

# Research on Sports Decision Making in Higher Learning Institution Tennis Players in Jiangxi of China

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## Abstract

This study explores sports decision-making among collegiate tennis players in higher learning institutions in Jiangxi, China, focusing on how training strategies, skill levels, and competitive experience impact decision-making during play. Tennis, a dynamic and fast-paced sport, demands rapid and strategic thinking, as well as adaptability to evolving game conditions. This research examines differences in decision-making abilities among players with varying skill levels and years of training and evaluates the role of innovative training programs, including multi-task combination training, in improving performance. By offering practical insights into enhancing strategic decision-making, this study contributes to the growing field of sports science and provides a foundation for developing training programs that integrate cognitive and physical components to foster holistic athlete development. The findings aim to support athletes in achieving optimal performance through better decision-making strategies both on and off the court.

**Keywords:** Sports Decision-Making, Tennis Players, Training Programs, Athletic Performance, Cognitive and Physical Development

## Introduction

Decision-making is a critical element of athletic performance, particularly in sports like tennis, where players must quickly evaluate complex, rapidly changing scenarios and respond strategically under pressure. Collegiate tennis players in Jiangxi, China, face unique challenges and opportunities in refining their decision-making skills due to the competitive and demanding nature of their sport. This study investigates the factors influencing sports decision-making among these athletes, aiming to understand how skill levels, training

duration, and innovative methods such as multi-task combination training affect their ability to make effective decisions during competition.

Research into sports decision-making underscores its importance in distinguishing elite athletes from their peers. Tennis players, for example, must continuously assess their opponents' movements, anticipate shots, and execute precise strategies, all while managing the physical and emotional demands of competition. As highlighted by Šimeček (2023), effective decision-making in sports relies on both physical preparation and mental agility. Similarly, Williams et al. (2022) emphasize the role of well-structured training regimens in enhancing strategic thinking and adaptability, which are essential for success in high-pressure scenarios.

Studies by Wang et al. (2021) and Santos et al. (2022) further illustrate that decision-making proficiency varies significantly among athletes with different skill levels and training experiences. These findings suggest that targeted interventions, such as multi-task combination training, can significantly enhance players' strategic capabilities. Chen et al. (2021) also support this approach, demonstrating that badminton players exposed to innovative training programs showed improved decision-making speed and accuracy, suggesting parallels that could be explored in tennis.

Moreover, research by Lee and Kim (2021) highlights the impact of stress and emotional regulation on athletes' decision-making abilities, pointing to the need for holistic training strategies that address both physical and mental components. Mayer et al. (2023) advocate for the inclusion of cognitive and emotional regulation exercises in sports training, emphasizing their potential to improve athletes' overall performance. These findings align with Patel and Davidson's (2020) argument that emotional regulation plays a vital role in maintaining decision-making efficiency under pressure.

Despite these insights, there is a lack of localized research on sports decision-making among collegiate tennis players in Jiangxi, China. Addressing this gap, this study explores the decision-making processes of athletes in this context, examining how factors such as skill levels, training duration, and innovative training methods contribute to performance outcomes. By focusing on this specific population, the research aims to provide actionable recommendations for enhancing decision-making through comprehensive training programs. Sports decision-making is a pivotal aspect of athletic performance that can be nurtured through targeted interventions and holistic training approaches. By exploring the decision-making abilities of collegiate tennis players in Jiangxi, this study contributes to the broader understanding of how athletes can optimize their strategic thinking and adaptability, paving the way for improved performance both on and off the court. The study aim to answer the following questions.

1. What are the differences in sports decision-making abilities among collegiate tennis players of varying skill levels in Jiangxi, China?
2. How do years of training influence the sports decision-making abilities of collegiate tennis players in Jiangxi, China?
3. What is the impact of multi-task combination training on the sports decision-making performance of collegiate tennis players in Jiangxi, China?
4. How do training interventions affect the sports decision-making abilities of collegiate tennis players in Jiangxi, China, post-intervention?

