



Basketball Game Theory Analyzes the Choice

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Abstract. Basketball is mainly the contradictory movement of attack and defense, the game of attack and defense mutual conversion, active and passive co-exist and appear alternately, it can be seen that the attack and defense have an inevitable relationship. Through the thorough understanding of this inevitable relation -- the dialectical relation between offense and defense, the law of basketball movement is revealed, the interaction between offense and defense in a basketball match is explored, and the corresponding strategies and tactics are formulated in basketball match practice. In this paper, the principle of game theory is used to analyze and discuss the winning rule of offense and defense in a basketball match, so as to have a deeper understanding of the winning way and development trend of basketball competition, making basketball competition more intense, more colorful, so as to better promote and promote the development of basketball skills to provide the reference.

Keywords: basketball competition; Game theory; Basketball tactics

1 Introduction

1.1 Game Theory Overview

Game Theory, also known as Game Theory, literally translated as "Games Theory", is the theory and method of studying competitive activities. It is a new branch of modern mathematics and an important subject of operations research 1. "Refers to some individuals, some teams or other organizations, in the face of certain environmental conditions, under certain rules and constraints, relying on the information they have, simultaneously or successively, one or more times from the behaviors or strategies they allow to choose. and implement it, and obtain corresponding results or benefits from it. The main purpose of game theory research is to study the behavioral characteristics of the game parties, that is, the decision-making characteristics when the behaviors of the decision-making subjects interact directly; and under what circumstances Which strategy is adopted and what kind of result will be achieved, that is, the equilibrium problem after the decision-making subject makes a decision 2.

1.2 The application of game theory in basketball competition

The connection between game theory and basketball tactics has been continuously reflected in basketball practice in recent years. Now more and more teams will be equipped with relevant tactical analysis teams. The scope of information acquisition in the game process improves the implementation effect of tactics.

1.3 The main content of the research paper

This paper uses the principle of game theory to analyze and discuss the winning rules of offense and defense in basketball games 3, so as to have a deeper understanding of the winning ways and development trends of basketball games, and make basketball games more intense and colorful, so as to better promote and Provide reference for promoting the development of basketball technology level.

1.4 Thesis research method

This paper mainly uses the case analysis method, according to the relevant materials collected about the 2013/2014 season of the American professional basketball league finals, according to the logic rules, the 2013/2014 season of the American professional basketball league finals The Heat and the Spurs game logical reasoning and reasoning.

1.5 Article structure arrangement

The first part is the introduction, which introduces the concept of game theory and the main content of the article research.

The second section analyzes the characteristics of basketball competitions.

The third section is the game characteristics used in basketball competitions, emphasizing the crucial role of game theory in basketball competitions.

The fourth section is the attack and defense in the basketball competition, analyzes the attack and defense in the basketball competition, and reflects the game law contained in the attack and defense.

The fifth section uses game theory to analyze the empirical analysis of the 2013-2014 NBA finals tactics, analyzes the American professional basketball finals, and analyzes the game ideas.

Section 6 summarizes the research content and prospecting

2 Characteristics of basketball competition

Competitive sports is an important part of sports, and it is a social sports activity with sports competition as its main feature, with the main goal of creating excellent sports results and winning the competition [2]. In the process of competition, the participants in the sports competition should first be carried out according to the rules of the project, which is reflected in: what athletes are allowed to do on the field, what they cannot do,

in what order, when to end, and the penalty for fouls, etc.. Secondly, all competitions have wins, losses, draws or gains. The result can be positive, negative, or how many points can be judged according to the rules, etc. This is the result of sports competitions. Again, it is reflected in the use of strategies in the competition. The beginning, process, and results of the participants must be formulated according to the process of things, and different strategies and tactics should be revised to achieve the goal. Finally, interdependence. In the process of competition, the quality of the contestant's results depends not only on their own strategic choices but also on the opponent's strategic choices.

