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ON THE BORDER

Info & insights from the interface between energy healing & science

February 2016

Welcome to the February 2016 edition of 'On the Border'..

With Valentine's Day looming this Sunday the shops seem to be full of all things red, be it hearts, flowers or fluffy toys. With the Valentine's energy in the air, then the question On the Border is posing this month is 'Does size matter?' But not like you may be thinking.... ;=)

For those of you new to 'On the Border', this is Jayne's monthly Ezine newsletter about the latest information and insights into energy fields, healing and science. Each month I share with you some of the latest research and how it applies to healing, energy work & (daily) life. There is also a Fascinating Facts section and a 'Freebie' where you get something for nothing, gratis.

Does Size Matter?

Now that I have your attention, then I may be about to disappoint you.
We are going to be considering whether the size of Woody Allen's second favourite organ really matters....The Brain.
Does a bigger brain make you necessarily smarter or wiser?

Adjectives such as "highbrow" and "lowbrow" have their origin in the belief, much expounded by 19th-century brain researchers, of a close correspondence between a high forehead—that is, a big brain—and intelligence. Is this true?

Bigger is slightly better

The human brain continues to grow until it reaches its peak size in the third to fourth decade of life. An MRI study of 46 adults of mainly European descent found that the average male had a brain volume of 1,274 cm^3 and that the average female brain measured 1,131 cm^3. Of course, there is considerable variability in brain volume, ranging from 1,053 to 1,499 cm^3 in men and between 975 and 1,398 cm^3 in women. As the density of brain matter is just a little bit above that of water plus some salts, the average male brain weighs about 1,325 grams, close to the proverbial three pounds often cited in American texts.

Removing brains after their owners died revealed that Russian novelist Ivan Turgenev's brain broke the two-kilogram barrier, coming in at 2,021 grams,

whereas writer Anatole France's brain could barely bring half of that weight on the scale at 1,017 grams. (Note that postmortem measures are not directly comparable to data obtained from living brains.) In other words, gross brain size varies considerably across healthy adults.

What about cleverness? We all know from our day-to-day interactions that some people just don't get it and take a long time to understand a new concept; others have great mental powers. Individuals differ in their ability to understand new ideas, to adapt to new environments, to learn from experience, to think abstractly, to plan and to reason. Psychologists have sought to capture these differences in mental capacities via a number of closely related concepts such as general intelligence (g, or general cognitive ability) and fluid and crystalline intelligence. These differences in people's ability to figure things out on the spot and to retain and apply insights that they learned in the past to current circumstances are assessed by psychometric intelligence tests. These observations are reliable, in that different tests strongly correlate with one another. They are also stable across decades. That is, measures such as the intelligence quotient (IQ) can be repeatedly and reliably obtained from the same subjects nearly 70 years later.

Differences in general intelligence, assessed in this way, correlate with success in life, with social mobility and job performance, with health and with life span. In a study of one million Swedish men, an increase in IQ by one standard deviation, a measure of variability, was associated with an amazing 32 percent reduction in mortality. Smarter people do better in life. Whereas a high IQ may not predispose people to be happy or to understand the finer points of personal relationships, the highly intelligent are more likely to be found among hedge-fund managers than among supermarket checkout clerks.

What about any numerical relation between brain size and intelligence? Such correlations were difficult to establish in the past when only pathologists had access to skulls and their content. With structural MRI imaging of brain anatomy, such measurements are now routine. In healthy volunteers, total brain volume weakly correlates with intelligence, with a correlation value between 0.3 and 0.4 out of a possible 1.0. In other words, brain size accounts for between 9 and 16 percent of the overall variability in general intelligence. Functional scans, used to look for brain areas linked to particular mental activities, reveal that the parietal, temporal and frontal regions of the cortex, along with the thickness of these regions, correlate with intelligence but, again, only modestly so. Thus, on average, a bigger brain is associated with somewhat higher intelligence. Whether a big brain causes high intelligence or, more likely, whether both are caused by other factors remains unknown.

Recent experiments take into account the particular connections among neurons in certain regions of an individual's brain, much like a neural fingerprint. They do better at predicting fluid intelligence (the capacity to solve problems in novel situations, to find and match patterns, to reason independently of specific domains of knowledge), explaining about 25 percent of the variance in this measure from one person to the next.

Our ignorance when it comes to how intelligence arises from the brain is accentuated by several further observations. As alluded to earlier, the adult male's brain is 150 grams heavier than the female's organ. In the neocortex, the part of the forebrain responsible for perception, memory, language and reasoning, this disparity translates to 23 billion neurons for men versus 19 billion for women. As no difference exists in the average IQ between the two genders, why is there a difference in the basic number of switching elements?

It is also well established that the cranial capacity of Homo neanderthalensis, the proverbial caveman, was 150 to 200 cm3 bigger than that of modern humans. Yet despite their larger brain, Neandertals became extinct between 35,000 and 40,000 years ago, when Homo sapiens shared their European environment. What's the point of having big brains if your small-brained cousins outcompete you?

Brain size across species

Our lack of understanding of the multiplicity of causes that contribute to intelligence becomes even more apparent when looking outside the genus Homo. Many animals are capable of sophisticated behaviours, including sensory discrimination, learning, decision making, planning and highly adaptive social behaviours.

Consider honeybees. They can recognise faces, communicate the location and quality of food sources to their sisters via the waggle dance, and navigate complex mazes with the help of cues they store in short-term memory. And a scent blown into a hive can trigger a return to the site where the bees previously encountered this odour, a type of associative memory that guides them back and that was made famous by Marcel Proust in his Remembrance of Things Past (À la Recherche du Temps Perdu). The insect does all of this with fewer than one million neurons that weigh around one thousandth of a gram, less than one millionth the size of the human brain. Yet are we really a million times smarter? Certainly not if I look at how well we govern ourselves.

