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Big Brain, Little Smarts: Brain Size and Intelligence

In Kurt Vonnegut's novel *Galapagos*, big-brained humans blow up the world with nuclear weapons. The only survivors are cruise-ship passengers shipwrecked on one of the Galápagos Islands of Darwin fame. Survival of the fittest plays out on the island, with those able to catch fish better suited to eat, live, mate, and pass on their genetic information. Smart people—the kind who can build weapons that destroy the world—are at a disadvantage on the island because all they know how to do is argue. They soon die. The dumb people, over the course of millions of years, evolve into dumber, penguinlike creatures skilled at catching fish. Vonnegut clearly doesn't have much respect for those with big brains. By "big brain," of course, he means the so-called smart person—creative liberty from a great author who knows deep down that human brain size has nothing to do with intelligence.

Assuming you could measure smartness (which we can't), and assuming you could measure brain size by measuring the outside of the head (which we can't), you'd still be wrong to assume that people with bigger heads are smarter. There have been geniuses with tiny brains and idiots with huge ones. Women have smaller brains than men, on average. Smaller people, particularly midgets, often have smaller brains. Unless you are prepared to defend the stance that women and short people are dumber, you'd be wise to drop the "big brain = big smarts" argument.

If the brain were a muscle, you'd be right in assuming that a bigger brain means more mental strength. Yet the brain is far more complicated than a muscle. The brain is a fluid-rich, spongelike tissue containing ten billion nerve endings controlling every thought and movement we undertake. The notion that a big brain equals big intelligence goes back several hundred years, yet it was in ancient times that humans first began to identify the brain as the organ that controls thought. The concept wasn't so straightforward. Imagine yourself with no medical instruments. How can you tell that the brain—which you see when you slaughter an animal—is responsible for thought in humans? Aristotle, a noted smart guy, thought the brain was a radiator that cooled the blood. The center of thought was the heart, according to Aristotle. This was around 350 b.c.e. Around 150 c.e., Galen, famed doctor to the Roman gladiators, began to notice that violent head injuries from ridiculously gory gladiator games led to neurological disorders. He suggested that the brain might harbor thought, a concept met with giggles.

Barbarians of all brain sizes sacked Rome late in the fifth century, and serious thought went underground for a while. The philosopher René Descartes revisited the brain in the seventeenth century. Descartes, of “I think, therefore I am” fame, suggested that mental activity took place in the soul and transmitted itself to the brain, which served as a transceiver of thought. He was quite adamant that the brain was just a relay and not the location of mental activity. A few hundred years later, phrenology suddenly became the rage. Phrenology is the study of head shapes to determine intelligence and personality. Phrenologists from Europe were the first group to subscribe to the idea that smart people have big brains and that other races were dumber because of their supposedly smaller heads.

Mind you, no group of people have smaller heads than others. In his book *The Mismeasures of Man*, the Harvard geologist and noted evolutionist Stephen Jay Gould reviewed data from centuries past to show that head measurements across races are more or less the same. Often, inaccuracies in measurements were a result of either foolishness or fraud, two fixtures of bad medicine that are



Size doesn't matter; it's how you use it that counts. *Courtesy of the National Institute of Neurological Disorders and Stroke*

difficult to discriminate. In one experiment from the nineteenth century, two skulls—one from an Englishman and the other from an African—were filled with gravel. The Victorian scientists packed gravel into the English skull and loosely filled the African skull, apparently demonstrating that English skulls hold more gravel and, therefore, larger brains. At any rate, the experiment said a thing or two about who had rocks in their heads.

Today, white supremacist groups and eugenicists—those who seek selective mating to produce superior offspring—use poor Gould's chart of brain sizes to show that they really do vary by race. (And again, even if they did—which they don't—this has nothing to do with intelligence.) The charts in Gould's book show that northern Asians have the largest brains, followed closely by Europeans. Native Americans and southern Asians have smaller brains. Ancient Europeans had even smaller brains, and modern Africans have the smallest. The problem here is the sampling. The size differences are small: 87 cubic inches for modern Europeans versus 83 cubic inches for modern Africans—although eugenicists argue this is the difference of millions of precious brain neurons. That may be true, but other samples of brain sizes show Africans

having larger brains than Europeans. It all depends on your sample population, and early headhunters collected the heads that best supported their arguments of Caucasian superiority. Phrenology was in full swing. Americans and Europeans alike used this pseudoscience as justification for the slave trade and the killing of native peoples in the Americas and Australia.

But what of big brains? Women have smaller brains compared to men. Are they dumber? Easy now. The average brain size is about 3 pounds or 1,400 grams. The brain of the French writer Anatole France was only 2.24 pounds, well below average. Lord Byron's brain was nearly twice this amount, over four pounds. These two geniuses with vastly different brain sizes lived roughly in the same era. Albert Einstein had an average-sized brain, most likely the same size as yours and mine. You can't even compare humans to other animals. Dolphins have about the same size brain as humans. Elephants' brains are five times bigger. Whale brains are bigger yet. If you compare the ratio of brain mass to body mass, the rat is the winner. Maybe rats *are* smarter. You try navigating the New York subway in the dark.

