

Hidden Hangers

by BOB JEWETT



SOME SHOTS ARE much easier than they first appear, if you can recognize how a particular principle of physics can be applied. The examples below each demonstrate some physical principle that you can use to help you approach perfection, or at least help you win some games you would have lost, if you learn how to recognize them.

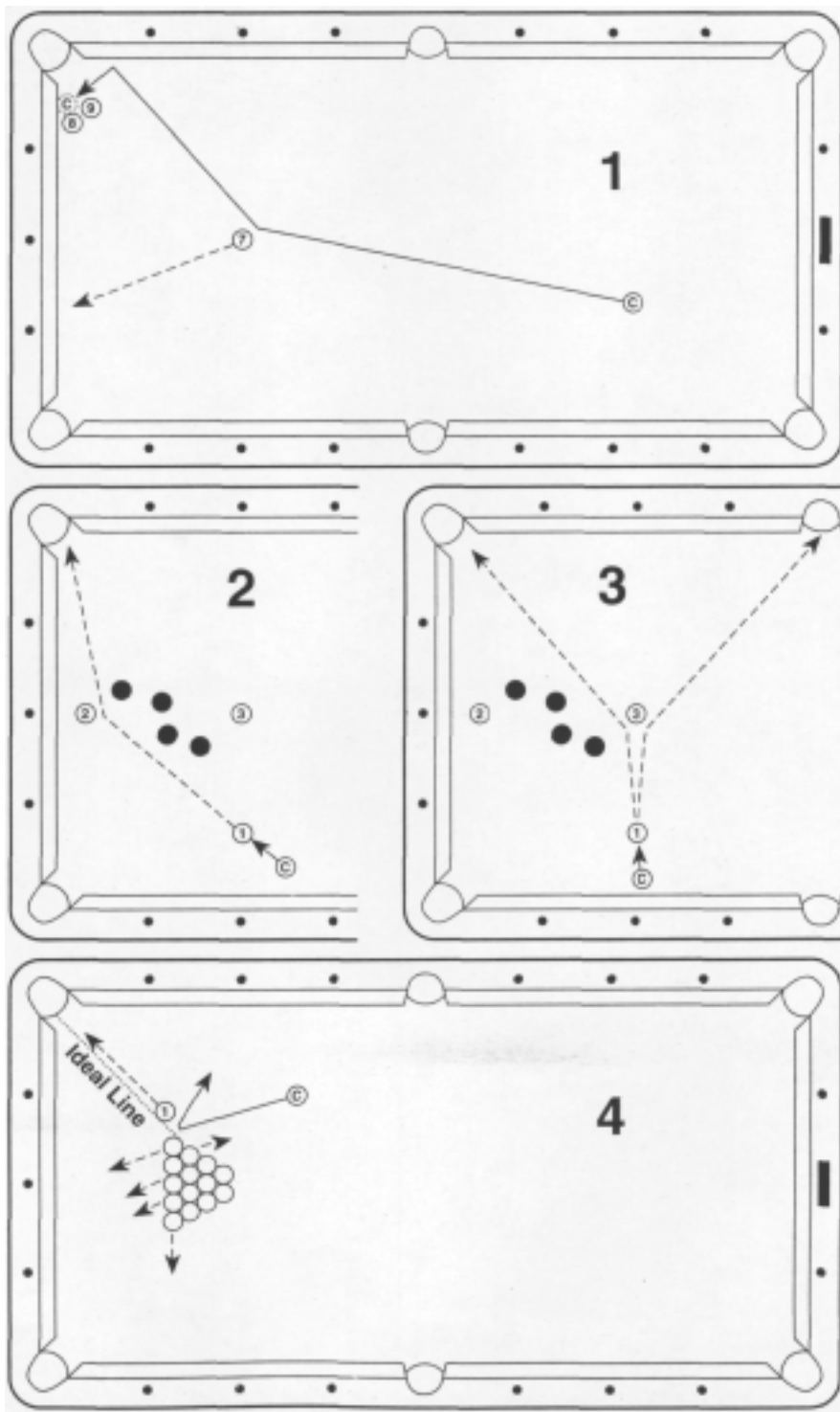
Diagram 1 is a position from 9-ball, with only grandstand shots available to pocket the 7. Freeze the cue ball behind the 8 and 9 for a safety, and the game is yours, but it looks like the needed control is improbable. In fact, the shot is easy if you hit half the 7 on the right side, half full.

The "half-ball" shot is the single most important shot to understand for position and safety play. It's defined as a shot in which the cue ball is rolling smoothly on the cloth when it hits the object ball half full. The resulting cut angle is 30 degrees. The important thing to remember is the angle the cue ball is deflected is nearly constant for a wide range of cut angles. This is a useful tool for cue-ball control.

In Diagram 1, the half-ball principle will take care of the angles after the 7 is hit, so you should concentrate on the speed. An additional aid from physics on this shot is that the cue ball loses energy rapidly when it hits the rails, so the two rail hits in the corner "kill" the ball right behind the 8.

Suppose that the cue ball starts only two inches from the head spot instead of a diamond. Now the shot is guaranteed to scratch unless you get just the right amount of stun to widen the angle, and that's tough at long range. The half-ball angle can be changed a little with side. Try outside English (in this case right English) to see if you can widen the angle when the cue ball rolls away from the 7.

The half-ball angle can also be used for some amazing offensive plays. The shots in Diagrams 2 and 3 are to make the 1 ball from the two cue-ball positions. In Diagram 2, if the 1 hits the right side of the 2 ball, it easily goes in the corner pocket. Be careful to play the shot just a little faster than you may think necessary to get the 1 to the pocket. Be careful; if the 1 ball is slid-



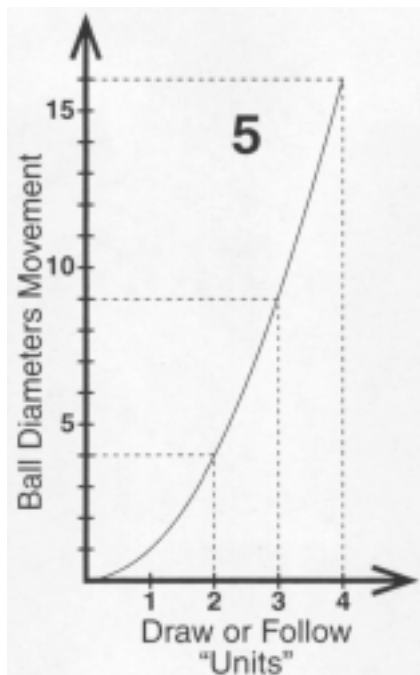
ing, rather than rolling, when it hits the 2, it will take a wider, unpredictable angle.

