Sample Pages

from the book:

The Illustrated Principles of Pool and Billiards

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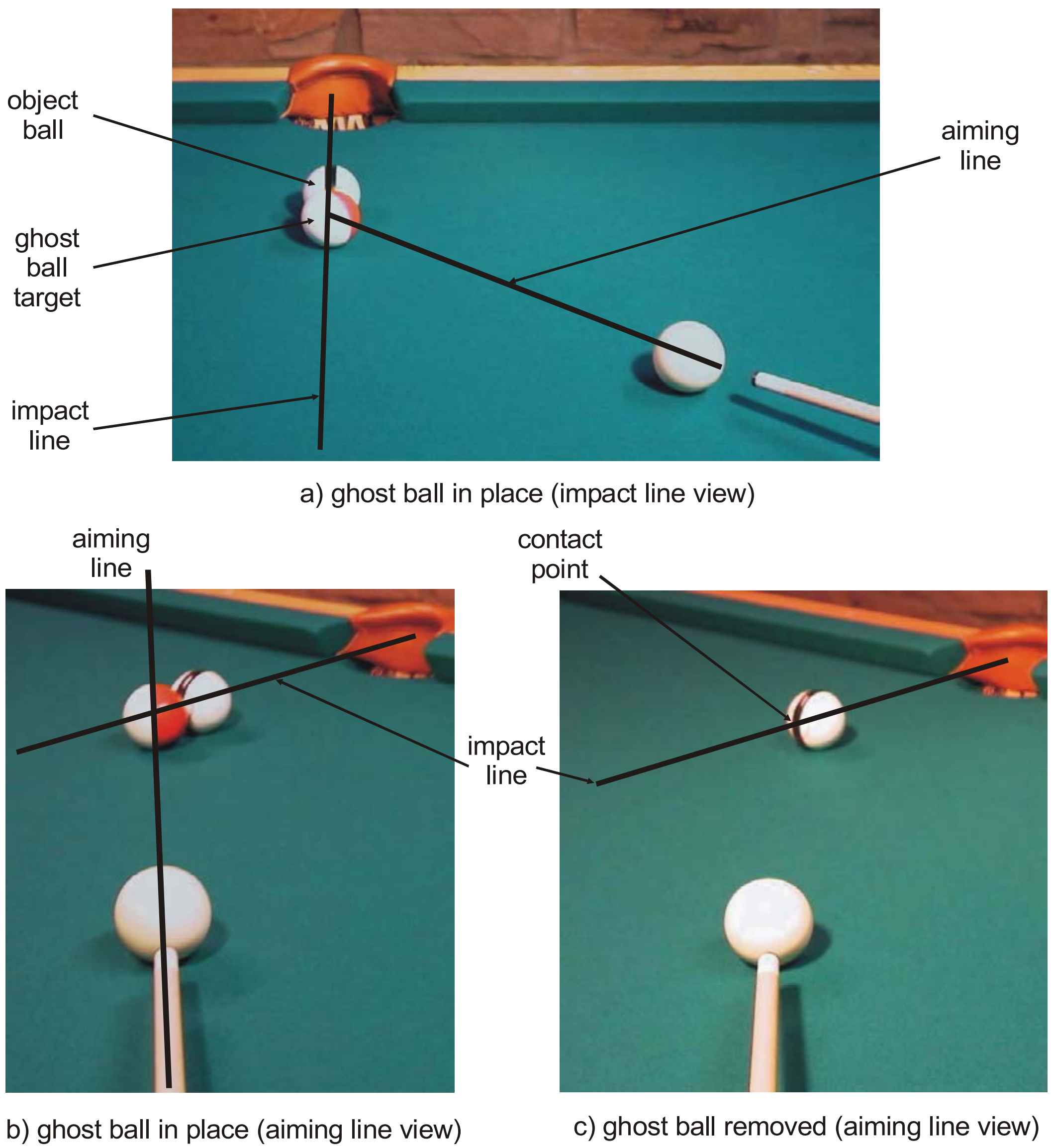
billiards.colostate.edu



a) ghost ball in place (impact line view)

b) ghost ball in place (aiming line view)

c) ghost ball removed (aiming line view)

Figure 3.6 Ghost ball aiming method


normal video

NV 3.1 – Practicing contact point and ghost ball visualization

Figure 3.7, Figure 3.8 and NV 3.2 show how you can use the cue stick to help visualize the impact and tangent lines for a cut shot. Placing the cue stick over the object ball in the direction of your target defines the impact line. The cue ball path tangent line will be perpendicular to this line. The cue stick can also help you visualize the ghost ball target location for the cue ball. Now that you know the required location for the ghost ball target, you can again use the cue stick to help visualize the appropriate aiming line for your stroke. Figure 3.9 illustrates how this is done. The tip of the cue stick is placed on the felt at the center of the imaginary ghost ball target and the cue stick is pivoted about this point until it is in-line with the cue ball. This defines the aiming line (see NV 3.2).

