

On the value-system and prospects of table tennis

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1 Foreword

With human beings' evolution and improvement sports started and kept developing as a kind of human activity. The spirit of sports is competition, by which the best one can be decided. Competition plays a key role at competitive sport, while aesthetic value, bodybuilding value, honour value, economic value form its value system. The high-level organization of modern competitive sport and its commercial running system push it to a higher level. And its commercial value becomes so important that no one can belittle the sport industry. According to the stars' annual incomes of different sorts of sports, we can divide the sports' commercial ranks. Level A: stars of professional football, basketball, boxing, and car racing. The salary of their representative figures such as Ronaldo, Jordan, Nolgfield and Hakkinon is as high as \$1,00,000,000 Level B: stars of professional tennis, rugby, basketball, golf, billiards, figure skating, chess, weiqi and so on. The annual salary of the top stars is close to \$ 10,000,000. Level C: stars of track and field, cycling, gymnastics etc. The best players can get more than \$1,000,000 every year. Level D: stars of volleyball, sumo etc. The best players can get more than \$ 300,000 a year. Level E: stars of professional table tennis, badminton, slide squash, swimming, javelin, etc. The highest annual personal salary is also more than \$100,000.

Table tennis is a highly popularized sport in the world. But why is it commercial value not high? How much is it value? What are its prospects? I will approach these issues and put forward some plans of reform.

2 The value system of table tennis

Pingpong, also called table tennis, originated in Britain about 100 years ago. It has been a formal part of the Olympic games since the Seoul Games in 1988. The World Table Tennis Championships, which was annual in the early stage but has now become once every two years, has now been held for 44 times.

Among various kinds of sports events, pingpong is like tennis and badminton. The regulations are almost the same. There is a net between the athletes on the two sides. They take turns to use the pingpong bats in their hands to beat the same object, a pingpong ball. They have to make the ball cross the net and fall in the opponent side, until one of them fails to get ball across the net or sends it outside the field.

Pingpong has its source from tennis, with apparent features of antagonism and

aesthetics in tennis sports. Comparing with tennis and badminton, pingpong playground is the smallest, which is about 3.75m^2 ; the distance between the two sides is the nearest; and the time between two strokes is the shortest (in most cases it is less than one second); the swirl is the strongest (Up swirl can amount to 180 circles per second, down swirl to 120 circles per second, side swirl to 90 circles per second) and most changeable. So in this sport, the relative speed of the ball is the highest; the requirement for skill is the highest, and is easiest to make errors. It has its own special antagonism, athletic characteristics and ways of building one's body.

2.1. The strong antagonism and the high degree of difficulty in pingpong

Pingpong is the "art of moment". Within a second, each player has to complete one technical action. The advanced players can make the ball acquire a speed above 20 meters per second. They can make the ball hit the opposite surface of the table within $1/10$ second. (The tennis players can blow the ball to reach the opposite side within $1/4$ second by a powerful serve.) Within such a short time, the player has to observe the angle and strength at which his opponent moves his bat, correctly judge the strength, swirl, hitting point and springing of the coming ball, at the same time, to complete his own movement, location, drawing of the bat, hitting of the ball and resumption.)

He manages to hit a ball which is fast, spinning and heavy, or which changes constantly in weight, speed, length, rotation, route and so on to attack his opponent's gap or vulnerable spot. This kind of extraordinarily continuous and fast reaction and instantaneous decision requires high-speed coordination of one's brain, eyes and all the joints and muscles, which are accomplished by the bat controlled by one's hand.

There are more than 80 kinds of individual skills and sub skills and over 10^{100} kinds of skill combinations of pingpong playing, in which there are so many immeasurable factors, such as randomness, complication and changeability. The variation of personal skills and difficulties are far beyond those of any other games. Though we can't regard it as one of the standards of human intelligence and strength, its existence and development are really challenges to human intelligence, strength and skills.

2.2 The aesthetic value of the pingpong game

White or yellow balls are flying so freely on blue or green tables and dark-red floors that the eye cannot take them all in. The lightninglike overpowering smashes and loop drives; the pliable and tough chops; the players' sudden move and sudden stop, making spectacular saves, fighting a battle of wits and courage during the fast competition. All these make up a beautiful moving picture.

