

How to strike ball with *accuracy*

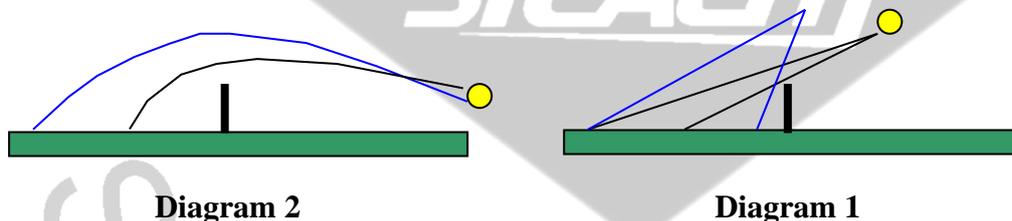
The rules of Table Tennis stated that, when a ball that is legally played, bounces on a player's side of the table, the receiving player must return the ball to the opponent's side of the table before it bounces a second time, without sending it off the table or into the net. This rule shows when competing, a player who legally returns the ball with greater *accuracy* would have a better chance of winning points and winning the game. The opposite would be true if a player's return percentage is lower than that of the opponent.

The research into how to strike the ball with accuracy begins with looking into the formation of the *flight trajectory*.

On a table that measures 274cm X 152.5cm, stands in the middle a 15.25cm high net. When striking a ball, a player must return the ball onto the opponent's side of the table regardless of the oncoming ball's placement, near or far from the net, high or low bounce, and type of spin. This is the point for our investigation into how to *strike the ball with accuracy*.

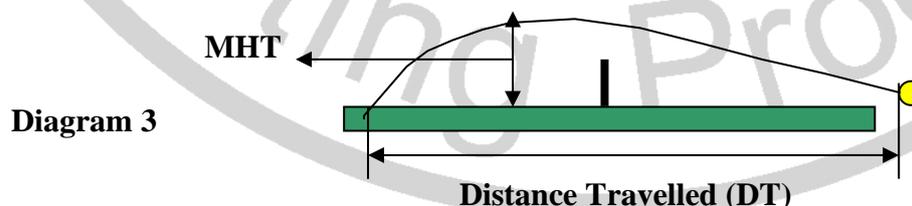
1: If we closely observe the flight path of a Table Tennis ball when two players are playing each other, it is not different to see that balls landing on the table that have no *curvature* (straight line) in its flight path (see diagram 1), are for less than balls landing on the table that has a *curvature* in its flight path (*trajectory*).

The reason for this is only when the oncoming ball's placement is farther from the net and has a lower bounce, then you must create a suitable curvature in the flight path so as to avoid hitting the net or sending the ball off the table (see diagram 2), and thereby achieve a high return percentage. The trajectory of a Table Tennis ball in flight is formed by the maximum height of the curve and the distance travelled.



2: *Maximum height of trajectory (MHT)*, represent the highest point of the *flight path* of the ball, and the *distance travelled (DT)* is represented by the distance between the point of contact by the player's bat and the point at which the ball lands (see diagram 3).

The force of gravity produces the ball trajectory, pulling it to the ground, and the *Air resistance*.



The trajectory of the ball also depends on the direction of the force applied when the ball is struck, the angle of the bat at the time of impact, the amount of force exerted onto the ball, the type of spin imparted on the ball, and the characteristic of the oncoming ball.

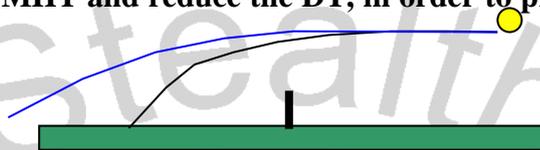
3: Direction of force and its impact on **the trajectory**.

At the time of impact, the direction of force is the same as the direction of bat travelled. It could be travelling forward, forward and upward, or forward and downward. Different direction of force creates different height of trajectory (**MHT**) and **distance (DT)**.

The example given below will help us to understand the relationship between the height of trajectory (**MHT**) and **distance (DT)**.

A: If the oncoming ball bounces higher than the net, it should be strike with a forward and downward force to lower the MHT and reduce the DT, in order to prevent the ball going out. (See diagram 4).

