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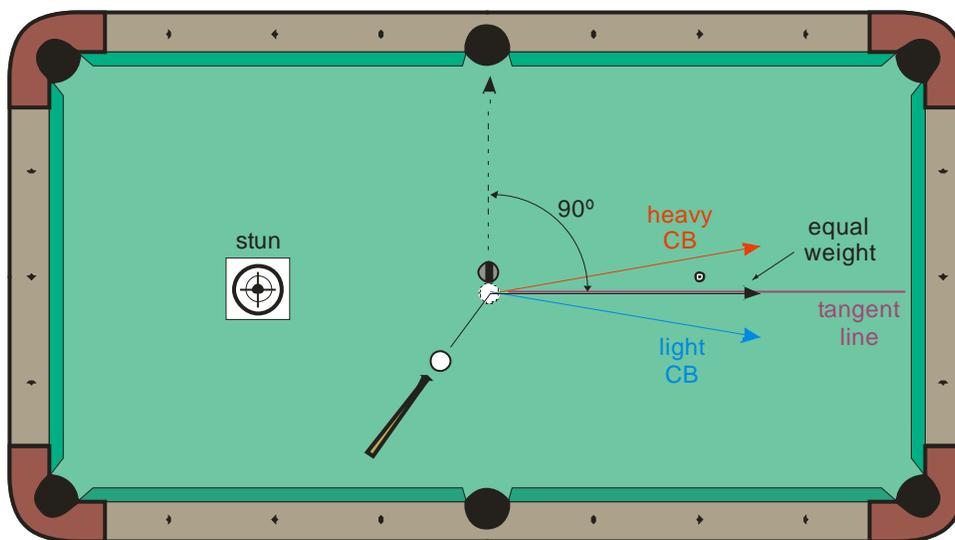
Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, technical proofs (TP), and all of my past articles can be accessed and viewed online at [billiards.colostate.edu](http://billiards.colostate.edu). The reference numbers used in the articles help you locate the resources on the website. If you have a slow or inconvenient Internet connection, you might want to view the resources from a CD-ROM or DVD. Details can be found online at: [dr-dave-billiards.com](http://dr-dave-billiards.com).

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Last month, we looked at ball and weight difference effects. The focus was on square-hit stun, follow, and draw shots. This month, we'll look at how weight differences affect cut shots and the 90° and 30° rules. All of the effects are described and demonstrated in online video **HSV B.49**, which I recently filmed with fellow columnist Bob Jewett.

Remember, the CB is sometimes heavier on some older coin-operated “bar boxes.” Also, even with an originally equal-weight set, the cue ball (CB) will sometimes be lighter because it takes more abuse from the cue tip, other balls, and cloth, and wears faster as a result. And if a new CB is used with an older object ball (OB) set, the CB will generally be slightly larger and heavier than the worn OBs not replaced.

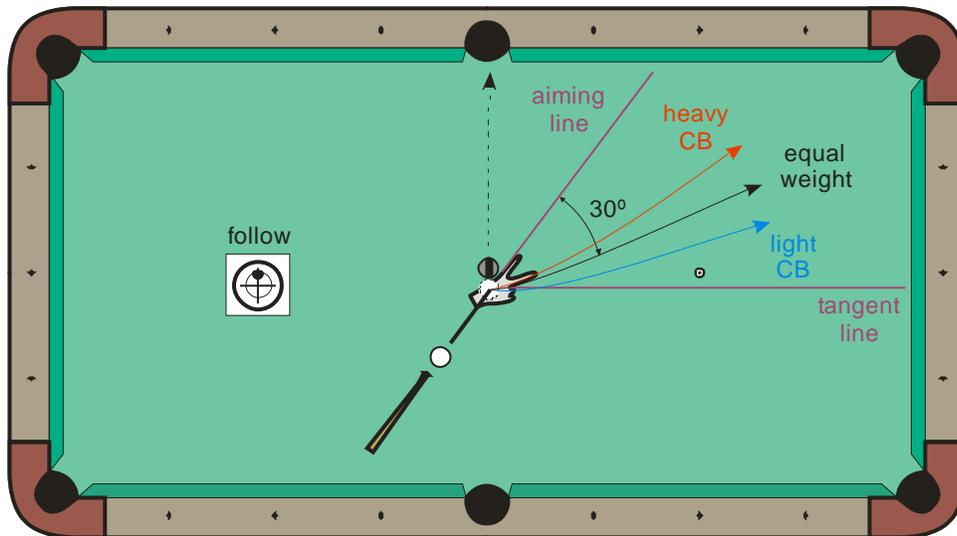
**Diagram 1** illustrates the effects of ball weight differences on a stun shot, where the CB has no top or bottom spin at impact with the OB. With a cut angle, a stun shot sends the CB straight down the tangent line, which is perpendicular to the line of travel of the OB. This is the famous 90° rule, which applies only for balls of equal weight. As shown in **HSV B.49**, the CB heads straight down the tangent line regardless of stun shot speed. As shown in the diagram, a heavy CB with stun goes forward of the tangent line, but still heads in a straight line. A light CB with stun deflects back from the tangent line.



