The Keypad

How do explicit and implicit memories influence skilled performance?

Do the following thought experiment without looking at your cell phone. Imagine that you are calling the phone number of a close friend. Visually imagine your fingers as you press each of the numbers on your keypad. Now, use those same numbers that you imagined dialing on your cell phone and visually imagine yourself typing them on a calculator or the numeric keypad on a computer keyboard. Did you happen to notice anything different about how you imagined pressing those numbers in the two situations? You should have noticed a rather dramatic difference. If you didn't, then take a look at figure 10.3.

The layouts of the keypads on the cell phone and the calculator are not only different; in fact, they are the reverse of each other. When I point this

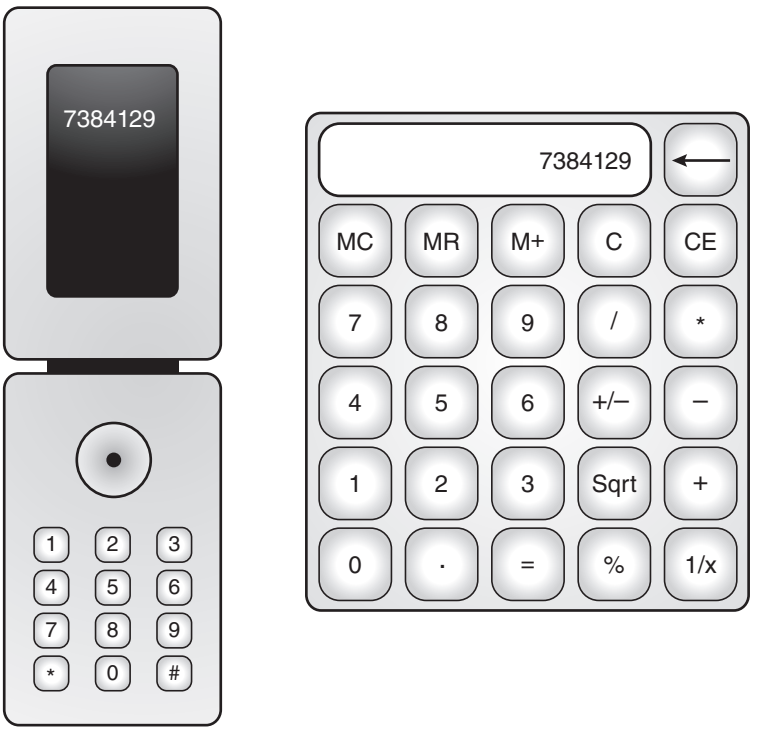

Figure 10.3 Do you notice a difference between the layout of a cell phone keypad and that of a calculator keypad?

out to students in my undergraduate classes, many are quite surprised. And yet, they are all quite proficient at using both cell phones and calculators and fluidly move back and forth between the two. So what does this suggest about how we can perform so skillfully without knowing some, fundamental features of the devices we are using? What does it say about the nature of perceptual and motor skill representation in memory in general?

One clue to an answer to these questions concerns the distinction between what researchers call explicit and implicit memory. In general, researchers use the term *explicit* to refer to features, concepts, relationships, and the like, about which you have a specific awareness that quite often you can verbalize. For example, you know the color of your bicycle and cell phone, and you may have a vivid memory of the last bike ride you took or the last phone conversation you had. These are called explicit memories because they can be recalled in rather detailed words and descriptions.

In contrast, the term *implicit* reflects a more loosely defined concept that refers to (mostly) nonverbalizable features of our actions. Implicit memories influence how we interact with the environment in ways about which we are not consciously aware, but which nevertheless influence our daily activities. Although you may recall the last phone number you dialed, you probably do not remember much about how you dialed the number or held the phone. You may recall the route you took on your last bike ride, but you likely don't remember much about the specific accelerations you applied to the bike at certain times, or the postural adjustments you made to go around corners. These implicit memories enable you to dial a phone number or lean into a curve while riding a bicycle, but often do not rise to any specific state of awareness. And yet, if it were not for these implicit memories, you would never be successful in placing a phone call or going for a ride on your bike.

In very general terms, explicit memories allow us to remember facts and details, and implicit memories enable us to do things.

The study of explicit and implicit memory suggests important features about how our brains are organized. Daniel Schacter, a neuropsychologist at Harvard University, reported a very interesting study about an amnesic patient with whom he played several rounds of golf. The patient displayed all the signs of a good implicit memory: his golfing skill was no worse than before he developed amnesia, and he displayed various behaviors on the course that were appropriate for the game of golf. In other words, he had no problem with the task of *how* to play the game. The problems that the patient encountered were associated with remembering the *what* of the game. He often forgot how many shots he had taken to complete a hole; he frequently forgot where his previous shot had landed; and on several occasions, after first hitting his ball and then waiting for Schacter to tee off, he started to tee his ball again because he had not remembered previously hitting his tee shot. The patient's amnesia seemed to be a specific impairment of explicit memory that left implicit memory relatively unaffected.

From T.D. Lee, 2011, *Motor control in everyday actions* (Champaign, IL: Human Kinetics).

Unless you are told that the calculator and cell phone keypads are opposite in their layouts, you probably have no explicit memory of their difference. And yet you have been able to not only use them, but go back and forth between the two layouts with no apparent difficulty. The absence of an explicit memory that the two keypads are different appears to have no influence at all on the implicit memory involved in using them.

Self-Directed Learning Activities

1. Define *explicit memory* and *implicit memory* in your own words.
2. Pick an activity of daily life, or a sporting activity, and provide examples of how explicit and implicit memory are used in the activity.
3. The terms *explicit* and *implicit* are sometimes interchanged with other terms in the literature (with only subtle differences in the distinction). Look up another memory dissociation scheme and briefly describe how if differs from the explicit–implicit distinction.
4. Describe a research methodology that you could use to assess whether or not the uses of a cell phone and a calculator are influenced by the specific awareness of their layout differences. Describe specifically how you would measure awareness and the nature of your performance measure.

Notes

- Explicit memory = what, implicit memory = how, and intentions = why.
- Some friends with whom I regularly play golf also have trouble remembering how many shots they had taken on a previous hole; in their case, however, I seriously doubt that amnesia is the cause.

Suggested Readings

Schacter, D.L. (1983). Amnesia observed: Remembering and forgetting in a natural environment. *Journal of Abnormal Psychology, 92,* 236-242.

From T.D. Lee, 2011, *Motor control in everyday actions* (Champaign, IL: Human Kinetics).