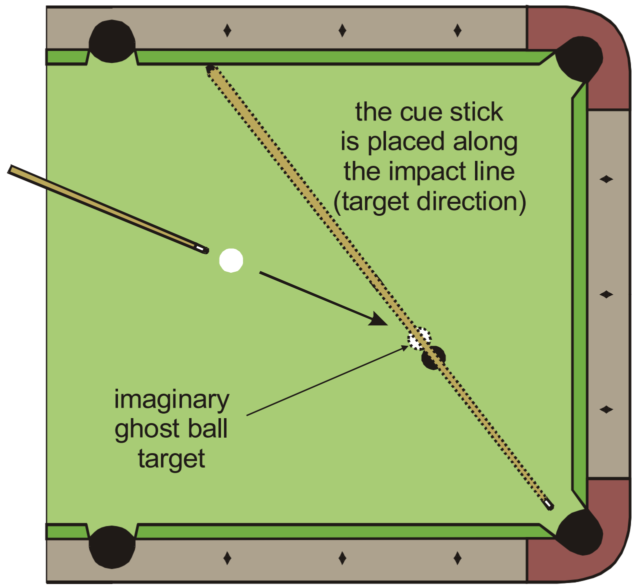


Figure 3.7 Example shot showing how to use the cue stick to help you aim

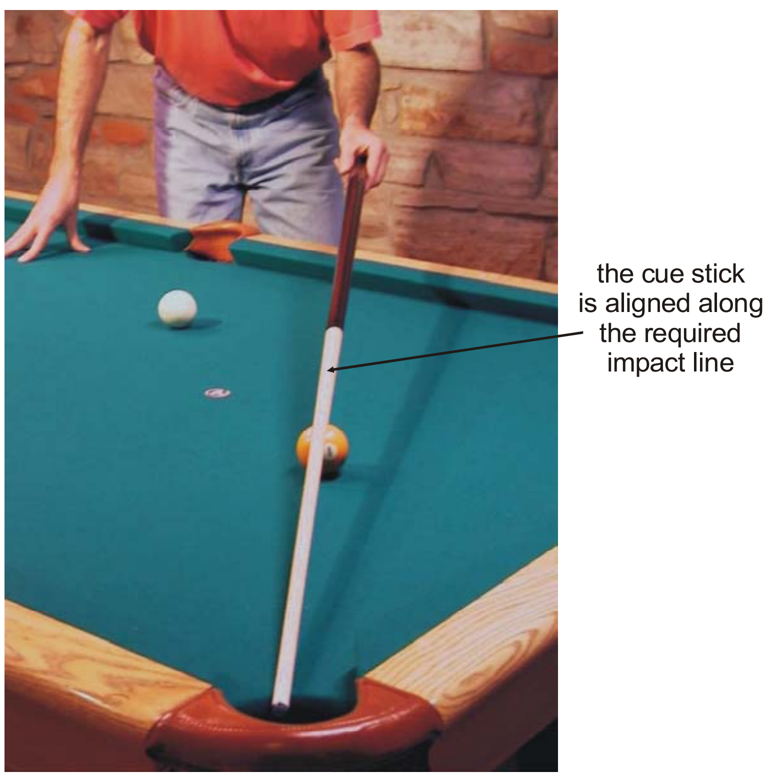


Figure 3.8 Using the cue stick to help visualize the impact line

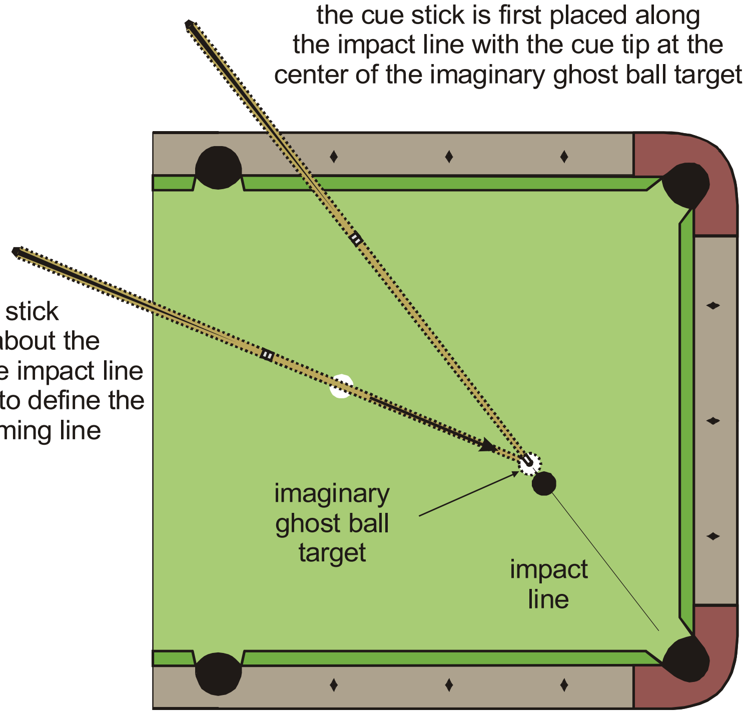


Figure 3.9 Using the cue stick to help visualize the aiming line

NV 3.2 – Using the cue stick to help visualize the impact and aiming lines

When addressing the ball (no "Excuse me Mr. Ball" is necessary) and taking your stance (see Section 2.04 starting on page 34), an upright look helps you visualize the ghost ball and see the angle before dropping your eye level to the final stance (see NV 3.3). Start your stance in an upright position, with the cue stick aligned with the aiming line and your head in the aiming plane, and gradually lower your upper body and head into the stance, keeping your head and gaze in the aiming plane. It helps to move your eyes up and down, between the ghost ball target and the cue stick, to help maintain the correct aiming plane. Align your dominant (aiming) eye with the cue stick along the aiming line and keep your head low and close to the stick during your stroke. Ideally, your chin should be close to touching the cue stick.

NV 3.3 – Addressing the ball and taking your stance

