The quest for speed has increasingly driven the course of progress. The history of technology records remarkable innovations to advance the cause of speed in communication and travel in particular. Emerging neuropharmaceutical technologies now introduce the prospect of accelerating the speed of thought.

In 1860, the fastest way to send a letter across the North American continent was to hire the Pony Express. A chain of riders on horses at a galloping 10 mph would deliver mail from the Atlantic to the Pacific coast in about ten days. The telegraph soon replaced the Pony Express, allowing messages to travel at the speed of electricity. These telegraph cables were laid out alongside the Transcontinental Railroad, which accommodated locomotives traveling at 20 mph. Today, jet aircraft couriers routinely deliver mail overnight to any city in North America. Senders take it for granted that e-mail messages dispatched from handheld cellular phones can instantaneously reach computers anywhere in the world.

In the historical lanes of motorized travel, the first self-propelled road vehicle was Nicolas Cugnot?s steam-powered military tractor, which in 1769 crept along at 2 ½ mph. In 1885, Karl Benz was the first to integrate an internal combustion gasoline engine with a chassis and manufacture for public use a practical automobile. In 1889, Gottlieb Daimler?s two-cylinder engine and four-speed transmission boosted automobile speeds to 10 mph. In the 1920s, Henry Ford?s famous Model T achieved speeds of 35 mph. Today, automobile speeds on highways are typically 55-70 mph. Formula 1 race cars may exceed speeds of 200 mph. Local service trains may travel at 90 mph and high speed trains up to 300 mph. The cruising speed of a modern commercial jet airliner is near 550 mph, while the Concorde airliner travels at supersonic speeds.
of up to 1,350 mph. The Space Shuttle travels at 17,000 mph, and to escape Earth’s gravitational pull, space vehicles exceed 36,000 mph. These feats of technology define the incrementally progressive scale of attainable speed.

What are the limits to which human intelligence can or should be hastened? The brain, in one respect, is an engine that exchanges one type of energy—carbohydrates and other forms of nutrition—for another—the neurochemical exchanges that underlie patterns of perception, thought, and expression. In another respect, the brain resembles a specific type of engine—a computer—as it processes parcels of information, lays down memory, retrieves memory, answers questions, and relays abstract ideas from one person to another. Pushing the limits of engines has yielded tremendous rewards in transportation and communication. It may be tempting to think of the brain as a vehicle to be similarly modified for enhanced performance.

A smorgasbord of pharmaceutical compounds comprising stimulants and agents that promote wakefulness or modify memory has become available for treating neurologic and psychiatric disease. Further research is likely to generate increasingly selective neuropharmaceutical agents. A number of ethicists contend that such drugs ought to be made available also for the purpose of enhancing cognitive capacity in healthy persons because of the potential benefits to individuals and to society.¹

The hope of cognitive enhancement grows out of the optimism inspired by technological progress combined with the allure of neuroscience. Whereas some other fields of investigation, such as cosmology, meteorology or geology, may rival neuroscience in the sum of data or the splendor of images, the mind cannot inhabit those realms directly. Neuroscience investigates, and some lines of neurotechnology seek to influence, the very organ of human contemplation, feeling, and biography. Herein dwell the most intimate of human thoughts.

Even a cursory survey of what neuroscience reveals about the brain gives one pause when considering whether to attempt to upgrade this enigmatic cerebral engine. The evidence is overwhelming that the human brain is astonishingly more intricate than any machine of human design. Unlike the manufactured engine, the human brain is living and conscious and part of a unique person of immeasurable dignity. Moreover, certain cerebral attributes lie beyond the reach of would-be redesigners. Rigid skulls confine the number of neurons that may be fit within the cranial vault. The human genome precisely determines the delicate balance of chemical messaging systems that interact within the complex neural architecture of the human brain. The speed of neuronal conduction is also biophysically fixed. Within peripheral nerves, the propagation of signals in myelinated motor neurons is approximately 130 mph and in unmyelinated sensory and autonomic neurons 2-5 mph. Neurons are also fragile, easily injured, and difficult if not impossible to repair.

At the heart of human nature lies a paradox. A fundamental aspect of what it means to be human is to be a limited creature. To be human is also to look beyond limitations and to reach for the stars. Fragile in form yet bold in yearning, humans are also inclined to hubris. Limitations entice ingenuity, which thrives under challenge. Each generation ventures to break existing records, whether the four minute mile or the sound barrier.²

Given the historical pattern of human achievement, attempts to extend the quest for speed to the brain itself may be inevitable. Already, off label and diverted prescriptions for cognitive enhancing
drugs are being used by students and professionals seeking a performance edge. The pursuit of faster thought through pharmaceutical or, one day, through microinterface electronic technologies may prove irresistible. If the aspiration to accelerate thought artificially is to be realized, then there is much to be learned from the parallel history of transportation safety.

