

DEAD-EYE PUTTING

by Geoff Mangum

Geoff Mangum's PuttingZone™ Instruction

<http://puttingzone.com>

geoff@puttingzone.com

ZipTip: BASIC PHYSICAL ROUTINE: Dead-Eye Putting

The purpose of a putting routine is to use effective physical behaviors for gaining putting perceptions that promote your best read and stroke and to use effective postures and movement dynamics to execute your best stroke, and an integrated routine has four keys to effective targeting for optimizing a shoulder stroke from a square setup: eye dominance, eye position, gaze control, and neck-head turn.

For the optimal use of the body in putting, one needs to know how the brain acts as the organ of perception and movement. Working to enhance your body and brain's natural way of relating to the world is a very fundamental way to make permanent improvements in your putting. Knowing how the eyes are used by the brain for locating targets and coordinating arm movements, and knowing how the body as a whole relates to targets and motions towards targets, is key to a deep understanding of how to putt.

The proper use of the eyes in putting is crucial. Because the brain knows the world only through the senses, the eyes as a channel for sensory signals must be employed in a physical manner that enhances sensory accuracy in telling the brain about the green and the putt, and that avoids feeding the brain deceptive or confusing information. Here is a core physical routine to enhance putting performance through consistent, reliable, and accurate physical procedures for building target perceptions.

Four Key Factors

A proper understanding of the eye-brain system is necessary to understanding an accurate and reliable physical procedure. This understanding yields four key factors:

- A. use the dominant eye for sighting;
- B. match the plane of vision with the plane of the putt with a flat head over the ball;
- C. use a straight and level fixed gaze out of the head -- without using eye muscles -- to look vertically down on the ball and then scan straight along the line of the putt to the target; and
- D. turn the head about its normal vertical axis from center of neck to the top of the head (oriented horizontally to the surface with eyes vertically above the ball) so that the head turn stays in the plane of the putt and delivers the line of sight in a straight line to the target.

Combined with a square setup and a shoulders-only straight pendulum stroke, this dead-eye putting enhances the body's native abilities to make an accurate and precise putt.

1. Dominant Eye.

The brain sights accurately only with the dominant eye. Locating a direction in space entails fixing the gaze on a specific location. Since there are two eyes separated by about two inches in the head, our bodies give us two different gazes with the eyes pointing inward in different directions. Eye dominance is not dissimilar to hand or foot dominance. The brain favors only one of the two eyes to define the body's relation to the target in terms of direction, and habitually uses only that eye to target objects and locations in space in terms of direction. Over time, the vision yielded by the other eye is ignored by the brain, so effectively when we sight targets, we use only our dominant eye. Trying to target only with the nondominant eye is a little like trying to sign your name with the wrong hand: it can be done, but not gracefully.

Try holding both hands out at arm's length, thumbs up side by side like a gun sight. Use the sight to target a distant object, with both eyes open. Close the right eye. If the object jumps to the left, you are right-eye dominant. Confirm this by opening both eyes, resighting, and then closing the left eye. The object will remain in the sight. You are left-eye dominant if when you close the right eye the object remains sighted, and when you use only the right eye, the object jumps to the right of the sight. If you try to determine which eye is dominant using only one hand with a single thumb or a circle of the thumb and forefinger, you will probably influence the test so that the brain uses the eye on the same side as the hand you use, so beware of testing yourself this way.

The dominant-eye factor is important in three contexts: 1) sighting from behind the line; 2) sighting from beside the ball; and 3) plumb bobbing.

From behind the ball, it is not true that you should strive to use "stereoscopic" vision. Two-eyed vision is necessary for depth perception, one of many distance clues, but this has little to do with locating the proper direction by sighting with the eyes. Moreover, depth perception ceases to exist past approximately 20 feet or seven steps. Other distance cues are usually more important (e.g., apparent visual size versus known actual size of familiar objects; texture changes in the surface in a gradient pattern becoming steadily finer and more crowded with increasing distance; angle of regard from known eye height rising with increasing distance, and the like). For sighting the line, only the dominant eye matters. And you must place the dominant eye on the line that extends from the target back to the ball and extending to you, so if you face directly towards the target, looking at the ball and the line, your dominant eye will be on the line and your nose and center of your body will be just to the side of the line.

You also need to stand square to the line: that is, parallel horizontal lines across your eyes, ears, shoulders, hips, knees, and ankles should all be perpendicular to the line of the putt (or more beneficially, to the vertical plane of the putt extending upward from this line). It also helps to stand back from the ball about as far as the distance from the ball to the target: this reduces the apparent distance from the ball to the target and makes sensing the line easier. In fact, crouching with the head level and square to the line has the same effect. This estimating the distance of the putt by moving back the same distance for sighting also gives you excellent body-knowledge about the putt's distance (and in a way, reduces the distance of the actual putt to half by allowing you to move from behind the ball halfway to the target before making the stroke.) Another aid is to hold the shaft of the putter like a ruler and line up the ball and the target using your dominant eye. This allows you to examine the precise blades of grass along the true line and pick out useful spots.

