

The Braindoc's Blog

REFLECTIONS: MIND, BRAIN, SPIRIT

Gender Minds

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(<https://braindoc.files.wordpress.com/2014/07/argue.jpg>).

My wife and I are united in purpose, convictions and moral character. We share values which are regarded as essential. We love each other and grow in our love for each other. Though united in common points, we are clearly different people. Her capacity to multitask, her broad social connections, her depth of emotional investment are clearly not built into my design. I am unable to handle more than one tasks at a given time. Though happy in the community of friends, I often prefer seclusion and research in a corner somewhere. I am more apt to lean on logic and determine a clear course of action than rehash emotional dialogue, and try to forecast how my actions may stir emotional turbulence. I have a son and daughter under in their early teens. After school I ask, "how was your day?" . My son will just say, "fine". The rest of the ten minute ride home, my daughter will give me a moment by moment narrative, including emotional tones , appearance of her involved friends that day; detailing every sequential step with her relationships. I love them both. But, I have to admit, it is much easier on my concentration to accept "fine" than to labor with my focus on elaborative reenactments. I would not change either one, and I know these are rare and prized moments I will cherish. But this vast difference between their modality of life is more than just personality. It is more about their gender design. One prominent theory states that testosterone, the male hormone is produced at a critical period of a boy's development, shrinks the bundle of nerve fibers that ties the right and left brain hemispheres together. This narrowing results in males becoming more left hemisphere logic dominant in cognition. While females evolve into whole brain cognition, laden with emotional content prominence. The woman's intuition (whole brain summation) is accredited to this wiring design. This leads to a challenging dialogue with their male counterparts asking, "...but tell me why you don't like John Smith (give me a logical reason)? The spouse replies "I can not explain it, but I do not trust him (whole brain summation)". Often, the suspicious woman will be found more accurate than what reason could provide. I have often shared with couples in counseling that we (males) are just half brained, Many marriages could avoid erosion if it could be understood up front that the design differences and not willful acts are behind the actions we display.

Here are some articles on this topic. Enjoy!

Greg E. Williams, MD

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Sex Differences

[The Nervous System \(http://www.gender.org.uk/about/07neur/72_nvsys.htm\)](http://www.gender.org.uk/about/07neur/72_nvsys.htm) [Nerves. \(http://www.gender.org.uk/about/07neur/73_nerve.htm\)](http://www.gender.org.uk/about/07neur/73_nerve.htm) [The Brain \(http://www.gender.org.uk/about/07neur/74_brain.htm\)](http://www.gender.org.uk/about/07neur/74_brain.htm) [The Cerebral Cortex \(http://www.gender.org.uk/about/07neur/75_cortex.htm\)](http://www.gender.org.uk/about/07neur/75_cortex.htm) [Theories About Thinking \(http://www.gender.org.uk/about/07neur/76_think.htm\)](http://www.gender.org.uk/about/07neur/76_think.htm) Sex Differences

Corpus callosum.

The corpus callosum itself has attracted the attention of biologists searching for sex differences. It will be remembered that it was surgery to sever it that drew attention to the differing organisation of the two sides of the cortex.

There is a great deal of dispute about whether there are reliable average differences between the sexes. Originally, it was claimed that it was larger overall in women, relative to brain size. Later the claim was that the posterior portion, the splenium was larger.

Fausto-Stirling(1,2) is extremely critical of studies in this area. Since 1982 there have been at least seventeen papers published. Since no two approach the problem in the same way, she suggests that none of them corroborate each other. What does appear is that there are changes with age, yet only one of the studies used age-matched subjects. Also, if there any sex differences at all, they show up after birth, possibly not until after adolescence.

Considering the millions of axons which must traverse this region, there is no total picture of their path. Larger nerve bundles can be traced leading to the front and back but, though a reasonable general rule is for them to take the shortest path, this is by no means inflexible..

The result of differences in the corpus callosum are said to result in a greater relative fluency of thought and speech. Reminding ourselves that no-one has actually counted the number of axons, nor traced their connections, we are told that this results in greater communication between the cerebral hemispheres of

women. It is suggested that women's greater sensitivity to emotional, non verbal communication, even their intuition, comes from the greater connectivity in their minds. A man is more purpose orientated. Emotions are kept on the right side of his brain, which, being less connected to the left, mean that he can, less easily, express emotions. Clearly, biological effects are not the whole story, for men are expected to be relatively unemotional.