As you develop your aiming skills and experience-based intuition, you will learn to "see the angles" and might not need to try to visualize the impact line and ghost ball target, but it still helps to methodically line up and aim a shot, using your intuition as a check and reinforcement.

Section 3.03 Cue ball path – the 90° rule

A very important skill for executing basic (and more complex) shots is the ability to predict where the cue ball will go after impact with an object ball. Figure 3.10 and Principle 3.3 summarize one of the most important principles of pool related to this – the **90° rule**. It states that when the cue ball strikes an object ball with no topspin or bottom spin the two balls will always separate at 90°. In other words, the tangent line will be perpendicular to the impact line. This is true regardless of the cut angle (see Figure 3.10 and NV 3.4).

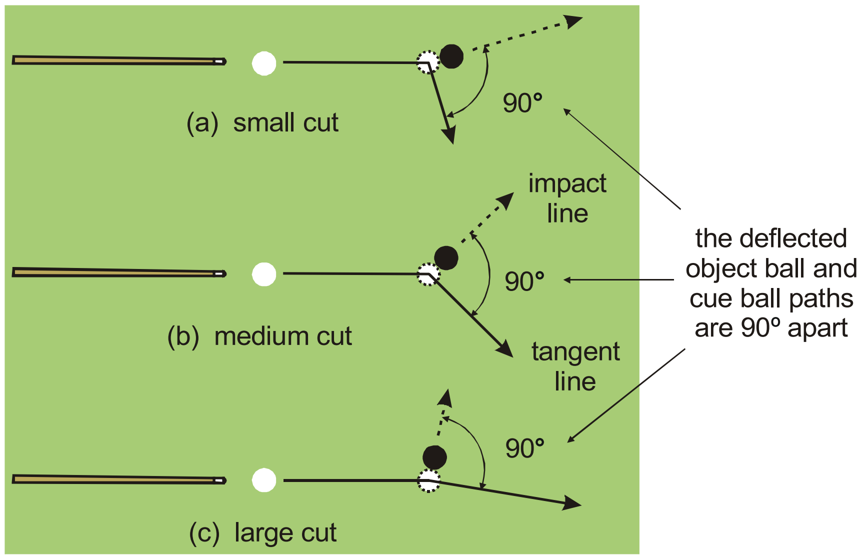
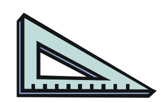


Figure 3.10 90° rule

Principle 3.3 90° rule



With a stun shot where there is no topspin or bottom spin, after impact the cue ball will depart along the tangent line which is perpendicular (at a right angle) to the impact line. In other words the cue ball and object ball paths, after impact, will be 90° apart (see Figure 3.10 and NV 3.4).