For Diagram 3, the 1 goes in off either side of the spotted 3 ball. On this shot, it's a little harder to get the ball rolling smoothly before the collision, so favor a somewhat thinner hit than half-ball on the 1-3 hit. Shots like this come up frequently on crowded straight-pool, one-pocket and 8-ball tables. Learn the angles by heart.

To really get a feel for half-ball shots, try English billiards, a three-ball game played on a snooker table. Half-ball shots are an integral part of making caroms, which is one of the ways to score in that game.

Diagram 4 is an all-too-familiar scene from straight pool. It's not a bad break shot, except for the very thin cut angle. A much easier shot is the short carom, playing the cue ball off the corner ball to the one.

What makes this shot easy is that the cue ball travels a very short distance on the carom. In fact, if the distance is less than a ball's width, the carom is easier than a straight — in shot of the same length. Before you try this, check the "ideal line," which touches the edges of the two object balls. If that goes to the pocket, the shot has promise. The "feel" of the shot is like



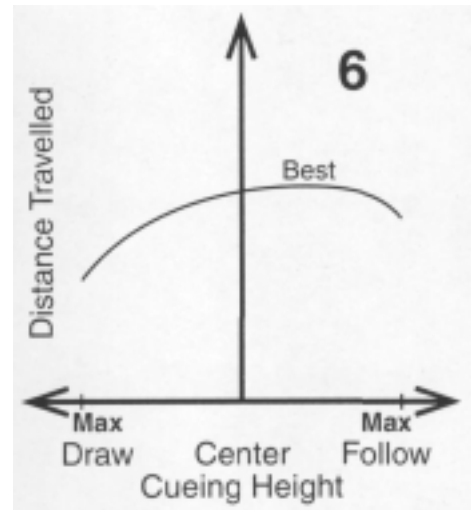
scratching off the first ball with a stop shot.

This shot needs practice, both to get the aiming down for shots that aren't sitting so

perfectly, and to learn how side spin can fix the angle if it's a little off. Get something to set the balls in the same place each time, so you can repeat a shot exactly. I like self-adhesive paper reinforcements used to protect the punch holes in binder paper. A warning about playing the cue ball off a middle ball in the rack: if the rack is tight, the cue ball will carom at a wider angle unless the hit on the first ball is thin.

Everyone likes to shoot stop-shot position; there are few things more satisfying than smacking the object ball full in the face and stopping the cue ball absolutely dead. It turns out that the shot is easier than it looks, and is far easier than getting the cue ball to drift forward or back a diamond. The "trick" to stop shots is to collide when there is no draw or follow on the cue ball. The problem is that you need to start with some draw for the cloth to rub off on the way to the object ball, and you may arrive with a little spin, one way or the other.

In Figure 5, a perfect shot is shown by zero ball movement for zero units of draw or follow on the cue ball at the instant of contact. If one "unit" of follow is on the cue ball, it will roll forward a ball diameter, and exactly replace the object ball. (How many



RPMs are in a "unit" depends on details we won't discuss.) Thus, an error of one unit of spin when trying a stop shot means the cue ball will be off by only 2.25 inches.

In comparison, suppose you want to pull the cue ball back 20 inches or nine ball diameters. This takes three units of draw. If you are off by one, the cue ball is either five balls short of position or seven balls past.

How is this useful in play? It means that precise stop shots are easy to learn and play, but moving the cue ball exactly a diamond will be much harder and frustrating. The result also applies to stun shots — stop shots at an angle — which are easier to control than "half follow" or "half draw" shots.

A final physics gem is in Figure 6. It answers the question "At what height should a shot be cued for maximum accuracy of travel distance?" The lag shot to see who breaks is a simple example. The curve supposes that the cue speed is constant, but the bridge height varies (perhaps randomly) giving varying amounts of draw or follow. While any height can get the job done — for draw, just shoot twice as hard as for center ball — the point with least effort is about half way between center ball and a miscue.

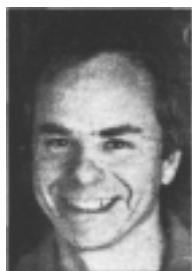
Notice that if you're a little away from that best tip height, there is very little change in distance travelled, while if you start farther away, you must be more and more accurate on the height to achieve the same distance accuracy. What might cause you to hit at the wrong height? Does your elbow drop?

When you see one of the shots above, get Newton on your side and shoot it the easy way.

Bob Jewett is a former ACU-I pool champion and currently trains BCA instructors in San Francisco.

Finding The Pocket

by BOB JEWETT



IRVING CRANE HAS said that the skill that set him apart from other top players was his pocketing accuracy — putting the ball right in the center of the pocket. When was the last time you worked on this part

of your game, and just how do you practice this? Below are some suggestions for getting your shots closer to the real target.

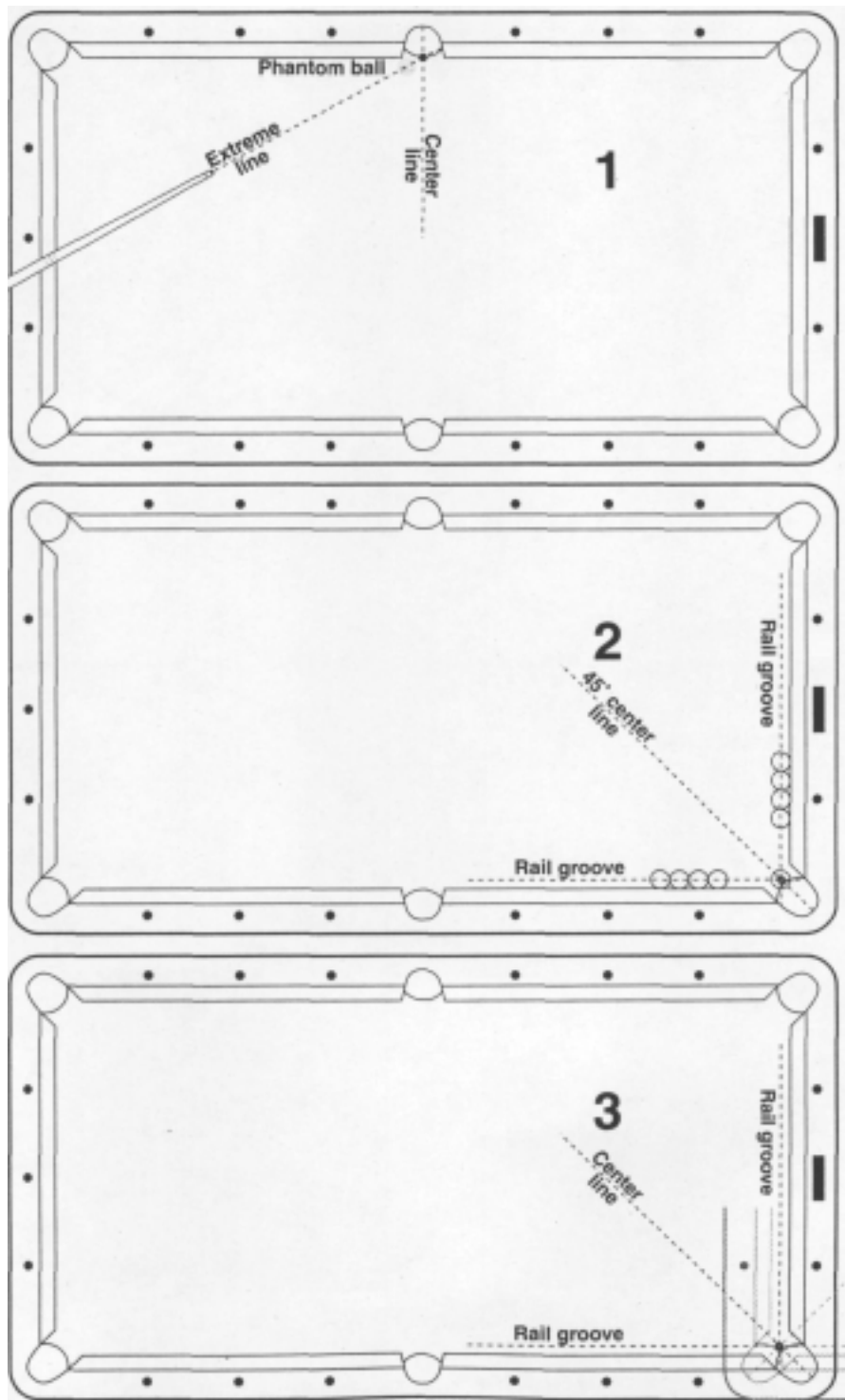
First we need to know where the pocket is. Obvious? Maybe not. Lots of players, and not just beginners, have trouble playing shots angled into the side pocket. The tendency is to set the target too close to the back of the pocket, so the object ball hits the cushion at the near corner of the pocket. As the angle of approach to the side gets more difficult, selecting the right target is more and more important. Where is the best target?

