

Sarah S. Richardson
Sex Itself: The Search for Male and Female in the Human Genome
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Sally Haslanger (Massachusetts Institute of Technology)

Sally Haslanger is Ford Professor of Philosophy and Women's and Gender Studies at MIT. She specializes in metaphysics, epistemology, feminist theory, and critical race theory. Her book *Resisting Reality: Social Construction and Social Critique* (Oxford, 2012) won the Joseph B. Gittler award for work in philosophy of the social sciences. In 2013-14, she served as the President of the American Philosophical Association, Eastern Division, and in Spring 2015 she held the Spinoza Chair at the University of Amsterdam.

In recent years, the sex/gender distinction has been repeatedly challenged by arguing that sex, as well as gender, is socially constructed. Social-constructionist claims, as we know, can be interpreted in a variety of ways. But on any account, it remains a challenge to understand what sex is, to what extent it is a meaningful anatomical distinction, and how patriarchal and heteronormative values have played a role in the science of sex. *Sex Itself* is an important contribution to debates in feminism and science studies over the purported biological, and specifically genetic, distinction between males and females.

Richardson's discussion focuses on genetic theories of sex, covering scientific literature from the turn of the twentieth century to the present. Her summaries of the science are accessible, beautifully written, and compelling (plus, the illustrations are excellent). I could hardly put the book down. In this review I will comment primarily on Richardson's contributions to feminist philosophy of science and feminist theory more generally.

Very broadly, Richardson follows in the tradition of feminist empiricism led by Ruth Bleier, Evelyn Fox Keller, Helen Longino, John Dupré, Anne Fausto-Sterling, Elizabeth Anderson, and others. According to feminist empiricism, scientific theories should aim to be empirically adequate and satisfy other epistemic norms, but contextual values play a legitimate role in both the context of discovery and the context of justification. (Although some reject the distinction between the contexts of discovery and justification, it is useful here to frame her work in these terms.) In the context of discovery, the questions motivating inquiry, the selection of data, the interpretation of data, and the presuppositions linking data with theory all reflect values that the scientist brings to research. Considered in this general form, the claim that contextual values influence scientists is not controversial. But it takes close analysis of scientific practice to see what values are influential in a particular scientific debate and how they make a difference.

In the context of justification, the main question is what, other than being empirically adequate, justifies a theory? It is well established that theories are under-determined by data (multiple theories may be empirically adequate). Feminist empiricists (and others)

argue that contextual values and other background cultural assumptions are relevant to bridging the data-theory gap. (Longino 1990). For example, medical research employs the concept of a *pathogen* because such research legitimately places value on human health. On this view, values do not stand in the way of objective inquiry; rather, certain kinds of value-laden research can enable us to develop better theories. Theories, after all, are not just lists of facts. The point of theorizing is to discover and organize significant facts. Although we must be ever-attentive to problematic forms of bias and partiality, the influence of illegitimate values, false background assumptions, and failures to actually achieve empirical adequacy, value-laden theorizing enables us to understand features of the world that legitimately matter (Anderson 1995).

Richardson's work makes important contributions to both of these dimensions of feminist empiricism. *Sex Itself* covers in detail debates over sex differentiation and explores their historical and social development. In doing so, Richardson is able to highlight ways in which assumptions that matter to the trajectory of research--at least in the context of discovery--are imported from contextually salient views about sex and gender. For example, the idea that sex is binary played an important role in the research project seeking the "master gene" for sex differentiation (chapter 7); the idea that females are unpredictable and capricious played a role in theorizing the role of the X chromosome (chapter 6); the idea of a "war between the sexes" continues to play a role in theorizing the role of the Y chromosome (chapter 8); and an investment in the significance of sex difference (as opposed to a more fundamental human similarity) plays a role in a broad range of sex-based biology (chapter 9).

Richardson's analysis does not presuppose that all of these assumptions are false. For example, it might be, after all, that sex is binary--and on her ultimate view there is truth to that claim. Rather, the question is how the claim that sex is binary (and other assumptions and values that are imported from the social context) functions within the research program. Is it a guiding assumption that restricts consideration of other alternatives, or is it a theoretical conclusion that has greater explanatory value than the competitors? Richardson calls this form of analysis that highlights the *role* of gender in inquiry *gender criticality* (17). Gender criticality or gender critique does not aim to eliminate the influence of values or gendered assumptions--this she regards as both unnecessary and unwarranted--but to identify how they function in research. On her view, as with other feminist empiricists, the goal is not "value-free" inquiry, but unbiased inquiry. Unbiased inquiry allows values to play a legitimate role in science, both in motivating the question and adjudicating the adequacy of the answer. Returning to the example of medicine: medicine is legitimately guided by a concern for human health and well-being, and the adequacy of its classification of an agent as pathogenic is assessed relative to such values (Anderson 1995). Nevertheless, we can criticize theories that rely on inappropriate values or that cherry-pick facts, either resulting from or leading to a biased point of view.

