

Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, technical proofs (TP), and all past articles are available online at billiards.colostate.edu. Reference numbers used in the articles help you locate the resources on the website.

Recently on AZBilliards.com, there was a discussion and debate about how sidespin can be used to throw a frozen combination with transferred spin. Matt Polland shared the illustration in **Image 1** clearly showing all possible effects at play with a straight hit into a frozen combination. With right spin on the cue ball (CB), which way do you think the 2nd object ball (OB) will head? Straight, to the left, or to the right? Think about it as you read on. Recently, I posted online video [NV L.56](#) to discuss and demonstrate all the effects separately. The video starts with some useful game-situation examples from Part 2 of my “Everything You Need to Know About Throw” video series ([NV J.42](#)), which shows how important throw is when shooting frozen combo shots. If you have not seen the throw video yet, check it out since it has useful background information and examples.

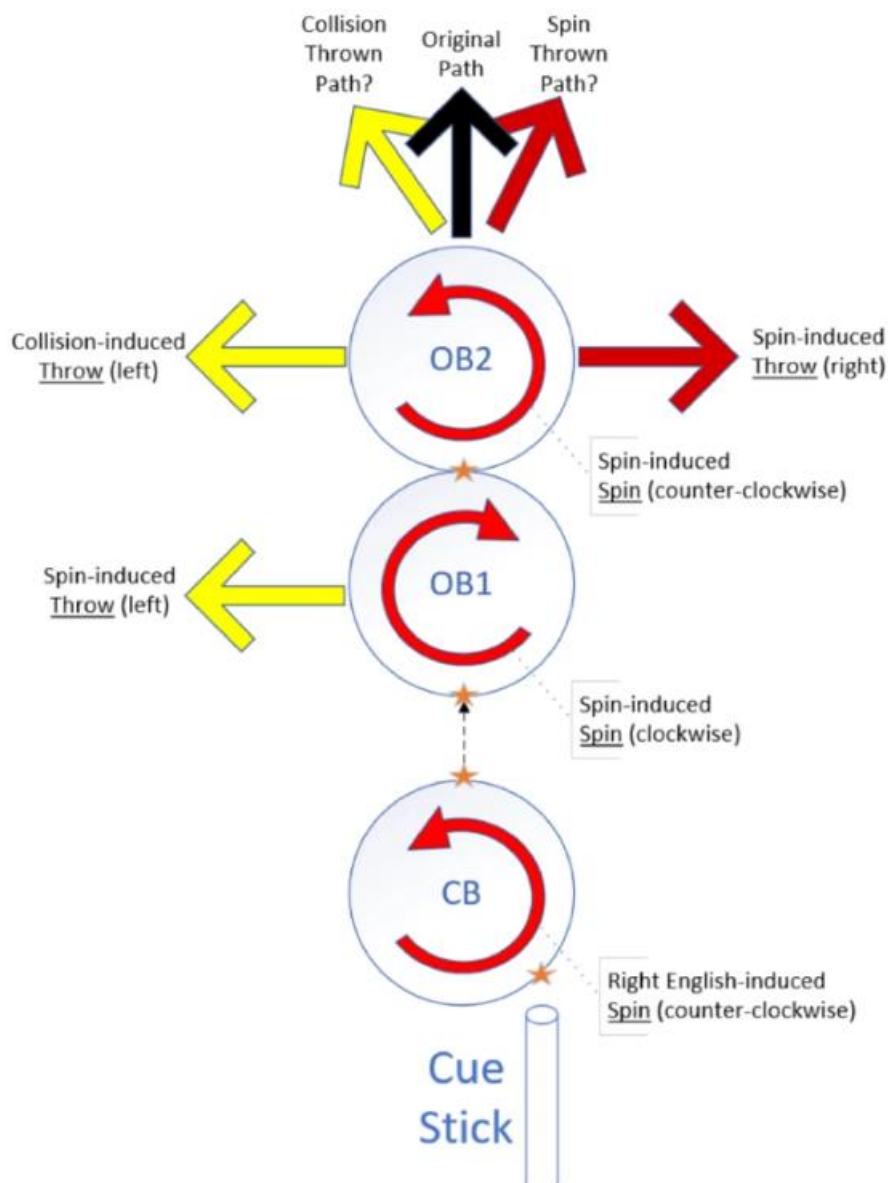


Image 1 Frozen-ball CIT, SIS, and SIT effects

Now let's look at each effect in Image 1, starting with throw of a single ball. For the shot shown in **Image 2**, with a center-ball hit and straight shot, the 11 heads straight up table and the stripe remains vertical as the ball rolls. But with a cut angle, again with a center-ball hit, the OB gets thrown well offline (see **Image 3**). This is called cut-induced throw or CIT. It is maximum for a slow-speed stun shot close to a half-ball hit. Friction between the balls throws the 11 offline in the direction of CB motion (along the red line in Image 3). With a cut in the other direction, the ball throws in the other direction; again, in the direction the CB is heading. As is clear in online video [NV L.56](#), the stripe wobbles with each throw shot. Anytime there is throw, the throwing force also imparts sidespin to the thrown ball. CB rubbing to the left causes left or CW sidespin on the OB ... and CB rubbing to the right causes right or CCW sidespin on the OB.

