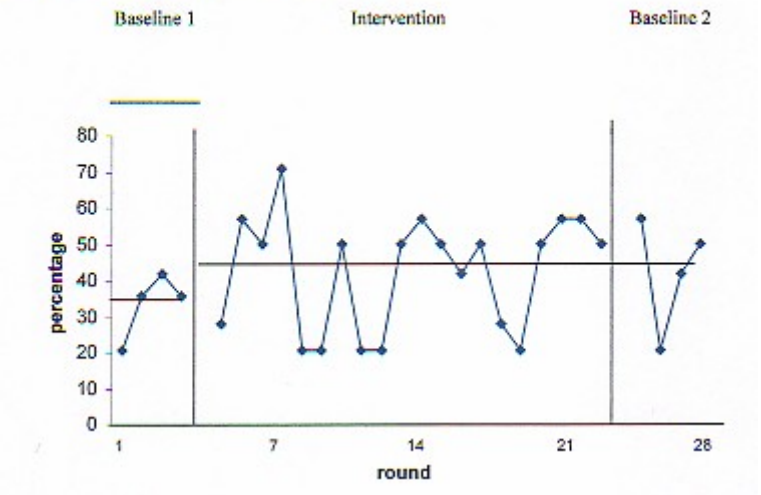


Figure 3. Golf performance scores for Andrew.

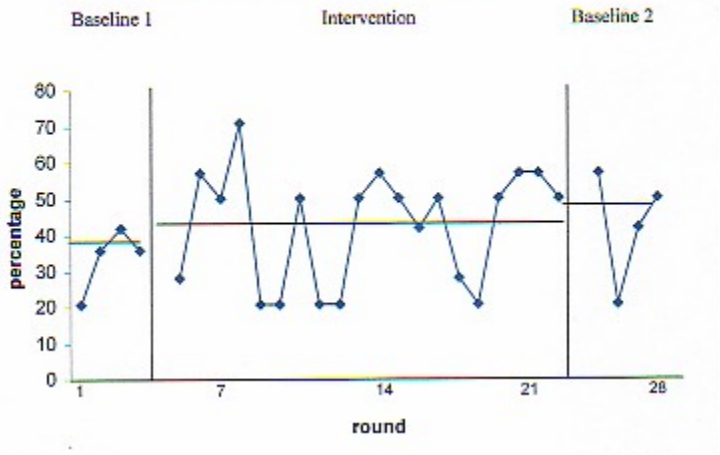


Figure 4. Golf performance scores for John.

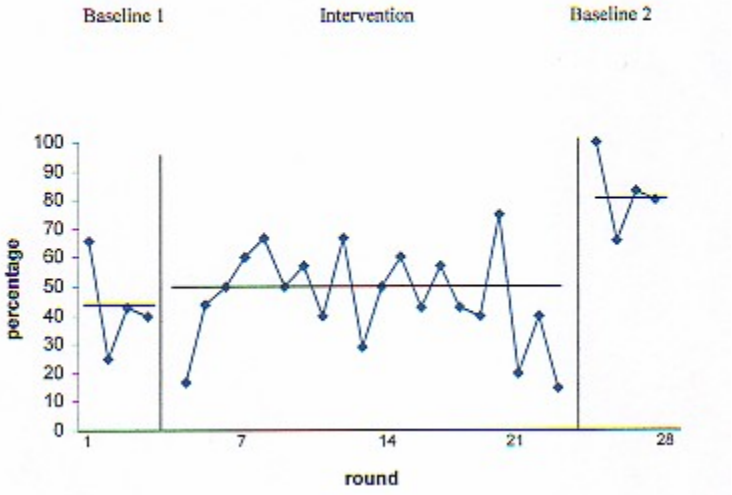


Table 1. Mean and standard deviation performance, global flow intensity and global flow frequency.

