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A Science Like Any Other: A Peircean Philosophy of Sex?[1]

Abstract: This chapter argues that a Peircean philosophy of sex offers a non-reductionist approach to sex as a biological category. The chapter surveys traditional biological accounts of sex categories and several social constructivist accounts of sex. It then provides an overview of Peirce's scholastic realism and his ethics of inquiry. While Peirce regarded the distinction between the sexes as a rare "polar distinction", the chapter works to recover the nuanced view of sex that Peirce ought to have adopted had he extended his scholastic realism to reproductive biology. Ultimately, the Peircean account offered treats sex differences as norms expressed as bimodal distributions. The chapter concludes by illustrating some applications of this Peircean philosophy of sex, and gesturing to those that we can yet barely imagine.

Keywords: Charles S. Peirce, sex, science, metaphysics, intersex, social constructivism, scholastic realism, health, biology, gender

If you have spent any time on social media since 2018 or so, you may have noticed an uptick in references to the science of sex. This increase corresponds to a massive increase in the attention to and increasingly polarized debate about trans issues in recent years within media and social media. A common trope within those debates – especially on social media – is the rhetorical invocation of science by both sides. Science shows that there are only two sexes, claims one side, pointing to chromosomes and gametes. Science shows that sex is a continuum, claims the other, pointing to hermaphroditic non-human species and intersex human beings.[2]

To a considerable degree, these latter pleas to understand biological sex "beyond the binary" reflect an explosion of scholarship on the philosophy of sex over the last thirty or so years.[3] In various ways, historians of medicine, feminist biologists, sociologists of science, and philosophers, among others working in this area have challenged traditional accounts of biological sex. This literature has served as an important corrective to the binarism and gendered ideology inherent in those accounts. However, the anti-realism about biological sex taxonomies that is endemic within these critical studies arguably neglects biological evidence of similarity among members of a sex, evidence of differences between the sexes, and practical (including clinical) deployments of sex categories.

In this chapter, I survey five scholarly challenges to the "standard view" of biological sex, all of them in some sense anti-realist. I then argue that our science of sex can be appropriately critical without necessarily being anti-realist. In other branches of science, it is possible to acknowledge both the historical contingency of scientific

practice and theory choice, and the rich complexity of data while retaining a broadly realist metaphysics.

Debating whether or not intersex conditions are appropriately termed "Disorders of Sex Development" (DSD), Ellen Feder and Katrina Karkazis argue that as a clinical umbrella term, DSD has the merit of treating intersex as "disorders like any other" rather than "disorders like no other."[4] Both the DSD appellation and Feder and Karkazis's defense of it are controversial due to the pathologizing connotation of "disorder".[5] I here remain agnostic on that aspect of Feder and Karkazis's argument but adopt and adapt their view to argue that that neither sex nor sex variation demand *sui generis* clinical or scientific treatment. Put simply: the science of sex ought to be *a science like any other*. Moreover, if it is a science like any other, then it must in principle be possible for well-informed, properly critical theorists to be realists about it.

I propose that the scholastic realism of American pragmatist Charles Sanders Peirce can handle our best evidence about the complexity of sex in a way that is rigorous and useful, but that does not efface, exclude, or pathologize members of the population with non-typical sex traits. I sketch the beginnings of a Peircean philosophy of sex, attending in particular to Peirce's so-called scholastic realism – his view that reality comprises individuals, laws, and possibilia. I argue that scholastic realism as applied to sex helps us to understand sex as bimodal rather than binaristic. While Peirce himself was uncharacteristically (for him) binaristic about sex categories, I work to recover the nuanced view of sex that Peirce ought to have adopted had he extended his scholastic realism to reproductive biology. Ultimately, my Peircean account treats sex differences as real but continuous rather than discrete.

