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The Surprising Power of the Aging Brain

Scientists used to think intellectual power peaked at age 40. Now they know better

By JEFFERY KLUGER

It took Barbara Hustedt Crook an awfully long time to get around to writing her first musical. She started last year, shortly before her 60th birthday. Her friend and collaborator, Robert Strozier, waited even longer; he's 65. It's not that they didn't have the creative chops for the job. The two have spent their careers writing and editing in New York City, and Crook has a background in performing, singing and piano. But creating a musical always felt just out of reach--until now.

"Somehow I have a confidence I didn't have before," says Crook. "I find that my brain makes leaps it didn't make so easily. I can hear my inner voice and trust instincts and hunches in ways I didn't used to."

And, says Strozier, they're both a lot more willing to take chances than in the past. "At a certain age," he says, "you either get older or you get younger. If you get younger, you venture out and take risks."

Risk-taking seniors making daring mental leaps? That's not the stereotype. Indeed, until quite recently most researchers believed the human brain followed a fairly predictable developmental arc. It started out protean, gained shape and intellectual muscle as it matured, and reached its peak of power and nimbleness by age 40. After that, the brain began a slow decline, clouding up little by little until, by age 60 or 70, it had lost much of its ability to retain new information and was fumbling with what it had. But that was all right because late-life crankiness had by then made us largely resistant to new ideas anyway.

That, as it turns out, is hooley. More and more, neurologists and psychologists are coming to the conclusion that the brain at midlife--a period increasingly defined as the years from 35 to 65 and even beyond--is a much more elastic, much more supple thing than anyone ever realized.

Far from slowly powering down, the brain as it ages begins bringing new cognitive systems on line and cross-indexing existing ones in ways it never did before. You may not pack so much raw data into memory as you could

when you were cramming for college finals, and your short-term memory may not be what it was, but you manage information and parse meanings that were entirely beyond you when you were younger. What's more, your temperament changes to suit those new skills, growing more comfortable with ambiguity and less susceptible to frustration or irritation. Although inflexibility, confusion and even later-life dementia are very real problems, for many people the aging process not only does not batter the brain, it actually makes it better.

"In midlife," says UCLA neurologist George Bartzokis, "you're beginning to maximize the ability to use the entirety of the information in your brain on an everyday, ongoing, second-to-second basis. Biologically, that's what wisdom is."

If your mind does indeed grow more agile as you age, one of the things that may help it do so is the amount of glue you carry around in your brain--glia (Greek for glue) being what the 19th century German anatomists called it. Only about half the mass of the brain is composed of gray matter, or nerve cells; the rest is white matter, the connecting tissue that, in a sense, glues it all together. Much of that white matter is made of conductive nerve strands, and covering each fine wire is a fatty sheath of myelin that keeps nerve signals from sputtering out or cross firing during transmission. "Myelin is what makes us human," says Bartzokis. "We have 20% to 30% more than other primates do."

Throughout our lives, fresh layers of myelin sheathing are laid down in the brain. In infants and children, who grow increasingly coordinated as they mature, the bulk of that takes place in the motor and sensory lobes. If we acquire better reasoning skills in middle age, Bartzokis long suspected, it would follow that most of the myelin added in those years would appear around the signal-transmitting axons in the higher brain regions that are the seat of sophisticated thought. Essentially, the brain spends decades upgrading itself from a dial-up Internet to a high-speed version, not fully completing the job until age 45 or so.

To test that idea, Bartzokis used magnetic resonance imaging to study the volume and distribution of white matter in 300 healthy subjects from 18 to 75 years old as well as in hundreds of older people suffering from such brain-related ills as Alzheimer's and Parkinson's diseases. As he suspected, the healthy adults had the most myelin in the frontal and temporal lobes--where big thoughts live. The quantity of sheathing reached its peak around 45 or 50, exceeding the amount in unhealthy older subjects and healthy younger ones.

"This last little bit of myelination essentially puts us online," Bartzokis says. "You may not have the same amount of information you had when you were 20, but you can use it better in everyday life."