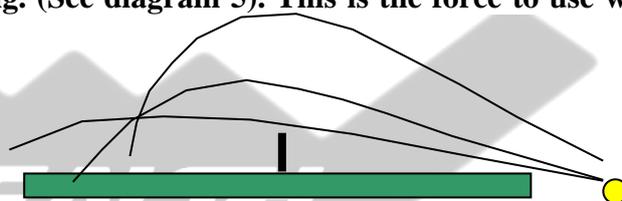
Diagram 4



This is the type of force you should create when practicing the *Kill* or *Downward Chop*.

B: If the oncoming ball bounces lower than the net or allowed to drop below table height, it should be strike with forward and upward force in order to increase the **MHT** and reduce the **DT**, so as to prevent the ball from going long. (See diagram 5). This is the force to use when practicing the High Loop and High Lob.

Diagram 5



4: *The angle of bat*

When striking the ball, the point of contact will vary according to the different bat angles.

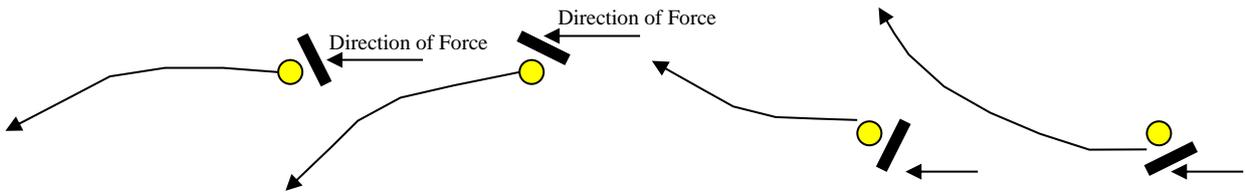
The bat may make contact with the top of the ball, bottom of the ball, middle of the ball, and between top middle, or bottom middle of the ball, etc.

The different contact points create different heights of trajectory and different lengths in **DT**.

For example:

When the same amount of force is applied in the same direction, a closed bat angle would make contact with the upper part of the ball. This would lower the **MHT** and reduces the length of **DT** of the ball. The closer the bat angle the lower the **MHT** and shorter the **DT**.

An open bat angle would make contact with the lower part of the ball (bottom middle), would increase the **MHT** and the **DT**. The more open the bat angle the higher the **MHT** but shorter the **DT**.



As practical experience correspond support these principles, we may therefore conclude that: when the oncoming ball bounces higher than the net, or when the oncoming ball is taken on the upward bounce and when the oncoming ball is heavily topspin, the bat should be closed or very closed in order to lower the **MHT** and shorten the **DT**.

This action would compensate for the upward catapult effect and therefore prevent the ball from going long or out.

This is the method to use when *killing* a ball that bounces high near the net.

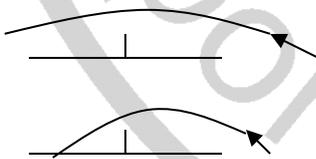
When the oncoming ball bounces lower than the net or when the ball is taken below the height of the table; the bat should not be too opened if you desire to attack the ball, because the ball may go into the net. The point of contact should be the middle top with an upward force added to increase the maximum height of the trajectory and thus avoid sending the ball into the net.

When the oncoming ball bounces lower than the net or when the ball is taken below the height of the table, the bat should not be too opened if you desire to attack the ball, because the ball may go into the net. The point of contact should be middle top with an upward force added to increase the maximum height of trajectory and thus avoid sending the ball into the net.

When the oncoming ball bounces higher than the net; the bat angle should not be opened too much when chopping, as the ball would go long otherwise. The point of contact should be the middle bottom, and a downward force added to lower the **MHT** and prevent the ball from going out.

5: Effect of force variation on trajectory

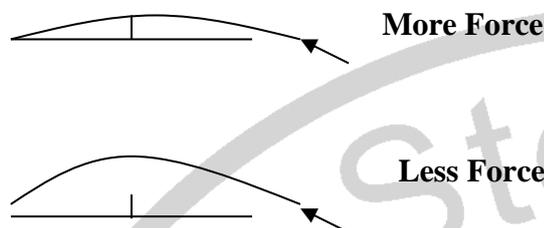
The amount of force that has been put on the ball varies the acceleration of the ball on its flight path. Greater the force, the greater the speed. Lesser the force, the lesser the speed. The speed of the ball affects the trajectory as well. For example:



A: When the force applied is a constant upward and forward force; the ball would travel faster when hit with greater force. This also increases the maximum height of the trajectory and lengthens the distance **DT**. On the other hand, the ball would travel slower when it is hit with a lesser force. This also lowers the **MHT** and shortens the **DT**.

