
Note: Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, and 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 article 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. See the website for details.

Well, it is the start of league season, so it's time to brush up on some important fundamentals. Over the next few months, I'll present information and drills focusing on important skills and principles related to the stroke, aiming, and cue ball control.

Diagram 1 shows what I call the pool-skills development pyramid or **Pyramid of Progress**. The foundation layers of the pyramid (A through D) represent successive levels of competencies required to become a good pool player. There is a natural progression of ability from the lower layer to the top. The pyramid illustrates the importance of building and reinforcing your level of ability from the bottom up, starting with fundamentals. The inspiration for the pyramid comes from Maslow's "Hierarchy of Needs," an important principle from the world of psychology. The principle states that people cannot reach their full potential unless they first meet their physiological needs (food, water, air, shelter), then safety needs (security, freedom from fear), then belonging needs (friends, family, love), and then esteem needs (self respect, reputation). If a lower level need is not met, it is difficult, if not impossible, to satisfy higher level needs. With the pool pyramid, you cannot reach your maximum competitive ability unless you first develop and master the lower level fundamentals.

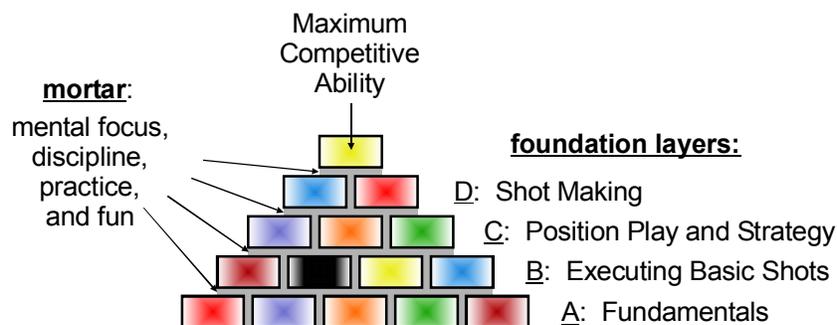


Diagram 1 Pyramid of Progress

The mortar in Diagram 1, required to build the pyramid and hold it together, represents the mental focus, discipline, practice, and fun that is required to develop and maintain your pool game. Continual practice, self-analysis, and improvement are required throughout the entire development and maintenance process. Confidence and intuition can come only with a great deal of practice and experience. It is also important to enjoy the game and have fun. If you do not have fun with the game, you will not have a desire to improve.

I want to stress the importance of building and strengthening the "pyramid" from the bottom up. You should spend much of your practice time working on fundamentals, especially if you are a beginner or intermediate player. This requires discipline, but there is a payoff – you will develop better and faster! Your "shot making" will also become more reliable. If your fundamentals are not solid, you will not be able to develop the higher-level skills as easily.

Even if you are a skilled and experienced player, you should still continue to work on and maintain solid fundamentals. There are many good players who could be much better if they had stronger fundamentals and if they had a better understanding of basic principles of pool. Many good players rely strictly on experience and do not truly understand pool principles. They have seen so many different shots, they often intuitively know what to do; but if they were armed with an understanding of principles, they could better plan many shots that would be difficult to execute relying strictly on experience and intuition. I do not want to undervalue the importance of experience and intuition – they are absolutely essential to be a great player. However, understanding can be extremely valuable in helping to accelerate your learning and intuition-building process.

Diagram 2 shows what I call the **Rack of Skills** that lists important pool elements and skills corresponding to the pyramid levels shown in Diagram 1. As with the pyramid, the rack of balls has five levels, each with specific topics. Both Diagrams 1 and 2 are from my book: “The Illustrated Principles of Pool and Billiards.” The diagrams illustrate how the book is organized, breaking down each pyramid layer into specific required skills.

