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The effect of performance routines on early learners performing the golf wedge shot

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Abstract
This article examines the question of whether golfers with little playing experience benefit from employing a performance routine prior to playing shots? The intervention strategies involved a physical skills practice and cognitive-behavioural routine program, as well as a physical skills practice only program. Performance was measured on a pre-intervention test, post-intervention test, and following a period of time without treatment, and involved golf wedge shots being played from distances of 40, 50, and 60 metres from a target. Participants in this study (N=66) were assigned to either a golfer or non-golfer group. Participants in the treatment groups attended two practice sessions per week during the acquisition phase. Non-golfers in both intervention groups improved performance following the acquisition phase and maintained these levels of performance in the retention test. Greater improvements in performance were found in the non-golfer physical skills practice and cognitive-behavioural routine group. The non-golfer physical skills practice and cognitive-behavioural routine group was the only group to realize significant improvements in wedge-shot accuracy when comparing initial test performance measures to post-intervention and retention test performance measures across all test distances. Although the golfer treatment groups had consistent improvement in performance measures following the intervention phase, these improvements did not reach statistical significance in the majority of cases.

Keywords: Golfer, physical skills practice and cognitive-behavioural routine group

Introduction
Golf presents participants with both cognitive and behavioural challenges. The social aspects of the game typically provide evaluative observers and/or fellow competitors, the opportunity to influence the performer possibly in an adverse manner. Golf also involves a wide variety of shots to master, extended periods of time between shots, and competitive situations that could be distracting and destructive in terms of performance decrement. Successful golfers have been identified as having the ability to develop plans for refocusing after distractions, have control over their thoughts and emotions, and employ cognitive techniques in imagining intended performance actions (Orlick & Partington, 1988; Thomas & Fogarty, 1997) [10, 13]. Coupled with these characteristics, it has been observed that highly skilled performers also often utilize consistent cognitive-behavioural patterns that are maintained during competitions (Cohn, 1990; Crews & Boutcher, 1987) [3-4, 6]. One example of a specific cognitive-behavioural strategy used in golf is the performance routine, and these has been shown to be effective in improving the performance of skilled participants across a number of sports (Cohn *et al*., 1990; Lobmeyer & Wasserman, 1986) [3-4, 8]. Some evidence also suggests that such routines may benefit novice and low-skill level performers in the performance of specific motor skills (Beauchamp *et al*., 1996; Lidor *et al*., 1996) [2, 7], but that there is a possibility of long-term detriment due to a 'ceiling effect'. While these early learners may need more time to internalize and replace existing performance routines, it is possible that this population offers the potential of a notional 'open page' in relation to learning a performance routine. The aim of this study, therefore, was to evaluate the effect of performance routines with novice and low skill level performers. The golf wedge shot was selected, as the capability to perform these shots is considered by some experts to be of paramount importance to successful golf (Rotella, 1995) [11].

Description of the experiment
Participants in this study included 66 males who were an average of 35.6 years of age. All participants were assigned to either a golfer (N=28) or non-golfer (N=38) group.

The criteria for assignment to the golfer group included the individual possessing an official golf club handicap at the time of the study, having never possessed a handicap lower than 18, having played a minimum of 12 rounds of golf in the six months prior to the start of the study, having been an active golfer for more than 2 years prior to the start of the study, and having a history of practice no greater than once a week. Overall, the golfers' handicaps ranged from 18.0 to 24.4 (M=21.4; SD=1.56). The criteria for assignment to the non-golfer group included having played less than three rounds of golf in their lifetime and having no history of golf practice. Within each category, participants were randomly assigned to one of the following six experimental groups:

- Non-golfer control with no practice group (NGCG; N=10).
- Non-golfer physical skills practice only group (NGG; N=15).
- Non-golfer physical skills practice and cognitive-behavioural performance routine group (NGRG; N=13).
- Golfer control with no practice group (GCG; N=10).
- Golfer physical skills practice only group (GG; N=9).
- Golfer physical skills practice and cognitive-behavioural performance routine group (GRG; N=9).

The program sequence involved participants being tested during Week 1 of the study. Then, the practice groups attended two sessions per week for a period of three weeks. All participants then completed a test during Week 5 of the study, and a final test during Week 7 of the study following one week without practice. The practice sessions were of a variable distance design, with all participants following the same protocol.