Participant	Mean Baseline 1 score	Mean Intervention score	Mean Baseline 2 score
Vicky			
Performance (% of 60-100 yrd Shots to within 15 feet)	39.5 (31.4)	40.9 (16.2)	41.6 (12.7)
Flow intensity	111 (9.9)	110 (13.5)	115.8 (3.6)
Flow frequency	103 (4.5)	106 (11.4)	109.5 (4.3)
Tom			
Performance (% of fairways)	34 (8.9)	42.6 (15.9)	42.5 (15.6)
Flow intensity	117 (26.1)	127.2 (20.8)	139.5 (10.5)
Flow frequency	117 (17.5)	124 (19.8)	129 (13.2)
Andrew			
Performance (% of chip shots)	38.3 (12)	42 (17.5)	45.8 (3.4)
Flow intensity	99 (5.6)	104 (25.7)	99 (21.4)
Flow frequency	93.8 (13.2)	95.3 (24.3)	97.8 (25.6)
John			
Performance (% of chip shots)	43.5 (13.2)	46.2 (16.6)	82.3 (14)
Flow intensity	107.5 (6.7)	117.6 (19.7)	145.3 (11.8)
Flow frequency	115 (14.9)	119.3 (19.2)	143.3 (9.8)

Global Flow Intensity

For three participants, the imagery intervention was followed by an increase in mean global flow scores. Vicky's FFS-2 mean score for Baseline 1 was 111 and declined to 110 during the intervention (see Figure 5). The other three mean flow intensity scores from Baseline 1 to the intervention increased from 117 to 127.2 for Tom (Figure 6), 99 to 104 for Andrew (Figure 7), and from 107.5 to 117.6 for John (Figure 8). In Baseline 2, the mean global flow intensity scores for Vicky, Tom, and John were higher than both their mean intervention and mean Baseline 1 global flow intensity scores. Only Andrew returned to a mean score for Baseline 2 that was below his intervention score (see Table 1 for mean flow intensity scores).

Figure 5. Global flow intensity scores for Vicky.

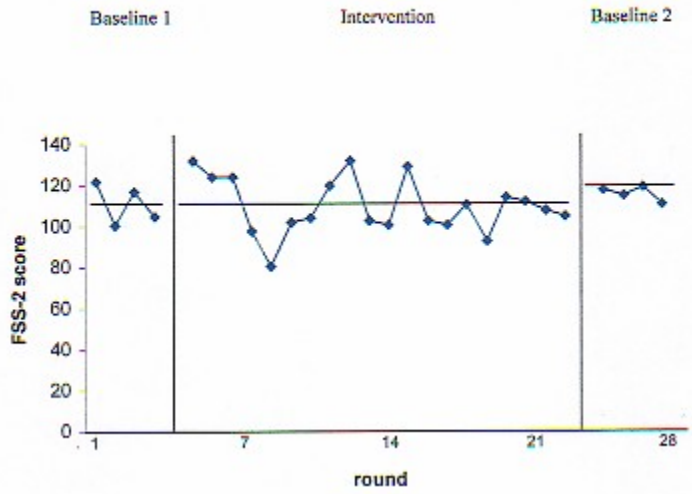


Figure 6. Global flow intensity scores for Tom.

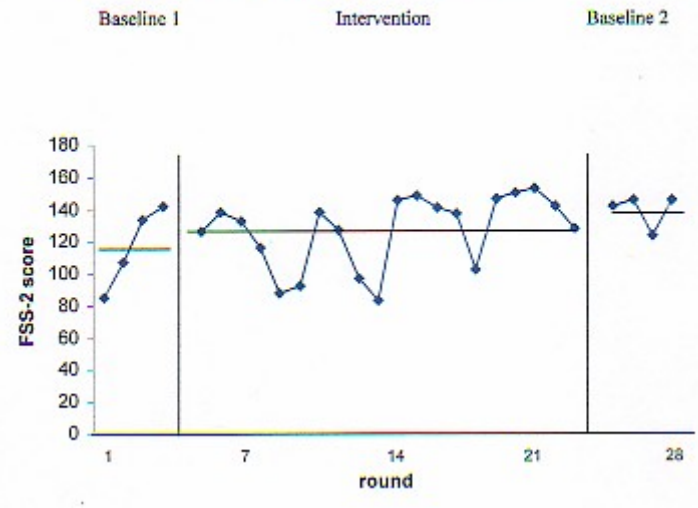


Figure 7. Global flow intensity scores for Andrew.

