

# A Study of the Reaction and Performance of Elite Athletes

Jun Zhang<sup>1,\*</sup>

<sup>1</sup> School of Physical Education, Zhengzhou Normal University, Zhengzhou 450000, China

\*Corresponding Author

**ABSTRACT.** *The relationship between football passing and catching and reaction time was studied by using the methods of literature and mathematical statistics. It was pointed out that the speed of reaction time had different effects on the stability of football players passing and catching, and the reaction speed of some students in the college of physical education was analyzed and compared.*

**KEYWORDS:** *reaction time; the driving force; reaction time; the investigation and study.*

## 1. Introduction

With the development of football in China, the performance and training level of Chinese athletes are improving. Results again and again refresh, technical and tactical level and international strong team close. In the personal physical quality and personal control level of the gap between the narrowing of the high-level players, the decision of the whole team may be in the handling of a key shot between the minute, the characteristics of modern football is distinctive, is the rapid transformation of attack and defense, fierce confrontation, huge physical consumption. Therefore, it is very important for football players to judge accurately the passing and receiving of teammates and opponents, and to be sensitive in movement and reaction ability. Reaction ability refers to the movement technique and movement ability mastered by athletes. Reaction process and reaction are different concepts. Reaction ability refers not to the duration of reaction, but to the time required for the body to make movement response after receiving external stimuli. In the highly competitive football game, the reaction speed of players plays an important role in the performance of the game. Therefore, it is of great significance for coaches to guide athletes in scientific training to study the influence of reaction and sports performance in football.

## 2. Research Methods

Hownet database in this paper, the data comes from China, China academic journal network, Internet search, zhengzhou normal college library, etc., mainly refer to the related content, books and related papers, mainly for reaction, football training for sorting and collecting papers related to, mainly including measuring instruments and measuring method of the reaction time, the important factors influencing the reaction time, the main factor affecting the football player performance, etc., to get the basis and data support, laid a theoretical basis for thesis writing.

## 3. Sensory classification and error analysis in reaction time

### 3.1 Conceptual classification of reaction time

In the field of psychology, reaction time is one of the important indicators of psychological stability and reliability. Reaction time can measure the excitation and inhibition function of cerebral cortex, and analyze people's attention, emotion, learning and thinking, personality differences and other psychological activities. The world health organization (WHO) USES reaction time as one of the key components of the neurobehavioral core portfolio test. Nowadays, reaction time measurement is widely used in medicine, pharmacy, hygiene and psychology.

In 1986, Dr. Dongders had a research application for reaction time measurement. He divided the reaction time into three categories, and the identification reaction time, simple reaction time, and selective reaction time. In addition, reaction time, as one of the indicators to judge the activity of external conditioning, is also divided into visual and auditory motor response, which are widely used in sports training activities. Lay solid scientific theoretical foundation for physical training.

In sports and training theory, reaction time can be divided into simple reaction time and complex (or selective) reaction time. The simple response is the response of the subject to a single stimulus in some way. As soon as a conditioned stimulus appears, a corresponding responsive action occurs. Sports stimulate the simple, the athlete is in accordance with the original signal, after the nerve center of sports reflection system, governing body organs in the activities of the fixed way, such as track and field athletes starting gun launching, gymnastics, figure skating movement after hear a chime to established body movements, these are the simple reaction time. Complex (or choice) is to point to in a complex environment when the reaction conditions, a number of different reactions for the athletes, but also as a response signal of sexual action of each different athletes must select a correct responsive action in response, ball games, archery, wrestling, boxing is applied to the complex reaction. So different sports use different responses. Reaction time is one of the important indexes to evaluate athletes' performance and performance level, which is of great research value. Coaches have never stopped thinking and discussing about how to improve athletes' reaction speed and shorten reaction time.

### ***3.2 Analysis of measurement error during reaction***

Visual response time meter is an electronic instrument specially used in sports training and medical physiology. Now, there are different types and functions of equipment available for our research both internationally and domestically. But the principle is pretty much the same, with three components: the stimulus, the response, and the timing device. Different items and units use different electronic measurement instruments for reaction time, such as; The signal source of external stimulus, the function and speed of instrument keys, the data processing algorithm of the internal computer of the instrument, and so on. Many instruments will bring errors in experimental results due to the design defects. In view of this problem, in recent years, the counter machine software technology has emerged to measure reaction time. Different software has different measurement methods and data processing methods, which have a great impact on the measurement results. There will also be different measurement results between the same age and gender. From the analysis of many factors, the standardization and consistency of measuring instruments and measuring methods is particularly important. Without a unified measurement standard, the measurement results cannot be compared and applied in scientific research.

