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‘A Large and Longstanding Body’

Historical Authority in the Science of Sex¹

Jeffrey W. Lockhart

Scientists’ testimonies are used to endorse everything from toothpaste to nuclear power and weapons, but they are also used to challenge the very same things. And this is where the knife goes in because at present “scientific” support can be elicited on all sides of every question, so the “lay” public is constantly forced to decide which scientists to believe.

Where then is the vaunted objectivity of science? People are realizing that they must... develop criteria on which to make these decisions.²

Notions of essential, biological sex differences play a major role in contemporary social and policy debates, ranging across the under-representation of women in science, government, and corporate leadership; the division of household labor and childcare; the access and rights of trans and intersex people to use appropriate facilities or to exist at all; and the best way to educate boys and girls. In other chapters in this volume, Charlotte Emily Mears and Tyler Stacy each discuss how far right movements have taken up essentialist arguments about biological sex in service of their agendas. These arguments by the right rest their legitimacy on the authority of science and sex difference research. Elsewhere in this volume, neuroscientist Tristan Fehr engages the substance of sex difference research head-on and shows how essentialist conclusions about sex are unwarranted in neuroscience. In this chapter, I take a different approach and use sociology of science to examine the competing claims to authority made by scientists studying sex. I argue that historical revisionism is a key means of establishing authority for

1 I thank Chalem Bolton, Dominique Canning, Megan Carroll, Erin Cech, Lanora Johnson, Rebecca Jordan-Young, Sari van Anders, Lauren Wilcox, and Jesse Yeh for their thoughtful feedback and engagement during the course of this research. I also thank the University of Michigan Library for its immense support in locating materials and for providing access to the Web of Science. While working on this project, I have been funded in part by the Gates Cambridge Trust and an NICHD training grant to the Population Studies Center at the University of Michigan (T32HD007339).

2 Ruth Hubbard, *The Politics of Women’s Biology* (New Brunswick: Rutgers University Press, 1990), 9.

scientists who advocate “essential sex differences,” and that this undermines the credibility of their claims.

More than almost any other field of scientific research, sex difference scholars push their findings to general audiences. A quick search for books with “sex difference” in the title returns more than 2,000 volumes, in addition to the torrent of interviews and op-eds on the topic that researchers give to the popular press.³ Statements like this one in the *Los Angeles Times* are routine: “the scientific reality is that it’s futile to treat children as blank slates with no predetermined characteristics. Biology matters. A large and long-standing body of research literature shows that toy preferences, for example, are innate.”⁴ Despite what proponents of essential differences would have us believe, there is also a large and longstanding body of research literature that is critical of the “sex difference” paradigm. Many scientists have challenged the scientific basis for claims of essential sex differences, arguing that biology is more complex, less deterministic, and less suited to categorical binaries than sex difference scholars claim. They include Ruth Bleier, Katherine L. Bryant, Gillian Einstein, Lise Eliot, Anne Fausto-Sterling, Tristan Fehr, Cordelia Fine, Geordana Grossi, Donna Haraway, Ginger Hoffman, Ruth Hubbard, Janet Hyde, Daphna Joel, Rebecca Jordan-Young, Anelis Kaiser, Marion Namenworth, Gina Rippon, Joan Roughgarden, Deboleena Roy, Rafaella Rumiati, Sigrid Schmitz, Stephanie Shields, Abigail Stewart, Banu Subramaniam, Sari van Anders, and Mariamne Whatley. Far from being anti-science, these scholars have dedicated much of their careers to biological research.

3 This holds in most large catalogs, and is discussed at length in Robyn Bluhm, “Beyond Neurosexism: Is It Possible to Defend the Female Brain?,” in *Neurofeminism: Issues at the Intersection of Feminist Theory and Cognitive Science*, ed. Robyn Bluhm, Anne Jaap Jacobson, and Heidi Lene Maibom (London: Palgrave Macmillan UK, 2012), 230–45.

4 Debra W Soh, “The Futility of Gender-Neutral Parenting,” *Los Angeles Times*, January 6, 2017, <http://www.latimes.com/opinion/op-ed/la-oe-soh-gender-neutral-parenting-20170106-story.html>; see also Ruben C. Gur and Raquel E. Gur, “Complementarity of Sex Differences in Brain and Behavior: From Laterality to Multimodal Neuroimaging,” *Journal of Neuroscience Research* 95, no. 1–2 (2017): 189–99. Versions of this debate go back to John Locke’s “tabula rasa,” and more recently Steven Pinker’s critiques of “The Blank Slate.”

I call these researchers and their work “feminist science,” a term many scholars who challenge essentialist “sex difference” research have taken up.⁵ Challenging the sex difference paradigm in biology does not mean insisting that men and women are identical. Instead, feminist biologists emphasize three points. First, biological traits show much more variation within groups (like men and women) than between them, which makes speaking categorically about things like male and female brains nonsensical. For instance, although the average height of men is greater than the average height of women, knowing a person’s height tells us little about their sex, and vice versa. Indeed, while the field of sex differences relies on arbitrary cutoffs to define “small,” “moderate,” and “large” differences (measured as Cohen’s $d > 0.2, 0.5, \text{ and } 0.8$), these are all dramatically smaller than the sex difference in height ($d = 2.0$), which statisticians point out is still *not* bimodal.⁶ This means that when we look at height data for all humans together, we do not see two separate groups in need of explanation by way of sex, but rather one group (one bell shaped curve) with all sexes mixed throughout. Second, many biological traits result from or get modified by social and environmental experience. Everything from testosterone levels and brain morphology to even height and menstrual cycle has been shown to vary dramatically depending on experience and environment. In other words, biology is not immutable destiny. Third, speaking of “sex differences” as essential results of innate biology often serves to reify harmful stereotypes and resist progressive calls for social change: *why fight against human nature?*

The terms of debate around sex differences are fraught. Neither feminist biologists nor sex difference scholars are homogeneous groups. Many resist simple labeling. For example, interdisciplinary feminist scientist Rebecca Jordan-Young at times separates the substance of her

5 For example: Ruth Bleier, “Sex Differences Research: Science or Belief?,” in *Feminist Approaches to Science* (New York: Pergamon, 1986), 147–64; Deboleena Roy, “Cosmopolitics and the Brain: The Co-Becoming of Practices in Feminism and Neuroscience,” in *Neurofeminism: Issues at the Intersection of Feminist Theory and Cognitive Science*, ed. Robyn Bluhm, Anne Jaap Jacobson, and Heidi Lene Maibom (London: Palgrave Macmillan UK, 2012), 175–92.

6 Mark F Schilling, Ann E Watkins, and William Watkins, “Is Human Height Bimodal?,” *American Statistician* 56, no. 3 (2002): 223–29.

scientific analysis from her feminist convictions in order to address other scientists on their own terms.⁷ Other feminist scientists integrate the two more often in their argumentation style, but neither of these approaches is necessarily more feminist or more scientific. Simultaneously, many proponents of the sex difference paradigm refer to themselves as feminists or liberals, including prominent figures like Simon Baron-Cohen and Melissa Hines. Most proponents of sex difference research distance themselves from “conservatives” or “the right.” Even Charles Murray, writing for the American Enterprise Institute, tries to distance the science of essential, biological sex and race differences from conservative politics.⁸ Steven Pinker argues that sex difference research and even *The Bell Curve* are “liberal,” despite the authors’ and their fans’ right-wing politics.⁹ Such rhetorical moves are typical of attempts to reconstitute neoliberal right-wing positions as apolitical or a “rational center.”¹⁰ As a result, the very terminology and “sides” in this debate are contested.

