On correct spin and its control

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Abstract

The article discusses the importance of correct spin in table tennis development and demonstrates several measures to assure that spin is controlled within the correct range.

Key words: correct spin, assured measure, coefficient of sliding friction, colored lines ball, double colored ball

1. Raising the question

No spin is more important in ball games than in table tennis. The spin in table tennis has greatly enriched the techniques and styles of contest. With various styles of techniques table tennis has attracted many people who participate for the physique, will, skill and intelligence of human being displayed in this game. In fact spin played an important role in the development of table tennis. However spin is effective in competition only when it is applied appropriately, or it will hinder the development of the sport. Unfortunately inappropriate spin in contemporary table tennis has produced sharp reductions in technical styles, length of rallies, spectator interest and the number of participants. So the research on controlling spin in an appropriate range for the best effect has become a subject which deserves much emphasis and an urgent solution.

2. Appropriate and inappropriate spin

Appropriate spin refers to a situation in which a player does not have much difficulty in command of either spin service and return, while inappropriate spin refers to a situation in which he has much more difficulty in command of the latter than the former. In the author's opinion appropriate spin produces good effect in promoting the table tennis development while inappropriate spin does just the opposite.

The joined forces service in padeling down style, which was popular during the 50's and 60's, is considered to be inappropriate. This is because the technique of returning this service is far more difficult than that of the service itself. And what is more, sometimes it is even impossible for a player to return it. Fortunately this service was soon restricted by changing the regulations. But generally table tennis is again up against the obstacle of inappropriate spin.

Take the excessively strong topspin loop service as an example. It is usually much easier to serve than to return. For the past twenty years no valid technique for returning this service has been found and chop players have had an even more difficult time. The main reason lies in the fact that the spin can cause a too-low trajectory after the ball

bounces up from the table and a too short distance to its highest point. The ball drops below the table so soon that the returner has to face with the twin difficulties of catching the best striking opportunity and preventing himself from returning a ball to an excessive height. Other kinds of spin service are also excessively powerful and considered to be inappropriate. Returning a spin service itself is natively passive. However, this situation is balanced by giving each player an equal opportunity of service. The problem is that , since there are incredible difficulties for a player to return a spin service, he has to learn how to use this kind of service himself. The result is that the player who receives the service makes more mistakes because of his wrong judgment of the spin, or provides the server with more opportunities to score with the next stroke because his own stroke is so passive.

3. Assured measures for appropriate spin limitation

3.1 The necessary characteristics of the racket surface for reasonable reduction of spin.The physical characteristics of a racket surface have obvious determinative influences on the motion of the ball. This is caused by the minute mass of the ball and its low moment of inertia when it rotates.

The coefficient of sliding friction between a racket surface and a ball μ is the most essential parameter that determines the maximum possible value of spin (note 1). The goal of controlling the spin within appropriate limits can be attained by limiting μ ($2.5 \geq \mu \geq 1$). This top limit is lower than typical values for inward-pimpled rubbers($\mu \approx 3.4$) and higher than those for outward-pimpled rubbers ($\mu \approx 2.5$). The bottom limit is higher than typical values for anti-loop pimpled rubbers and most of raw rubbers ($\mu \approx 1$). This limitation would reduce the spin produced by the commonly used outward-pimpled rubber and also the differences between the spin produced by different kinds of rubbers.

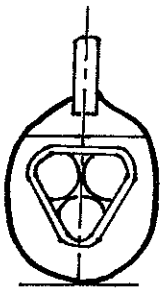
The shape of pimples, the ratio of the diameter, the height (K) and the total area of the pimples per square centimeter (S) are the three parameters that determine to what extent the pimples will bend in the course of playing (note 2). We could require that pimples on inward rubber must be straight cylinders with $K \geq 1.5$ and $S \geq 25mm^2$ so that it would be more difficult for pimples to bend. By doing this the spin from the "sticky" rubbers would be reduced, as would the differences between the different types of rubber.

3.2 A new requirement for reasonable reduction of the difficulty in returning spin. The color of a ball itself does not affect spin, while it does affect players' ability to identify the spin. The single-colored ball, even with its trade marks, makes it absolutely impossible for players to identify the spin by simply perceiving the ball itself. It is proposed that a new requirement on the color of the ball be established so that the players can more easily estimate the spin. Mistakes due to wrong judgment when returning spin would obviously decrease. Two practical measures are offered for choice: a. On surface of the ball are drawn three 2mm red or green lines orthogonal to each other and passing through the central point of the ball. We call this the colored-line ball. b. Change the single colored ball into double colored ball (half orange and half white).

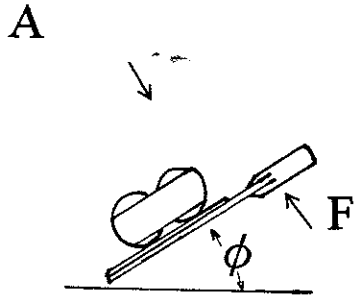
4. Implement of proposed steps

The proposals discussed in 3.1 and 3.2 should not only change greatly the dominance of the various techniques, but also play an obvious part in controlling excessive spins. Only one of the changes should be practiced at one time, however, otherwise the unique fascination of this sport can be lessened. There should be no difficulty in implementing either change. Modern manufacturing techniques can really meet the requirements of the two measures mentioned in 3.2.

A simple method was invented by the author in the late 70's to measure the coefficient of sliding friction between a racket surface and a ball. A wide elastic ribbon or specially made fixture is used to wedge three balls as shown below.



A direction plane



Horizontal

Put the racket at a horizontal level, raise it by the handle slowly and stop raising at the exact moment when the wedged balls start to slide. Measure the angle between the racket surface and horizontal section and the tangent value of this angle is the required coefficient of friction $\mu = \mathrm{tg}\varphi$ (note 1). According to this principle a simple mechanical device can be easily designed for umpires to use.

5. Concluding remarks

As appropriate spin in table tennis has much to do with the correct development of this activity and there still exist a lot of practical technical problems, the author presents this article with the hope of discussing it with scholars and experts who are engaged in table tennis research work.

Note 1: Liu Weizeng, On Angle of Friction in Striking-spin value theorem and spin effect Vol. 2, 1985, Journal of Wuhan Sports College.

Note 2: Liu Weizeng, On Design, Function and Effects of Short-Pimpled Rubber, Penhold Slanted Handle racket and Round-Square Racket. Issue 23, 1982, China Sports Science and Technology.