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Scientific review

USING THE MIND IN REPROGRAMMING THE LIMITS OF MUSCLE FORCE IN THE PROCESS OF CREATING CHAMPIONS

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Abstract: This paper shows the use of the mind in reprogramming the limits of muscle force on the application of learning reversible contractions in the process of creating champions in various sports. In a large number of sports, basic movements are carried out in a reversible muscle workout regimen, at 80 to 170 ms from the beginning of a muscle contraction, often in conditions of a large amount of lactic acid, as well as fatigue and the possibilities of joint and muscle injuries. In order for sports movements to comprise winner traits, a reversible contraction should last as short a time as possible, along with a large amount of generated force. Increasing force and shortening the time of a reversible contraction is the result of a Renshaw inhibition – the inhibition of the Golgi tendon organ reflex, the increase of the stretching reflex, shortening the time of alternating eccentric and concentric contractions, increasing speed and synchronizing the switching on of motor units, improving inter-muscular coordination, that is, reprogramming the limits of motor units force, which requires an increased and synchronous entry of impulses and a change of the recruiting pattern of motor units. As reversible contractions represent an integral part of many sports movement and are a condition for top results, they must be learned separately and exercised with a different use of the mind. Thus, the main aim

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of the paper is a review of the methodology of using the mind in reprogramming the limits of muscle force on the example of learning reversible contractions.

Key words: championship mind, reversible contraction, visualizing, intellectualization of the training process, linking the sensory and kinesthetic codes.

INTRODUCTION

The presumption is that with two top competitors the mind[2] functions perfectly and enables them to realize themselves in competing in the best possible way, but to have different energy and capacities in force (Anohin, 1970; Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević et al., 1989, 1997, 1998[9], 2000, 2004; Milošević, 2002, 2010[15]; Milošević & Milošević, 2011; Mudrić et al., 2003, 2004; Zatsiorsky & Kramer, 2009). The competitor whose capacity and speed of producing energy and force is greater within the time determined by the conditions and the game, along with other conditions, will win. Ensuing from this fact is that along with the mind, all the relevant traits of a champion must be developed at top level (Anohin, 1970; Doillard, 2001; Evert & Jansen, 1996, Ivancevic et al., 2010; Kuehl et al., 2005; Milošević et al., 2004; Milošević & Milošević, 2011; Mudrić, 2010; Ungerleider, 1996).

In the development of champion traits and the total self-realization of champions at competitions, it is the mind which dominates (Anohin, 1970; Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević, 2010[15]; Milošević et al., 2004; Milošević & Milošević, 2011; Mudrić, 2010; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009; Ungerleider, 1996).

In a great number of sports (karate, boxing, handball, volleyball, basketball, football, rugby, water polo, tennis, baseball, etc.) the basic movements (hits, throws, shoots, services, smashes, running and movement change, jumps, landings, leaps, acceleration of stride running or after movement direction change, sprints with and without changing movement direction) are carried out in a reversible workout regimen of the muscles (by alternating eccentric and concentric contractions), often with large amounts of lactic acid, fatigue and the possibility of joint and muscle injury, in time intervals from 80 to 170

[2] The mind is viewed as a type of intellect and awareness expressed by a combination of thinking, comprehension, memory, sense, will and imagination, including all the subconscious cognitive processes.

ms from the beginning of muscle contractions (Kuehl et al., 2005; Milošević et al., 2000; Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Mudrić, 2010; Ungerleider, 1996). In order for the said movements to have champion traits, a reversible contraction should last as short a time as possible with great speed and amount of generated force (Ivancevic et al., 2010; Milošević et al., 2000; Milošević, 2002; Zatsiorsky & Kramer, 2009). Thus, the subject of the paper is the researching of a reversible contraction, the use of the mind and the methodology of perfecting the process of creating a champion in various sports. The problem of increasing speed and shortening the time of the reversible contraction is resolved on a neural level through the integral result of the Renshaw inhibition – the inhibiting of the Golgi tendon reflex[3] (the inhibition level determines the top level of force of the motor units, that is, the muscles), the increase of stretching reflexes, the shortening of time to alternate between eccentric and concentric contraction, increasing speed and the synchronization of switching on of motor units, improving internal and intra-muscular coordination, that is, reprogramming the limits of force of motor units. This draws an increased and synchronous entry of impulses and a change of the recruitment pattern of motor units (Ivancevic et al., 2010; Milošević et al., 1989, 1997, 1998_{9}, 2000; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Zatsiorsky & Kramer, 2009).

