



Outside Assistance

A little spin to help the angle?

One of the most-repeated maxims in pool instruction is that you should never use sidespin unless you really need it to position the cue ball. Many teachers assert that nearly all shots can be played with a hit on the vertical centerline of the cue ball; draw and follow are OK, but side is to be avoided.

Willie Mosconi told us, "My experience has taught me that more than 85% of the shots can be accomplished by stroking the cue ball in the center of its vertical axis." He later said, "The vast majority of shots can and should be executed by stroking the cue ball at its exact center," and "Resort to English only when you are confronted with the need to alter cue- or object-ball action radically." In Diagram 1, you'll need that something special to get to either the 2 or 3.

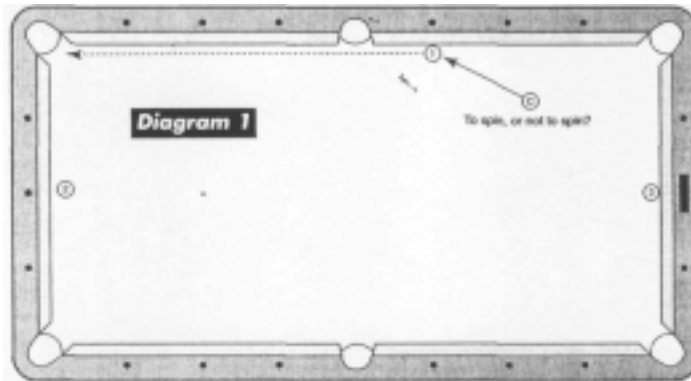
The case against sidespin is easy to support. Squirt, swerve, throw and cling due to the spin are each impactful enough to make shots miss. If you're facing a tough shot, it would be insanity to make it harder with those factors unless the position demanded it. If you have an easy shot, you run the risk of changing a 100% proposition to a 95% chance.

On the other hand, long-time readers of this magazine may have noticed a former world champion advocating the use of outside English to help the ball into the pocket on cut shots. (Outside is right English for cuts to the left, and vice versa.) The idea is that some outside English will counteract the throw from the cue ball rubbing across the surface of the object ball during the collision. Since you can hit the object ball fuller, you will also take more of the speed off the cue ball and it will be easier to control.

Ideally, the outside English will exactly cancel the "collision-induced throw" and the cue ball will roll across the surface of the object ball without any rubbing. In response, the object ball will move away exactly along the line of centers of the balls at the instant of collision, and the ghost- or phantom-ball method of aiming — and all their equivalent systems — will be perfect.

Before we get into the details, what do you usually do? Does a shot down the rail

feel better with a little outside? If you have to shoot a spot shot, do you help the angle a little with spin? A pool buddy of mine much prefers inside English on tough cut shots when position isn't a factor, as it



would be in Diagram 1 if the 1 were the game ball. He doesn't follow the theory of some who claim that such spin, especially down a rail, will put enough sidespin on the object ball to make it zip into the pocket; he just finds it easier to aim with inside. He's got a point. The contact points on the cue ball and object ball are both close to the line of the cue stick, so the shot is more "compact" with all parts along your sighting line.

To analyze the problem, two basic facts are important: object-ball throw is determined by how the surface of the cue ball at the contact point is moving relative to the surface of the object ball at the instant of contact; and if the balls slide against each other during the entire contact, there is a maximum amount of throw that can be imparted to the object ball, and it is in the direction of relative motion.

The first point is critical to the use of outside English to "relieve the angle." Think about a half-ball cut shot like the one in Diagram 1. The cue ball is generally moving across the face of the 1 ball, so the 1 will be thrown towards the cushion. If some outside English is used, right english in this case, the surface of the cue ball will roll across the 1 ball without nibbing. Thus the amount of sideways rubbing, or throw, has two contributors: the general motion of the cue ball, and the sidespin on the cue ball. The tricky part is to know how much English to use. If you don't have enough,

the cue ball's motion will dominate, and you will still have throw. If you have too much sidespin, the ball will be thrown in the other direction.

Is it even possible to get this last condition of "excess" outside English? Absolutely! The fuller the hit, the easier it is to do, since the cue ball's motion across the object ball is slower. On a half-ball hit, it takes only a moderate amount of spin, not even close to maximum possible tip offset on the cue ball.

