
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. 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.

Pool players on the online forums and Facebook often ask: What is the best weight for a playing cue? Or: Is there an optimal weight for a break cue? I will attempt to address these questions in this article.

For your main playing cue, you should use whatever weight feels most comfortable. Different weights can produce slightly different results; but with practice, one can get accustomed to a cue of any weight. You will learn to adjust your stroke as necessary to achieve the range of cue speeds appropriate for different shots. The only shots for which cue weight can make a significant difference are power shots (e.g., an extreme power draw, or the break shot), as discussed later in the article.

In general, a lighter cue will allow more control over finesse shots, and a heavier cue will allow more cue ball (CB) speed with less apparent stroke effort. A heavier cue might also be easier for some people to keep on line during the stroke, but this is a very individual thing. Also, a heavier cue might tend to have a shaft with more endmass (the weight of the portion of the shaft closest to the tip); although, this isn't necessarily the case. If it is, the heavier cue will create more squirt (AKA "cue ball deflection"), which can have both advantages and disadvantages for different people. For more information, see the "[squirt endmass](#)" and "[low-squirt \(AKA low CB deflection or LD\) shaft advantages and disadvantages](#)" resource pages in the FAQ section at billiards.colostate.edu.

Another potential pitfall with a heavy cue is that it could result in double hits, pushes, or miscues at large tip offsets from center. When using a very heavy and/or stiff cue, the maximum tip offset (and maximum spin) possible with a good hit can be more limiting than normal. As shown in the plots on pages 7 and 8 in [TP A.30](#), with a hit close to the miscue limit using a heavy cue, the CB might not separate from the tip fast enough. Also, with a stiff shaft (e.g., a carbon fiber shaft) the end of the cue won't deflect away from the ball as much as normal and will tend to flex back toward the CB faster. These effects can result in a double hit or push that might not even be directly noticeable; although, the CB will squirt more than expected (as with a miscue shot). In [HSV A.106](#), the 2nd-to-last shot (before the miscue) visually shows how close the tip can come to a double hit even with a typical-weight LD shaft, which is not very heavy or stiff. For more info, see the "[maximum english](#)" and "[cue vibration](#)" resource pages in the FAQ section at billiards.colostate.edu.

For a break cue, the optimal weight for maximum cue ball (CB) speed will depend on your arm anatomy (the size and weights of the different parts of your arm), muscle physiology (whether your muscle fiber dominance is fast-twitch or slow-twitch), technique, and timing. The only way to find out the optimal weight for sure is to experiment. Cue weight is not just a question of physics. Physiology also comes into play. Some people have more fast-twitch muscle fibers than others. Because of this, cue weight selection can be a very personal thing.

What determines the CB speed is the cue's mass and the cue's speed at impact with the ball, and CB speed is what we are striving for on the break (in addition to accuracy). For a given cue speed, if the cue has more mass, the CB will go faster; and for a given cue mass, if the cue has more speed, the CB will go faster. Both factors (cue speed and cue mass) are important. Some people can generate more breaking power with a lighter cue, and some can generate more with a heavier cue. A detailed analysis of the physics of how CB speed varies with both cue mass and speed (and tip offset from center, and tip efficiency) can be found in [TP A.30](#). Breaking power is related to the square of CB speed, and CB speed is directly related to cue speed, so if you can increase the speed of your break stroke while maintaining accuracy, it can result in a big improvement in break effectiveness. And if you can also use a heavier cue, and maintain the same or similar cue speed, you can also increase breaking power; although, increases in cue weight don't have as large of a benefit as increases in cue speed.

[Cue and tip efficiency](#) can also affect breaking performance. Based on the numbers in [TP A.30](#), changing from a medium-hardness leather tip on a typical playing cue (with a typical "coefficient of restitution"

or COR of 0.73) to a phenolic tip on a break cue (with a COR as high as 0.87), can increase breaking power by 17%! For comparison purposes (see the end of [TP A.30](#) for details), if you could increase your cue speed by 10%, the cue ball speed would also increase by 10%, and the effective increase in breaking power would be 21%. And for a given cue speed, if you could increase the cue weight from 17 to 22 oz (while maintaining the same speed), the cue ball speed would increase by 6.3%, which would correspond to an effective increase in breaking power of 13%. So with a dramatic increase in cue weight (17 oz to 22 oz), the benefit is not as large as one might expect, even if the heavier cue could be stroked at the same speed as the lighter cue (which is usually not the case).

