



New Theories of Depression Focus on Brain's Two Sides

By SANDRA BLAKESLEE

Two new theories of depression are rekindling interest in the once fashionable topic of how the left and right sides of the human brain interact.

At a meeting of the Society for Neuroscience last November in Los Angeles, Dr. Jack Pettigrew, a neuroscientist at the University of Queensland in Brisbane, Australia, proposed that people with manic depression have a "sticky switch" somewhere deep in their brains.

In normal people, the switch allows either the left or right hemisphere to be dominant during different mental tasks, with the two sides constantly taking turns. In people with manic depression, one hemisphere becomes locked into a dominant position in periods of depression while the other hemisphere is locked at times of mania. In a truly bizarre finding, Dr. Pettigrew reported that the placement of ice water into one ear seems to unstick the switch.

The second theory is being put forth by Dr. Frederic Schiffer, a psychiatrist at Harvard Medical School. He maintains that one hemisphere can be more immature than the other and that this imbalance leads to different mental disorders. Dr. Schiffer has designed special goggles to help people "talk" to each half of the brain separately, to learn which is less mature, and to bring the two hemispheres into harmony.

Both ideas have been well received by brain lateralization authorities eager to see a revival of their specialty.

"It's nice to see the left and right hemispheres are back," said Dr. Brenda Milner, a cognitive neuroscientist at the Montreal Neurological Institute in Quebec. The notion that the human brain has two halves and that the left side is associated with logical, analytical thinking while the right side is more intuitive, emotional and creative was popularized about 20 years ago, she said, and soon became received wisdom about how the brain works. "This idea fell from fashion not because people didn't like it but because they got interested in other things," she said.

Dr. Marcel Kinsbourne, a cognitive scientist at the New School for Social Research in New York City and early pioneer in brain lateralization studies, believes that left and right brain ideas also fell from fashion because they were oversold. People looked for universal dichotomies -- the left brain is a whiz at legal briefs but the right brain is deft at poetry -- that carried things too far. But the new theories are "intriguing," Dr. Kinsbourne said, although they have a long way to go before they can be accepted as valid. "We are in half-baked land here," he said.

The new theories are also appealing to many experts because they take on a question that has divided researchers for decades. Do people have one overarching mind that spans the two hemispheres? Or are they born with two separate minds -- one on the left and one on the right -- which operate so seamlessly that the person simply does not notice that there are two?

The subjective sense of having just one mind is overwhelming and unmistakable, said Dr. Joseph Bogen, a neurosurgeon at the University of Southern California in Los Angeles. But if the thick band of fibers connecting the two hemispheres is severed, he explained, humans seem to end up with two separate minds that show different abilities. In one dramatic disparity, the left hemisphere does all the talking while the mute right hemisphere has better access to emotions. For example, when the right brain is shown a photograph, the talkative left brain will say that it does not see anything and cannot comment. But the left hand, which is connected to the right brain, can raise a thumb up or down in response to the question, "Do you like the picture?"

These kinds of experiments led to a dichotomy of opinion among neuroscientists, Dr. Bogen said. One camp held that in splitting the brain, a single mind is cut into two but that it is abnormal to have two brains. The other camp said every person is born with two brains but because the two sides get along so well, people simply have the illusion of one mind.

After thousands of experiments carried out on normal subjects and split-brain patients, scientists still passionately disagree. But one feature has clearly emerged, said Dr. Terry Sejnowski, a neuroscientist at the Salk Institute in San Diego: Human brains show enormous variation in lateralization.

The claim that certain talents or abilities lie in one hemisphere or the other is usually based on averaging the brains of many people, he said. Because each individual brain is a complex system that evolves in response to a unique environment, many brain functions do not end up in the same place. This is further complicated by the fact that the left and right hemisphere

probably communicate through deeper pathways that are not affected in split-brain patients.

The new ideas about lateralization will not resolve the question of one versus two brains, but they do add insights and suggest new ways to treat mental patients, said Dr. Schiffer, whose research was set off by his observation that many of his patients seemed to have a kind of double personality.

"On the one hand, they are very mature and stable, but on the other hand, they can be irrational, overly emotional and compulsive," he said. "Often these two sides appear to struggle against or sabotage each other. The troubled part seems stuck in a traumatic past, whereas the other part seems more mature and in control."