- The cue ball path will exactly coincide with the tangent line only when the cue ball hits the object ball with no topspin (due to follow or normal roll) or bottom spin (draw). Figure 3.11 shows the type of shots where the 90° rule applies.
- Topspin (e.g., roll) results in angles less than 90°, bottom spin results in angles more than 90° (see Chapter 4 for more information).
- Sidespin has practically no effect.
- The distance the cue ball travels after impact depends on the cut angle (see Principle 3.4).
- Even when the cue ball has top or bottom spin, it will still leave initially along the tangent line before curving due to the spin (see Section 4.07 starting on page 104).
- If the cue ball is rolling naturally, a more useful rule is the 30° rule (see the next section).


normal video

NV 3.4 – 90° rule with various entering angles


technical proof

TP 3.1 – 90° rule

other balls, or purposely hit other balls. Scratch avoidance is described in this section and the other strategies are presented in Chapter 5.

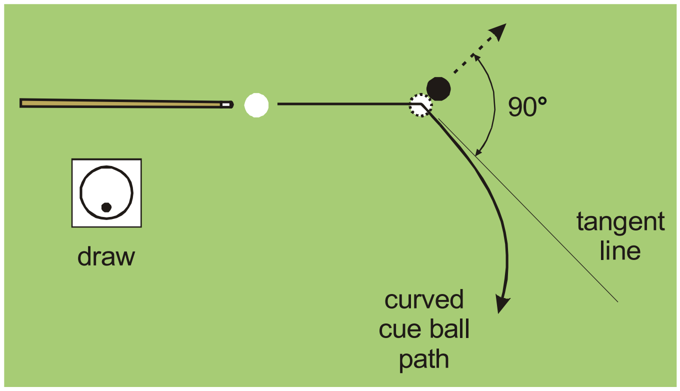


Figure 4.9 Draw shot

When there is very little or no bottom spin on the cue ball when it hits the object ball, the result is a **stun shot**. With a stun shot, the cue ball travels exactly along the tangent line 90° away from the object ball path (see NV 4.1) as predicted by the 90° rule (see Principle 3.3 on page 47).


normal video

NV 4.1 – Stun shot

Figure 4.10 and NV 4.2 illustrate how a draw shot can be used to avoid a scratch. In this example a stun shot, resulting from a firm stroke or slight draw, would cause the cue ball to travel straight along the tangent line path into the pocket. (That's bad.) Instead, the draw causes the cue ball path to curve as shown, avoiding the scratch.

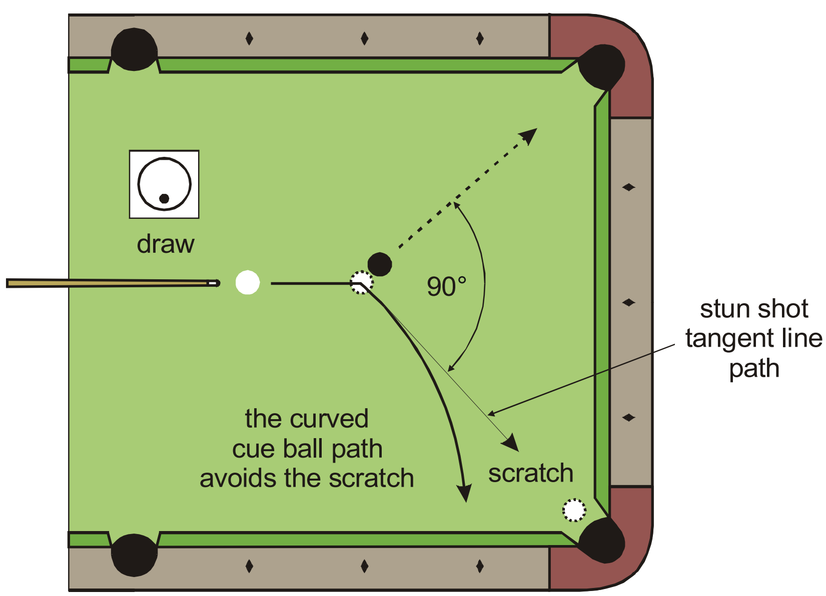
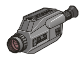