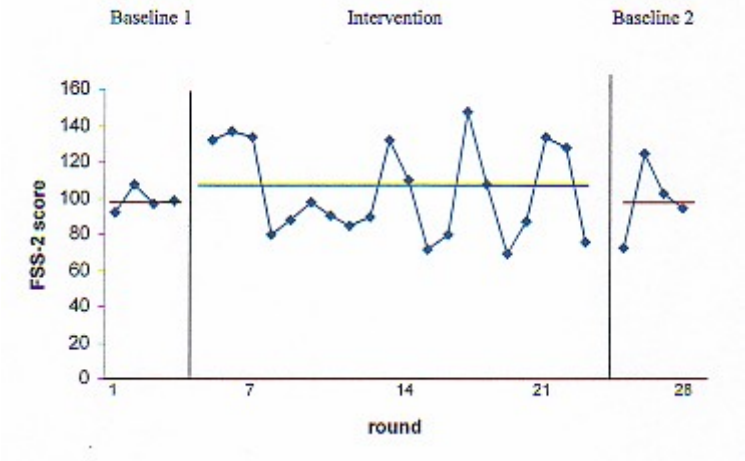
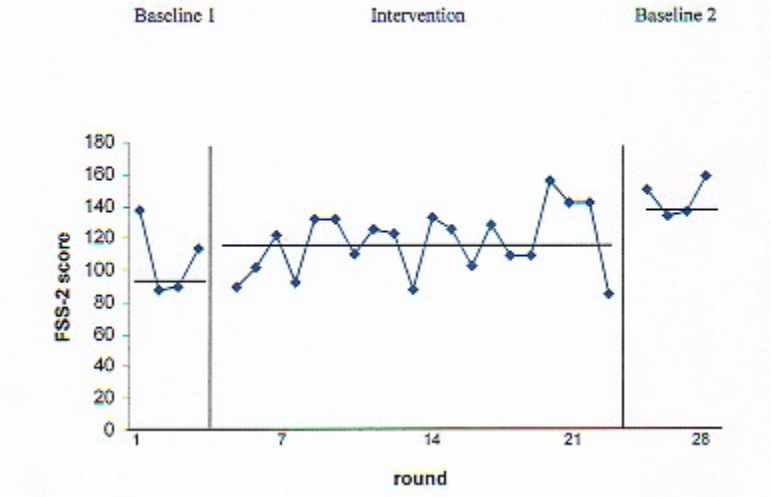


Figure 8. Global flow intensity scores for John.



Global Flow Frequency

The imagery intervention was associated with increases in global flow frequency for all four participants. Vicky's global DFS-2 flow mean score was 103 for Baseline 1, which increased to 106 for the intervention (see Figure 9). Tom's mean global flow frequency increased from 117 in Baseline 1 to 127.2 in the intervention (Figure 10). Andrew's global flow frequency increased from 93.8 to 95.3 (Figure 11) and John's frequency scores increased from 115 to 119.3 (Figure 12). All of the participants had a higher mean Baseline 2 score for global flow frequency than their mean global flow frequency intervention or Baseline 1 score (see Table 1 for mean flow frequency scores).

Figure 9. Global flow frequency scores for Vicky.

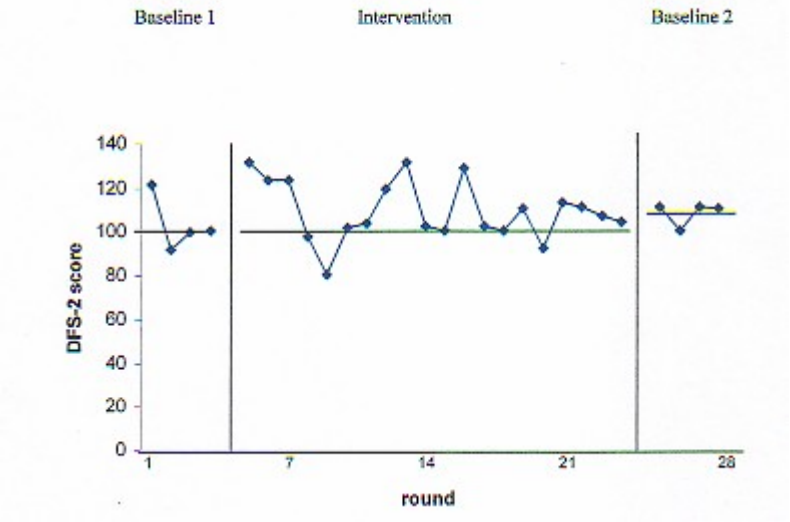


Figure 10. Global flow frequency scores for Tom.

