**Proceeding**

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# Motor imagery as a tool to enhance the didactics in physical education and artistic gymnastic

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**ABSTRACT**

Raiola G, Scassillo I, Parisi F, di Tore PA. Motor imagery as a tool to enhance the didactics in physical education and artistic gymnastic. *J. Hum. Sport Exerc.* Vol. 8, No. Proc2, pp. S93-S97, 2013. The motor imagery is a cognitive process of mental simulation of an action in absence of physical movement. During the motor imagery the cerebral areas of the pre-motor cortex, the same which a muscular contraction would put in action, are activated. There are two methods of motor imagery: In first person - In thirdperson. The biological basis on which the motor imagery theory is founded, is formed by mirror neurons. The mirror neurons are a particular class of visual-motor neurons which permit to learn and to optimize a motor gesture without executing it. The mirror neurons are the basis for learning and understanding of motor events intentions. The artistic gymnastics is a sport of precision and the movements are complex,then it use the abilities closed skills. The artistic gymnastics uses the model of closed-loop control.According to the recruitment of energy, artistic gymnastics is a sport mainly alactacid anaerobic/lactate. Starting from these scientific assumptions the aim of this study wants to evaluate the effects and the potential benefits of motor imagery in order to contribute to the strengthening of young athletes performances in the artistic gym. Used in training in the race. **Key words**: MIRROR NEURONS, VMIQ AND MIQ-R, VIVIDNESS, MOTOR SKILLS.

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## INTRODUCTION

The motor imagery is a cognitive process of mental simulation of an action in the absence of physical movement (Jeannerod, 1995). MI was deeply investigated also by Marc Jeannerod, one of the most active scientist about the neurological process. He had lived between 1935 and 2011, its scientific life was entirely dedicated to neurology and neurophysiology, to cognitive neuroscience and experimental psychology. Specially, the mechanisms underpinning motor control, motor cognition are investigated by Decety in 1996, Driskell and Copper in 1994, Gallese and Rizzolatti between 1996-2012, Lafleur in 2002, Sanders in 2004. It also defined as a state of general activation during which a person feels himself to perform an action. The motor imagery should be distinguished from mental practice, the first refers to the cognitive process while, the second refers to the process of mental training that takes advantage of the first process. There are two types of motor imagery: in first-person and in third-person. In first person mode, the subject imagines himself to perform an action but not in the sense of seeing himself as an external or reflected image, in the sense to see what he would see, if he performed a movement and at the same time feel emotions, excitation, stress and changes of arousal. In third person mode, the person sees himself or another person as an external image, as with the use of a camera. The most effective for learning is that first-person. Numerous studies have shown that the performance is optimized through the cognitive process of motor imagery. During the motor imagery the cerebral areas of the pre-motor cortex, the same which a muscular contraction would put in action, are activated. The pre-motor cortex is responsible for complex sequences of movements and selects them in response to a stimulus. The pre-motor cortex is located in front of the primary motor cortex and laterally on the surface of the frontal lobe. The execution and imagination activate the same regions of the cerebellum, basal ganglia and motor cortex. All this is possible thanks to mirror neurons which are the biological basis on which is based the motor imagery. Mirror neurons are a class of neurons which are activated when we make a move and when we observe it, as if the observer did the movement (Rizzolatti & Sinigaglia, 2006). Mirror neurons were discovered in the 90's by a group of researchers in a macaque, group coordinator is Giacomo Rizzolatti. In 1995, the same group of researchers demonstrated the existence of a neuronal group, similar to that of macaques, also in man. Mirror neurons have been found in the pre-motor cortex and the parietal lobe, area to which deputed only motor function and not the cognitive function. The activation of mirror neurons allows to map on the same nervous substrate actions performed and observed or imagined. In this way you create an internal image released from execution (Jeannerod, 2002a). Mirror neurons are a particular class of visual-motor neurons which allows to learn and optimize a motor gesture without executing it. Mirror neurons represent the space of internal sharing that allows us to imitate, learn and understand the intentions of motor events. The ability to create an inter-subjective space which is then shared with the world is connected to the role played by embodied simulation, neuro-scientifically based on mirror neurons (Jeannerod, 2002b). The study aims to evaluate the potential benefits of motor imagery on a group of gymnasts practicing gymnastics, especially for the rond off flick. The artistic gymnastics is a sport of precision and the movements are complex, then it use the abilities closed skills serial type, skills that are used in stable environments consist of a number of discrete skills are placed in sequence to form a more complex and protracted movement; as rond off flick. The rond off is like the wheel but at half movement the legs join. The flick is often performed after the rond off and consists of two times: the first time you push whit the legs and then you put your hands back to the ground, in the second time you push by the upper limbs and then return to the position departure. The artistic gymnastics uses the model of closed-loop control with the use of feedback (Schmdit & Wrisberg, 2000). In sport activity the phenomenon of the influence of mental aspects run usually. In the School of Sport, Health, and Exercise Sciences at Bangor University, the project proposal module is worth 10 credits and comprises of a verbal presentation and written proposal. Nichola Callow and Ross Roberts propose the module project is worth 10 credits and comprises of a verbal presentation and written proposal on sport

