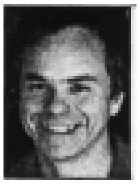
Bob Jewett



Don't Grip It and Rip It

The Jacksonville Experiment also revealed the significance of cue speed.

The video tapes made during the Jacksonville Experiment (*BD*, April) provided the first quantitative information on cue speed throughout a shot. We did this by attaching a graph-paper scale to the cue that would be used for the measurement. The high-speed video camera was focused on the scale, and set to its fastest recording rate. Each of three players took shots at various speeds and with several cue weights.

To convert this raw video data into cue velocity, the sequence was examined frame by frame, and the time for each movement of one centimeter (about four-tenths of an inch) is noted. This gives the time the cue took to move one centimeter. The number could then be turned into speed by simple division. When the resulting speeds were plotted versus cue positions, a graph like Diagram 1 is produced. Along the horizontal axis is how far the tip traveled from the bridge hand. On the vertical axis is the speed of the stick, with negative speed on the backstroke and positive speed on the forward stroke.

The backstroke begins with the tip almost at the ball — about 22 centimeters, or 8.5 inches from the bridge hand. As the stick is brought back, a peak negative speed of 0.6 meters/second is reached. The stick comes to a stop (speed = 0) with the tip just a centimeter from the bridge. As the forward power takes over, the stick is accelerated to 1.9 meters/second. When the tip contacts the ball, the stick speed suddenly drops to about half its value. This takes only a millisecond (one-thousandth of a second), which is about one-fifth of the time between the measured points, and was determined from separate close-ups of the tip/ball contact. The follow-through takes the stick forward another 12 centimeters as it slows to a stop.

A major point to note on this stroke is, the ball was struck when the stick was at, or very near, the peak of its speed. As mentioned in a previous column, this is theoretically the best time to hit the ball for efficiency and consistency. Just at the peak, the stick is coasting at maximum velocity.

A very interesting and unexpected feature in the plot is that the cue speeds back up after the ball has left. This turns out to be from the hand and arm, which don't slow down much during the very brief tip-ball contact. After the ball has left, the cue, hand and arm gradually go to their average speed, which is about halfway between the peak speed and the reduced cue speed after contact. From the time it takes for equilibrium to be reached, it is possible to estimate how tightly the hand is gripping the stick, compared to how hard the tip is. It turns out that the hand is about 100 times softer than the tip. That is, to push the tip one millimeter into the ball required 100 times the force needed to move the cue one millimeter against the grip.

What does all of this mean for practical purposes? In essence: Let the cue do the work and don't worry about the details. A very major point is that your hand — unless your grip is much, much firmer than mine — cannot have any significant influence on the ball during the brief tip-ball contact. Another point is that a good time to hit the ball is at the peak speed. Notice that if the ball had been an inch (2.5 centimeters) closer, the cue speed at impact would have been nearly the same. This means small errors in stroke timing should have little influence on the outcome.

Bob Jewett is a certified instructor for the Billiard Congress of America.

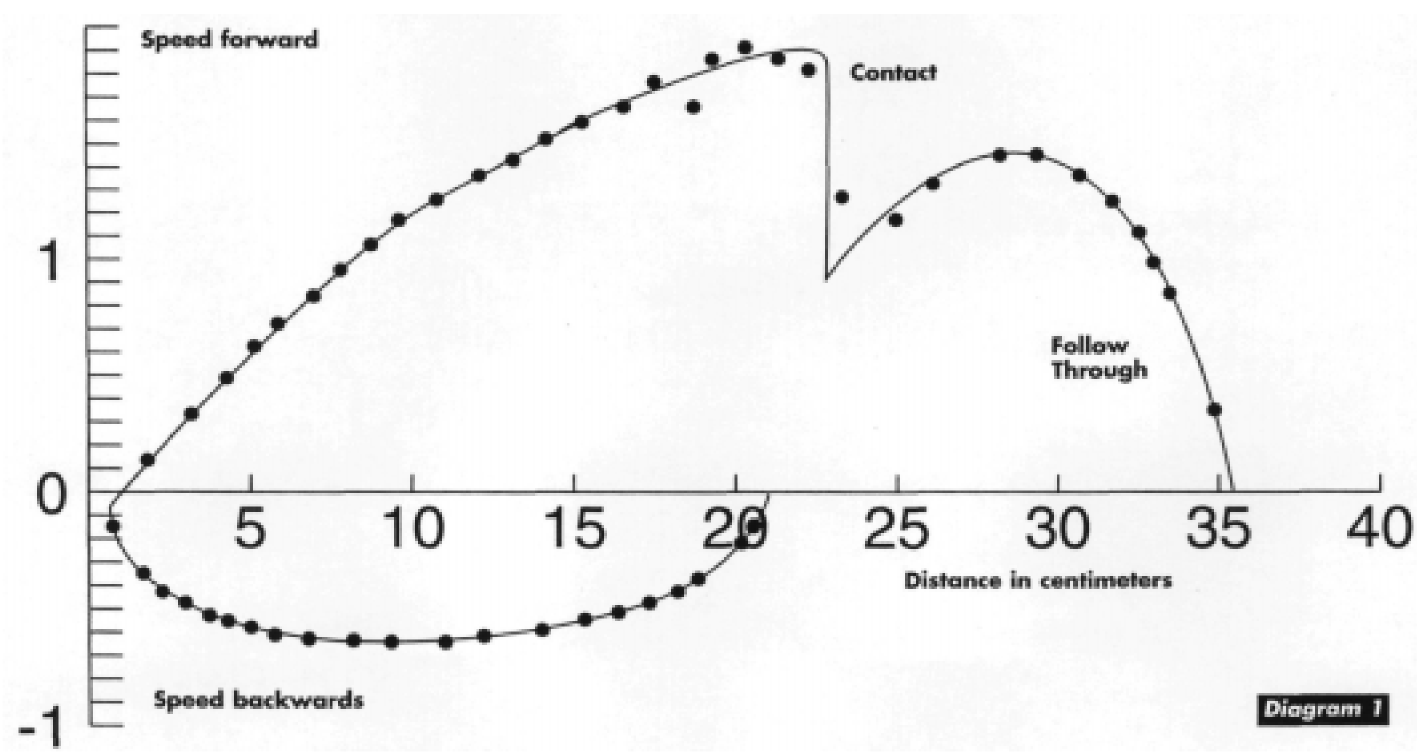


Diagram 1