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Effects of Self-controlled Feedback on the Performance and Learning of Easy Versus Difficult Golf Putting in College Students

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Abstract: A 2 x 2 x 4 factorial design (groups x distance x trial blocks) ANOVAs with repeated measures on the last factor were calculated to determine learning effects of self-controlled feedback schedule for easy versus difficult golf putting. Twenty-eight volunteer university students at Kyungpook National University were aimlessly assigned to one of two conditions (1) self- controlled group and (2) yoked group. G power was used to calculate the appropriate number of subjects for this experiment. The easy task is a 1m golf putting and the difficult task is a 5m golf putt. The putting mat consisted of a 2 m × 2 m square grid with lines spaced 5 cm apart. Subjects performed [four] blocks of [five] trials for the acquisition phase and [two] blocks of [five] trials for the retention phase. Dependent variables (absolute error, direction error, and variable error) were analyzed using two-dimensional measurement methods. The questionnaire was analyzed by calculating response percentages. The results of this study only showed trial block and distance effects in the acquisition and retention phases in both conditions. The findings of this study demonstrated that not all self-controlled feedback program is beneficial to motor skill performance and learning, and results vary subject on the type of motor tasks.

Keywords: Easy Task, Difficult Task, Learning, Performance, Self -Controlled Feedback, Skills

1. Introduction

Self-controlled feedback (SC) refers to the learner's ability to control and request feedback during the process of motor learning. It is based on the principles of autonomy, learner-centered instruction and interactions between participants and instructors. The main idea behind SC is that learners have the freedom to decide when they receive feedback, which can enhance their motivation, engagement, information processing abilities[1-4] neural efficiency[5] and learning outcomes. Some researchers argued that self-controlled learners tailor more efficient information processing in learners involved in self-controlled learning paradigms[6-9]. In addition, self-controlled practices allow the learner to use deliberate schemes effectively that results in improved learning[10].

Although it is well established that SC is beneficial for motor learning and performance in serial[11], continuous[12], discrete[6], cognitive motor skills[13], sequential timing tasks[14] as well as ballistic tasks[15]. However, SC is not effective for all motor task performance[16]. According to Moon et al.[17] the result of self-control differs depending on the amount of feedback requested by the subject and the nature of the task, that is, the extent to which the task includes cognitive elements (easy versus difficult

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task). To generalize the effect of SC, it is necessary to verify the effect of SC in easy task and difficult task conditions that have not been attempted in motor learning so far.

Although effectiveness of SC as a function of different task difficulty remained unexamined yet, in a study conducted by Keetch and Lee[4] asked participants to perform either four easy or four difficulty patterns on a computer through moving the cursor. Participants in the SC had control over choosing the schedule of the trials to be learned. In contrast, subjects in the yoked group had to follow the practice schedule generated by participants in SC. SC showed learning benefits for both easy and difficult tasks. Similarly, Ali et al.[18] asked participants to perform timing anticipation tasks with higher level of difficulty (random schedule) and easy tasks (blocked practice schedule) while dividing participants into one of two experimental conditions including self-controlled KR and yoked KR. They found no additive learning advantages of SC over yoked conditions. Also, these findings were limited to less complex tasks in a firm laboratory setting that cannot be generalized for more complex sports related tasks such as tennis strokes that are closer to real-world settings with greater ecological validity.

To this end, if the task difficulty is a fundamental variable with respect to learning of motor tasks [19], then, theoretically, lead us to the question of how self-controlled KR schedules interact with the motor tasks with different levels of task difficulty. Previous research found different learning effects of KR as a function of tasks with differing difficulty[19][20].

The conceptual framework of this study is based on the idea that allowing learners to have control over certain aspects of the feedback they receive during the learning process of easy and difficult motor skills can enhance their learning and performance. In addition, the significance of this study is investigating the learning effects of SC for easy versus difficult tasks in golf putting to help us better understand how this instructional and conceptual approaches can be optimized for different cognitive and motor skills, provides valuable insights into the role of autonomy in motor skill learning. To date, there has been rare study to verify the effect of SC considering the cognitive characteristics of motor tasks. Therefore, the purpose of this investigation is to determine the effects of SC on performance and learning of easy versus difficult golf putting. This study is expected to answer the question of how the effectiveness of SC varies depending on the level of difficulty of the task.

