Psychological Mechanisms of Reproduction of Intensity and Freedom of Movement in Tennis Matches: Transfer of Training Effectiveness to Competitive Conditions

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1. Introduction

One of the most important and difficult problems in sports training is the ability to reproduce in competitions the level of intensity and freedom of movement that is achieved during training. This is especially true for tennis, which requires a high degree of coordination of movements, quick reaction and precise technical actions from the player. In training, athletes usually reach a certain state where movements become smooth, free, and even intense; Thoughts are completely switched to solving game problems. But most players find it difficult to match this level of performance when they find themselves in a competitive environment; a problem that is usually attributed to psychological factors.

The aspect of psychology, which involves the transfer of effective techniques from the training environment to the game environment, has been extensively studied in sports psychology and neuroscience. More importantly, it is about how to come to understand the mechanisms underlying the state of flow, automating movements, and coping with anxiety and stress. The project aims to systematically reveal the psychological mechanisms by which intensity and freedom of movement can be preserved and reproduced in competitive tennis based on modern theoretical approaches and practical observations.

This study will examine in detail the differences between training and competitive psychological attitudes; the theory of flow is discussed; methods of psychological training are considered; Individual psychophysiological characteristics of tennis players that affect the level of their playing efficiency are described. The work is aimed at specialists in the field of sports psychology, coaches and athletes seeking to improve the quality of game implementation in stressful situations.

2. Comparison of psychological conditions: training versus competition

2.1 Nature of the load

In the process of training, the load is usually regulated and predicted: the athlete knows how long the sessions will last, how many repetitions there will be and what exercises will be performed. Training is structured to methodically improve physical and technical capabilities with a controlled degree of intensity. This allows the athlete to pay attention to the quality of movements, work on technique and tactics without strong emotional stress. In such an environment, adaptation occurs gradually, building optimal motor patterns.

In competitions, the situation is fundamentally different. A match is an unpredictable, dynamic process accompanied by the instability of external and internal conditions. Psychological pressure due to the importance of the result and competition significantly increases the intensity of nervous and mental tension. As Hanin's research shows, "when switching to a competitive mode, the sympathetic nervous system is activated, the production of stress hormones – adrenaline and cortisol – increases, which affects the on the functional

state of the athlete"[1]. These changes, although they contribute to the mobilization of the body, often cause increased muscle tension and impair coordination.

Consequently, the competitive and training load are significantly different from each other. Training load is aimed at development, while competitive load is aimed at maximum mobilization and adaptation. Despite the differences in perception and physiological reactions of the body, it is vital for an athlete to learn how to transfer his skills from the training environment to the competitive one.

2.2 The role of anxiety and stress

One of the main factors that prevent a tennis player from maintaining intensity and freedom of movement during a match is anxiety and mental stress. Somatic anxiety manifests itself through physiological symptoms such as sweating and heart palpitations, while cognitive anxiety is associated with thoughts of possible mistakes and negative consequences. Both forms of anxiety can reach a high level in competition, which leads to a significant deterioration in performance qualities.

Baumeister (1984) describes the phenomenon of "choking", when strong emotional stress causes a decrease in the quality of performance in high-level athletes. "Emotional overstrain impairs coordination and disrupts the work of automatic motor programs."[2] Stress causes excessive control of consciousness over automatic motor programs, which slows down reactions and increases the likelihood of errors. This is the mechanism of this phenomenon. For example, a tennis player who easily serves in training may experience stiffness in movements and loss of naturalness in a match.

Experience has shown that dealing with anxiety is an important component of preparing tennis players for competition. The use of relaxation techniques, breathing exercises and mental exercises helps to reduce anxiety and restore the body's trust in the automation of movements.

2.3 Perception of the result

In training, the result is often not a big deal, as mistakes are seen as an important stage in learning and development. This atmosphere allows athletes to experiment and develop without fear of consequences, which contributes to their openness to new motor solutions and innovations. The result is crucial in the competitive process, and the goal shifts from self-improvement to achieving victory.

This shift leads to the fact that the athlete begins to fear mistakes and concentrates on avoiding failures. Gould and Udry (1994) noted that "an over-focus on results can lead to a deterioration in adaptive behavior and motor flexibility."[3] The tennis player begins to slow

[1] Hanin, 2000, p. 234-237
[2] Baumeister, 1984, p. 612-615
[3] Gould & Udry, 1994, p. 481-485

down movements, avoid risky strokes, and act less expressively, which reduces the overall level of intensity and freedom of movement.

Thus, the perception of the result affects the mental state of the athlete and, consequently, the quality of performance. To overcome this effect, you need to change your settings, shift your attention from the result to the process and become more confident in your abilities.

