Kinaesthetic Imagery and Video Modelingon Performing a Closed Motor Skill

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Abstract

Imagery is an important intervention strategy used in Psychology. It is widely used for mental preparation and training of sport skills as well. kinaesthetic imagery (KI) is a form of imagery that is used in sport where athletes feel the movements rather than experience the imagery of a skill in other sensory forms. In the present study the researcher is testing the efficacy of video model-based KI in learning and performing a closed motor skill, a skill that is totally under the volition of the athlete executing it. The skill used in the present study to test efficacy of KI is Jump Service in Volleyball, a closed motor skill. The results exhibited considerable improvement in service accuracy of the players who were tested using APHERED Volleyball service test.

Keywords: *Imagery, video modelling, Kinaesthetic imagery, closed motor skill.*

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Introduction

Over the years many methods have been employed by coaches, psychologists and trainers to bring out the best from the athletes. One of the most effective methods that is in use for a long time is mental imagery (Morris, Spittle, & Watt, 2005; Callow, Roberts & Amendola, 2012). Demonstration, observation and imitation of a skill using a model is a long-standing method in motor skill learning(Zetou, Tzetzis, Vernadak, &Kioumourtzoglou, 2002). Researchers have tested the efficacy of mental imagery in combination with other modes of learning(Marshall, Wright, Holmes, Williams, &Wood, 2020; McNeill, Ramsbottom, Toth, & Campbell, 2020;Taher, Pavlovic, &Skrypchenko, 2019; Takazono& Teixeira, 2018).The availability of modern devices like mobile phones and tablet PCs has led to increased usage of video models to enhance the learning process.This is no different in competitive sport whereperfect execution of motor skills is the key to success. According to Ridderinkhof and Brass (2015) Kinaesthetic Imagery (KI) is widely used by the professional athletes as an effective way to improve motor performance through covert mental rehearsals without overt motor output. The present study investigates the effects of video model-based KI training to see its effects on learning a closed motor skill.

According to Richardson (1969) imagery involves all those quasi-sensory and quasi-perceptual experiences of which we are self-consciously aware and which exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts and which may be expected to have different consequences from their sensory or perceptual counterparts. For Morris etal.(2005), imagery in a sport setting is the creation or re-creation of an experience generated from memorial information, involving quasi sensorial, quasi perceptual and quasi-affective characteristics, that is under the volitional control of the imager and which may occur in the absence of the real stimulus antecedents normally associated with the actual experience. There are many forms of imagery in use. The two most common forms are internal and external forms based on visual perspective (Mahoney &Avener, 1977), whereas KI is a form of imagery engaging feeling of movements (Callow, Jiang, Roberts&Edwards, 2017; Magill, 2006). KI is based on sensory information normally generated during the actual movement (Ruffino, Papaxanthis,

&Lebon, 2017) . Several researchers have found positive effects of KI on learning and performance of motor skills (Féry&Morizot, 2000;Taktek, Zinsser, & St-John, 2008).

Taktek et al. (2008), conducted a study where they tested the relative efficacy of visual and KI programmes on retention and transfer of closed motor skill in young children. Results of the study showed that combination programme of imagery and physical practice had positive effects in transfer of closed motor skill. White and Hardy[10] conducted a study where they tested the efficacy of different imagery perspectives in learning and performance of different motor skills. The participants were 48 university students. They found that KI can be used in tandem with internal and external imagery. They further found that internal imagery was beneficial in attaining accuracy of performance, whereas external imagery was beneficial in attaining greater speed than internal imagery. Fery and Marizot(2000), studied the beneficial effects of kinaesthetic modelling and visual modelling on learning service in Tennis. Analysis showed kinaesthetic modelling having superior effects on outcome results than the visual modelling.

Machado et al. (2013) conducted an EEG study where they tested the involvement of nervous system during KI and actual movement. They used Event Related Potentials (ERPs) to get to their findings. They identified the neural networks activated during KI of movement and actual movement and found that KI and actual movement activated similar neural locations exhibiting a functional similarity between KI and actual movement. The above results showed that KI has some functional similarity with actual movement and can be beneficial in learning motor skills.

Video modelling is a method of usingvideos to instruct an individual on desired skills or behaviours by viewing someone demonstrating those skills or behaviours. This method uses videos to provide a visual model of the targeted behaviour or skill (Prelock, Paul, &Allen, 2011). Researchers have been using video models to test its effects on learning motor skill (Atienza, Balaguer, &García-Merita, 1998; SooHoo, Takemoto, & McCullagh, 2004).

