

Evaluation of the effects of mental visualisation training in sport with regard to karate shotokan fighters specialising in kata

Paweł Piepiora, Kazimierz Witkowski, Juliusz Migasiewicz

University of Physical Education in Wrocław, Faculty of Sport Sciences

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Summary

Introduction Mental visualisation training makes use of human imagination in such a way as to program a person's mind to perform a movement task in the best possible manner. The aim of this article is to evaluate the effects of mental visualisation training in sport with regard to karate shotokan fighters.

Material and methods. 20 karate shotokan fighters – members of the Lower Silesia team competing in kata events – were purposefully selected for the study. The age of those studied ranged between 18 and 39 years. They had training experience of 5 to 20 years and were ranked from the 1st to the 5th dan. The fighters performed an exercise consisting in visualising their participation in a kata event. The empirical research was performed using the diagnostic survey method and the research material was collected by means of a specially prepared survey questionnaire.

Results. Before commencing mental visualisation training the study participants evaluated all the areas of their mental preparation at a medium level (3). After one month one area received a very high score, four of them – high scores and two of them – medium scores. After two months one area received a very high score and the remaining ones – high scores. After three months six areas received very high scores and one area – a high score, but only marginally short of a very high score.

Conclusions. Over a period of two months a trend towards positive effects of mental visualisation training was noted. The full effects were achieved after three months of practice.

Introduction

In modern sport the level of training and skills of the world's best athletes is very similar. Success is determined by fractions of a second, centimetres or decisions made at the right moment of a competition. It is assumed that the biggest reserves lie in the athlete's mental sphere. In order to fill this training gap in contemporary sport training, a very high importance is attached to mental training, which should be understood as a set of exercises that, through systematic repetitions, lead to the development and consolidation of certain mental traits and skills of the athlete [1]. Those traits are not granted to a person once and for all – one can train them in the same way as one can train the body. Thus, we may only speak of mental training when the athlete applies psychological exercises on a systematic and cyclic basis.

The use of mental training is always dependent on a training macro-cycle [2]. In the preparation period, it is introduced when the following is observed in the fighter: lack of progress; back of care on the part of the coach, club or federation; the

athlete not being called upon to join training camps or the team; limitation of future appearances due to disqualifications; too intensive training or an excessive degree of difficulty of exercises performed; the athlete's concern about their health and life; a conflict between values (e.g. family or religious values) and sport activity; concern about the future of one's career or pressure from the public – expectation of the result. The purposefulness of mental training in the competition period is conditional upon: lack of information on the opponents; lack of possibility to do a warm-up; a long-lasting tension related to waiting for the competition; fear of losing or performing badly; lack of sleep or proper rest; body fatigue as a result of very intensive efforts; restricted movements due to an injury; the awareness that one is the weakest in the field; excessive efforts; prospect of a defeat; fear of not being able to maintain an advantage; lack of proper equipment; violation of rules by the opponents; unfair referee decisions or mishaps. The transitional period requires the ability to cope with the consequences of a defeat, i.e. the athlete being abandoned by their coach, fans, club authorities and col-

leagues and the discomfort stemming from the difference between the sporting target and the actual performance [3].

A very important element of mental training is visualisation, i.e. mental visualisation training. It is used at each stage of the training process. The purpose of mental visualisation training is to make use of human imagination in such a way as to program a person's mind to perform a task in the best possible manner. Exercises of this type consist in creating images in a controlled manner and the systematic and repeatable nature of such activities leads to the development of neuronal connections between muscles and the central nervous system [4]. Visualisation has an enormous impact not only on our conduct, but also on our body. By using visualisation one can induce a number of changes within the body, such as a faster pulse or an increased frequency of breaths [5, 6]. All the senses should be employed during mental visualisation training. At first, it will be hard to perform and will be limited to the sense of vision. With time, however, it will be followed by the senses of hearing, touch, taste and smell. Visualisation exercises have a wide scope of applications. They may be used as a separate training unit or as a permanent element of typical sport training.