Let's first assume that there is a "single best target" for all angles of approach. Our goal is to mark that point to make practice easier, and to know that point to use during normal play. This point must be on the centerline of the pocket as shown in Diagram 1, as long as the pocket is symmetrical — the same on each side. Where on this line is the single point?

Consider the toughest possible angle into the side. At the limit, the object ball will barely miss the near corner of the pocket, and pass exactly through the phantom ball. Note the point on the short rail that the cue stick passes over. The point on the short rail and the center of the phantom ball give a line that goes through the center line. The "single best target" for the side pocket is that point on both the center and extreme lines.

Where this extreme line is will depend a little on how the pocket is made, but on most tables, a ball can be made from the centers of the short rails. On my table, this line crosses the center line exactly at the brink of the pocket where the slate starts to fall away. Try on your own table to find the limit using short, straight — in shots.

While the point we've found is clearly the best target for the two shots analyzed, is it the best target for all shots to the side? Try some experimenting to see if it is the best



target for shots between the center and the extreme lines.

Where is the "single best target" for the corner pockets? Since corner pockets are also symmetrical — the short-rail side is made just like the long-rail side — the target must be on the pocket's center line, which is the 45-degree line in Diagram 2.

Once again, consider the extreme case, which now is when a ball is coming right down the rail. Notice the rail groove — the line worn in the cloth where a ball sits when it is frozen to the rail. One easy way to find the target in the corner pocket is to freeze several balls together in a line on each rail by the corner — they are all sitting in the rail groove — and place a ball in the jaws of the pocket in line with the two lines of balls. The base of the ball gives the "single best target" point.

Again, you may want to try approach angles between the two angles to see whether the single point is really a good target for all shots.

Now let's apply the theory to practice. Get some self-adhesive donut-shaped white paper reinforcements. (The kind used on pages in a three-ring binder; they come in rolls of a hundred.) Place them on your practice table, one donut at each pocket's target point. If you can't find donuts, white chalk will also work, but tends to wear off during the course of a practice session.

As you go through your normal practice routine, strive on each shot to drive each object ball exactly over the target point. Be sure to note on each shot how much error you made to one side or the other. Over the edge of the donut is good, but try to roll the object ball directly over the center.

While using this practice aid you may find out, like I did, that on some shots the pocket isn't where it appears to be.

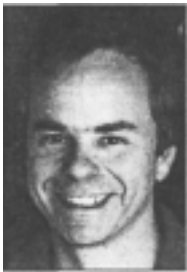
The rail groove is also the "reflecting line" that mirror banking systems depend on. If a ball starts slightly off the rail and is shot slightly into the rail, it will be reflected from this line. That means that if you could see the image of the pocket reflected in a mirror on the line, it would be the pocket for shots aimed a little too far into the rail. The important thing for us is that this "image" pocket (shown in gray in Diagram 3) provides another pocket, just like the real pocket, but for balls reflected off the cushion. The center of the combination of these two pockets is on the rail groove. This gives us our second line to find the "single best target" for the corner pocket. Note that it is also the intersection of the straight extension of the two rail grooves.

Bob Jewett is a BCA billiards instructor and a former ACU-1 national college pool champion.

Collective Wisdom

It seems they've heard all the questions, but the pool players on the Internet still have no consensus about cues.

by BOB JEWETT



DO YOU LIKE to hang around the pool hall and discuss important topics over a beer or a cup of coffee? Subjects like what kind of cloth is best, Efren Reyes' latest miracle shot, whether inside English makes the ball

hug the rail, where the best action is in L.A.... When a pool hall isn't handy, you can get your pool-chat fix in the Internet newsgroup rec.sport.billiard (r.s.b for short). If you happen to find yourself in cyberspace, drop on by.

There is a standard practice in newsgroups called a FAQ list, for "Frequently Asked Questions." Once online for a few months, you'll find that each crop of newcomers tends to ask the same questions. A

list of those questions with answers is compiled by many volunteers to avoid some of the repetition. It helps the newcomers get up to speed without boring the old hands, having to answer the same question again and again. The FAQ is updated as newcomers bring up questions that haven't been asked before.

Some of the answers on r.s.b.'s FAQ are just pointers to other resources on the Internet, such as the BCA's web page that has the rules for the major pool games, or the E.J. Riley page that has not only snooker info, but covers other cue sports as well. Mark Avion, an r.s.b regular, has assembled and maintains a list of over 300 online links to pool, billiard, and snooker pages. Another, Ira Lee, has illustrated instruction of three-cushion — within a couple of clicks you'll see how to avoid that pesky five-cushion kiss-out you always get.