The dependent variable chosen for this investigation is volleyball jump service, a closed motor skill. A closed motor skill is the one performed in a stable or predictable environment where the performer decides when to commence the action (Magill, 2006). Many researchers have investigated how different strategies help in learning motor skills. Perfect execution of a closed sport skill can provide an added advantage to any sport team. There are many closed skills used in competitive sporting contexts. They include all set piece situations in ball games, gymnastic events, track and field events, aquatics etc. It is predicted that motor system can programme a closed motor skill better than an open motor skill as it is performed in more stable environment than an open motor skill which is dependent upon changing environment (Ruffino et al., 2017).

The research is silent on the effects of combination training of video model and KI. It will be interesting to see what effects are produced by observing a model performing a task and feeling those movements imaginarily immediately after observing it, on learning a closed motor skill. The present study aimed to test the efficacy of combination of video modelling, KI and physical practice in learning a closed motor skill through an analysis of pre and post training scores of experimental group and the control group, which did only physical practice.

Materials and Methods

Participants

The participants of this study were 10 male college volleyball players within the age range of 19 to 23 who played at the intercollegiate level. They had an average mean age of 20.8 years. The participants were initially screened for their Kinaesthetic imagery ability on the basis of their scores on the revised Vividness of Movement Imagery Questionnaire-II (VMIQ-II),(Roberts, Callow, Hardy, Markland, &

Bringer, 2008) which includes items that examine KI ability. Originally there were 14 participants and four of them did not meet the required level of KI ability based on the VMIQ-II and were excluded from the study.

Procedure

Participants were tested for their jump service ability for the initial pre-training scores prior to the beginning of training. Jump service ability was tested using AAHPER Volleyball service test (1969). After the pre-test the group of 10 was randomly divided in to two groups namely control group and experimental group. Experimental group underwent viewing the video and KI training whereas control group participated only in the physical practice session. In the first week the participants of the experimental group simply viewed the videos six times i.e. views in three different angles two times each. Video viewing session was followed by physical practice session for both experimental and control group at the volleyball courts of Christ College. The participants of the experimental group viewed videos three times for three days in the 2nd and 3rd weeks which was followed by KI training on the basis of oral instruction specifically scribed for producing KI. In the remaining three weeks they viewed videos 6 times, i.e. each video two times, followed by 6 repetitions of KI of the jump service three days in a week without the help of oral instructions by the experimenter. After viewing the video each time, the participants were given just enough time to imagine the task kinaesthetically. After each imagery session, the participants were queried by the experimenter, to know whether they could imaginarily feel the movements of jump service. This was to ensure that the participants actually performed KI. The video viewing and the KI programme was always followed by physical practice for both the groups. After the KI sessions all participants of both groups joined together to physically practice the jump service at the Christ College volleyball courts. Each participant had to perform a minimum of 10 services. At the end of six weeklong training programme participants of groups underwent post-training tests through AAHPER volleyball service test to know the effects of training on learning the task.

Kinaesthetic Imagery training: The participants underwent KI training for three days in the second and third week based on the oral instructions given by the experimenter based on a specifically prepared imagery script for producing KI through feeling the actual movements. The participants did 6 repetitions of the imagery task sitting on the chairs following the instructions of the experimenter. Imagery training was always done after viewing the videos three times. During the final three weeks participants did KI without the oral instructions of the experimenter. The participants acknowledged the completion of KI task by raising their right hand

The Videos: The videos were shot using a model who looked similar to the participants in the study. The similarity in look was particularly essential to create confidence in the participants. The videos were shot from three different angles. One from an external angle where the model moved towards the camera before execution and second in more compatible internal angle where the participant moved away from the camera and a third one showing a general lateral view of the execution of the jump service. Each video lasted 4 to 5 seconds and clearly showed the ball landing on a particular target. This was to give a clear visual stimulation of the task to the participants.

AAHPER volleyball service test(1969):AAHPERvolleyball service test measures the participant's skill in serving. The test has a reliability of .80. Equipment and facilities required are volleyballs and fully-fledged volleyball court with specific markings as shown in figure 1 for the purpose of scoring. Figure 1 shows the specific markings required for scoring for the test. The participant did jump service from the serving area of the opposite court to the reception court with score markings. Each participant was given 10 trials. When the ball did not go over, it counted as a trial, but no points were given. The total number

of points made was determined by where the ball landed in the opposite court which is divided into 5 parts and marked with points according to degree of difficulty for reception. For all balls that struck on a line, the higher score of the areas concerned was awarded. The maximum points one could garner was 40.

