



## THE GOLFER'S LITTLE HELPER

### What elements of motor learning are neglected when we use mechanical training aids?

**T**here is a TV channel devoted solely to golf. I'm not kidding. Golf tournaments, highlight shows, and instructional lessons are the main shows on the Golf Channel. Squeezed between these shows are half-hour-long infomercials for various products. Most of them drive me crazy.

The most annoying of these infomercials advertise practice aids—guidance devices specifically designed to constrain the arms, legs, hands, head, or other body parts so that the person's motions are more or less forced to conform to a certain path. These practice aids come in many forms. Some put physical restrictions on your movements—for example, by having you move the club along a string or length of plastic that constrains the motion of the golf club along some “ideal” swing path. Some aids project a beam of light that shows you the alignment of the club relative to the target. Others physically constrain the distance between the hands or arms so that a constant relationship is maintained throughout the swing. The number and variety of practice aids on the market are staggering. But don't take my word for it. Search on the phrases *golf practice aids* or *golf training aids* in your Internet browser and see what comes up.

To get an idea of how effective (or ineffective) these practice aids might be, I want you to try a little experiment. The intention here is to simulate what a golf practice aid actually does when you use it. You will need a blank sheet of paper, a piece of cardboard, a pencil, a ruler, and a pair of scissors or a utility knife. First, draw a line on the piece of cardboard that is exactly 4 inches (10 cm) in length. Then, using the scissors or knife, cut a small 4-inch-long trough out of the cardboard. The trough only needs to be wide enough to insert a pencil. Place the sheet of paper on a table and, using a pencil in the cardboard trough, draw a 4-inch line using a quick left-to-right movement on the paper. Then draw another 4-inch line. Do this eight more times. According to the logic of golf practice aids, you have just learned to make a perfect 4-inch line by making 10 flawless repetitions of your movement goal. Now, put everything away.

About an hour later, get out another blank sheet and draw 10 more 4-inch lines, but don't look at the lines you drew earlier. And this time, draw the 4-inch lines using a straightedge that does not have any markings on it that might clue you in on what length to draw the line. This is a test to see how well you have remembered what you learned earlier. After you have drawn all 10 lines, measure the length of each line and compute the mean

of the 10 new lines (see “Cutting Wood and Missing Putts” in chapter 4). Compare the mean of the lines that you just drew in this retention test to the perfect mean of 4 inches that you made during the guided trials. If you are similar to most people, the average line length is likely to be either longer or shorter than the mean of the cardboard-guided trials. And if you are like some people, that average is *considerably* different from the lines you drew in guided trials.

Drawing lines is a simple task, of course, and bears no resemblance at all to the golf swing or most of the complex actions we make in everyday activities. However, the principles involved in learning are similar. The goal of most guidance aids, especially those in golf, is to prevent the introduction of, or drastically restrict the possibility of introducing, error into the movement. Once error is eliminated, the idea (or theory) is that the person can then make many repetitions of the correct movement and, in so doing, “groove” that learned representation into the central nervous system. This idea is based on the same logic that I discussed earlier (“But I Was Great on the Practice Range!”) and is consistent with earlier theories of learning that stated that making errors resulted in learning to make errors. The logic was that, to combat the problem of learning to make errors, an activity or aid that helped someone make correct movements could be used to promote the learning of correct movements.

But that is *not* how humans learn motor skills. Based on a wealth of accumulated research in the past half-century, human motor learning theorists believe that what happens is almost the opposite: we learn from making all types of actions, both correct and incorrect. There are three key steps in the learning process: (1) make a movement plan prior to action, (2) execute the action, and then (3) evaluate the movement in relation to the original plan. The logic that underlies most guidance devices is that step 2 is the only important one. But, in fact, steps 1 and 3 are equally important, if not more so; they help us clarify what we are trying to achieve with the movement and evaluate it later using both inherent and augmented feedback (see “The Coach as a Dictionary”).

The overuse of most golf practice aids undermines both of these two key information steps for learning. First, a guidance device discourages advance movement planning because a correct movement can be achieved by simply following the guide. Second, because no movement plan was devised in advance, there is no referent against which to compare the outcome after the movement has been completed. Moreover, because errors are virtually eliminated, there is little need for evaluation anyway. A guidance device will not create an effective learning process regardless of how many repetitions are made. In fact, it is likely to be detrimental to learning because every minute you spend using the device is a minute you did not spend engaged in more effective practice (see “Zero-Sum Training” in chapter 8).

Some of these infomercials suggest that using their products will guarantee lower golf scores. Sadly, repetitive use of these practice aids simply cannot be effective, no matter what the infomercial tells you. And this advice comes to you without the three easy payments of \$29.95.

## SELF-DIRECTED LEARNING ACTIVITIES

1. Define *guidance*, in terms of motor learning, in your own words.
2. Conduct the experiment described in the story using two friends who do not anticipate the purpose of your experiment. Calculate their constant error (CE) and variable error (VE) scores (see “Cutting Wood and Missing Putts” in chapter 4). Now run the experiment again with two other friends, but this time, alternate guided and nonguided practice trials (five each). Compare the retention test CE and VE scores of the first two friends with those of the latter two.
3. Find a golf guidance device (or a guidance device used in another sport) on the Internet and critically analyze the manufacturer’s claims about its effectiveness for motor learning.
4. Design a research investigation in which you assess the effectiveness of the golf guidance device you identified in question 3. What are the appropriate control, or experimental, conditions against which you are comparing the golf guidance device, and why did you choose these particular comparison conditions?

## NOTES

- The following research study shows a typical finding of the detrimental effect of relying on a guidance aid for motor learning. The article also provides many useful references to earlier research.

Sidaway, B., Ahn, S., Boldeau, P., Griffin, S., Noyes, B., & Pelletier, K. (2008). A comparison of manual guidance and knowledge of results in the learning of a weight-bearing skill. *Journal of Neurologic Physical Therapy*, 32, 32-38.

## SUGGESTED READINGS

- Marchal Crespo, L., & Reinkensmeyer, D.J. (2008). Haptic guidance can enhance motor learning of a steering task. *Journal of Motor Behavior*, 40, 545-556.
- Schmidt, R.A., & Lee, T.D. (2011). Augmented feedback. In *Motor control and learning: A behavioral emphasis* (5th ed., pp. 393-428). Champaign, IL: Human Kinetics.