Once the basic "line" has been sighted this way, you need to preserve the relationship between the ball and target, because once you start walking, your brain will naturally

want to dump its contents under the habit of moving on to the next task. The preserving of perceptions is done with at least three techniques. First, pick spots not too far in front and behind the ball to anchor your perception of the line. Second, as you walk toward the ball, walk along the line with the dominant eye kept on the line and looking fixedly on the target (and at least on the line). Third, try to sense the plane of the putt kinetically by allowing the arm on your dominant-eye side to swing the putter into the plane of the putt in a tempo matching your pace of walking, and when you arrive at the ball, still standing along the line behind the ball, set the putterhead down with the toe pointing at the target so the flat face of the putter parallels the line and the toe points through the center of the ball at the target. Keep the putter resting thus as you step around to the side, and then recover the spots and sense of line from the putterface and assess what would be perpendicular to that line, and swivel the putterface around so the face is flatly perpendicular to the line. At this point you have a good approximation of where the putt should start, but it's only an approximation.

From beside the ball, you need to plant your plane of vision over the ball and in the plane of the putt. Then, when sighting thereafter, use only the dominant eye. This is discussed further in the next section.

Because I don't believe plumb bobbing is a good idea, I will not discuss it, other than to say the flawed procedure yields much worse visual information if you do not rely exclusively on the dominant eye.

A last topic is whether you should close the nondominant eye in putting. Perhaps sometimes. Standing behind the ball, you can either train yourself to know when you are relying upon your dominant eye, or you can close the other eye temporarily to remind yourself. The feeling of using your dominant eye is subtle but very definite. One way to notice this more is to try sighting with the nondominant eye, with both eyes open, and sense the feeling in this eye. It's like the sighting eye is a little squeezed still while the other eye is left unattended and allowed to rest loose and at ease. Use the gun-sight test. Once you get the hang of using the nondominant eye, switch back and forth at will, using first the left eye, then the right eye. You will soon develop a sense of this feeling. You always need to have this feeling in the dominant eye when putting. Can you putt with only the dominant eye open? Sure, very effectively too, but for other reasons you need both eyes open, so it's not something to encourage too much.

2. On plane.

If the head is considered as a cylinder on the axis pole of the neck and spine, the cylinder being about eight inches in diameter from the back of the head to the bridge of the nose, with the eyes two inches apart on either side of the nose, it matters a great deal how this cylinder / head is oriented over the ball for purposes of sighting the target. In short, the axis of the head needs to parallel the surface, so that a line between the axis and the ball is both vertical to the surface and perpendicular to the axis of the head. In other words, the back of the head must be flat he chin and forehead the same height above the surface. Why? Because this sets the gaze direction perpendicular to the head axis, and only when this is true does a head turn on the fixed axis direct the gaze in a straight line without any eye muscle activity changing the gaze direction.

When you turn the head to the target, ONLY a flat head delivers the eyes to the target in the vertical plane of the putt without requiring moving the direction of gaze from what it was looking at the ball or alteration of the orientation of the axis as you turn. While it is possible to set the eyes back inside the ball (rather than vertically above the ball) and look down at the ball with the eyes straight out of the face, this posture requires tilting the face

back up from horizontal. Such a posture is capable of delivering the gaze in a straight line without eye muscle activity, but it cannot do so with the plane of vision matching the vertical plane of the putt.

In other words, anything other than a flat head requires moving the eyes with eye muscles when trying to turn and look at the target or cocking the head to compensate for the plane of vision skewing out of the plane of the putt. What's wrong with that? The movement of the eyes or head complicates the brain processing of the location of the target in reference to the body, so that the brain either needs to carefully keep track of the eye motion and factor it in to the localization process or it has to forget everything up to the eye movement and wait until the eyes are still again and start all over figuring out the relationship. Moreover, from one putt to the next, which is more likely to produce the best control: no eye or head-axis compensations, or head and eye motion that may or may not be the same from putt to putt?

And the plane of vision needs to stay aligned in the vertical plane of the putt, essentially because "vertical" in the inner ear and in the visual field is a more potent cue and is more easily repeated from putt to putt. If the gaze is only straight out of the face, but the forehead is tilted up higher than the chin, the plane of vision is likewise tilted back out of the vertical plane of the putt. This is a serviceable posture, but not an optimal one. Optimally, the plane of vision should coincide with the vertical plane because this coincides as well with the plane of motion of the putterhead and hands and the vertical hang of the arms, thus facilitating movement planning and visual hand-eye coordination. This greatly aids consistency of setup, targeting, and stroke movement, and thus makes the learning and habituation of targeting and movement cues quicker and stronger.

Incidentally, the eye ball is seated in a pocket of fatty tissue designed to allow the eye ball to swivel about with near frictionless motion. In effect, it is nearly impossible to "feel" your eyes move, and if you monitor eye movement, you have to concentrate on how the visual field changes due to eye reorientations in the socket.

Why do the eyes have to move if you turn to the target with anything other than a gaze straight out of the face? Try this: Place your head and eyes directly over the ball so the back of the head is flat, then lift the forehead up a bit so the head is tilted. You have to slant your gaze down the nose a bit to look at the ball with the forehead back up like this. Hold the shaft of your putter at your dominant eye as if it were the line of sight to the ball. Once the shaft is pointed like this, hold it fixed and swivel the head on the axis of the neck toward the target. You will see that the shaft does not point along the line to the target but curves away to the inside. Another way to check this is to make a tube with your hand (use the same hand as the eye that is dominant). Look at the ball through this tube while closing the other eye.

If the gaze is not straight out of the face but the forehead is tilted up, the head turn on the axis will sweep this gaze progressively more to the inside of the straight line to the target, just like a searchlight beam sweeping the prison yard from a high guard tower or like an island lighthouse with its beam angled down as it revolves. The longer the putt, the worse this off-line effect becomes -- roughly one-half a foot to the inside for every three feet of putt. The fact that noticing this off-line directing of the gaze is very difficult without special training is all the more reason to keep the plane of vision in the vertical plane of the putt: if the gaze is straight out of the face but the forehead is tilted up (eyes thus back a bit from vertically above the ball), a head turn on the axis is capable of delivering a steady gaze along the straight line, but whether this in fact is occurring is more difficult to carry out accurately and to monitor.