2. Methods

2.1 Research Design

A true experimental design was conducted to validate the effectiveness of SC. G power was used to calculate the appropriate number of subjects for this experiment. A post-test questionnaire was used to ensure whether subjects actively participated in the experiment and requested feedback when needed.

2.2 Subjects

Subjects were undergraduate university students (n=28), age ranged from 21 to 23 years (means ± SD: 22.3 ± 1.15 years) who were recruited from courses offered in the department of physical education at Kyungpook National University, South Korea. Subjects were volunteers who had no experiences in golf and they received extra credit for participating in this study. Each subject is erratically assigned to one of two conditions: (1) SC group and (2) yoked group. All subjects gave an informed consent form.

2.3 Apparatus and Task

A golf putting mat was made with artificial turf. The putting mat consisted of a 2 m × 2 m square grid with lines spaced 5 cm apart. A hole about 10.8 cm in diameter was centered and targeted. The putting

lines were marked at one end 1m and 5m away from the hole. After each trial, the investigator recorded the participant's scores. Lower scores indicate potentially better performance, and each score ranges from 0 to 20. Each score represents an error of 5 cm from the hole. Easy task and difficult task are to perform 1m and 5m golf putting from the target, respectively.

2.4 Procedures

Upon arriving at the laboratory, the general purpose and procedural information was explained to the subjects. An expert golf player showed subjects how to grip a golf club, stroke stance, fore strokes and demonstrations by the player for 5 times. After watching the demonstrations, five practice trials were allowed for all subjects. When the investigator places the ball on the putting line, each participant strikes the ball to the target. Subjects performed [four] blocks of [five] trials for the acquisition phase and [two] blocks of [five] trials for the retention phase. Approximately 10 s were allowed for each putting and 60 s resting time was provided between trial blocks. An interval between the acquisition and the retention tests was 24 hours. After each trial, the investigator recorded the participant's score. Feedback was provided whenever requested by self-controlled participants, while yoked participants were given feedback according to a schedule created by their counterparts in a self-controlled condition.

2.5 Statistical Analyses

Separate 2 x 2 x 4 (groups x distance x trial blocks) ANOVAs with repeated measures on the last factor on both easy and difficult tasks were measured for absolute error (AE), direction error (DE), and variable error (VE). Retention data were analyzed with a 2 x 2 x 2 (groups x distance x trials blocks) ANOVA using dependent measures similar to those in the acquisition phase. The VE, DE and AE were analyzed using the flow method, $AE = \bar{x} = \frac{1}{N}\sum_{i=1}^{N} x_i$, $\bar{y} = \frac{1}{N}\sum_{i=1}^{N} y_i$, $RE = \sqrt{\bar{x}^2 + \bar{y}^2}$, $VE = \frac{1}{n}\sum_{i=1}^{n}\sqrt{(x_i - \bar{x})^2 + (y_i - \bar{y})^2}$, $DE = \frac{1}{n}\sum_{i=1}^{n} \operatorname{atan}\left|\frac{y_i}{x_i}\right|$.

2.6 Ethical Considerations

All subjects gave an informed consensus form. Participants were informed that they had their right to withdraw from the experiment at any time without penalty or loss of benefits. The recruitment and selection of participants were carried out without any form of discernment based on race, ethnicity, gender, religion, sexual orientation, or any other characteristic.

3. Results

3.1 Acquisition Phase

3.1.1 Absolute Error

A significant trial block effect was found ($F [3, 78] = 6.34$, $p < .001$, $\eta 2 = .196$). There was a significant interaction for distance by trial block ($F [3, 78] = 3.154$, $p <. 05$, $\eta 2 = .108$). The analysis for AE revealed no significant main effects for group ($F [1, 26] = .325$, $p >. 05$, $\eta 2 = .012$), group by trial block interaction ($F [3, 78] = .440$, $p >. 05$, $\eta 2 = .017$), group by distance interaction ($F [1, 26] = .102$, $p >. 05$, $\eta 2 = .004$), and group x distance x trial block ($F [3, 78] = .453$, $p >. 05$, $\eta 2 = .033$) as shown [Table 1].