In sport mental visualisation training performs many functions. It enables one to acquire successive skills or maintain and strengthen those already acquired, review the accomplishments achieved so far, solve problems, build confidence, reduce stress or cope with the anxiety accompanying one's participation in an event [7-10]. In addition, visualisation may often be used by, e.g., athletes who have suffered an injury and are unable to perform physical exercises. Just like an actual movement, an image of performing a given exercise leaves traces in our brain. There is no doubt that such skills are needed not only by great athletes, but by everyone who wishes to perform at a more-than-average level in their discipline. All actions begin in one's head. The attitude, imagining the end result and involving all the senses in what one is doing determines the ultimate success or the lack of it.

Studies on Olympic Game participants have shown that the best athletes associate their success with elements of mental training. The end result depends on the everyday use of mental visualisation training, an exact specification of training goals, the ability to focus on an exercise, the ability to control one's emotions and simulation exercises, i.e. the introduction after the training of elements simulating the real event [11-16].

In view of the above we have set out to evaluate the effects of mental visualisation training in sport with regard to karate shotokan fighters.

Material and methods

20 karate shotokan fighters – members of the Lower Silesia team specialising in kata – were purposefully selected for the study. The age of those studied ranged between 18 and 39 years. They had training experience of 5 to 20 years and were ranked from the 1st to the 5th dan.

In order to evaluate the effects of mental visualisation training, an exercise consisting in visualising participation in a kata event was added to a training micro-cycle. For the purpose of the study all the fighters performed one Kanku Dai kata and the kata event visualisation exercise was done according to the following pattern – with individual modifications introduced by fighters:

- entering the state of relaxation:
(Counting each inhalation and exhalation from 27 to 0) Relax. Assume a comfortable position. Close your eyes. Direct your vision under your closed eyelids and consciously repeat in your thoughts: "I, (...name of the fighter...), control my thoughts and images" (30-60 seconds for each side): to the left side "I, (...name of the fighter...)"; to the front side "I, (...name of the fighter...)"; to the right side "I, (...name of the fighter...)"; to the rear side "I, (...name of the fighter...)". Imagine yourself feeling extremely well. Think about a moment or situation in your sport career when everything worked out just fine for you. When you felt at the peak of your ability. When you were certain and consciously aware of it. Think about such a moment (take as much time as you want). Remember exactly a moment like that, perhaps during training or a competition, remember exactly what you were doing. How you felt ... What you were thinking (take as much time as you want). Maintaining the state of relaxation, stay with this image. Maintain your focus precisely on this image. Try to "flow" with this image. An image of ideal well-being.
- kata event visualisation exercise:
I imagine myself preparing for the competition. I have used the preparation period well. Difficulties are a natural part of the preparation process. Right now I'm focusing on that's going on at this moment. I'm planning on how to make the best of my current potential. Even if I felt tired – I have the energy to act. I know that's what I need right now. In my head I'm creating a plan of what I want to how. This is my plan. It focuses on my strengths. I'm putting it together in my head. I can see more and more clearly what it's going to look like. These are the final days before the competition and I know my preparations have been good. I'm building my confidence. I know they're going to evaluate my body, my motor capacities, technique and fighting spirit.. I will demonstrate my confidence to my opponents and to the judges. Confidence is infectious. It transpires from your posture, movements, face and eyes. A firm and determined posture. I make as many movements as I need. I have a calm, slightly menacing look. Calm and focused eyes. I'm thinking of an appearance that I was satisfied with. Of how I felt at that moment. What I was thinking. It's going to be the same this time. I can see it step by step. I'm changing my clothes. Doing a warm-up. Preparing. I know what I want to do and I know I'm going to do it. It'll be my turn soon. I've been given a signal to come out onto my tatami. I'm walking confidently, calmly and proudly. In my own rhythm. I'm happy that my appearance is coming up. I know what kata I'm going to demonstrate and I'm focusing on that. There

are fighters around me, but I'm only focusing on myself. My look is firm. I'm capable of performing my kata in all circumstances. With every audience and at event. The other fighters are next to me, but I'm doing what I need to do. There's a presentation. I can hear other competitors' names. My name's going to be called soon. I can hear my name. I greet the judges and the audience. I'm feeling well. I've been training for this moment. I'm starting my show. I know what I want to demonstrate in kata and I know I'll do it. In an unhampered and natural way. What I'm doing gives me pleasure and I'm pleasantly absorbed with it. The people watching me feel my confidence. This earns me additional points. The judges aren't even aware of how strongly they are impacted by my determination and composure. In each moment, whenever I need it ... I'm focused on what I'm doing. I'm thinking about what's happening here and now. I believe in myself. My heart is beating rhythmically. My breath is deep. I'm focused on myself and on what I'm doing. It absorbs me. My focus is unhampered and very natural. I'm happy with what I'm doing. My kata presentation is coming to an end. I feel satisfied with what I've done. I'm sure I've done my best. And that's how I'm going to present myself next time. Staying calm and believing in myself. In my own rhythm.