5. What factors contribute to effective sports decision-making in collegiate tennis players in Jiangxi, China?

**Literature Review**

***Sports Decision Making***

*Overview of Decision Making*

Making the right call from a menu of options is a common example of decision making in athletics. Important for a sportsperson's performance, it impacts their agility, responsiveness, and precision in executing strategies. Athletes do not have an innate set of cognitive abilities, but they can hone them via practice and competition. Some of the most important executive functions for successful athletic decision-making are working memory, inhibitory control, cognitive flexibility, and others (Beavan et al., 2020). As an example, a study carried out in the UK by Beavan et al. (2020) discovered that athletes exhibiting higher levels of these executive functions exhibited superior decision-making abilities when faced with intense game pressure. Quick processing of information, laser-like focus on the big picture, and the ability to make split-second decisions are all skills that help athletes succeed. Some researchers have recently tried to develop a theoretical model of how people think when making decisions in athletic settings by studying the process through the lens of applicable theories (Ashford et al., 2021). The model put forth by Ashford et al. (2021), based on their research in Australia, describes the decision-making and information-processing processes of athletes while they are competing, drawing attention to the significance of both internal and external influences. Refer to graph 1.

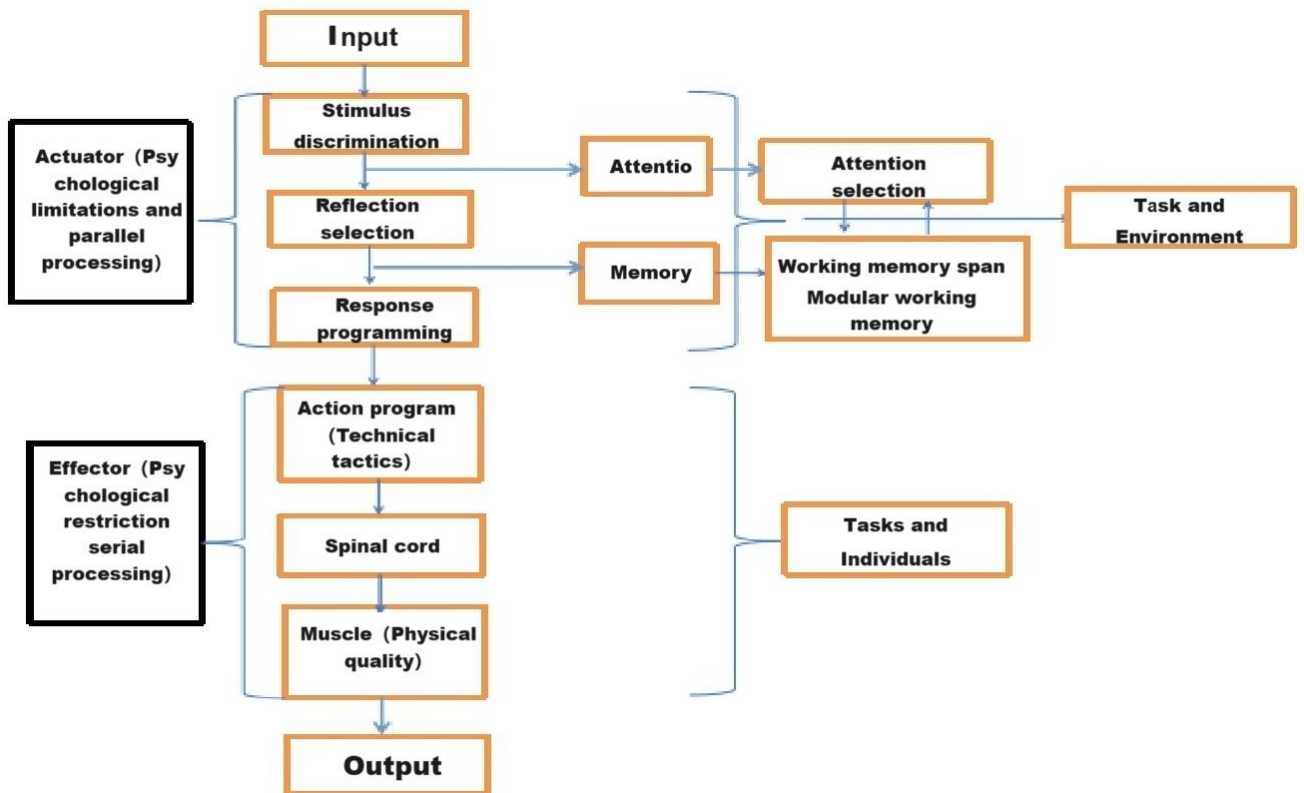


Chart 1 Motion Decision Modelling

*Types of Sports Decision Making*

Intuitive and cognitive decision-making are the two primary frameworks in sports. Intuitive decision-making is similar to making the ideal shot in golf or the correct pass in football; it comprises responding appropriately to a given situation. In order to make decisions like this in different situations, athletes need to be technically proficient and adaptable. Donka and Balogh (2022) in Hungary, for instance, discovered that top-tier football players with superior technical abilities were better able to make good decisions when faced with time constraints. This highlights the need of being technically proficient in situations that are constantly changing. Using higher-order cognitive processes is essential while making tactical decisions. The ability to understand the game, anticipate your opponents' moves, and devise strategies to exploit your team's advantages and disadvantages are all necessary qualities of a good athlete (Donka & Balogh, 2022). Players with good tactical decision-making skills, such as being able to read their opponents' moves and change their own strategy appropriately, also fared better in competitive bouts, according to their research. Athletes must make both types of decisions, and their decision-making abilities are impacted by things like the specific demands of their activity, their cognitive capacity, and their experience level.

