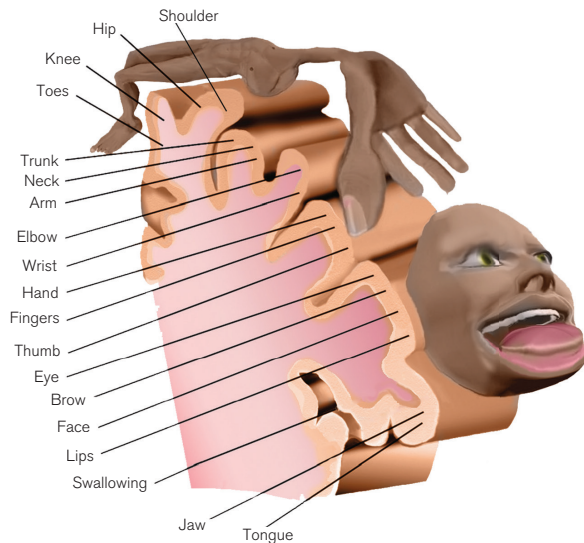


(Continued)

FIGURE 9.8 How Is Your Body Represented in Your Brain?

This figure presents Penfield's homunculus showing the representation of the body in the brain. Note that some body areas have more representation in the brain than others.

Source: From Wilder Penfield & Theodore Rasmussen, *The Cerebral Cortex of Man*. Copyright 1950, Macmillan Publishing Company; copyright renewed 1978, Theodore Rasmussen.



to as a *mirror box*. It is literally a box with a mirror that divides it in half. On each side of the mirror is a hole in the box such that a person could put a hand in each side. A person who had lost his left arm could put his right arm through the hole. Looking at the right hand and arm, the person would see both the limb and its reflection, creating the illusion of having two hands. What is amazing is that the person has the sensation of moving not only the right hand but the left one as well. The person has the experience of moving the phantom limb, and for some individuals, the pain can also be modified.

As scientists have examined phantom limb with neuroscience techniques, it turns out that our sense of our body is all in our heads—just not in the way that most people think. It is not “made up”; it is real. Wilder Penfield in the 1940s and 1950s was able to map how the body is represented in the brain (see *Figure 9.8*). What became clear is that the body is represented on a thin strip in the brain. Some areas such as the hands and lips have more brain areas devoted to them than do other body parts. However, the body's representation is not how it appears in real life. The hands—not the neck—are next to the face in the brain.

Experiences such as learning a new skill can change the connections in the brain. Losing a body part can do the same. If a person lost his middle finger, for example, then the area represented by it in the brain could be taken over by the fingers on each side of it. If the individual loses his arm, then the brain area that represents the arm can be taken over by the face. Now when the person touches his face, he not only experiences his face, but he also experiences the sensation of the arm being touched. What if someone lost his leg? As Penfield's map suggests, both males and females have reported sensations in their lost leg when they are having sex. The brain areas representing both male and female genitalia is located next to that of the toes and leg and farther from the hands. This may also help to explain why it is more common to have a foot fetish than a hand fetish.

Thought Question: If it's true that “our sense of our body is all in our heads,” how might it be possible to use video games or virtual reality to lessen or eliminate the negative effects of phantom limb?

Based on V. S. Ramachandran & Sandra Blakeslee. (1998). *Phantoms in the brain*. New York, NY: William Morrow.