Under the premise of uniform measuring instruments, the error in measuring reaction may come from the receiver itself, and the factors that may cause the error in measuring reaction mainly come from the following aspects (1) age. From childhood to adolescence, the reaction time is gradually shortened, and from adolescence to old age, the reaction time is gradually increased, and the reaction ability is decreased, the corresponding motor ability is also decreased (2) gender. Given the same age and measurement equipment, women's response times are generally slower than men's, and there are no precise figures to describe the difference. The researchers believe that the time it takes for muscles to contract is the same in men and women, and that the difference is due to the time it takes for muscles to respond to stimuli. (3) fatigue. There is a lot of evidence to show that muscle fatigue alone has no effect on reaction time, while psychological fatigue has a larger effect. When people are under greater psychological stress, or lack of sleep, reaction time increases significantly. (4) personality. Personality is also one of the many factors that affect the reaction time. People with a cheerful personality tend to get excited easily, and their reaction time is shorter than that of introverted people. (5) exercise. People who do exercise often react much faster than those who don't. (6) intelligence. The level of intelligence affects the level of change in response. When intelligence is severely impaired, there are dramatic changes in response. It can be seen that there are many factors influencing the reaction, so there are many factors to be controlled in the measurement. Only when the variables are controlled to a consistent level can the measurement achieve a consistent and effective result.

#### **4. The effect of reaction time on football training and play**

##### ***4.1 The significance of reaction time to football training and games***

In football training, players mainly use complex reactions. Football mainly consists of two parts: ball technique and no ball technique. Coaches enable football players to master various skills needed in sports through various trainings. Taking passing and catching the ball and intercepting the other side's pass as an example, the player needs to make a judgment on the direction, speed and trajectory of the ball in advance, and the player needs to prepare and catch the ball. For passing and receiving, the reaction speed includes reaction time and movement time. The response of receiving the ball is obviously different from the process of movement. Receiving the ball is not the time for the body to continue to stimulate the player, but the time for the body to make movement when the signal of passing the ball is visually obtained from the opponent or his own player. In other words, it is the time for the body to make reasonable movement after receiving the stimulus. The response is not the same as the body receives the stimulus and the body ACTS accordingly. The whole process of seeing an opposing or opposing player pass the ball and the athlete's body making a series of movements is stimulating, but this process is hidden or latent in the athlete's body until the muscles respond, producing a beneficial effect on training and the game. The sight of an opposing or opposing player passing the ball is a kind of visual stimulation, which causes the excitement of the cerebral cortex, which is processed by the brain and then exported by the brain to the muscles, which do work and act on the external performance of the outside world. It takes time for a soccer player to go from visual stimulation, to the brain processing information and giving instructions, to the muscles, which sit and react. After countless tests by scholars, it takes the longest time for the brain to process information. Therefore, in the training, the coach should constantly improve the ability of the athlete's brain to process information. Even the best athletes, in response to simple stimuli, receive moral impulses from the sensory organs to the point where they accumulate enough to generate enough excitement for the motor regions of the brain to send commands to the muscles. Therefore, the reaction is also known as the reaction latency, belongs to the second stage of the reaction. This includes the time it takes for sensory organs (sight, smell, touch, etc.) to receive stimuli, the time it takes for the brain to process information, the time it takes to transmit information, and the time for muscles to act accordingly. There is a clear difference between the reaction of elite athletes and that of untrained ordinary people. In addition, these responses can be significantly improved through exercise training.

In addition to natural factors, the reaction is also related to the stimulation received by the outside world. In the process of passing a football, in the face of the object to pass the ball, we simply pass the ball, giving less stimulation than issuing verbal commands at the same time, such as following, hitting the door and so on. Greater intensity of external stimulation, can cause a faster response. However, if the stimulus intensity is large, it will cause inhibitive reaction, resulting in slow

movement of athletes, slow reaction. In addition, the concentration of the athletes will also affect their reaction ability. According to the experimental measurement, when the athletes are in the state of concentration, the athletes in 1.5-8 seconds, in the face of external stimuli, the fastest response, than in the state of relaxation, 60% faster. In the face of their own and ball player action sequence and the reaction time is as follows: the eyes see the ball to the brain 0.14 seconds, brain processes 0.15 seconds, the cerebral cortex of muscles issue instructions to 0, 25 seconds, muscle action, namely athletes make action to 0, 38 seconds, after contrast can be found, professionally trained athletes is faster than untrained people this process, excellent athletes than novice shortened about 0.05 to 0.12 seconds.