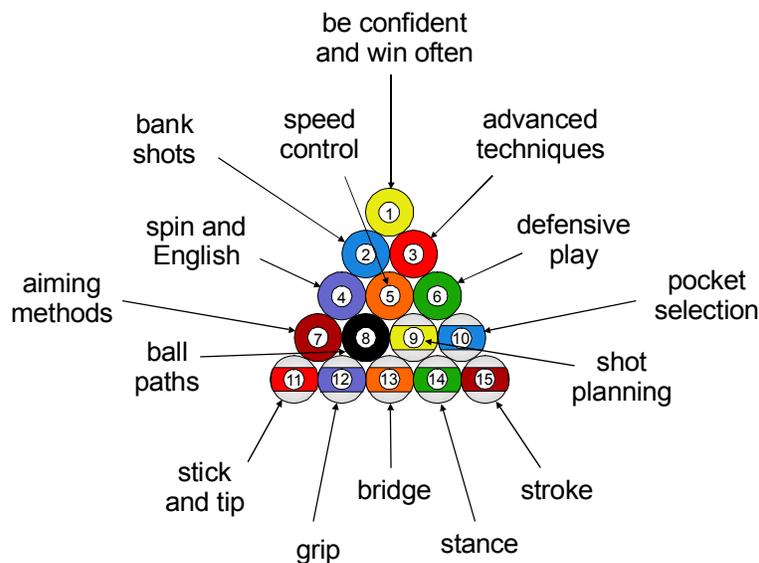


Diagram 2 Rack of Skills

The stroke is by far the most important building block of a successful pool game. Your stroke must be reliable, accurate, and consistent to have a solid game. It is appropriate that the stroke is a cornerstone of the skills pyramid (see Diagram 2). In the May '08 issue, Mason King and I presented a “Stroke Tune-up” coaching bonus feature to cover stroke “best practices” in detail. The tune-up article, along with useful summaries and check sheets for all fundamentals (stick, tip, grip, bridge, stance, and stroke) can be found in the “Instructor and Student Resources” section of my website. It is always best to meet with a qualified and experienced instructor to help you diagnose and eliminate flaws in your fundamentals; but the checklists might help you spot some things, especially if you have some mirrors and/or a video camera handy.

Two things about the stroke that often cause debate is whether or not you should use a pure pendulum stroke, where the elbow remains still, and whether or not you should pause at the end of your final back-swing before your final forward stroke. I don't want to get into these issues here, because it would take too many pages. Most instructors do recommend a non-elbow-drop pendulum swing and a pause (even if only very slight) before the final forward stroke. If you want to read more about these topics, see the “stroke” section in the “Answers to Frequently Asked

Questions” on my website. Allison Fisher once told me the one change she made to her game that had the biggest positive impact, compared to any other change she has ever made, was adding a distinct and deliberate pause before her final forward stroke. It certainly seems to work for her. Now let’s look at a drill that might help you identify and fix certain problems with your stroke.

Diagram 3 shows what I call **MOFUDAT**: The **MO**st **F**amous and **U**seful **D**rill of **A**ll **T**ime. This is a very popular drill with instructors and instructional authors. Here are the drill instructions:

1. Use a medium-speed, above-center hit to send the striped ball straight up-table and back. Align the stripe with the shot direction before shooting.
2. Observe any wobble in the stripe. This indicates an off-center hit.
3. Stay down in your follow-through position and observe how close the ball returns to the cue tip. A close return indicates good aim and alignment and an accurate stroke.
4. Shoot the shot ten times, keeping track of how many attempts are good (very little or no wobble, and ball return close to the tip).
5. Repeat steps 1-4 with center-ball and below-center tip placements.
6. Which cue tip position results in the best consistency and accuracy?

The MOFUDAT drill is an excellent test of your aim, alignment, cue tip placement accuracy, and stroke consistency. I’ve added the balls on the rail to provide a clear target and to provide a changeable difficulty level (by narrowing the gap). If the stripe doesn’t remain vertical and the ball doesn’t come back to your tip, then you have room for improvement. One-page summaries of MOFUDAT and many other drills can be viewed and printed from the “Instructor and Student Resources” section of my website. Remember, practice makes perfect!

