What's On Your Mind?

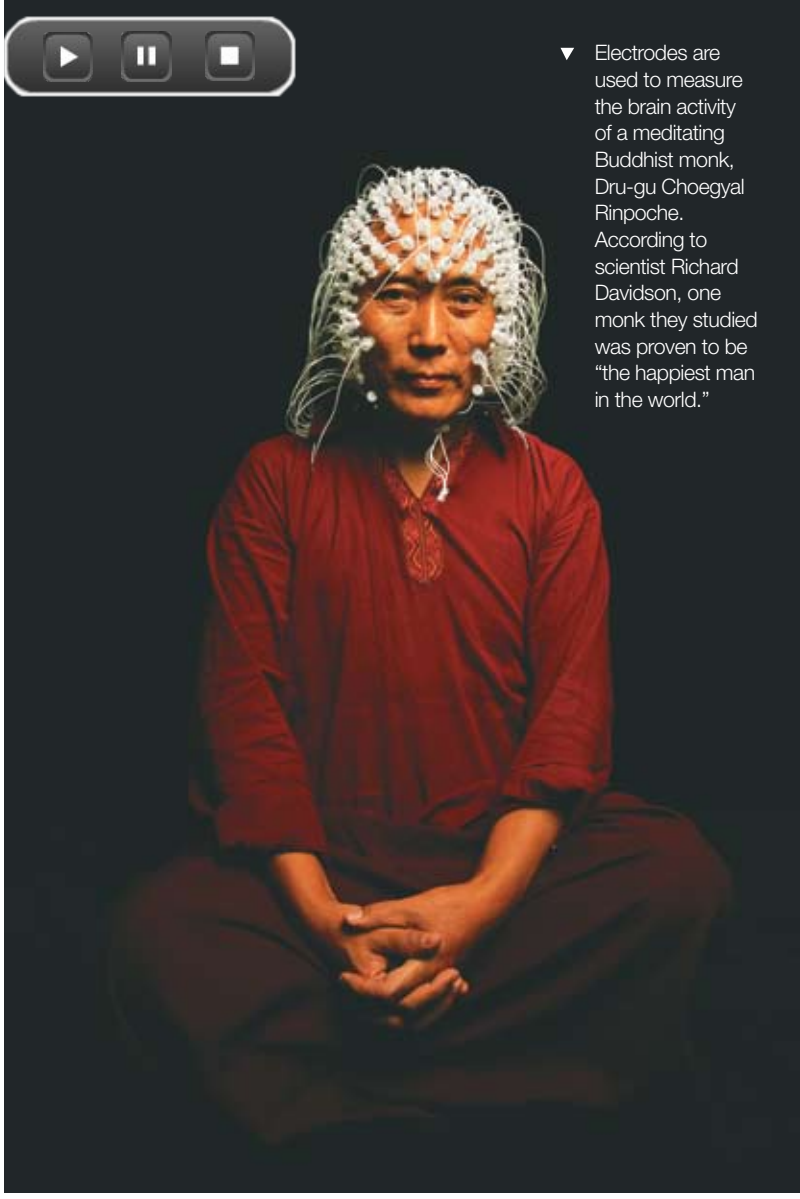
The ancient Egyptians thought so little of the brain that when a king died, they removed the brain from his body and threw it away. The Egyptians presumed, like many people before and after them, that consciousness existed in the heart.

Today we know that the mind is a product of the brain, but how exactly does this 1.5 kilo (three pound) piece of flesh create a mind which allows you to think about yourself, experience happiness and anger, or remember events that happened 20 minutes or 20 years ago? This isn't a new question. Today, however, powerful new techniques for visualizing the sources of thought, emotion, behavior, and memory are transforming the way we understand the brain and the mind it creates.

Have you ever stopped and thought, "What's wrong with me today? I just don't feel like myself"? Perhaps you were more tired or worried than usual—but somehow, you knew that something was different about *you*. This self-awareness—the ability to think about yourself and how you're feeling—is an important part of being human.

This part of your mind has its origins in the prefrontal cortex—a region of your brain just behind your forehead that extends to about your ears. Before this area began to function (around age two), you didn't understand that you were a separate entity with your own identity. In time, as this part of your brain developed, you then became more aware of yourself and your thoughts and feelings.

Perhaps one of the most important factors involved in shaping our identity is memory—the ability to retain and remember facts, faces, and experiences. What exactly is a memory? Most scientists define it as a stored pattern of connections between neurons in the brain. Every feeling you remember, every thought you think, alters the connections within the vast network of brain cells, and memories are reinforced, weakened, or newly formed.



▼ Electrodes are used to measure the brain activity of a meditating Buddhist monk, Dru-gu Choegyal Rinpoche. According to scientist Richard Davidson, one monk they studied was proven to be "the happiest man in the world."

▲ This 85-year-old man, who researchers call "EP," lives almost entirely in the present. A brain infection wiped out decades of memories, along with the capacity to create new ones.

Most people's earliest memories reach back to about age three or so. Very few people recall anything before this time because the part of the brain that helps form long-term memories (the hippocampus) was not yet mature. This doesn't mean earlier memories don't exist in your mind, though. Some scientists believe highly emotional memories—especially those associated with intense fear—might be stored in another structure in the brain (the amygdala) that may be functional at birth. Though these memories are not accessible to the conscious mind, they might still influence the way we feel and behave, even into adulthood.

But where do our emotions come from, and how do they shape the people we are and the way we perceive the world? Forty years ago, psychologist Paul Ekman demonstrated that facial expressions used to exhibit certain emotions are recognized by people everywhere. Ekman suggested that these emotions and their corresponding facial expressions evolved to help us deal quickly with situations that can affect our welfare.

Though humans may share certain emotions and recognize them in others, we don't all have the same emotional response to every situation. In fact, most emotional responses are learned and stored in our memories. The smell of freshly cut grass, for example, will generate happy feelings in someone who spent enjoyable childhood summers in the countryside, but not in someone who was forced to work long hours on a farm. Once an emotional association like this is made, it is very difficult to reverse it. "Emotion is the least flexible part of the brain," says Ekman. But we can learn to control our emotions by becoming consciously aware of their underlying causes and by not reacting automatically to things in our environment.

But is it really possible to control our emotions? Researcher Richard Davidson has demonstrated that people who experience negative emotions display activity in their

▲ Glen McNeill spends six or seven hours a day learning the streets of London in order to become a taxi driver. After his training, which will last for years, his hippocampus, the part of his brain used for memory and learning, will be larger than other adults.

right prefrontal cortex. In those with a more positive perspective, the activity occurs in the left prefrontal cortex. Could we, Davidson wondered, control this activity and shift our mental state away from negative feelings toward a calmer state of mind?

To answer this question, Davidson worked with a group of volunteers in the United States. One group received eight weeks of training using different meditation and relaxation techniques, while another group did not. By the end of the study, those who had meditated had accomplished their goal: they showed a clear shift in brain activity toward the left, "happier" frontal cortex.

For centuries people have studied the brain, but it is only in recent years that we have really started to learn how it works. Nevertheless, there is still a long way to go before we understand our minds' many complexities.