Since a gaze angled down the cheeks carries your line of sight off to the inside of the hole. You consequently will raise your gaze toward your eyebrows to redirect the gaze back on line and then "at" the hole. This happens near the end of the head turn and usually without noticing the eye movement, as the peripheral view of the target comes closer to central focused vision. The end result is

- an unnoticed change of the gaze by eye muscles while the head was turning that the brain has to try to monitor and take into account;
- a conflict between the neck turn and the eye sighting, so the brain has to choose whether the neck muscles or the eyes are doing a better sighting job;
- a largely wasted opportunity to view the actual grass along the true line because the eyes were constantly changing gaze as the head turned,
- an attitude of the head that makes using the right eye more difficult and so harms right-eye dominant golfers, and
- little more benefit than changing from looking at the ball to looking at the target further down the nose.

If the head is tilted the other way when looking at the ball, with the forehead lowered, the eyes start out looking a bit up and the turn carries the line of sight to the right of the hole, and the golfer has to direct his gaze even further down the cheek / nose to recapture a fixed focus on the hole. Alternatively, or in combination with eye movement compensation, the axis of the head turn will cock in order to reposition the skewing plane of vision: with gaze down the nose, the top of the head axis moves backward; with the gaze up toward the eyebrows, the top of the head axis moves forward.

The long and short of this is that the "cylinder" of the head needs to be oriented above the ball so that the center-of-neck/top-of-head axis pole is horizontal and parallel to the ground and the length of the axis is perpendicular to the line/plane of the putt. From this head posture, a look down at the ball is necessarily with a gaze directed perpendicular to the head axis, straight out of the face. Then, in turning the head to the target, this axis should rotate as you swivel the head but it should not change its orientation with respect to the putt plane and the ground. You know that's working correctly when the top of the head stays in the same spot as you turn to the hole or back to the ball, because it's not likely the center of your neck will rove about.

This being the case, where should the eyes be oriented? The answer is simple: with the dominant eye directly over the ball, that is, vertically above the back of the ball with the line of sight looking at the central dimple on the back equator that lines up with the center of the ball on the line of the putt. There is one minor point about this. For a right handed golfer with right eye dominance, the right eye will not be vertically above the back of the ball because that would make place the ball too far back in relation to the putter stroke arc, which needs to reach bottom just before impact. So, the right eye actually looks straight down at a spot about one to two inches behind the ball and a tiny head swivel targetward brings the line of sight onto the back of the ball. This is a useful point to remember when checking the squareness of the putterface. If you look straight down with the right eye, you "spot" your vision just behind the center of the clubface, on the putt line, and the move to the back of the ball should be with the head, and not with eye muscles shifting the direction of gaze. This is a subtle reminder to keep the eyes still and presets your sense of moving the head in plane along the line of the putt.

When the axis length is perpendicular to the line / plane of the putt, there are three other relations that fall into place: the plane of vision defined by the parallel lines of sight of both eyes coincides with the plane of the putt exactly, the "horizon" line across both eyes

matches the line of the putt on the ground, and the axis of the head is parallel to the face of the putter. The only way this can occur when the back of the head is flat is when the gaze is directed straight and level out of the head.

3. Fixed Gaze.

What does "straight and level gaze" mean? If you stand on an ocean shore and face straight out to sea, with your shoulders, hips, knees, and ankles parallel to the sea-shore line, and gaze at the farthest point on the horizon straight out, you are very close to looking straight and level out of the head. The result is that the horizon line of the far ocean makes a "horizon" line across the field of vision of both eyes cutting across both pupils, the bridge of the nose, and a touch above the corners of both eyes.

There is one direction in each eye where the gaze is directed, and neither eye should have much inward orienting, because you are gazing at infinity and the two lines of gaze are essentially parallel. If you fix on a distant target with such a straight and level gaze (nondominant eye closed) and then slowly raise the tip of your finger to "touch" the target (a pencil point or tee tip works better), this point indicates the single spot in your field of vision where your straight-ahead level gaze should always look. If you wore glasses, you could paint a dot or cross-hair with a red magic marker on your lens where this point is. So, when looking at the ball's back dimple this way, the dimple must be located at this exact spot in your field of vision. The spot is a little less than one inch to the side of the bridge of your nose on the "horizon" line across your eye (about the length of the index finger's tip from the line of the last knuckle out). If you touch the tip of your index finger horizontally to the bridge of your nose, your fixation direction should be directly out over the knuckle line on your finger. You need to memorize this point in your field of vision -- know it instinctively, because it guides your putting every time.

One way to practice locating this point is to place a small pencil cross on a wall so the cross is the same height as the pupil in your dominant eye when you stand with erect posture. This is usually about four inches below the top of your head, so the pupil is that distance below your total height. Just walk close to the wall standing erect and note how high up the wall your pupil is and make the mark. Then stand back from the wall, square your body to the wall, close or cover the nondominant eye, and gaze directly at the cross mark. The mark is on the aiming spot in your field of vision. Nod your head a bit and watch it move up and down. Turn your head from side to side and watch the mark slide sideways across your "horizon" line. If you are looking at a target that is pupil high and the target does not occupy this spot, then your gaze is not straight and level.