The prevailing rule of thumb holds that the bigger the animal, the bigger its brain. After all, a bigger creature has more skin that has to be innervated and more muscles to control and requires a larger brain to service its body. Thus, it makes sense to control for overall size when studying brain magnitude. By this measure, humans have a relative brain-to-body mass of about 2 percent. What about the big mammals—elephants, dolphins and whales? Their brains far outweigh those of puny humans, up to 10 kilograms for some whales. Given their body mass, ranging from 7,000 kg (for male African elephants) up to 180,000 kg (for the blue whale), their brain-to-body ratio is under a tenth of a percent. Our brains are far bigger relative to our size than those of these creatures. Smugness is not in store, though. We are outclassed by shrews, molelike mammals, whose brain takes up about 10 percent of their entire body mass. Even some birds beat us on this measure. Hmm.

One small consolation is an invention of neuroanatomists called the encephalization quotient (EQ). It is the ratio of the mass of the brain of the species under investigation relative to a standard brain belonging to the same taxonomic group. Thus, if we consider all mammals and compare them against the cat as a reference animal (which therefore has an EQ of 1), people come out on top with an EQ of 7.5. Stated differently, the human brain is 7.5 times bigger than the brain of a typical mammal weighing as much as we do. Apes and monkeys come in at or below five, as do dolphins and other cetaceans. We finally made it to the top, validating our ineradicable belief in humanity's exceptionalism.

Yet it is not quite clear what all this means in terms of the cellular constituents of brains. Neuroscientists always assumed that humans have more nerve cells where it counts, in the neocortex, than any other species on the planet, no matter the size of their brain.

A 2014 study of 10 long-finned pilot whales from the Faeroe Islands plays havoc with this hypothesis. Caught as part of a local hunt in the cold waters of the North Atlantic, between Scotland and Iceland, these graceful mammals—also known as blackfish—are actually dolphins. The number of nerve cells making up their highly convolved neocortex was estimated in a few sample slices and then extrapolated to the entire structure. The total came to an astonishing 37.2 billion neurons. Astonishing because this implies that the long-finned pilot whale has about twice as many neocortical neurons as humans do!

If what matters for cognitive performance is the number of neocortical neurons, these dolphins should be smarter than all other extant creatures, including us. Whereas the highly playful and social dolphins exhibit a variety of skills, including the ability to recognize themselves in a mirror, they do not possess language or any readily discernible powers of abstraction that stand out from those of other nonhuman animals. So what gives? Is the complexity of the nerve cells themselves substantially less than cells found in people, or is the way these neurons communicate or learn less sophisticated? We don't know.

People forever ask for the single thing that distinguishes humans from all other animals, on the supposition that this one magical property would explain our evolutionary success—the reason we can build vast cities, put people on the moon, write Anna Karenina and compose Eroica. For a while it was assumed that the secret ingredient in the human brain could be a particular type of neuron, so-called spindle or von Economo neurons, after Baron Constantin von Economo (1876–1931).

But we now know that not only great apes but also whales, dolphins and elephants have these neurons in their frontal cortex. So it's not brain size, relative brain size or absolute number of neurons that distinguishes us. Perhaps our wiring has become more streamlined, our metabolism more efficient, our synapses more sophisticated.

As Charles Darwin surmised, it is very likely a combination of a great many different factors that jointly, over the gradual course of evolution, made us distinct from other species. We are unique, but so is every other species, each in its own way.

References:
The Evolution of the Brain, the Human Nature of Cortical Circuits, and Intellectual Creativity. Javier DeFelipe in *Frontiers in Neuroanatomy*, Vol. 5, Article No. 29. Published online May 16, 2011.

Quantitative Relationships in Delphinid Neocortex. Heidi S. Mortensen et al. in *Frontiers in Neuroanatomy*, Vol. 8, Article No. 132. Published online November 26, 2014.

Self-Healing Circles

The next Self-Healing Circles are planned for:

Wednesday 10th February (that's tomorrow!) **15-16h** and
Monday 29th February 15-16h

Remember that the Self-Healing Circles are not only for times when you have a problem or are ill. They can be used to deepen "good" feelings or to ground the aspects of your life that are working in alignment with your soul's purpose and longing for this life.
You can take part in person or at distance (via Skype).

For all the dates and the full information about our Self-Healing Circles see http://www.theself-healingworks.com

Fascinating Facts

Computer programmers do have a sense of humour!
Try typing the following words or phrases into your Google search function and see what happens….The first one is good for Valentine's Day ;=)
nr1. sqrt(cos(x))*cos(300x)+sqrt(abs(x))-0.7)*(4-x*x)^0.01, sqrt(6-x^2), -sqrt(6-x^2) from -4.5 to 4.5
nr2. askew
nr3. the answer to life, the universe and everything
nr4. anagram
nr5. http://elgoog.im/doabarrelroll/

February Freebie

In this section you get the chance to get something for nothing. Helemaal gratis. Always a pleasure!

To keep in line with the Valentine's theme, and available only for another 2 days, an insightful talk about relationships:

- Tune into the energies generated by your body, mind, and spirit and use them to feed your love
- Stop an argument in its tracks with techniques that will instantly shift the energies between you
- Turn your differences into opportunities for deeper connection and recovering passion.

The Energies of Love: Nourishing Heart & Soul

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