 

activity. In physical education and sport medicine was realized many studies about the mental function and the results show the preeminent position on imagination and its pattern in movement and performance (Astin et al., 2003). Curry, L. A and Maniar, S. D. researched in academic course combining psychological skills training and life skills education for university students and student-athletes (Curry et al., 2004). The aim of this study is to apply the tool of the evaluation by oneself, by others and by judge according to a specific standard tests. Two imagery measures (VMIQ and MIQ-R) were used to capture whether the self-modeling video would influence competitive divers' imagery vividness and ability.

## MATERIAL AND METHODS

The method used for this study is an experimental one and it consists of two steps: the first step is a direct experimental type while the second is an indirect experimental type. The means used in the first part of the study is the questionnaire (here attached) formed by three columns and different items. The first columns concerns the evaluation by oneself, the second one concerns the oneself evaluation of others and the third one the valuation by a judge/technician. The participants are asked to evaluate the sensation of their own motor act and then their mate's one in accordance with valuation methods of Italian federation of artistic gymnastics. The data will be compared with those of judge/technician. The means used in the second part of the study is the video recording. The participants are given the vision of their own motor gesture and then the others' one, previously recorded, and the video will be stopped before the gesture ends. The participants are asked a starting evaluation of external type, which will be compared with those of the judge/technician and at last a final forecast of the performance result will be asked. The forecast will be compared with the final results (internal, external and judge/technician) and collective according to an appropriate statistical pattern. The sample that are part of the experiment consists of six athletes to medium-high level practicing gymnastics for not less than 5 years of age between 12 and 15 years. The athletes before beginning the training, they will be educated on the modalities cognitive and practices that must be performed (MI in the first person) and the means by which they are evaluated.

## RESULTS

***Table 1.*** *Athlete 1.*

| RONDATA FLICK | ATHLETE 1 | ATHLETE 2 | ATHLETE 3 | ATHLETE 4 | ATHLETE 5 | ATHLETE 6 |
|---|---|---|---|---|---|---|
| **1** | 7 | 6 | 5.5 | 5 | 6.5 | 6 |
| **2** | 6.5 | 7 | 6 | 5.5 | 6.5 | 6.3 |
| **3** | 6 | null | 5 | 7 | 7.5 | 7 |
| **4** | 7.5 | 7.5 | 8 | 6 | 8 | 6 |
| **5** | 7 | 7 | 6.5 | 6.7 | 7 | 7 |
| **6** | 7 | 8.7 | 7.5 | 9 | 7.5 | 8 |
| **7** | 8 | 8 | 7.5 | 7 | 7 | 7.5 |
| **8** | 8.3 | null | 6.5 | 6.9 | 8 | 7.9 |
| **9** | 7.9 | null | 7.9 | 6.5 | 6.5 | 6 |
| **10** | 7.3 | 7 | 7.3 | 5 | 7 | 6.7 |
| **11** | 8.5 | 7.5 | 7 | 7 | 8 | 6.7 |

***Table 2.*** *Athlete 2.*

| RONDATA FLICK | ATHLETE 2 | ATHLETE 1 | ATHLETE 3 | ATHLETE 4 | ATHLETE 5 | ATHLETE 6 |
|---|---|---|---|---|---|---|
| **1** | 5 | 6.5 | 5 | 4 | 6 | 6 |
| **2** | 6.5 | 6 | 6 | 4 | 6 | 6 |
| **3** | null | 7.5 | 5.5 | 7.5 | 8.5 | 7 |
| **4** | 8.5 | 6 | 9 | 6.5 | 8 | 5 |
| **5** | 6.3 | 7 | 6.5 | 6.5 | 6.5 | 7.3 |
| **6** | 7 | 6 | 7.5 | 8 | 6 | 8 |
| **7** | 8.9 | 9 | 7.5 | 6.5 | 7.5 | 6.7 |
| **8** | null | 7.5 | 6 | 7 | 7.5 | 6 |
| **9** | null | 6.5 | 6 | 6.5 | 6 | 6.3 |
| **10** | 7.5 | 8 | 7 | 6 | 7.5 | 7 |
| **11** | 7.3 | 9 | 6.5 | 6 | 7.9 | 7.5 |