2.3 The bodybuilding value of table tennis

In addition to the bodybuilding function, playing table tennis helps to develop man's fast reaction and prompt decision, because it is an extraordinarily fast continuous competition. The reaction of a topnotch player is extremely quick (only 0.008 second) while that of a topnotch goalkeeper in soccer is 0.012 second. Playing apart from the net and having the lightest ball, these two characteristics

determine that this game has little danger.

2.4 The honor value of table tennis

During the past half century, table tennis has been spreading all over the world. Especially in Europe and Asia, many countries pay high attention to it.

A special emphasis has been put upon table tennis in the European countries, such as Germany, France, England, Italy, Belgium, Austria, Spain, Sweden, the Netherlands, Denmark, Russia, Poland and Czech, etc, and in the Asian countries, such as China, Japan, South Korea, Singapore, India, Thailand, Vietnam, Kuwait, Qatar and Iraq. Also in the U.S., Canada, Australia, as well as some African countries, there are many table tennis clubs.

It was in 1959 that the Chinese won their first gold medal in the world Table Tennis Championships, and thus ended the record that no Chinese won any world championship. From then on, table tennis has been gaining momentum in China. So far the Chinese have won more than 100 world championships, and table tennis has become China's "national ball", bringing great fame to the Chinese people.

With the further popularization and reform, the prestige of table tennis will be going higher and higher.

2.5 The economic profits of table tennis

In the modern society in which economy has developed rapidly and which has been highly commercialized, the commercialization and industrialization of sports have made noticeable achievements. The tremendous pay that stars of athletic sports can get has also reflected the large profit and good reward of athletics. But the gap among pays of various kinds of sports is very wide as illustrated at the beginning of the article. The pay can be divided into five such grades as A, B, C, D and E.

The athlete who wins championship of men's singles at the Grand Tournament Finals of Tennis will get a high bonus of 1,600,000 dollars. However, the champion of men's singles of Table Tennis World Cup can get only 30,000 dollars. Actually the total pay that hundreds of champions of Table Tennis have got in decades can not be equated with what a tennis star earns (For example, Pete Sampras's total income is in decades. There are great disparity between the money value of 'son' (Table Tennis) and 'mother' (tennis)? Is it fair? Or isn't Table Tennis valuable?

2.6 Appreciation of table tennis and participation

Table tennis is a game in which it is easy to make mistakes and lose points, a game ever puzzling to spectators. As the rate of appearance of the intense scenes is low, and the duration of the game is short, the game is over when the viewer's feeling hasn't reached the top or the cheer just starts. Compared with football, basketball, rugby and boxing, in which the viewers are very frantic, venue of table tennis appears deserted. The ball is too small, the spinning is too strong, the speed is too fast, changes are too many, and the difficulty of judgment is too high, so it is difficult for the viewer to watch the ball and the action of the athletes, and it is more difficult to appreciate the

performance and skill of the athletes. All these affect the watching, appreciation and participation in the game.

Whether an expert or a layman, the skills which will interest him fall into four types:

1. the multi-round contact of the aggression versus chopping.
2. the successive rapid contact in middle and close course
3. the excellent contact of high ball and attack
4. the strength contact of curves.

It is a pity that these scenes which can stimulate the audience's emotions appear on few occasions.

We should and can change this situation.

3 The reform of table tennis and its future

At the turn to the 21st century, the process of commercialization of competitive sports has been quickened. The dimensions of the grand competitive sports industry continue to expand. Every sports activity Centers on the skills to arouse "the appreciation and participation of the viewers", It also continuously enriches and enhances its value system in an attempt to attract more fans, to create a better television effect and ultimately to get more box-office income and industrial profits. In general, to modify the game rules, to change the game forms, to improve game equipment and to strengthen the commercial operations are effective measures adopted by all sports organizations.

