Rebecca Jordan Young: *Brain Storm: The Flaws in the Science of Sex Differences*, Cambridge, Massachusetts: Harvard University Press, 2010, 408pp., $35.00, £25.95, ISBN: 978-0-674-05730-2 (hdb).

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In *Brain Storm*, Rebecca Jordan-Young provides a robust scientific critique of what she terms 'brain organisation theory', the dominant paradigm which suggests that gender and sexuality are conditioned by early foetal exposure to organising sex hormones. To underscore the significance of looking critically at brain organisation theory, she notes that ideas that there are 'male' and 'female' brains are both pervasive and highly influential, academically, socially and politically. Jordon-Young argues that the orthodoxy of brain organisation theory, which connects 'sex typical' patterns of behaviour, interests, cognitive styles, and sexual desires to naturalised biological sex produces a notion that men and women are 'born different'. This argument is also extended into understandings of sexuality with the presumption that that too is innate and biologically determined. She highlights how this presumption rests within a liberal humanist culture that encourages celebratory diversity, within which equality is no longer seen as desirable, and where any challenge to the idea of brain sex is rendered "not only anti-science, but anti-diversity" (4).

The author convincingly develops her argument through a detailed and exhaustive review of the scientific literature. In the first three chapters of the book, she lays the ground for her analysis, providing an overview of her argument, an historical context for understanding brain organisation theory, and an exploration of the methodologies used in this kind of

research. The question of methodology is one that she repeatedly returns to throughout the book, exploring the (necessary but problematic) over-reliance on quasi experimental design in this body of research, and exploring issues with definition and consequently with measurement. She explains how the tendency of journals to accept papers that report 'positive' findings, rather than those in which hypotheses are not supported, tends to favour research that identifies 'difference'. In particular, she is concerned with the degree to which so much of this kind of research is imbued with a prior assumption that difference is itself 'common sense' and inevitable. In Chapters 4 and 5, she outlines the two main approaches to research in this area with human participants – research which explores the development of individuals known to have been exposed to sex hormones in utero, and research which looks at 'gender atypical' adults, and traces backwards to explore possible influences. She then goes on to look at specific areas of research focused on masculine and feminine sexualities within heterosex, 'other' sexualities, and exploring sex typed interests. In the closing chapters, she argues that brain organisation studies disregard key elements of both biological and social context, producing oversimplified and reductionist accounts of gender and sexuality. She concludes with a call for a more dynamic developmental engagement with human gender and sexuality, one that does not begin from a presumption of stable gendered / sexed 'essences'.

As I started to prepare this review, an interesting interaction on the internet underscored for me the importance of this particular book, at this particular historic moment. Reading a review of *Brain Storm* on The Guardian newspaper site, I was drawn into a discussion in the comments section with a man who felt very strongly that the book was profoundly flawed. He suggested its author had no qualifications to write this book and that she clearly adhered to an *ideological* view about gender and sex difference that had nothing to do with science. In short, she was a woman, and really shouldn't be given too much credence, since she clearly

was one of those crazed feminists who denied the obvious reality of biological sex and its role in producing both gender and sexuality. The man in question had, of course, not read the book. He had, however, read Pinker – an author whose influential ideas Jordan-Young herself references as she sets the context for the book in the first chapter, reminding us of his somewhat scathing claim that anyone who doesn't accept the premises of the brain sex view is 'on a collision course with the findings of science and the spirit of free inquiry' (Pinker 2005, 15). In one fell swoop, Pinker dismisses all critique of the dominant view of sex, gender and sexuality, and all dissenters to this view are relegated to the position of 'political ideologues' – a position which makes all scientific critique rather difficult! Countering this presumption, Jordan-Young suggests that the brain organisation research is itself perhaps not particularly scientifically robust. Rather, it encourages an approach to the field of gender, sex and sexuality that presupposes a particular kind of causality, with the answer to research questions already laid out in the terms of the approach itself.

Jordan-Young is at pains to point out that her work is not anti-scientific, but committed to the production of *good* science. She highlights the importance of unpicking the taken for grantedness of the assumption that gender, sex and sexuality are essentially fused, or that they are causally related. She illustrates this convincingly throughout the book. She notes "it is not just possible, but urgently necessary, to reopen the questions that have been closed by accepting brain organization as a done deal... evidence that human brains are hormonally organized to be either masculine or feminine turns out to be surprisingly disjointed." (3) She insists that questioning brain organisation does not require that we reject science, but that to reinvigorate free inquiry about sex differences requires a more detailed interrogation of the science that underpins such dominant theories about gender, sex and sexuality.

Her aim in this book is to provide a detailed synthetic analysis of brain organisation theory research, mapping "the structure of studies to see how well the studies fit together"

(3). She achieves this through a systematic synthetic review of peer reviewed research published in English-language journals that focused on the connection between prenatal hormone exposure and masculinity, femininity and human sexuality. Three hundred articles were included in this analysis. In addition, Jordan-Young used an influence analysis based on citation rates to identify the 25 leading figures in the field and conducted interviews with twenty-one of these individuals.

The book highlights that at least part of the difficulty in brain organisation theory is slipperiness of definition in work on gender and sexuality. Jordan-Young makes the important point that "Before we can conclude that certain kinds of hormone exposures 'organize' the brain for feminine sexuality, we must be clear about what constitutes feminine sexuality; the same goes for homosexuality, 'masculine' or 'feminine interests and priorities' (39). It is important that we question our assumptions about gender and sexuality, and what might be a feminine or masculine trait, something that, as Jordan-Young notes, many scientists treat as 'common sense'.

Jordan-Young argues that brain organisation theory research rests on a presumption of dichotomous sexes, with ambiguous sex and sexualities being read, necessarily, as deviant within this work. It is presumed that these category differences extend into categorical differences in cognition and behaviour. However, she notes, there is significant overlap between the sexes as well as substantial within group variation in cognitive and behavioural traits. With respect to sex differences in behaviour and cognition "there is simply too much overlap between the sexes and too much variation in traits within each sex, for that sort of categorical reference to be useful" (52). She suggests that a focus on the idea of 'fundamental sex differences' that pervades this kind of research makes it difficult to explore the complexity of the interplay of biology and social structures, the idea of shifting sex roles, and how changing environments and times have varying influences on men and women.

Similarly, for example, by categorising hormones (which are *not* only present in either males or females, and which appear to serve multiple functions) as *sex hormones,* we have already indicated our understanding of their purpose – their role in *producing sex difference*, in a manner that forecloses on other ways of making sense of their action.

Outlining research on homosexuality, Jordan-Young points out that much of this work starts with the presumption that male homosexuality will be associated with greater levels of femininity. These kinds of studies are typically laden with socially derived assumptions, in particular the assumption that feminine sexuality is associated with passivity and receptivity, and that gay sexuality reproduces that. (It is difficult within this logic to be both gay - or healthily female - and sexually dominant.) As Jordan-Young suggests, "When research starts to look too much like an 'infomercial' for cherished beliefs, it is no longer science"(p. 291), and these cherished beliefs have significant implications for research and practice.

While the basic arguments of the book may not be entirely new, the detail and complexity of her engagement with brain-sex research is. This is an impressive book, not easily dismissed as 'anti-scientific' or 'ideological'. Jordan-Young's commitment to engaging this research on its own terms, to exposing the scientific vulnerabilities of this body of work is the book's most significant contribution. As a teaching tool, and as a tool of resistance to the more oppressive excesses of brain-sex research, this makes this book invaluable.

References

Pinker, S (2005) Sex Ed.: The Science of Difference. *New Republic Online,* 14 February 2005.