Considering the fact that a reversible contraction is an integral part of many sports movements and that it is very complex and a condition for championship achievements, it must be learned and worked out separately and with a different mind frame. The problem of using the mind in reprogramming the limits of muscle force will be resolved in the paper by using the example of learning the reversible contraction in training champions in various sports, via instruction and the intellectualizing of the training process, and then through the linking of the sensual and kinesthetic codes, visualizing the training and competition process, and via training and management of the realization and training effects and using various exercises with reversible muscle contractions which cause disinhibition processess at all levels (Anohin, 1970; Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević et al., 1989 1998_{9}, 2004; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Mudrić, 2010; Zatsiorsky & Kramer, 2009).

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[3] The level of inhibition caused centrally from the Renshaw cells, peripherally from the Golgi tendon organ and the secondary endings determine the upper limits of the motor units force (muscle force). Learning and training of disinhibition in the reversible contraction is one of the basics of reprogramming the upper limits of muscle force via their permanent increasing.

Instruction in the training process

During the carrying out of planned training sessions, an athlete is instructed in the daily, weekly and monthly distribution of training (Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004). In that sense, the athlete knows where each and every workout is carried out, on what day and at what time. But also, he or she has the information how long the breaks are between the training sessions of the same and different directions, as well as when the days are programmed for rest during the week.

In interacting with the coach, using workout plans, the athlete also learns what kind of work is used in certain training sessions (continued, discontinued, etc.), the duration of each training session (the lasting of work and duration of all breaks), the exercises and types of muscle contractions, their number or combinations, the weights they must lift, number of series, number of repetitions of exercises or combinations in series, duration and speed of one repetition, number and duration of breaks, the intentional impact of every training session (the might of impact, area of impact, types of characteristics and knowledge which is developed, a framework level of effect and changes which will occur in one training session, after a week and a month of training) (Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004).

One by one, they are acquainted with the individual amounts of workout sessions which are to be carried out in individual training sessions: the quantity of information, force production, energy production, workout speed, work duration, spatial work parameters, the size and frequency of carrying out workouts during training, the number and duration of breaks, the correlation between the speed of realization and duration of work and speed and amount of force created, expenditure of energy resources, the created oxygen debt and lactic acid, subjective feelings, etc. (Milošević, 2010_{15}; Milošević, 2010_{16}; Milošević & Milošević, 2011; Mudrić et al., 2004).

Intellectualization of the training process

The intellectualizing of the training process is carried out by the trainer and the athlete via an analysis of reversible contractions, the analysis and setting of training aims, and the explication of training problems and their resolutions (Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Ungerleider, 1996). The intellectualization of the training process should enable all athletes to anticipate their own and their opponents' behavior and workouts via the visualizing or realistic carrying out of training and competition (Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević & Milošević, 2011; Mudrić et al., 2004; Ungerleider, 1996).