Figure 4.10 Using a draw shot to prevent a scratch

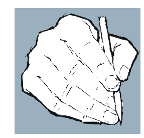

normal video

NV 4.2 – Using a draw shot to prevent a scratch

Principle 4.3 summarizes the technique required for a good draw stroke. The most important attribute is follow-through. Many people try to elevate the stick and chop at the ball when shooting a draw shot. This might be effective for short shots requiring little draw; however, in general, this is very poor technique. You should strive to keep the stick level and accelerate through the ball.

Principle 4.3 Good draw

A good draw shot with significant draw action is achieved with the following technique:

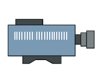


- Make sure the cue tip is in good condition (see Section 2.01 on page 27).
- Keep the cue stick level during the entire stroke. Do not elevate the cue stick.
- Accelerate through the ball, and follow through straight and well past the cue ball starting location. Do not chop, jab, or poke at the ball. Accelerating through the ball keeps the cue tip in contact with the cue ball a little longer allowing it to impart more spin.
- Hit the ball lower and softer (and level) rather than higher (but below center) and harder. This results in better control. Also, the slower speed might be required for position control for the next shot.
- An open hand bridge (see Section 2.03 on page 31) can allow a better draw stroke because the cue stick can be stroked lower and more levelly.
- For longer shots, you need more spin or speed so some spin remains after sliding along the felt to the ball (see Principle 4.1 on page 81).
- Draw shots are difficult to execute with a mechanical bridge and when the cue ball is close to a rail (mostly due to limitations on cue stick levelness and follow-through), so be cautious in these situations.

For a straight-on shot, where the cut angle is 0°, the cue ball does not move at all along the tangent line. In this case a draw shot will result in the cue ball coming straight back from the object ball toward from where the cue ball was hit (see NV 4.3 and HSV 4.1). A special case of a straight-on draw shot is a **stop shot** where the bottom spin wears off on the way to the object ball such that the cue ball has very little on no bottom spin at impact (see HSV 3.1 and Figure 4.6b on page 81). In that case, the cue ball comes to a complete stop after hitting the object ball (see NV 3.6 and HSV 3.2).

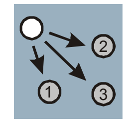

normal video

NV 4.3 – Straight-on draw shot
NV 3.6 – Stop shot


high-speed video

HSV 4.1 – Draw shot
HSV 3.1 – Stop shot showing loss of bottom spin over distance
HSV 3.2 – Stop shot to prevent a scratch

As summarized in Principle 4.4, a useful application of draw is to create a slow stun shot that results in the least possible motion of the cue ball after impact with the object ball. This can be useful when you do not want the cue ball to move much after object ball contact in preparation for the next shot (see NV 4.4). This type of shot is called a **kill shot**.



Principle 5.5 Always think three balls ahead

For effective position play, you need to plan three balls ahead to know what angle you need to create for the next shot.

- Figure 5.3 and Figure 5.4 provide good examples of this principle.

Figure 5.4 and NV 5.2 show another sequence where speed control and leaving angles can be used to result in three relatively easy shots. The 1-ball shot requires medium-fast speed because the cut angle is small and the cue ball leaves along the tangent line much slower than it approaches the object ball. For the 2-ball shot, because the shot speed is relatively slow, the cue ball will be rolling naturally by the time it arrives at the 2-ball. Therefore, a center ball hit is appropriate. The cue ball roll (top spin) results in the deflected path into the rail, providing an easy shot on the 3-ball.