When developing new technologies, planning for safety often lags the pursuit of greater performance. The early automobiles, for example, were high risk contraptions. The fuel tank of the Ford Model T was mounted just beneath the driver’s seat, so that only a thin tin frame separated ten gallons of gasoline from the driver. Before the physics of brain and spine injuries was well understood, the automobile chassis was built to be rigid. Modern vehicles, however, are designed with crumple zones and air bags which absorb kinetic injury, head restraints which limit cervical spine rebound extension, and seat belts which hold the driver to the seat. Safety standards are also established to guide road construction, including curve embankment, signs, and bridges. Rules of the road are established as well to ensure safety, including the requirement to obey stoplights, yield signs, and speed limits. The consequences of ignoring safety principles are dire. Motor vehicle accidents continue to be the leading cause of death in the U.S. between the ages of 15 and 24.

Early planning for safety is of paramount importance. Development of effective safety measures must draw from valid empirical data. There is much that is still unknown about the short- and long-term risks of drugs that boost cognitive performance, particularly in children. More research is needed into the patterns of use and life impact of cognitive enhancing drugs by healthy persons. Studies are needed to assess the form and style of accelerated thought and examine the content of knowledge gained and note what is ignored or unheeded. This research should assess not only retention of information but also understanding and character development?qualities that it would seem are unlikely to be improved through sheer chemical means. More studies are needed also to compare the incidence of anxiety, depression, headache, professional satisfaction, social fulfillment and suicide among those who use cognitive enhancers with their incidence in those who do not.

In assessing the need for safety standards to guide the use of cognitive enhancers, abundant empirical evidence already exists concerning the desires and tendencies that distinguish human nature. Several broad predictions may be offered. Some users will enter the cognitive fast lane in the pursuit of individual perfection. Others will roll down the gradient of narcissistic appetite. Still others will seek to enhance their capacity to serve others. Some will be conscientious and others careless. Enhanced knowledge intake might distract at least as often as it will elevate thought. Many things discoverable in the slow lanes of life may become blurry. Beauty may be overlooked and subtlety passed over as supercharged minds whiz by.

Exhilarating mental speed will occasionally collide with other mental pursuits. The crashes of racing thoughts may be expected to produce posttraumatic sequellae. A future sociology might adopt such metaphorical terms as cultural concussion, emotional whiplash, or existential hemorrhage. Caring for such casualties will challenge the healing talents even of cognitively augmented professionals. Dedicated effort will be needed to develop safety measures and ethical rules to minimize such personal and societal harms.

In a possible future in which cognitive enhancement technology is pressed to the extreme, those
who choose to remain unenhanced may feel as cyclists on a bustling superhighway. Chasing after unlimited cognitive enhancement narrowly defined may place sanity itself at risk. In the words of the poet John Dryden, ?Great wits are sure to madness near allied.?\(^6\) The not yet counter-cultural methods of study, discipline and training remain tried and true, if not safer and surer, ways of enhancing cognitive performance.

Pony Express riders initially traveled with a pouch containing water, a Bible, and a revolver. For the sake of speed, the Pony Express later lightened the rider?s pouch by removing the Bible. The pursuit of ever faster thought risks attaining short-term gains at the expense of leaving wisdom behind. The race may not be to the swift after all.\(^7\)

**Endnotes**


2 The first man known to run a mile in less than four minutes was Sir Roger Bannister in 1954. Sir Roger subsequently became a neurologist at Oxford University specializing in disorders of the autonomic nervous system. This author was honored to have dinner with him in 2005.


5 Days before this essay was written, the author?s teenage son was injured by a car that sped through a red light. As a helpless father?s thoughts spin out, the meaning of loss and the redemption of suffering are painfully grey matters.

6 Dryden J. *Absalom and Achitophel*, Part 1, line163, 1681.

7 *Ecclesiastes* 9:11.

*The views expressed herein are his own and do not necessarily reflect the positions of Mayo Clinic, USA.* This article originally appeared in *Ethics & Medicine: An International Journal of Bioethics* Vol 25 No. 2 (Summer 2009) and is used by permission.

**Podcast Episode:**

122

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 United States License.

**Source URL (modified on 11/07/2018 - 16:12):** https://cbhd.org/content/accelerated-thought-fast-lane