Sex Itself is especially noteworthy in its careful examination of the role of contextual beliefs and norms about gender in genomics. Those working on race have devoted considerable attention to genomics, but there has been less attention by feminists. However, Richardson's contribution is not simply an application of well-developed feminist strategies to a new area

of science. Richardson makes a compelling case that competing background views about gender contribute to fruitful discussion and *better* science. For example, reflecting on debates between David Page and Jennifer Graves over the role of the Y chromosome--whether the Y is on the decline or has a unique ability to regenerate--Richardson argues that their research has been enriched by the cultural controversies in the background, for example, over the future of men in the "postfeminist" era. Although Richardson grants that sometimes the debate is rhetorically excessive, it has nonetheless led to new questions, a closer scrutiny of competing claims, and more fruitful hypotheses than it would have otherwise. This is a counterfactual thesis that is hard to evaluate. However, it is a significant move to highlight an example in which insulating science from the contextual values in the background is not the way to promote better science.

Even if we grant Richardson that the context of discovery is enriched by social and political debate, one might question how "better" science in this sense is related to justification. Debates fueled by background cultural commitments may be especially fruitful, but the question remains whether it is possible to settle a debate between opposing theories drawing on opposing background assumptions. Won't they ultimately just talk past each other? How does the recognition of the differing background assumptions and values contribute to theoretical adequacy or theoretical justification? Richardson takes up these issues. For example:

As the case of theories of Y chromosome evolution shows, changes in the gender system should not lead us to expect gender to one day disappear from the intellectual background of the science of sex, nor is it advisable to champion an unrealistic "gender-neutral" science. Gender conceptions--feminist, masculinist, antifeminist, and beyond--are an inevitable backdrop to the science of sex, and they can play a constructive role in science when they are subject to criticism. In light of this, our aim should be to construct a gender-critical practice of science in which debate about how gender conceptions valence scientific language, theories and models is welcomed in the course of normal scientific practice. (175)

The philosopher in me is keen to know more about how we should evaluate the opposing theories and whether it is always good to have a raging controversy of this kind. Is the idea that we let each project run its course--spurred on by critical engagement with the opposing view--until one side can be shown to be empirically inadequate? I would venture that we (scientists, philosophers, and others) should undertake a close investigation of the precise assumptions--not the rhetorical grandstanding--underwriting the theories in question. In many cases, such investigation would likely yield that the opposing sets of assumptions are not equally justifiable. Such evaluative and gender-coded disagreement, then, would promote good science only during a phase of inquiry when the opposing background assumptions both have *prima facie* plausibility. We must be judicious about the kinds of disagreement that are worth engaging. (I assume that Richardson would agree.)

On a side note: As Richardson sketches the debates between Page, Graves, and others, she argues that gender critique (and feminist methods more generally) have become normalized in studies of sex differentiation. This is, in part, why the debate over the Y chromosome can

be as explicitly political as it is. Although it is not part of Richardson's agenda to theorize disciplinary change, as a woman in philosophy (a much more male-dominated field than the fields she is discussing), I found it especially useful to see her analysis of the stages of incorporation of gender as a factor in scientific inquiry (for example, 131-33). This, I'm sure, is an aspect of Richardson's work that will hardly be noticed by most readers. However, it is tremendously useful for those engaged in feminist interventions into mainstream research that has failed to incorporate the insights of feminism. This is perhaps one reason I resist her use of *postfeminism* to characterize our current moment. Even if feminist insights have been normalized in sex difference research, this does not entail that we (or they) have reached a "postfeminist" stage. I suspect that she would agree about the general point, even while using the term *postfeminist* as a label for a phase in the history of the biology of sex.

In addition to her historical and cultural analysis of ongoing debates over sex differentiation, Richardson offers a positive account of sex--what sort of thing sex is. Within feminist debates over sex/gender, this is a huge issue (Fausto-Sterling 2000). There are many who reject the sex/gender distinction, arguing that there is no such thing as sex that, supposedly, underlies gender. There are others who allow that there are sex differences, but that they are fluid and lie on a continuum. Some claim that sex exists but that it is socially constructed, not natural. Richardson's effort to characterize sex--in her words, "gametic sex" (199)--is an extremely important contribution to feminist debates, especially given her expertise in the scientific literature.

Richardson argues that sex is a "dynamic dyadic kind" (197-99). What does she mean by this and what is her argument? She says:

There are differences between properties of a population, properties of a pair, and properties of individuals. Thinking about "sex" requires paying attention to these differences. Sex is a relational property of individuals within a (sexual) population or species. . . . While sexes are frequently explicitly or implicitly analogized to populations within a species, sex is not simply a property of individuals, nor is it simply a subclass. . . . From the perspective of evolutionary and population genetic modeling, sex is an irreducible dyad. Moreover sex is relational. The sexes are not fixed and dichotomous subclasses within a population, but in dynamic interdependence and interaction with one another. Genetically, sex is a dynamic dyadic kind. (197)