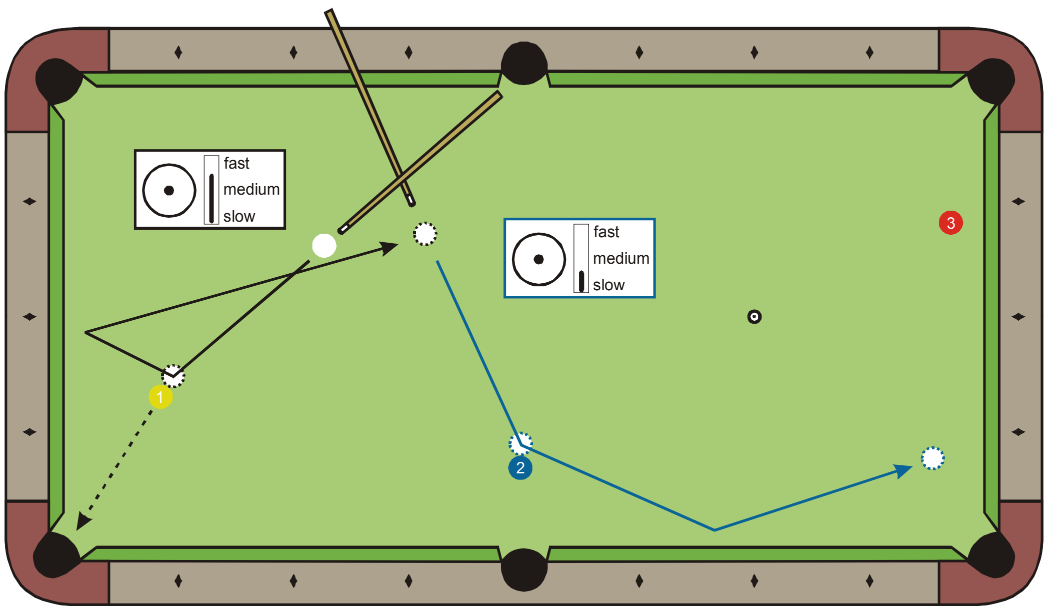


Figure 5.4 Another speed and angle control example

normal video

NV 5.2 – Using speed and angle control to pocket another three-ball sequence

When speed control alone is not satisfactory to achieve the desired cue ball position, draw, follow, and English can be added to help. Section 4.07 (starting on page 104) and Section 4.08 (starting on page 109) presented how to use draw and follow to control the cue ball path and how to use sidespin English to alter the path of the cue ball after it strikes a rail. In general, draw and follow are better alternatives than trying to use sidespin English (see Principle 5.6). Furthermore, when you have a choice (e.g., with ball-in-hand), follow is a better choice than draw because it is much easier to control. With follow, you can often rely only on normal roll and speed control. Whereas with draw you need to try to impart the exactly correct amount of bottom spin, which degrades at different rates depending upon shot speed and the condition of the felt and is therefore difficult to control.

Principle 5.6 Follow and draw are often better than sidespin English

When speed control alone is not sufficient for cue ball control, use follow or draw. Do not rely on sidespin English and rail interaction unless speed control and draw or follow are too limiting.

- Sidespin English suffers from many pitfalls (see Section 4.04 starting on page 89).
- You must be aware of speed and spin effects and how they relate to the 90° and 30° rules (see Section 4.07 starting on page 104).
- Follow, or just normal roll, is easier to control than draw because there are less variables to control.

Figure 5.5 and NV 5.3 illustrate an example where speed control alone is not sufficient for good position control. To leave position on the 2-ball after making the 1-ball, bottom-right English is required. The bottom spin pulls the cue ball path back from the 1-ball tangent line to avoid impact with the 4-ball. The right English flattens the angle of the cue ball off the foot rail enabling the cue ball to avoid hitting the 3-ball. Appropriate speed on the 1-ball shot results in good position for the 2-ball. In the figure, the cue ball position after the 1-ball shot results in a straight-in shot on the 2-ball. Then, a slow draw shot on the 2-ball stops the cue ball in place after impact leaving an easy shot on the 3-ball and then the 4-ball. The English on the 1-ball shot resulted in a very easy run of the four balls. If English had not been used on the 1-ball shot the cue ball would have hit other balls and the probability for making all four balls would have been low.