The two most common sorts of questions

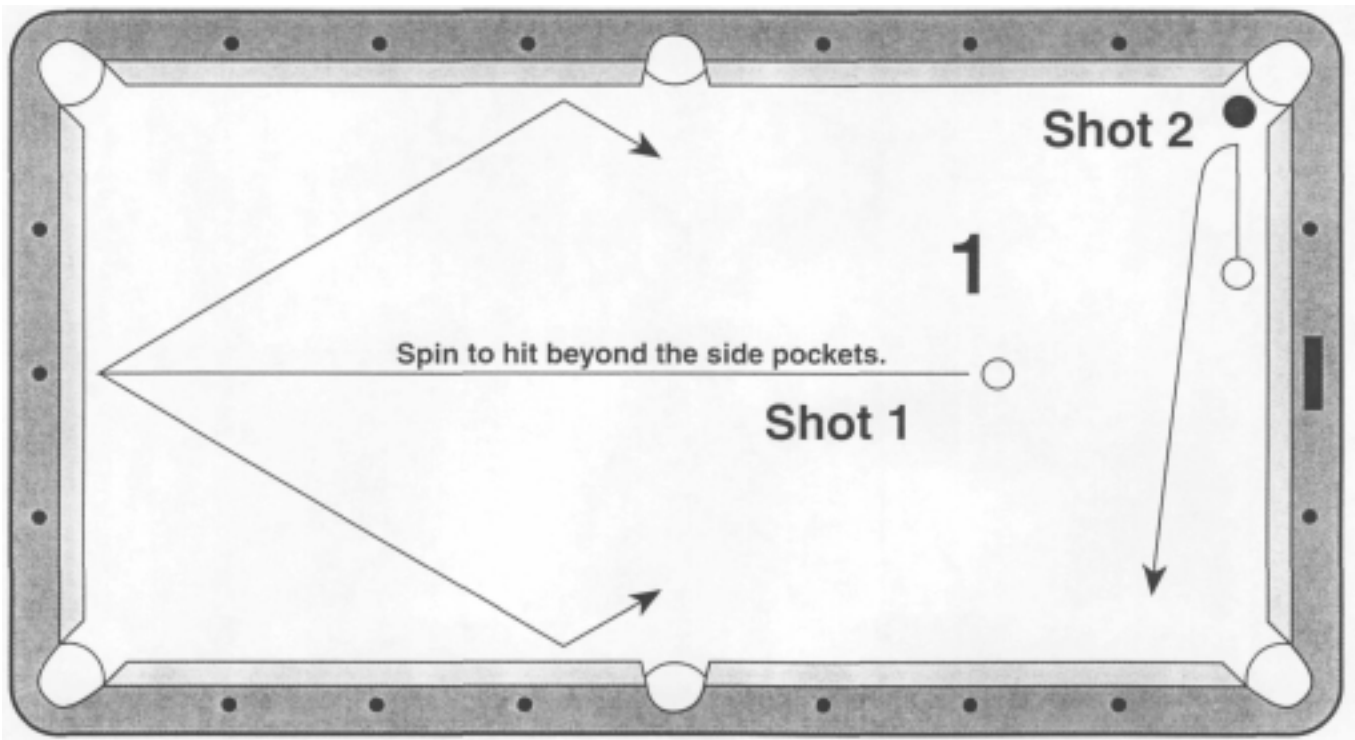
are about rules and cues. The FAQ briefly lists rules for 11 games, and suggests the purchase of a real, physical, paper rule book. I'll go into cue selection farther below, but first let's look at some of the other questions (with abbreviated answers) from the FAQ.

Q: How can I make my own table and cue?

The intrepid handyman is directed to articles in *Fine Woodworking Magazine* for plans, the July/August '86 for the cue, March/April '89 for the table. (Call 1-800-477-8727 for info). An r.s.b contributor, Bob Stantley, has a story online of how he built his own table between Memorial Day and Labor Day.

Q: How can I learn about pool physics?

Besides the books by Jack Koehler and Wayland Marlow, there is a 60-page mini-



dissertation available online by r.s.b'er Ron Shepard with discussion, equations, and diagrams covering many aspects of sticks, balls, and cloth. Also, two books in French are available: a reprint of Gustave Coriolis' 1835 master work, and a recent book by Regis Petit.

Q: How much room do I need for a table?

I'm amazed by how many people want to jam a pool table into a 12-foot by 15-foot room. Briefly: leave at least 64 unobstructed inches around all sides, or be ready to shoot with a cut-down cue. To find your personal elbow room needs, place a piece of plywood near a pool table like a wall, and move it back until you are comfortable shooting near it. You may want chairs and such in the room as well, so be sure to leave room for them.

Q: What is the "Diamond System?"

It is hard to describe any of the many diamond systems FAQ since it lacks table diagrams, but an example of the corner-five system is illustrated using text characters to draw the table. The reader is then directed to books by Robert Byrne, Eddie Robin and Walt Harris.

Q: My shaft has a dent. What now?

Eight different methods are discussed in a page and a half, ranging from just rubbing with a glass rod to steaming with a wet cloth and a soldering iron. Try a stream of steam from a tea kettle directed through a small hole punched in aluminum foil. Disclaimer: neither *Billiards Digest* nor I will replace your shaft if you ruin it.

And finally...

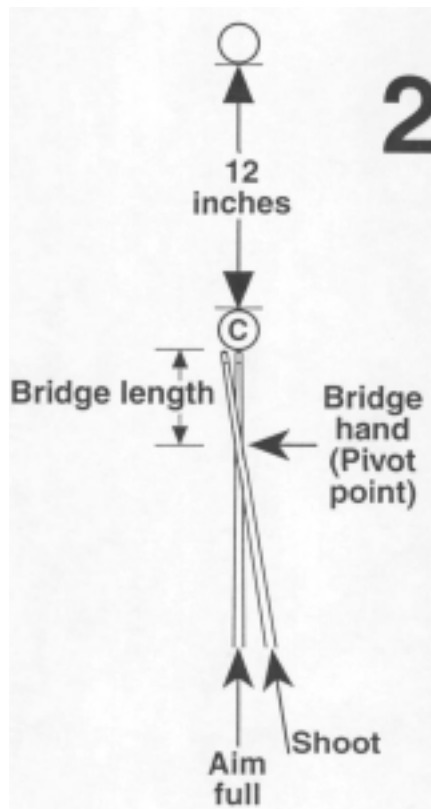
Q: What kind of cue should I get?

If opinions were pennies, r.s.b would be rich beyond compare. Someone might mention that his Williams Swash-buckler hits the ball great, and the next person will call him an idiot for owning such crap. When you get into personal things — religion, sex or cue sticks — on the Internet, be prepared for "strong interactions," as the physicists say.

Before buying a stick, you might ask whether you're ready to own one. There is a huge variation between sticks available today, and if you're a relative beginner, your game and style may still be evolving. Trying different house cues will let you find a type that fits you now. When your style has settled down some, and your game — especially the spin part — has developed

to the point that the stick becomes important, buy your first stick.