Reversible contractions

Eccentric contractions are in sports movements as natural as concentric contractions (Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009). However, many sports movements, as has already been mentioned, consist of the eccentric and concentric stage (bending and stretching, rotation in the actual joint or joints) in which the shortening of the muscle is followed by its sudden extending, especially in movements (exercises) with a large overload (leaps from great heights, weightlifting with large weights and speeds of lifting in both stages of realization, a change of running direction at great speed). The combination of eccentric ad concentric contractions (a cycle) in movements is called a reversible contraction (Ivancevic et al., 2010; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009). In an eccentric concentric cycle in the shortening phase (the beginning of a concentric contraction, that is, the moment of shifting from eccentric to concentric contractions) a greater force in a short time is realized (in movements with overloads whose acceleration exceeds 25 ms-2 up to 14500 N is generated, in 0.100 s) than individually in eccentric or concentric muscle contractions, due to several reasons (Jelen, 1991; Milošević, et al., 1998_{10}; 1998_{11}). First, at the highest point of the cycle, at the moment when extension stops and muscle shortening begins, force is developed in isometric conditions. Second, considering that force starts to increase in the eccentric stage (in conditions of a large external resistance it increases up to 10000 N in 0.090 s), the time in which it is possible to generate force in a reversible contraction is extended (Milošević, et al., 1998_{10}; 1998_{11}). Third, muscle tendon elasticity impacts the force level (accumulation of elastic energy in the stage of muscle and tendon extension) and fourth, due to the reflex contractions of muscles. All these effects can be determined by measuring them in the leaps, lifting weights or other sports movements. Muscle length and force level, after contacting the ground after a leap and stopping the first stage of movement with weightlifting or other sports movements, changes suddenly. Muscles are expanded by force and at the same time their tautness is greatly increased. These changes are simultaneously controlled and partly kept in balance as a joint effort of two motor reflexes: the stretching reflex, which maintains an optimal length of muscles and the Golgi tendon organ reflex, preventing an especially large and damaging muscle straining. Eccentric clearing towards the muscle in the extension stage is also modified by a joint effect of the mentioned two reflexes. The stretching reflex has a positive effect (increasing the clearing) and the Golgi reflex a negative one (inhibitory) and an efferent impact and the effect is a measure of the shown force. What is important for learning the reversible contraction during great muscle straining is that activating the Golgi tendon organ prevents a further activity of muscles that is a concentric contraction, as it prevents an

efferent inflow into the muscle. However, in leaps with an amortization or blockade, a leap from large heights or lifting of heavy weights in a half-squat, bench press, pullover, torso rotations along with additional loads, due to the possibility of disrupting the integrity of the organism, the mind reacts with an amplifying and disinhibition effect on varied levels (Anohin, 1970; Milošević et al., 1989). In that case, the reticular system starts to have effect, increasing the efferent inflow in an amplifying way. Then the centrally inhibited Renshaw inhibits the interneurons which results in a free transition of an increased efferent synchronous inflow of the impulse. Also, peripherally the Golgi tendon organ is inhibited, which removes the last obstacle for the inflow of efferent impulses into the muscle. Neural disinhibition, due to the mentioned, impacts the increase of the stretching reflex (and the time of reflex latency decreases, while the speed and level of generated force in the reflex increases) (Anohin, 1970; Milošević et al., 1989). Further, the neural disinhibition conditions the increase of speed of switching on and the level of work synchronicity of the motor units and reprogramming (by increasing) the limits of forces of all the motor units over the maximum and it can be measured during standard testing. Thus, the greatest impact on the great increase of force along with the shortening of time for its generating in a reversible contraction is made by the neural component of the muscle contraction, primarily the disinhibition process at all levels (Anohin, 1970; Ivancevic et al., 2010; Milošević et al., 1989; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009). The greatest challenge of a champion's mind in learning and managing a reversible contraction is the learning and managing of disinhibition (Anohin, 1970; Ivancevic et al., 2010; Milošević et al., 1989; Milošević, 2002, 2010; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009). Learning and managing disinhibition and thereby, reprogramming the limits of muscle force by a permanent increase is achieved by using training exercises which can disrupt the integrity of the athlete's organism and cause inhibition processes by using the link method, as well as the method of intellectualization and visualization of the training process during a longer time period. Those athletes who manage the disinhibition process badly in a reversible contraction, even though they have, during testing, much higher levels of maximum force than those who manage well with reversible contractions, as a rule have a weaker serve in tennis and volleyball, a weaker smash ball in volleyball, weaker hits in handball, water polo, tennis, karate, boxing, and weaker jumps in basketball, handball, as well as slower changes of movement direction during great running speeds in all sports due to a lack of training, among other things, as well as managing the effects of the Golgi tendon organ in the concentric contraction stage (Anohin, 1970; Ivancevic et al., 2010; Milošević et al., 1989; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009).