2.4 Social and psychological pressure

The presence of an audience, the expectations of the coach, family and sponsors create additional social pressure on the athlete. This pressure increases the level of stress and causes doubts in one's own abilities, exacerbating anxiety. Sports psychology highlights the effect of "social observation", when the presence of spectators and the possibility of evaluation increase internal tension. "The presence of the public can impair motor performance due to increased self-control and anxiety."[4]

A good example is a young tennis player who easily performs technical elements in training, but when he plays in big tournaments, he restricts movement due to fear of public evaluation. To overcome this phenomenon, simulation of game conditions with the participation of spectators is used, as well as training with elements of public speaking and feedback.

Good psychological preparation includes the assimilation of skills of self-regulation and resistance to social pressure, which is achieved through the repeated repetition of competitive situations.

2.5 The problem of "paralysis of analysis"

"Analysis paralysis" is a condition in which excessive conscious interference with automatic motor processes makes movements less effective and less effective. This manifests itself in tennis in excessive control over technique, which leads to a slowdown in reaction time and a loss of naturalness. Studies by Beilock & Carr (2001) confirm that "conscious intervention increases the load on the prefrontal cortex and disrupts the automatic implementation of movements."[5] For the athlete, the task is to learn to trust bodily memory and allow the movements to be performed automatically, without unduly interfering with the mind.

In practice, this is achieved through attention training, the development of awareness and work with psychological barriers that prevent you from "letting go of control" and fully realizing your physical capabilities in the match.

4 Smith, 1990, p. 270-275

5 Bellock & Carr, 2001, p. 290-295

3. Flow theory and automation of movements in sports

3.1 Flow state: structure and features

The state of flow, first described by Mihaly Csikszentmihalyi, is one of the central phenomena that explain the high level of productivity and freedom of movement in sports. Flow is characterized by total immersion, a balance between challenge and skill level, a lack of self-criticism, time compression, and a sense of control.

This means that in tennis, all actions are performed without internal tension, with high speed and precision. This condition allows free and intense movements, which improves reaction and ability to adapt to the situation on the court.

3.2 Conditions for achieving flow in training

In order to achieve a state of flow in training, it is necessary to create conditions in which the athlete can fully concentrate on a specific task without any external obstacles or excessive pressure. In training, it is very important to have clear goals. Each component of technique and tactics should have a specific and achievable goal to increase concentration and engagement. Being able to get quick feedback from the coach and athlete is crucial. The flow is either interrupted or does not start if there is no adequate feedback.

In addition, the training environment should strike a balance between the degree of difficulty of the tasks and the degree to which the athlete can cope. Tasks that are too easy or too difficult cause boredom and anxiety. The state of flow develops in the "zone of proximal development", where the challenge corresponds to mastery.

The ability to switch attention between internal (body sensations, breathing) and external (ball position, opponent) stimuli is another important factor. This flexibility of attention helps to integrate the cognitive and bodily processes necessary for the development of automatism. In addition, the likelihood of entering the flow during training increases significantly with the regular use of mental techniques, such as visualizing successful game episodes or meditative practices.

Thus, flow training is not just exercises, but a complex process that includes attention management, creating optimal conditions for motivation and self-confidence.

3.3 Obstacles to flow in a match

In a competitive environment, there are many psychological obstacles on the way to the state of flow. First, the high levels of anxiety and stress caused by social control and outcome pressures make concentration much more difficult. Second, when people start talking about themselves within themselves, they become more questionable and insecure, which disrupts the natural flow of automated motor programs.

Technical and tactical mistakes, perceived by an athlete as a threat to his own status and success, can cause a chain reaction of negative emotions, which blocks further immersion in the gameplay. Often, athletes describe a state of "turning off" or "freezing" when everything seems uncontrollable and movement becomes mechanistic and restricted.

In addition, match conditions require constant adaptation to the changing game situation and the actions of the opponent, which requires a significant cognitive load. Loss of concentration and loss of harmony occur due to excessive attention to the assessment of one's own game and the actions of the opponent.

The problem of "analysis paralysis" is most pronounced in athletes, when they consciously control each movement, trying to correct mistakes in real time. This results in slowing down and loss of natural movements, which reduces performance and enjoyment of the game.

3.4 Automation as a protection against anxiety

Automation of movements means that certain movements are made unconsciously and do not require active attention. Automation is critical to maintaining efficiency in stressful situations in tennis, where speed of decision-making and accuracy of execution are critical.