### *Intuitive Decision-Making*

Good sportsmanship boils down to making the appropriate technical call at the right moment. A basketball player's decision to shoot or pass is an example of a technical decision that requires quick reflexes and pinpoint accuracy. Athletes with more experience and training are better able to make technically good selections when time is of the essence. When it comes to making technical decisions in the face of sudden physical stimuli, Kalén et al. (2021) state that athletes' motor skills, reaction speeds, and physical training are crucial. The Swedish research by Kalén et al. indicated that under intense game pressure, basketball players with greater stamina and quicker reflexes made more accurate technical decisions. This demonstrates how an athlete's technical decision-making skills can be enhanced through thorough training and physical preparation.

### *Cognitive Decision-Making*

Cognitive decision-making is dependent on technical knowledge and is based on strategic reasoning. There are decisions that call for forethought, cerebral processing, and strategic manipulation of the game's progression. Team sports rely heavily on this type of decision-making because winning or losing depends on understanding your formation, the roles of your players, and the best way to utilize your resources. All aspects of the game, including the current scenario, the opponent's patterns and strategies, and the potential results of specific acts must be considered as athletes make tactical decisions. Competing at the top levels requires the development of critical thinking and decision-making skills; these are the areas that elite coaches and trainers focus on the most (Sharma et al., 2022). The Indian study by Sharma et al. (2022) indicated that highly trained soccer players had a better chance of winning matches due to their improved ability to anticipate their opponents' moves and make efficient tactical adjustments. This highlights the value of tactical training in getting athletes ready to give their best performances in all kinds of competitions.

### *Sports Decision Making in Tennis Players*

Tennis provides a one-of-a-kind context for studying decision-making in sports due to its rapid pace and frequent intuitive and cognitive decision-making. Players on the tennis court are under continual mental and physical pressure to make split-second judgments on their

positioning, shot selection, and match strategy. Research on tennis players' decision-making abilities has shown that one of the most important skills is the ability to read an opponent's non-verbal cues, such as their body language and shot patterns, and to predict their next move. Because they are able to make more informed choices, players who possess these qualities have a distinct edge. Furthermore, research shows that the capacity to make split-second decisions under duress is just as important as technical skill when it comes to making top tennis players stand out from the crowd. According to Heilmann et al. (2022), this proves that cognitive functions are crucial for peak performance in sports. German researchers Heilmann et al. (2022) discovered that top tennis players fared better in high-stakes matches when they were able to read their opponents' non-verbal clues and make quick decisions under duress. In addition to mechanical competence, this study highlights the importance of cognitive abilities for reaching the highest levels of tennis performance.