Here's a quick test to see if you'll benefit from cue ownership. In Figure 1, Shot 1, shoot the cue ball straight up the middle of the table with side spin. Can you consistently hit the side rails beyond the side pockets? In Shot 2, can you consistently bring the cue ball clear across the table with just draw? If so, it's time to buy a stick, carefully.



Q: Which brand?

It is pointless to suggest a particular brand, since sticks within a single brand often hit the ball very differently.

You need to play with a cue for a while to see if it is right for you. If purchasing at a retail store, ask to shoot with a variety of sticks, and include the test below. If the store refuses to let you chalk the tip — a common problem reported in r.s.b — go elsewhere. If you buy by mail order, ask about the return policy. The stick must be able to spin the ball properly.

Some basic properties of the stick are obvious — diameter, length, weight, balance — all of which you should sort out during your "house cue" phase. In a jointed cue, you also need to select the joint, wrap

and decoration.

Q: What about joints, wrap and decorations?

There are lots of opinions about joints. The problems, like the cues themselves, is that there seems to be nothing but opinions, so the FAQ isn't much help when it comes to joints. For the wrap, get something that doesn't let your hand slip even on hard shots, unless you feel the bizarre urge to develop a slip stroke. For decoration, realize that you're buying style rather than playability.

Suppose you have a stick in hand, ready to test. What shots should you try? First, just shoot straight over the spots, like Shot 1 but without spin, at various speeds. Is the stick solid or does it have a click, rattle or buzz? You should only hear the quick thud of tip on ball. Next, try the shots in Figure 1 to see if the stick lets you spin the ball up to your usual standard.

The last test is a little more complicated. It measures the single most important characteristic of a stick: how much it makes the cue ball veer to the side when applying side spin. This is known as "squirt" or "deflection."

As shown in Figure 2, place the cue ball about 12 inches from an object ball (no pocket is involved). Line up as if for a perfectly straight shot right through the center of the cue ball full at the object ball. Now, without moving your bridge hand, pivot the stick for a maximum left spin shot without draw or follow. Stroke and shoot along this new line. Squirt will make the cue ball go to the right of the expected line, and for a very squirry stick it may even hit on the right side of the object ball.

Now for the hard part. Adjust your bridge length so that the cue ball lands full on the object ball, and sits there spinning in place if you don't draw or follow. If the cue ball moves to the left, lengthen your bridge; to the right, shorten.

The distance between the cue ball and this perfect pivot point measures the squirt quality of the stick — lengths between eight inches and three feet have been reported in r.s.b — and longer is better.

This method of measuring squirt can also be used to compensate for it during aiming, provided that you adjust your bridge length to the perfect pivot point. Aim without side spin, and then pivot the cue over to give as much spin as you need and stroke through.

Bob Jewett is the keeper of the rec.sport.billiard FAQ (<http://www.accessone.com/~mavlon/faq.txt>).

Those Who Can, Teach

Basic techniques to instruct those who need it, without getting too technical.

by BOB JEWETT



IF YOU HAVE played seriously for more than a few months, you've probably already done a fair amount of instructing. If you find it fun to help others play better, this column has

some tips that will improve your instruction. On the other hand, if your game is not up to the level that you want to share it with others, just adopt the role of the student as you read the following.

Do you know a player who is all slam and no finesse? The drill in **Diagram 1** may help him tone down his "enthusiasm". It comes courtesy of Ed Nagel, a long-time instructor on the West coast. Starting from the position shown, the goal is to make the object ball in the side pocket, but it must take at least four soft strokes. The object ball must be driven towards but not to the far pocket on each of the first three strokes. This can be turned into a competition to see who can take the most shots to sink the ball; can you stretch it out to thirty? Many players are slow to develop the "soft" part of their game; this lack is usually most evident when they try to play soft safety shots.

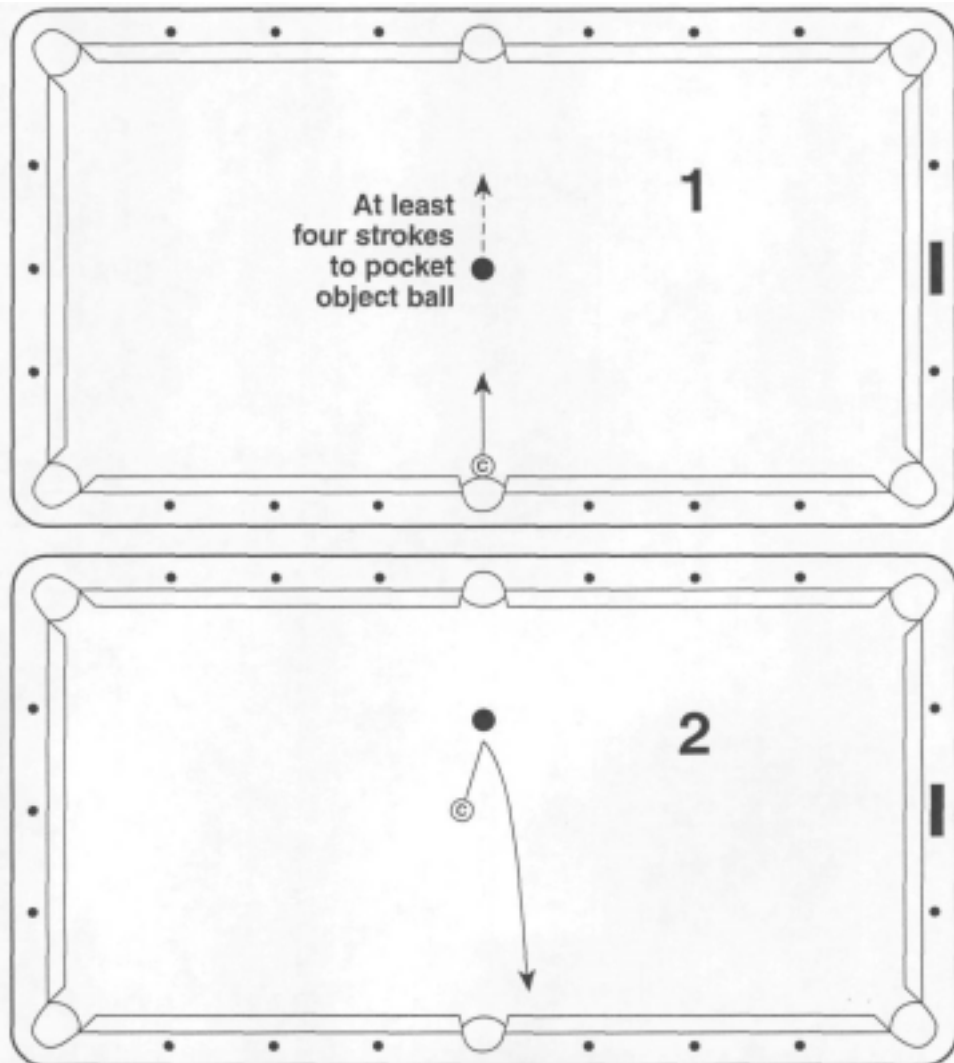
The shot in **Diagram 2** has given tremendous pleasure to many beginners, believe it or not. The idea is to get even the clumsiest tyro to draw the cue ball, a delightful result that all too many players have never experienced.

