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METHODOLOGICAL JOURNAL**<http://mentaljournal-jspu.uz/index.php/mesmj/index>**IMPROVING REACTION TIME IN JUDO ATHLETES OF THE TRAINING GROUP****Alisher Olimov***PhD, Associate Professor of the**Department of sports teaching methodology of the**Jizzakh State Pedagogical University named after Abdulla Kadiriy. Uzbekistan**E-mail: alisherolimov6777@gmail.com**Jizzakh, Uzbekistan***Madina Begmatova***2nd-year Master's student of the**Jizzakh State Pedagogical University named**after Abdulla Kadiriy, Uzbekistan, Jizzakh**E-mail: madinabegmatova87@gmail.com**Jizzakh, Uzbekistan*

ABOUT ARTICLE

Key words: judo, reaction time, training group, speed, technical and tactical preparation, sensorimotor reaction, motor response, specialized exercises.

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Abstract: This article analyzes the scientific and methodological foundations for developing reaction time in judo athletes of the training group. In competitive judo, the athlete's ability to rapidly perceive an opponent's movements, assess the situation, and execute an appropriate motor response is one of the important factors determining high sports performance. The study examines the importance of reaction time in the technical and tactical preparation of judo athletes, its simple and complex forms, and the possibilities for its development through specialized exercises. Particular attention is given to the transition from simple responses to complex and choice reactions, as well as to the integration of reaction-training exercises with technical and tactical actions specific to judo.

Introduction. In the modern system of athlete preparation worldwide, the targeted development of physical qualities and the enhancement of competitive performance are

regarded as important scientific and practical priorities. This is particularly relevant in combat sports, where, alongside movement speed, strength, agility, balance, and coordination abilities, reaction time plays a crucial role.

Judo is one of the most complex combat sports, requiring a high level of technical and tactical preparation. During competition, rapidly changing situations, various movements by the opponent, and unexpected attacking actions require athletes to make decisions within a very short period of time. Therefore, the interval from perceiving an external stimulus to executing an appropriate purposeful motor response, namely reaction time, directly influences the effectiveness of competitive performance.

In the scientific literature, reaction time is described as the interval between the perception of an external stimulus and the execution of the corresponding motor response. In sports characterized by rapidly changing situations, such as judo, it is important to develop not only simple reaction but also complex and choice reaction abilities to a high level. Recent studies have indicated that improving judo athletes' responses to visual stimuli, decision-making speed, and complex reaction abilities is an important factor in enhancing sports performance. In particular, the significance of visual reaction time and cognitive-motor abilities in judo has been substantiated by scientific research.

From this perspective, the targeted development of reaction time in judo athletes of training groups and the development of an effective methodology for its improvement represent relevant scientific and methodological challenges.

Aim of the study. The aim of this study was to investigate the specific characteristics of reaction time in judo athletes participating in a training group and to identify effective methods for improving reaction time through specialized exercises.

Research objectives. To achieve the stated aim, the following research objectives were formulated:

- to analyze the theoretical and practical significance of reaction time in judo athletes;
- to assess the baseline reaction-time indicators of judo athletes in the training group;
- to determine the characteristics of simple and complex reaction time;
- to develop a system of specialized exercises aimed at improving reaction time in judo athletes;
- to evaluate the effectiveness of the proposed exercise system.

Methodology. The study employed the following research methods: analysis of scientific and methodological literature, pedagogical observation, pedagogical testing, pedagogical experiment, and mathematical-statistical analysis.

Reaction time was assessed using indicators of response time to visual and auditory stimuli, as well as measures of simple and choice reaction time.

Reaction time is one of the important psychophysiological abilities that enables judo athletes to perform technical and tactical actions effectively. During competition, the ability to rapidly perceive an opponent's movements, assess their intentions, and select an appropriate response within a short period directly affects the athlete's performance. From this perspective, reaction time is closely associated not only with a simple motor response but also with attention, perception, information processing, and decision-making processes (Sukdee et al., 2024).

Studies investigating reaction time and coordination abilities in judo athletes have paid particular attention to simple and complex reaction indicators. In particular, relationships among auditory reaction time, complex reaction, movement accuracy, and coordination abilities have been examined in young judo athletes. The findings demonstrated that reaction time is associated with the coordination of motor activity and the effectiveness of technical actions performed by judo athletes (Mroczkowski et al., 2013).

A study focusing on the development of reaction time in adolescent judo athletes investigated the effects of balance exercises on visual and auditory reaction time. The study involved 40 adolescent judo athletes, with additional balance exercises incorporated into the training program of the experimental group. The findings indicated that the use of specialized training exercises may have a positive effect on improving reaction time and coordination abilities in athletes (Akay et al., 2021).