#### *Relationship between Brain Executive Functions and Sports Performance*

Athletes' ability to integrate their physical abilities with their cognitive processes has recently received a lot of attention, highlighting the interconnected nature of these two domains. Working memory, inhibitory control, and cognitive flexibility are components of executive functions in the brain. These functions allow for planning, decision-making, error correction, and adaptation to new conditions. These cognitive talents are essential for making split-second decisions, devising long-term strategies, and adapting to changing situations; they are also significantly relied upon in everyday life and athletic performance. Athletes with higher levels of cerebral executive functioning performed better in sports requiring quick decision-making and strategic planning, according to a study by Verburgh et al. (2021) performed in the Netherlands. This correlation emphasizes the value of cognitive training for improving athletic performance on all fronts.

Extensive research points to a reciprocal relationship between exercise and enhanced executive functioning in the brain. Staying active on a daily basis can help you perform better in sports. Cognitive capacities, especially executive function, and brain health will both improve as a result of this. Aerobic exercise has a favorable effect on brain executive functions, particularly inhibitory and attentional control, according to a meta-analysis carried out in Switzerland by Ludyga et al. (2020). Incorporating aerobic exercise into training programs may be beneficial for athletes' physical health and the cognitive components necessary for their performance on the field, according to this study's results.

Sports are distinct from other activities and place special demands on executive functions; this highlights the complicated relationship between cognitive capacities and athletic performance. Sports requiring continual decision-making, tactical thinking, and on-the-fly strategy adjustments, such as soccer, basketball, and tennis, place a premium on the executive functions of the brain. According to a study carried out in Sweden by Vestberg et al. (2022), elite soccer players had superior executive function abilities compared to the general population. This was particularly true for tasks requiring inhibitory control and cognitive flexibility. Not only do these activities tend to attract individuals with stronger executive functions, but there is mounting evidence that they may also improve cognitive capacities through sport-specific training and experiences.

Sports for youth and the development of physical and mental abilities are as crucial to the proper functioning of the brain's executive processes as professional sports for adults. A study carried out in China by Guo et al. (2021) found that kids and teens whose brains were involved in organized sports had better executive functioning. This link is particularly interesting because the brain is still changing and developing during adolescence, namely during the development of executive functions. Cognitive development, which may lead to better health and academic performance, can be facilitated by engaging in sports that call for strategy, coordination, and teamwork. Incorporating sports into current educational and developmental programs is, thus, a fantastic approach to aid in the mental and physical growth of young people.

Emerging from the field of neuroscience, new technological approaches have been developed for testing and training the executive functions of the brain in relation to athletic performance. Athletes can learn to focus and regulate their thoughts with the help of neurofeedback training, which provides real-time feedback on brain activity. The Italian study by Staiano et al. (2020) indicated that athletes' field performance was enhanced after receiving neurofeedback training for their attention and brain executive functions. This technique shows the potential of technology-assisted training methods for improving the mental aspects of athletic performance as an alternative to traditional physical training.

Lastly, there are numerous intricacies to the intricate network of connections between the brain's executive functions and performance on the field of athletics. These include the following: the benefits of exercise on cognitive abilities; the unique cognitive demands of different sports; and the long-term effects of youth sports participation on brain executive functions. If it turns out that the brain's executive functions are really important for sports performance, that could change training programs, how athletes grow, and how sports science deals with cognitive training. A fascinating new field of research has emerged for sports scientists, coaches, and players: cognitive training and its potential to enhance athletic performance in conjunction with physical training. By including cognitive components into athletic growth and training programs, individuals can reach their full performance potential in all aspects of life.