Although the diagram appears simple, there are lots of details that you as the instructor need to take care of to make sure the shot

comes off correctly. The position is very important, with the object ball one diamond straight out from the pocket and the cue ball on the center line of the table but just off line from straight in. The shot is easy, the aiming is obvious, and the slight angle keeps the cue ball from spinning directly back at the shooter, so he can stay down. Note also that the stick

will not pass over the rail at the pocket, so a high pocket liner can not prevent a level stick.

The bridge is absolutely critical on this shot: a fist bridge with all of the end knuckles of the fingers planted firmly on the cloth. A fist bridge is formed by making a fist, and then looping out the index finger barely enough to get the stick



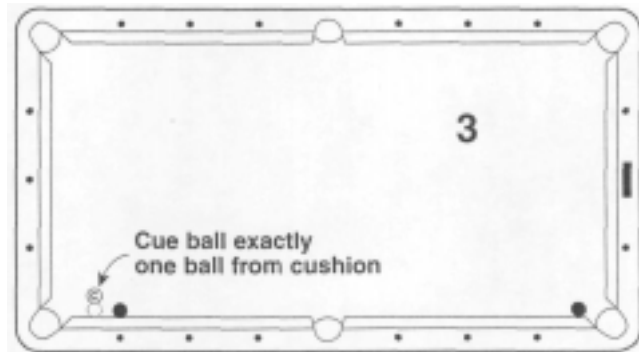
through the loop. The thumb should hold the tip of the index finger against the middle finger. Do not let the student uncurl the middle finger — its tip must remain touching the palm of the hand. The shaft should be off the cloth by exactly the diameter of the thumb. Most beginners can make a reasonable fist bridge even when the standard fanned-finger closed bridge is impossible for them.

Chalk! Do not trust the student to do this correctly; inspect their work. Stand in front of the target pocket so you can see the part of the tip that will hit the ball. Also, you can act as short-stop if there's a major miscue.

Once the student is down in position, have him adjust the length from bridge hand to ball to get a reasonably low hit, but not a miscue.

Now that the position is set, tell the student that you want to see nothing move except the stroking forearm until the cue ball stops moving. Remember to be in position for your short stop duty.

Most will draw the cue ball back to the side rail on the first



try. For those who don't, the most common problem is raising the bridge hand just as stick comes forward, probably due to fear of miscuing. In this case, set up the shot again, and say just before the shot, "Put a little pressure down on your bridge hand. I want to see all those knuckles touching the cloth."

If a lack of speed has prevented that soul-satisfying zippy draw, say just before the shot, "Shoot firmly." Do you agree now that there is a lot more to this shot than meets the eye? Once you get the details down, in just a couple of minutes you can get your student to draw like never before. Along the way you have taught a firm, closed bridge, minimization of body movement, the importance of chalk (is your stomach sore?) and the fact that amazing draw can be imparted without much effort.

In my column last time, I described a way to measure one of the three pitfalls of side spin — squirt. The next two diagrams describe how to demonstrate the other two — curve and throw.

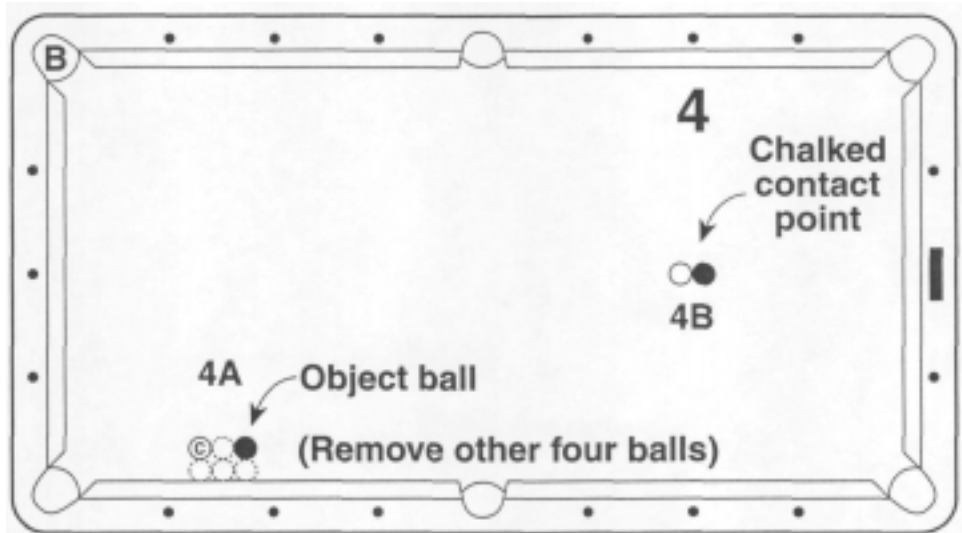
Diagram 3 is a curve shot beginners can make with just a minute or two of instruction. The idea is to get them to do the shot themselves, rather than for you to demonstrate it. In the position shown, making the ball by the pocket is clearly impossible, since if the cue ball misses the near ball it must also miss the far ball. Point this out, and then tell the student, "Just use right English, and make your normal bridge up on the rail. Aim to just miss the first ball." The automatic elevation from being up on the rail guarantees curve if they can manage any significant side spin. You may need to suggest a little draw with the side spin to increase the effect, and a soft hit works better than

a hard one. Chalk! Most beginners can get too much curve after a couple of tries.

Diagram 4 illustrates two aspects of throw. In 4A, the object ball, if struck straight on, will clearly miss the pocket. Have the student play straight at the ball, but with a little left side spin. Except with the cleanest new balls, the shot goes right in.

Diagram 4B illustrates an amazing shot. Again, even people who have never before picked up a stick can do it themselves. The point is to stress the importance of clean equipment. Spot a ball, and freeze the cue ball to it. Prior to placing the balls, chalk the contact point. A quick way to do this is to breathe onto the ball for condensation, rub your finger down in the depression in a chalk cue, and then roll your chalky finger print onto the ball, forming a thin layer of chalk mud.

Have the student pick a far corner pocket, and then tell him to shoot with the



stick pointed directly at the pocket and to use outside (left for pocket B) English.

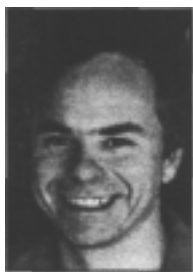
If you would like to perfect your teaching technique, the BCA offers several levels of courses. If you have little teaching experience, I'd recommend the one-day course to become a Recognized

House Instructor. If you have extensive experience already, the three-day Certified Instructor course at one of the six or seven Master Academies may be right for you. Contact Bruce Baker of the BCA at 319-351-2112, or see the BCA Web page at <http://www.bca-pool.com/>.