Now that the head is flat above the ball (and so able to make a turn toward the target without causing use of the eye muscles) and the dominant eye is set directly above the back dimple with a straight and level gaze, a regular swivel of the head about the neck-spine axis will carry the line of sight of the dominant eye in a straight line along the ground with the plane of vision remaining in the vertical plane of the putt throughout. Every time. No exceptions.

4. In-Plane Head Turn.

With the plane of the gaze of both eyes matching the plane of the putt from the ball to the target, a "regular" head turn delivers the lines of sight to the target without any movement or change of the direction of gaze. What is a "regular" head turn? If the "cylinder" of the head were striped with rings parallel to the top and base of the cylinder, a regular turn is one in which all disks (the top, the base, and all rings) remain parallel to the plane of the putt at every point during the turn. And the axis rotates but does not otherwise move.

One image that captures the spatial relations of the head and the putt plane in a proper turn is an old radio tuner. The tuner consists of two sets of parallel metal plates, one fixed and one turned by a dial, and each set of plates evenly spaced the same distances apart so that one set fits into the space of the other set. When the dial is "tuned," one set of plates rotates in an interdigitated fashion among the fixed set of plates without touching. The head in a proper turn is the dialed set and the putt plane is the fixed set.

If the axis is truly horizontal, so the top, base, and "plates" are all vertical (as is the putt plane), then these planes are also parallel to the lines through the ankles, hips, and shoulders. If the chin is on the "base" of the head's cylinder, then a regular head turn is one in which the chin maintains a constant distance from the shoulder line during the turn. To learn this relationship, stand over a floor with a line on it (kitchen linoleum block floors are great), sight an intersection as if it were a back dimple, square your body to the line, and turn the head so that the line of eyesight is carried along the floor line without eye muscle movements redirecting the gaze. It helps to look in both directions, toward the target and back away in the opposite direction, to sense the neck muscles involved and the chin-shoulderline relation. Other than the eyes, the neck turn is the key to good putting, so knowing the feeling and sense of a correct, on-plane head turn is essential.

The tendency in turning the head is for the chin to draw in closer to the shoulder line as you turn to the target. That's because this is the characteristic way people look about to the left or right when standing or sitting. This moves the top of the head closer to the target and casts the axis of rotation aslant the putt plane. Just as a quick experiment, look casually to your left and then check to see whether your plane of vision is level or slanted left eye down to right eye. Usually, it is slanted. To prevent this, learn to feel a constant chin distance from the square shoulderframe, and to keep the top center of the head in the same location as the head swivels. And when the forehead is tilted up, this relationship between the chin and shoulderframe in the turn is more difficult to maintain -- another reason the "flat" head over the ball is preferable to having the eyes back inside a bit with the forehead tilted up.

Flaws in the Current Head-Eye Pattern of Putting

Throughout most of golf history, the above-described head-gaze relationship has been the preferred technique. This is evident in the putting of the great masters Billy Casper, Bobby Locke, Bob Rosburg, George Archer, Bob Charles, Arnold Palmer, Gary Player, Lee Trevino, Nick Faldo, Brad Faxon, Seve Ballesteros, Morris Hatalsky, Payne Stewart, and many others. However, the dominant pattern of today's golfers has the eyes back inside from the ball, not vertically above the ball, with the forehead tilted up a bit and the gaze tilted down the face a bit. This is the pattern of Ben Crenshaw, Tiger Woods, Phil Mickelson, and indeed most pro golfers today. As discussed above, this setup and movement pattern is not conducive to use of a steady gaze. In point of fact, it encourages so-called "saccadic" eye movement and this harms targeting and thus also stroke planning.

In this saccadic pattern of eye movement, the eye muscles shift the gaze rapidly from one gaze to another, darting focal vision from this to that object or location, skipping over the vision of everything in between the starting object and the final target. The saccade (rapid shift of focal fixation) is the foundation of reading words on a page, when the head is held still and the eyes rove along from word to word, character to character, line to line. This is also the way a painting is viewed in a museum, or a landscape scene calmly taken in. The eyes dart from point of interest to point of interest, collecting features and impressions one at a time and compiling them into an impressionistic general sense of the whole. The problem is that putting is concerned with space, not information. The spatial relations between the body, the ball, and the target / hole inhere in distance, direction, and the space in between the body, the ball, and the target.

In evolution, the visual system of mammals has developed different neural circuits and pathways for discerning detailed information in a scene versus the spatial relations in a scene. These two different visual systems are called the "what" and "where" systems. The "what" system relies upon very precise focusing on fine details discriminated by sets of "small" (parvo) neurons, so this system is the parvocellular visual system. The "where" system of vision is more action oriented in terms of detecting threats and opportunities for survival, and is most sensitive to change and motion in the visual scene. This system uses sets of large (magno) neurons, and is called the magnocellular visual system. There may well be a sense in which there are two visual systems as well divided along the lines of "recognizing" and "taking action." For putting, the important visual neurology is the "where" or the "action" visual system.

In other words, the golfer could care less about the fact that the dark oval he sees when he aims is called a "hole" or is so many inches in diameter. Instead, all he is concerned with is where that hole is in relation to his body, in terms of the intended action of rolling the ball into the hole.