The performance area for both test and practice occasions was a well-maintained hockey pitch. Participants performed using the same wedge golf club on all occasions. A circle with a 10-metre radius was created as the target area, with a flag stick positioned in the center of the circle as the target. The test distances were the distances from the flag stick target that golf balls were played from, and included 40, 50, and 60 metres. The distance (in metres) and angle (in degrees and minutes) of each golf ball played during a test occasion were determined in relation to the target and performance position using a surveying sighting rod and a SOKKIA Digital T6 Model theodolite (accurate to within .001 m for distance and, to within 20 seconds for angles).

All initial test performances were conducted in Week 1 of the study. Participants performed 30 wedge shots on the test occasion. The golf balls were numbered 1-30 and colour coordinated. The golf balls were played in numerical sequence with golf balls numbered 1-5 played first from 40 m; numbers 6-10 from 50 m; numbers 11-15 from 60 m; numbers 16-20 from 40 m; numbers 21-25 from 50 m and, finally, numbers 26-30 from 60 m. The golf balls were played from a level ground position that would not hinder performance. Only one attempt to play a particular golf ball was permitted. On completion of a set of tests, the target was removed and the theodolite erected in exactly the same position. In order to score each golf ball (according to its colour and number) a sighting pole was held at each golf ball's location and the distance and angle of each golf ball recorded in relation to the performance position and the theodolite (i.e., target).

On completion of the initial test, participants who were assigned to the NGRG and GRG groups were issued with a handout of a performance routine and given two practical demonstrations (with verbal commentary) highlighting sequential and procedural elements of the routine. The performance routine was an adaptation of a performance routine designed by Crews and Boutcher (1986) [5] for golf, and included the following elements:

- Address imaginary ball next to the ball to be hit.
- Visualize an imaginary line from the target to the club face.
- Waggle club.
- Visualize an imaginary line from the target to the club face.
- Take a deep breath.
- Perform the swing recalling the word "smooth" on the backswing and the word "swing" on the downswing.
- Visualize the ball flying from the club face with the correct trajectory and landing at the target.
- Address ball to be hit.
- Visualize an imaginary line from the target to the club face.
- Waggle club.
- Visualize an imaginary line from the target to the club face.
- Take a deep breath.
- Perform the swing recalling the word "smooth" on the backswing and the word "swing" on the downswing.

The skill acquisition phase (Weeks 2, 3, and 4 of the study) involved participants in the NGG, NGRG, GG and GRG groups attending two practice sessions per week. There was a minimum of one day and maximum of four days between practice sessions. The practice area setting was similar to that of the test area (i.e., performance distances, a target area, and centrally positioned target). During the practice sessions participants played five golf balls from three different distances from the target. This procedure was repeated with a total of 30 shots being played, with the distances being changed each week. The variable practice distances were 35 m, 45 m and 55 m for Week 2; 45 m, 55 m and 65 m for Week 3 and 30 m, 50 m and 70 m for Week 4. Participants in the NGRG and GRG groups were provided with a large, laminated performance routine prompt card. The cards were transportable and accompanied the performer at each test distance and practice distance. The function of the cards was to assist the performer to follow the correct sequence of events in the performance routine. The cards were pinned to the ground above the position where the golf balls were being played.

Participants repeated the initial test procedure during Week 5 of the study with a minimum of four days and a maximum of seven days between the last practice session and performance of this test. This performance was designated as the post-intervention test. Participants repeated the initial test procedure again during Week 7, after a week without treatment. A minimum of four and maximum of eight days elapsed between the post-intervention test and the performance of this test. This performance was designated as the retention test.

The weather did not pose a problem on any test occasion and prevented practice on two occasions for a period of 15 minutes only. The ability to predict such stable naturally occurring conditions is unlikely and would clearly be a factor in the reproduction of such a design. Participants were

aware of the importance of attendance and all 66 completed every test and practice session where appropriate.
Participants employing the performance routine were asked not to discuss this with other participants.

Results and Discussion

Mean distances in metres from the target were calculated for the 10 shots played from each of the test distances (i.e., 40 m, 50 m, and 60 m) and mean values were used as the participants' performance measures. Group mean test results were determined from these measures. Figures 1, 2 and 3, provide graphs of group mean performance measures in metres from the target across test occasion at each of the 3 distances. Table 1 provides group mean performance measures differences in metres and F-ratio values for within-group effect measures.