A SAFETY DANCE

When a delicate touch is required to hook your opponent, explore the options.

by BOB JEWETT



IT WAS MY own fault, really.

I had left myself on the last ball — it happened to be a nine ball game — as in **Diagram 1**. There was no good safety off either side of the ball, and no bank shot was available.

My choice was to play a soft shot directly towards the ball, leaving the same position but with even less space between the balls and the object ball nearly frozen to the rail. My opponent was unlikely to have the delicacy of touch to play a safety without double-hitting the cue ball, or so I smugly thought as I left the table.

His surprising play was to lay his stick on the table as in position A, with the tip slightly under the edge of the cue ball. With one hand, he lifted the shaft end of the cue straight up to position B in **Diagram 2**, hitting the cue ball a light, glancing blow that was just hard enough to get the object ball to the rail and leave everything even tighter. This shot, which I had never seen before, brings up a question: Can he do that?

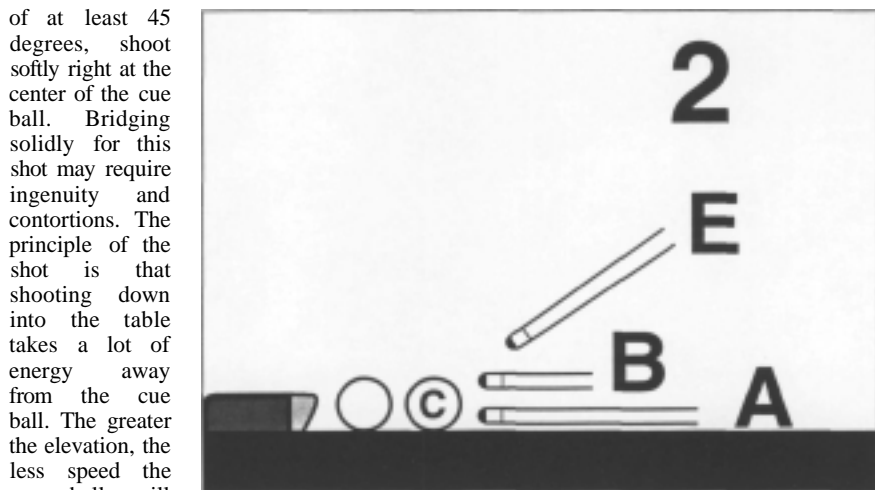
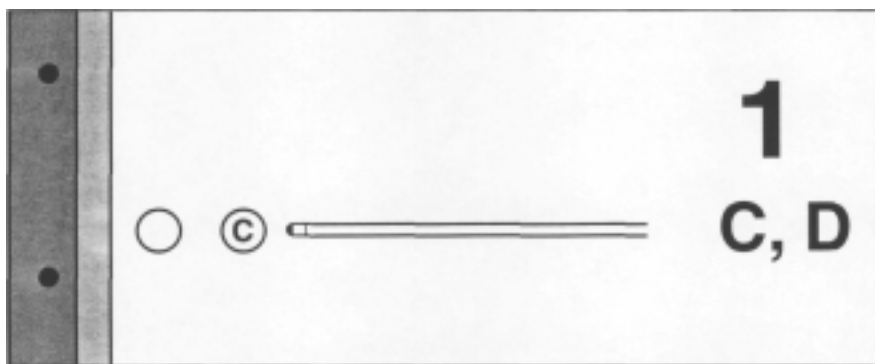
Before we start on an answer, let's look at some other ways to play the shot.

B. The Drop. Hold the stick by the ferrule in position B and drop it. Be careful not to take too much cue ball or it may roll back for a foul.

C. The Waggle. This is the same idea but sideways. With a normal bridge in position C, slowly bring the stick forward and to one side of the cue ball. Now move your grip hand not forward but sideways, keeping your bridge hand locked tightly on the shaft to prevent and forward/backward motion.

D. The *Hara-kiri*. This method was shown to me by two different players. Stand right by and facing the object ball. Hold the shaft in the fingers of both hands and jab the cue ball lightly. A little practice yields surprisingly good control.

E. The Dead Masse. Using an elevation



of at least 45 degrees, shoot softly right at the center of the cue ball. Bridging solidly for this shot may require ingenuity and contortions. The principle of the shot is that shooting down into the table takes a lot of energy away from the cue ball. The greater the elevation, the less speed the cue ball will

have. Using a dart-throwing grip for the back hand gives better control than a standard grip. I feel this technique gives the best control, but needs a little more practice than some of the others. It is useful for a range of situations whereas the first four work only for the single, rare situation.

Which of these techniques is legal? Under current rules, they all are. For Methods A, B, and D, the player should note that it is a foul to lay the stick on the table and release it while lining up a shot.

Which of these techniques should be legal? Should the player be required to

hold the stick when it hits the ball (B)? Should a hand on the back half of the stick be required (A,B,D)? Should a generally forward motion of the stick be required (A,B,C)?

Please send me your opinions on this shot in care of this magazine or by email to: Jewett@netcom.com, and I'll summarize the feedback in a future column.

Bob Jewett is now the Secretary of the USBA (carom association) and is an Instructor in the San Francisco Billiard Academy.

Welcome to Masse 101

Tips for mastering one of the game's most difficult shots.

by BOB JEWETT



I'VE LIKED MASSE shots ever since Willie Mosconi told me to shoot them.

It wasn't in person, but his *Winning Pocket Billiards*, the book that first taught me how to play, has two masses among the fancy shots at the

end. To be able to amuse and amaze onlookers is enough reason to study the shots, but there is a practical side to masses. If you know how to play them, you'll be ready for those not-so-rare situations in games when a masse is the right shot to play.

First the theory. In his 1835 book, which has recently been reprinted, the French engineer Gustave-Gaspard de Coriolis described the aiming system shown in **Figure 1**. The good news is that the system is accurate as far as it goes: the bad news is that the shot is still largely by feel. The system tells you which direction the cue ball will take after it stops curving. What it doesn't tell you is how long the curve will take; you control that by the speed of the hit.