In lower forms of animals, with less evolved brain systems, the detection of threats and opportunities was the responsibility of the neurons in the Superior colliculus (SC). The SC is a midbrain structure that remains in the human brain despite evolution and still carries out the guidance of saccadic jumps in vision. However, this system is not fully integrated with the more robust and finely tuned spatial sensing that is carried out by the "what" system of vision and the full-blown spatial mapping in the cortex itself (in the parietal lobe). This cortical mapping of space relations is the one that structures and informs movement for action by tracking the position of the body and its parts as well as the locations in the scene. The SC in comparison is somewhat crude, a "down-and-dirty" mechanism solely for redirecting the gaze in response to changing stimuli in the scene. In the frog for example, this is the mechanism that allows the frog to spot a passing fly as it enters the peripheral visual scene, and instinctively dart its tongue out to snag it. The problem in putting is that the target does not move or attract attention by changing. Instead, the human saccadic system in this putting context must rely upon remembered position of the target in order to dart the focal fixation from the ball to the target. This remembered sense of the target depends greatly upon the physical movements of the body and the head and eyes in initially building up the sense of location. Without the strong and reliable techniques for building the sense of target location described above, the saccadic system does not work that accurately in putting. And it is difficult to monitor whether the saccade actually delivers the focal fixation right onto the target, unless coupled with a deliberate checking to see the focus clarify on the back of the cup or a specific blade of grass. Golfers simply aren't trained to do this, and don't.

Today's so-called elite golfers have been studied with eye-tracking devices in an attempt to describe what these golfers do. The idea is that whatever these golfers of today are

doing at the professional level must be the best way to putt. Well, these golfers may putt better than amateurs do in general, but it is a dubious proposition to say they putt better than amateurs putt because of their typical eye-usage pattern in targeting.

Today's golfers who use this saccadic pattern of targeting employ something like this physical procedure to build up a sense of target location and stroke planning:

- the golfer looks at the ball (down the cheeks with forehead tilted back up from horizontal and eyes back inside the ball);
- the golfer then recalls the target location that has been developed earlier by "looking around" the green or walking behind the ball or around on the green or other indifferent processes;
- dart the eyes from the ball to the target in an express saccade that ignores everything between the ball and the target (the head does not fully turn with the eyes, thus the gaze changes orientation to the face from straight ahead out of the face to off to the left side for right-handers);
- not stop at the target until focus clarifies, but instead execute a return saccade to the ball with a shorter return of the neck as the face looks down and the gaze shifts from left to straight again;
- the express saccade is repeated to the target and a return saccade is repeated back to the ball;
- the golfer then is satisfied with his sense of target location and makes his stroke.

Comparing this saccadic routine to the one described above illustrates how a repeating physical procedure for developing target perceptions is necessary for optimal, consistent performance. The saccadic system depends upon the physical procedures employed earlier to develop a sense of the "remembered" position. It relies upon the somewhat crude SC system, which is not especially well suited to locating an inert target like a hole in a green that poses no physical threat. Initially, the saccadic system can be no better at directing the gaze to the target than this earlier variable targeting process (which degrades with the passage of only a short time). While the repetition of saccades is capable of improving the sense of location, it is not sufficient in itself to build up a consistently accurate and vivid relationship between the body and the target for the impending action of putting the ball into the hole. The obvious result is observed at the rope around any PGA Tour event's practice green: pros using this pattern usually miss 15- to 20-foot putts left or right by about 6 inches or more, and aren't that good on 10-footers either. And when these and other pros get more accurate and successful on these putts, it is almost always because they are targeting with a procedure that is better than these saccades alone.

[Integrating the Dead-Eye Targeting Routine with the Stroke](#)

Once you have a flat head, a straight and level fixed gaze, and a regular head turn, you can employ a straight shoulders-only pendulum stroke on the line to make yourself a putting machine that always putts the ball straight out of the square setup the same way. The problem is to make this straight putt match the line of the putt you are facing. You begin with ankles, knees, hips, and shoulders all "square" to the tentative putt plane, turn the head, and see where your line of sight ends up without changing the direction of gaze. Do not under any circumstances try to anticipate where your vision will end up; instead, concentrate on keeping the gaze fixed and the head turn in plane. If you end up looking at a spot on the ground to either side of the target (for right-handed putters) instead of dead on the target, then your whole body is mis-oriented to the true line and your putting machine will miss to the same side. In other words, a square setup and proper use of the

eyes can tell you whether your body is properly oriented to the putt line. In still other words, in case you don't see the importance here, your physical procedure actually finds the line or reliably tells you if you are off-line.

If you are mis-oriented, simply change your feet, ankles, knees, hips, and shoulders as a unit of parallel joints, and try the head swivel again, and repeat until your line of sight is carried accurately to the target without eye movement. You may want to go back behind the ball and take another look to convince yourself your body's setup orientation was wrong.

If you go forward with the putt after delivering your line of sight off to the side of the target, you will inevitably make a stroke that is not straight with a square face. Never ever try to make something other than a straight putt, at least until you know how to make a straight putt that matches your eye-head system's revealing of the true line. This ruins your sense of distance control AND directional control.

For similar reasons, second-guessing in mid-stroke is just as bad. You are going through these physical procedures to create and nourish a relationship between your body and the ideal putt in terms of direction and distance. If at the last moment you have a "feeling" that something else would be better, you should regard that feeling as the ravings of a lunatic, as if the janitor started yelling to the brain surgeon where he should cut. Why waste your targeting / stroke planning work thus far for something utterly speculative and not founded on sound procedures? A second-guess stroke almost NEVER works out. Unfortunately, these "impulses" come in the stroke at a point where it is nearly impossible to stop them.