Basketball is a dynamic sport. In the game, constantly change the rhythm and direction, and strive to take the initiative. Intense competitiveness is one of the most essential characteristics of basketball competitions 4. In the competition, in order to defeat the opponent, both participating parties always strive to maximize the mobilization and exertion of the potential of their team members in all aspects, and give full play to and improve the individual's potential in physical fitness, technical and tactical ability, psychological ability and intellectual ability. It not only pays attention to individual competitive ability, but also pays more attention to overall cooperation, emphasizes collective wisdom and skills, and exerts team spirit, core combat effectiveness, and team style. At the same time, it also pays attention to the degree of openness of technical and tactical use. At the same time, according to the situation of both offense and defense, athletes quickly make targeted strategic adjustments, use technical and tactical skills flexibly, and show high offensive and defensive efficiency. For example, openness can fully and fully exert its own technical and tactical advantages in the game, and limit the play of the opponent's advantages, so as to be in a position of relative advantage.

3 Game characteristics used in basketball competition

"Tactics" is not only the content of choice in the game process of both sides of the competition but also an important basis for analyzing the results of the game. It is the rational choice of the competitors after the game. From the perspective of game theory, it is the strategic choice of the game between competitors, and it reflects the contest of wisdom between competitors. To a certain extent, it is also an important factor of the team's comprehensive competitiveness. From the perspective of the development characteristics of modern basketball competitions, basketball tactics are diverse, confrontational, cooperative, adaptable, confusing, and time-sensitive.

Diversity, that is, basketball tactics are endless. Under the influence of objective factors such as different environments, different coaches and players, different opponents, etc., basketball tactics are always ever-changing, and there are no basketball tactics with a certain content range 5 . To a certain extent, slight changes in any aspect will affect the formulation and implementation of tactics, which makes basketball tactics unpredictable. From the perspective of relevant principles of game theory, this variety of characteristics makes game analysis of basketball tactics only for theoretical analysis of the formulation process, and can only analyze its formation process in terms of results, and cannot make specific predictions of results.

Confrontation, that is, basketball tactics exist in competitive games. Confrontation is an important feature of basketball games, so the formulation of tactics should also take this factor into account. On the one hand, confrontation refers to the aspect of physical confrontation. In the process of specific implementation and formulation of relevant tactics, it is necessary to fully consider the impact of physical confrontation on the implementation of tactics, or confrontation is an important factor in the formulation and selection of tactics. On the other hand, it refers to the confrontation between wisdom. The formulation of basketball tactics is like ancient military strategies. What needs to have collided with the wisdom of the opponent, is the formulation of tactics needs to fully consider the opponent's possible choices, rather than formulate without outside interference.

Cooperation, that is, basketball tactics require cooperation between the whole team and finally achieves the effect required by the tactics. The basketball game itself is a holistic movement, which requires the cooperation of the five players on the court and the concerted efforts of all members of the team. In cooperation, any subject will affect the execution and implementation of tactics to varying degrees. In addition, from a more objective point of view, when the game analysis of basketball tactics is carried out, the two sides of the competition are also a whole. Carry out relevant academic analysis to provide reliable realistic materials

Resilience, that is, basketball tactics are adjusted according to various factors in the process of formulation and implementation to achieve the ultimate goal. In competitive basketball games⁶, the implementation of tactics is not static, especially in fierce competitions, no party can fully obtain sufficient information, which makes any objective factor beyond the scope of information will affect the formation of tactics, which requires Competitors have the ability to debug tactics, which makes basketball tactics show the characteristics of adaptability. On the one hand, in the process of formulating tactics, it is necessary to respond randomly according to the different changes of the opponent, and at the same time, it is necessary to effectively debug the changes that occur in itself, so that the tactics can be formed to meet the conditions of the subjective and objective environment as much as possible. On the other hand, in the process of implementing tactics, it is necessary to debug the most reasonable tactical choices according to the changes of both parties and under the guidance of the established tactics to achieve the ultimate goal ⁷.

Confusing, that is, the formulation and implementation of tactics need to effectively protect the designated tactics and increase their own information advantages. In a basketball game, with the influence of multiple competitions between the two sides, the information obtained by each side is basically the same, which makes the use of information difficult. In order to prevent one's own strategy from being seen through to the greatest extent, the formulation and implementation of tactics need to be modified, so that the opponent cannot really see through the essence of their own tactical formulation and selection. The confusion is mainly aimed at the opponent and exists in the competition. It can be seen from the real basketball competition that sometimes in order to increase the confusion of the tactics, the coaches will choose to suspend and make substitutions to make the opponent difficult for a short time. Judging the team's intentions,

which allows the formulation of tactics to confuse the opponent and make it difficult to effectively choose the tactics of the confrontation