Prończuk and co-authors investigated visual reaction speed in highly skilled judo athletes. The study involved 24 highly trained judo athletes and employed both simple and complex visual reaction tests. The authors reported positive changes in visual reaction indicators following specialized EEG-biofeedback training. These findings suggest that reaction time can be improved through targeted and specialized training interventions (Prończuk et al., 2023).

Sukdee and co-authors examined the relationship between cognitive abilities and sporting success in judo athletes. The study assessed simple reaction time, choice reaction time, and other cognitive indicators. The authors emphasized that achieving high-level performance in judo depends not only on physical and technical preparation but also on the athlete's ability to rapidly perceive and process information and make appropriate decisions (Sukdee et al., 2024).

Some studies have also examined the influence of an athlete's functional state and physical workload on reaction time in judo. In particular, the effects of pre-competition body-mass reduction on reaction time, balance, and strength indicators have been analyzed. The findings demonstrated that reaction time is closely associated with the athlete's overall functional state (Barley et al., 2018).

Results and Discussion. The analysis of existing scientific research indicates that reaction time in judo extends beyond simple sensorimotor responses and encompasses visual perception, attention, selection of complex movements, and decision-making processes (Mroczkowski et al., 2013; Akay et al., 2021; Prończuk et al., 2023; Sukdee et al., 2024). However, most of these studies have focused on highly skilled or adolescent judo athletes. The effectiveness of a comprehensive methodology for developing reaction time in judo athletes of training groups through specialized technical and tactical exercises has not been sufficiently investigated. This research gap provides a rationale for conducting the present study.

Reaction time is defined as the ability to initiate a motor response to an external or internal stimulus within a short period of time. In sports, reaction time is an important physical and psychophysiological quality, particularly in judo, where rapid movement, anticipation of an opponent's actions, and timely responses are essential. Depending on the characteristics of the stimulus, the motor task, and the complexity of the response, reaction time can be classified into several types. The main types include simple reaction, complex reaction, choice reaction, and reaction to a moving object.

Simple reaction refers to responding to a previously known stimulus with a predetermined movement. In this case, the athlete waits for the appearance of the stimulus and performs the specified movement immediately after the signal is presented. For example, rapidly initiating a particular movement in response to a coach's signal represents a simple reaction. Exercises involving responses to auditory, visual, or movement signals can be used to develop simple reaction time.

Complex reaction requires the athlete to identify which of several possible stimuli has occurred and to select an appropriate response. In this situation, the athlete must not only perceive the stimulus rapidly but also analyze it and select the corresponding movement. In judo, selecting different defensive or attacking techniques depending on the opponent's movements represents a practical example of a complex reaction.

Choice reaction involves selecting the most appropriate motor response from several possible signals or movement options within a short period of time. In judo, selecting an appropriate technical action according to the opponent's grip, direction of movement, change

in balance, and preparation for an attack is an example of choice reaction. The speed of choice reaction is closely related to the athlete's attention, perception, motor memory, and technical and tactical preparation.

Reaction to a moving object refers to an athlete's ability to respond promptly to changes in the speed, direction, and position of a moving opponent or object. In judo training and competition, observing the opponent's movements, rapidly identifying the direction of an attack, and executing an appropriate counteraction at the right moment are important manifestations of this type of reaction. Another important form of reaction is anticipatory reaction, which involves the athlete's ability to anticipate an opponent's movement and prepare an appropriate response before the movement begins or during its initial phase. In highly skilled judokas, this ability develops through the rapid recognition of such cues as the opponent's body position, direction of movement, and positioning of the arms and legs.

In developing reaction time in judo athletes, it is appropriate to progress from simple reactions to complex reactions and from predetermined movements to the selection of an appropriate response according to the changing situation. This approach enhances the athlete's ability to rapidly perceive and analyze the opponent's movements, make an appropriate decision, and execute a technical action within a short period of time.

Developing reaction time in judo athletes participating in training groups is an important component of technical and tactical preparation. In judo, athletes are required to perceive an opponent's movements within a short period, recognize their intentions, select an appropriate response, and execute a technical action at the right moment. Therefore, reaction time should not be considered merely as the speed of responding to a stimulus, but rather as a complex ability associated with assessing the movement situation, making decisions, and executing an appropriate action. Systematic development of this ability in training groups creates an important foundation for mastering technical skills, adapting to an opponent's movements, and performing actions rapidly during competition.