Setting training aims

The status of the athletes was under analysis, along with the rules of changing certain traits, their capacities, financial conditions and based on these, real and quantified training aims for learning and managing reversible contractions were set (Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004):

1. Workout aims were set for every training with weights and for every individual, based on his current status and calculated progress after visualizing training, i.e. how much weight he or she can lift was analyzed, that is, how much work there will be, at which speed the weights were lifted, how long the amortization time in a reversible contraction will last, how much force will be created thereby, what the speed of creating and the speed of changing force will be, the speed of switching on and synchronizing the motor units, the total strength created, how much energy spent, as well as the maximum energy force. For every lactate training, for every athlete, there was a calculation of how much glycogen should be spent, how much oxygen debt and lactic acid will be created as well as how much energy, how much work is necessary and which energy strength, at which speed the recovery will occur, how long every reversible contraction in the conditions of lactate fatigue will be, the level of synchronization of work of motor units, what the efferent inflow is in the stage of running direction change, as well as in the alactate, the distance run in one training session, the amount of spent energy during training, the energy source (CP), the amount of force created in one session, and the maximum energy strength in one alactate training session.
2. Shortening the time to carry out a reversible contraction.
3. Maintaining control over disinhibition effects (reprogramming by moving, increasing the limit of the maximal force of motor units, that is, the muscles).
4. Increasing the effect of stretching reflexes (reflex latency and the time of generating force is shortened, with an increase of the level of generated force in the reflex - an immediate reaction).
5. Shortening the time of generating force in a reversible contraction.
6. Increasing synchronicity of motor units work in a reversible contraction.
7. Improvement within an inter-muscle coordination in a series of reversible contractions. Increasing the level and speed of generating force and inter-muscular and intramuscular coordination has a

direct impact on the shortening of time and increasing precision of the movement as well as on the efficiency of the brain in a competition. The cerebellum determines the arrangement of muscle inclusion and the duration time of their engagement in movement. Due to the mentioned improvement, all the muscles can generate a sufficient amount of force in a shortened time (accelerated) movement, that is, they can be included at the right moment predicted for them and not before, due to the low speed of generating force. In that case, the brain does not have to be engaged to control the prior switching on of some muscle groups for the movement to be swift and precise. Freed from that function, there is also time for other activities such as observation of the opponent, the field, various analysis, checking personal strategies, bringing decisions, predicting the future moves of the opponent, the choice of the best solutions for future situations, etc., which makes the athlete more superior in relation to the opponent during the match.

8. Increasing the level of generating force during an 80 to 180 ms interval in a reversible contraction.
9. Increasing the speed of energy production, the speed of creating and the speed of changing the speed of changing force during an 80 to 180 ms interval in a reversible contraction.
10. Eliminating the impact of great amounts of lactic acid in the muscles and the body on the speed of carrying out a reversible contraction.
11. Increasing the resistance of CNS to lactic acid.
12. Achieving confidence and self-assurance.
13. Release from fear (as well as dread and doubt) caused by large quantities of lactic acid in the body and creating the feeling of power by eliminating the alarm systems in the subconscious.
14. Overcoming and freeing pseudo pain caused by lactic training.
15. Increasing glycogen in the muscles.
16. Increasing the speed of degrading and re-synthesizing glycogen during lactic work.
17. Increasing recovery speed during and between training sessions.
18. Establishing a positive transfer of training of reversible contractions to all sports movements.
19. Establishing a positive transfer of reversible contractions at competitions.

For every monitored measurement, a change which will occur after a week or month of training is defined (Milošević, 2010[15]; Milošević & Milošević,

2011; Mudrić et al., 2004). The changes are expressed in units in which the measurements are defined by training aims or in percentiles (Milošević, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004).

Explication of training problems

1. How to shorten the time of generating force in a reversible contraction of the leg extensor muscles, the muscles of the torso, the shoulder area and the torso rotator?
2. How to increase the amount of force in regards to the existing force during the shortening of time of its generating in a reversible contraction with the leg extensor muscles, the breast muscles, the shoulder area and the torso rotator?
3. How to secure an increased and synchronized impulse influx?
4. How to centrally carry out the inhibition of Renshaw inter-neurons (disinhibition), the peripheral Golgi tendon endings and the secondary endings in order to increase a synchronous influx of efferent impulses and move the limitations of maximal production of force of the switched-on motor units, increase the speed and synchronicity of the work of the motor units, the speed of creating and changing of creating force, inter and intramuscular coordination within the time from 80 to 170 ms from the beginning of muscle contractions?
5. How to change the pattern of including motor units, so that motor units of a large threshold of activation start to be activated at the beginning of generating force?
6. What does the anticipatory trait of CNS assume regarding the choice of the way and arrangement of switching on motor units for the desired muscle activity?

