

52 The space-time feature and relativity of the competitive table tennis

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1 The space – Time classification of characteristics of the competitive table tennis

In the course of the research of this paper, we regard related essential factor and content as the time feature of competitive sport table tennis, such as, the ball speed concerning time , attack ball speed , wave racket speed , move speed , attack ball rhythm, the rotational speed etc. It is far and near to stand position , move scope, arc line difference in degree and movement size , attack ball point, attack ball period to belong to for the space of the competitive sport of table tennis feature (Table 1).

Table 1. The time and space classification of characteristics of competitive sport of table tennis

Time feature	Space feature
Ball speed , attack ball speed , wave racket speed , move speed , attack ball rhythm, the rotational speed etc.	Station position is far and near , moves scope, arc line difference in degree and movement range , attack ball point , attack ball period etc.

2 The space-time feature in the development of the competitive table tennis

Since the first World Championship of Table Tennis, the competitive table tennis has gone through 5 important periods of development. Each period has its primary technology (Figure. 1).

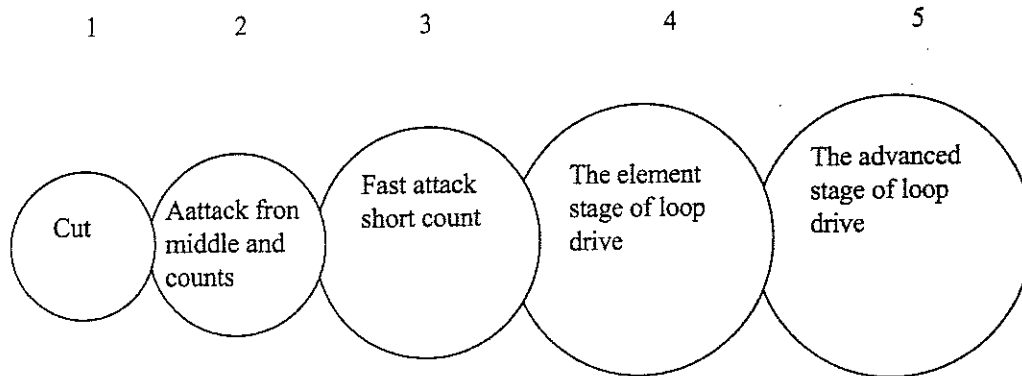


Figure 1. The primary technology of each period

The development of table tennis presents two characters: The first one is continuity that refers to the succession and development of the former technology that perfects and evolves along with the research about the competitive sport law of table tennis. From the angle of space and time, the technology has the relatively stainable future of space and time as well as the structure of technologies. The second one is irregular bounce of research which means that the change of external environment and the recognition of the law of table tennis initiate the innovation and grand change.

Fig. 2 shows the transition and forming of each historical period begin with the innovation of technology on the base of which form the different strike and characters from the past. For example, the transition of the first and second periods was caused by two essential changes of the outside world. One is the transform in size of table in 1937 (146.4cm width \rightarrow 152.5 cm; Net high 16.77 cm \rightarrow 15.25 cm); another is the invention and use of sponge - rubber racket. Regular change has modified the space feature of competitive table tennis; the use of sponge - rubber racket has changed its time feature. The two changes establish the foundation for the attacking strike.

Through the discussion and the analysis for the above 5 technologies, though in different historical period, we can find that the strikes and technologies such chop - and - attack and rackets with rubbers of two properties, but what promotes the development of competitive table tennis is still the strikes with speed feature. Therefore, increasing the speed of attack as the primary trend should be taken into consideration.

3 The space - time feature of major technologies of competitive table tennis

With space - time sight make further investigation for the course of developing of every technology of table tennis, we discover, nearly each technology is along speed recover to recover rapid, technical movement recover to recover small change and development step by step (shown in Figure 2).