How are we to decide between the competing claims of these scientists? Their claims to authority often come down to competing historical narratives, either explicit or implicit, about the nature of sex difference research to date. In this chapter, I document three common types of historical revisionism used to bolster the authority of claims about sex differences. We have already seen the first type. The *Los Angeles Times* op-ed quoted earlier asserts a history in which innate, biological causes of social differences have long reigned as uncontested scientific facts. Such a history is blatantly revisionist, and the feminist biologists who are written out of that narrative typically respond by presenting extensive histories of debates within sex research to show that claims of innate, categorical differences are not uncontested. More subtly, many sex-difference publications present revisionist

7 *Brain Storm: The Flaws in the Science of Sex Differences* (Cambridge: Harvard University Press, 2010), 9, 200.

8 Charles Murray, “Conclusion: Why It All Matters and What Is To Be Done,” in *The Science on Women and Science*, ed. Christina Hoff Sommers (Washington, D.C.: AEI Press, 2009), 285–300.

9 Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York: Viking, 2002).

10 Lisa Duggan, *Twilight of Equality?: Neoliberalism, Cultural Politics, and the Attack on Democracy* (Boston: Beacon Press, 2003).

histories through citational practice, selectively citing only supportive material or even placing references next to ideas that they do not support.¹¹

In a second approach, sex difference scholars position themselves as historical underdogs, defenders of Science, Truth, and Free Inquiry against the tyranny of “political correctness,” trans activists, and feminists.¹² This version of history is at odds with the first, in which sex difference reigns unchallenged. More to the point, I show it is not historically defensible either. Finally, the third type of revisionism involves setting up and burning a straw man I call “the big, bad social constructionist.” By selectively reporting on and demonizing their critics, sex difference scholars are able to avoid substantive engagement with alternative explanations for the gendered world we live in. While the details of citations can sometimes feel peripheral to the main point, especially for non-academic audiences, they can have far-reaching consequences for perpetuating baseless “academic urban legends” that translate into public policy and popular belief.¹³

In the rest of this chapter, I explore these claims in more detail. First, I sketch a brief history of sex difference research in order to clarify its political origins and rhetorical tactics. Then I present and evaluate three revisionist narratives common to sex difference research. Finally, I conclude by making explicit the role of scientists’ motives in modern sex scholarship and calling for deeper engagement by both scientists and the public.

Eternal Return

Before engaging with revisionist accounts, it is helpful to review some often-omitted aspects of the real history of sex difference research. While writing this section, I entertained a once forgotten teenage fantasy: to write something using a patchwork of quoted material, with no original words of

11 Rebecca M. Young and Evan Balaban, “Psychoneuroindocrinology,” *Nature; London* 443, no. 7112 (October 12, 2006): 634–634.

12 Roy, “Cosmopolitics and the Brain: The Co-Becoming of Practices in Feminism and Neuroscience,” 189; Young and Balaban, “Psychoneuroindocrinology,” 634.

13 Ole Bjørn Rekdal, “Academic Urban Legends,” *Social Studies of Science* 44, no. 4 (August 1, 2014): 638–54.

my own. One certainly could. Numerous books and articles have been dedicated to the critical history of sex difference research.¹⁴ Beth Hess summed it up well when she wrote,

For two millennia, “impartial experts” have given us such trenchant insights as the fact that women lack sufficient heat to boil the blood and purify the soul, that their heads are too small, their wombs too big, their hormones too debilitating, that they think with their hearts or the wrong side of the brain. The list is never-ending.¹⁵

Critiques of biological sex essentialism are well established.¹⁶ Three decades ago, feminist biologists lamented the ongoing need to be “going over ... old ground,” and today they are still writing critical responses to “Whac-a-Mole Myths” of sex difference research.¹⁷

But it does not take a kitchen table covered in feminist biology and history of science to catch on to the main thread of these arguments. They all show cases where the science of sex differences shifts over time in response to social beliefs and scientific advancement. Time and again, the social advancement of women motivates new waves of research on women’s “essential character,” from the suffrage movement, to the feminism of the 60s and 70s, to the moment when women began outperforming men in education. Each time, sex difference scientists are explicit that they are reacting to feminist movements.¹⁸ The purported biological basis of sex differences changes as science

14 Thomas Walter Laqueur, *Making Sex: Body and Gender from the Greeks to Freud* (Cambridge, Mass: Harvard University Press, 1990); Viola Klein, *The Feminine Character: History of an Ideology* (London: K. Paul, Trench, Trubner, 1946); Veronica Sanz, “No Way Out of the Binary: A Critical History of the Scientific Production of Sex,” *Signs: Journal of Women in Culture and Society* 43, no. 1 (August 17, 2017): 1–27; Shulamit Reinharz, “Patriarchal Pontifications,” *Society* 23, no. 6 (September 1, 1986): 23–29 to name a few.

15 “Beyond Dichotomy: Drawing Distinctions and Embracing Differences,” *Sociological Forum* 5, no. 1 (1990): 81.

16 For example: Helen Mayer Hacker, “Marx, Weber and Pareto on the Changing Status of Women,” *The American Journal of Economics and Sociology* 12, no. 2 (1953): 149–62; Robert H. Lowie and Leta Stetter Hollingworth, “Science and Feminism,” *The Scientific Monthly* 3, no. 3 (1916): 277–84; François Poullian de La Barre, *De l’égalité Des Deux Sexes* (Paris, 1673).

17 Whac-a-Mole is an arcade game where players strike down small puppets. Each time one mole is struck, another pops up somewhere else. Gina Rippon, *The Gendered Brain: The New Neuroscience That Shatters the Myth of the Female Brain* (London: The Bodley Head, 2019); Anne Fausto-Sterling, *Myths of Gender: Biological Theories about Women and Men*, 2nd ed. (New York: Basic Books, 1992), 259.

18 Cordelia Fine, *Delusions of Gender: The Real Science Behind Sex Differences* (London, 2010); Hubbard, *The Politics of Women’s Biology*.

advances: women's brain fibers were prone to snapping until we discovered they were not; then their brains were too small, until we discovered brain weight does not correlate with intelligence.¹⁹ The frontal and then parietal lobes were each, in turn, too small in women when those areas were seen as the locus of intelligence.²⁰ Then women's corpus callosum was different from men's, until we found that it was not.²¹ And now when feminists point out that the corpus callosum research was unreliable, advocates of sex difference say "of course this is completely unfair," because the latest sex difference research has shifted yet again to new measures of the brain.²² Whac-a-Mole indeed.

In order to make the political stakes and internal logic of sex differences clear, I trace out two threads of its intellectual lineage in more detail. The first highlights the political motives of this science and begins at least with Thomas Hobbes, whose seventeenth century commentary on the state of nature described it as a war of all against all, intense competition for survival and dominance. A century later, T. R. Malthus published his *Essay on Population*, which describes human races competing to the point of "extermination" through reproduction and argues that poor children should be left to starve as natural/divine punishment for their parents' choice to have children.²³ Enter Charles Darwin, who read Malthus and credited him as inspiration for his work on evolution.²⁴ Contemporaries Karl Marx and Friedrich Engels pointed out that Darwin's theories read directly as a transposition of Hobbes, Malthus, and nineteenth century liberalism onto the "natural" (non-human) world, complete with markets, competition, and specialization of labor.²⁵

19 Fine, *Delusions of Gender: The Real Science Behind Sex Differences*, xxiv.

20 Stephanie A Shields, "Nineteenth-Century Evolutionary Theory and Male Scientific Bias," in *Sociobiology: Beyond Nature/Nurture?*, ed. George W Barlow and James Silverberg, 1980, 489–502.

21 Anne Fausto-Sterling, *Sexing the Body: Gender Politics and the Construction of Sexuality* (Basic Books, 2000), chap. 5.

22 Larry Cahill, "Fundamental Sex Difference in Human Brain Architecture," *Proceedings of the National Academy of Sciences* 111, no. 2 (January 14, 2014): 577.

23 *An Essay On Population* (1798; repr., London: J. M. Dent & Sons, 1958).

24 Darwin is not alone in his Malthusian origins: like many sociologists and demographers, I am currently employed at a Population Studies Center.