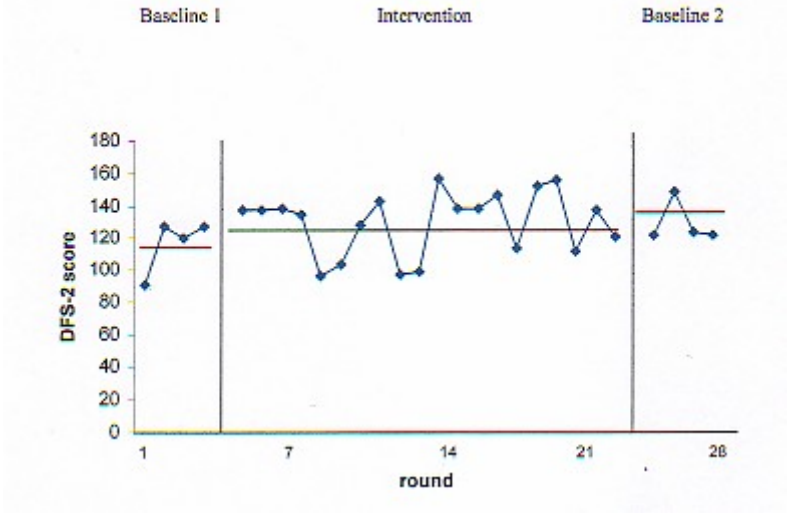


Figure 11. Global flow frequency scores for Andrew.

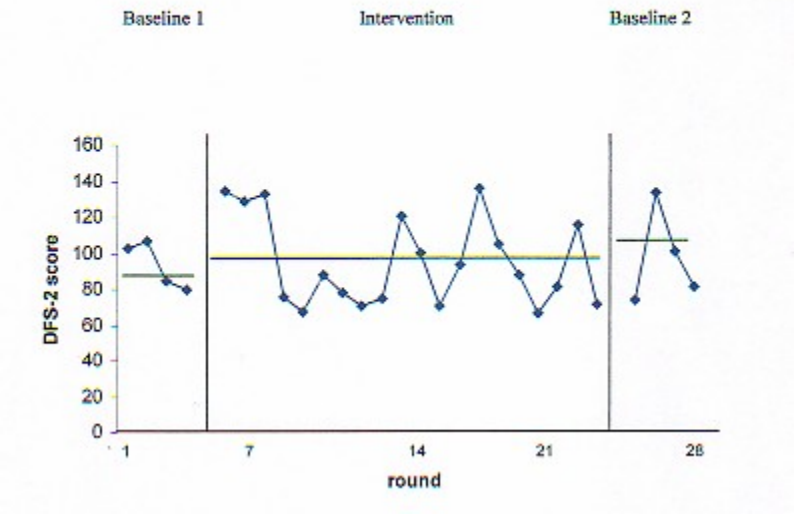
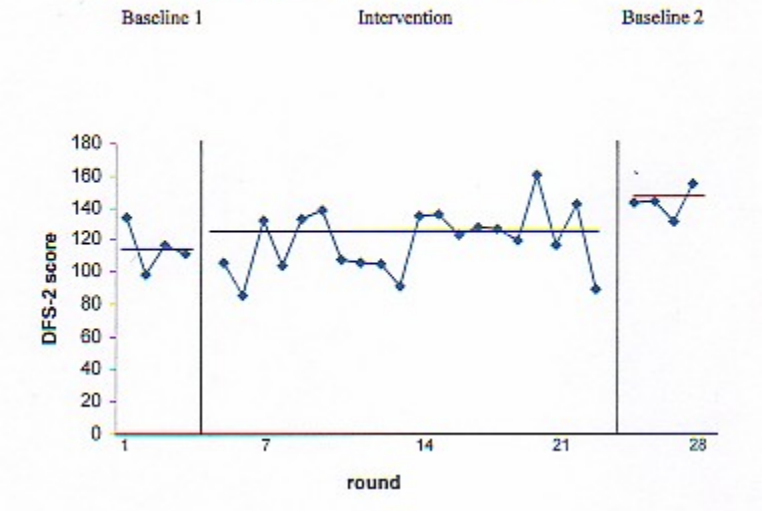


Figure 12. Global flow frequency scores for John.