During the development of table tennis, the International Table Tennis Federation has taken some measures, which in a sense has guaranteed the healthy development of the sport. For example, it restricts the thickness of the sponge in order to restrict the ball's speed. It stipulates that there must be obvious distinction between the bat's two sides' colors to restrict the unfair competition which using bats with two sides in similar color but of different function; it stipulates the rule of alternative serve in order to avoid dull marathon war of excessive attrition; it prohibits using poisonous glue in order to restrict speed caused by the expansion of the sponge, etc. Also, it has argued and studied for a long time the suggestions such as "increase the bat's diameter", "restrict the serving area", "enlarge the table's area", "unify the cover of the bat" and so on. Now the International Table Tennis Federation is having a test of using balls with a diameter of 4 centimeters, which is good beginning.

In fact, as early as ten years ago, former International Table Tennis Federation chairman, Mr. Dichi first made big orange balls in Japan and used them in games. Later, big orange balls were even used at the first Sino-Japan Friendly Cities' Table Tennis Games at the beginning of the 1990s. From all these, we can see that the effort to reform table tennis is great. However, this idea of using big balls wasn't accepted by all at last. Though the speed of ball slows down, the degree of whirling weakens and the number of rounds increases, the character of hard instant confrontation of table tennis becomes obscure. The big orange ball whose weight remains as much as before, and flexibility apparently decreases causes the apparent slowing down in speed and makes table tennis not like what it should be.

And this is the main cause of the failure. Even so, the thought and the act of enlarging the ball is still the right, important and necessary. The slowing down of whirling greatly avoids unnecessary mistakes.

The spectators can neither see nor feel the mystery of whirling. Changeable whirling is "the first murderer" of the game, causing unnecessary mistakes. Furthermore, the spectators in the distance, especially the elderly can clearly see big balls.

It is clear that expansion the volume of the ball alone can not accomplish the complicated task of pingpong reform. In pingpong reform, the following conditions should be taken into consideration.

1. With the expansion of the volume of the ball, the mass of it should be correspondingly increased so as to preserve the high-speed characteristic of pingpong, (i.e. the average time between two strokes should be shorter than that of tennis and badminton.)
2. To reduce spinning intensity of the ball by quite a big margin, and to reduce unnecessary faults which are not well received by the audience. To increase intense, exciting, and continuously attacking scenes. To raise its enjoyableness and participability of the spectators.
3. To enlarge the table and the court. The enlargement will enable players to move in a big scope but it will not be more difficult for players than for the tennis players.
4. On the basis of the above, to designate the service area. To adopt the service style of tennis so as to make players attack each other at the beginning of each match.

According to the above requirements, the author has made a whole set of reform designs.

(1) Increasing the ball's diameter and its weight

First take four balls of different diameters as examples. (The ball used today is 3.7cm in diameter; ball a, 4.0cm; ball b 4.2cm; ball c 4.5cm) Count the weights that the a, b, and c. balls should have. And then compare them with that of the ball used today. (See list one.)

From list one, we can see the weights increase to 2.9g, 3.2g and 3.7g with the increasing of diameters to 4.0 cm, 4.2cm and 4.5cm; the maximum speeds of loop drives decrease by 13 Round/Second (R/S), 20R/S. and 30R/.; the speeds of the strongest underspins decrease by 9R/S, 14R/S, and 21R/S; and the speeds of the strongest sidespins decrease by 7R/S, 11R/S, and 16R/S. The differences are notable.

In practice, because of the increase of the weight of the ball, athletes have to spend more power to get the increased speed. At this time, the actual spinning speed will be lower than the theoretical turning speed which has been calculated in List 1. But, spinning is still very important. It can still make reasonable curves, shorten the distance, improve the rate of hitting and change the bouncing curve. Its spinning speed is still greater than that of "the turning ball" in tennis and that of the "banana ball" in football. The only loss is its being "the invisible killer" and "the first killer" in the table tennis campaign. And such loss is necessary for the reform and the development of the table tennis campaign.

To only increase the diameter but not enlarge the mass will inevitably result in the over thinness of the shell of the ball, thus the form of the ball changes a lot when it is hit, the elasticity will distinctively decrease and the ball just flows in the air, thus the speed of the ball is decreased. So, if the weight of the ball is also increased, with the increase of diameter, the loss of the speed can be effectively avoided. This is very important.

