The 30° rule:
Part II – Examples

*Note: Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, and technical proofs (TP) can be accessed and viewed online at www.engr.colostate.edu/pool. The reference numbers used in the article (e.g., **NV 3.8**) help you locate the resources on the website.*

As I pointed out in last month's article, if you don't know the 30º rule yet, learning it can truly transform your game. Like the 90º rule presented in my previous series of three articles, the 30º rule helps you predict the path of the cue ball after impact with an object ball. You may recall that the 90° rule applies only for stun shots, where the cue ball strikes an object ball with no topspin or bottom spin. However, with many shots the cue ball is rolling (with topspin) by the time it strikes the object ball. This is where the 30° rule comes in handy. Last month's article (April, 2004) introduced the rule, when it applies, and how it is used in practice. The purpose of this article is to show some real examples of how you can use the rule in your game to prevent scratches, plan break-up or avoidance shots, and execute carom or billiards shots.

The key points of the 30º rule are summarized in **Principle 2** and illustrated in **Diagram 1**. The rule states that if the cue ball hits approximately half of the object ball (see **Diagram 2**), the cue ball will deflect off at very close to 30° from its original path. An exact **half-ball hit**, where the center of cue ball is aimed at the edge of the object ball, is illustrated in **Diagram 2**.

Principle 2 30° rule

When the cue ball hits an object ball with normal roll close to a half-ball hit (see Diagram 2), the cue ball will deflect approximately 30° away from its initial aiming line (see Diagram 1, NV 3.8, and NV 3.9).

- The 30° rule applies only when the cue ball is rolling without skidding at object ball impact.
- There is a fairly large margin of error. In other words, for a fairly large range of ball-hit fractions (i.e., cut angles), the cue ball path will still deflect by approximately 30° (see **TP 3.3**).
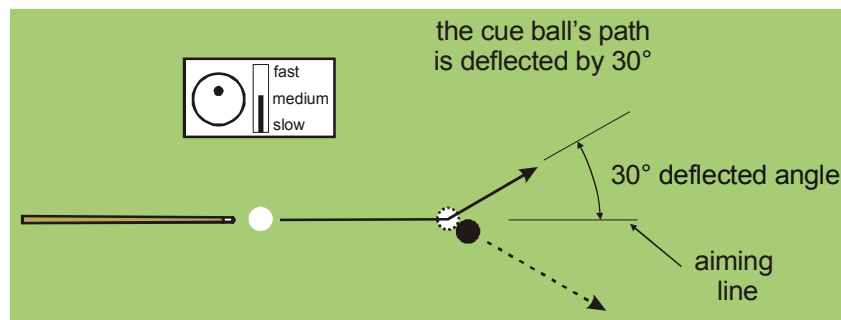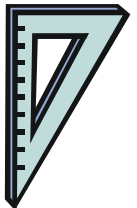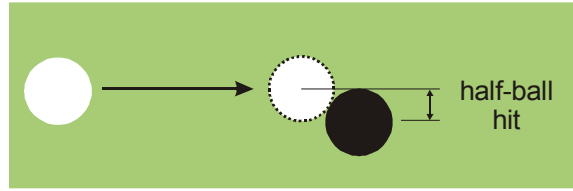

