Unraveling the mysteries of memory loss and gain

by Bill Dietrich
Times science reporter

Memory loss and recovery from a brain injury such as that suffered by Bill Zoller is not uncommon, says University of Washington psychology professor Hans Doerr. But neither is it well understood.

"I'd be up for a Nobel Prize if I could give a precise answer" to what exactly happens to victims such as the UW chemist, Doerr said.

Zoller sustained two blood clots nearly the size of pingpong balls in the frontal lobe of his brain, the area that controls recall of long- and short-term memory.

The resulting damage explains why many of his memories seem intact, but that he has had trouble accessing them.

Zoller's memory loss and recovery is dramatic, but not unprecedented. Even though the brain cannot replace destroyed cells in the way a cut muscle repairs itself, the brain does demonstrate an ability to work around injuries by growing new connective tissue.

"It's almost like re-routing telephone wires," Doerr explained.

Understanding such processes is of the most exciting areas of brain research," the psychologist said. Scientists are so excited about impending discoveries that Congress has designated the 1990s the "Decade of the Brain."

While Zoller compares his injury to the loss of a computer's hard disk directory, the brain is actually far more complex because of its ability to make complicated associations.

Robert Ornstein, author of a new book called "The Evolution of Consciousness," cites as a simple example how if you are hungry, you may recall a shopping mall as a place to eat; if cold you'll recall the same mall as a place to get a coat. Otherwise "mall" won't be recalled at all. Memory combines with need, stimulation and instinct.

Zoller's neurosurgeon, Dr. John Maxwell, explained this complexity is what is difficult to recapture. "The important thing about the brain is how its sub-regions intercorrelate," he said.

People suffering head injuries sometimes experience loss of short-term memory, long-term memory, or some combination of both, Some may lose memories associated with what they saw, others with what they have heard. It is not clear why.

Doerr cited cases in which patients have no memory retention; if a person they know walks around a corner and then reappears, they will respond to them as if meeting for the first time.

In another case a patient could recall the music and words of a nursery rhyme, but not the words alone.

While nothing cuts to the core of a person more than a brain injury, new research indicates the brain is not quite the fragile, unchanging, unrepairable machine once believed.

Doerr said scientists have learned the same memory appears to be stored in more than one place, so if lost in one part of the brain they might be recoverable in another.

Similarly, the brain has an excess of cells. According to Dr. Richard Restak in his new book, "The Brain Has a Mind of Its Own," in everyday life your brain ceils die at the rate of 50,000 to 100,000 per day, and are not replaced.

Despite this, most people feel more competent at middle age than when young because the ability to draw upon experience and make mental connections more that makes up in practical function for the loss ot neurons.

There is evidence that Zoller's conscious efforts to improve his memory, to "exercise his brain," can indeed have beneficial effects. Researchers recently reported to the American Psychological Association that children who attend school improve their tested intelligent quotient over those who do not, suggesting that education not only pumps kids full of information, but that by requiring mental exercise it makes students "smarter."

Restak's book cites a case in which a population of rats trained to run a maze produced more of a specific neurotransmitter, choline, than did a population of rats not so trained. The training appeared to improve the rats' physical brain, he writes.