It's not just the wiring that charges up the brain as we age, it's the way different regions start pulling together to make the whole organ work better than the sum of its parts. For all its plasticity, the brain is a specialized

machine, with specific regions handling specific operations. The greatest divergence comes between the left and the right hemispheres, which often work almost independently of each other. That is not such a bad thing because one hemisphere can be busy writing a grocery list or solving an equation while the other scans the environment and tends to other basic chores. As we age, however, the walls between the hemispheres seem to fall, with the two halves working increasingly in tandem. Neuroscientist Roberto Cabeza of Duke University dubs that the HAROLD (hemispheric asymmetry reduction in older adults) model, and judging by his work, the phenomenon is a powerful one.

Cabeza recruited a sample group of adults 65 to 95 years old who had scored high on a memory test, along with a group of lower-performing adults of the same age and a group of younger, college-age adults. He then asked them all to perform a series of tasks that called on numerous skills, including language, memory, perception and motor functions. Throughout the tasks, he conducted functional magnetic resonance imaging scans of their brains. Again and again, he found that the high-functioning older adults were using either a hemisphere different from the one the other subjects were using or both hemispheres at the same time.

Why that is so is still unclear, but Cabeza doesn't believe the brain is programmed to get stronger as it ages. Rather, he acknowledges, in many ways it gets weaker, with neurons processing information less efficiently. The bilateralization may be a trick the brain uses to compensate for the decline, sometimes integrating the hemispheres so efficiently that our thought and reasoning processes are actually better than they were before.

"It's similar to the way you need both hands to lift a weight that you could lift with one hand when you were younger," Cabeza says. "In the brain, there's a nice, natural distribution of resources. You get more neural tissue to support the task."

As the brain's flexibility improves, so too may the temperament we bring to our work. There's no question that personalities can calcify with age, causing us to become less receptive to new experiences and flat-out crabby when faced with them. But that's not the case with everyone. In fact, in many people the opposite happens.

In 1958 psychologist Ravenna Helson, now an emeritus professor at the University of California, Berkeley, began a long-term study of 142 women, all of them 21 years old, at Mills College in Oakland, Calif. She interviewed the subjects and took measures of their personalities, drives, relationship skills and the like. Then she reinterviewed them at ages 27, 43, 52 and 61 to determine how those traits changed over time. Just last year she and a graduate student, psychologist Christopher Soto, collated the data from the 123 women who stuck with the study. The results were surprising.

On the whole, they found, the women's highest scores in inductive reasoning occurred from their 40s to their early 60s. Similarly, their so-called affect optimization (the ability to highlight the better aspects of one's

personality and restrain the less attractive ones) and their affect complexity (the ability to evaluate various contradictory ideas and remain objective) did not peak until their 50s or 60s. There was also an increased tolerance for ambiguity and an improved ability to manage relationships.

The Mills sample group was hardly random, consisting principally of white women of the same age who attended the same college. Still, they were 123 different individuals, and the results were nonetheless uniform. "People generally describe personality change in middle age as a midlife crisis, with all its negative connotations," says Soto. "In the Mills women, the change was positive--a reorienting, not a crisis."

If such a change occurs, says psychologist Robert Levenson, also at U.C. Berkeley, it may be shaped in part by evolutionary forces, offering advantages for the whole species. Human beings' comparatively long life spans and extended families are very good things, but keeping big broods healthy and well behaved over the decades takes more than the energy of young parents. It takes the cool heads and wise counsel of the family graybeards too. "Evolution isn't just about reproduction," Levenson says. "When you get into your 40s and 50s, you're caretaking, looking after your children, grandchildren, even the people who work for you. There's an advantage to having a more relativistic mind."

It's that talent for reflective thinking that explains the role older adults have always played in the human culture. It's not for nothing that history's firebrands and ideologues are typically young, while its judges and peacemakers and great theologians tend to be older. Not everyone achieves the sharp thought and serene mien that can come with age. But for those who do, the later years can be the best years they have ever had.