

# LEADER-POST

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## Boys and girls are wired differently

By Ed Willett

Boys and girls are different ... and not just in the obvious ways. Even their brains are **wired differently** -- which has implications for everything from education to the treatment of mental disorders.

That's the focus of an article by Larry Cahill, a neurobiologist at the University of California in Irvine, in the most recent Scientific American ([www.sciam.com](http://www.sciam.com)).

For example, Jill M. Goldstein of Harvard Medical School has found that parts of the frontal cortex (home of many higher cognitive functions) and the limbic cortex (central to emotional responses) are bulkier, relative to the rest of the brain, in women -- while parts of the parietal cortex (involved in space perception) and the amygdala (which responds to emotionally-arousing information) are bulkier in men.

Sandra Witelson at McMaster University has found that women have a greater density of neurons in parts of the temporal lobe and frontal cortex associated with language comprehension and processing (interestingly, women score higher on tests of verbal fluency).

But are these differences innate, or learned?

Probably the former. We know that even very young boys prefer "boy" toys like balls and cars, while girls gravitate to "girl" toys like dolls.

Research by Melissa Hines of City University London and Gerianne M. Alexander of Texas A&M University has found the same preferences in young vervet monkeys -- males prefer trucks, females prefer dolls. It's hard to argue the monkeys learned those preferences from the surrounding culture.

Cahill suggests males prefer toys that can be "propelled through space and that promote rough-and-tumble play" because they relate to behaviours that help males hunt and secure a mate, while females gravitate toward toys that help them build the skills necessary for some day nurturing young.

Researchers at the University of Cambridge, led by Simon Baron-Cohen, recently followed up on work that has shown that one-year-old girls spend more time looking at their mothers than one-year-old boys, and that one-year-old girls prefer films of faces to films featuring cars, while boys prefer the opposite. The Cambridge scientists put a video camera in a maternity ward and

recorded one-day-old babies looking at either the face of a live female student or a mobile that matched her face but scrambled her facial features. Girl babies, they found, spent more time looking at the live face, while boys spent more time looking at the mechanical one.

The differences seen in the amygdala are the focus of some of Cahill's own research. He discovered that when men and women were shown a series of graphically violent films, the number of films they could recall weeks later depended on how active their amygdala was during the viewing. But he also discovered, to his surprise, that in men only the right hemisphere of the amygdala lit up in the PET scan, while in women, only the left one did.

It's long been held that the right hemisphere of the amygdala is mainly concerned with processing the central aspects of a situation, while the left processes the fine details. To test that, Cahill and his cohorts gave men and women a beta-blocker, propranolol, which dampens the activation of the amygdala, then showed them a disturbing slide show about a young boy run over by a car while walking with his mother.

Sure enough, the drug made it harder for men to remember the gist of the story, while women remembered the gist, but had trouble remembering peripheral details. Additional studies have shown that differences in response occur immediately on viewing the material, before subjects have even had the time to consciously interpret what they've seen.

Another brain region that differs between men and women is the hippocampus, crucial to both memory storage and spatial mapping.

It's larger in women than in men -- which may explain why men are likelier to navigate by "dead reckoning" -- estimating distance in space and orientation -- while women are more likely to navigate by monitoring landmarks.

Cahill's Scientific American article lists much more research, all of which points to the same conclusion: boys and girls are different.

Didn't I just say that?