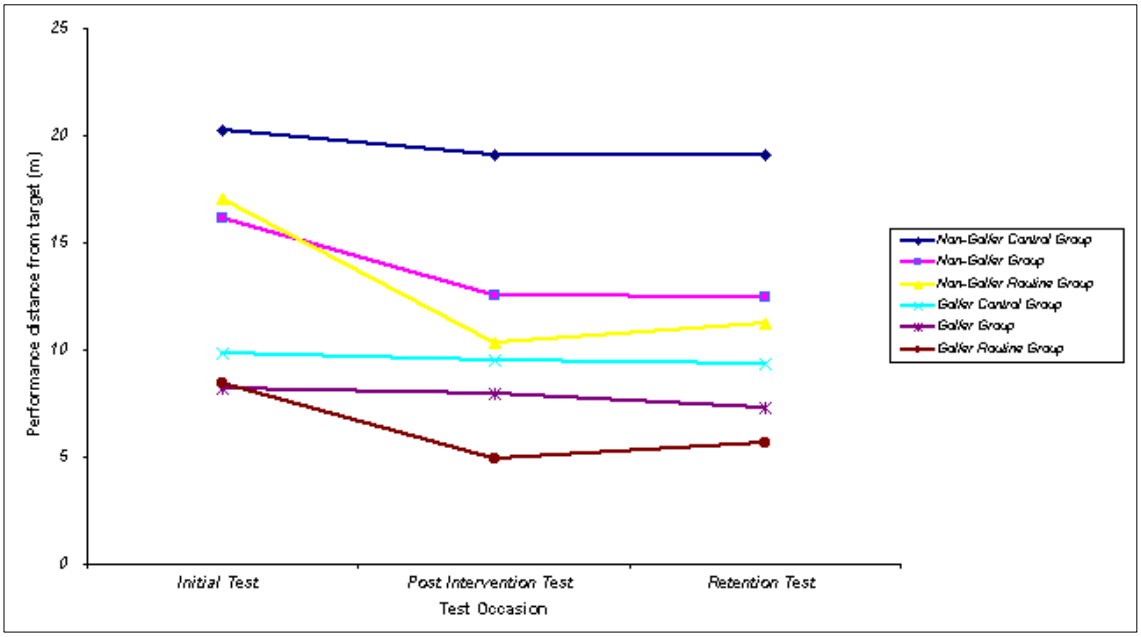

Fig 1: Group mean performance measures for shots played from 40 metre test distance across test occasion

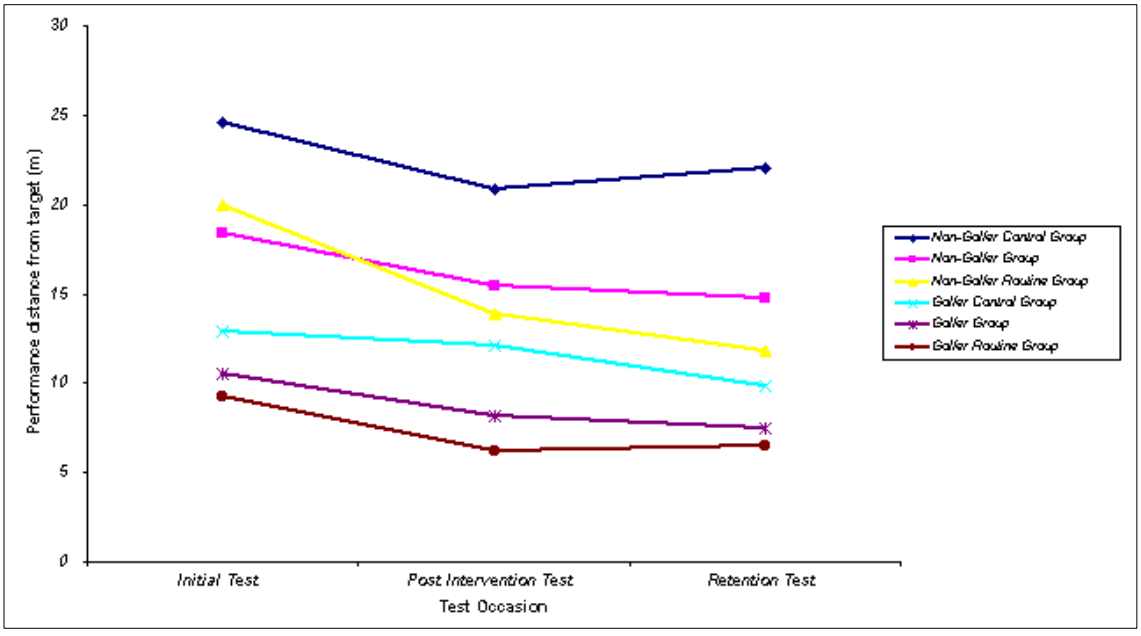

Fig 2: Group mean performance measures for shots played from 50 metres test distance across test occasion