A set of solutions for open issues

1. Overloading during weight lifting by increasing the weight over the possible maximum achieved in one lifting by 30 to 50%, throwing weights by 95% to 100% from the maximum from a certain height, catching it and carrying out a reversible contraction by increasing the height from which the weights fall.
2. Overloading by increasing the height of the leap and landing.
3. Overloading by increasing the weight of the athlete while landing.
4. The shorting of the amortization time during a leap.
5. Shortening the time of impeding weight load (eccentric contractions) and the time of extending (concentric contractions).

6. Increasing the speed of running in which a movement direction takes place.
7. Shortening the time of shifting from an eccentric to a concentric contraction in a reversible contraction.
8. Increasing the imagined weight load and personal weight.
9. Choice of such an exercise type in which there is a simultaneous taking place of a disinhibition on all levels, an increased and synchronous influx of efferent impulses, the greatest speed of including motor units and their synchronization, an improvement within the muscles and inter-muscular coordination as well as the speed of creating energy.
10. Visualizing a reversible contraction in training and competition by changing the perception of personal possibilities.

The link between the sensory and kinesthetic codes

The trainer explains and shows the athletes exercises in which the loading consists of weights and their own weight. In that sense, s/he chooses from a larger group of workouts which can be found in training programs, exercises for improving the reversible contractions, their effects, and s/he gives instructions and shows how to carry them out (Milošević et al., 1997, 1998_9, 2000, 2004; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009).

He or she first explains the exercises which focus on the concentric stage of reversible effort of the relevant muscle groups in a half-squat, bench press, torso rotations with a fixed pole on one end and a pullover with weights which are 130 to 150% of the maximum weight which an athlete can reach in one lifting. It is explained to them that the impact of these exercises is disinhibitory (Anohin, 1970; Milošević et al., 1989), that the speed of energy production is largely increased, that during its realization the efferent influx is higher and synchronous, that they move the limits of maximum force production of all the motor units and change the pattern of switching on the motor units, along with their absolute synchronization in all treated muscle groups (Milošević et al., 1997; Milošević, 2002, 2010, 2010_{15}; Milošević & Milošević, 2011).

Then the work and impact are explained (disinhibition and its consequences) of the same exercises which work with weights from 95%, 97% and 100% of the maximum in a reversible muscle effort (Anohin, 1970; Milošević et al., 1989).

And at the end, the same exercises are shown, that is, the same muscle groups taken into consideration, those which function in the reversible workout regimen, with weights 70%, 85%, 90% and 95% of the maximum, during

which development is maximal, and the speed of switching on and work synchronization of motor units is developed, as well as the speed of creating and changing the creating of force and energy and inter-muscular coordination.

The trainer also explains that for improving disinhibition, moving the limits of maximum generated forces of all motor units, increasing the consecutive efferent influx, level and speed of creating force and energy in the interval from 80 to 170 ms from the beginning of muscle contractions. Shortening of amortization time, increasing the speed of switching on and synchonization of the work of motor units, improvement within and inter-muscular coordination and change of pattern of switching on of motor units during which the first to be switched on are the motor units of the highest threshold of switching on and the highest level of generated force, use of leap-blockade from the height of 100 do 200 cm, leap amortization from the same height, leap jump from the height of 100 to 170 cm and leap jump from the height of 76 cm (Anohin, 1970; Milošević et al., 1989: Milošević, 2010_{15}; Milošević & Milošević, 2011).

After the explanation, the trainer shows how the mentioned exercises are carried out. Regarding running at the speed of 6.7 m/s with 13.4 change of movement direction in 1 minute (402 m for 1 minute, during which there is a direction change every 30 m) (Milošević, 2010_{15}), the trainer explains that in the change of movement direction due to great fatigue and the possibility of joint injury, there are effects of disinhibition (Anohin, 1970; Milošević et al., 1989) on all levels, which in turn causes an increased efferent consecutive influx of impulses, as well as high levels of generating force along with a large percentage of synchronized motor units.