25 This chain of argumentation is summarized at greater length in Hubbard, *The Politics of Women's Biology*, 90–92.

In turn, Herbert Spencer and others brought these ideas back into the human world as Social Darwinism. In the end, “Darwin consciously borrowed from social theorists such as Malthus and Spencer some of the basic concepts of evolutionary theory. Spencer and others promptly used Darwinism to reinforce these very social theories and in the process bestowed upon them the force of natural law.”²⁶ Human social proclamations are not a perversion of some pure, objective, nature-focused Darwin. Darwin himself infamously wrote in *The Descent of Man* that “the chief distinction in the intellectual powers of the two sexes is shown by man’s attaining higher eminence, in whatever he takes up, than can woman.”²⁷ It was no accident that Darwin’s cousin coined the term “eugenics” in 1883, that Darwin’s son hosted the First International Congress of Eugenics, or that IQ testing was largely developed by eugenicists.²⁸ Evolutionary theories began as social theories of human aggression and hierarchy, and they have remained social theories.

While scientists rarely claim the term “eugenics” for their own work after 1970, eugenics research has an “openly continuous history” to the present day.²⁹ In 1969, the *Eugenics Review* renamed itself the *Journal of Biosocial Science*. That same year, *Eugenics Quarterly* changed its name to *Social Biology*. In this same vein, E. O. Wilson published *Sociobiology*, a hugely influential work that sparked what is now known as evolutionary psychology.³⁰ Wilson and evolutionary psychologists frequently cite Darwin’s theory of sexual selection to argue *a priori* that there must be innate, cognitive differences between human men and women, just as there are differences between the tails of male and female peacocks, because of how evolution works.³¹ They assume that everything, including complex

26 Hubbard, 90–92.

27 *Descent of Man, and Selection in Relation to Sex* (1871; repr., D. Appleton, 1901), 576.

28 Hubbard, *The Politics of Women’s Biology*, 181–82; Rachel Gur-Arie, “American Eugenics Society (1926-1972),” in *Embryo Project Encyclopedia*, November 22, 2014, <http://embryo.asu.edu/handle/10776/8241>; Stephen Jay Gould, *The Mismeasure of Man*, Rev. and expanded (1981; repr., New York: Norton, 1996).

29 Alison Bashford and Philippa Levine, *The Oxford Handbook of the History of Eugenics* (Oxford University Press, USA, 2010), 542.

30 *Sociobiology: The New Synthesis* (1975; repr., Harvard University Press, 2000).

31 For example: Larry Cahill, “Sex Influences on Brain and Emotional Memory: The Burden of Proof Has Shifted,” in *Progress in Brain Research*, ed. Ivanka Savic, vol. 186, Sex Differences in the Human Brain, Their Underpinnings and Implications (Elsevier, 2010), 29–40; David C. Geary, *Male, Female: The Evolution of Human Sex Differences*, Second

social processes and historically recent behaviors, necessarily serves some evolutionary purpose. Whatever we do today, they argue, must have been advantageous in the distant evolutionary past, when it was “hardwired” into our genetics for future generations. And so, we get claims that men are good with maps and spatial reasoning because prehistoric men went out hunting, and that female monkeys prefer “feminine” toys like cooking pots while males prefer “masculine” police cars.³² These positions represent a staunch opposition to social change: social life today is the necessary *telos* of millions of years of evolution. Social change is therefore against human nature. Such claims have been met with substantial empirical and theoretical criticism from social scientists and biologists alike.³³

The second intellectual lineage illustrates another core idea from feminist biology: the construction of categorical difference from complex phenomena. The history of “sex hormones” has been documented extensively.³⁴ Gonads, especially testes, have been considered the source or essence of gender in many historical periods. In 1889, Charles-Édouard Brown-Séquard published the results of injecting himself with crushed guinea pig and dog testicles, claiming to experience increased virility and youthfulness. Although he admitted within a decade that the results were likely a placebo effect, the scientific quest to find the chemical essence of sex was on. By the 1920s and 1930s, substances called “male hormone” and “female hormone” had been isolated from gonadal tissue.

Edition (Washington DC: American Psychological Association, 2010).

- 32 Gerianne M Alexander and Melissa Hines, “Sex Differences in Response to Children’s Toys in Nonhuman Primates (*Cercopithecus Aethiops Sabaeus*),” *Evolution and Human Behavior* 23 (2002): 467–79; Pinker, *The Blank Slate*.
- 33 e.g. Joan Roughgarden, *Evolution’s Rainbow: Diversity, Gender, and Sexuality in Nature and People* (Berkeley: Univ of California Press, 2004); Jill S. Quadagno, “Paradigms in Evolutionary Theory: The Sociobiological Model of Natural Selection,” *American Sociological Review* 44, no. 1 (1979): 100–109; Ruth Hubbard, “Have Only Men Evolved?,” in *Biological Woman--The Convenient Myth*, ed. Ruth Hubbard, Mary Sue Henifin, and Barbara Fried (Cambridge, MA: Schenkman, 1982), 17–46; Stephanie A Shields, “Functionalism, Darwinism, and Advances in the Psychology of Women and Gender: From the 19th Century to the 21st,” *Feminism & Psychology* 26, no. 4 (November 1, 2016): 397–404; see also a related critique in Aaron Panofsky, *Misbehaving Science: Controversy and the Development of Behavior Genetics* (Chicago; London: The University of Chicago Press, 2014).
- 34 Nelly Oudshoorn, *Beyond the Natural Body: An Archaeology of Sex Hormones* (Routledge, 2003); Fausto-Sterling, *Sexing the Body: Gender Politics and the Construction of Sexuality*, chap. 6; Diana Long Hall, “Biology, Sex Hormones and Sexism in the 1920s,” in *Women and Philosophy: Toward a Theory of Liberation*, ed. Carol C Gould and Marx W Wartofsky (Perigee, 1976), 81–96; Gail Vines, *Raging Hormones: Do They Rule Our Lives?*, 1st University of California ed (Berkeley: University of California, 1994).

Almost immediately however, it became apparent that males – even stallions! – also had “female hormone” in their bodies, and vice versa. Scientific advances showed that testosterone and estrogen are part of a larger family of steroid hormones; that they get converted into one another within the body; that they are also produced outside gonads; and that testosterone and estrogen are both necessary for the regular functioning of non-sexual parts of the body, such as blood. In other words, the substances called “male and female hormone” were not as categorically distinct in form, function, or distribution, as scientists initially thought. Nevertheless, their association as categorical “sex hormones” remains today, defining the “true” essence of sex in professional athletics and justifying all sorts of gendered behavior.³⁵ Modern parenting guides by scientists even still refer to them as “male and female hormone.”³⁶

By 1953, scientists had discovered that testosterone levels influence the genital development of fetuses. Not long after, others argued that the same was true for brains: fetal testosterone levels permanently “organized” brains as male or female, just as they shaped genitals, therefore determining behavior later in life.³⁷ This is the “organizational/activational hypothesis” that underlies most recent research on biological sex differences. Champions of the hypothesis write in terms of “essential difference” and “sexual dimorphism” (literally “two forms”). They discuss how men and women’s brains are “hard-wired” differently, creating a sense of clean, categorical distinction that, like the name “sex hormones,” is far from the biological reality.³⁸ Nearly every work in this genre admits that no such

35 Fine, *Delusions of Gender: The Real Science Behind Sex Differences*; Georgiann Davis, *Contesting Intersex: The Dubious Diagnosis* (New York: NYU Press, 2015); Fausto-Sterling, *Sexing the Body: Gender Politics and the Construction of Sexuality*, 1–4.

36 Leonard Sax, *Why Gender Matters: What Parents and Teachers Need to Know about the Emerging Science of Sex Differences*, Second edition (New York: Harmony Books, 2017).

37 Rebecca M Jordan-Young and Raffaella I. Rumiati, “Hardwired for Sexism? Approaches to Sex/Gender in Neuroscience,” *Neuroethics* 5, no. 3 (December 1, 2012): 305–15; C H Phoenix et al., “Organizing Action of Prenatally Administered Testosterone Propionate on the Tissues Mediating Mating Behavior in the Female Guinea Pig,” *Endocrinology* 65 (1959): 163–96.