- getting out of the state of relaxation:
(Counting each inhalation and exhalation from 1 to 10)
Consciously repeat in your thoughts: "I, (.name of the fighter.), control my thoughts and images. I, (.name of the fighter.), am becoming my own coach". Open your eyes.

The above exercise was to be performed by the fighters every day for three months: in the morning, just after waking up; before each training unit during meditation while being seated in the kneeling position; and before falling asleep. The empirical research was performed using the diagnostic survey method and the research material was collected by

means of a survey questionnaire prepared by the author specifically for the purposes of this study. The evaluation of the mental visualisation training was performed by the fighters themselves after the first, second and third month of training. The level of the following factors was evaluated: positive thinking, mental resilience, focus, balance between the states of relaxation and stimulation, control of emotions, confidence, thinking about goal implementation; on the following scale: 1 – very low, 2 – low, 3 – medium, 4 – high, 5 – very high.

Results

Before the start of mental visualisation training, the study participants evaluated all the elements of their mental preparation at a medium level (3). The scores as part of the evaluation of the effects of mental visualisation training in the first, second and third month are shown in Table 1 below.

The above data were then presented in graphic form on Chart 1.

Discussion

Mental training, also referred to as internal mind training or training of psychological skills is, like any other goal-oriented training, a systematic, long-term, controlled and regular process. It involves the necessity to prepare and execute plans, to evaluate their course and effects and, if necessary, to modify them, as sporadic activities do not fall under the category of goal-oriented training. Through training one strives to achieve structural or functional adaptation, which is necessary for efficient and effective operation. Regularly performed exercises are meant to increase the athlete's general mental and physical fitness on the basis of recognition of their strengths and weaknesses, strengthen their confidence and belief in themselves, reduce the fear of failure and adjust the thinking processes directly connected

Tab. 1. Evaluation of the effects of mental visualisation training in the first, second and third month.

visualisation effects evaluated	average score in the first month	average score in the second month	average score in the third month
positive thinking	4.73	4.86	5.0
mental resilience	3.91	4.54	4.91
focus	4.16	4.78	5.0
balance between the states of relaxation and stimulation	3.71	4.42	5.0
control of emotions	4.4	4.72	5.0
confidence	4.36	4.86	5.0
thinking about goal implementation	5.0	5.0	5.0

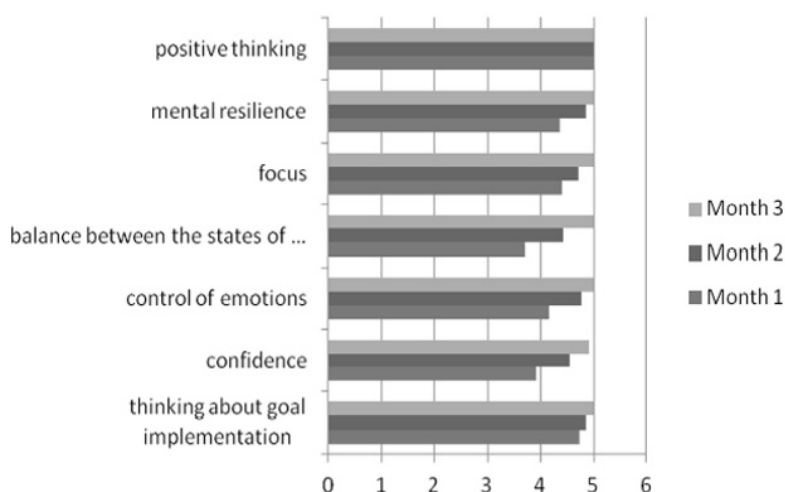


Fig. 1. Specification of the effects of mental visualisation training.

with sport combat. Psychological training programmes popular all over the world, described in many sources, have been devised for athletes practising all individual and team disciplines [17-24].