As mentioned above, the optimal cue weight for each individual, providing the best combination of cue speed and weight to produce the best breaking power, is a very personal thing. The only way to determine the optimal weight is to experiment. And even if you are using the optimal-weight cue and are generating the most cue speed possible, none of that will matter if you are not using [good technique](#) to get a square hit on the lead ball or if you are getting too much unintentional sidespin or [CB hop](#). You should only use as much speed as you can control.

A good analogy to pool break cue weight selection is baseball bat weight selection. A lighter bat can be swung faster, but a heavier bat has more mass. Some players can generate more ball speed (and distance) with a heavier bat (e.g., Babe Ruth), and some do better with a much lighter bat (e.g., Barry Bonds). An excellent webpage dealing with baseball bat weight effects can be found at: <http://www.acs.psu.edu/drussell/bats/batw8.html>. Graphs about 3/4 down the page show how maximum possible ball speed varies with bat weight. The curves are very flat at the optimal weight, implying bat weight doesn't really make that much difference in the range of typical values. This effect should be similar with break cues. If you are in your preferred weight range, an ounce more or less shouldn't make much difference.

Diagram 1 illustrates how the maximum CB speed you can generate might vary with cue weight. This is similar to the graphs for the optimal bat weight in baseball. The black curve shows how performance might vary for a typical person. With a very light cue, the maximum CB speed possible will be lower than what is possible with a heavier cue. And for a cue that is too heavy, the maximum possible CB speed will also be limited. There will be an optimal weight range where the break speeds can be the highest (see "optimal break cue weight" in the graph). The blue and red curves show how things might vary with muscle physiology. For a person with predominantly fast-twitch muscle fibers (e.g., sprinters, jumpers, and fast baseball-bat swingers), the optimal cue weight will usually be lighter. And for a person with predominantly slow-twitch muscle fibers (e.g., distance runners and slow/powerful baseball-bat swingers), a heavier cue weight will usually be more effective. But again, since the CB speed vs. cue weight curves will typically be fairly flat near the optimal, small changes in cue weight won't have much of an effect, so there's no need to try to get too precise with finding your optimal cue weight.

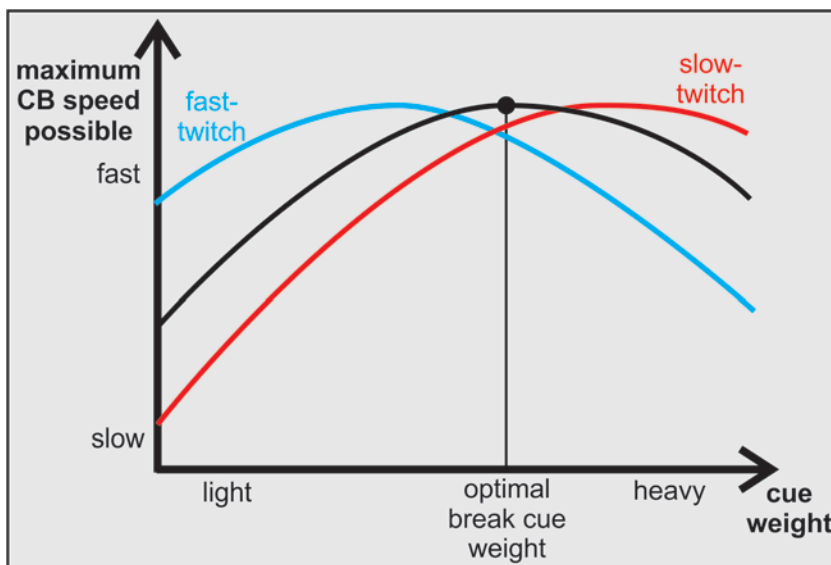


Diagram 1 Optimal break cue weight

Now the next time somebody at the pool hall or on an online forum asks about the best weight for a cue, I hope you feel you now have better answers for them. Or you can just tell them: Use whatever feels best. FYI, links to all of the online resources mentioned can be found in the "[break weight](#)" resource page in the FAQ section at billiards.colostate.edu. Enjoy!

Good luck with your game,
Dr. Dave



high-speed video

[HSV A.106](#) – English and squirt for a Predator 314 shaft at slow speed and increasing offsets



technical proof

[TP A.30](#) – The effect of cue tip offset, cue weight, and cue speed on cue ball speed and spin

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](#) at billiards.colostate.edu.

Dr. Dave is author of "[The Illustrated Principles of Pool and Billiards](#)" book and DVD, and co-author of the "[Video Encyclopedia of Pool Shots \(VEPS\)](#)," "[Video Encyclopedia of Pool Practice \(VEPP\)](#)," "[How to Aim Pool Shots \(HAPS\)](#)," and "[Billiard University \(BU\)](#)" instructional DVD series.