#### ***4.2 Psychological interference in sports and its influence***

With the continuous development of modern sports training and the improvement of sports skills, football players are under more and more mental pressure. In addition to the pressure from the competitors, many subjective and objective factors will become the disturbance of the athletes can not play the normal technical and tactical stress source. On the football field, often can see the athletes not to adapt to the external environment such as temperature, fans of abuse, whistles, or is unable to correctly handle the internal emotional disturbance caused by movement technology can't normal play, misfired in sports level, such as track and field athletes before the start of the game to the former, the phenomenon of the false start in advance, the ball players on the pitch psychological don't adapt to the rapid heartbeat, gymnastics or skating athletes began to panic the phenomenon such as loss of rhythm, is with the athletes in the game by the interference of the external environment, adjust the psychological state of their own. In the daily sports training and competition, the athletes' skill station level is not the highest level every time. In the ordinary training process, the athletes do not perform well. In the competition field, they perform extremely well. However, in the competition, it is inevitable to see some athletes have too much psychological pressure, resulting in the technical movement cannot play normally, the performance on the field is different from the ordinary training, this situation, must be the athletes in the technical movement, by external or internal some objective and subjective conditions interference. For example, in the face of abuse from opposing fans, football players produce excessive physical behavior on the field. The influence of comments from spectators on the gunners in shooting matches is a typical example. Psychological interference may exist in cognition, memory, thinking, emotion and other areas of psychological activities, such as religious differences, deliberately advance the sad and sad past events of athletes, disturb athletes' judgment, etc., perhaps any slight hint will lead to emotional fluctuations of athletes. Such as communication with emphasis on conscious language, athletes at away games, referees and spectators unfriendly behavior. In the competition field, noise is also a common form of psychological interference to athletes. Noise is the voice of the cyclical fluctuations, in 85-95 decibels of noise in the game, both athletes and spectators in produces obvious psychological interference, noise by interfering with human auditory system, caused people's worry mood, ability to make the athletes focus, at the same time, the noise

can also lead to human body's stress response, blood pressure, pulse generating irregular change. In athletes to prepare and into the whole process of the venue, the audience and chants, discussion, sharp whistles, content from the her voice, and constitute the obvious psychological interference on the volume for the venue has obvious noise environment, many athletes psychology to bear ability is poor due to the impact and unconsciously create tension, even flinch psychology, lead to the game tactics appear obvious mistake, can't play the level of technology in the peacetime training. Therefore, it can be seen that whether in training or on the field of football players to maintain psychological stability should be an important reflection of the strong psychological quality of an excellent football player, in training and on the field to maintain a smooth and sensitive response should be an important part of the support for the selection of elite athletes. At the same time, this situation also reminds coaches to strengthen the stability of psychological response to athletes and anti-interference ability training, so that athletes have a strong psychological foundation.

## **5. Conclusions and recommendations**

With the development of modern sports technology, the training level is constantly improved, and the athletic level has reached an amazing height. Reaction time is the speed of reaction as one of the criteria of motor ability. Physical fitness is the foundation of football, and there is still a certain gap between China's sports training level and the international level. In football, technique and tactics are one of the key points of sports training, and good reaction ability plays an important role in both technique and tactics and physical quality. Through the collation of the literature, the following conclusions are summarized. Reaction time has important research significance and great research value in various fields, but there is no unified standard for measurement methods and standards. Without standardization of measurement methods, there is no way to directly compare the measurement results, and many scholars will have different research results, which will affect academic communication to some extent. Modern reaction time measurement instruments have a variety of problems, such as: expensive, slow processing of information, data storage difficulties, low test efficiency and so on. Cannot meet the actual needs of scientific research workers. With the application of technology, I believe this problem will be solved.

Reaction speed is determined by innate factors. Whether it is simple reaction or complex reaction, the process is completed through the cultivation of acquired consciousness. The difference is the integrity of the reaction, and the agility of the action. For football players, scientific and reasonable sports training is only for the whole reflection process in the process of the game will be complete and fast performance. On the football field, players are subject to all kinds of interference on the spot. Some athletes get excited about it, which is good for their performance. But too noisy environment, as well as fans, coaches too much expectation will bring too much pressure to some athletes. From the perspective of sports psychology, any stimulation on the spot will cause the players' psychological burden, thus leading to

the reduction of reaction speed, but relevant psychological research is not sufficient. Some scholars believe that simulating the actual situation of relevant psychological characteristics in competitive sports designed in the experimental research, observing the change characteristics of reaction time, and further studying the relationship between reaction time and psychological stress will be a better way to conduct psychological research on human neural response. There was a moderate correlation between reaction time and football. Short reaction time and fast reaction speed would promote the stability of football performance. Under the condition that the football players' level was close, reaction time had no significant influence on their sports performance. But for teams that vary too much in training, there is a difference in response. Football players who are quick with simple reactions do not necessarily perform well in football, because football skills include too much, reaction speed is only one of the completion of football skills rather than the only factor.

In the process of daily sports training, coaches should pay attention to the exercise of athletes' psychological control ability. In a tight football match, winning or losing can happen in a split second. , can appear a variety of situations, deficit, injured his teammates, fans the reproach of men, opponents of provocation, are likely to affect the level of the athletes, the coaches should pay attention to is to make players prepared field inside and outside all kinds of complicated situations, adjust their own state of mind, every moment of the day to the full state to cope with their own in the competition of various situation, give full play to their best performance. At the same time, it is suggested that coaches instruct their athletes to minimize the influence of spectators or other factors on their own games.

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