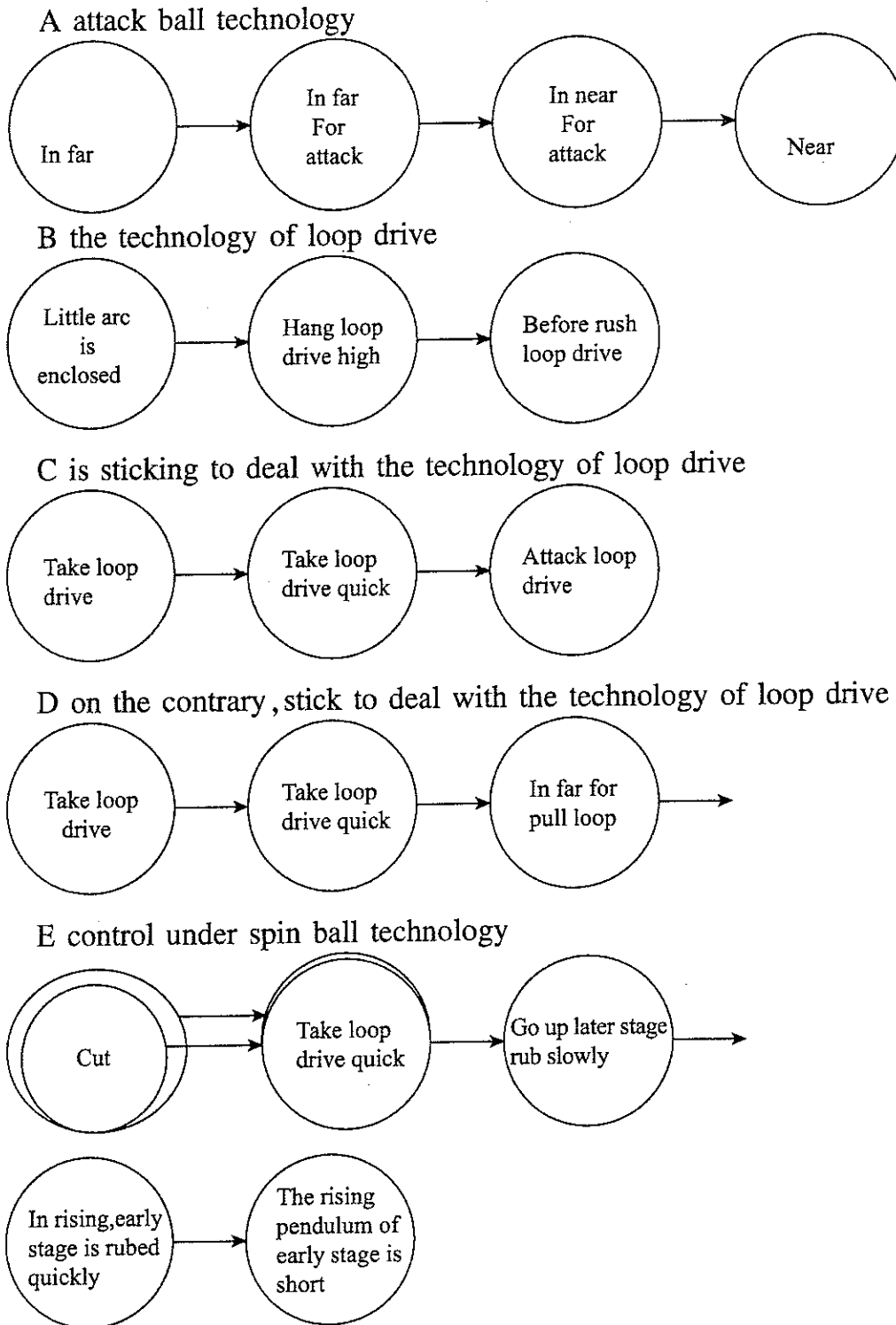


Figure 2. The space - time feature of major technologies of competitive table tennis

According to the more every technical use in different historical period frequency, we can reach, along with the development of the sport of table tennis the major technology of every type, toward to raising ball speed, decrease to attack ball time and space the direction development. Author thinks that this is the historical necessity that the sport of table tennis with speed as core.

4 Compensation principle and the invalidness of the technical time and space of table tennis

Compensation principle and the invalidness of the technical time and space of table tennis denote any technology (technical system) have it with space feature and the time of survival, when its time or space feature encounter damage, the original power of this technology (technical system) finalize the design will disappear, but can pass through the compensation on space or time and get resumed (see Figure 3).