Treatment Effects

Hrycaiko and Martin (1996) advocated visual inspection of the plotted data to establish if the treatment had an effect based on the following five guidelines. Although this research has found an increase in the means of the participants, caution has to be taken due to limitations of the present study meeting the criteria set out by Hyrcaiko and Martin.

(a) Stable baseline performance. In general, the baseline data did not show stability. As the data was collected from competitive golf situations it is possible that the baseline would never have been stable. This is because the golfers played different courses under varying whether conditions. However, the use of a longer baseline period might have been beneficial in creating a

more stable baseline, in particular for the flow data. Thirdly, the selection of just one performance indicator might have contributed to relatively unstable baselines for golf performance.

(b) Replication of effect within and across participants. Inspection of the data points suggests that a replication of the treatment effect occurred for three out of the four participants for golf performance (Tom, Andrew and John). Although, only Tom's improvement was of substantial magnitude (8%). Furthermore, there is also tentative support for a replication effect for three out of the four participants for flow intensity and flow frequency (Tom, Andrew, and John). Again, as for the golf performance scores, most of these improvements were relatively small in magnitude and it is unclear if these are the result of the imagery intervention or variability in the data set.

(c) Number of overlapping data points. Due to the way in which this study was conducted (ecologically valid setting, as opposed to a laboratory) it was expected that there would be overlapping data points. Although Vicky's mean golf performance increased from Baseline 1 to the intervention, all 20 of the data points overlapped. For Andrew, between Baseline 1 and the intervention there were 11 overlapping data points for golf performance. The number of overlapping data points for John's performance, between Baseline 1 and the intervention was 19 (although his performance actually increased by 2.7%). The number of overlapping data points for flow intensity and flow frequency between Baseline 1 and the intervention ranged from 7 to 19. Generally, the fewer the number of overlapping data points between baseline and treatment phase the more likely there will be a treatment effect. The relatively small effects observed in combination with the frequent overlapping data points makes it unclear whether the changes in either performance or flow are due to the imagery intervention.

(d) Timing of effect following introduction of treatment: The sooner an effect occurs the more likely this is due to the intervention or treatment. Following the introduction of the imagery intervention there were relatively prompt improvements (i.e., after three rounds) for global flow frequency in all of the participants. Swift improvements were also observed for two of the four participants in golf performance (Tom and Andrew), and for three of the four in global flow intensity (Vicky, Tom, and Andrew).

(e) Size of effect in comparison to baseline: The size of effect for one of the participants (Tom) for golf performance was relatively large. Tom improved his Baseline 1 performance by 8.6% of fairways hit. There were no large effects for the other participants with regard to performance. Moreover, although improvements were found in flow intensity and frequency they were relatively small in magnitude. However, the participants in this study were high-level golfers. It was therefore anticipated that the effects of the intervention would not be large (social validity argument). Hence, improvements of only a few percentage points in performance or flow frequency would potentially make enormous difference to the participant's success. This is particular true for the sport of golf where performance is often measured over multiple rounds of golf.

Perceived Negative Effects of Intervention

Vicky thought that the intervention actually interfered with her game in some ways. She said, "I was constantly thinking about the study, and writing the scores down after each round

constantly reminded me." If Vicky did not hit the ball to within 15 feet she felt as though she had "failed, regardless of whether I holed the subsequent putt [because] I should have been hitting the ball closer." Vicky commented that it was "very rare that I would experience any of the feelings very strongly." With regards to the intervention tape, Tom thought "it would have been good if the tape was longer as I was really starting to imagine clearer pictures."

Andrew experienced certain extremes of performance during the intervention period, and it appeared that the intervention somehow intensified Andrew's emotional responses to his performance. He said, "Throughout the intervention my good days were very good in both feelings and performance. However, on my bad days they seemed to be lower than before. So my good days were higher in terms of the intensities of my feelings but [my feelings were] lower than usual on the poor days." Andrew suggested that "I did not need the tape to be as long to experience the same feelings. I felt the long gap should have been shorter the more I listened to the tape."

Although John's intervention was designed to improve his short game, He said that "It didn't particularly affect my chipping, it was more with my whole game." He thought this may have been because "I was trying to be too focused and thinking of one specific thing… So I took it a bit out of context." John felt that the structure of the recorded instructions could have been improved. He said "there was no break between this is what you should do and then straight away another point [i.e., there should be a break]."