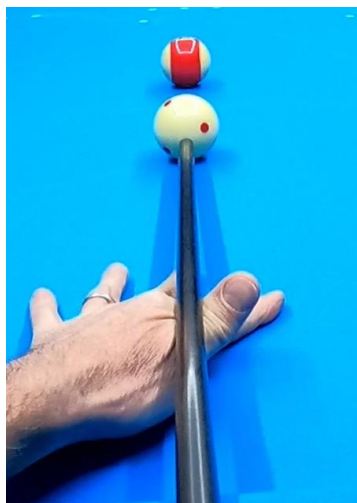


Image 2 GoPro view



Image 3 Cut-induced throw (CIT)

Throw caused by sidespin instead is called spin-induced throw or SIT. For a straight shot, it is maximum with slow-speed stun at about half of maximum sidespin. See the "[maximum throw](http://billiards.colostate.edu)" resource page at billiards.colostate.edu for more information and demonstrations. Left spin throws the OB to the right, in the direction the CB is rubbing, and right spin instead throws the OB to the left. Note that with an accurate aim at the desired ghost-ball position, the CB drifts sideways in the opposite direction from the throw. As demonstrated in online video [NV L.56](#), to get the CB to stop in place, you need to cut the OB to counteract the throw effect on the CB.

Now let's look at frozen-combination throw for the shot in **Image 4**. With a straight center-ball hit, the 2nd ball goes straight. But hitting the 1st ball at an angle causes the 2nd ball to throw. Remember, throw is always in the direction the 1st ball is rubbing against the 2nd. If the 9 is going to the right, the 11 gets thrown to the right, and if the 9 is going to the left, the 11 gets thrown to the left. Again, when you watch the video, notice the stripe wobble caused by the sidespin imparted to the OB by the throwing force.

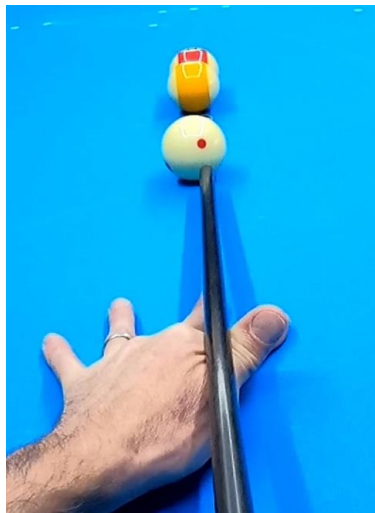


Image 4 Frozen-combo spin-induced throw

Well, are you now ready to accurately answer the question from the beginning of the column? With right spin on the CB, which way do you think the 2nd OB will head? Straight, to the left, or to the right? Choose your answer before reading on. ... As shown in online video [NV L.56](#), with right spin, the 2nd OB throws to the right. And with left spin, it throws to the left. With right spin, the CB throws the 1st OB to the left with SIT, but it also transfers left spin to the 1st OB. This spin throws the 2nd OB to the right. In the video, you will notice that the amount of throw is not very much. This is because there is a limit to how much spin can be transferred from the CB to the 1st OB. Also, the CIT effect that moves the 1st OB to the left reduces the effective throwing motion caused by the left spin. But right spin on the CB does throw the 2nd OB to the right. Did you get the correct answer?

If your only goal is to throw the 2nd OB, cutting the 1st ball in to the 2nd is much more effective than trying to use spin transfer. As shown in the video, you can throw the ball a large amount with this approach. Remember, to get the most throw, you want to aim the center of the 1st ball at the edge of the 2nd ball for a half-ball hit on the 2nd ball. And use slow speed.

Image 5 shows an example 8-ball game situation, shooting stripes with the 9 and 11 frozen, where the spin-transfer-throw technique can be helpful. As shown in the video, the 11 goes wide of the pocket with a straight hit. If the 1 weren't there, you could just cut the 9 into the 11 to get more than enough CIT to pocket the ball. However, with the 1 there, the only reliable option is to use the small spin-transfer-throw effect. Remember, you need left spin to throw the 2nd ball to the left slightly. The technique allows you to pocket the ball here; but, in general, the technique is not very useful since a situation like this is rare and the amount of throw you can get is very small, even with pocket speed. In the video, I hit the shot very well and still barely got enough throw to pocket the ball. But if the technique can help you win a game, like in this situation, it is worthwhile to know.



Image 5 8-ball example using spin-induced frozen throw

I hope the info and examples here and in online videos [NV J.42](#) and [NV L.56](#) will help you be more effective when you need to throw balls in. If you want to learn more about throw and spin transfer, see the resource pages linked in the video descriptions of the YouTube videos. Be sure to watch the videos. It is very helpful to see the shots instead of just reading about them. And better yet, try the shots out at a table.

Good luck with your game,
Dr. Dave



[NV J.42](#) – Top 10 Things You Need to Know about THROW
[NV L.56](#) – Spin Transfer Throw of Frozen Balls – with GoPro POV

PS:

- I know other authors and I tend to use lots of terminology, and I know not all readers are totally familiar with these terms. If you ever come across a word or phrase you do not fully understand, please refer to the [online glossary](#) at billiards.colostate.edu.

Dr. Dave is a PBI Master Instructor, Dean of the Billiard University, and author of the book: [The Illustrated Principles of Pool and Billiards](#) and numerous instructional DVD series, all available at: DrDaveBilliards.com.