38 Simon Baron-Cohen, *The Essential Difference: Male and Female Brains and the Truth about Autism* (New York: Basic Books, 2003); Daphna Joel et al., “Sex beyond the Genitalia: The Human Brain Mosaic,” *Proceedings of the National Academy of Sciences* 112, no. 50 (December 15, 2015): 15468–73; Digit ratios are now a very popular measure in this line of research, although the evidence supporting them is scant: Mitch Leslie, “The Mismeasure of Hands?,” *Science*

clean, categorical distinction exists in human brains or behavior. Authors include illustrations of two overlapping bell curves and admonitions that average differences between men and women should not be read to mean all men or all women are one way or another. Baron-Cohen goes so far as to say that individual women may have “male brains.”

As Gina Rippon points out, however, readers “may not hover too long on the semantic niceties of a ‘male brain’ not meaning ‘the brain from a man.’”³⁹ Sex difference scientists do not hover long on such niceties either. In *The Essential Difference*, Baron-Cohen introduces brains as a spectrum from those that are good at systematizing (type S) to those good at empathizing (type E), with a plurality of brains falling statistically in the balanced middle (type B).⁴⁰ Within a few pages, however, he switches to calling type S “male brains” and type E “female brains,” disregarding his own assertion that the types do not correspond neatly with male and female people. Balanced brains, supposedly the most common type of brains, are entirely absent from most of his discussion. In keeping with the title, readers are left with a sense of *Essential Difference* between men and women. As with hormones themselves, complex brain biology that affects both men and women gets recast in terms of simple, categorical, inborn difference between male and female. Such is the internal logic of the sex difference paradigm.

It Is Known

For the most part, none of this history appears in writing from proponents of sex differences. Science writing generally does not go into the history of its field. Sex difference research is no exception: most papers and books focus on recent advances and current knowledge, leaving history of science as an altogether separate discipline. Writing about sex differences, Unger and Dottolo observe that “history is not highly regarded by psychology because of the field’s commitment to... ‘just the

364, no. 6444 (June 7, 2019): 923–25.

39 Rippon, *The Gendered Brain*, 240–41.

40 *The Essential Difference*.

facts.”⁴¹ Consciously or otherwise, authors write centuries of controversy, and their position in it, out of sex science. In so doing, they perform the “god trick” of appearing to have a “view from nowhere” (i.e. with no social history or agenda), which lends their work scientific credibility by making it seem objective.⁴² Since all research is influenced by the motives, perspectives, and assumptions of researchers, Sandra Harding refers to this as “weak objectivity” and argues that explicit engagement with the social dimensions of scientific work – reflexivity on the part of researchers – can produce better science.⁴³ Without reflexivity, flawed science and revisionist histories may flourish.

More insidious than the general lack of historical reflection, however, is the elision of specific, germane controversies. Take, for example, Alexander and Hines’ study of vervet monkeys.⁴⁴ The authors concluded that monkeys, with no human gender socialization, showed gender-typical toy preferences that mirrored human children. Therefore, they argued, there must be some biological, innate component to differences in interests between human men and women. The study has been critiqued numerous times for including confounding variables; for downplaying its own no-difference findings; for using toy gender labels that are inconsistent with the explanations offered; for presenting the toys in a nonstandard way; and more.⁴⁵ Given how gender labels were assigned to toys, the results also contradict the only similar study published to date, which used rhesus monkeys.⁴⁶ The vervet study, and even its picture of two monkeys playing with toys, is ubiquitous in reviews of sex difference

41 “Historical Significance of Shields’ 1975 Essay: A Brief Commentary on Four Major Contributions,” *Feminism & Psychology* 26, no. 3 (August 1, 2016): 278; Shields, “Functionalism, Darwinism, and Advances in the Psychology of Women and Gender.”

42 Donna Jeanne Haraway, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,” ed. Londa Schiebinger, *Feminist Studies* 14, no. 3 (1988): 575–99.

43 Sandra Harding, “Rethinking Standpoint Epistemology: What Is ‘Strong Objectivity’?,” in *Feminist Epistemologies*, ed. Linda Alcoff and Elizabeth Potter (New York: Routledge, 1993), 49–82.

44 “Sex Differences in Response to Children’s Toys in Nonhuman Primates (*Cercopithecus Aethiops Sabaeus*).”

45 Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences*, 234–36; Fine, *Delusions of Gender: The Real Science Behind Sex Differences*, 124–26; Lise Eliot, *Pink Brain, Blue Brain: How Small Differences Grow into Troublesome Gaps - and What We Can Do about It* (Boston: Mariner, 2009), 108.

46 Janice M. Hassett, Erin R. Siebert, and Kim Wallen, “Sex Differences in Rhesus Monkey Toy Preferences Parallel Those of Children,” *Hormones and Behavior* 54, no. 3 (August 1, 2008): 359–64.

research.⁴⁷ Yet those who cite the study rarely mention that it is contested. Even the original authors – who are aware of critiques – present their findings with less ambiguity over time.⁴⁸ Of the “feminine” toys, a cooking pot and a doll, the pot is downplayed. The confounding color variable disappears, along with males’ equal preference for “masculine” and “feminine” toys. And the rhesus study is cited as corroboration rather than contradiction.⁴⁹

Many aspects of this are normal in science. Researchers publish new ideas and results. Replies and critiques routinely follow. Subsequent references to work are generally simpler than initial reports of it. In the field of sex differences, these simplifications led to a false sense of consensus among studies with conflicting methodology.⁵⁰ Sometimes, initial scientific findings turn out to be unsupported by follow-up research. Meta-analyses have shown that this is very common in the sex difference literature.⁵¹ It is a core feature of science that we sometimes publish incorrect or contested conclusions. Science is a process, not an infallible dogma.

This becomes problematic, however, when critical engagement is ignored and findings are presented as if they were universally accepted. For example, consider retractions. Papers are retracted in every discipline for many reasons, ranging from benign statistical errors to gross misconduct and data fabrication. Yet an analysis of 1,775 retractions found that retracting papers does little to stem the flow of citations to those papers, and that the vast majority of citations to retracted papers cite them as

47 e.g. Melissa Hines, “Gender Development and the Human Brain,” *Annual Review of Neuroscience* 34, no. 1 (2011): 69–88; Ai-Min Bao and Dick F Swaab, “Sexual Differentiation of the Human Brain: Relation to Gender Identity, Sexual Orientation and Neuropsychiatric Disorders,” *Frontiers in Neuroendocrinology*, Sexual Differentiation of Sexual Behavior and Its Orientation, 32, no. 2 (April 1, 2011): 214–26; Soh, “The Futility of Gender-Neutral Parenting”; Sax, *Why Gender Matters*.

48 Melissa Hines and Gerianne M. Alexander, “Commentary: Monkeys, Girls, Boys and Toys: A Confirmation Comment on ‘Sex Differences in Toy Preferences: Striking Parallels between Monkeys and Humans,’” *Hormones and Behavior* 54, no. 3 (August 2008): 478–81.

49 Hines, “Gender Development and the Human Brain”; Melissa Hines, *Brain Gender* (New York: Oxford University Press, 2004); To her credit, Hines has revised her position on other branches of sex difference research after years of methodological critique: Leslie, “The Mismeasure of Hands?”

50 Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences*; Bleier, “Sex Differences Research: Science or Belief?”