Diagram 1 30° rule

Diagram 2 Half-ball hit

TP 3.3 – 30° rule

technical proof

NV 3.8 – Using your hand to visualize the 30° rule
NV 3.9 – 30° rule example

normal video

Diagram 3 and **NV 3.10** show how the 30° rule can be used to **prevent a scratch**. The goal of the shot is to pocket the 1-ball in the top corner pocket without scratching in the bottom corner pocket. If the 1-ball is pocketed with a slow stroke, so the cue ball is rolling when it contacts the object ball, the shot will definitely result in a scratch. This is because the cue-ball path gets deflected by 30° after impact, sending it straight to the pocket. If the shot is hit with more speed or with a partial stun stroke, the cue ball can be directed along path A or B instead, which avoids the scratch. The effects of speed and spin on cue-ball paths will be presented in detail in a future article.
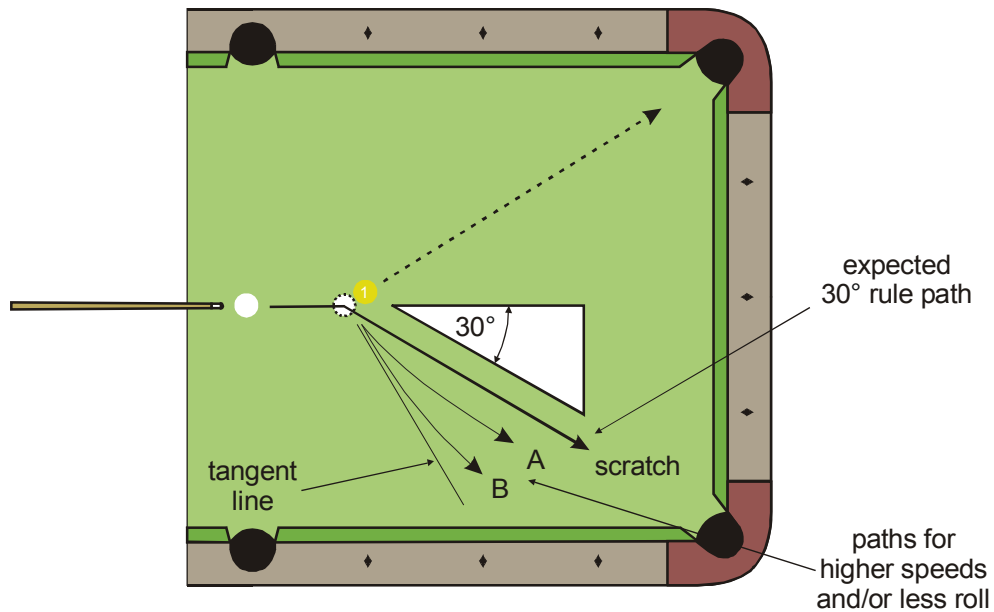

Diagram 3 Using the 30° rule to check for and prevent a scratch

NV 3.10 – Using the 30° rule to check for and prevent a scratch

normal video

With a **break-up shot**, the goal is to purposely drive the cue ball into object balls (e.g., to break up a problem cluster). With **avoidance shots**, the goal is to purposely avoid hitting certain balls. In the game of 8-ball, the balls you want to avoid could be your own ("stripes" or "solids") if they already happen to be in good places (e.g., close to a pocket, or blocking shots for you opponent). The balls to avoid could also be your opponent's balls if they happen to be in a bad place for your opponent (e.g., tied up in a cluster). Also, sometimes you just want to avoid hitting balls so the cue ball can end up in good position for your next shot. **Diagram 4** shows a table layout where an avoidance shot is appropriate, assuming you are shooting "solids." The two "stripes" are tied up and you would like to leave them that way so if you do not run the table your opponent will be faced with a difficult shot. You also need to avoid the "stripes" to reliably control the position of the cue ball.
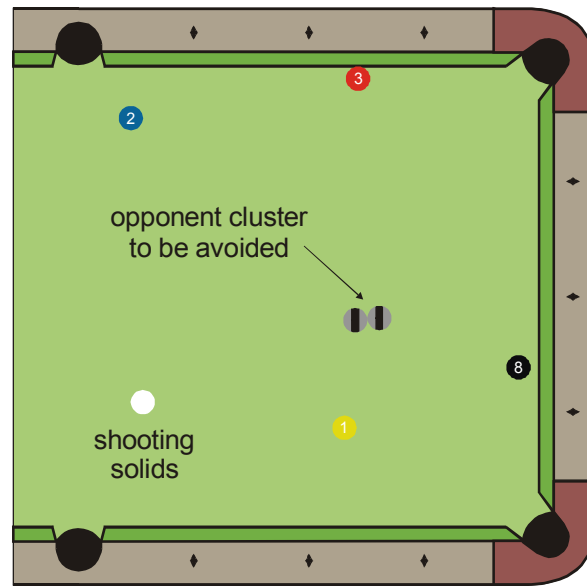