[Table 1] Golf Putting Score Changes Between Self-Controlled and Yoked Groups During the Acquisition Phase

Acquisition		Self- Controlled		Yoked	
		M	SD	M	SD
AE Easy Task	Trial Block_1	10.48	6.10	8.15	4.76
	Trial Block_2	6.65	6.28	5.03	2.95
	Trial Block_3	*5.44	4.57	4.71	2.63
	Trial Block_4	*3.82	1.87	*4.64	3.17
AE Difficult Task	Trial Block_1	15.91	7.86	16.75	8.30
	Trial Block_2	17.52	6.02	16.09	4.14
	Trial Block_3	14.98	4.63	13.47	5.09
	Trial Block_4	14.81	4.92	14.77	4.71
VE Easy Task	Trial Block_1	*5.29	2.96	*4.33	2.38
	Trial Block_2	*3.73	1.90	*3.84	2.25
	Trial Block_3	*3.15	1.45	*3.92	1.79
	Trial Block_4	*3.42	1.75	*3.51	1.85
VE Difficult Task	Trial Block_1	12.16	4.75	13.76	6.11
	Trial Block_2	14.17	4.15	13.45	3.48
	Trial Block_3	12.73	4.05	11.72	5.05
	Trial Block_4	12.86	5.71	13.45	5.44
DE Easy Task	Trial Block_1	*83.76	23.30	*96.45	53.40
	Trial Block_2	*78.16	32.16	115.60	63.05
	Trial Block_3	142.07	78.40	127.21	74.66
	Trial Block_4	115.80	62.96	*97.54	53.38
DE Difficult Task	Trial Block_1	174.08	84.54	189.92	90.79
	Trial Block_2	136.88	82.53	185.34	85.57
	Trial Block_3	159.73	82.74	205.07	82.82
	Trial Block_4	218.82	75.20	221.72	79.75

* $p < .05$

3.1.2 Variable Error

A significant distance effect was found ($F [1, 26] = 372$, $p < .01$, $\eta 2 = .935$). No significant interaction for distance by group was found ($F [1, 26] = .014$, $p >. 05$, $\eta 2 = .001$). There were no significant main effects for trial block ($F [3, 78] = .831$, $p > .05$, $\eta 2 = .031$) and group ($F [1, 26] = .008$, $p > .05$, $\eta 2 = .001$). An interaction for distance by trial block was not found ($F [3, 78] = .779$, $p > 05$, $\eta 2 = .029$). The analysis for VE revealed no significant interaction for group x distance x trial block ($F [3, 78] = .911$, $p >. 05$, $\eta 2 = .034$). No main effect for the group was found ($F [1, 26] = .208$, $p >. 05$, $\eta 2 = .001$) as shown [Table 1].

3.1.3 Direction Error

A significant distance effect was found ($F [1, 26] = 38.1$, $p < .001$, $\eta 2 = .595$). No significant interaction for distance by group was found ($F [1, 26] = .863$, $p >. 05$, $\eta 2 = .032$). There were significant

main effects for the trial block (F [3, 78] = 3.22, p < .05, η2 = .110). An interaction for groups by trial blocks (F [3, 78] = 1.22, p > 05, η2 = .045) was found. Distance by trial block was significant (F [3, 78] = 3.11, p < 05, η2 = .107). No significant interaction for group x distance x trial block (F [3, 78] = .584, p >. 05, η2 = .022) was found. No main effect for the group was found (F [1, 26] = .208, p >. 05, η2 = .001) as shown [Table 1].

3.2 Retention Phase

3.2.1 Absolute Error

A significant distance was found (F [1, 26] = 139.5, p < .001, η2 = .843). There was no significant interaction for distance by group (F [1, 26] = 1.478, p > .05, η2 = .054). The analysis for AE revealed no significant main effects for group (F [1, 26] = .016, p >. 05, η2 = .001) and trial block (F [1, 26] = 3.742, p > .05, η2 = .126). Group x trial block (F [1, 26] = .644, p >. 05, η2 = .024) and group x distance x trial block (F [1, 26] = .428, p >. 05, η2 = .016) were not significant. A significant interaction for trial block by distance was found (F [1, 26] = 7.114, p <. 05, η2 = .215) as shown [Table 2].