(2) The reform of the table, the net and the court

First, lengthen the table. It is not to make it become a big conference table, but to pull the tables on both sides of the net back for a certain distance. Thus the net will become a stand with its own support legs. Meanwhile in proportion with the increased distance, widen the table, increase the side of the net and the ground. Then we separately give the size of the changed side of the table, the net and the ground when the tables are pulled back away from the net for 20cm, 25cm, 30cm, 35cm, we call them "New Table Type A", "New Table Type B", "New Table Type C" and "New Table Type D".

That is to say, the original length of the table doesn't change. It lengthens just because the distance increases between the table ($120\text{cm} \times 2$, $25\text{cm} \times 2$, $30\text{cm} \times 2$, $35\text{cm} \times 2$). And it is illegitimate to bat the ball in the area between the tables. This area is covered with a net with the same color as the table.

In order to make athletes dare to use their force, the table is lengthened. In order to prevent the occasion that the short range balls cannot be kicked back as a result of the lengthening of the table, the gaps are covered. Because of these improvements, the cost of a new table is just a little higher than the old standard one. (the cost of the widened part)

(3) Changes of the rules of the game

1. To designate the service area. A server is only allowed to the ball from his own left ball part or right- half part to his opponent's left – half part or right – half part. At the same time, the service area is also limited on the ground of the competition area. Servers are required to serve a ball in the service area (to see Figure 1)
2. To set the way of serve. The ball must directly pass over the net and then drop onto the opponent's half-part table.
3. The way of recording the points can refer to that of tennis, and also can follow the old way of table tennis.

With these improvements, there are chances that bats are lengthened and enlarged moderately.

The possibility of unifying bats and their coverings also increases. In sports, there is no other kind of holding instruments used for batting (such as tennis rackets, squash rackets, sticks of hockey and puck and the batting instruments of basketball, billiard ball and golf) as complicated as pingpong bats. Only for the outside rubber, there are five sorts. And every sort has its own "small family". A lot of people focus their attention on coverings of bats in order to win surprisingly. But they don't realize that it will cause a lot of trouble to the player, who must make great efforts to adapt themselves to different kinds of tactics and different sorts of coverings, and the audience, who can't understand those strange tactics and also dislike to watch dull match full of faults.

Through reform, we should be able to make pingpong bats as simple as

badminton rackets and tennis rackets, so that it could become a popular sport. Football has been entitled "No.1 sport" in the world, and tennis "No. 2". We expect that after the completion of reform in table tennis, it will become "No.3 sport" within 10 years.

With the same pace of this reform, there are the diversity, the tendency of interest, and the practice of table tennis which have already begun. For example, children and elder people can play table tennis with big, soft balls on small tables; amateur fans, including housewives, can also use those tables which are smaller than those standard ones. (for example, those tables with the length ranging from 2 meters to 2.4 meters, the width 1 meter to 1.2 meters, even dinner tables). Thus it is possible to make table tennis become a popular sport enjoyed by hundreds of thousands of people. In the cold regions of Northern Europe, North America, Russia, or the northeastern part of China) as well as the rainy regions which are dominated by continuous wet and overcast days and not fit for outdoor exercises, and the sweltering regions which are not fit for staying for relatively long time to do other exercises, this kind of "small space, small ball – tables . . . big soft ball" entertainment of table tennis is especially acceptable.

An important way for the popularization and future development of pingpong sport. The big soft ball's advantage lies in its low expense. It only needs quite a small area, and it is not too difficult. The big soft ball has a lower speed, weak spinning and it is easy to learn. It is effective to build up our body (when you play it, every part of body such as eyes, hands etc. should act and you should put your full heart into it). It is a good entertainment. And as it is interesting. Everyone can play it.

4 Conclusions

1. The author has proposed conception that sports of athletics, which centers on dual competition is a system of value which mainly contains aesthetic value, body building value, honor value, commercial value and the audience's participation. He has also discussed the value of the pingpong sport, as well as the disadvantages that limit its value. He has also pointed out its necessity of reform.