Perceived Positive Effects of Intervention

Vicky said that after a mistake she has been able to "get one back, which was what the tape encouraged." Vicky also thought that her "images were stronger" as a result of listening to the tape and that she was able to imagine "different types of shots and playing in front of other people." Vicky also reported that during the second baseline period that she would "subconsciously stand over the ball and imagine."

Tom reported that the imagery helped him to relax and focus. He said, "There have been several times where I have been very worried and doubting myself when I have stood on tees that require long and accurate shots. I have felt myself tensing up and have used the imagery to see in my mind where I am going to hit the ball. This helped me focus and forget about things which are not important while I am playing golf." More specifically Tom thought that the intervention had a positive effect on his driving. He said that "using the imagery when I am just about to hit the ball allowed me to kind of feel the swing that I need to hit the ball where I want it to go… I have generally felt more confident and seemed to swing with more conviction, which has seemed to work." He also provided a specific example of how the imagery helped him during a competition after he had missed the fairway. He remembered that "I started to feel a little worried over where the ball was going to finish. I took a deep breath and imagined the swing that I wanted to make and the flight of the ball, which seemed to ease my worries. I then stood up to the ball and hit it making the swing that I had imagined." He said that this type of response "seemed to occur on a number of occasions whilst listening to the tape."

Andrew said that after his practice swing he would "almost see a kind of line in the ground

whilst saying to myself 'I feel confident and mentally strong.' I then hit the ball." He recalled that the imaginary line was "only something that I have noticed towards the later part of listening to the tape." He also thought that the tape helped him to manage competitive anxiety because by "concentrating on how the tape said I should feel I would forget any worries that I may have had."

Despite perceiving that the intervention did not serve its intended purpose (i.e., improving chipping performance), John thought that "it definitely helped with concentration to some extent, because it was the case of it actually giving me something to focus on. It was like 'concentrate. Focus on the shot. Hit the shot' instead of thinking of other things." Additionally, John said that his "actual images of the flight of the ball improved… In the past I have never tried to image the everything about the ball." Finally, he thought that the instructions on the tape became almost automated, and he said "I am sort of concentrating on the same sort of way that you said on the tape without specifically thinking about the tape. It's like 'oh yeah I have just done that.'"

Discussion

The primary aims of the present study were to investigate whether individualized imagery interventions had an effect on the intensity and frequency of flow, and selected aspects of golfing performance. Inspection of the mean scores revealed that three of the four participants showed an increase in global flow intensity, and all four golfers showed an increase in mean global flow frequency during the intervention and post intervention period in comparison to baseline 1. However, the increases in magnitude of both flow intensity and frequency were relatively low. Taking in consideration the social validity argument that small alterations in behavior could have dramatic effects on success for the population under investigation, we would suggest that the results of the present study indicate that the strategic use of psychological skills training may increase personal control over the flow experience (Munroe et al., 2000; Pates & Maynard, 2000; Pates et al., 2001; Pates et al., 2002). This study provides preliminary evidence for practitioners who wish to employ imagery interventions to enhance flow and performance in golf.

Although flow is generally associated with performance in the sport psychology literature, flow experiences do not always result in optimal performances (Jackson & Csikszentmihalyi, 1999). For example, Vicky reported similar flow frequency and intensity scores when she had performed poorly or well. This indicates that high performance can occur in the absence of flow. Although all four participants improved their average performance from baseline to intervention, and performance remained at a higher level after withdrawal of the imagery intervention most of these improvements were relatively small in magnitude. We believe that this study provides preliminary support for the relationship between flow and performance in sport (Jackson et al., 2001). Furthermore, the findings demonstrated some support for the efficacy of an imagery intervention for improving performance in a competitive sport setting (cf. Biddle, 2000; Nicholls, Holt, & Polman, 2004; Nicholls, Holt, Polman, & James, in press).