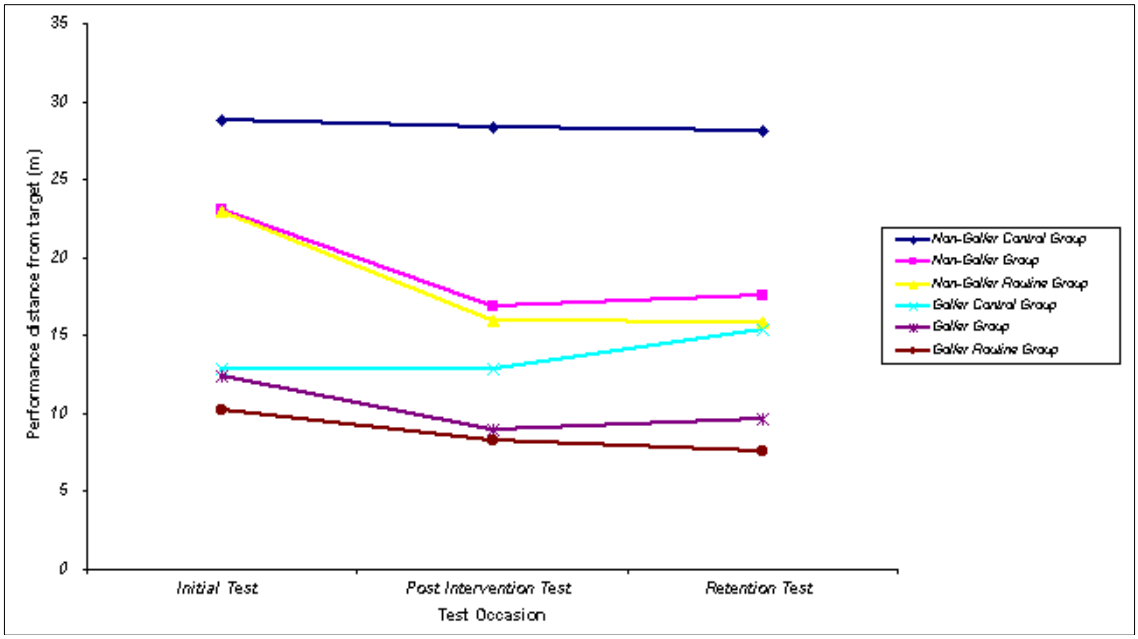

Fig 3: Group mean performance measures for shots played from 60 metre test distance across fest occasion

Results revealed that wedge shot performance and motor skill learning for the non-golfer intervention groups was significantly improved following a three-week acquisition phase. The results from the golfer intervention groups found some significant changes in performance and motor skill learning, but not of the same magnitude, breadth nor consistency as found in the non-golfer intervention groups. Additionally, the performances of the NGRG were found to be significantly more accurate than the performances of the NGG when considered in relation to the performances of the NGCG. These results support the suggestion made by Beauchamp *et al*. (1996) [2] who propose that the effectiveness of such interventions is not limited to elite athletes but can be extended to novices.

	TO	IT	PIT	RT		IT	PIT	RT		IT	PIT	RT
NGCG	IT		nsd	nsd			nsd	nsd			nsd	nsd
	PIT	1.19		nsd		3.7		nsd		0.55		nsd
	RT	1.15	0.04			2.53	1.17			0.77	0.22	
NGG	IT		**	**			nsd	nsd			**	**
	PIT	3.65		nsd		2.94		nsd		6.2		nsd
	RT	3.66	0.01			3.63	0.69			5.52	0.68	
NGRG	IT		**	**			**	**			**	**
	PIT	6.75		nsd		6.04		nsd		7.03		nsd
	RT	5.86	0.89			8.16	2.12			7.14	0.11	
GCG	IT		nsd	nsd			nsd	nsd			nsd	nsd
	PIT	0.32		nsd		0.75		nsd		0.25		nsd
	RT	0.52	0.2			3.01	2.26			2.78	2.53	
GG	IT		nsd	nsd			nsd	nsd			*	nsd
	PIT	0.25		nsd		2.4		nsd		3.45		nsd
	RT	0.94	0.69			3.11	0.71			2.66	0.79	
GRG	IT		nsd	nsd			nsd	nsd			nsd	nsd
	PIT	3.54		nsd		3.03		nsd		2.01		nsd
	RT	2.83	0.71			2.74	0.29			2.68	0.67	