The only real ultimate solution is to train them into nonexistence. In practice, every time you make a stroke that got corrupted by one of these "second-guess" last-minute alterations, stand and watch the ball roll off to the side of what you needed and remind yourself along the following lines: which is better, to have second guesses in 10 putts and to miss all but 2 of them, or to have those 10 putts back and go with your tested physical procedures for deciding where and how to stroke the ball? It really boils down to convincing yourself that your chance of MISSING with the tested, planned procedure is LESS THAN the chance of MAKING a putt with a sudden change in the stroke without the tested procedures guiding you. Stick to the plan, even if you feel while making the stroke that the ball does not have a prayer to drop.

Another way to eliminate or reduce these moments of impulse putting overriding your plan is to devote time during setup and targeting to do it right so your body knows what's coming in the planned stroke. The second guess feeling is generated by a mismatch between the mind's planned stroke and the body's planned stroke. The body always wins this contest. The trick is to get the mind and the body on the same page before initiating the stroke. One way to express this in conventional terms, much blunted is to say you have to be "comfortable" over the ball. You really need to be comfortable in your body with what the mind has planned. To get there, visualize your stroke and feel it in your imagination. Feel the smoothness, the direction, the nice control of the arc, and the good solid contact. If that works okay, you've probably done all you can to avoid the last-minute ruinous crisis of faith.

[An Integrated Physical Routine.](#)

Based on the above, and combining this targeting process with a simple and reliable stroke using hands below the shoulder sockets, powered by the shoulder and back

muscles only and not the arms or hands, in a controlled pendulum tempo, a simple physical routine to maximize accuracy results.

1. Sighting Behind the Ball.

You begin behind the ball, and sight the line with the dominant eye, perhaps using the shaft as a ruler to pick out spots; then walk the line and watch the target with fixed gaze and place the putterhead behind the ball with toe pointing on line. This sighting can be done from a good distance back from the ball, and the same distance back as the length of the putt is often good. This distance back from the ball also gives you an experience of the true putt length by estimating it, seeing it, duplicating it, and walking it. Crouching to shorten the apparent line is also useful. Keep the putterhead oriented on the line as you step around to take your setup.

This sighting is not intended to completely supplant other techniques for reading a putt. Other targeting techniques include sighting from behind the hole; crouching to see contour a little better; sighting from halfway to the hole on the low side making an equilateral triangle with you and the ball and the hole; and so on. But it is recommended that once this reading is complete, you start behind the ball as you move into the putt.

2. Adopting a Solid Square Setup.

A proper setup consists of square feet, knees, hips, and shoulders; a flat head with the plane of vision matching the plane of the putt; and hands hanging relaxedly beneath the shoulder sockets holding the putter grip directly beneath the shoulders.

After stepping around to the side of the ball, assess the line again by checking spots, and turn the putter to square the face and center the center of the putter behind the back dimple and center of the ball on the supposed line. Another way to "check" the line at this point is to gaze straight down at the ball and note the target in your peripheral vision; shift your eyes to the target while keeping your head still and try to make sure your eyes shift only along the "horizon" line. Then roll your head quickly to the target, delivering your vision right in the target, ignoring everything between. Look back and forth to see the plane of the putt. This will give you a sense of the line by using a separate brain system; you can imagine a vertical plane of the putt arising from this line and square your body (shoulders, feet, hips, knees) to this plane as if it were a wall from the ball to the target.

Then square the feet and plant the eyes. To plant the eyes, stand erect, look out straight and level, and bend from the hips and also bend the neck so the head ends up flat with the dominant eye vertically above the back of the ball and the plane of both eyes matching the plane of the putt. The bending to set the head requires a slight knee bend to keep the body in balance. The hips have to bend to get the shoulder sockets a bit out in the air and beyond the chest and abdomen so the arms can hang freely and swing on a straight path without contacting the body.

The distance from your eyes back to your ankles defines how far back from the ball you stand, not the lie of your putter. For me, the distance is about ten inches from the dimple to a line across my toes (with left foot more or less pointed straight to the line of the putt). The width of the stance is also defined by your body bend and knee bend so that you are stable and comfortable without too much conscious awareness of your lower body -- usually, your ankles about as wide as your shoulders or just a touch wider.

This setup also automatically defines ball position in stance so that the ball is just forward of the bottom of your shoulder-stroke's pendulum arc. The bottom of the arc should be directly opposite the center of your neck / top of the spine in the back (the pivot of the stroke), so the ball should be forward of this point. My shoulder sockets are about 15 inches on center, so my ankles are also about this width apart. The bottom of my stroke arc then is about 7.5 inches in, and a good spot for the ball would be about two inches forward of this, or 5.5 inches in from the left ankle's center. Because of the width and slight angling of my left foot, this means the ball should sit just inside my left heel, so that if it were actually beside my heel, the forwardmost edge of the ball would rest against the heel. In so many words, the proper setting of the eyes by itself determines all other ball-putt-body relations quite naturally.

2. Adopting a Propitious Hands Position and Grip.

Only after the eyes and head are set and the arms freely hanging directly beneath the shoulder sockets should you then take hold of the putter grip. You will be surprised that you are much lower on the grip than usual. This is, quite frankly, because putter manufacturer deliberately design the putters to sell instead of for optimal putting technique: that is, the putters are designed for use by bad putters with bad technique, since they far outnumber potential customers with good technique. To fix this problem, you need a putter that matches your good technique, which is likely to be shorter than your normal putter is. The other thing you will notice is that the lie of the putter is too flat, since your hands are nearer the ball than usual, thus lifting the heel of the flat-lie putter up a bit off the surface. Same reason-- bad manufacturing. The hand-ball horizontal distance defines the lie, not the putter, and this distance for a 6'0" male is the same as the distance from the eyes back to the shoulder sockets, about six or seven inches usually. So the geometry of the lie is fixed by the eyes and your body as well. For a 6'0" male with standard shirtsleeve arm length of 32 inches, the end result is something like eyes 48 inches above the surface directly over the ball and hands back six or seven inches from the ball with the centers of the palms hanging a little over 24 inches above the ground. In other words, a 30 inches putter with a 10-inch long grip and a lie 14 degrees back from vertical is about right.