51 Janet Shibley Hyde, “The Gender Similarities Hypothesis.,” *American Psychologist* 60, no. 6 (2005): 581–92.

if they had not been retracted.⁵² Unfortunately then, criticizing, correcting, or even retracting bad research is not enough. Scientists in general, and sex difference scholars in particular, need to engage with the historical context and debate around their sources in all of their work if they are to avoid perpetuating inaccurate information or settle methodological disagreements.⁵³

Unfortunately, some sex difference scholars are actively hostile to historical perspectives. Two critical reviews of feminist neuroscientist Gina Rippon's recent book⁵⁴ are instructive:

Rippon also builds her case with historical examples of “neurosexism”. One shockingly offensive example she quotes is from the anthropologist Gustave Le Bon, who wrote in 1895: “Women... represent the most inferior forms of human evolution...” However, Rippon goes farther still. She argues that... scientists are perpetuating such historical sexism in a new guise.⁵⁵

A book like this is very difficult for someone knowledgeable about the field to review seriously.... Suffice to say it is replete with tactics that are now standard operating procedure for the anti-sex difference writers.... tactics include... resurrecting 19th century arguments almost no modern neuroscientist knows of, or cares about.⁵⁶

Both reviews refuse to engage with the substance of historical comparisons offered by feminists.⁵⁷

Bringing the history of sex difference research into contemporary scientific discussions is framed as

52 “A Visual Analytic Study of Retracted Articles in Scientific Literature,” *Journal of the American Society for Information Science and Technology* 64, no. 2 (2013): 234–53, <https://doi.org/10.1002/asi.22755>.

53 Shields, “Functionalism, Darwinism, and Advances in the Psychology of Women and Gender.”

54 *The Gendered Brain*.

55 Simon Baron-Cohen, “The Gendered Brain by Gina Rippon Review — Do Men and Women Have Different Brains?,” *The Times*, March 8, 2019, sec. Saturday Review, <https://www.thetimes.co.uk/article/the-gendered-brain-by-gina-rippon-review-do-men-and-women-have-different-brains-vq757qnph>.

56 Larry Cahill, “Denying the Neuroscience of Sex Differences,” *Quillette* (blog), March 29, 2019, <https://quillette.com/2019/03/29/denying-the-neuroscience-of-sex-differences/> these reviews were published in right-leaning venues: *The Times* (London) and the “intellectual dark web” blog *Quillette*. Positive coverage of Rippon's book appeared both in left-leaning venues like *The Guardian* and also in *Nature*.

57 a long form of this argument appears in Paul R Gross and Norman Levitt, *Higher Superstition: The Academic Left and Its Quarrels with Science* (Baltimore: Johns Hopkins University Press, 1994).

“offensive” and irrelevant. This hostility to discussion of history is what Nancy Tuana calls an “epistemology of ignorance.”⁵⁸

Tellingly, Cahill admits that neuroscientists do not know the history of their own field or the claims they make. Similarly, Baron-Cohen recounts a “recent” revelation:

Professor Konrad Lorenz [is] widely regarded to be the founding father of ethology, and the master of careful behavior observation and measurement.... I read his books at the tender age of nineteen.... A recent [2001] book points out that, despite his high intelligence, the esteemed Lorenz was unable to see that the political ideology of ethnic purification in Germany in the 1940s where he worked, and indeed his own views on eugenics, were hurtful and even dangerous.⁵⁹

Lorenz was a Nazi who defended his eugenicist beliefs and research long after the war.⁶⁰ This revelation did not prevent Baron-Cohen from writing a glowing apologia for Lorenz. Indeed, Lorenz is brought up only because he is an example of the “male brain,” which is brilliant at systematizing but poor at empathizing (and thus prone to being both a great scientist and a Nazi, with no apparent conflict between the two). Some sex difference scholars, then, are not simply unaware of the political and social history behind their ideas; they are also unfazed by learning about it. Most are not so explicit. Hines, for instance, has read and replied to books by Fausto-Sterling and Jordan-Young. But her replies ignore their lengthy, well-documented historical arguments as if they were irrelevant to modern scientific questions.⁶¹

58 “Coming to Understand: Orgasm and the Epistemology of Ignorance,” *Hypatia* 19, no. 1 (2004): 194–232.

59 *The Essential Difference*, 27.

60 Konrad Lorenz, “Konrad Lorenz – Biographical,” NobelPrize.org, 1973, <https://www.nobelprize.org/prizes/medicine/1973/lorenz/biographical/>.

61 Hines, “Gender Development and the Human Brain.”

The Scientist as Recently Liberated

When sex difference scholars do discuss the history of their field, many tell a story of overcoming oppression. Nowhere is this more apparent than in Alice Dreger's *Galileo's Middle Finger*. Dreger begins by building up her progressive credentials: she calls herself a "liberal feminist," recounts her support for intersex activism, and celebrates the work of "Marxist and feminist science-studies scholars" like Hubbard.⁶² Quickly, however, readers learn that she has been condemned and pushed out of the academy by the powerful forces of "PC culture," feminists, and trans activists for seeking "dangerous" scientific truths, just as Galileo Galilei was persecuted for his research. Such 'truths' include defining transgender as a paraphillia and defending a biological drive to rape with evolutionary psychology.⁶³ In response to critics, Dreger describes her own "reactionary" desire to "make a point of studying ... *race and IQ*," which she admits can do "no good and much harm," just "in order to prove how important truth seeking is."⁶⁴ In the end, she bucks the oppressive forces that would silence her and forges her way as an independent scholar.

Baron-Cohen tells a similar story. In the first pages of *The Essential Difference*, we read that he "would like to believe that, deep down, men and women's minds do not differ in essence" and he "remain[s] a staunch supporter of efforts to eliminate inequality in society." He was hesitant to write because,

Discussing sex differences of course drops you straight into the heart of the political correctness debate.... The topic was just too politically sensitive to complete in the 1990s. I postponed finishing this book because I was unsure whether a discussion of psychological sex differences could proceed dispassionately.... My women friends,

62 *Galileo's Middle Finger: Heretics, Activists, and the Search for Justice in Science* (New York: Penguin Press, 2015), 4.

63 For critique, see Julia Serano, "A Matter of Perspective: A Transsexual Woman-Centric Critique of Dreger's 'Scholarly History' of the Bailey Controversy," *Archives of Sexual Behavior* 37, no. 3 (June 1, 2008): 491–94; Cheryl Brown Travis, *Evolution, Gender, and Rape* (MIT Press, 2003); Ruth Bleier, *Science and Gender: A Critique of Biology and Its Theories on Women*, Athene Series (New York: Teachers College Press, 1997), 32.

64 *Galileo's Middle Finger*, 132–33 emphasis original.

most of whom consider themselves feminists, have persuaded me that the time is ripe for such discussion.⁶⁵

Cahill echoes the same sentiment. He stresses his progressive commitment to including women in medical research, so that treatments do not have unforeseen adverse effects.⁶⁶ Yet he received “strong advice to steer clear of studying sex differences from a senior colleague around the year 2000.... For the vast majority of his long and distinguished neuroscience career, exploring sex influences was indeed a terrific way... to become a pariah in the eyes of the neuroscience mainstream.”⁶⁷

Dreger, Baron-Cohen, Cahill, and others deploy a common narrative: despite their liberal and feminist beliefs, their scientific pursuit of objective truth has led them to insist that men and women are innately different in their abilities and desires. Those who disagree with them are a “cult” of “extremists” with “deeply ingrained, implicit (but false) assumption[s].”⁶⁸ Sex difference scientists, we are told, pay a steep political price for telling their uncomfortable truths, just as Galileo did.

Interestingly, feminist biologists tell essentially the same narrative, but in reverse. Hubbard’s is representative of many early feminist biologists’ accounts:

That I was able to turn my attention to these issues was due to the fact that in 1973, owing in large part to the political work of the women’s movement, the tenuous position I had held at Harvard became stable. In an unusual step, the university promoted a few

65 *The Essential Difference*, 11; For an argument that such feminists are detached from the goals, motives, and history of feminism, see Steven Epstein, *Inclusion: The Politics of Difference in Medical Research* (University of Chicago Press, 2008).