Diagram 4 Example table layout requiring an avoidance shot

Diagram 5 shows how the 30° rule can be used to plan the path of the cue ball, assuming the 1-ball will be pocketed first. Note that the 90° rule would predict that the cue ball would deflect directly into the tied up "stripes" in the tangent-line direction. But remember, the 90° rule only applies exactly in the case of a stun stroke. In this shot, the cue ball will be rolling when it hits the 1-ball. The roll is ensured by the use of a slight follow stroke. After hitting the 1-ball, the cue ball's path is deflected approximately 30°, resulting in good position for the 2-ball after rebound off the end rail. **Diagram 6** shows how the remainder of the table can be run easily, resulting in victory.
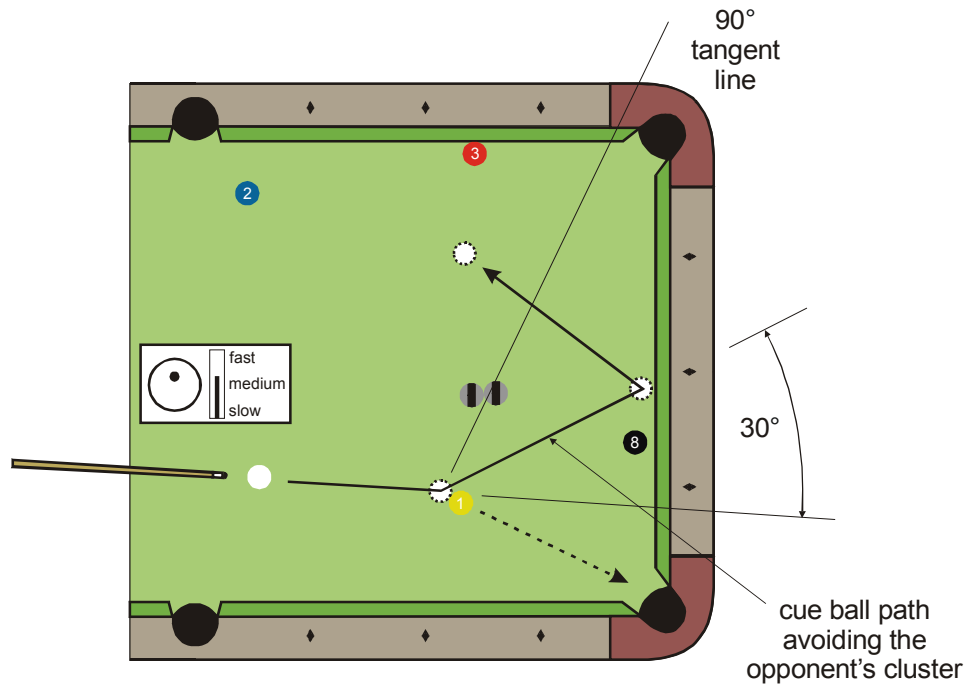
90°
tangent
line

fast
medium
slow

30°

cue ball path
avoiding the
opponent's cluster

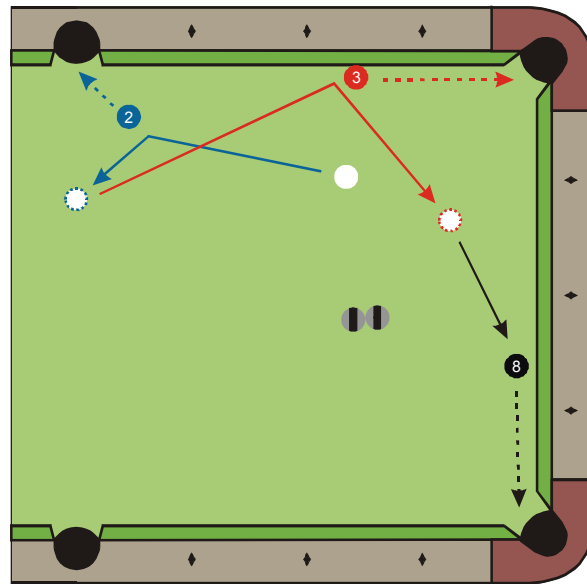**Diagram 5 Using the 30° rule to plan an avoidance shot**