Practical experience and these principle shows, when the oncoming ball is far from the net and bounces low, it should be hit with increased force. This increasing ball speed would result in higher **MHT** and lengthen the **DT**, so as to ensure adequate height and length of return. This is the method to use when playing attacking shots away from the table and chopping balls away from the table.

When an oncoming ball is near the net; and bounces lower than the net, it should be hit with lesser force. This decreases the ball speed to suitably lower the **MHT** to clear the net, and the distance **DT**, so as to ensure that the ball does not go long. This is the method to use when making high loops near the table, lifting balls near the net, making blocks, chopping a low and short ball, and playing drop shots.



B: when the distance **DT is constant;** if the force is greater, then the ball speed is faster but the **MHT** will be lower. The weaker the force, the slower the ball speed but the **MHT** will increase.

The practical experience and these principles show that, if greater force is used to lower the **MHT** and shorten the **DT**, it would work with reasonable success only if the oncoming ball is near the net and high. Should the oncoming ball bounce at net-high or lower, the success rate would be much lower, or even to a point where the ball would not make it onto the opponent's table.

If we use lesser force to higher the trajectory and shorten the distance **DT**, it would increase the success rate but because of the return's slower speed and higher bounce, it gives an easy opportunity for the opponent to attack. This is the reason why *flat hit* or *lift* and *drive* (produce little or no spin on the ball when hitting it) is not advisable to be used.

6: *The effect of different spin on trajectory*

When hitting a ball if you produce spin (top, bottom, side, etc.) upon it, it would affect the trajectory.

The effect of Topspin and Backspin on trajectory:

A: When the direction of force is constant; if Topspin is introduced onto the ball, it would lower the **MHT** and shorten the distance **DT**. The stronger the Topspin the lower the **MHT**.

If Backspin were produced, it would lengthen the distance **DT** and increase the **MHT**. The stronger the Backspin, the higher the **MHT**, so much that it would even cause an inverted trajectory or the ball coming back on itself.

B: When the distance DT is constant; if the ball is hit with a certain amount of Topspin the **MHT** must be suitably raised so the ball clears the net. The stronger the Topspin, the higher you need to raise the **MHT** to compensate for the suppression of **MHT** by Topspin. On the other hand, if the ball is hit with a certain amount of Backspin, the **MHT** must be suitably lowered to compensate for the amplification of trajectory by Backspin.

The greater the Backspin the more we need to lower the height of the trajectory.

These principles, together with the point of contact and bat angle, have a different impact on a trajectory.

How to make use of Spin to alter the line of trajectory in relation to improving Accuracy:

As mentioned before, it would be most beneficial if attacking shots were hit with a certain amount of Topspin, because it creates better trajectory and greater speed. What is more important, this greatly improves Accuracy, because it achieves a higher rate of good returns against near the (net balls) and below the (net balls) as Topspin helps to alter and heighten trajectory so the ball could clear the net, and the same time shortens and manipulate the distance **DT** for added control.

Many players make strong loops or compact light Topspin shots with higher ball trajectory but shorter distance **DT**, and achieve a high rate of accuracy by making good use of the impact of Topspin.

Many fast-attacking players often hit the ball *flat* and without Topspin, which means they have to lower the flight path to shorten the distance **DT**. This method has a reasonable success rate against balls that bounce higher than the net but are much less successful against balls that bounce lower than the net.

If *Friction* introduced against the ball when flat hitting to create a small amount of Topspin, it would create more trajectories and therefore improve accuracy.

On the other hand, hitting a ball with Backspin is not conducive to creating a better trajectory or greater speed. Choppers, therefore, have to raise the maximum height of trajectory enough to get the necessary height for the net clearance when they play balls near the net or balls that bounce lower than the net, and the same time, reduce the ball speed to shorten the distance **DT**, so as to prevent the ball from going into the net or long.