Timeliness, that is, the development of basketball tactics is inherently related to the development of basketball. From the perspective of the development process of basketball, in order to cater to the marketization, commercialization, and socialization of basketball, the rules of basketball games and club management rules have shown the characteristics of continuous evolution, which makes the formulation of basketball game tactics. Significant changes have taken place with the objective conditions of implementation. With the continuous improvement of athletes' personal physical fitness, the continuous improvement of basketball skills, and the continuous updating of basketball equipment, the basic ability of athletes have also made great breakthroughs, which has changed the subjective elements of basketball tactics. Therefore, the formulation and implementation of basketball tactics must meet these changes, which makes basketball tactics have strong characteristics of the times

4 Offense and defense in basketball competitive games

Basketball competition is a concentrated reflection of the competitiveness of sports. The offense and defense reflected in the competition have special game rules. The outcome and ranking of the competition are the inevitable results of sports competition. The whole process of offense and defense in the competition is the problems to be studied and solved in sports game theory. The competitiveness of the game is also the lever of basketball's continuous development, which not only increases the uncertainty of the outcome of the game but also makes basketball more attractive. The mutual transformation and interdependence of offense and defense in the game also determine the characteristics and development trend of sports competitions, making sports competitions more colorful. But we must realize that in the game, even if the offensive strength is unparalleled in the world if the defensive strength is weak, it is difficult to win the game; on the contrary, no matter how good the defense is, it is difficult to win the game without attacking. Each side of offense and defense is interdependent with the opposing side, and cannot exist and develop in isolation. Either side of offense or defense must be mediated by the other side, and the existence and development of one side must be mediated by the existence and development of the other side. Development is a condition, only if the defense is firm, the attack can be overcome without worries. The offense is the dominant force of defense, and only by attacking can we win. And strengthening the defense is to make the attack better, and strengthening the attack is to actively defend; however, the attack cannot replace the defense, and the attack cannot be the best defense in any situation.

Basketball is a contradictory process of mutual transformation between offense and defense. Offensive-defense transition refers to the transition from an offensive state to a defensive state, or from a defensive state to an offensive state, the mutual transition between offense and defense or defense and offense, and the transition from offense to defense, or from defense to defense, and from offense to offense. all technical or tactical actions. The transition of offense and defense in a basketball game is the transition

between the gain and loss of control of the ball between the two sides in the basketball game. This transition is reflected in the transition of ideology, physical stress, technical movements, tactical coordination, tactical actions, and organizational changes. The offense in basketball games can be divided into direct offense and indirect offense. The direct offense is an offense that directly threatens the opponent's actions, such as a basketball shot. The indirect offense is an offense on the psychological level that affects the opponent's play by interfering with it. Defense is any action or behavior that disrupts the opponent's offense. In the game, both sides tried to use their own skills and tactics to complete the active attack, make the other side fall into the passive, and finally win. For example, when a shot is made, when a shot is missed and a rebound is not captured, when an offensive error occurs, when an offensive violation occurs, when an offensive player commits a foul, when a jump ball is not captured, etc., the offense turns to defense. And when grabbing a rebound, stealing the ball when the opponent makes a shot, when the opponent violates the law, when the opponent fouls, and gets a jump ball, the defense is converted into an offense. In the mutual conversion of offense and defense, different characteristics are reflected: an attempt is made to control the opponent through the offense of one's own side, making the opponent's competitive level difficult to exert, and ultimately defeating the opponent. Every point in the basketball game is achieved by the mutual struggle and conversion of offense and defense. Winning points depends not only on hits but also on the opponent's mistakes. Both offense and defense can score points directly or by causing the opponent's mistakes. It is difficult to separate the two from defeating the opponent and not being attacked by the opponent in the course of the game. In a confrontation, an advantage can become a disadvantage, passive can become active. Offense determines defense, defense stimulates offense, and in order to win, the offense must break through the defense, find its weak link and master the initiative on the field, and attack it unprepared. To defeat the offense, the defense must avoid its edge and counterattack quickly. Therefore, the offense and defense should be treated with a scientific attitude, and effective countermeasures should be taken according to the constantly changing situation of the game. This is determined by the certainty and uncertainty of offense and defense. in the best interests of the party, to obtain the final victory