[Table 2] Golf Putting Score Changes Between Self-Controlled and Yoked Groups During the Retention Phase

Acquisition		Self- Controlled		Yoked	
		M	SD	M	SD
AE Easy Task	Trial Block_1	*6.42	4.19	*5.21	2.40
	Trial Block_2	6.49	4.87	*5.63	3.78
AE Difficult Task	Trial Block_1	16.22	2.70	16.00	5.79
	Trial Block_2	12.25	3.88	13.97	4.74
VE Easy Task	Trial Block_1	*3.15	1.14	*3.85	1.86
	Trial Block_2	*3.67	1.05	*3.45	1.30
VE Difficult Task	Trial Block_1	13.16	4.32	14.10	4.39
	Trial Block_2	09.60	3.82	10.32	4.49
DE Easy Task	Trial Block_1	141.34	81.37	140.81	81.74
	Trial Block_2	*111.69	54.19	154.43	86.14
DE Difficult Task	Trial Block_1	195.35	75.82	231.73	70.81
	Trial Block_2	159.84	78.73	171.06	85.96

* p < .05

3.2.2 Variable Error

A significant distance effect was found (F [1, 26] = 167, p < .01, η2 = .866). No significant interaction for distance by group was found (F [1, 26] = .216, p >. 05, η2 = .008). There was a significant main effect for the trial block (F [1, 26] = 9.84, p < .05, η2 = .275). An interaction for the group by trial block was not found (F [1, 26] = .252, p > 05, η2 = .010). The analysis for VE revealed no significant interaction for group x distance x trial block (F [1, 26] = .093, p >. 05, η2 = .004). Distance by trial block (F [1, 26] = 10.67, p <. 05, η2 = .291) was significant. No main effect for the group was found (F [1, 26] = .208, p >. 05, η2 = .001) as shown [Table 2].

3.2.3 Direction Error

A significant distance effect was found (F [1, 26] = 16.3, p < .001, η2 = .386). No significant interaction for distance by group was found (F [1, 26] = .011, p >. 05, η2 = .000). There were significant main effects for the trial block (F [1, 26] = 5.44, p < .05, η2 = .173). No interaction for groups by trial block (F [1, 26] = .142, p > 05, η2 = .005) was found. Distance by trial block was not significant (F [1, 26] = 2.42, p > 05, η2 = .085). No significant interaction for group x distance x trial block (F [1, 26] = 1.76, p >. 05, η2 = .064) was found. No main effect for the group was found (F [1, 26] = 1.133, p >. 05, η2 = .042) as shown [Table 2].

3.2.4 Post Questionnaire

The percentage of feedback requests for easy and difficult tasks was 2.7% and 57%, respectively.

4. Discussions

Findings of this study yielded that no performance differences were observed during acquisition and retention phases in both conditions. These findings support the study by Ali et al.[18] showing no superior learning on difficult tasks over easy tasks of anticipation timing. An interpretation of this result is that the increased cognitive challenge of difficult tasks interferes with learners' ability to process information, resulting in poor performance in the acquisition and retention phases. Some previous studies[19][21] support the results of this study by arguing that performance deteriorates when information processing is not performed well due to increased cognitive demands in performance.

In addition, the principles of SC are self-determination and motivation, and if the subject's motivation is not induced, SC has no effect. According to the post-questionnaire in this study, the overall rates of feedback requests were low in the easy task. This feedback demand ratio means little to no motivation to ask feedback. Lee at al.,[22] support the notion of this study by arguing that the effect of self-control feedback does not appear when motivation is not induced. For the difficult task, feedback effect did not appear either. The rate of feedback requests for difficult task was high, but the feedback is ineffective for learning. It is believed that the reason why the feedback effect did not appear in this study was because the task was difficult. Mahmood and Darzi[23] supported this interpretation that If the task is difficult for beginners, there is no feedback effect because they do not understand even if the explanation or feedback is given.

Furthermore, the results of these findings demonstrated that performing tasks with relatively low cognitive demands does not mean that SC is effective for motor learning. Although many preceding studies[5][24] have argued that SC can be an significant intervention strategy to improve motor learning, judging from the results of this study, SC does not always improve motor learning. The ineffectiveness of SC in this study is considered to be due to the following reasons. First, novice learners lack the necessary knowledge and expertise to accurately evaluate their performance and determine the type and timing of feedback they need. They not have a clear understanding of what constitutes correct technique or movement patterns, which leads to incorrect self-assessments and ineffective feedback requests. Second, learners often have personal biases and preferences when it comes to feedback. They choose feedback that confirms their preconceived notions or avoids information that challenges their self-perception. These biases hinder the acquisition of new skills and impede the correction of errors.