***Table 3.*** *Athlete 3.*

| RONDATA FLICK | ATHLETE 3 | ATHLETE 2 | ATHLETE 1 | ATHLETE 4 | ATHLETE 5 | ATHLETE 6 |
|---|---|---|---|---|---|---|
| **1** | 6 | 6 | 8 | 7 | 7 | 7 |
| **2** | 6.3 | 6.3 | 6 | 7 | 6 | 6 |
| **3** | 5.5 | null | 7 | 7.5 | 8.5 | 7 |
| **4** | 6.3 | 8 | 6 | 7 | 6.5 | 6.9 |
| **5** | 7.3 | 6.5 | 7.5 | 6.5 | 6 | 6 |
| **6** | 7.5 | 7 | 8.5 | 8.3 | 6.3 | 6.5 |
| **7** | 7.5 | 8 | 8.5 | 6 | 7 | 6.5 |
| **8** | 7.8 | null | 8.3 | 6.5 | 7 | 7 |
| **9** | 6.5 | null | 7 | 7 | 6.5 | 6.5 |
| **10** | 8 | 6.9 | 8 | 7 | 7 | 6 |
| **11** | 8.5 | 6 | 8 | 7.5 | 8 | 7 |

***Table 4.*** *Athlete 4.*

| RONDATA FLICK | ATHLETE 4 | ATHLETE 3 | ATHLETE 2 | ATHLETE 1 | ATHLETE 5 | ATHLETE 6 |
|---|---|---|---|---|---|---|
| **1** | 6.9 | 6.5 | 7 | 7.5 | 8 | 7.5 |
| **2** | 7.5 | 7.5 | 7.5 | 6.5 | 6 | 6 |
| **3** | 6.3 | 7 | null | 8 | 7 | 7.5 |
| **4** | 8.9 | 8.5 | 7.9 | 6 | 7.5 | 7.9 |
| **5** | 6.3 | 6 | 7.5 | 9 | 6.5 | 6.5 |
| **6** | 7.5 | 6 | 7 | 7.9 | 8 | 6.9 |
| **7** | 8 | 6.9 | 7.5 | 8 | 7 | 8.2 |
| **8** | 7.3 | 7 | null | 8 | 7.9 | 8.5 |
| **9** | 5 | 6 | null | 7.5 | 9 | 8 |
| **10** | 6.5 | 6.5 | 9 | 9 | 6 | 9 |
| **11** | 7 | 8 | 8.5 | 9.5 | 9 | 7.5 |

By the data interpretation you expect to observe a more effective internal evaluation in the first part of the study and a more effective external evaluation in the second part of the study. The basis of this theory comes from the mirror neurons substratum for executed or observed actions.

The aim is to use the MI to improve the feeling of knowledge, and awareness of the performance. Using the technique of motor imagery in the first person during training and during the race to reduce the scope for error of a motor execution. in order to standardize practice.

## DISCUSSION

In this preliminary study two basic aspects of the sports performance are examined: the motor execution and the motor imagine. Both share the same neuro-motor mechanism: the motor imagery. Concerning the woman artistic gymnastics, it can be useful during the training and the race. It gives a pattern of action in first person which allow to concentrate all emotions, sensations and mood of a motor action without moving a muscle but putting all the neuro-motor proceeding in action. The motor imagery is a natural ability and so if trained, it is useful for the performance strengthening. So providing the athletes and trainers of a means which uses the motor imagery as a possible application for the improvement of the performance is very ambitious.So in conclusion, the study aims to provide a standard training feasible on a large scale to train the cognitive and physical abilities of an athlete and provide a support tool in the race in order to improve performance, optimize time and to reduce the margin of error.

"To systematize organically the whole training plan is needed the technical data over a full period of observation with a rationale design of survey. So it can useful to improve the motor learning and decision making skills by adequate teaching methods according to a new orientation of didactics" (Raiola & Ditore, 2012).

## REFERENCES

1. ADAMS JA. Closed-Loop theory of motor learning. *Journal of Motor Behavior*. 1971; 3(2):111-150.
2. ASTIN JA, SHAPIRO SL, EISENBERG DM, FORYS KL. Mind-body medicine: State of the science, implications for practice*. Journal of the American Board of Family Practice*. 2003; 16:131-147.
3. CURRY LA, MANIAR SD. Academic course combining psychological skills training and life skills education for university students and student-athletes. *Journal of Applied Sport Psychology*. 2003; 15:270-277.
4. CURRY LA, MANIAR SD. Academic course for enhancing student-athlete performance in sport. *The sport Psychologist*. 2004; 18:297- 316.
5. JEANNEROD M. *Le Cerveau intime*. Paris: Editions Odile Jacob. 2002a.
6. JEANNEROD M. *La Nature de l'esprit*. Paris: Editions Odile Jacob. 2002b
7. JEANNEROD M. *Motor cognition: What actions tell the self*. Oxford University Press. 2006.
8. RAIOLA G, Di TORE P. Bodily communication skills and its incidence on female volleyball championship to enhance didactics. *Journal of Human Sport and Exercise*. 2012b; 7(2):365-375.
9. RIZZOLATTI G, SINIGAGLIA C. *So quel che fai. Il cervello che agisce e i neuroni specchio*, Raffaello Cortina Editore: Milano. 2006.
10. RYMAL AM, STE-MARIE M. Does self-modeling affect imagery ability or vividness*? Journal of Imagery Research in Sport and Physical Activity.* 2009; 4(1).