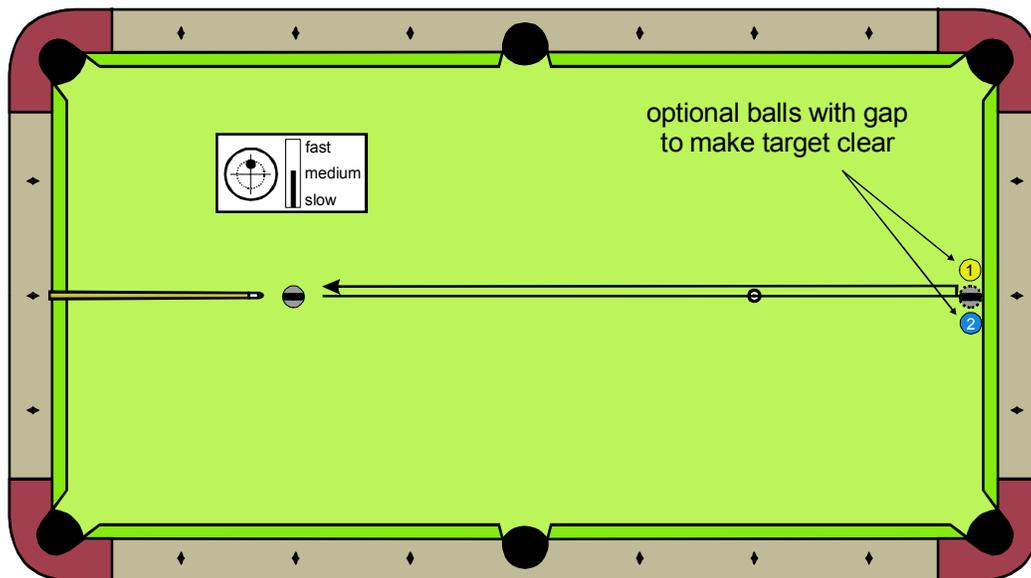


Diagram 3 Most Famous and Useful Drill of All Time (MOFUDAT)

Step 6 above implies your consistency and accuracy might be different with different tip placements on the vertical centerline. Online video **HSV B.10** demonstrates the effects of above and below center hits and explains some of the reasons why an above-center hit seems to provide the best success with the drill. Here's a summary of some of the reasons why:

- The cue can be more level (less elevated) for an above center hit, with the same clearance between the cue and the rail. This will reduce the amount of swerve (cue ball curve) if the cue ball is hit unintentionally off center.
- The slowing drag effect of a below-center hit, with unintentional English, increases the effective sidespin off the rail. The drag action slows the ball's speed more than with a roll shot, but the sidespin doesn't wear off any faster. With the same spin and less speed, the rebound angle off the rail will be larger for the drag shot.
- It might be easier for some people to position the tip on the cue ball centerline when the tip is closer to the top edge of the ball, where there is clearer alignment with the top of the tip and the top of the ball (although, this reason might be debatable).



[HSV B.10](#) – MOFUDAT stroke drill follow and draw effects

One thing is obvious in HSV B.10: with a below center hit, it is very difficult to maintain the stripe orientation during the shot. Some people think this is because the ball's motion easily gets disturbed due to skid (instead of roll), but this is not the case. The reason is the drag action of the shot creates stun, before roll develops. While the ball has close to no bottom-spin or topspin (i.e., it is close to stun), even a slight amount of English (sidespin) can reorient the stripe. This doesn't happen with an above center hit because the stripe is constantly rolling, not giving the English enough time to turn the stripe off course in any one direction. The stripe does wobble when English is used with a rolling shot, but the stripe doesn't totally tumble as it does with a below-center hit with even the slightest touch of English. Please watch the video so you can see all of this in super slow motion.

Well, I hope you try out the MOFUDAT drill and use some of the check-sheets on my website to try to improve your pyramid foundation. Next month we will look at some basic aiming methods and drills that might be helpful if you sometimes have less than perfect aim.

Good luck with your game,
Dr. Dave

PS:

- If you want to refer back to any of my previous articles and resources, you can access them online at billiards.colostate.edu.
- I know other authors and I tend to use lots of terminology (e.g., squirt, throw, stun, impact line, etc.), 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 in the "Instructor and Student Resources" section of my website.

Dr. Dave is a mechanical engineering professor at Colorado State University in Fort Collins, CO. He is also author of the book, DVD, and CD-ROM: "[The Illustrated Principles of Pool and Billiards](#)," and the DVD: "[High-speed Video Magic](#)."