

Summary

The diversity of applied training methods as well as complex training of athletes, channeled for improvement of physical and mental abilities cause significant progress in most sports. Increasing requirements and obtained achievements among many sport disciplines are initiating constant search for alteration of innovative solutions which allows to enhance athlete's potential during training competition.

Taking under consideration the significance of the mental aspects of maximizing an athlete's performance, and countering this with the currently limited base of applied methods in this field, the purpose of this research is the evaluation of EEG biofeedback training on the reaction speed of judo athletes together with an attempt to improve mental training in terms of the number of sessions and the time of their implementation, directed at significant improvement of the reaction times of the participating athletes.

In this experiment the following scientific research questions were formed:

- 1.) Did the EEG biofeedback training sessions statistically and equally impact the speed of visual response in the researched groups of judo players?
- 2.) Which types of perception – simple or complex – indicate improvement due to the applied EEG biofeedback training procedures in the researched groups of judo players?
- 3.) Which of the applied EEG biofeedback training procedures significantly improve simple and complex reaction speed to visual stimuli among in the researched groups of judo players?

The study included 24 elite judo athletes from the Polish National Judo Team aged 22 – 25 years old. EEG biofeedback training was administered in four cycles, differing in terms of frequency and time duration for each training session. Each training cycle was separated by a four week break. Both, the experimental and the control group followed the same training routine and were characterized by identical frequency and duration of sessions. Basic training protocol in the experimental group included theta/beta1 training, which was directed at developing concentration, while the control group conducted a sham training using the displayed EEG simulation. Before the start of the first and at the end of each training cycle measurements of „simple and complex” reaction speed were performed in order to compare the achieved results.

Research indicated that athletes from the experimental group, as a result of training sessions with the theta/beta1 protocol, achieved significant statistical improvement of simple

and complex reaction times after each training session. The most impressive increase in the speed of the complex reaction was observed as a result of an applied 4 minute EEG training conducted every other day while, on the other hand, the greatest reduction in simple response times was observed after ten minutes of training conducted each day. No similar changes were observed in the control group.

Extensive analysis of the obtained results showed that thanks to the use of neurofeedback training in accordance with the theta /beta1 protocol, while maintaining the appropriate duration and frequency of individual training sessions, statistically significant improvements in reaction time of athletes visual stimuli can be obtained.