There is a tendency to let the hands drop back towards the body, and this requires a stroke that propels the putterhead more sideways than along the line. Of course, the actual stroke will necessarily be a combination of sideways and along a line, with the hands moving on one line and the center of the putter moving along a parallel line about six inches further away. But "high hands," as Dave Stockton refers to them, help prevent pulls and pushes and allow a more finely calibrated stroke on line.

The actual grip itself is not that important so long as the basic idea of treating the hands about the same is followed, with palms facing each other in balanced opposition and palmar surfaces perpendicular to the plane of the putt. To keep this grip from twisting the face during the stroke, the four keys are:

- never change grip pressure once the stroke begins;
- align thumbs straight on the shaft;
- oppose even thumb pressure with opposing and balancing pressure from the last two or three fingers of both hands; and

- if there is any change in either wrist during the stroke, it can only be a change that leaves the palmar surfaces still square to the line and the stroke path (okay to deloft the putter with a little wrist break going back and keeping the same angle going through, but not okay to rotate either the heel of the hands or the top of the hands out of plane).

3. Scan the Line to the Target for Distance as well as Direction.

Once the static setup has been assumed, the eyes and body are in a position for a regular head turn to determine precisely how to orient to the true line. For a straight putt without complication of breaking contour, the target is the hole, but the principle is the same no matter where the target is located with reference to the hole. After checking that the starting direction of the putterface through the center of the ball matches the plane of vision, a regular head turn ascertains whether the plane of vision matches the true plane of the putt. If the head turn delivers the eyes to the hole, and the head turn is performed correctly, the body is correctly oriented to the real line and all that is left is the making of a straight putt with the right force or weight.

To assist in making a straight putt with the right force, the head turn is used as follows. When looking from the ball to the hole by turning the head with fixed gaze, the turn is carried out at the imagined pace of the perfect putt down the line into the cup, as if watching an imaginary ball roll down the line and rattle securely into the cup. The pace of the neck turn and the visualization key the brain about the precise force of the stroke, without any conscious involvement. The feeling is more an athletic one of rolling the ball perfectly into the hole rather than a mental one of "figuring out" how hard to "hit" the ball to "get it there," "don't leave it short," or "don't run it by."

4. Gaze into the Hole for at least 4 Seconds.

After delivering the eyes to the hole, allow the focus to clarify on the exact entry point into the hole and gaze into the space of the hole and count to four. This is the minimum time needed to build up an image of the hole that will persist during the next 4 to 6 seconds it will take to look back to the ball and make a stroke, and an image of the hole at the moment of impact is very helpful in assisting the brain and body to execute a stroke in the direction and for the distance intended (and perceived). The brain gets bored after three seconds, so a conscious overriding of the impulse to discontinue the gaze into the hole is required. After three seconds, staying fixed on the target, one frequently feels the onset of a dreaminess pervading the body and a focused connection with the hole and the putt.

Also, the brain is processing both the map of the relationship of the body to the putt and target as well as planning the motor program for movement during the stroke. The brain requires some time after turning to the hole for visual focus to settle down, for the inner ear to settle down, and for the brain to take stock of the body's new still position and look at the target. Once this is done, the brain completes the sensorimotor map and plans the movement. The planning of the movement is enhanced by gazing at the target with eyes and body still, and the brain's motor cortex does its optimal best sorting among the various available motions to select the best one to plan and empower with the eyes and body still.

While gazing into the hole, it helps to localize the hole in relation to the body to think of the "thereness" of the hole. Thinking that the hole is "just there, not to the left, not to the

right, not nearer, not farther, just there," helps the brain focus and sharpen its appreciation of the spatial relations of direction and distance.

At this point, while gazing in the hole, a sense of the line manifests itself emerging from the hole back towards the ball for perhaps the final two or three feet of the ball's path. Once this segment is perceived, the segment matches the "horizon" line across the two eyes and one begins the head turn back along the plane of the putt to deliver the line of sight of the dominant eye to the back dimple of the ball. The pace of the neck turn is not critical now, but a smooth even turn is beneficial by setting up a smooth stroke. Once the eye returns to the ball and the stroke begins, the stroke will mimic the pacing of the neck turn, so it is a good idea not to pause along the return swivel, but to keep the motion fluid and even. A little slower pace is okay, however, and one can turn back slowly enough to pick out spots as anchor points for the stroke to come, planning on sending the ball over these spots to and into the hole. The last five inches of the path just in front of the ball are critical and must be noted almost grass blade by grass blade. It is not enough just to try to sense a "line" here, as an abstract relation; one needs to actually see the specific grass blades the bottom of the ball must traverse if it is on line.