In terms of examining the treatment effects, with the exception of Tom, there were many overlapping data points throughout the different phases of the study for all of the variables measured. For example, between Baseline 1 and the intervention all of Vicky's golf performance measurement data points overlapped. Fewer overlapping data points between treatment, and

intervention indicates a greater experiment effect (Hrycaiko & Martin, 1996). It must be noted that in some cases (e.g. Vicky) participants recorded particularly high performance scores in Baseline 1, which leaves less room for improvement in the intervention period. Hence, the selected dependent variables have a ceiling effect. For example, the participant could theoretically hit all fairways in his round of golf. Secondly, relatively large variability was observed for some of the subjects. This was particularly true for the performance data. We would suggest that future studies either use an extended baseline period, use a multiple baseline approach or alternatively select multiple performance indicators. In particular the last point might be of important in the game of golf, because some shots are only played a limited number of times during a round of golf.

When there are overlapping data points Hrycaiko and Martin (1996) suggested utilizing the other guidelines to demonstrate an experimental effect. In the current study, all of the participants showed relatively swift improvement in their global flow frequency score, three of the participants showed a prompt improvement in global flow scores, and two of the participants showed an immediate improvement in golf performance. There was a replication of the treatment for three out of the four participants for golf performance, flow intensity, and flow frequency. However, the magnitude of this experimental effect especially performance, with the exception of Tom, was relatively small.

We believe that there are a number of reasons for this small increase. Firstly, some of the participants scored relatively high during the baseline phase allowing not much room for improvement. Secondly, the participants in the present study were high-level performers. Interventions with high-level performers may result in small percentage improvements, but such improvements may have significant performance outcome effects (social validity argument) (cf. Hrycaiko & Martin, 1996). In elite golf, reducing individual round scores has vast implications for total tournament outcome. Additionally, the conditions in which the performance measures were taken may have also contributed to the high number of overlapping data points (i.e., during competition, which leads to fluctuations in shot difficulties). It could be that a visual inspection of overlapping data points might not be a sensitive measure of experimental effects in ABA designs, especially with high-level performers in ecologically valid situations as opposed to laboratory conditions. Also, weaker experimental effects may be one of the consequences of conducting research in competitive sport settings with high-level performers.

In the ABA design, reversal of the dependent variables after the intervention has been withdrawn is important for demonstrating the experimental treatment condition. After the withdrawal of the intervention, the subjects tended to experience a continued improvement in their golf performance, global flow intensity, and global flow frequency (except for Tom's golf performance and Andrew's global flow intensity scores). The absence of reversal to baseline may be partially explained by the nature of the intervention employed. That is, despite the withdrawal of the intervention during Baseline 2, subjects may either consciously or unconsciously continue to use imagery while performing. This notion was supported by the qualitative data, which revealed that all of the participants' thought that their imaging ability improved as the intervention continued. In such cases, the withdrawal of the intervention (i.e., the imagery tape) does not ensure that the participants no longer use imagery. Indeed, Vicky actually reported that during the second baseline period she would "subconsciously stand over the ball and imagine."

Similarly, Pates and Maynard (2002) suggested that participants might have continued to use hypnotic triggers following an intervention (and this resulted in their adoption of an AB research design in contrast to the ABA design used here).

The secondary purpose of this investigation was to examine athletes' experiences of the delivery of the intervention. Such qualitative information has implications for improving aspects of sport psychology intervention delivery (cf. Poczwardowski, Sherman, & Henschen, 1998). During the post-intervention interview, Andrew reported that he experienced extremes of emotion during the intervention phase (which is corroborated, by his global flow intensity [Figure 7] and global flow intensity [Figure 11] scores). Similarly, Pates and Maynard (2000) found that one participant experienced extremes of emotion during their hypnotic intervention. This finding highlights that caution is warranted when delivering psychological skills training programs to athletes.

During the interviews, all participants reported positive outcomes from the imagery intervention. Vicky commented that she was more confident in her abilities to recover whereas Tom stated that his increased confidence reduced pre-round anxiety levels and allowed him to have more positive swings. Confidence is a construct that can facilitate the flow experience (Jackson, 1995). All participants indicated that their imagery ability had improved significantly and there were able to imagine clearer, stronger, and more controllable images. On the negative side, two of the participants found some of the gaps on the tape too long and two participants indicated that they would have liked more variation in the imagery instructions.

