

Psychoneuroendocrinology

The Female Brain

by Louann Brizendine

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In an age when one in three American adults firmly rejects evolution as false, it is a daunting challenge to write a popular and accessible account of the endocrinology, pharmacology, neurobiology, development and evolution of human sex differences. As a result, we are inclined to give authors who take up the challenge a certain amount of freedom to spruce up the facts in order to attract lay readers, who may not have the patience for the usual cautious, scientific approach.

In her book *The Female Brain*, Louann Brizendine adopts a mix of self-help, sex-specific medicine and populist neuroscience. The book advances a particularly stark version of the theory that exposure to prenatal hormones 'hard-wire' male and female brains for sex-differentiated patterns of emotion and cognition throughout life. Brizendine — director of the Women's Mood and Hormone Clinic at the University of California, San Francisco, with diplomas in neurobiology from the University of California, Berkeley, medicine from Yale University, and psychiatric training at Harvard Medical School — uses personal stories from her patients, her friends and her own life to anchor the discussion of sex differences in behaviour, hormones and the brain. The stories are the best part of the book, and it is through these that Brizendine emerges as a dedicated and sympathetic clinician. Readers whose eyes glaze over when they encounter scientific concepts will surely be drawn in.

Yet, despite the author's extensive academic credentials, *The Female Brain* disappointingly fails to meet even the most basic standards of scientific accuracy and balance. The book is riddled with scientific errors and is misleading about the processes of brain development, the neuroendocrine system, and the nature of sex differences in general. At the 'big picture' level, three errors stand out. First, human sex differences are elevated almost to the point of creating different species, yet virtually all differences in brain structure, and most differences in behaviour, are characterized by small average differences and a great deal of male-female overlap at the individual level. Second, data on structural and functional differences

in the brain are routinely framed as if they must precede all sex differences in behaviour. Finally, the focus on hormone levels to the virtual exclusion of the systems that interpret them (and the mutual regulatory interactions between receptor and secretion systems) is especially lamentable, given the book's clinical emphasis on hormone therapies.

Misrepresentations of scientific details are legion. Readers who studied biology in high school may puzzle over the invocations of the male brain with its single "dose of X



Two species? Cary Grant and Katharine Hepburn in *The Philadelphia Story*.

chromosome (there are two Xs in a girl): is the author suggesting that X-chromosome dosage compensation is absent from female brains? Is it an improvement to dispel the myth that testosterone is a "male hormone" only to call it the "sex and aggression hormone"? (If each hormone needs a sound bite, "confidence and sense of well-being hormone" might better fit the data.) Ironically, at the intracellular level, much of the differentiation of the "testosterone-formed male brain" is accomplished by oestrogens. Fostering such misleading metaphors may prevent broader understanding.

The text is rife with 'facts' that do not exist in the supporting references. A typical example is the claim that young boys "physically cannot

hear" the cues in the intonation of adult human female voices that girls can, "just as bats can hear sounds that even cats and dogs cannot". The references provided (including a paper on songbird brains) require major misunderstanding or misrepresentation to be twisted into such a statement, a state of affairs that is repeated throughout the book.

Like other popular books on the biology of human nature, *The Female Brain* has a rigid plot line: the foil of 'political correctness' against which the author wages a struggle for truth. We are told that the media, feminists, pointy-headed intellectuals and a vaguely specified 'culture' dogmatically insist that gender or racial differences in personality and behaviour are entirely cultural, an observation that is hard to reconcile with the volume and tone of media attention to the biology of gender and sexuality.

Such assertions require empirical support. This genre loves to dwell on childhood toy preferences: little girls cradle inanimate, 'boy-coded' objects as if they were baby dolls (here, as is often the case, it's a fire engine); and little boys turn harmless objects into weapons (our favourite is the boy who bites his toast into a gun in Deborah Blum's *Sex on the Brain* (Allen Lane, 1997)). The emphasis on myth-busting turns into a vehicle for dressing the myth up in new clothes — such as Simon Baron-Cohen's recent hypothesis that the 'male brain' is hard-wired for 'systematizing', and the 'female brain' is hard-wired for 'empathizing' — there is no shortage of pseudo-scientific ways of saying 'thinkers' and 'feelers'. The problem with such explanations of sex differences is not that they are overly biological, but that they are fundamentally non-biological and explain nothing.

Ultimately, this book, like others in its genre, is a melodrama. Common beliefs are recast as imperilled and then saved. Stark, predictable protagonists (an initial "cast of neuro-hormone characters" that reads like a guide to astrological signs) interact linearly with foreseeable results. The melodrama obscures how biology matters; neither hormones nor brains are pink or blue. Our attempts to understand the biology of human behaviour cannot move forward until we try to explain things as they are, not as we would like them to be.

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