Note: NSD = Not Significantly Different. * $p<0.05$. ** $p<0.01$. TO = Test Occasion. IT = Initial Test; PIT = Post Intervention Test; RT = Retention Test. NGCG = Non Golfer Control Group; NGG = Non Golfer Group; NGRG = Non Golfer Routine Group; GCG = Golfer Control Group; GG = Golfer Group; GRG = Golfer Routine Group

Although the performance of the golfer intervention groups generally improved, following the acquisition phase in this study, these improvements did not reach statistical significance. Cohn *et al*. (1990) [3-4] reported that a 14-week cognitive-behavioural intervention program did not immediately improve performance in elite collegiate golfers. Improvements in performance were reported in a 4-month follow-up, however the researchers acknowledged that intervening variables may have confounded these improvements. It has been suggested that extended periods of time may be required for the internalization of cognitive-behavioural performance strategies (Beauchamp *et al*., 1996; Cohn *et al*., 1990) [2, 3-4]. This may explain the findings in the present study, in that more time may be required to relegate well-established strategies and learn and adjust to new ones (Cohn *et al*., 1990) [3-4]. As Singer *et al*. (1993) suggest, novices may be receptive immediately to new performance strategies that are employed by elite level performers. The performance routine intervention utilized in the present study was very prescriptive and may have induced boundaries compared to a more customized performance routine based on the individuals personality, skills, imagery capabilities, construct etc.

Previous research (Beauchamp *et al*., 1996; Lidor *et al*., 1996) [2, 7] has supported the notion that novices may benefit from cognitive-behavioural interventions, which have typically been associated with elite performers (Crews and Boutcher, 1987) [6]. Beauchamp *et al*. (1996) [2] reported significant improvements in putting performance among novice golfers, utilizing a cognitive-behavioural intervention in the later stages of a 14-week study. These improvements were maintained over a period of time, with a change in behaviour indicative of motor skill learning (Bakker *et al*., 1995). Despite the differences in time course, and nature of the motor skill, the results of the present study support these and earlier findings.

Conclusion and Practical application

The findings of the present study showed that non-golfers were able to demonstrate significant levels of motor skill learning following a three-week acquisition phase utilizing either a physical skills-only, or a physical skills and cognitive-behavioural intervention program. These improvements were most evident in the non-golfer physical skills and cognitive-behavioural intervention group. Statistically significant improvements in performance were not found in low skill level golfers in similar experimental groups. The golfer treatment groups' mean performance measures improved across all test distances following the acquisition phase compared to their respective initial test scores. However the improvement differences, with one exception, did not achieve a level of statistical significance.

One aim of the present study was to explore the effects of a multi-dimensional performance routine. Future research designs may wish to control for the various components of such performance routines in order to explore the relative impact of these component parts on performance and learning. Additionally future research designs may provide extended periods of time in order for performers to relegate the performance routine to a more automatic level.

The performance routine may be considered as a learning and performance aid to be incorporated with the expert input of the golf coach who directs the performer's attention to appropriate internal and external cues, and technical aspects of the golf swing.

As a clearer understanding of the mechanisms underlying the learning of motor skill and factors affecting the performance of such skill is reached, a greater appreciation of the role of cognitive-behavioural performance routines will become apparent. It is hoped that coaches and performers can appreciate the potential advantages of such performance routines in the performance and learning process. In this respect the performance routine could be used to train the performer to follow a sequential pattern which may facilitate concentration focusing on task specific cues assist in minimizing the effects of anxiety provoking cues which may prove detrimental to performance and learning and promote a situation where cognitive functioning promotes rather than hinders performance and learning.

For a more detailed explanation of this study and its findings, readers are recommended to consult the original article of McCann, Lavallee and Lavallee (2001) [9].

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