Whereas the ABA research design we employed does not allow for an examination of external validity across different settings (Hrycaiko & Martin, 1996), it does allow for greater experimental control than multiple-baseline designs. Verification of the baseline prediction made for each behavior within a multiple-baseline design does not tend to be directly demonstrated by that behavior but is in fact inferred from the lack of change in other behaviors (Cooper, Heron, & Heward 1987). A possible limitation of the current study was the relatively short baseline period (four rounds of golf). Kazdin (1992) has suggested that the ABA design requires an assessment of stable baseline performance of the dependent variable or a trend in the opposite direction. The results in the present study revealed relatively unstable performance scores for Baseline 1 whereas the global flow intensity and frequency scores tended to be more stable. The fact that the present study, only used one particular aspect of the golfers performance as dependent variable might have contributed to this. Future studies might consider multiple aspects of golf performance as dependent variables. Furthermore, the flow scores obtained for the present study consisted of retrospective analysis of a whole round of golf which can take up to four to five hours of play and included only a single performance parameter. With regard to the latter, golfers could perform relatively well on the selected performance variable but play poorly for the rest of the round. These issues highlight some of the difficulties of investigating the flow experience in real-life competitive sport settings. However, research in ecologically valid settings has the potentional to add to both the literature and the applied work of sport psychology practitioners. Future evaluative studies that employ a range of methodological approaches (including group-based designs) will be useful in developing the applied knowledge base underpinning sport psychology interventions.

The findings of the current study provide initial support for the notion that an individualized MG-M imagery intervention can have a positive influence on performance and the intensity and frequency of flow among high-performance golfers. At high levels of competition, relatively small performance improvements may have dramatic outcomes (especially for golf competitions played over several rounds). By tailoring imagery interventions to a client's needs, sport psychology consultants may be able to improve performance as well as increasing the probability of achieving flow experiences.

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Appendix A

Imagery Script

* = insert individual golf performance here

Get into a comfortable position and close your eyes. Focus on the center of your body and take several slow deep breaths. With each inhalation imagine that you are pulling all the tension from your body into your lungs. With each exhalation, imagine that you are releasing all of the tension and negative thoughts from your body. Continue this breathing, becoming more focused and confident. (30 seconds)

That's fine, now imagine that you are reaching into your golf bag and pulling out the club that use for * shots…….. Look at the bag……. Notice where this club is…… feel its shape as you grab it. As you partially exhale let your shoulders drop and arms relax….. Feel the bend in your knees as your as your club head drops into position for the practice swing. Look ahead to the position to where you are going to hit the ball…… As you look back to your ball take an easy centering breath. When you have exhaled to the point where you feel comfortable remind yourself that you feel mentally tough and confident. …….. As you look back to your ball take an easy, breath. When you have exhaled to the point where you are comfortable remind yourself that you feel mentally tough and confident. Imagine the feeling of confidence in your hands and notice how smooth the swing feels and you are feeling the distance during these swings…. Imagine a sense of ease and lightness in the swings……. As hitting this shot is almost becoming effortless. Take your practice * shot.

Good, rehearse a few * shot, rehearse every aspect of the * shot……. Try * of different lengths with different breaks…. Make some of them easy and some more difficult…… Imagine that other golfers are present, but don't let them rush you……Notice how the focus of your concentration shifts from a broad focus as you are looking around to a very narrow focus, as you line up the chip and hit the ball. Imagine feeling that you have the ability to meet any challenges you are faced with on your round. (3 minutes)

Good, imagine you are about to hit a * shot, you are feeling a little tight……. You want this one…….. you start to worry about dropping a stroke after a poor shot……. You can stop your worrying by taking breath. On the exhale remind yourself that you feel relaxed and confident. Imagine the shot that you want to play, feeling the distance and seeing the shot. You are confident and successfully recover by staying focused and in control of your emotions. Hit the * shot…… (20 seconds)

Now imagine yourself arriving at the golf course feeling confident in both your mental and physical preparation, feeling good. (20 seconds)

You feel the nervous anticipation of the competition and remind yourself that it is exhilarating to play golf. You are motivated to perform. (10 seconds)

You feel confident in your preparation and clearly focused on your up coming round. Your breathing is calm and controlled. Your muscles feel warm and elastic ready to explode with

intensity and precision. You are ready. (20 seconds)

Your pre-round warm-up goes well and you remind yourself that your are ready for any unexpected obstacle as you are confident in your refocusing ability and remind yourself that you are mentally tough. You feel optimally energized and ready to go. Enjoy it.