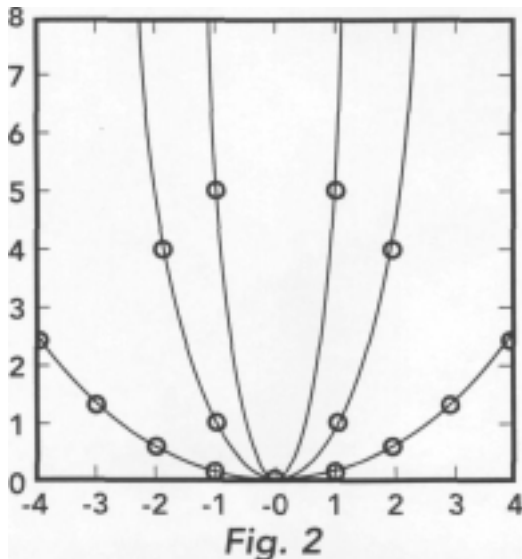


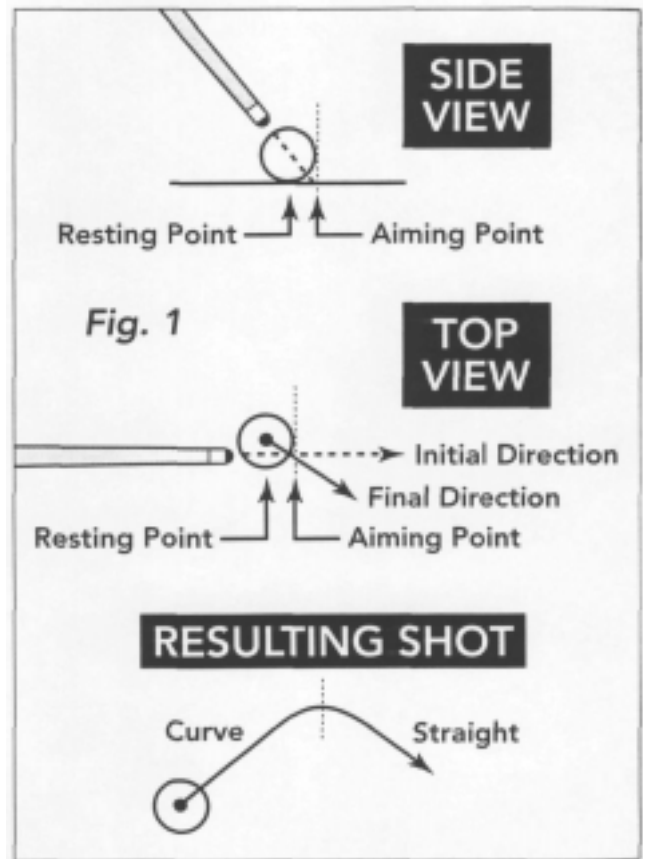
Fig. 2

In the side and top views, note the two points on the cloth. The point where the cue ball is resting is obvious. Harder to visualize is the point on the cloth that the stick points to, which we'll call the "aiming point." Coriolis' truly remarkable result is that the final path of the cue ball will be parallel to the line joining these two points. This is shown in the final part of the figure where the cue ball starts out parallel to the line of the stick and goes immediately into a curve, perhaps 45 degrees of path change, which requires about 45 degrees of elevation.

Suppose you want the cue ball to take a full right turn — 90 degrees — after the curved part of the path. For this you have to adjust the elevation and perhaps add some draw so that the stick points on the cloth to an aiming point just to the right of the resting point as seen from your side of the cue ball. This visualization is hard because your eye cannot look directly along the axis of the stick, so there is some guess-work about where exactly it points. Also, the aiming point is not very far from the resting point, so accuracy is hard.

Note that if you want the cue ball to go out and then back towards you, the aiming point must be under the nearer side of the cue ball, so the line from the resting point to the aiming point also comes back toward you.

What is the shape of the curve? It is always a parabola.



Reports of cue balls going in "circles" are mistaken, and figure-eights are impossible. Some typical parabolas — in case you wiped them from your mind as soon as you escaped from algebra — are shown in **Figure 2**. In theory, any section of any of these curves, expanded or shrunk, is a possible path for your cue ball.

Some parabolic paths that solve a single shot are shown in **Figure 3** (p.34). In each case, the line of the cue stick sets the initial direction of the cue ball and the arrow head marks the end of the curved portion of the path. Can you find a stick alignment and an aiming point for each of the three

continued on page 34

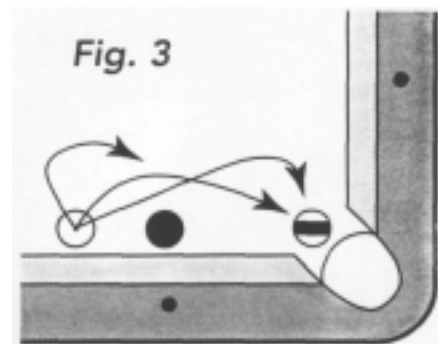
shots? Can you imagine about how much elevation is required for each?

While Coriolis will help you get the direction right, the extent of the curve — how far the ball goes out before it breaks — needs a feel for the speed of the shot. That requires practice, and useful practice requires good fundamentals. You must approach each shot methodically and execute it with as much mechanical stability and accuracy as you

can muster.

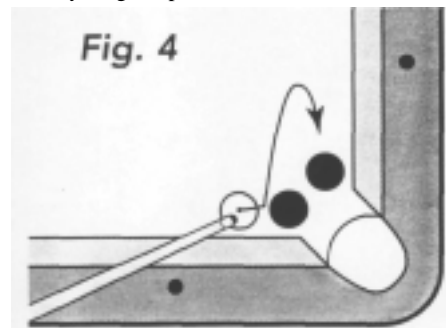
A firm, raised open bridge is essential. If you practice the shot in Figure 3, the rail provides additional height. This shot does not need the "flying bridge" you might see trick shot artists use, with the hand entirely off the table. Find the minimum elevation and speed needed to make the shot; that's also the highest-percentage way.

If you do need a longer bridge for more



power with the cue ball near the rail, sit partly on the rail so you can form a normal closed bridge on your thigh. If the cue ball is a diamond from the rail, try placing your left knee out there as a bridge platform. Be creative and flexible, but above all, be stable.

There are two common grips to use. For relatively soft shots — nearly all practical shots in game situations — the dart or pen grip gives best control. Extreme power comes more easily with the normal grip. In either case, your forearm should still be perpendicular to the cue stick even though everything is up in the air.



Next time I'll go over more equipment problems and some practical uses of masse in game situations. Until then, work on the following practice: With the balls set up as in Figure 3, try to pocket the duck with the absolute minimum of speed needed. Ideally, the cue ball will not have enough energy to get to a rail after pocketing the ball. Also, keep the elevation down to make aiming easier. Once you are comfortable with the shot as shown, move the cue ball and the blocker back a diamond at a time. As you progress up the table, remember, keep the speed down!

For a little fun, try the shot in Figure 4. This position appears three times in the movie *The Hustler*, but the path shown is how Allen Hopkins likes to shoot it: minimum speed to make the shot.

Note: If you plan to practice these shots on somebody else's cloth, ask first.

Bob Jewett is the USBA secretary and an instructor in the San Francisco Billiard Academy. He can be reached [citjewet1@billi\(irds\)digestxoiit](mailto:citjewet1@billi(irds)digestxoiit).