There is another structure that connects between the cerebral hemispheres, the anterior commissure. It communicates visual, olfactory and auditory information and is larger in women than men. Allen has demonstrated that it is also larger in homosexual men.

Size isn't everything.

A myth that surfaces, from time to time, is one from the nineteenth century that purported to show that women have smaller brains than men. It had been put forward in the nineteenth century in an effort to prove that women (and black people) were inferior. The authors of that time had not taken account of the fact that women are, or were, in general smaller overall than men. Even then it was pointed out that there was such a wide variation, an enormous sample size would needed to show a significant difference.

Was it, then, true? And why did it matter? Fausto-Sterling answers the first question fairly effectively. "*the average male/female difference in brain weight for all ages is 9.8%. when charted as a function of either height or weight, however, the difference in adults virtually disappeared.*" This from a study of over four thousand subjects.(3)

What matters is the complexity of the cortex. If overall size was all that mattered, elephants would have a considerable intellect. The human cerebral cortex contains some ten to fifteen thousand million neurons, with four times as many glial cells, and one million billion synaptic connections. Spread out, the total surface area would cover about three quarters of a square metre.

Sex and lateralisation.

Where the gender debate first arose, was from claims about differences between men and women in the way they use the two halves of the cortex.

The original hypothesis was that men used their logical left side while women used the emotional irrational right side. However, the argument soon arose that, if language was a function of the left side, how was it that women were better at expressing themselves verbally?

This is rather a simplistic view of the controversy, however, the theory was modified to suggest men have greater lateralisation, that their abilities are more compartmentalised, while, in women utilisation of the two halves is more diffuse.

From the sixties onward, Landsell was working with people who had damage to one side of the cortex or the other. The knowledge of the time indicated that damage to the left hemisphere should lead to deficits in verbal tasks, while right-side damage should produce deficits in visuospatial tasks. This proved

particularly true for men, but the prediction was not borne out well for women. It led him to speculate that the abilities of the two hemispheres overlapped to an extent.

Electroencephalogram measurements have also shown a difference. When given abstract problems to work out, men showed a great deal of activity in the right side of their brain, while for women the activity was more generalised to both sides. Similar studies with teenage boys and girls gave similar results.

With women who had Turner's syndrome, which comes about because they have only one X chromosome, XO, and are considered to behave in a very feminine manner, this diffusion of organisation was particularly marked. The phenomenon has also been found in men whose exposure to androgens in the womb was reduced.

Workers following hormonal hypotheses have found that in rats given testosterone at birth, the females developed a larger corpus callosum. Others have found that male rats showed a thicker right hemisphere, except when they were very old. One developmental theory is that high levels of prenatal testosterone slow neuron growth in left hemisphere.

However, Shute(4) analysed blood samples from groups of males and females whose hormones were within the normal range. For spatial tests, females with high androgen levels performed better than their lower androgen counterparts. However, low testosterone men performed better than high testosterone men, leading the researchers to conclude that high androgens may inhibit the acquisition of spatial skills, and that there may be a low optimum level.

Other tests have claimed that females are superior in language, verbal fluency, speed of articulation and grammar, also arithmetic calculation. Their perceptual speed, for instance in matching items is better, and so is their manual precision. Males are reckoned to be better at tasks that are spatial in nature, such as maze performance and mental rotation tasks. Also mechanical skills, mathematical reasoning and finding their way through a route. Certainly, among brain injury patients, after damage to the left hemisphere, long term speech difficulties occur three times more often in males.

Some critics asked why, after a hundred years of research, these findings have only just appeared. One reason may be that most of the subjects studied originally were male war veterans. But, in any case, nobody had looked for sex differences. What we are discussing are average differences which are statistically significant but their effect is very small within a very wide range of individual variation. The investigator must be specifically looking for them, using a large number of subjects.

Anatomy.