When developing reaction time, the athlete's age, physical fitness, technical proficiency, and training experience should be taken into account. In training groups, it is not advisable to limit the process to repeated performance of the same exercises. The content of exercises should gradually become more complex, requiring athletes not only to respond rapidly but also to make appropriate decisions. For example, at the initial stage, athletes may be required to perform a predetermined movement in response to an auditory or visual signal from the coach. Subsequently, they may be asked to select an attack, defensive action, or counter-technique depending on the opponent's movement. Such an approach facilitates a gradual transition from

simple to complex reactions. During the training process, specialized preparatory exercises can be effectively used to develop reaction time. These include exercises involving rapid responses to different signals, quick movement in a predetermined direction, imitation of an opponent's movements in pairs, responses to an opponent's gripping action, reactions to signals to initiate or stop an attack, and rapid transitions from defense to counterattack. Exercises integrated with judo-specific movements are also important, such as rapidly executing a technical action in response to an opponent's attempt to disrupt balance, changing the gripping position, and switching technical actions according to the opponent's movements.

When developing reaction time, attention should be paid not only to the speed of exercise performance but also to the accuracy of execution. Performing a movement very quickly but with incorrect technique may reduce the effectiveness of training. Therefore, exercises should first be mastered with technically correct execution, after which their performance speed can be gradually increased. In particular, when working with young judokas, technical accuracy and safety should remain the primary considerations.

Exercises performed with an opponent are particularly important for developing reaction time. In judo, athletes respond not to a predetermined movement but to the opponent's continuously changing actions. Accordingly, in partner exercises, one athlete initiates a movement while the other rapidly identifies it and responds with a predetermined action. Subsequently, the direction, speed, and content of the movements can be modified. This approach develops the athlete's ability to maintain attention, perceive movements rapidly, and make the required decision within a short period. The development of reaction time during training can be organized conditionally into several stages. At the first stage, athletes perform exercises involving responses to simple and predetermined signals. At the second stage, the type of signals and directions of movement are varied. At the third stage, athletes observe the opponent's movement and select one of several possible responses. At the subsequent stage, these movements are combined with technical and tactical tasks, bringing the exercises closer to real situations on the judo mat. Such a progressive approach not only improves reaction time naturally but also expands the athlete's ability to apply this skill under competitive conditions.

Proper distribution of training load is also important in the development of reaction time. Exercises aimed at developing speed are generally more effective when performed before the athlete reaches a high level of fatigue, as both movement speed and accuracy are then maintained at a higher level. Exercises should be relatively short, sufficient recovery intervals should be provided between repetitions, and the quality of movement execution should be monitored. Excessive fatigue may reduce reaction time and impair the quality of technical

actions. Therefore, reaction-development exercises should preferably be incorporated into the main part of the training session or performed when the athlete is adequately prepared.

At the same time, special physical preparation should not be separated from technical and tactical preparation in the development of reaction time. Rapid movements in judo are supported by sufficient strength, agility, coordination, and the ability to maintain balance. For example, merely detecting an opponent's attack rapidly is insufficient; the athlete must immediately position the body correctly, maintain balance, and execute an appropriate counter-technique. Thus, reaction time should be developed in an integrated manner together with other physical and technical abilities.

Regular monitoring of the development of reaction time in training groups is also important. In addition to simple reaction time, complex reaction, response-selection speed, and the speed of technical execution can be assessed. Based on the monitoring results, the individual characteristics of each athlete can be identified and appropriate adjustments can be made to subsequent training sessions. In particular, athletes with relatively slower reactions may be provided with individualized exercises, whereas athletes with well-developed reaction abilities may be given more complex and variable tasks.

Conclusion. The development of reaction time in judo athletes participating in training groups represents an important component of technical and tactical preparation. Effective reaction enables athletes to rapidly perceive an opponent's movements, assess the developing situation, select an appropriate response, and execute the required technical action within a limited period of time. In competitive judo, where the direction, speed, and nature of an opponent's actions can change rapidly, the ability to respond promptly and accurately is closely related to the quality of technical and tactical performance.

Regular assessment of reaction abilities provides an opportunity to monitor individual progress and adjust the content of subsequent training sessions. Simple reaction time, complex reaction, response-selection speed, and the speed of technical execution can be considered as complementary indicators. The results of such assessments can be used to identify individual differences among athletes and to differentiate training tasks. Athletes demonstrating relatively slower responses may require more targeted exercises, whereas athletes with better-developed reaction abilities can be exposed to more complex, variable, and decision-making-oriented situations.

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