Suspecting he was seeing two minds working at cross purposes, Dr. Schiffer designed a pair of goggles that forced his patients to view the world from either the left or right hemisphere separately.

Many experiments show that it is possible to stimulate one hemisphere and inhibit the other so that a person looks at the world using half a brain at a time, Dr. Schiffer explained. When people gaze to the far right and engage their left brains, they do better on verbal memory tasks, he said, and when they look far to the left, to engage the right brain, they feel more inertia and fatigue.

To test how this affects psychiatric patients, Dr. Schiffer made two types of goggles. One permits vision only in the right visual field, thus activating the left brain. The other allows a person to see objects in the left visual field, which activates the right brain. Each brain hemisphere controls the opposite side of the body.

When patients looked through goggles, they reported very definite feelings, depending on which side of the brain was being engaged, Dr. Schiffer said. Some felt negative symptoms like anxiety and sadness when the right brain was activated. Others felt bad when the left brain was engaged. In general, he said, depressed patients felt worse when the right side was stimulated and people with post-traumatic stress syndrome fared poorly when the left side was more active.

Dr. Schiffer speculates that in certain mental disorders, one hemisphere is less mature than the other. The immature side is the repository of past traumas and can come to dominate the healthy side. Thus each hemisphere has mental properties with some autonomy from the other side. Each can hold separate opinions, have a different sense of humor and carry a different perspective on the world.

Many people feel no mood difference when wearing the goggles, Dr. Schiffer said. This may be because both their hemispheres have similar outlooks, being equally calm or equally troubled.

Dr. Schiffer uses the goggles in therapy sessions to help patients recognize their two minds and to help the mature side take control over the immature side. Patients wearing goggles can actually converse with the opposite hemisphere, he said, and through talk therapy work toward recovery. The goggles do not support the idea that the right brain is poetic and the left is logical, Dr. Schiffer said. People are very different. Each hemisphere is individualistic; either one can be messed up or both sides can be in balance.

Dr. Pettigrew, who invented the sticky-switch idea of depression, also falls into the two-minds camp. He theorizes that patients cycle between bouts of mania and depression for days, weeks or months at a time.

"Because the hemispheres have different cognitive styles, I thought it doesn't make sense to have them both working at the same time," Dr. Pettigrew said in an interview at the neuroscience meeting. "So I thought there should be a switch. This would allow each side to take turns dominating."

Dr. Pettigrew said there was plenty of evidence that different parts of each hemisphere cycle back and forth, left and right, during everyday tasks. Parts of the visual cortex switch dominance every few seconds, he said, whereas parts of the frontal lobes cycle every couple hours.

To measure how fast the two sides switch dominance in a visual task, Dr. Pettigrew used a standard apparatus that measures so-called binocular rivalry. When a target of horizontal lines is shown to the right eye and vertical lines are shown to the left eye, and the targets are flashed, the brain does not fuse the lines into a hatched pattern. One side of the brain sees vertical, the other side sees horizontal and the two take turns seeing a pure target. Most people switch sides every two to three seconds, Dr. Pettigrew said. But patients with manic depression require 20 to 30 seconds to switch between the two targets.

"I think they have a sticky switch between the hemispheres," he said. If the switch is stuck, it may be possible to unstick it, Dr. Pettigrew said, by turning to a strange observation made several years ago by Italian scientists.

"If you tilt a person's head 30 degrees to the side and put ice water into one ear, the opposite brain hemisphere will become activated," he said. Thus cold water in the left ear, activating the right hemisphere, might temporarily reduce the symptoms of mania. Depression might be temporarily reduced by placing cold water in the right ear.

Ice water in the ear is a traditional neurological test that has been performed, among other things, on astronauts in space to help understand space sickness. How ice water stimulates one hemisphere is not precisely known, but it seems to activate orientation pathways in one ear (which tell people where they are in space), and these pathways are connected to mid- and higher-brain regions in the opposite side of the head, Dr. Pettigrew said. Trying the ice water in his own left ear, Dr. Pettigrew, who suffers from manic depression, said, "I sat on my couch at home for 40 hours, ruminating about my life." His left brain was stuck in the depression phase. It was, he said, an unpleasant experience.