Differences in brain anatomy have included the length of the left temporal plane, which is usually longer than the right. Of those showing a reversal, which was assumed to reflect a lesser degree of lateralisation, most were female. However, as Springer and Deutsch(5) warn us: *"the link between anatomical asymmetries and functional hemispheres is an untested assumption."*

Cerebral blood flow is used as a measure of cerebral activation and, in a mental rotation task, women scored significantly lower. Both men and women showed greater right hemisphere activity, though with men it was greater in the right frontal lobe, and with women it was greater in the temporal-parietal region. Other differences have been found in other tasks, but there is no way of telling whether they are due to a difference in structural organisation, or simply the use of different strategies.

Some of the results are difficult to compare with others. For instance in recognising melodies and familiar sounds, women have had a left ear advantage, while in men, the difference was very small. Some workers have suggested that lateralisation for certain nonverbal auditory stimuli may be greater in women, rather than less.

Another problem is that the degree of lateralisation for auditory and visual tests do not always correlate for one individual. It may be that different individuals have different organisation for different tasks, or they are bringing in strategies that the experimenter didn't intend, thus confounding the results. Repeating the tests at a later date, with the same subject, does not always produce the same result, as though on each occasion the problem has been approached in a slightly different way.

Unlearning learning.

We have seen how plastic cortical development is. Even with laboratory rats, it has been shown that those reared in a stimulating environment develop a much more intricate cerebral organisation than those reared in nothing more than a bare cage. Development is not *either* predicted by biology *or* learning.

Brain development goes on for many years after birth. It clearly must be influenced as much by the environment after birth as it was before. Exactly how and why, and by how much, is something that psychologists and biologists generally are very reticent to explore. They continue to work on independently following their separate paradigms, and do not cross the boundary. Psychologists use the general assumption that memory is composed of patterns of neuron firing. Biologists tend to work with permanent structures. It is thought that if a particular synapse is active often enough, it becomes more permanent, operating in preference to other possible synapses.

Others(6) have made suggestions based on the assumption that the degree of myelinisation of a particular area of the nervous system is a measure of its maturity – or, conversely, its loss of plasticity.

Clearly the social experience of a young baby is limited, but even then it is interacting, soaking up experience like a sponge. In an astonishingly short time it becomes proficient in a complicated, not entirely logical language. Even before an infant begins to talk, it understands sentences containing quite complex sequences.

Socialisation begins when it meets other children. In the days of the tribal group, this may have been from its first steps. In recent England, school began at five, and its primary experience would have been its parents, its siblings, relatives and visitors, perhaps next-door's children.

The author has, from time to time, met counsellors, and other, who claim that transvestites can be cured. Gender reassignment is seen by a prejudiced National Health Service as elective cosmetic surgery. Gay people choose their way of life. Can anyone become other than who they really are? Something that is learned can be unlearned surely? Perhaps it is in reaction to such attitudes that certain groups of TV's and others are so insistent about the biological model – otherwise they could 'help' being who they are.

It is assumed that much of one's personality is learned, with an Eysenckian biological substrate, yet it is also assumed that any extensive personality change means trouble. It's a question that psychology has not really addressed, perhaps developmental neurobiology will, one day, provide some answers, if it can, once and for all, free itself from political gender bias.

Conclusion.

Many critics have complained of the prevalence of what psychologists call the type 1 error in a number of these studies. That is, the differences are real when the results are actually due to chance. The problem is in extracting common features in a area where individual people vary greatly.

On balance, Springer and Deutsch(7) accept that there is a very small but consistent greater degree of lateralisation in male humans. They conclude *"Our review of the lateralisation literature in general has given us a healthy respect for the type 1 error the consistency of reports of sex differences lead us to accept their reality, at least as a working hypothesis there are true differences that are small in magnitude and easily masked by individual variability or other factors that are not controlled."*

Such differences as have been found have been labelled by most writers as differences in cognitive style. Given the difference in socialisation between girls and boys, it is hardly surprising that this occurs.

Witleson concluded that people use their 'preferred cognitive strategy' based on the faculties they have. It is suggested that men and women may tend to think in different ways, but every individual thinks in his, or her, individual way – each of us uses our preferred mental strategy. Let us not come to believe that all women think in one way and all men in the other.