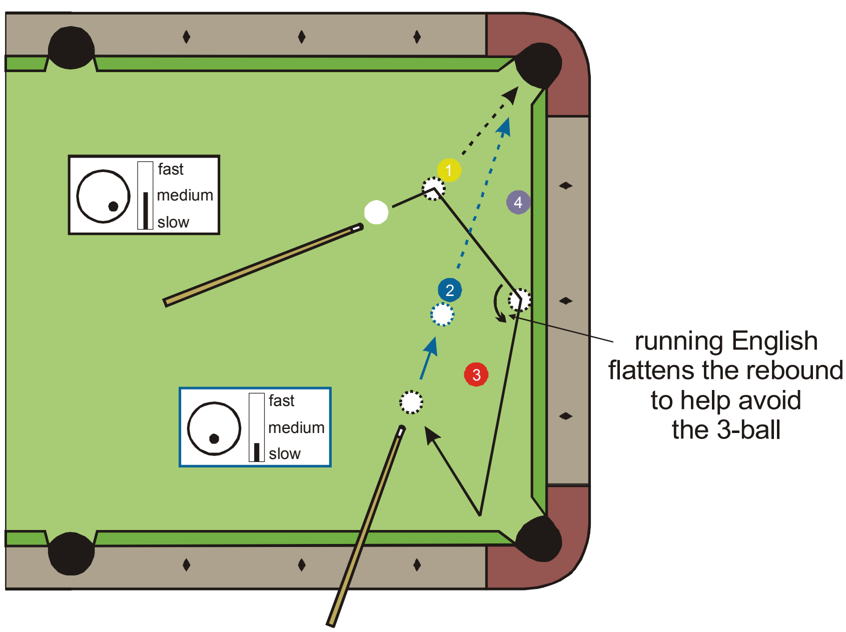
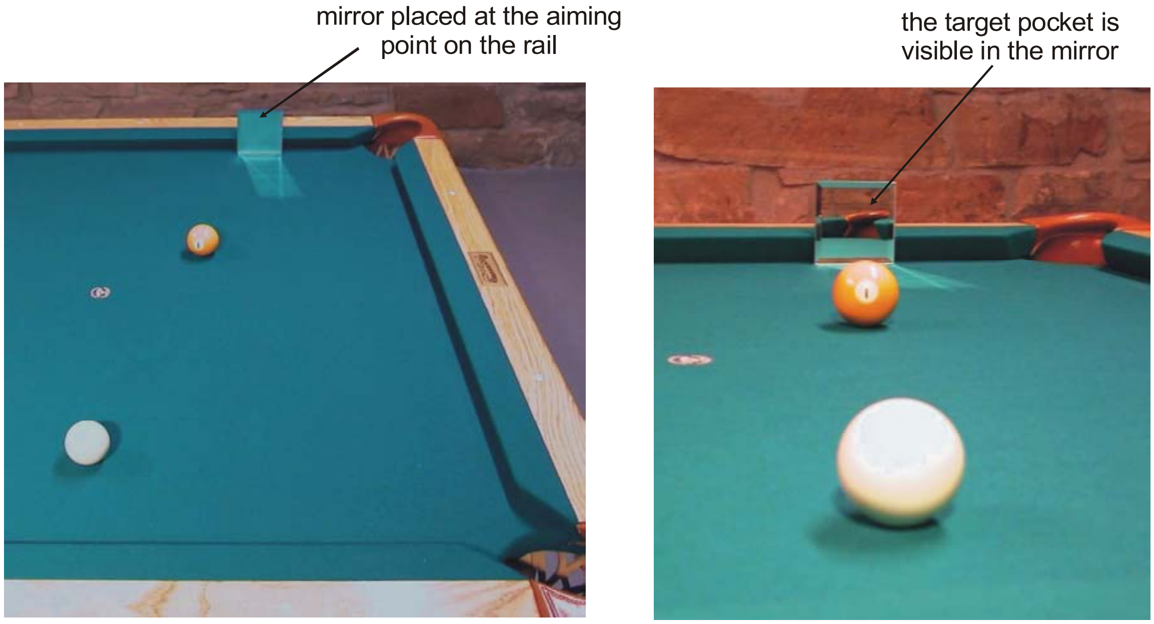


Figure 5.5 Example where draw and side English is necessary

NV 5.3 – Using side English to help run a four-shot sequence

Another application for English in position play is to use reverse English to help "kill" the cue ball on a cut shot with rail contact. As shown in Figure 5.6, the numerous obstacle "stripes" present a challenging position control problem in pocketing the last solid and setting up for a

