

The Technology That Changed Your Brain

... it's not the internet

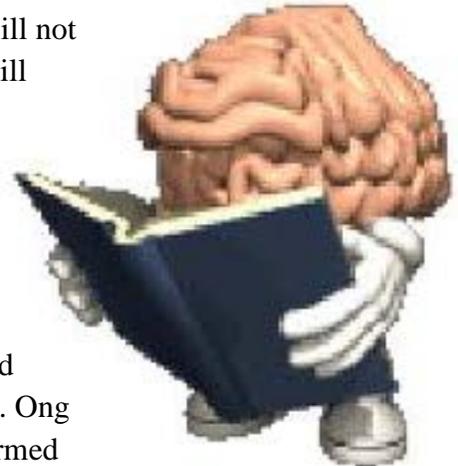
by Cheryl Laurent

A cover story in *The Atlantic* asked, “Is Google Making Us Stupid?” while a headline in *Scientific American Mind* wondered, “Are Social Networks Messing With Your Head?” ***Distracted: The Erosion of Attention and the Coming Dark Age*** by Maggie Jackson and ***The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future (Or, Don't Trust Anyone Under 30)*** by Mark Bauerlein are just two of the books (ironically available on Amazon) warning readers of the dangers lurking on the web. But what of the technology that made the internet possible? Has literacy affected your mind?

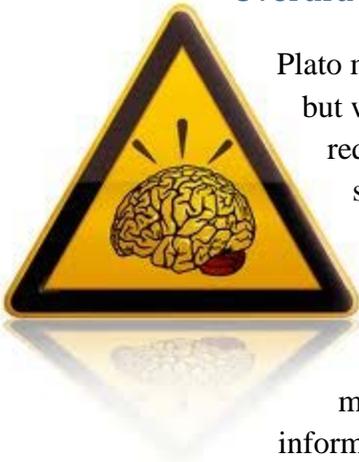


The Danger of Books

Plato warned of the terrible effects of books 2400 years ago. In the *Phaedrus*, Socrates railed against them, saying that readers, “will not use their memories . . . they will appear to be omniscient and will generally know nothing.” A hundred years after the printing press, soldier-author Barnaby Rich wrote, “One of the great diseases of this age is the multitude of books that doth so overcharge the world that it is not able to digest the abundance of idle matter that is every day hatched and brought into the world.” Put that into modern English and it sounds like the subtitle to ***Distracted***. Even modern scholars who had benefitted from books could speak ill of them. The noted scholar Walter J. Ong said, “More than any other single invention writing has transformed human consciousness,” but mourned the loss of an oral culture.” “Sight isolates, sound incorporates,” he wrote.



Overdrawn at the Memory Bank



Plato may have thought books would keep people from using their memories, but working memory is probably limited. Licensed London taxi drivers are required to memorize “the knowledge,” the layout of all the streets within a six-mile radius of the center of the city. This is a daunting task that takes years of practice. Researchers from University College London found that taxi drivers had greater gray matter volume than bus drivers (who need only memorize bus routes). The downside is that cabbies did worse on a test of trying to recall a complicated line drawing. They memorized 25,000 streets, but possibly at the cost of taking in new spatial information.

Changing the Guerilla Brain

In the 1990s, the government of Columbia wanted to reintegrate former guerrilla groups into mainstream society. One of the programs offered was literacy training. Researcher Manuel Carreiras of the Basque Center on Cognition, Brain and Language scanned the brains of ex-fighters who had been taught to read and compared the scans to those of fighters who had not yet started the program. Magnetic Resonance Imaging (MRI) showed that readers had more gray matter, the processing cells of the brain, than the non-readers. MRIs also showed that readers had more white matter, the cells that connect different areas and allow parts of the brain to “talk” to one another.

Changing the Workings of the Brain

Stanislas Dehaene of the French National Institute of Health and Medical Research ran functional MRIs (fMRIs) on literate and illiterate volunteers from Brazil and Portugal. He noticed that literacy made some non-verbal changes in how the brain processes information. Literate brains respond to the written word in the same way that illiterate brains respond to spoken words. You are reading to yourself even if your lips don’t move. Also, literacy creates biases in the brain. Literate brains react more strongly to the high contrast of black-and-white images and the horizontal line in a checkerboard pattern . A literate brain is looking for something to read.

The downside of this is that literacy may affect the way people react to one another. Among Dehaene’s findings was the fact that the brains of the literate reacted less strongly to faces than those of the illiterate, and that this effect was strongest among those who had learned to read as children. The part of the brain that deciphers words from other visual input is right next to the part that discriminates faces. Learning to read books may affect one’s ability to read people, though Dehaene describes the effect as “modest.”

Watch Your Language – Part I

Deahaene and Carreiras were working with test subjects who spoke similar alphabetic languages (Portuguese and Spanish). Their findings don't hold for over one-seventh of the world's population.

Geng Li of the University of Hong Kong, showed that native readers of Chinese process words differently than do readers of alphabetic languages. Literate Chinese brains use a lot of frontal lobe to get the job done; brains literate in English use almost none. English depends on “phonemic analysis” the ability to sound out words like C-A-T, to figure out words. Readers of Chinese use analysis visual patterns. Good thing, too. There are dozens of ways to write and read the English syllable “shi” in Chinese.



Watch Your Language –Part II

Your native language also determines how debilitating dyslexia is. In an article in The Guardian, neuroscientists Brian Butterworth and Joey Tang tell the story of Alan. Alan's parents are British, but he grew up in Japan. He is a proficient reader of Japanese, but severely dyslexic in English. Japanese is largely character-based, like Chinese, but Alan might be better off if his parents were Italian.

English has hundreds of rules and exceptions which readers must learn. “Ghoti” can be pronounced as “fish” if the three letter combinations are pronounced as in “enough,” “wOmen” and “action.” It can also be completely silent if the combinations are pronounced as in “thouGH,” “peOple,” “balleT” and “busIness.” By contrast, Italian has just 26 rules and fewer irregularities and exceptions. And only “pesce” (PESH-eh) is “fish.”

Left Out

Oh, and if you're one of the 10% of Americans who are left handed, virtually none of the research applies to you. The overwhelming majority of righties use the left side of their brain for speech and language, but southpaws may use either the left or the right side. “Only invasive, risky procedures that inject substances into arteries can determine dominant side for language with certainty,” says Virginia Berninger, a professor of educational psychology and the University of Washington. Limiting scans to right handers eliminates a lot of data “noise.” It also eliminates four of the last seven U.S. presidents.