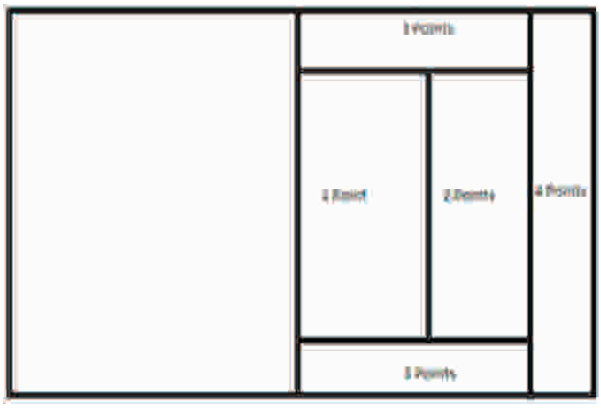


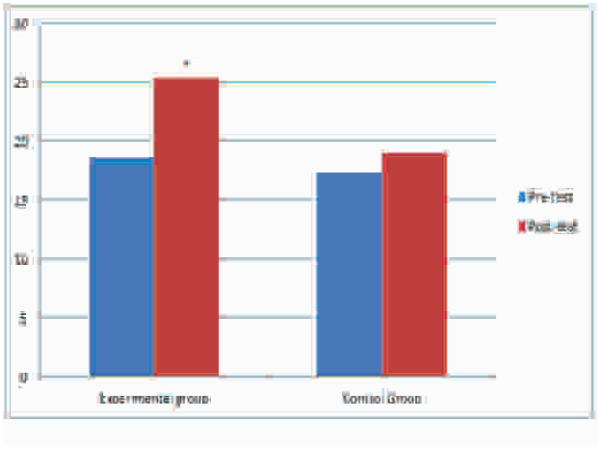
Figure 1. The scoring chart of AAHPER Volleyball service test

Experimental task: During the experimental task, the video of jump service was viewed by the participants of experimental group three times a week for a period of six weeks. This was done in the indoor hall of the department of BPE, Christ College. Participants of experimental group were thoroughly instructed how to experience KI by feeling the movements involved in jump service. Participants were also instructed to feel the movements of jump service as a whole in the proper movement sequence within a time frame that equalled actual execution of the task. They watched videos and imagined sitting comfortably on chairs.

Measures. The measures for the experiment were the test points scored by the participants from AAHPER volleyball service test (1969). There were measures of pre training scores and post training scores which were compared to find out the statistical difference to know the effects of Video model-based KI training on Jump Service in Volleyball, which is a closed motor skills used in sports.

Analysis

A comparison of post and pre-test scores was done by using analysis of covariance to analyse the impact of video model training in improving the jump service ability of the subjects. Figure 2 below shows results of data analysis.



*significant at .05 level. Figure 2. Comparison means for pre and post test scores.

Results

The Figure 2 shows mean difference for both experimental and control groups for pre and post test scores. An analysis of pre test scores showed that there is no significant difference between the means scores of experimental and control group, $F(1,9) = .22, p > .65, \eta = 0.26$. An analysis of post test scores showed that there is a significant difference between experimental and control groups with a large effect size, $F(1,9) = 7.56, p < .028, \eta = .52$.

Discussion

The results clearly show that there has been a significant improvement in the performance of participants of experimental group in terms of their volleyball jump service ability. This demonstrates that the combination training of video modelling, KI and physical practice has been effective in bringing up a desired change in the performance of participants of experimental group. On the other hand, the participants of the control group who underwent physical training alone made only a small improvement which was not a significant one.

The present results support the findings of several other studies that found KI an

effective tool in learning a motor skill. Féry and Morizot (2000) investigated the effects of kinaesthetic and visual image in modelling a closed motor skill, tennis service. They found that kinaesthetic representations have primacy over visual representations in terms of tennis service performance. The study by Taktek et al. (2008) found that a combination of visual and KI was an effective tool in retention and transfer, two important elements of learning, of a closed motor skill.

An important issue that emerged from this study was the usage of video model which is based on visual sensory modality as stimulus proposition for imagery and the use of KI which is based on feeling sensation of the movement as response proposition. There was a chance of visual stimulus being a predominant one, over influencing the response proposition of KI. But as the results would show the combination of video model-based stimulus proposition has produced a superior combination effect to improve the performance of jump service in Volleyball, which is a closed motor skill. There is also a possibility that kinaesthetic sensation worked effectively even while the participants observed the video model, making the combination efficient and effective. There is research evidence for kinaesthetic sensation being active during external and internal perspective of imagery (Callow & Hardy, 2004). There is also a possibility of KI being active during the observation of video which could have made combination effect highly productive during the physical performance of the dependent variable.

The results of the present study show that the training method consisting of observing demonstration of an expert model and then feeling those movements along with actual physical practice could enhance learning process of that particular skill. The results show that KI can couple efficiently with the execution of a closed motor skill. Evidence from the study indicates that KI is probably capable of programming a closed motor skill precisely as it is almost always the same sequence of movements repeated without any major change motor plan.

Conclusion

The study has provided ample evidence for the efficacy of combination training of KI and video modelling in learning and performance of a closed motor skill. It is concluded that the combination training of KI and video modelling along with physical practice is an effective method to learn a closed motor skill. The results of this study suggest that video model-based KI is an excellent tool to facilitate learning and performance of a closed motor skill.

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