As illustrated in Figure 6.3, if you could use a mirror to help you aim bank and kick shots it would be very easy to visualize the required ideal aiming direction. You simply need to move the mirror along the rail (in the rail grove) until you can see the target pocket in the reflection. If you shoot the object ball at the image in the mirror with medium speed, the object ball will bounce off the rail into the pocket (provided the mirror is removed during the shot). Unfortunately, using a mirror as an aiming aid is illegal because you are not allowed to use any special equipment as aiming aids. If you are using a mirror for practice, don't forget to have someone remove the mirror before you shoot (especially if you are superstitious or if you are a husband that borrowed a "special" mirror from your spousal unit).



a) overhead view b) aiming line view

Figure 6.3 Aiming a bank shot with a mirror

Section 6.02 Bank shot aiming methods

The most basic method for aiming bank shots is illustrated in Figure 6.4. It is called the **equal rail distance method** and is based on Principle 6.1. To use the method you move your rail impact aim point along the bank rail until the distances shown in the figure are equal. The distances are measured along the bank rail or along the rail opposite from the bank rail adjacent to the target pocket. As summarized in Principle 6.2, the distances that are equal are between the projected aiming line point and the rail impact aim point and between the rail impact aim point and the target point. Note that all of the points are defined along the rail groves, which is important when trying to measure distances accurately.

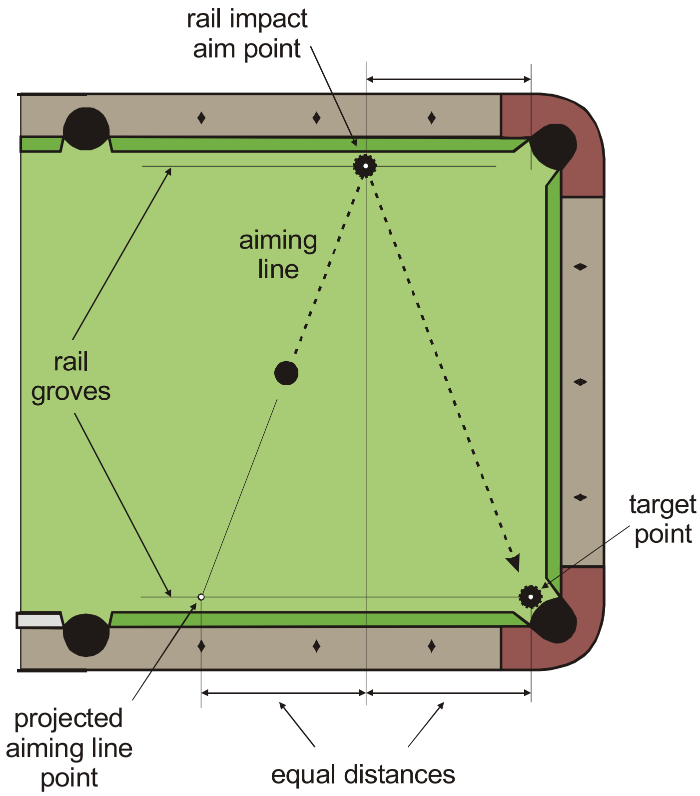
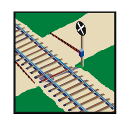


Figure 6.4 Equal rail distance bank method

Principle 6.2 Equal rail distance bank method

For a medium speed bank shot with no English, the rail distances between the projected aiming line point, rail impact aim point, and target point must be equal to make the shot (see Figure 6.4 and NV 6.1).

- This principle is a direct consequence of Principle 6.1 on page 150.
- The distances are not equal at fast or slow speed or when the object ball is close to the rail (see Section 6.04), with English (see Section 6.05), or for cut shots (see Section 6.06).



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NV 6.1 – Equal distance bank method

The easiest way to use the equal rail distance method is to first use your intuition to guess where you think the rail impact aim point should be. This defines the estimated aiming line, which you can project to the bottom rail (e.g., using the cue stick) to define the projected aiming line point. Then you should check to see if the distance from the target point to the projected aiming line point is twice the distance from the target point to the rail impact aim point. As shown in the figure, the shorter distance can be easily measured along either rail. Also, as an alternative to measuring the distance from the target point to the rail impact aim point, you could measure the distance from the rail impact aim point to the projected aiming line point instead. If the distances are not equal, then you need to adjust your aim. As illustrated in Figure 6.5, if your first guess for the rail impact aim point if too far to the right, the rail distances will not be equal and you will need to move your aim point to the left to equalize the rail distances and the approach and rebound angles. Figure 6.6 shows what happens if your guess is in error in the other direction. Again, you