## **Discussion**

This study underscores the significance of sports decision-making as a critical factor influencing the performance of collegiate tennis players in Jiangxi, China. The findings revealed that players of higher skill levels consistently demonstrated superior decision-making abilities compared to their less experienced counterparts. This distinction is likely due to their refined strategic thinking and ability to anticipate game dynamics effectively. These results align with prior research emphasizing that expertise and accumulated practice contribute significantly to athletes' ability to make rapid and effective decisions under competitive conditions.

Training duration emerged as another crucial factor impacting decision-making abilities. Players with longer years of training displayed heightened situational awareness and adaptability during matches. This improvement is consistent with findings in previous studies, which suggest that prolonged exposure to competitive scenarios enhances cognitive functions such as pattern recognition and anticipation. The gradual progression in decision-

making skills observed among more experienced players underscores the value of sustained and deliberate practice in fostering both technical and mental competencies in tennis.

Multi-task combination training proved to be a valuable intervention in enhancing sports decision-making among the participants. Players who engaged in such training exhibited notable improvements in their ability to analyze complex game situations and execute appropriate strategies under pressure. This approach, which integrates cognitive and physical training elements, mirrors findings from other sports, demonstrating its effectiveness in preparing athletes for high-pressure environments. It also highlights the potential of innovative training methods to bridge gaps in strategic thinking and physical execution during gameplay.

The practical implications of these findings are significant for coaches and trainers aiming to optimize player performance. Incorporating decision-making exercises into standard training routines can help players develop the ability to process information quickly and respond strategically. Drills designed to mimic match conditions, combined with targeted cognitive challenges, could enhance athletes' overall readiness for competition. The findings also suggest that multi-task training programs should be prioritized to foster a more holistic development of both mental and physical skills.

The study also underscores the interplay between cognitive and emotional factors in decision-making. Stress and pressure, commonly experienced during matches, may impair decision-making performance, particularly in less experienced players. This highlights the need for psychological training alongside physical and cognitive preparation. Techniques such as mindfulness, visualization, and stress management could further enhance athletes' ability to maintain focus and composure during high-stakes moments, ultimately improving their decision-making capabilities.

This study contributes to the growing body of sports science research by providing insights into how decision-making abilities can be nurtured among collegiate tennis players. The findings emphasize the importance of integrating innovative training methods, consistent practice, and psychological preparation to foster comprehensive athlete development. By addressing both cognitive and physical components, coaches and sports educators can create well-rounded training programs that enhance decision-making performance and overall athletic success. These insights have the potential to inform broader applications in sports training, supporting athletes in achieving peak performance.

### **Conclusion**

The results of the correlation between cognitive tactical decision-making and intuitive tactical decision-making in tennis of students with different tennis fundamentals (skillful, beginner novice) in physical education majors were analyzed. In terms of the correctness rate (ACC) index, All showed a significant positive correlation between a significant positive correlation between correct cognitive tactical decisions and correct intuitive tactics. This indicates that the students' tactical intuitive decision-making ability and cognitive decision-making ability in this experiment are consistent, i.e. tactical intuitive decision-making and cognitive decision-making are highly correlated, and the two decision-making abilities have obvious characteristics at individual level. In terms of reaction time (RT) indicators, data analysis of

students from different tennis groups resulted in no significant correlation and low correlation coefficients on RT indicators, and the results showed no correlation on reaction time indicators, with cognitive tactical decision-making reaction time and intuitive tactical reaction time both showing no correlation

Ultimately, this study contributes to a growing body of evidence supporting the integration of cognitive science into sports training methodologies. By bridging the gap between mental and physical preparedness, coaches and sports scientists can foster holistic athlete development, enabling players to reach their full potential on and off the court. Future research should expand on these findings by exploring long-term impacts, gender differences, and cross-sport comparisons, paving the way for innovative, science-driven approaches to enhancing athletic performance at all levels.

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