In the analysis of variable error, absolute error, and directional error in difficult task, there was no difference between groups, but a trial block effect was found. These implications show that feedback affects performance over time when performing difficult tasks. However, the easy task did not show a trial block effect, but the difficult task showed a trial effect. This finding suggested that it is important to consider task characteristics and provide feedback that is tailored to the learner's needs, allowing for

optimal engagement and skill acquisition. An important finding in this study is that self-control does not apply to all motor skills, but it shows that the effect of SC appeared when there is an active interaction between the researcher and the subject to enhance the feedback.

5. Conclusions

In sum, the purpose of this study was to determine the effect of SC on easy versus difficult golf putting. The findings of this study suggest that a SC is not always beneficial for motor learning. Although many studies claim that SC has a beneficial effect for skill acquisition (motor learning), the findings of this study show that the effect of SC differs depending on the nature of the tasks such as easy versus difficult skills. The limitation of SC is that the results vary depending on the motivation of the subjects to participate in the experiment and how actively they participate in the experiment. Therefore, this study implies that, to increase the effectiveness of SC, it is essential for researchers to establish a strategy that allows subjects to request feedback as needed. The implications of SC on the motor learning of challenging and simple motor tasks differs due to variations in heightened engagement and autonomy levels. For further study, it would be an interesting study to examine the SC effect according to the feedback demand ratio.

References

[1] G. Wulf, Self-controlled practice enhances motor learning: implications for physiotherapy, Physiotherapy, (2007), Vol.93, No.2, pp.96-101.
DOI: https://doi.org/10.1016/j.physio.2006.08.005

[2] S. Chiviacowsky, Self-controlled practice: Autonomy protects perceptions of competence and enhances motor learning, Psychology of Sport and Exercise, (2014), Vol.15, No.5, pp.505-510.
DOI: https://doi.org/10.1016/j.psychsport.2014.05.003

[3] S. Chiviacowsky, G. Wulf, Self-controlled feedback is effective if it is based on the learner's performance, Research Quarterly for Exercise and Sport, (2005), Vol.76, No.1, pp.42-48.
DOI: https://doi.org/10.1080/02701367.2005.10599260

[4] K. M. Keetch, T. D. Lee, The effect of self-regulated and experimenter-imposed practice schedules on motor learning for tasks of varying difficulty, Research Quarterly for Exercise and Sport, (2007), Vol.78, No.5, pp.476-486.
DOI: https://doi.org/10.1080/02701367.2007.10599447

[5] Y. Kim, J. Kim, H. Kim, M. Kwon, M. Lee, S. Park, Neural mechanism underlying self-controlled feedback on motor skill learning, Human Movement Science, (2019), Vol.66, pp.198-208.
DOI: https://doi.org/10.1016/j.humov.2019.04.009

[6] M. J. Carter, A. N. Carlsen, D. M. Ste-Marie, Self-controlled feedback is effective if it is based on the learner's performance: A replication and extension of Chiviacowsky and Wulf (2005), Frontiers in psychology, (2014), Vol.5, Article.1325.
DOI: https://doi.org/10.3389/fpsyg.2014.01325

[7] C. M. Janelle, J. Kim, R. N. Singer, Subject-controlled performance feedback and learning of a closed motor skill, Perceptual and Motor Skills, (1995), Vol.81, No.2, pp.627-634.
DOI: https://doi.org/10.1177/003151259508100253

[8] J. T. Patterson, M. Carter, E. Sanli, Decreasing the proportion of self-control trials during the acquisition period does not compromise the learning advantages in a self-controlled context, Research Quarterly for Exercise and Sport, (2011), Vol.82, No.4, pp.624-633.
DOI: https://doi.org/10.1080/02701367.2011.10599799

[9] P. G. Post, J. T. Fairbrother, J. A. Barros, Self-controlled amount of practice benefits learning of a motor skill, Research

Quarterly for Exercise and Sport, (2011), Vol.82, No.3, pp.474-481.
DOI: https://doi.org/10.1080/02701367.2011.10599780

[10] J. T. Patterson, M. Carter, Learner regulated knowledge of results during the acquisition of multiple timing goals, Human Movement Science, (2010), Vol.29, No.2, pp.214-227.
DOI: https://doi.org/10.1016/j.humov.2009.12.003