66 Scholars point to the 2013 US FDA decision to recommend different dosages of sleep medication for men and women as proof that sex is key in medical research. Subsequent research has shown that that decision was misguided, however, suggesting the need for caution rather than zealous pursuit of innate sex differences. David Greenblatt, Jerold Harmatz, and Thomas Roth, “Zolpidem and Gender: Are Women Really At Risk?,” *Journal of Clinical Psychopharmacology* 39, no. 3 (May 1, 2019): 189–99..

67 “An Issue Whose Time Has Come,” *Journal of Neuroscience Research* 95, no. 1–2 (2017): 12.

68 Baron-Cohen, “The Gendered Brain by Gina Rippon Review — Do Men and Women Have Different Brains?”; Cahill, “An Issue Whose Time Has Come,” 12; Pinker, *The Blank Slate*, x.

of us from the typical women's ghetto of "research associate and lecturer" to tenured professorships.⁶⁹

From her newly secure position, Hubbard was able to pursue her own research interests and develop a network of colleagues who would go on to publish and edit some of the foundational works in feminist science studies. Changing culture and social movements led to new-found academic freedom, which enabled a career doing otherwise unpopular work. By the mid-1990s, mainstream biologists remarked with horror that "this [feminist, leftist biology] literature grows with astonishing speed" and "that the only widespread, *obvious* discrimination [in science] today is against white males."⁷⁰

Still, feminist biology was a tenuous field. Many of its major figures transitioned from science into women's studies, philosophy, or history departments. Many of its publications were in humanities-focused journals like *Signs* and *Hypatia*, or in books and edited volumes. Not all, of course. But it is harder for feminist biologists to make it in science than for sex difference scholars, Fausto-Sterling argues. In response to claims that it just recently became safe to study sex differences in 1992, she pointed out that she wrote a whole book about sex difference research from the 70s. "With few exceptions," she says, "scientists who have taken a different road have a far more difficult time. Their work is less well-known and certainly receives less press coverage, they have a harder time finding jobs, and they often end up working in less prestigious schools, making it harder to get grant money."⁷¹ Such material disadvantages suggest a real cost to doing critical feminist work in the life sciences, in direct contradiction of sex difference scholars' claim that feminists set and police research agendas in the field.

So which narrative is better supported by the evidence? The list of more than two dozen biologists, endocrinologists, geneticists, molecular biologists, neuroscientists, psychophysicologists, and

69 *The Politics of Women's Biology*, 1–2.

70 Gross and Levitt, *Higher Superstition: The Academic Left and Its Quarrels with Science*, 108, 110.

71 *Myths of Gender: Biological Theories about Women and Men*, 258.

zoologists in this chapter's opening shows that critics of sex difference are not anti-science Luddites. They believe that the biological aspects of sex and gender are worth studying and important for non-scientists as well.⁷² But for all their intellectual care and success, feminist biologists have never reigned supreme. Politics before 2000 did not prevent the publication of sex difference research. More than that, "sex differences" has always been a more successful, dominant field of research than feminist biology. In 1997, when Baron-Cohen and Cahill felt unsafe speaking about sex differences, the author of *Men are from Mars, Women are from Venus* boasted that the book had "sold more than ten million copies" and was "a bestseller in more than 40 languages."⁷³ Indeed, Baron-Cohen credits another pop-science best seller from 1989 for his core idea about "brain sex."⁷⁴

Figure 1 shows the volume of research about sex differences and critiques of it published from 1900-2018. It is clear from the publication counts in the top panel that those in favor of sex differences have always dramatically outnumbered critical feminist publications. At no point were critical perspectives dominant.⁷⁵ The total number of scientific publications has grown exponentially over time, so the rapid growth of sex difference publications should be read with caution. The lower panel shows the same data as a percent of all publications in a given year. From it, we can see that sex difference research has been a part of English language academic publications throughout the last century. It was particularly common from 1925 to 1945, and has generally grown as a share of all publications since 1950. At its lowest points in the last 100 years, sex difference research made up a similar proportion of all scientific publications as feminist biology did at its highest points.

72 Anne Fausto-Sterling, "Building Two-Way Streets: The Case of Feminism and Science," *NWSA Journal* 4, no. 3 (1992): 336–49; Ruth Hubbard et al., "Comments on Anne Fausto-Sterling's 'Building Two-Way Streets' [with Response]," *NWSA Journal* 5, no. 1 (1993): 45–81; Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences*, 10.

73 John Gray, *Mars and Venus on a Date: A Guide for Navigating the 5 Stages of Dating to Create a Loving and Lasting Relationship*, 1st ed (New York, NY: Harper Collins, 1997), xii.

74 "The Extreme Male-Brain Theory of Autism," in *Neurodevelopmental Disorders*, ed. Helen Tager-Flusberg (MIT Press, 1999), 401–29.

75 In 1914, 1916, and 1919, there are 1-2 feminist papers, compared with 0-1 difference ones, out of approximately 13,000 papers each year. Over 5-year intervals, difference publications in this period are dominant.