5 Empirical analysis by using game theory

5.1 Rational analysis of the offensive and defensive tactics of the San Antonio Spurs

In the 2013/2014 season, the San Antonio Spurs absorbed the lessons of the previous year's defeat and further strengthened the team's overall tactical coordination and scoring opportunities. One was to replace Thiago Split by Boris Diaw as a power forward. The position-important player, Tim Duncan, has completely become a center, which makes the connection between the inside and outside of the team's offense smoother. The second is to strengthen the offensive opportunities of Danny Green, Kawhi Leonard, Patty Mills, and other perimeter shooters, and the team GDP combination (Tim Duncan, Tony Parker and Manu Ginobili) The main role becomes the tandem team. In

particular, Kawhi Leonard, in many games, strengthened his personal breakthroughs and singles, saving a lot of physical strength for Tony Parker and Manu Ginobili.

The defensive tactics of the San Antonio Spurs in the 2013/2014 season were mainly man-to-man defense. Of course, this is inseparable from the improvement of Kawhi Leonard's personal defensive ability. From the perspective of five games, Kawhi Leonard's performance is equivalent to super. At the star level, the fight against LeBron James has left him either in a one-man situation or difficult to break through the San Antonio Spurs' overall defensive arrangement. For other positions, due to the decline of the competitive state of many Miami Heat players, the San Antonio Spurs focused on man-marking and at the same time proposed a tactical arrangement to help defend LeBron James, which made the Miami Heat as a whole in a situation where it was difficult to score.

5.2 Rational analysis of the offensive and defensive tactics of the Miami Heat

In the 2013/2014 season, the Miami Heat were affected by the decline in the state of personnel competition, and LeBron James became the team's main offensive player. Whether it was direct scoring or assisting teammates' offense, in many cases, LeBron James had to complete it. Therefore, the offensive tactics of the Miami Heat in the 2013/2014 season were mainly based on the participation of the whole team under the leadership of one person, mainly because LeBron James' breakthrough alone brought offensive opportunities to the entire team, and the rest of the players mostly waited for opportunities, rather than creating opportunity. Judging from the performance of the five-game series this year, LeBron James's score is on the rise, but the team's score and the score of his teammates have dropped significantly, which made the Miami Heat in the final game not have very clear offensive tactics. It was only done by LeBron James alone, and the offense was obviously weak.

In the 2013/2014 season, the Miami Heat's defense changed from man-to-man defense to team defense. The victory in the previous year's game made man-to-man defense a more rational choice. Nader's personal ability has improved by leaps and bounds, and the San Antonio Spurs have plenty of offensive opportunities at all points. The Miami Heat had to use team defense, mainly regional zone defense to limit the San Antonio Spurs' performance. Judging from the progress of this series of games, the defensive effect of superstars has gradually declined. The rapid progress of the new generation of San Antonio Spurs players has made the team's offense smooth. A single-man-to-man defense can no longer meet the needs of the Miami Heat. Therefore, zone defense has become ineffective. Second choice.

In short, from the analysis of the US professional basketball finals, the tactical choice of the team's offense and defense is based on the conventional methods of basketball and the early understanding of the opponent. This is the first stage of the game between the two sides. 7[8]. With the continuous deepening of the game, formulating and acting according to the opponent's actions is an important game strategy formulation process, which reflects the basic ideological principles of the game to a certain extent [9-10]. It is worth noting that the ideal result of the game is to give full play to the potential and

strength of both sides so that the game can meet rational expectations. From the comparison of many factors, the two games reflect a high level of gameplay.

6 Conclusion

The phenomenon of a sports game is various conflicts, confrontations, and competitions that exist in sports practice. The offense and defense reflected in basketball competitions are strategies formulated by competitors to overcome their opponents to improve their odds of winning and win, which makes the development of basketball increasingly large and the competition is becoming more and more fierce. It is reflected in the ingenious combination of the offensive players' personal technical movements or personal skills and opportunities, as well as the tactical cooperation, support, and tacit understanding of teammates, creating offensive opportunities for the offensive players, and also including the defensive side's techniques and tactics.

It is suggested to strengthen the value understanding and method application of the basic principles and thinking logic of game theory in competitive basketball by current competitive basketball workers. Expand the practical research of game theory in basketball competitions, and then improve the theoretical level and decision-making ability of competitive basketball workers, broaden their thinking, make fewer mistakes in the process of making decisions related to basketball training, and systematically from each job The working principle of personnel, and use scientific theory to guide basketball training.

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