1. Binaristic biology

In recent decades, the nature of gender and the relationship between gender and biological sex categories have both been problematized in important and useful ways. However, it is with sex – the biological category whereby we deploy various markers to distinguish between male and female organisms – that I am in particular concerned in this chapter. That is, I am here interested in the categorial demarcation made in biology on the basis of such features as sex chromosomes, hormonal production and reception, gonad type, and phenotypic features such as genitalia, mammary glands and facial hair. What exactly is it to be biologically male or female? More fundamentally, do the categories *male* and *female* carve nature at the joints?

In general, scholars offer two broad classes of answers to these questions. The first of these is traditional reproductive biology, which is in general committed to the view that there really are just two sexes and that the binarism of sex categories simply reflects this fact rather than reflecting underlying biases.

Historically, this view is notoriously evident in Geddes's and Thomson's still influential characterization of female metabolism as anabolic (conserving energy and hence passive) and male metabolism as catabolic (expending energy and hence active). Geddes and Thomson's cell biology grounds their biodeterminism, which is encapsulated in the most oft-quoted passage from their 1889 *The Evolution of Sex*:

> We have seen that a deep difference in constitution expresses itself in the distinctions between male and female, whether these be physical or mental. The differences may be exaggerated or lessened, but to obliterate them it would be necessary to have all the evolution over again on a new basis. What was decided among the prehistoric Protozoa cannot be annulled by Act of Parliament.[6]

While contemporary reproductive biology typically avoids polemics like that of Geddes and Thomson, it largely retains their conviction that there are two heterogeneous sexes, a view that sometimes requires some shoehorning of the evidence.

Consider, for instance, the quickness with which sexual binarism is projected onto simultaneous hermaphroditic species – that is, species each member of which throughout its life cycle produces both male and female gametes – or, less tendentiously, two different types of gametes.[7] Here, for example, is a much-reproduced popular science description of the mating behaviour of hermaphroditic flatworms:

> During penis fencing, each flatworm tries to pierce the skin of the other using one of its penises. The first to succeed becomes the de facto male, delivering its sperm into the other, the de facto female. For the flatworms, this contest is serious business. Mating is a fight because the worm that assumes the female role then must expend considerable energy caring for the developing eggs.[8]

Notice that the account just quoted assumes that reproduction necessarily involves not just male and female organs and gametes but male and female *organisms* – that even hermaphroditic organisms that simultaneously produce both sperm and ova are *de facto* male or female roles. Only a bias in favour of sexual binarism could explain imposing such a description on a hermaphroditic species.

Some biologists resist this binarism. In the early 2000s, interdisciplinary biologist Joel Parker made waves in popular science publications with his research on genetic caste determination in harvester ants and his suggestion that some harvester ant species have more than two sexes. While the species have only two phenotypic sexes, Parker argues that, "from the perspective of the number of gametic types required to make individuals in the population (functional definition) and the number required to prevent demographic extinction (stability definition)," the species have more than two sexes.[9] While Parker

argues that some harvester ant species have more than two sexes, he nonetheless maintains that "sexual systems appear to be a binary process at some fundamental level."[10] Parker characterized his harvester ant discovery as evidence of a "major evolutionary transition." However, his view seems not have been widely taken up outside of popular science venues. Still, Parker's work was part of a new focus on genes and chromosomes in the biology of sex that emerged in the early 2000s with the completion of the Human Genome Project.

In her 2013 book, *Sex Itself,* Sarah Richardson documents the influence of gender biases on research on the biology of sex. On her account, these biases led, and still lead, biologists to take sex binarism for granted, and have in recent years encouraged the view that genetics and genomics might reveal "sex itself" – that is, a rock-bottom fact of the matter about sex categories. Richardson characterizes the history of sex chromosome research as a "history of contestations" in which, in the face of partial empirical evidence, scientists fell prey to the influence of gender biases.[11] In particular, she argues, they assumed rather than discovered chromosomal sex binarism. She focuses on genetic and genomic research to offer a feminist critique of the science of sex, and ultimately a careful, nuanced understanding of sex categories. As part of her positive project, Richardson develops a sophisticated account of the sexes as "dynamic dyadic kinds" (as opposed to species, which are individual kinds) while offering a caution about the risk of the future encroachment of gender biases into sex science, including via feminist sex-based biology.[12]

2. Critical sex studies

Where traditional reproductive biology, including the post-genomic biology Richardson documents, tends to be binaristic and uncritically realist, the trend within what we might term "critical sex studies" is to deny (or problematize) binarism and to adopt some variety of anti-realism about sex. It is worth spending a bit of time here attending to some of the ways in which this second broad approach to sex taxonomies has played out in sex and gender scholarship.