Diagram 6 Running the table after an avoidance shot

Both the 90° rule and the 30° rule can be used to plan **carom shots**, where you deflect one ball (cue ball or object ball) of another to make a shot. These shots can be difficult, but if you can accurately predict the angle at which a deflected ball will travel, a carom shot can be a useful weapon in your arsenal. **Diagram 7** shows a good example from a 9-ball game, where a cue ball carom shot off the 1-ball can result in a victory. Remember, the 30° rule predicts that the cue ball path deflects from its original path approximately 30° over a fairly wide range of cut angles. That means that the shot in **Diagram 7** is easy to make (i.e., there is a wide margin of error) as long as

you are careful with speed. In this example, the cue ball is hit a little above center to make sure the cue ball is rolling when it hits the 1-ball; otherwise, the 30° rule does not apply. Also, the shot is hit fairly slowly so the cue ball deflects immediately after impact with the 1-ball (see **NV 7.4**). If the shot were hit harder, the cue ball would deflect along the 1-ball tangent-line first before turning to the 30° direction (see **Diagram 3**), possibly resulting in a missed shot.
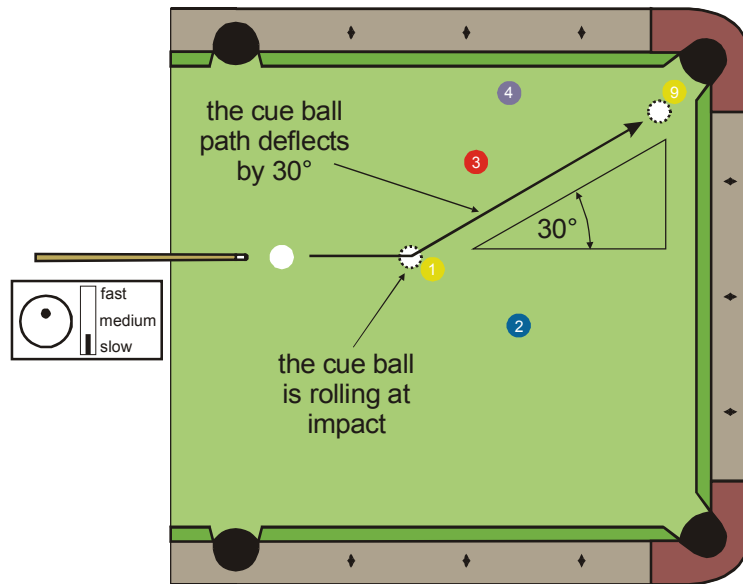

Diagram 7 **30° rule cue-ball carom example**

NV 7.4 – 30° rule cue-ball carom shot

normal video

In **Diagram 7**, because the 9-ball is a "duck" in the mouth of the pocket, the carom shot is an obvious choice because it results in victory. However, even if some other ball was in the 9-ball's place, the carom shot would still be more attractive than the difficult 1-ball-2-ball combination. This is because the margin of error for a 30° rule carom shot is so much larger than the small margin of error for a combination shot. Furthermore, even if the 2-ball was not blocking the path of the 1-ball to the corner pocket, the carom shot might still be preferable (easier to execute) than the 1-ball cut-shot in the bottom corner pocket. Again, this is because the margin of error for a 30° rule carom shot is still larger than the small margin of error for a large cut angle cut shot. In next month's article, I will look at this issue in more detail and provide a very dramatic example illustrating how important and useful the 30° rule can be.

It always surprises me how few people know the 30° rule and how to apply it. Also, it is shocking to me that most pool and billiards books give little (if any) coverage of this extremely important and useful principle. I hope this series of articles will help you incorporate these ideas into your game.

Have fun and practice hard,
Dr. Dave