In addition, the neck turn creates a reference plane of feeling in the neck that guides a square stroke with the shoulderframe. As the head is turn on a still shoulderframe to and from the hole, the turn establishes the feeling of a vertical "plate" in the neck (sort of like a clutch plate, perhaps). Once the head is back looking down at the ball, the head is still and this time in the stroke the shoulderframe moves. The feeling of the shoulderframe moving inside the neck while the head stays still is along precisely the same "plate." Hence, as you turn your neck to and from the hole, sensing this "plate" as the guide to your shoulderframe movement helps make a straight, on-plane stroke. Combined with sensing the angle and pacing of the neck turn, this "plate" effectively determines the guiding feeling of your stroke motion in terms of orientation or squareness and speed / tempo pattern.

This neck feeling is combined with visual monitoring. When the last five inches or so of the line are clearly seen, the head turn comes to a complete rest back with the dominant eye vertically above the back dimple of the ball. The 5-inch segment points to and contacts the ball at a front dimple, and the line continues through the center of the ball and out the back through a second dimple that may or may not be the same as the one you started with. Regardless, the 5-inch line and the two dimples and center of the ball must all coincide in one line. The two dimples and center of the ball define what amounts to a thin vertical ring in the ball. This ring is what the stroke actually propels towards the hole. The stroke will deliver the center of the putterface, squarely oriented perpendicular, along this line through the back dimple, the center of the ball, out the front dimple, and down the line as seen in the 5-inch segment, rolling the "ring" of the ball straight along the line. The pacing and force of the stroke is controlled by the neck turn's extent and pacing.

The dominant eye is directed at the back dimple but the brain is "watching" several things at once: it attends to the 5-inch segment and the ring through the ball it defines, to the back dimple where contact must occur, to the putterhead's center to watch it going back and coming into the ball and down the line, and to an internal mental image of the hole as last seen while gazing fixedly at it. Most putts are missed by failing to keep the face square to the line or by failing to move the center of the putter on the line. So practice and conscious effort are given to monitor this dynamic of the stroke. Once vision's focus has clarified back at the ball, it is necessary to spot the relations described accurately right away and then initiate the stroke with a shoulder turn straight back from the ball. The timing is altogether critical, because putting is a staging and sequencing of perceptions

integrated into movement. The only swing thought is to do the job correctly so you give the putt its very best chance of going into the hole.

Benefits of the In-Plane Dead-Eye Targeting

The Dead-Eye targeting procedure has the following benefits:

- one and only one focal point in the field of vision is used, thus allowing monitoring of whether gaze shifts or head-turn axis shifts have occurred;
- the absence of gaze shifts complicating the brain's building up a sense of space relations between the body and the target;
- delivery of the line of sight accurately along the intended line to the target;
- employment of the richer cortical processes for targeting space perceptions in the process of guiding the stroke planning and execution rather than the dependent and cruder processes of targeting a moving threat;
- a movement of the chin during the head turn that is easier to replicate and monitor than one made with the forehead up;
- a better sense of the plane of the putt as a vertical plane, which is easier to repeat from putt to putt and which helps gain a sense of direction and distance in a reliable, repeating way;
- a coordination between a set position of the head and inner ear for balance that coordinates with a straight-ahead look into a visual field;
- better tracking by the inner ear of the head turn's staying in the vertical plane;
- a matching of the verticality of the plane of vision and the hanging of the arms and hands at address and the in-plane motion of the arms and hands and putterhead during a straight stroke;
- use of the targeting procedure as a specific and repeating way to check whether the body's setup is aimed square at the target;
- a "Ferris wheel" relationship between the two eyes as the head turn directs the gaze targetward, which serves as a monitoring check on whether the targeting procedure is being employed accurately and reliably;
- a differential focusing of the steady gaze during the head turn along the true line from ball to target that helps build a sense of the space between the ball and target in terms of specific textural features of the green surface;
- a head turn extent that reliably and repeatedly informs the brain accurately about distances along the ground;
- an orientation of the boundary plane between the turning head and the still shoulderframe that in effect teaches the brain how to replicate this boundary when in the stroke the head remains still and the shoulderframe turns back and then through;
- a pacing of the head turn keyed to a smooth pursuit with steady gaze of an imaginary rolling ball putted with perfect speed that teaches the brain about the ideal stroke motion using neck muscle input and visual / mental simulation of the putt;

The disadvantages are that you have to learn how to do it and get used to it and rely upon it. And if you are not physically capable of orienting your head above the ball as needed, you will have trouble reaching your full potential as a golfing athlete.

Summary

Dead-eye putting is consistent, reliable, and accurate. Use the dominant eye to sight from behind the ball. Match the plane of vision with the vertical plane of the putt by a square setup with proper orientation of head and eyes. Use a fixed straight and level gaze

without involvement of the eye muscles. Make a regular in-plane head turn at the imagined pace of the perfect putt. Use the sense of boundary between the head and shoulderframe to learn the orientation and pacing of the shoulder stroke. Dead-eye putting gives you an extremely accurate and vivid appreciation for the line of the putt as well as the distance, and this targeting sense and movements in the targeting process guide and nourish the stroke preparation and execution, making it more consistent and accurate for line and direction. This routine takes advantage of several perceptual modalities at once in a coordinated and synergetic fashion. The process is staged and designed to integrate smoothly with optimal movement biomechanics and brain processes. It works with the natural information-processing functions of the body for superior accuracy, precision, and repeatability. If you can make a straight putt (preferably with a shoulders-only pendulum stroke), the physical procedures for Dead-Eye putting can very substantially increase your putting acumen. Dead-Eye putting makes targeting and stroking a unified action for optimal accuracy and reliability.

For more tips and information on putting, including a free 10,000+ database of putting lore and the Web's only newsletter on putting (also free), visit Geoff's website at <http://puttingzone.com>, or email him directly at geoff@puttingzone.com.