On the face of it, critical sex studies is a reaction to the binaristic sex science we considered in the previous section. However, it is similarly resistant to a too-tidy demarcation between sex and gender that emerged in mid-twentieth century feminist scholarship in the wake of Simone de Beauvoir's provocative query, "Are there even women?"[13] That twentieth century bifurcation between sex and gender holds that sex as a biological category is fixed and inevitable while gender is a more fluid psycho-socio-cultural epiphenomenon. In various ways, critical sex scholars invert this picture. They argue that the construction of sex categories and the conduct of the science of sex are influenced by beliefs and norms about gender, and thus that sex supervenes on gender and is neither fixed nor inevitable.

For Suzanne Kessler, our historico-culturally situated beliefs about gender inescapably influence our interpretations of biological evidence.[14] A case in point: her 1990 study of neonatal gender (re)assignment[15] among infants with ambiguous genitalia revealed that the Freudian phallocentric biases of clinicians frequently led to gender (re)assignments being made based on the size of the phallus rather than, for instance, chromosomal character. For Kessler, our judgments about sex taxonomies are so deeply

gendered, and gender is so complex, that it is not possible to demarcate between sex categories and gender categories.

Thomas Laqueur's *Making Sex: Body and Gender from the Greeks to Freud* (1990) surveys medical history to arrive at a very similar conclusion to Kessler's.[16] Laqueur deploys the seeing versus seeing-as distinction in a persuasive case that physicians and biologists in any historical period cannot help but interpret evidence of reproductive biology in light of prevailing biases. Under the sway of Aristotelian and Galenic accounts of reproduction, Laqueur tells us, medieval anatomists saw – literally *saw* – vaginas as internal, inverted penises. The Aristotelian model treated males and females as two tokens of the same reproductive type but regarded females as underdeveloped males. The view went that all males and females perform broadly the same reproductive functions, but males perform them better. This treatment of male and female reproductive biology as isomorphic eventuated in the medieval view that both men and women must achieve orgasm in order to conceive offspring. This, appallingly, led to the view that females who became pregnant because of a rape were in fact willing participants in the rape and hence blameworthy for it.

Laqueur argues that new epistemological and political developments in the Enlightenment led to a shift away from the Aristotelian-Galenic model, in which male and female bodies were seen as "hierarchically, vertically, ordered versions of one sex" to a new model in which they were seen as "horizontally ordered opposites, as incommensurable."[17] For Laqueur, this modern conception of sex difference, while more familiar than the medieval one, is historically contingent, just as its predecessor was. On

Laqueur's view, biological science reflects and reproduces the historico-cultural context in which it is produced.

Anne Fausto-Sterling is perhaps the most influential contemporary theorist of sex taxonomy. In her famous "The Five Sexes: Why Male and Female Are Not Enough" (1993), Fausto-Sterling argues that the incidence of female pseudo-hermaphroditism, male pseudo- hermaphroditism and true hermaphroditism entail that there are actually five rather than two human sexes.[18] While conservative critics read the article as evidence of a creeping queer feminist agenda, scholars like Kessler argued that Fausto-Sterling's five sex model was oversimplified – that given the rich sexual variation among humans (and, in particular, given the wide array of varieties of intersex) – there are many more than five sexes. Fausto-Sterling herself later described her 1993 article as intentionally provocative and tongue in cheek.[19] In later work, Fausto-Sterling cites the wide range of human sexual variation in support of a continuum account of sex. She writes:

> Complete maleness and complete femaleness represent the extreme ends of a spectrum of possible body types. That these extreme ends are the most frequent has lent credence to the idea that they are not only natural (that is, produced by nature) but normal (that is, they represent both a statistical and social ideal). Knowledge of biological variation, however, allows us to conceptualize the less frequent middle spaces as natural, although statistically unusual.[20]

In her *Hermaphrodites and the Medical Invention of Sex* (2000), Alice Domurat Dreger traces the history of intersex people and argues that sex category criteria are always historically contingent.[21] She regards the period 1870-1915 as "the Age of Gonads" – a time when, in cases of ambiguous genitalia, physicians and jurists used gonadal tissue to decide the matter of subjects' sex. An intersex person with testes was regarded – medically and legally – as male; an intersex person with ovaries was regarded as female. With the twentieth century, however, scientific and technological advances

and changes in social mores led to a shift in the treatment of intersex people. Microbiology made it possible to determine sex based on chromosomal character, and women's increasing participation in the workforce (and the development of the birth control pill) made reproduction more or less optional. The gonads thus came to be seen as less important in sex assignment, and chromosomes became the chief marker for sex.

In a little-known 2011 study, philosopher Jill Oliver argues in favour of adopting what she terms a "multi-dimensional" account of sex.[22] Inspired by Sandra Bem's (1974)[23] and Christopher Kilmartin's (2000)[24] account of gender, and in particular their characterization of masculinity and femininity as independent dimensions, Oliver's multidimensional model treats male and female as orthogonal to each other rather than as opposites. Thus, a single organism might possess both highly male and highly female traits. For Oliver, "sex" is an umbrella term for a number of distinct biological traits, such as chromosomal character, hormonal production and reception, genital anatomy, etc. On Oliver's account, these are independent traits, united by convention, not by any real mind-independent category. Oliver argues that "parts" are sexed – that vaginas are female, for instance, and xy chromosomes male – but she denies that people have sexes. She terms this the "parts not people" view. Biologically, she argues, we are all clusters of male and female parts. Some of us possess the parts of only one sex; others possess a mixture. Further, Oliver recognizes that some parts, for instance ambiguous genitalia, may not be exclusively male or female. Thus, the "parts not people" view is primarily a critique of the sexing of whole bodies rather than an argument in favour of sexing parts of bodies. Moreover, Oliver argues that for many of us – including trans people, women who undergo hysterectomies, etc. – the cluster changes over the course of a lifetime.

3. Beyond critical sex studies: a Peircean philosophy of sex

There is much that is no doubt right about the critical sex scholarship I have just sketched. It is surely true that scientists' and clinicians' historico-cultural biases affect their judgments about sex. Moreover, there is indeed wide variation in sex trait expression within and across species. This variation raises serious challenges to a binaristic account of sex.

However, it is not at all clear that nominalism about sex is the right scientific attitude. In other branches of science, it is possible to admit the historico-cultural contingency of scientific practice, and to admit the rich complexity of the phenomena under examination without necessarily plumping for anti-realism. Conversely, it is possible to assert an anti-realist position without recourse to historicism or worries about complexity. In the philosophy of science, metaphysics and epistemology often come apart.

Moreover, it might be argued that the critical sex scholars whose views I have just described pay too much attention to sexual variation and theory change and too little attention to statistical commonalities and theory resilience. While our science of sex has no doubt evolved (or, on Laqueur's account, undergone revolutionary change), the broad sex categories have remained remarkably stable over time. Further, while we are today better at understanding the tails of the sexual bell curve, the fact remains that the majority of the human population clusters within the bell of the curve.