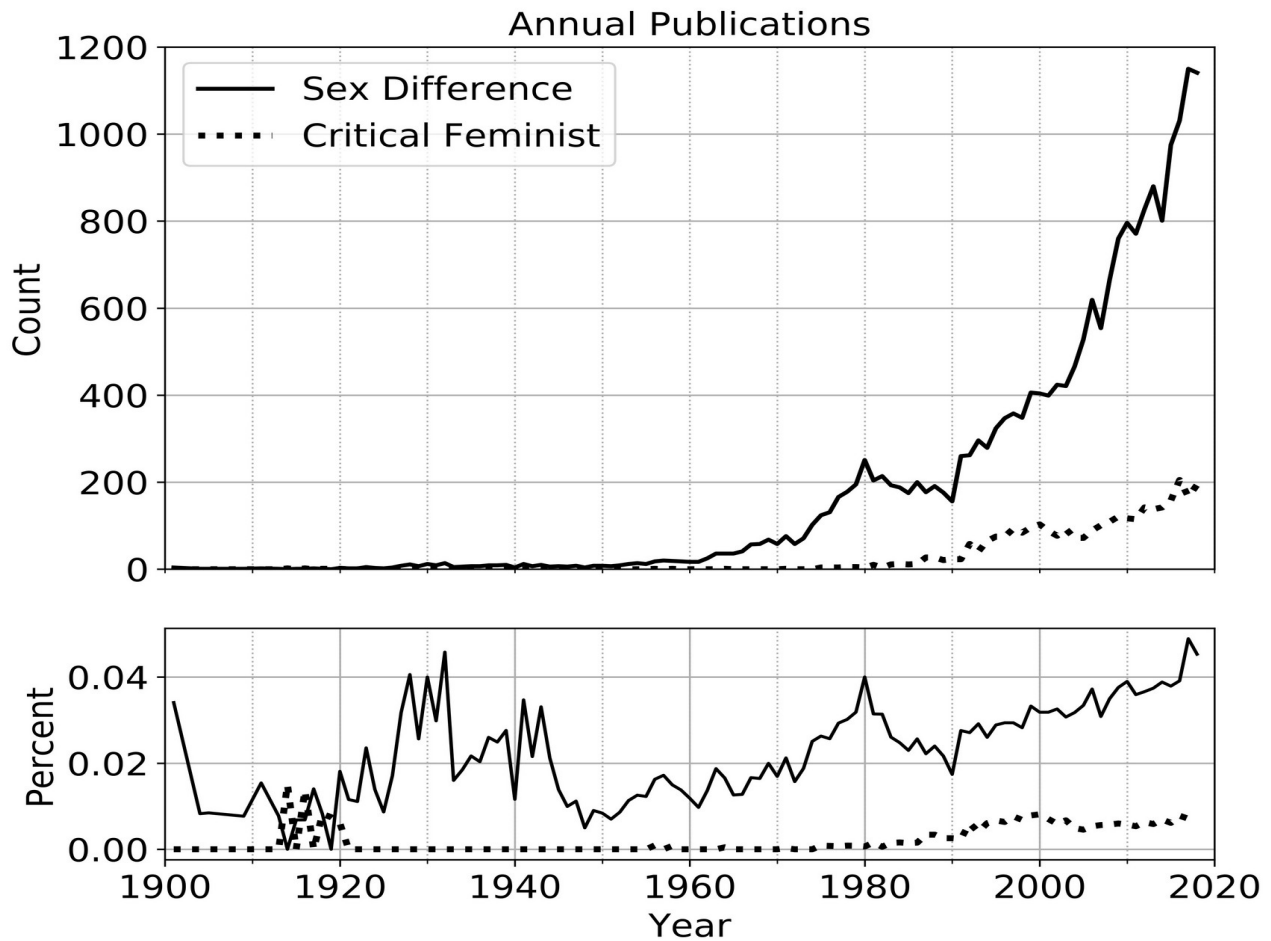


Figure 1: Publications in sex differences and feminist biology, 1900-2018. The top panel shows absolute counts, while the bottom panel shows the same data as a percent of all publications in the Web of Science Core Collection. Sex difference publications are counted as those with some variant of “sex difference,” “sex[ual] dimorphism,” or “[fe]male brain” in their title or abstract. Critical feminist publications are counted as those with some variant of “[sex/gender] similarity”; “feminis[t/m]” and also “[biology/science]”; or authored by any of a set of feminist critics. Medical and animal-only publications are excluded. If a publication matches both searches, it is counted as critical feminist only. This approach is a conservative estimate of sex difference publications’ dominance: including medical and animal publications doubles the gap; and adding difference authors, removing feminist ones, or including “gender difference” widens it as well.

These data fit well with the histories told by feminist biologists: social change and feminist movements brought more women into the academy and offered some of them tenure in the 70s and 80s. Newly secure in their positions, it became safer and more feasible to publish critiques of sex difference

literature. These early publications and career advances paved the way for subsequent generations of feminist biologists. More than that, they correspond with a ten year period of decline in publications about sex differences. This may be where some difference scholars' sense of persecution comes from. Their field really was in decline during the 80s, while feminist scholarship was on the rise. Pro-difference papers held a near monopoly before 1980, when they made up 98% of all publications on the topic. Their market share fell to just 79% of new papers in 1997, when the share of feminist critiques peaked. Still, sex difference scholarship has always been dominant, and scholars like Melissa Hines, who published sex difference research in the 80s, do not, then or now, tell the stories of being recently liberated or persecuted by "PC Police" that later generations of difference scholars tell.

The Big, Bad Social Constructionist

When they are not revising history to erase all critique or to paint themselves as the victims of powerful critics, some sex difference scientists tell a cautionary tale about the dangers of disagreeing with them, which conveniently sidesteps the need to engage with gender socialization research. This is the tragic "John/Joan Story," about a clinical patient whose real name was eventually revealed as David Reimer. Shortly after Reimer was born in 1965, his penis was destroyed in a botched circumcision. John Money and Anke Ehrhardt counseled his parents to raise him as a girl and oversaw his care. They published claiming wild success in socially reassigning gender. As he got older, however, Reimer transitioned back to living as a boy, had his penis surgically reconstructed, and eventually married a woman. He died by suicide in 2004. As sex difference proponents tell it, "the irreversibility of programmed gender identity is clearly illustrated by the sad story of the John–Joan–John case."⁷⁶ Indeed, this seems like a clear-cut case of biology trumping socialization: Reimer was born a boy, and despite many efforts to socialize him otherwise, he insisted that he was a boy.

⁷⁶ Ivanka Savic, Alicia Garcia-Falgueras, and Dick F. Swaab, "Sexual Differentiation of the Human Brain in Relation to Gender Identity and Sexual Orientation," in *Progress in Brain Research*, ed. Ivanka Savic, vol. 186, Sex Differences in the Human Brain, Their Underpinnings and Implications (Elsevier, 2010), 44.

The John/Joan Story is used for more than demonstrating the importance of biology and the impotence of socialization for gender, however. Sex difference proponents use it to argue that those who emphasize gender socialization are not only *wrong*, they are actively *harmful*. In a typical statement, Baron-Cohen says, “John Money, the infamous paediatrician of the 1960s, ignored biology at his peril, in claiming that a child's gender could be determined purely by experience.... Tragically, this dishonest sex reassignment recently led to suicide.”⁷⁷ The implication is that the people who disagree with them are not simply defying Biological Truth; they are *causing misery and suicide*. Money is figured as the quintessential big, bad social constructionist, the villain in a cautionary tale.⁷⁸

The team that led Reimer’s care acted unethically. They reported wild success in the academic literature for years when it was clear that Reimer was deeply unhappy with his gender assignment.⁷⁹ Worse, their efforts to socialize Reimer into a girl were highly traumatic, including medical deception, frequent physical and psychological examinations about his sex, and “simulated” sexual intercourse with his twin brother.⁸⁰ Many aspects of his treatment, including medically unnecessary surgery on children too young to consent, withholding medical information from patients, and frequent sexual examinations, are things intersex activists have campaigned against.⁸¹ Even though these details could be used to further demonize Money, they are left out of essentialist accounts. Reimer’s traumatic and highly unusual childhood means that the John/Joan Story is not representative of research on gender socialization or the social construction of gender. As a response to that work, it is a strawman. In order to lump their critics together and pit “biology” against a “socialization” boogeyman, sex difference proponents tell a selective history. There are also multiple cases of other babies like Reimer who had

77 “Does Biology Play Any Role in Sex Differences in the Mind?,” in *The Future of Gender*, ed. Jude Browne (Cambridge: Cambridge University Press, 2007), 92.

78 Ehrhardt was a prolific scholar with and without Money, but she is often left out due to the Matilda Effect. Margaret W. Rossiter, “The ~~Matthew~~ Matilda Effect in Science,” *Social Studies of Science* 23, no. 2 (May 1, 1993): 325–41..

79 Davis, *Contesting Intersex*; Eliot, *Pink Brain, Blue Brain: How Small Differences Grow into Troublesome Gaps - and What We Can Do about It*.

80 Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences*; John Colapinto, *As Nature Made Him: The Boy Who Was Raised as a Girl*, 1st ed (New York: Harper Collins, 2000).

81 Davis, *Contesting Intersex*.

more positive outcomes, but such cases get less attention in the media and are generally omitted from sex difference proponents' accounts.⁸² Perhaps most surprisingly, the accounts demonizing Money for denying biology leave out the fact that Money and Ehrhardt went on to become major proponents of brain organization theory and increasingly dismissive of social factors.⁸³

Beyond the John/Joan Story, proponents of sex differences have almost no engagement with the vast array research on the social aspects of sex and gender. Sociologists have long studied socialization and the social construction of sex and gender. Indeed, "Sex and Gender" is the largest section of the American Sociological Association, with more than 1,100 members. Yet one is hard pressed to find any references to the relevant sociological research in sex difference publications.⁸⁴ Even in books with sprawling 28- and 44-page reference lists, Baron-Cohen and Hines each cite just a single article from a sociology journal and each cite only eight sources with a predominantly sociological argument.⁸⁵ By comparison, Baron-Cohen cites publications where he is first author 29 times, and Hines does so 19 times. Baron-Cohen's chapter on "Culture" is primarily populated by citations to evolutionary psychologists who are critical of cultural influence.

The situation in most journal articles, where space is more limited, is bleaker still. Many simply ignore social influences on gender. Dick Swaab and colleagues frequently assert that "there is no proof that the social environment after birth has an effect on the development of gender identity."⁸⁶ In support of this claim, they offer a single citation to Simon LeVay's controversial 1990s research. Others point to a 1991 analysis to argue that there are minimal differences in how parents treat boys and girls and

82 Positive outcomes are reviewed in Heino F. L. Meyer-Bahlburg, "Gender Identity Outcome in Female-Raised 46,XY Persons with Penile Agenesis, Cloacal Exstrophy of the Bladder, or Penile Ablation," *Archives of Sexual Behavior* 34, no. 4 (August 1, 2005): 423–38. These outcomes should not be read to undermine the important critiques of unethical practice raised by intersex activists and scholars described by Davis, *Contesting Intersex*. I mention them only to demonstrate the highly selective telling of the John/Joan Story.