[11] S. Lim, A. Ali, W. Kim, J. Kim, S. Choi, S. J. Radlo, Influence of self-controlled feedback on learning a serial motor skill, Perceptual and Motor Skills, (2015), Vol.120, No.2, pp.462-474.
DOI: https://doi.org/10.2466/23.PMS.120v13x3

[12] M. Huet, C. Camachon, L. Fernandez, D. M. Jacobs, G. Montagne, Self-controlled concurrent feedback and the education of attention towards perceptual invariants, Human Movement Science, (2009), Vol.28, No.4, pp.450-467.
DOI: https://doi.org/10.1016/j.humov.2008.12.004

[13] M. J. Carter, J. T. Patterson, Self-controlled knowledge of results: Age-related differences in motor learning, strategies, and error detection, Human Movement Science, (2012), Vol.31, No.6, pp.1459-1472.
DOI: https://doi.org/10.1016/j.humov.2012.07.008

[14] S. Chiviacowsky, G. Wulf, Self-Controlled Feedback: Does it Enhance Learning Because Performers Get Feedback When They Need It? Research Quarterly for Exercise and Sport, (2002), Vol.73, No.4, pp.408-415.
DOI: https://doi.org/10.1080/02701367.2002.10609040

[15] W. F. W. Wu, D. E. Young, S. L. Schandler, G. Meir, R. L. M. Judy, J. Perez, M. J. Cohen, Contextual interference and augmented feedback: Is there an additive effect for motor learning? Human Movement Science, (2011), Vol.30, No.6, pp.1092-1101.
DOI: https://doi.org/10.1016/j.humov.2011.02.004

[16] H. W. Lee, Optimal Presentation of External-Focus Feedback on Bowling Task: Comparison of 100% Frequency and Self-controlled feedback, The Korean Journal of Physical Education, (2004), Vol.43, No.6, pp.281-292.

[17] D. W. Moon, C. T. Chung, J. Kim, The Effects of Self-Controlled Feedback on the Performance of a Golf-Putting, The Korean Journal of Physical Education, (2003), Vol.42, No.3, pp.211-218.

[18] A. Ali, B. Fawver, J. Kim, J. T. Fairbrother, C. M. Janelle, Too much of a good thing: Random practice scheduling and self-control of feedback lead to unique but not additive learning benefits, Frontiers in psychology, (2012), Vol.3, Article.503.
DOI: https://doi.org/10.3389/fpsyg.2012.00503

[19] B. Sidaway, J. Bates, B. Occhiogrosso, J. Schlagenhaufer, D. Wilkes, Interaction of feedback frequency and task difficulty in children's motor skill learning, Physical therapy, (2012), Vol.92, No.7, pp.948-957.
DOI: https://doi.org/10.2522/ptj.20110378

[20] B. P. Ferreira, L. F. Malloy-Diniz, J. O. Parma, N. G. Nogueira, T. Apolinário-Souza, H. Ugrinowitsch, G. M. Lage, Self-controlled feedback and learner impulsivity in sequential motor learning, Perceptual and Motor Skills, (2019), Vol.126, No.1, pp.157-179.
DOI: https://doi.org/10.1177/0031512518807341

[21] M. A. Guadagnoli, T. D. Lee, Challenge point: a framework for conceptualizing the effects of various practice conditions in motor learning, Journal of motor behavior, (2004), Vol.36, No.2, pp.212-224.
DOI: https://doi.org/10.3200/JMBR.36.2.212-224

[22] D. W. Yook, Y. J. Yoon, H. W. Lee, Learning effect of self-controled feedback by motivation level in task participation of soccer-closed skill, Korean Society of Sport Psychology, (2005), Vol.16, No.2, pp.89-102.

[23] T. Mahmood, A. Darzi, The learning curve for a colonoscopy simulator in the absence of any feedback: no feedback, no learning, Surgical Endoscopy And Other Interventional Techniques, (2004), Vol.18, pp.1224-1230.
DOI: https://doi.org/10.1007/s00464-003-9143-4

[24] Z. Pourbehbahani, E. Saemi, M. Y. Cheng, M. R. Dehghan, Both Sensorimotor Rhythm Neurofeedback and Self-Controlled Practice Enhance Motor Learning and Performance in Novice Golfers, Behavioral Sciences, (2023), Vol.13, No.1, Article.65.
DOI: https://doi.org/10.3390/bs13010065