Certainly, a study of adult male-to-female transsexuals found that they were better in verbal memory, and worse in mental rotation tasks than a control group of men. Groups of both male and female transsexuals groups also did not show a clear degree of lateralisation. Apart from the fact that, once again, they were possibly extreme cases, it does not necessarily show that their minds were 'opposite sexed' for biological reasons. It could just as well be argued that they acquired transsexual minds because of their conflict with the cultural criteria demanded of them.

The theory must be able to accommodate itself to allow for general differences, not stigmatising or clinicising those who do not conform. Men and women, perhaps, follow careers that utilise their individual abilities in the most satisfying and successful way. In spite of the predictions of biological determinism, there are female artists, designers, even mathematicians, and we are not short of male communicators.

As Sayers(8) says: *"If boys are more able in Mathematics and girls have a greater verbal ability, it is hard to see how men can be better fitted for political life and their dominant role there."* What we have discovered should not be a prohibition against a man or a woman from entering a career normally viewed as being the province of the other gender, because of the way we suggest he, or she, 'ought' to think.

Afterword.

Throughout this chapter the difference between the cerebral hemispheres has been described as being between verbal versus spatial abilities, with a qualitative difference between women and men. Most workers believe this to be far too simple an idea. It may be that we are labelling the mental organisation in terms of the rather limited tests we are applying – we look for something, so we find it.

Considering the whole range of thought processes to which humans bring a whole range of strategies, it is possible that each problem that an individual's brain attends to is unique, happening for the first time in human history.

What else can be said about the features of brain lateralisation? A more realistic way of describing the situation may be to suggest that each hemisphere approaches a task in a different way. Thus the left side may analyse the problem while the right considers it as a whole. This division has created a whole raft of hypotheses, such as rational vs intuitive, and western versus eastern thinking.

In turn there has been a rash of claims like "Unleash the power of your right brain. Send £50 for our five-day course." Another is quizzes in popular journals which claim to test whether readers think like a man or a woman. Naturally those completing the questionnaire already know how they ought to think, as men or women, and even know the 'correct' answers to the questions.

As one group of writers(9) suggest *"hemispheric specialisation has become a sort of trash can for all sorts of mystical speculation."*

Nevertheless some insights have come from some more reputable sources. One needs to describe first the difference between conscious and automatic behaviours. Once we have learned to walk or ride a bicycle, we never forget. Current thinking is that such knowledge is transferred to the cerebellum. Probably, the automatic actions in manipulating the controls of a motor car are stored there also.

However, in our daily round we develop what are called action scripts, habitual procedures like making a cup of tea. If one goes to one's bedroom to change for an outing and, instead, puts on one's nightclothes and get into bed, it is the confusion of two action scripts. So, some workers believe that the right hemisphere handles processes for which there is an established routine, while the left side deals with novel situations. Perhaps the right brain handles more familiar tasks for which an action script is already available, while the left analytical side is better equipped to handle new situations.

This leads to an interesting speculation. We have all been cursed with the driver on the motorway, hogging the middle lane, operating on right side 'autopilot' mode, while his attentional left hemisphere is chatting to his passenger. If women have better communication between the hemispheres, perhaps they can switch control more easily, and they really are better drivers than men. Perhaps insurance companies should calculate premiums on the basis of brain scans taken while the person is performing a series of standardised tasks. Crazy, perhaps, but no more outlandish than the claims in some 'pop' psychology books.

Another hypothesis includes the function of the corpus callosum, which connects each side of the brain topographically – that is each fibre from a neuron in one side connects to its equivalent in the opposite side. This is described more fully in Springer and Deutsch,(10) but the idea is that an image in the left half, say a cow, inhibits the image in the right half, which allows it to conjure up associated images, like milk or a field.

Psychology students will be familiar with the words "Top down, bottom up," but other speculations have included distinctions between analysis and insight, while another compares the right hemisphere to Freud's seat of the unconscious

It has been suggested that, not only is the human brain more complex than we think, it is more complex than we can comprehend.

No doubt the debate about sex differences in general will continue *ad nauseum*. One study will suggest “the difference in size between the sexes has not escaped the notice of sociobiologists.” Another will point out that the size dimorphism in humans is less than for any other primate. It all depends on which side of the bread you like to spread your butter.

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