Further, the trainer explains that in this type of training (lactate training) there very quickly occurs an exhausting of glycogen reserves in the muscles, a decreasing of blood sugar level in the blood under 50% of the normal value, an accumulating of lactic acid in the muscles and the central nervous system, lowering PH values in the muscles, fatigue of the nervous system and blockage of the contractile machinery in the muscle (Milošević, 2010_{15}). Large amounts of lactic acid in which the brain functions and a large deficit of glycogen in the brain, with athletes in training and competitions causes an intellectual disorientation, insecurity, a dislocating of perception, technique, a large number of unnecessary mistakes, fear of repetition, the feeling of nausea, diarrhea, phantom pains in the joints and muscles, and the desire to immediately finish training or the competition and a lack of any desire to win. This is the way in which programmed lactate training sessions contribute to eliminate all these and athletes acquire the feeling of security and power along with the increasing of the desire to win (Milošević, 2010_{15}). In 50 m sprints, at a speed of 8.2 m/s, with 5 changes of movement direction at every 10 m (speed trainings), due to the possibility of joint injury in the change of movement direction, there are effects of disinhibition on all levels, as well as an increased efferent

consecutive influx of impulses and a high level of generating force due to a large synchronization of the work of motor units and moving the limits of a maximal generating of forces in all motor units (Anohin, 1970; Milošević et al., 1989; Milošević, 2010_{15}).

By using descriptions, showing exercises, trainers' advice and reports, every athlete from the visual and verbal (conscious) code transfers each exercise into a kinesthetic (unconscious) code and carries it out. After the realization of every exercise and some of its phases (kinesthetic code), every athlete using the appropriate words describes in detail, that is, leads the entire exercise and expresses his experience into a verbal (conscious) code. There is a special insistence on the verbal description of all phases of a reversible contraction in a certain exercise as well as all the exercises of the entire training. The link between the sensual and kinesthetic code is applied in the desire to create an interaction with the unconscious and the awareness of the subconscious, in order for the athletes to be able to, on the subconscious level, impact the creating of new desirable programs and changing the old ones. In the later phases of training, the trainer seeks to pass from the kinesthetic into the verbal code and vice versa in situations when development does not go as planned.

Visualization of the training process

A visualization session always starts with the visualization of aims for the upcoming training, then a visualization of the reversible workout regimen of exercises in a planned training, the visualization of entire exercises, and the entire training (Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl et al., 2005; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2003, 2004; Mudrić, 2010; Ungerleider, 1996). Then the training effects which have been achieved by visualization are transferred into concrete competitive movements, and certain tactical variants in order for the process of visualization to finish with a visualization of the entire match or game. Dual training sessions come before visualization, done in the evenings prior to sleep, with eyes closed, in an Alpha state of mind and in frequencies of 11 do 13 Hz/s. Access to the subconscious is available in that state through the possibility of reprogramming limits of showing force and improving the skill of mental force management. Every step of visualization is always followed by a repeated sense of superiority, security, power and satisfaction.

Visualization of training aims

Athletes visualize the relation work-force and work-energy support. They try various combinations of the mentioned relations until in their mind

they meet the set aims. They visualize the feeling of creating large amounts of force in a short period along with a huge production of energy in a reversible contraction. They also visualize the effects of changes of the mentioned relations, the ease of realizing the most intensive work without fatigue (muscle tension and the feeling of pain) and the feeling of security and satisfaction that the mentioned relations have been overcome, as well as the opponent and the movement. Also, visualized is the feeling and ease of managing the tempo and rhythm of realizing movements in whose foundation is a reversible contraction in a longer time period.

Visualization of the reversible workout regimen in a separate movement

When changing the direct of the movement, bending and extending the knee joint are separated, as well as the elbow joint in the shoulder, the torso rotation during weight lifting in various conditions, in a leap, a leap jump or a sprint. Visualized is the change of bending and extending the joint, with the idea that it should occur more and more rapidly. The beginning of the extending in the joint is also visualized, which starts before the bending stops with the idea to do this much more quickly than planned by the training. This segment of every exercise is mentally done ten times with the intention to more and more quickly carry out all the stages of the reversible contractions. Especially visualized are the reversible contractions as a series of bending and extending of the knee joint, which is carried out at great speed and conditions of lactate training and fatigue as well as in sprints of short runs at running speeds which exceed the possible personal maximum speeds in situations of change of movement direction. The mental image visualized is always a dynamic one.

