Chapter 2 Biological Foundations of Behavior

If you stub your left toe, cells in your right parietal lobe will “light up,” producing sensations of pain. Conversely, a blow to your right toe will register in your left parietal lobe. This is because the sensory cortex in each hemisphere is connected to sensory receptors on the opposite sides of the body. Likewise, the motor cortex in your right frontal lobe controls the movements of the left side of your body, and vice versa. Thus, if we were to stimulate your left motor cortex in a certain spot, the fingers on your right hand would involuntarily contract. As we see next, evidence indicates that the right and left hemispheres are also specialized for certain types of functions.

The Brain at Work: Lateralization and Integration

The term lateralization refers to the division of functions between the right and left hemispheres (see Concept Chart 2.5). Generally speaking, the left hemisphere in most people appears to be dominant for language abilities—speaking, reading, and writing (Blakeslee, 1996; Gazzaniga, 1999). The left hemisphere also appears to be dominant for tasks requiring logical analysis, problem solving, and mathematical computations. The right hemisphere in most people appears to be dominant for nonverbal processing, such as understanding spatial relationships (e.g., piecing together puzzles, arranging blocks to match designs, reading maps), recognizing faces, interpreting people’s gestures and facial expressions, perceiving and expressing emotion, and appreciating music and art.

Despite such differences, people are not “left-brained” or “right-brained” (Gazzaniga, 1995; Hellige, 1993). The functions of the hemispheres largely overlap, and messages rapidly zap back and forth across the corpus callosum, the bundle of nerve fibers that connects the hemispheres. In fact, though one hemisphere or the other may be dominant for a particular task, both hemispheres share the work in performing most tasks.

Language dominance is associated with handedness. For about 95 percent of right-handed people and even for about 70 percent of left-handed people, the left hemisphere is dominant for language functions (Damasio & Damasio, 1992; Pinker, 1994; Springer & Deutsch, 1993). For about 15 percent of left-handed people, the right hemisphere is dominant for language functions. The other 15 percent of left-handers show patterns of mixed dominance.

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