With a high degree of automation, the athlete can perform the most complex technical elements without the need for conscious control, which reduces cognitive load and reduces the impact of anxiety. "Automated skills protect the athlete from 'paralysis of analysis' by allowing the body to work on 'autopilot', even under heightened emotional stress."[6]

However, automation does not imply mechanistic repetition of movements. Due to its flexibility, this process can adapt techniques to changing playing conditions while maintaining high accuracy and speed. High-quality feedback and repetition form automation, ensuring reliability and stability of performance.

Psychologically, automation helps an athlete feel more confident and calm because he knows that his body "knows" how to act in any situation. This confidence reduces anxiety and increases overall freedom of movement.

3.5 Freedom of movement as a product of bodily confidence

Freedom of movement is not only the absence of physical restrictions, but also a state of self-confidence and control over the body. Bodily confidence is vital to ensure optimal motor activity in tennis, where a quick and accurate response to the game is required.

A sense of stability, balance, and coordination are the basis of bodily confidence. These sensations are achieved through targeted training, including the development of muscle memory, flexibility and endurance. This state allows the athlete to "relax" and express movements freely, as it is associated with the reduction of doubts and internal tension.

6 Beilock & Carr, 2001, p. 290-295

Bodily confidence is associated with the integration of sensorimotor signals in the cerebral cortex and the synchronization of the CNS. Movements become more harmonious and coherent with an increase in the level of integration.

Freedom of movement is manifested in the ability to quickly and effectively change game strategies, experiment with technique and use a creative approach to solving game problems. Thus, bodily confidence is the foundation for realizing maximum intensity and adaptability on the court.

4. Training methods of preparing for competitive stress

4.1 Simulation training

Simulation training is a training session that has been designed in such a way as to meet the conditions of the competition as much as possible. These include creating playing conditions that are typical of matches, as well as adding pressure factors such as the presence of spectators, referees, or time limits for performing actions.

The main purpose of such training is to change the physical and mental response of the athlete to stress. Imitation helps reduce the novelty of the competitive environment, which reduces anxiety and helps to get into a better rhythm during a real match.

This type of training also teaches you to switch attention and control emotions, while maintaining high intensity and freedom of movement. An athlete learns to maintain concentration and confidence despite stress. Simulation training is widely used in professional tennis and is considered one of the most effective methods of preparing for tournaments, especially for young athletes who have difficulty adapting to competitive stress.

4.2 Visualization and mental scenarios

Visualization is a psychological technique that allows the athlete to imagine how he acts in the game, as well as his movements and achievements. As a result of this approach, neural patterns similar to those that occur in a real game arise, which improves the automation of movements and reduces anxiety.

Tennis players can create mental scenarios to "live" the match in advance, practice ways to respond to problems and make successful decisions. This builds confidence and helps you prepare for unexpected twists and turns in the game. Psychologists note that visualization improves the perception of one's own state and helps to form positive attitudes that help to remain stable and free during competitions. Visualization should be thorough, involving all sensory channels (sight, hearing, touch), and repeated regularly to create stable motor and emotional patterns. This will be as effective as possible.

4.3 Relaxation and breathing techniques

Relaxation and controlled breathing techniques are important for reducing the physical strain caused by anxiety and stress. Proper breathing affects the quality of movement because it controls oxygen levels in the blood, lowers the heart rate, and promotes muscle relaxation.

Even in between games, athletes can quickly regain mental and physical balance with techniques such as diaphragmatic breathing, progressive muscle relaxation, and autogenic training. Research in sports psychology shows that these techniques work. Athletes who regularly perform breathing and relaxation exercises show a significant improvement in performance. Relaxation techniques help maintain freedom of movement by preventing unnecessary muscle tension, which often leads to poor technique in stressful situations.

4.4 Pressure Modeling and Distraction Management

Modeling pressure and working with distractions are methods aimed at developing the psychological resistance of the athlete to internal conflicts and external stimuli. In tennis, distractions can include the opponent's behavior, one's own thoughts and emotions, the noise of the audience, and the opponent's behavior.

Training exercises help to develop skills to quickly restore focus in the presence of distractions. Repeating important moments of a match can help an athlete get used to high demands and stress, which reduces the likelihood of a "breakdown" in real competitions. These strategies contribute to the development of psychological flexibility, which means the ability to adapt to change and continue to behave effectively in any situation.

4.5 The role of the trainer as a stability mediator

The coach plays an important role in creating a psychological environment that supports the athlete in confidence and stability. It not only provides technical knowledge, but also provides emotional support, helping to adjust attitudes and manage stress.