This all comes down to what is unique about the human brain. Whales and elephants need huge brains not to think but to move. Most of the whale's enormous brain, up to ten times bigger than a human brain, is devoted to moving its massive fins and sensing feeling along its massive body.

The human brain is unique in that it has a highly developed section called the cerebral cortex, which is located in the frontal lobe of the brain. The cerebral cortex is essential for processing thought and language. Early humanoids had a less developed cerebral cortex and therefore could not attain what we commonly call conscious experience. The same can be said for modern apes and dolphins. An ape's brain could get bigger, but unless the cerebral cortex develops in a certain way, the ape will never achieve "thought." The cerebral cortex is merely one section of the brain. A dog's brain has a larger section devoted to smell, and therefore dogs can detect and remember smells better than humans, regardless of brain size. Dogs went one way, humans went another.

Scientists are far from understanding what constitutes the "mind"—that combination of skills responsible for decision making,

emotion, perception, imagination, and self-awareness. Conscious experience does not arise from one neuron, nor is it confined to the cerebral cortex. The “mind” seems to be a neural network, a hardwiring of brain nerve cells with each cell connected to fifty thousand of its neighbors. Smarter people—creative, scientific, or physically skilled—make better use of the human brain through networking. Size doesn’t matter, but how one relays nerve impulses around the brain does. Drug addicts and alcoholics hinder their ability to think by damaging neural networks. A connection is broken, and a skill or memory is lost. Likewise, neurological disorders such as Alzheimer’s disease involve broken networks.

The brain of a child is primed for hardwiring, yet humans can generate neural connections throughout life. Taxi drivers in London, for example, develop over the course of many years a larger hippocampus, the section of the brain responsible for navigating and remembering directions. This well-circulated finding, conducted on about two dozen taxi drivers, sure gave cabbies a big head. The study confirmed the theory that certain types of thought lead to greater development of a particular part of the brain. With this development come more neurons, more capillaries, more blood, and, yes, more mass—in the case of the taxi drivers, a good milligram or two in a 1,400-gram (1,400,000 mg) brain. Inactivity in other parts of the brain leads to shrinkage. Overall, though, the brain doesn’t gain much mass by “thinking hard.”

Some of us are born with a brain better designed for certain types of thought. The brain is like farmland. True geniuses—which are few and far between—are often those people with one section of the brain that is more fertile than others. Einstein, for example, had a larger inferior parietal region, the part of the brain responsible for mathematical thought and the ability to visualize movement in space. This section was 15 percent wider, perhaps at the cost of making another section smaller (possibly the hair-combing section). Also, Einstein’s brain lacked a groove called the sulcus that normally runs through this part of this brain. This absence may have allowed the neurons on either side to communicate more easily.

The bottom line is that Einstein’s brain was just different, not larger. If eugenicists had their way, they would not “breed” other Einsteins, because Einstein had an average-sized brain. By

selectively choosing big brains and big brains only, you would miss the brain of an Einstein, of an Anatole France, and of the countless great artists, musicians, thinkers, comedians, and hard-working ordinary folks with average-sized brains or smaller.

Evolutionists have no problem accepting the fact that brain size doesn't matter. We say that humans became humans as their brains got bigger, but this is only partially true. Yes, early humanoids had smaller brains. As the prehuman developed, it grew larger but, more importantly, progressed in such a way that allowed for thought—separating humans from every other animal. Whale brains got bigger and bigger, too, as whales got bigger. Whales didn't necessarily become smarter because of it.

The human brain, by the way, isn't getting any bigger, nor are humans getting innately smarter. We are no smarter than the cave-men, those clever souls who domesticated fire and figured out that grain makes bread. Admit it. It took ingenuity to melt certain rocks into copper, bronze, and iron. A caveman alive today, socialized as a modern human, would be just as smart or dumb as the rest of us, depending on your perspective.

Humans will get smarter in terms of learning new things, despite the potential for permanent stupidity from watching television. Humans will build upon the knowledge of preceding generations. We will understand new physics and create technologies beyond our comprehension today. We may very well master deep-space travel and discover new dimensions and forces in the universe. Our brains will stay the same size, though. The notion of a future human with an enormous head to house an enormous brain is pure fantasy. Evolution simply doesn't favor larger heads over small heads. Evolution doesn't even favor smart people over dumb people. Dumb people mate with stellar success. For humans to develop bigger heads, we would have to kill off people with small heads and only mate with large-headed people. Of the offspring, only the largest of the large heads could mate. Then, over tens of thousands of years, assuming this ridiculous practice of big-head mating continued, humans would have larger heads. What we would gain is uncertain. Baseball caps would need to stretch; this much is sure.