Visualisation should be understood as mental images created as a result of the reflection or processing of the reality. It influences movement technique and emotional states. It may be used to increase or decrease the level of the athlete's psychophysical stimulation and to develop their opinion on themselves and on others. The basic areas where visualisation may be applied include learning and perfecting technique, tactics, mental skills and emotional control as well as exercising after an injury in order to accelerate the rehabilitation process and return to proper shape.

It is particularly important that a part of the mental visualisation training process is getting to know the limits of one's capabilities. The traits acquired in this manner influence the general development of athletes. Such skills as setting and consciously pursuing one's goals, observing and adjusting one's own reactions, analysing errors, organising one's work or evaluating its effects may provide athletes with multiple benefits in their professional and personal life, reducing the risk of helplessness and randomness of actions and increasing the chances of success in every field. Systematic mental visualisation training is neither an easy nor a quick process. It requires full commitment and acceptance from the athlete—positive effects are more frequently achieved by those who enjoy working on themselves. The effects usually appear after three months of directed work [25-32].

References

1. Murphy S. M. Imaginery interventions in sport. *Medicine & Science in Sports & Exercise*; 1994, 26 (4): 486-494.
2. Klodecka-Różalska J. Autoregulation and the ability to cope with stress in sport activity. *Biology of Sport*; 1989, 6 (3): 336-341.
3. Jeannerod M. Neural simulation of action: a unifying mechanism for motor cognition. *Neuroimage*; 2001, 14: 103-109.
4. Munzert J., Lorey B., Zentgraf K. Cognitive motor processes: the role of motor imagery in the study of motor representations. *Brain Research Reviews*; 2009, 60: 306-326.
5. Wódka K. Trening wyobraźniowy, czyli jak przekuć myśli w rzeczywistość? *Perfect body*; 2013, 19 (1): 34-36.

Mental visualisation training makes use of measures that are at the human mind's disposal – thoughts, speech, memory, imagination and perception – both at the level of conscious and subconscious activity, while also relying on the sphere of feelings and emotions. In the case of sport this process is meant to lead not only to the development of mental visualisation skills, but also to an increase in psychomotor fitness, and, first of all, to an increase in control over the course of one's own movement activity. In consequence, it is tangibly reflected in an improvement of sport performance. In this sense, mental visualisation training is an element of psychological preparation, which, in sporting rivalry, enables full utilisation of the motor fitness and of the technical and tactical skills perfected in the course of training.

Conclusions

1. After a month of visualisation exercises, significant effects were noted in the areas of: thinking about goal implementation and positive thinking.
2. After two months of visualisation exercises, a trend towards the achievement of the full effects was noted in all of the areas, except for the area of thinking about goal implementation – the full maker was recorded after the first month.
3. The full effects of mental visualisation training were achieved in six areas after three months of practice, except for the area of mental resilience, which was only marginally short of a very high score.