Quality coach feedback helps the tennis player become more confident in their abilities and helps them avoid excessive self-criticism. In addition, the coach helps in developing rituals and strategies to optimize the mood before the match. In addition, the coach helps the athlete adapt to the environment by demonstrating stressful situations in training and helping them interpret the results correctly. The role of the coach goes beyond technical training and plays an important role in developing mental resilience and the ability to use the same intensity and freedom of movement in a match as in training.

5. Individual characteristics and psychophysiology of a tennis player

5.1 Type of temperament and its influence on behavior in the match

"Individual characteristics of an athlete, including the type of temperament and the ability to regulate emotions, significantly affect his reaction to competitive stress."[7] Choleric, sanguine, phlegmatic and melancholic differ in the level of excitability, emotional stability and ways of responding to stress.

Choleric people are prone to rapid excitement, which can cause emotional outbursts, as well as high activity. Sanguine people cope better with stress and recover faster from failures. Melancholics are very sensitive and prone to introspection, and phlegmatic are calm, but sometimes not proactive. Tennis players who understand their character can change their behavior and control their emotions by choosing the best strategies for preparing and controlling their condition during the match. Coaches, in turn, should take these features into account when planning training and providing athletes with psychological support.

5.2 The role of self-esteem and player identity

An athlete's self-esteem is an important part of his psychological stability and motivation. Low self-esteem leads to doubt and fear of failure, and confident behavior, freedom of movement, and reduced anxiety.

A player's self-esteem and his image of himself as an athlete are formed on the basis of his experience, achievements and social recognition. A positive identity helps athletes develop psychological flexibility and resilience, which allows them to remain motivated and concentrated even in difficult conditions. Psychological work aimed at improving self-esteem and positive self-image is crucial to preparing tennis players for competition.

5.3 Neuropsychology: The role of the prefrontal cortex and the amygdala

In neuropsychology, the prefrontal cortex and amygdala are the main structures that regulate the behavior of an athlete under stressful conditions. The prefrontal cortex is responsible for cognitive control, attention regulation, and decision-making, while the amygdala is responsible for emotional reactivity, particularly anxiety and fear.

Maintaining a balance between these structures helps the athlete stay calm and focused on the task under stress. Excessive activity of the amygdala causes emotional arousal and cognitive decline, which prevents players from playing effectively. Self-regulation training, such as meditation and breathing techniques, improves the functioning of the prefrontal cortex and reduces the influence of the amygdala. Understanding neurophysiological processes allows you to create more accurate strategies for the psychological training of athletes.

7 Hanin, 200, p.45

5.4 Psychological flexibility and acceptance

Psychological flexibility is the ability to adapt to changing conditions and manage your thoughts and emotions without allowing them to interfere with the achievement of goals. In tennis, it manifests itself in the ability to maintain concentration and calmness, despite mistakes and unexpected game situations.

Accepting one's own feelings and thoughts without overestimating allows you to avoid internal resistance and paralysis of analysis, which contributes to freedom of movement and the effectiveness of the game. "Under pressure, skilled athletes can unexpectedly 'break' due to heightened self-awareness and excessive control over their game."[8]

Cognitive behavioral therapy methods and mindfulness practices help to develop psychological flexibility, which becomes an important component of the training process. "Automating skills reduces cognitive load and protects the athlete from 'paralysis of analysis' in stressful situations by allowing the body to perform movements automatically."[9] The ability to "go with the flow" of the game, without dwelling on the negative, makes the tennis player more resistant to stress and improves the quality of his performances.

5.5 Moving from Assessment to Observation: Developing Mindfulness

The transition from evaluative thinking to neutral observation of one's own sensations, thoughts, and emotions is called the development of awareness, or mindfulness. This skill helps athletes better concentrate and control their bodies, reduces internal pressure and criticism.

Mindfulness helps a tennis player accept circumstances as they are, rather than trying to correct mistakes right away, which reduces the likelihood of getting "stuck" in negative situations and promotes more natural and fluid movements. Many professional athletes include regular meditation and mindfulness classes in their program, which are considered one of the effective methods to improve their athletic performance.

6. Practical recommendations and migration strategies

6.1 Building Trust in Body Memory

For the successful transfer of skills from the training process to competitive activities, the development of trust in body memory is a key component. Body memory arises as a result of repetitive movements that are fixed in the nervous system of the athlete, which leads to the creation of automated motor programs. These programs allow the tennis player to practically not control complex technical elements. This frees up cognitive resources to make tactical decisions and adapt to changing match conditions.