Conclusion

Through the analysis, it can be concluded, that Trajectory and Flight-path and their variations are highly complex. Before we can decide how to make a return, we need to

consider how far away the ball is from the net, the height of bounce (high or low), the type of spin on the ball, and whether it is to be taken with early or late timing.

When we actually make the return, we need to pay attention to the collective impact on trajectory created by the direction of force, the bat angle, the amount of force and spin, and the nature of the oncoming ball so as to create an appropriate trajectory for the return and therefore achieve greater accuracy.

Considering the fact that attacking shots and defending shots have different demands on the direction of force and bat angle, as well as the different impact the two spins make.

There are basic differences in the method for creating trajectory when playing these types of shots:

1: *Attacking shots (including fast attacking and looping shots) and production of trajectory.*

A: When the oncoming ball is near the net and high, trajectory is less important, as long as we take the appropriate point of contact (middle top) and apply forward and downward force for this situation, we may easily attain good accuracy.

B: When the oncoming ball is far from the net and high, then a certain MHT must be created for the trajectory and, the DT must be suitably shortened. To do so we must take the correct point of contact (Middle Top) and apply forward and a little upward force. We should introduce a degree of *Friction* to create a certain amount of Topspin so as to suitably raise the MHT and shorten the DT. This is the way to improve *Accuracy* in this situation.

C: When the oncoming ball is far from the net and low, then we need to raise the height of trajectory and suitably lengthen the distance DT, the point of contact should be middle or middle top. Direction of force should be forward and upward, and to increase the amount of force to avoid the ball going into the net.

D: When the oncoming ball is near the net and low, we need to create a higher MHT and shorten the DT. The point of contact should be Middle Top and the direction of force should be upward and forward, and introduce *Friction* to impart a certain amount of Topspin so as to avoid playing the ball long. The near the ball is to the net, the lesser the amount of force should be so as to shorten the DT.

E: When the oncoming ball carries strong Topspin, we must pay attention to lower the MHT for the purpose of shortening the DT.

The point of contact should be Middle Top or even Near Top and direction of force should be Forward or Forward and Downward, and to suitably increase the amount of force when playing the shot to prevent to ball going long (the stronger the oncoming Topspin the greater the amount of force when making the Return).

F: When the oncoming ball carries strong Backspin, we must pay attention to raising the MHT for the purpose of lengthening the DT. The point of contact should be Middle or Middle Bottom. Direction of force should be upward and forward, and to suitably increase the amount of force

when playing the shot to prevent to ball going into the net (the stronger the oncoming Backspin, the greater the amount of force when making the Return).

2: *Backspin shots (including Copping and Pushing) and creation of Trajectory*

A: When the ball is near the net and high, trajectory is less important. As long as we take the correct point of contact (Middle or Middle bottom) and apply a Downward and Forward force, the ball would then travel with a trajectory of a near straight line or inverse curve to land on the opponent's side of the table.

B: When the oncoming ball is far from the net and high, we must pay attention to lowering the MHT for the purpose of shortening the DT. When playing this Chop Return, the point of contact should be Middle Bottom. The direction of force should be downward pressing and forward so as to prevent the ball from going high and long.

C: When the oncoming ball is near the net and low, we need to raise the MHT and shorten the DT. When playing the Chop return, the point of contact should be near bottom. The direction of force should be forward and without downward force. A little amount of force should be used to reduce the speed of the return so as to avoid sending the ball into the net or long.

D: When the oncoming ball bears strong Topspin, we must lower the MHT for the purpose of shortening the DT. When playing Chop return, reduce the angle of your bat backwardly-inclines. Point of contact should be Middle bottom, and increase downward force to cancel and compensate for the Topspin on the ball (the stronger the oncoming topspin, the greater the amount of force when making the return), and prevent it from going high and long.

E: When the oncoming ball carries strong backspin, we must raise the MHT for the purpose of lengthening the DT. When playing this Chop return, increase the angle of the bat backwardly-inclines. Point of the contact should be near bottom, and increase the forward force to cancel and compensate for the backspin on the ball to prevent it from going into the net.

I have deliberately mentioned how to play defensively or how to play against them in case one day you have to play against some choppers or players using a very high quality back spin, although there are no such players in UK to be able to create strong backspin due to their bad technique and also using wrong bats.

I hope you study this section as you study your normal school subjects in order to understand it well and implement it into your game.

Until the next time, play right. JavadAmeri