

RONALD L. GRAHAM, a 57-year-old mathematician at AT&T Bell Laboratories in Murray Hill, N.J., is taking up Japanese and golf. He has learned to speak Chinese, throw a boomerang, play the piano and beat most comers at table tennis. He also juggles and does handstands.

What possesses him to master one skill after another? Graham says he wants to keep his brain active and capable of solving thorny math problems. Learning Chinese, he says, "stretches your brain in dramatically different directions." Juggling four or five balls simultaneously at three different heights "is amazingly tough mentally," he adds. It makes him concentrate every second. Graham believes the more he uses his brain, the better it will perform.

This is the "use it or lose it" concept applied to the mind. Its proponents include an increasing number of neuroscientists and psychiatrists. They believe that a mind challenged by reading, by an engrossing hobby or by work—paid or volunteer—is likely to remain vigorous and creative into old age.

Although the brain does change with age, scientists are not sure what bearing this has on the ability to think and reason. Dr. Gene Cohen, acting director of the National Institute on Aging, a federal research or-

ganization in Bethesda, Md., says it is no longer assumed that people will suffer mental deterioration as they get older. "Many changes once said to be related to aging," explains Dr. Cohen, "are now thought to be due to illness or even medications."

Until recently, researchers did not ask whether those elderly people who best retained their mental acuity did so because they were healthy or because they continually challenged themselves. That is why a study published in 1990 by Dr. John Stirling Meyer and his colleagues at Baylor College of Medicine in Houston was so unusual. It followed a group of healthy older people for four years and tried to determine whether those who allowed themselves to stagnate experienced any decline in their mental abilities.

The 83 participants were about 65 years old and employed when the study began. Researchers gave them standard neurological and psychological tests and measured blood

DOES BRAIN EXERCISE WORK?

Many experts believe the more you stretch your mind, the longer it will serve you well

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flow to their brains. All registered normal for their age.

Subsequently, a third of the participants continued to work. Another third retired but remained mentally and physically active. The rest became basically inactive after retirement. Four years later, the inactive people showed less blood flow to their brains. They also did significantly worse on I.Q. tests than the other two groups.

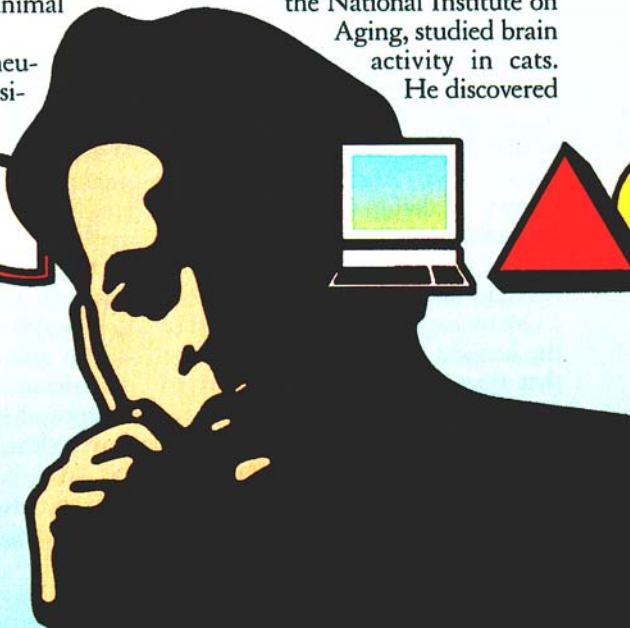
"I would definitely say this is cause and effect," says Dr. Meyer, a 69-year-old neurologist. "The only thing that varied was their level of activity."

Other similar studies are now in progress, but the results may take years to confirm. Meanwhile, the idea that people can maintain mental skills by continually using them remains controversial. It is grounded for the most part in animal experiments.

Carl W. Cotman, a neurobiologist at the Universi-

ty of California at Irvine, cites one study in which rats stimulated by treadmills and other gadgets in their cages, as well as by the company of other rats, had 26 percent more connections between their brain cells than did rats raised alone in bare cages. The rodents raised in the dull environment gained brain-cell connections when provided stimulation. Those raised in an enriched environment lost connections when stimulation was removed. The refinement and direction of connections between cells depend on stimulation, Cotman says, and "in early development, activity influences how and where connections are made. Current thinking holds that connections are being modified throughout life."

Zaven Khachaturian, associate director of the neuroscience and neuropsychology of aging program at the National Institute on Aging, studied brain activity in cats. He discovered



that when he gave the animals something to look at, not only their visual but their auditory cortex was stimulated. The brain is not strictly compartmentalized, he says, which is one reason why there are no firm data indicating whether people improve their minds more by pursuing several different activities or by performing just one type of task, like reading something challenging every day. Nonetheless, it is Khachaturian's guess that, by using different parts of the brain, people can coax nerve cells to make connections they might not otherwise make.

Researchers have established that when people are mentally engaged, biochemical changes occur in the brain that allow it to function more effectively in cognitive areas such as attention and memory. This is true regardless of age, says Herbert Weingartner, formerly with the National Institute on Aging.

People will be alert and receptive if they "are confronted with information that gets them to think about things they're interested in," Weingartner says. "And someone with a history of doing more rather than less will go into old age more cognitively intact than someone who has not had an activated mind."

Many experts are so convinced of the benefits of challenging the brain that they are putting the theory to work in their own lives. "The idea is not necessarily to learn to memorize enormous amounts of information," says James Fozard, associate

scientific director of the National Institute on Aging. "Most of us don't need that kind of skill. Such specific training is of less interest than being able to maintain mental alertness."

Fozard and others say they challenge their brains with different mental skills, both because they enjoy them and because they are betting that their range of activities will enhance the way their brains work. Fozard, 62, plays the trombone in his spare time and leads a jazz band. Khachaturian, 55, studies languages, does woodwork and repairs machines. Cotman, 52, paints landscapes and builds rock walls. "When I do that," he says, "I definitely feel sharper."

Gene Cohen suggests that people in their old age should engage in solitary mental and physical activities, such as reading and walking or swimming, as well as group activities, such as dancing or playing bridge or tennis. Cohen says that we are frequently advised to keep physically active as we age, but older people need to keep mentally active as well. Those who do are more likely to maintain their intellectual abilities and to be generally happier and better adjusted. "The point is, you need to do both," Cohen says. "Intellectual activity actually influences brain-cell health and size."

No one has to tell that to mathematician Ronald Graham. "The essence of learning is that you learn how to learn and continue learning," he says. "Once you stop learning, you start to die."