Visualization of entire movements

Unlike the former way of visualizing, the entire training movement can also be visualized, during which the external conditions in the sense of complicating the reversible contractions are changed, such as increasing weight load, breathing speed, leap and jump height and running speed, along with the imagined danger from joint and muscle injury. Also visualized are various training situations at the level of mental images in which only the dynamics of a reversible contraction in the movement itself dominate.

Regarding weights, in all movements (half-squat, bench press, torso rotation and the pullover) always imagined is a rapid movement of bending and extending which begins in the mind before the bending or joint rotation begins, with increased training for 30 to 50% of the one programmed, during which the reversible contraction is drastically shortened, that is, it is quickened

and creates the feeling that the created force and energy in weight lifting would simply throw the weight up in the air).

With the leap amortization and blockade and the lap jump, jumping from great heights from 3 to 5 meters is imagined, during which se u the time of amortization is drastically shortened and the enormously increased the height of the bounce is enormously increased. Visualization is done in the way that there is a feeling that the muscles are working like springs and that the stages of eccentric and concentric contractions are carried out in the short period of 20 to 60 ms during which an enormous amount of force and energy (80% of the maximum) is generated, which speeds up and increases the bounce or weightlifting, after which the muscles relax, with no feeling of fear from injury, but with security and satisfaction.

The mental time of the change of running direction is drastically decreased in the imagined running speeds which exceed 15 m/s prior to every change. The decreasing of time is followed by a feeling of security, satisfaction with the achieved change speed, increasing of synchronization and speed of inclusion of motor units in each reversible contraction stage.

In the lactate regimen of running at the speed of 6.9 m/s, a drastic decrease of change of running direction is visualized, also with the feeling of a lack of effects of lactic acid in the brain and the feeling of security and pleasure with the effects of lactate training. It is imagined that all exercises are carried out with ease and without any muscle tension along with a lack of pain due to a large volume and work intensity.

Visualization of the entire training

The next step is a visualization of the entire training, all the exercises, in the way programmed with the idea of a drastic shortening of the amortization stage and a accelerating of extension and rotation in the joints with the feeling of pleasure caused by fatigue during training. Especially visualized is the lactate training which is done a longer time with the feeling of a rapid re-synthesizing of glycogen, recovery and a feeling of pleasure and security and no fear due to an ease of overcoming of the effects of large amounts of lactic acid in the muscles and brain. Also visualized in the positive transfer of the achieved training effects of all exercises to speed and the realizing of a sports movement. The break between series is such that mentally the treated muscles are loosened by shaking and quickly eliminated in the lactate training of the oxygen debt. The number of repetitions of exercise and the series numbers are determined by training. The visualization is carried out on the level of a film (moving mental images) in which the main protagonist is the athlete himself.

Visualization of sports movements in the reversible regimen of current muscles

Athletes visualize the key movements in their given sports - tennis players visualize serves, volleyball players serves and smashes, handball players, water polo players, tennis players, football players, karate experts, boxers visualize hits, basketball players, football players jumps and sprints with a change in the movement direction in all regimes of running, which is also valid for tennis players, basketball players, handball players, football players, et al. Also visualized are various situations in the game on the level of mental images in which present are only the dynamics of reversible contractions in imagined movements. The idea is that during the visualization, shortened are all the phases of reversible contractions in movement, while in the shortened time increased is the level of force in order for all movements to be carried out easily and properly along with great speeds and increases of jumps. Thus carried out, reversible contractions should enable the sports movements to be carried out in a timely fashion, as well as at great speeds with large precision.

An example from tennis is visualizing the situation of a serve. Visualized is the court, the position of the opponent and one's own position, the speed of the serve and the place on the court where the served ball should end up. Further, visualized is the first (eccentric) stage of the reversible contraction which is carried out at the same time in the knee joint, then the torso, the shoulders, the elbow and at the end, the hand wrist. Visualization of the second (concentric) stage of reversible contractions in a serve is carried out successively. First it is carried out is in the knee, then the torso, the shoulder, the elbow and at the end in the wrist, and in each joint it is powerful, quick, and timely (a perfect inter-muscular coordination). A successive series of contractions should produce a force which will enable in the muscle the predicted speed (over 320 km/h) and the precision of the serve from all positions. The visualization of the carrying out of contractions during a backhand and forehand with one or both hands is carried out in the same way as in the serve, though the speed of the ball should mentally exceed 270 km/h with a 100% spatial precision. Especially visualized is the sense of security and satisfaction due to the ease of managing movements of great speed.