6. Wódka K. Możliwe zastosowanie treningu wyobraźniowego. *Perfect body*; 2013, 20 (2): 32-34.
7. Gould D., Murphy S., Tammen V., May J. An evaluation of U.S. Olympic sport psychology consultant effectiveness. *The Sport Psychologist*; 1991, 5: 111-127.
8. Gentili R., Han C. E., Schweighofer N., Papaxanthis C. Motor learning without doing: trial-by-trial improvement in motor performance during mental training. *Journal of Neurophysiology*; 2010, 104 (2): 774-783.
9. Olsson C. J., Jonsson B., Nyberg L. Learning by doing and learning by thinking: an fMRI study of combining motor and mental training. *Frontiers in Human Neuroscience*; 2008, 2 (5): 1-7.
10. Holmes P., Calmels C. A. Neuroscientific review of imagery and observation use in sport. *Journal of Motor Behavior*; 2008, 40 (5): 433-445.
11. Nyberg L., Eriksson J., Larsson A., Marklund P. Learning by doing versus learning by thinking: an fMRI study of combining motor and mental training. *Neuropsychologia*; 2006, 44 (5): 711-717.
12. Courtine G., Papaxanthis C., Gentili R., Pozzo T. Gait-dependent motor memory facilitation in covert movement execution. *Brain Research Cognitive*; 2004, 22: 67-75.
13. Gentili R., Cahouet V., Ballay Y., Papaxanthis C. Inertial properties of the arm are accurately predicted during motor imagery. *Behavioural Brain Research*; 2004, 155: 231-239.
14. MacIntyre T., Moran A. A qualitative investigation on imagery use and metaimagery processes and imagery direction among elite canoe-slalom competitors. *Journal of Imagery Research in Sport and Physical*; 2007, 2 (1): 1932-1941.
15. Nelson D. A., Kaforey G. R. An Olympic Training Program: A Holistic Perspective. *Journal of Applied Sport Psychology*; 1996, 8: 124.
16. MacIntyre T., Moran A., Collet C., Guillot A. An emerging paradigm: a strength-based approach to exploring mental imagery. *Frontiers in Human Neuroscience*; 2013, 12: 1-13.
17. Zetou E., Vernadakis N., Bebetos E., Makraki E. The effect of self-talk in learning the volleyball service skill and self-efficacy improvement. *Journal of Human Sport & Exercise*; 2012, 4 (7): 794-805.
18. Brouziyne M., Molinaro C. Mental imagery combined with physical practice of approach shots for golf beginners. *Perceptual and Motor Skills*; 2005, 101 (1): 203-211.
19. Shackell E. M., Standing L. G. Mind over matter: mental training increases physical strength. *North American Journal of Psychology*; 2007, 9: 1189-1200.
20. Post P., Wrigberg C. A. A phenomenological investigation of gymnasts lived experience of imagery. *The Sport Psychologist*; 2012, 26: 98-121.
21. Smith D., Wright C., Allsopp A., Westhead H. It's all in the mind: PETTLEP-based imagery and sports performance. *Journal of Applied Sport Psychology*; 2007, 19: 80-92.
22. Zdebski J., Blecharz J. Z badań nad zapotrzebowaniem na trening mentalny. *Sport Wyczynowy*; 2000, 3/4: 57-60.
22. Evans L., Jones L., Mullen R. An imagery intervention during the competitive season with an elite rugby union player. *The Sport Psychologist*; 2004, 18: 252-271.
24. Debarot U., Sperduti M., Di Rienzo F., Guillot A. Experts bodies, experts minds: how physical and mental training shape the brain. *Frontiers in Human Neuroscience*; 2004, 8: 1-17.
25. Damisch L., Stoberock B., Mussweiler T. Keep your fingers crossed! How superstition improves performance. *Psychological Science*; 2010, 21(7): 1014-1020.
26. Guillot A., Moschberger K., Collet C. Coupling movement with imagery as a new perspective for motor imagery practice. *Behavioral and Brain Functions*; 2013, 9: 8.
27. Martin K. A., Hall C. R. Using Mental Imagery to Enhance Intrinsic Motivation. *Journal of Sport and Exercise Psychology*; 1995, 17(1): 54-69.
28. Lotze M., Scheler G., Tan H. R., Braun C., Birbaumer N. The musician's brain: functional imaging of amateurs and professionals during performance and imagery. *Neuroimage*; 2003, 20: 1817-1829.
29. Malouff J. M., McGee J. A., Halford H. T., Rooke S. E. Effects of precompetition positive imagery and self-instructions on accuracy of serving in tennis. *Journal of Sport Behavior*; 2010, 31 (3): 264-275.
30. Post P., Muncie S., Simpson D. The effects of imagery training on swimming performance: an applied investigation. *Journal of Applied Sport Psychology*; 2012, 24: 323-337.
31. Hatzigeorgiadis A., Zourbanos N., Galanis E., Theodorakis Y. Self-talk and sports performance: a meta-analysis. *Perspectives on Psychological Science*; 2011, 6 (4): 348-356.
32. Evans S., Ferrando S., Findler M., Stowell C., Smart C., Haglin D. Mindfulness-based cognitive therapy for generalized anxiety disorder. *Journal of Anxiety Disorders*; 2008, 22: 716-721.

Author for correspondence:

Paweł Piepiora

University of Physical Education in Wrocław, Faculty of Sport Sciences, Chair of Sport Didactics,

I. J. Paderewskiego 35 st., 51-612 Wrocław,

e-mail: pawel.piepiora@awf.wroc.pl,

phone: +48 71 347 3511

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