83 Bleier, "Sex Differences Research: Science or Belief?," 150–52.

84 Barbara J. Risman, "Calling the Bluff of Value-Free Science," *American Sociological Review* 66, no. 4 (2001): 605–11, <https://doi.org/10.2307/3088926>.

85 Baron-Cohen, *The Essential Difference*; Hines, *Brain Gender*.

86 Savic, Garcia-Falgueras, and Swaab, "Sexual Differentiation of the Human Brain in Relation to Gender Identity and Sexual Orientation," 41.

then move on.⁸⁷ Yet the same 1991 study has also been cited to show the opposite, and to clarify that similar treatment of boys and girls by parents happens only when children conform to gender expectations.⁸⁸ These latter interpretations are supported by the sociological literature.⁸⁹ Moreover, a parent-only focus ignores the broader social milieu. Children are exposed to messages about gender from parents, yes, but also from siblings, peers, teachers, and coaches; from books, movies, and television; from sex-segregated activities, clothing, and toy store isles; and from myriad other sources. As children and adults participate in a gendered world, we do not simply absorb outside influence: we actively participate in constructing group differences for any arbitrary groups we find ourselves in.⁹⁰ When scientists fail to engage with the extensive research on how social processes influence gender differences among people, they present a distorted view of the relevant, empirically grounded research on sex and gender.

Conclusion

I have focused on common examples of historical revisionism within sex difference research, but it is important to note that these patterns are not universal. Like their feminist critics, the proponents of sex difference research are a heterogeneous group with varied agendas and arguments. Some, like James Damore, Anne Moir, John Gray (author of the *Mars and Venus* series), Leonard Sax, and Debra Soh, write for a non-scientific audience. They make explicit personal, social, and policy arguments about hiring fewer women in technology firms, single-sex schools, division of household labor, or parenting style. Most scholars who publish academic work on sex differences, however,

87 Hugh Lytton and David M. Romney, "Parents' Differential Socialization of Boys and Girls: A Meta-Analysis," *Psychological Bulletin* 109, no. 2 (March 1991): 267–96.

88 Thomas Eckes and Hanns M. Trautner, *The Developmental Social Psychology of Gender* (Psychology Press, 2012).

89 For example: Emily W Kane, "'No Way My Boys Are Going to Be Like That!': Parents' Responses to Children's Gender Nonconformity," *Gender & Society* 20, no. 2 (2006): 149–76; Taylor L Field and Greggor Mattson, "Parenting Transgender Children in PFLAG," *Journal of GLBT Family Studies*, 2016, 1–17.

90 For a partial review of these complex processes, see Heidi M. Gansen and Karin A. Martin, "Becoming Gendered," in *Handbook of the Sociology of Gender*, ed. Barbara J. Risman, Carissa M. Froyum, and William J. Scarborough, *Handbooks of Sociology and Social Research* (Cham: Springer International Publishing, 2018), 83–93.

ritually distance themselves from such prescriptive, deterministic writing by telling readers, “the view that men are from Mars and women Venus paints the differences between the two sexes as too extreme.”⁹¹ Statements like these position them as part of the “reasonable middle” between extreme biological or cultural determinism. They frequently raise the same social and policy questions as their motivation, claiming they want to shed light on those debates. But after many pages arguing for innate gender differences and the natural inevitability of gender inequality in work, aggression, and caring, they stop short of answering social policy questions, leaving readers to infer the rest based on stereotypes.⁹²

Sex difference scientists’ motivations are varied. Some, like Simon Baron-Cohen, express worry about oppression and denigration of men. He says that “hopefully, in reading this book, men will also experience a resurgence of pride at all the things they can do well,” a list which includes “the most wonderful scientists, engineers,... bankers,” and “even lawyers,” compared to women’s “primary school teachers, nurses,... or personal staff.”⁹³ Scholars like Baron-Cohen are primarily concerned with differences in *abilities*, what men and women are good at and so what roles in society they should fill. In contrast, scholars like Melissa Hines are explicit that they do not see socially meaningful differences in abilities, but rather in *preferences*. Noting the well-documented placebo effect and stereotype threat influences on performance, she admonishes her colleagues: “reports that hormones cause girls or boys to perform more poorly in certain areas or limit their occupational prospects, even when erroneous, are not benign,” because such reports can cause the very outcomes they claim to describe.⁹⁴ For Hines, differences in play behavior and occupational outcomes result from innate preferences for certain kinds of activity, preferences we share with our monkey relatives, not from women’s lack of ability or from

91 Baron-Cohen, *The Essential Difference*, 9; Cahill, “Denying the Neuroscience of Sex Differences”; Hines, *Brain Gender*.

92 For a damning critique of this writing style, see Bleier, “Sex Differences Research: Science or Belief?”

93 *The Essential Difference*, 184–85.

94 *Brain Gender*, 228.

social influences.⁹⁵ Still others, like Larry Cahill, say they are motivated by a desire to ensure medical treatments are tested on women before they are approved for treatment of women.⁹⁶ As always, some scholars confound simple categorization. Alice Dreger and Sara Blaffer Hrdy, for example, have each defended and also critiqued sex difference research on both scientific and social grounds.

Almost no one in or adjacent to the scientific community has argued for the outright superiority of men over women in the last few decades. Sex difference scholars ritually invoke the refrain that “overall intelligence is not better in one sex or the other” in order to show that they, and science, are not sexist.⁹⁷ Superiority may exist in particular abilities or interests, but overall men and women are “equal,” just not “the same.”⁹⁸ Amusingly, the scientific “truth” that men and women have equal average intelligence is a deliberate choice on the part of intelligence scientists. It is “socially constructed” in the most straightforward way. Intelligence testing and measurement was long controlled by eugenicists for the purpose of demonstrating the superiority/inferiority of ethnic, class, and gender groups.⁹⁹ Later tests were revised to minimize group difference rather than establish it. Now, questions on intelligence tests are included either if they show no gender difference in performance or if they show a small difference that can be balanced out by another question. Questions showing large gender differences are thrown out.¹⁰⁰ Scientists have “the ability to construct valid measures of intelligence that would favor either sex,” but deliberately chose to find sameness instead.¹⁰¹ So, if sex difference scholars are right, and modern science is “not sexist” because it finds that women

95 For critique, see Erin A Cech, *The Passion Principle* (Univ of California Press, Forthcoming).

96 This motive does not explain his vitriolic review of Rippon’s book, which is about the social rather than medical implications of biological sex. For more on sex difference motives and meanings in medicine, see Epstein, *Inclusion*.

97 Baron-Cohen says this to show he is different from Le Bon, the 19th century scientist he criticizes Rippon (2019) for bringing up. Baron-Cohen, *The Essential Difference*, 10.

98 For example: Cahill, “An Issue Whose Time Has Come”; Pinker, *The Blank Slate*.

99 Gould, *The Mismeasure of Man*.

100 Diane F. Halpern, *Sex Differences in Cognitive Abilities*, 4th Edition (New York: Psychology Press, 2012); David Wechsler, *The Measurement and Appraisal of Adult Intelligence*, Fourth Edition (Baltimore: Williams & Wilkins, 1958).

101 Hines, *Brain Gender*, 211.

and men have the same general intelligence, then *modern science is not sexist because scientists chose not to look for sex differences*.

Opposition to the Sex Difference Paradigm in scientific research is not made up of powerful, anti-science ideologues out to enforce “political correctness.” Rather, feminist biology is made up of those who care deeply about and thoughtfully engage with research on sex and gender. They call on their colleagues and the public to avoid the scientifically unsound rhetoric of essential, innate, and categorical differences and the socially harmful effects that rhetoric has. The solution is more and deeper engagement with the science of sex and gender, not less. And that engagement must include a fuller, more accurate picture of the field’s history and citational practices.

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