This passage (and those surrounding it) is puzzling. She suggests that sex is a "relational property of individuals," it is an "irreducible dyad," and it is a "dynamic" kind. What is the ontology here? In what sense is (gametic) sex a relational property of individuals? Does she mean that sex is a relation *between* individuals? Other relations between individuals include: being larger/smaller than, being inside/outside of, being a genetic ancestor of. Is sex a relational property of any of these sorts? If so, then it would seem that for me to be female is for me to stand in a relation to another individual, presumably male. But this is clearly not what Richardson has in mind. Rather, the relevant relationality seems to be at the level of classes. She says:

This insight that sexes, not as individuals, but in some substantial way, *as a class*, are paired and interdependent, forms the kernel of the concept of sex as a *dynamic dyadic kind*. . . . (197; italics in original)

Idealizing sexes as different classes, or kinds, rather than as continuous, interdependent, interacting classes, contributes to lazy sex difference claims. (198)

Richardson is looking for a way to resist the idea that one can identify a class of individuals as sexed, without identifying another set as having a different sex; being sexed is always one of two (or more) ways to be. The individuals need not each be sex-related to another individual of a different sex, but the category of male, say, is impossible or incoherent without there being a category of female (or at least some other sex). How might we capture this?

One model would be functional. Consider doctors and patients. It is the function of a doctor to heal patients. The existence of doctors requires the existence of patients, but it is also possible for there to be a particular doctor without any patients. Similarly, the existence of males requires the existence of females; what it is to be male and to be female is to be such that it is possible to sexually reproduce with one of the other sort. But it is possible for any particular male or female not to reproduce. The postulated relation between the sexes is not merely conceptual (one might argue that in the case of doctors and patients the *concepts* are interdependent). Consider a heart. The function of the heart is to pump blood. So there cannot be hearts without there also being blood. An organ is a heart because it has the proper function of pumping blood and is morphologically similar to organs that do, even if it stops doing so (or never did?). And it would make no sense to do cardiology without (at least some) hematology.

Richardson never mentions function, so it isn't obvious that functional interdependence is what she has in mind. (Given that *functionalism* has earned a bad name in some domains might partly explain why she avoids the term.) Interpreting her by using the notion of function also leaves it mysterious why she calls sex a "dyadic kind." Doctors + patients, heart + blood are not kinds, dyadic or otherwise. Nor is it clear in what sense a functional interdependence can be understood as "relational properties of individuals." Nonetheless, Richardson leaves hints that what's crucial to her account is that the sexes are *together necessary* (at least given current biological facts) to achieve reproduction:

In mammalian biology, the union of two different gametes--male and female--is required for reproduction, and the two sexes present reliably different morphology and behavior arising from their reproductive roles. . . . While it is essential to acknowledge the plurality and social contingency of sex and gender forms, the (present) necessity of male-female pairing for reproduction requires a different approach to the biological concept of sex. (199)

Perhaps this is her idea: The function of the sex is reproduction, and in the case of humans,

two sexes are required; but the particular features distinctive of sexual difference as we know it are not necessary. If we take her account to treat the dyadic nature of sex as functional, then her claim that sex is "dynamic" makes sense. Just as the heart may evolve in different ways and remain a heart as long as it functions to pump blood, the sexes may evolve in unexpected ways and remain sexes, as long as they function to reproduce the species. This allows Richardson to be open, temporally, to sex being "fluid." However, she notes that on her view, sex is binary (at least for the imaginable future), even though it is expressed in a plurality of ways. Thus, I suggest that the best interpretation of Richardson's account treats sex as serving the function of reproduction: roughly, males are those that [can] function biologically--given current human biology--to reproduce with females, and *mutatis mutandis* for females.

Although I have some concerns, as noted, about the clarity of Richardson's analysis of sex, her defense of it is compelling. On one hand she wants to acknowledge the "gametic reality" of human (mammalian) dependence on sexual reproduction, while also resisting the temptation to treat the sexes as distinct kinds, populations, or species. This is consistent with the ongoing feminist effort to understand sex and gender as relational. Although some might resist the suggestion that to be female (or male) is to have a function in sexual reproduction, such resistance, I believe, would be grounded in ordinary understandings of and identifications with *femaleness*, rather than a scientific meaning of *sex*. I don't see any tension between Richardson's account of sex and feminist efforts to relieve women of assumptions concerning our proper *social* function in hearth and home.

Sex Itself is not only valuable as a model of feminist empiricist work, but it is also courageous. Richardson takes the science seriously and follows its implications, even if it conflicts with trends in feminist theory; she takes feminist work seriously and applies its methods to critique scientific research. A further example of the latter are her arguments against sex-based biology from the perspective of the women's health movement (chapter 10). Those invested in sex-based biology themselves claim women's health as a priority. However, being aware of and sensitive to the issues in race-based medicine, and drawing on longstanding feminist activism around women's health, Richardson is not convinced that sex-based biology is in women's best interest. She lays out the issues clearly and sounds an important cautionary message.

Overall, *Sex Itself* is an important contribution to feminist scholarship. It engages a broad interdisciplinary literature and makes valuable and original contributions to multiple debates. It will have a significant impact in feminist philosophy of science, and feminist theory more broadly.

References

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