8 Baumester, 1984, p. 613

9 Beilock $ Carr, 2001, p. 703

Developing this trust requires not only numerous repetitions, but also a deep understanding of each movement, as well as an understanding of the effectiveness and correctness of the technique. Training should be varied and adapted to game situations so that the brain and body can "remember" the right level of intensity and dynamism.

In addition, regular reflection, which includes evaluating the movements that have been performed as well as feedback from the trainer, plays an important role in improving and strengthening body memory. This prevents incorrect motor patterns from occurring and helps to consistently reproduce the technique you want, even in a competitive environment. In this way, athletes can maintain the freedom and fluidity of the movements achieved in training and successfully perform their movements in the match thanks to the trust in bodily memory.

6.2 Focus on the process, not the result

One of the fundamental principles of the psychological preparation of a tennis player is to focus on the process of the game itself, and not on the final result. This change of perspective allows the athlete to maintain intrinsic motivation, increase concentration levels, and reduce stress pressure, which is often associated with expectations of victory or fear of failure.

Concentration on the process includes attention to technical aspects, tactical decisions, breathing, and inner feelings in each specific moment of the game. This approach helps to stay in the present moment, which is a prerequisite for achieving a state of flow, a special psychological state in which a person uses his resources as efficiently as possible and shows his best qualities.

The practice of mindfulness and the development of mental rituals before and during the match help to maintain this concentration. For example, simple breathing exercises, short pauses to focus on sensations and mental attitudes help the athlete to "reboot" and avoid distractions. In addition, attention to the process helps the athlete perceive mistakes not as a disaster, but as a natural part of learning, which reduces the level of self-criticism and contributes to maintaining psychological stability.

6.3 Developing rituals before and during a match

Rituals are an important psychological tool that helps an athlete create a stable psycho-emotional state necessary for a successful performance. They form a certain rhythm and sequence of actions that reduce the level of anxiety, provide a sense of control and confidence.

Before the match, rituals can include preparatory actions: a certain warm-up order, visualization of game situations, repetition of mental attitudes, breathing techniques or certain movements with a racket. During the match, these are the usual movements before serving, rhythmic steps, short pauses for breathing and concentration.

It is important that the rituals are individual and organically fit into the overall strategy of the athlete's training. The regularity and consistency of rituals create stability and a sense of

security, allowing the athlete to reduce internal tension and maintain high intensity and freedom of movement. Psychological research shows that rituals help to shift attention from external stressors to internal resources, which significantly improves the quality of performance in a competitive environment.

6.4 Feedback and self-reflection after the game

Feedback is a key component of tennis player development, helping to reinforce positive skills and identify areas for improvement. It can be external - from the coach, partners or specialists, and internal - through the self-reflection of the athlete.

External feedback should be constructive, specific, and timely. It helps to identify technical errors, incorrect tactical decisions and psychological moments that affect the game. However, it is important that it is presented in a supportive form, which helps to increase motivation and self-esteem.

Self-reflection involves analyzing your actions, emotional state, and thoughts after a match or training. Regular diarying, the use of video analysis and a focused discussion of the results with the coach allow the athlete to form a more objective and realistic perception of his capabilities.

This practice contributes to the development of psychological stability, helps to correct internal attitudes and increase the level of self-control, which ultimately leads to the stability of performances and an increase in sports results.

6.5 Long-term construction of competitive stability

Competitive stability is a complex quality that is formed not in one day, but as a result of systematic and long-term work of the athlete and his team. It includes technical, physical and psychological training, as well as the ability to manage stress and recover from failures.

Many years of experience in competitions and regular training with an emphasis on psychological skills such as self-regulation, concentration, adaptation to changing conditions and emotional management allow the athlete to develop resistance to high loads.

The coach, the sports psychologist and the tennis player themselves must work closely together to create a holistic system of support and development that will help maintain optimal gaming activity even in the most stressful situations.

This process requires patience, perseverance and flexibility, because each new stage of a sports career brings its own challenges and requires adaptation. However, it is this long-term preparation that lays the foundation for a successful and stable performance at the highest level.

7. Conclusion

Reproducing the same intensity and freedom of movement in a match as in training is a multifaceted task that requires the integration of psychological, physiological and technical training. Flow theory, automation of motor skills, individual characteristics of the athlete and specially developed training methods form the foundation on which the successful competitive activity of a tennis player is built.

Practical strategies aimed at developing trust in bodily memory, concentration on the process, the use of rituals, effective feedback and long-term building of competitive stability allow the athlete not only to achieve high results, but also to maintain health and motivation in the long term.

An integrated approach that takes into account all these aspects provides the athlete with the opportunity to maximize his potential and successfully implement the qualities achieved in training in a match, which is the key to a successful sports career and personal growth.

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