**Diagram 1 Stun shot ball weight effects**

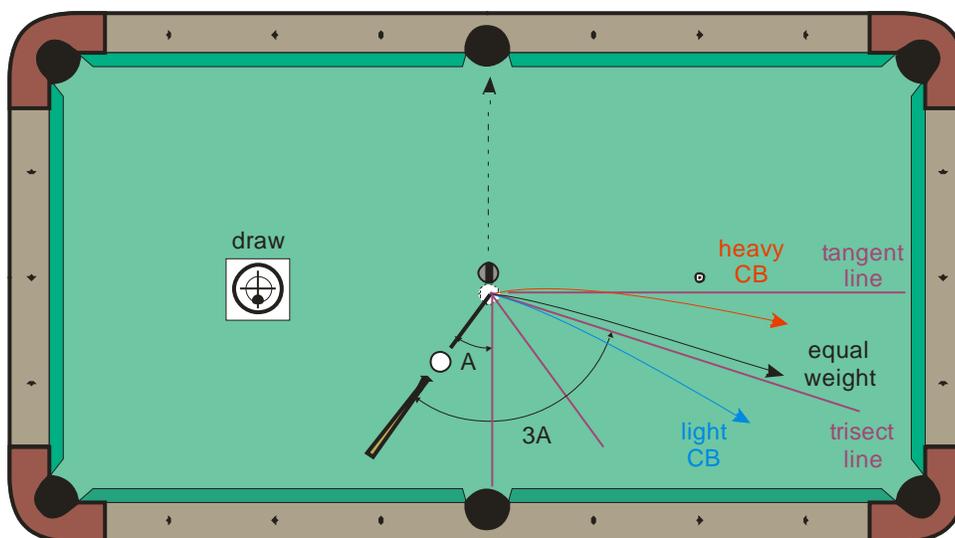
**Diagram 2** illustrates the effects of ball weight differences on a follow shot, where the CB rolls into the OB with topspin. Follow shots curve forward of the tangent line, which happens almost immediately with a slow-roll shot. Over a wide range of cut angles, the angle the CB deflects off the OB is about 30°, sometimes called the “natural angle.” This is the famous 30° rule (see the [30° rule resource page](#) in the FAQ section of my website for more info and demonstrations). As shown in **HSV B.49**, with faster speed the CB persists along the tangent line longer before curving forward. The 30-degree rule applies for any balls (pool, carom, or

snooker) as long as the CB is the same weight as the OB. As shown in the diagram, a heavy CB follows sooner and more than normal. A lighter CB actually deflects back from the tangent line slightly before going forward and doesn't follow forward as much as normal.



**Diagram 2 Follow shot ball weight effects**

**Diagram 3** illustrates the effects of ball weight differences on a draw shot, where the CB slides into the OB with backspin. With a draw shot, the CB curves back from the tangent line. To predict the amount of draw, you can use the trisect system, which is illustrated in the diagram. For cut angles less than about  $40^\circ$ , a good-action draw shot results in a final CB angle that is 3-times the cut angle from the original direction (see A and 3A in the diagram). For more information and demonstrations, see the [trisect system resource page](#) in the draw FAQ section of my website. As with follow shots, with more speed, the CB persists along the tangent line longer before curving to the final direction (for more info and demonstrations, see the [speed effects resource page](#) in the FAQ section of my website). As shown in the diagram, a heavy CB with backspin goes forward of the tangent line before drawing back, and doesn't draw back as much. It is much easier to draw a lighter CB. The lighter CB bounces back some naturally and the bottom spin makes the CB draw back even more.



**Diagram 3** Draw shot ball weight effects

The next time you play on a bar box with a heavy CB, or if you're playing with a set of old OBs and a new CB, see if you can notice some of the effects described and illustrated in this article and last month. Obviously, to play accurate position, avoid scratches, and aim carom and break-out shots, it is important to have a feel for these effects if you happen to play on equipment with ball weight differences.

If you still haven't checked out the online video yet, visit my website and navigate to **HSV B.49**. It's much more fun seeing the effects rather than just reading about them. Better yet, find a heavy CB (or a carom ball) and try all of the shots yourself.

Good luck with your game,  
Dr. Dave



**HSV B.49** - Cue ball and object ball weight/size difference effects

**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 don't fully understand, please refer to the [online glossary](#) on my website.

*Dr. Dave is author of the book, DVD, and CD-ROM: "[The Illustrated Principles of Pool and Billiards](#)," and co-author of the DVD Series: "[The Video Encyclopedia of Pool Shots \(VEPS\)](#)" and "[The Video Encyclopedia of Pool Practice \(VEPP\)](#)."*