So, to get cancellation of the two sources of throw, you need to balance the English against the amount of cut. This leads to the question of how perfectly this needs to be done in order to get pretty good results. This is a difficult experiment to do, as you need to control speed, angle, spin and draw/follow. You may have noticed that many of the experiments I've suggested here involve combination shots so that you can repeat the setup precisely. Studying a shot with more variables quickly becomes hard to control.

Fortunately, we already have a theoretical result. Ron Shepard, scientist at the Argonne National Laboratory in Argonne, Ill., has worked out the physics of throw for a lot of different cases of spin and cut, and has made them available in a 109-page online paper you can access at www.play-pool.com. The paper does have a lot of equations about all aspects of pool, and if those aren't your cup of tea, just pay special attention to the many practical questions and solutions he includes. Throw is covered around page 44.

Figure 2 is adapted from Shepard's Figure 4.4. It shows the amount of throw according to the amount of outside spin for the shot shown in Diagram 1. If you have just the right amount of spin, there is no throw. If you have not enough spin, you get throw to the right; too much spin throws to the left. The interesting part is how quickly the throw changes if the spin is a little wrong. If you have between no spin and half enough, the throw is almost constant. If you have, say, between 50% too much and great steaming gobs of outside, the

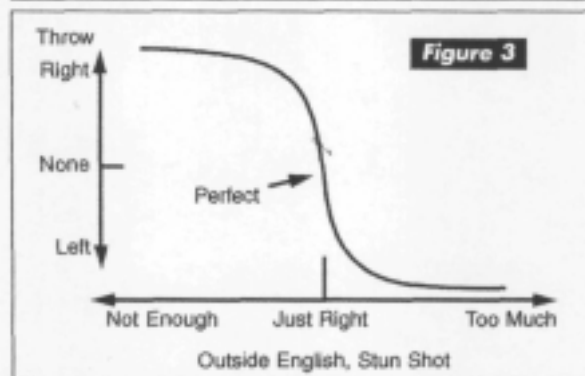
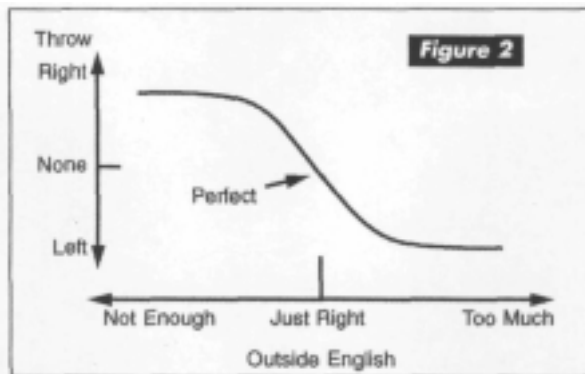
Bob Jewett

throw is again almost constant. In the middle region, around the "perfect cancellation" spot, if the English varies a little, the throw varies a lot.

This theory predicts that if you are interested in accuracy and consistency, the worst possible plan is to try for zero throw when you are cutting the object ball. Either no outside English or lots will get much more consistent object-ball paths.

What does this theory say to the people who like to use inside English? In Figure 2, their shots would be farther out to the left of the curve, and are in the region that's nearly constant throw. Providing that you can overcome the general pitfalls of using sidespin, this is a better choice than outside, generally.

The theory also has something very interesting to say about what follow and draw do when factored into the throw equation. The curve in Figure 2 is drawn for shots with moderate amounts of draw or follow. If you play the shot as a stun shot — that is, so the cue ball arrives at the object ball without draw or follow, like a stop shot — the curve in **Figure 3** applies. Note the much sharper transition between throw to



the left and right. In effect, draw or follow "mellows" the effect of the English, and makes the cut angle much less sensitive to

small errors in the amount of spin. Notice also that for a stun shot, you get more throw in either direction. This is related to the second major point mentioned above: the draw or follow in some sense competes with the sidespin, and makes it less effective.

This last point says something very important for a stop shot. Many of us tend to put small amounts of sidespin on the cue ball unintentionally. If we are playing a stop shot, the result is similar to Figure 3, where the horizontal axis is relabeled as "Unintended Left or Right English." It is not so easy to get exactly no English, and if you fail, there is a large penalty in throw angle. The trick, suggested by Shepard, is to make sure you have just a little draw or follow on the cue ball when it gets to the object ball. You won't get perfect stop action, but small amounts of side will be tempered by the draw or follow.

So here's my recommendation: Take Mosconi's advice, and use sidespin only when you have to. And when it comes to avoiding the effects of unwanted side, mix in a little follow or draw.