2. The author has proposed 4 premises of the reform and designed a specific scheme of reform in order to enhance its spectator enhance its value.

3 The author also mentions a kind of recreative and health -building way to play table tennis, with smaller court, smaller table and bigger softer ball. It, as well as the reformed big hard table tennis, will create splendid prospects for table tennis.

(Key words: table tennis, value, compete, reform, the possibility of attending)

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Appendix:

the ball's technical parameter of all kinds of diameters	the technical parameter of the strongest loopdrive	the technical parameter of the strongest under-spin	the technical parameter of the strongest sidespin (the serve)
a. the present-used ball's diameter: 3.7cm	a. the best sportsman of the world class's is about 170 revolutions per second	a. the best sports man of the world-class' is about 120 revolution persecond	a. the best sports man of world-class's is about 90 revolution/second
b. the perimeter of the big circle: $3.7 \times 2 = 11.62\text{cm}$	b. such speed's immediate rotating speed is 1975cm/second	b. such speed's immediate rotating speed is 1394cm/second	b. such speed's immediate rotating speed is 1045cm/second
c. the ball's surface area: 43cm^2			
d: weight: 2.5g e: the density of its surface: $d \div c = 0.05814\text{g}/\text{cm}^2$			
a: lengthen the diameter to: 4cm	a. the ball whose diameter is 4cm still can make the immediate rotating speed about: 1975cm/second	a the ball whose diameter is 4cm still can make the immediate rotating speed about 1394cm/second	a. the ball whose diameter is 4cm still can make the immediate rotating speed about 1045cm/second
b: the perimeter of the big circle: 12.57cm	b. then the big balls' highest rotating speed is $1975\text{cm}/\text{second} \div 12.75\text{cm}$ (the perimeter of the big cricle) = 157revolutions/second	b. the balls' highest underapin speed is $1394\text{cm}/\text{second} \div 12.57\text{cm}$ (the perimeter of the big circle) = 111revolutions/second	b. the balls' highest sidespin speed is $1045\text{cm}/\text{second} \div 12.57$ (the perimeter of the big circle) = 83 revolutions/second
c: the ball's surface area: 50.27cm^2	c. 157 revolution/second is weaker than 176 revolutions/second about 13 revolutions/second	c. can make about 9 revolutions/second	c. compared with 90 revolutions/second it can weaken about 7revolutions/second
d: the density of surface doesn't change: $0.05814\text{g}/\text{cm}^2$ e: the weight should be $d \times c = 2.92\text{g}$			

a the table tennis ball's diameter increased to 4.2cm	a the way to calculate (ditto): the highest rotational speed is 150 r. p. s (revolutions per second)	a the way to calculate (ditto): the highest rotational speed: $1394\text{cm/s} \div 13.19\text{cm} = 106\text{r. p. s}$	a the way to calculate (ditto) the highest side rotational speed: $1045\text{cm/s} \div 13.19\text{cm} = 79\text{r. p. s}$
b the big circle's perimeter 13.19cm	b 150r. p. s is 20 r. p. s slower than 170r. p. s	b It can slow down 14r. p. s than 120r. p. s of a ball that is 3.7cm in diameter	b It can slow down 11r. p. s than 90r. p. s one 3.7cm in diameter
c surface area of the ball 55.42cm ² d the ball's density remains 0.058145kg/m ³ e the ball's quality $d \times c = 3.22\text{g}$			
a the ball's diameter increased to 4.5cm	a calculation (ditto) the highest rotational speed is 140r. p. s	a calculation (ditto) the highest rotational speed $1394\text{cm/s} \div 14.14\text{cm} = 99\text{r. p. s}$	a calculations (ditto) the highest side rotational speed $1045\text{cm/s} \div 14.14\text{cm} = 74\text{r. p. s}$
b perimeter: 14.14cm	b 140r. p. s is 30r. p. s slower than 170r. p. s	b It is 21r. p. s slower than 120r. p. s	b It is 16r. p. s slower than 90r. p. s
c surface area: 63.62cm ² d density remains: 0.05814g/cm ³ e quality: $d \times c = 3.70\text{g}$			