Visualization of the entire game or match with an emphasis on the reversible way of movement

Visualization is the anticipated course of the match, game, way of thinking and behavior of one or more opponents and victory. During this, visualized are all the situations in a real time spatial area, speed, causes, frequency and the way of future changes of the anticipated situation and behavior of the

opponent, as well as all responses planned ahead, and those appropriate to future changes at a film level (moving mental images). In that context, in his thoughts, the athlete sees himself, simultaneously focused on the game and future situation changes. Based on the intentions and behavior of the opponent and the understanding of the causes of changes, he imagines his quick responses (adaptation) to expected changes. He visualizes the superiority of a personal model in a precise anticipation of the moves of the opponent, and the efficiency of resolving (planning) his future behavior appropriate to all situations, their speed, causes and frequency of changes, as well as tasks or tactics which the athlete sets for himself or was given by the trainer. In that context, the visualization of all movements gives a special significance, in whose foundation there is a reversible contraction. Reversible contractions are visualized based on the previously mentioned, so they are very rapid, timely and powerful in relation to the expected behavior of the opponent and situational changes. Also visualized is the number of repeated movements in the anticipated environment, the great speed of producing energy and force, speed and prevision of movement, without the feeling of fatigue, with the security of a perfect revealing of the intentions of the opponent and realization of pre-planned responses or tactical variations along with a permanent sense of satisfaction.

Managing the realization and effects of training

The final stage is the management of the realization and training effects (Milošević & Milošević, 2011; Mudrić et al., 2004; Zatsiorsky & Kramer, 2009). The preceding realized stage enables athletes to work independently (training management) in the club and outside it, along with a trainer or without one, and with that work, a moving of the limits of speed and level of maximum force production of all motor units from 60% to 230% for 3 months of training (Milošević et al., 1997; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011). The acquired knowledge from the prior stages enables athletes to simply apply a modern training technology, to know in advance based on reports from training what they will be doing at every session and how it is carried out (Milošević et al., 1997, 19989, 2000, 2004; Milošević, 2002, 2010_{15}; Milošević & Milošević, 2011; Mudrić et al., 2004; Mudrić, 2010; Zatsiorsky & Kramer, 2009). Further, athletes can be acquainted with the sort of effort necessary for every training session, the response of their organisms to every training during the month and several days after visualization and what the transfer of changes of the achieved visualization on the realization of reversible contractions on training and competitions will be. Management with the mediation of the mentioned knowledge of the athletes secures, along with a permanent resetting of the limits of muscle force, also the strengthening of the willpower, the feeling of security, stability and elimination of exaggerated respect for the opponent (Doillard, 2001; Evert & Jansen, 1996; Ivancevic et al., 2010; Kuehl

et al., 2005; Ungerleider, 1996). This is possible as athletes are enabled to with great dependability know what they can do at each particular training, match or games, how they feel, or in one word, they are enabled to manage themselves, their training and its effects, as well as the tempo and the rhythm of matches or games, the behavior of the opponent and their energy and mental fatigue.

CONCLUSION

Champions in all sports, along with other traits, also have the possibility of using a large amount of force in a short time period during reversible muscle contractions, due to the champion's mind. This paper simply, methodologically and theoretically unfailingly describes the use of the mind in reprogramming the limits of muscle force, using the example of learning reversible contractions via instruction and intellectualizing the training process, then via linking the sensory and kinesthetic codes, visualizing the training and competitive processes, through training itself and managing its realization and effects, as well as using exercises which can disrupt the integrity of the organism of athletes and cause disinhibition processes on all levels which are carried out in the reversible regime of the muscles.

In nearly all sports, while creating a champion, there is no doubt that the most significant is the theoretical-neural-mechanical analysis of the reversible contraction as well as the way to improve it through various kinds of training sessions, using a reliable method which is given in this paper.

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