The certain technical movement that needs 0.2 seconds of completion changes along with the ball space of speed that quickly produces

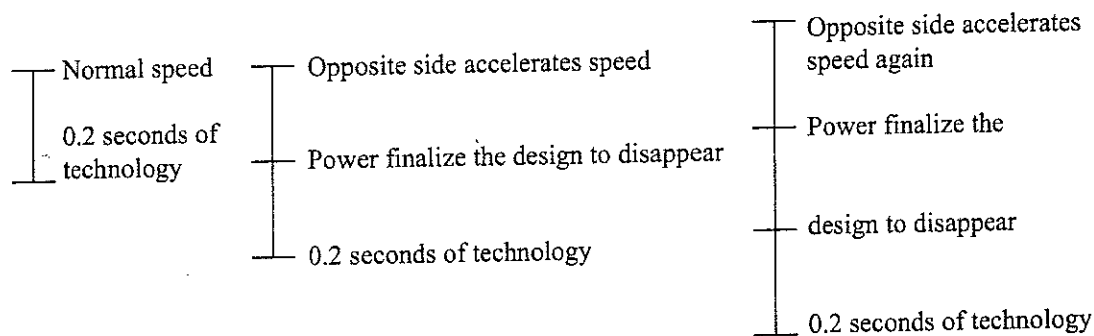


Figure 3. Compensation principle and the invalidness of the technical time

Fig. 3 shows us that on specific location, the certain technical movement that needs 0.2 seconds to completion, but with the speed of ball is becoming faster and faster, the time (complete movement time) not enough, therefore, power determine the nature to disappear, in order to get necessary 0.2 seconds, athlete can retreat backwards, increases distance, gains time with space. Since the more to be far away from table to move scope bigger (is shown in Fig. 4), it is passive to will inevitably also. Therefore, its very important to raise absolute velocity of each pace about ball and technology.

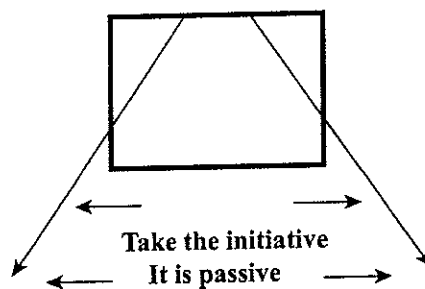


Figure 4. Compensation principle and the invalidness of space of table tennis

5 The space - time relativity principle of sport

Competitive sport space - time relativity principle produces in 1993, is author

in Beijing physical education university study sports training to study Master graduate student make. From this theoretical forehand near recoil that drawn forth with attack before rush the technology of loop drive, have gotten then China table tennis associate chairman Li Fu Rong, national team male team Cai Zhen Hua of chief coach, Yao Zhen Xu of the leader of group with Yin xiao support and the solicitude of clouds coach, at the same time, in Chinese country body department place, biological mechanics laboratory Wu yang - xi researcher he help of etc. research people take off, difference is for then Liu Guo Liang, kong ling hui, feng zhi, Huang da Wei, Wang fei for 5 young team members test and study, through practice, this technology has become the now world most important essential technology of the man excellent athlete of table tennis circles with score one of means.

Competitive sport space - time relativity principle is spoken briefly, includes 4 parts, they are spiritual space - time, physical space - time, technical space - time and tactical space - time. The concept of 4 space - times is respectively:

Spiritual space - time: It is the thought of person and the space - time that can be realized. Its property is changeability.

Physical space - time: Stand independently relatively in the space - time of person that shows objective material world subjectively. Its property is relative stability.

Technical space - time: Is spiritual with material join the space - time with 2 of one. Its property is to have changeability, and is stabilized relatively.

Tactical space - time: Is basis opposite side and self more 3 space - time forms, and the corresponding space - time that adopted. Its property is flexible changefulness.

The core of competitive sport space - time relativity principle is spiritual space - time. Because: 1, competitive sport is the sport of person, is the sport that controlled by the spirit of person; 2 only, lead into the concept of spiritual space - time, with train, tactical space - time talent and the skill of closely related match establish completely; 3 the various sports essential factors in physical space - time only pass through spiritual space - time alternate get change.

Competitive sport space - time relativity principle has extensive actual application value, is theoretical according to it, we can establishment rise to be concerned with table tennis train development space - time model and the static quiet with every fields such as match, make former determine the nature research can fit in the research to ration come. Competitive sport space - time relativity principle is also that people break through spirit and old have habit tie with obstacle have offered strong weapon and theory sustain, therefore it is also the huge power and source that a sport creates and develops continu-

ously.

6 Conclusions

(1) "Speed" is the basic force power to promote the competitive table tennis in different historical periods.

(2) With the development of the sport of table tennis, the former technology (technical system) develops toward to increasing ball speed or decreasing strike time and space.

(3) Compensation and invalid of the principle of time and space of table tennis have revealed the space - time property about technical performance dynamic stereotype.

(4) The relativity time - space principle of competitive sports has promoted the development of table tennis.