I think that critical sex studies' movement toward historicism and attention to outliers within the population is a useful corrective to the deeply ideological, uncritically

binaristic work on sex that often goes on in the life sciences. However, it cannot be the whole story, and ought not to become the new orthodoxy. At the end of the day, if the science of sex is to be good science, then it should arguably be a science like any other, not a science *sui generis*. Thus, it should be subject to broadly the same norms and values as other sciences. In particular, it should be as attentive to convergence and stability as it is to variation and change. I want to suggest that Peirce's scientific metaphysics gives us the tools we need to take the next step in sex science. In this section, I sketch the beginnings of a Peircean philosophy of sex.

Despite a growing interest in pragmatism among feminist and queer theorists, Charles Sanders Peirce's work is seldom deployed in the context of sex and gender studies. One reason for this may be Peirce's own uncharacteristic binarism about sex. Peirce regarded male and female as one of the few pairs of true opposites in the world. In an undated fragment, he wrote that "...in the external world polar distinctions are few. That of past and future ..., with the right and left sides of our bodies, and the two sexes, seems pretty much to exhaust the list of them...."[25]

Admittedly, this remark was a one-off and not the expression of a well-developed view, but it is in some ways out of character for Peirce. As I note below, he elsewhere refused to draw a sharp distinction between life and death or between mind and matter due to his view – which he termed *synechism* – that all of reality is ultimately continuous. While his description of the two sexes might seem to suggest a non-synechistic understanding of sex, it is worth pointing out that his other examples in the above quote show that Pierce regarded at least some polar distinctions as continuous rather than discrete. After all, the past is continuous with the future, and the right half of the body is

continuous with the left half.[26] Possibly, therefore, he regarded male and female likewise as polar but continuous distinctions.

Peirce's fallibilism and his commitment to leaving paths of scientific inquiry unblocked by dogmatism prevented him from asserting synechism as an "ultimate and absolute metaphysical doctrine,"[27] but it was certainly a metaphysical working hypothesis for him and served as an important normative ideal for his metaphysical enquiries. Peirce's commitment to the principle that *natura non facet saltus* led him ultimately to reject the law of excluded middle, and to develop an early three-valued logic, as well as undergirding his openness to non-Euclidean geometries. Synechism led Peirce to regard all persons as constituting a single communal person,[28] to treat mind and matter as different degrees of the same thing,[29] and to entertain the possibility of an afterlife.[30] Thus, the doctrine of synechism had important consequences not only for Peirce's metaphysics, but also for his ethics, philosophy of mind, and philosophy of religion. He predicted that synechism would one day "play a part in the onement of religion and science."[31]

Peirce's synechism was at the heart of his doctrine of scholastic realism, the metaphysical position that he claimed would "go far toward supplying the philosophy which is best to harmonize with physical science."[32] In brief, for Peirce, scholastic realism is the view that reality consists of three fundamental ontological categories – which he termed *Firstness*, *Secondness*, and *Thirdness* – all of them real.

Among these, Secondness is the easiest to grasp. It refers to individuality, definiteness, action, and reaction. By contrast, Firstness is the category for possibility, chance, quality, and feeling. Where Secondness picks out some particular thing in the

universe, Firstness is prior to any particular thing. It represents possibility not yet actualized. It is not a "this" but "some". It is vague in the sense that the unactualized possibility could turn into this or that. Finally, Thirdness is Peirce's category for relation, law, habit, necessity, and mediation. Where Secondness is definite and Firstness is vague, Thirdness is general: laws, habits, and relations all imply more than one instance. Secondness refers to *this*, Firstness refers vaguely to *this or that*, and Thirdness refers generally to *these*.

An example may help to make sense of Peirce's triadic system. Consider a black horse, Bucephalus. We experience the blackness of the horse qualitatively. This quality alone is insufficient to pick out the individual or the species. Some other horses and some other non-horses are also black. Our sensation of blackness raises the possibility of Bucephalus and of horses, but also of other things, like frying pans and deep shadows. In this respect, it is vague. This is Firstness. Bucephalus – this particular horse – occupies the category of Secondness. *Qua* being this particular horse, Bucephalus is definite and determinate. Finally, the species *horse* falls under the category of Thirdness. Peirce regards all three of these categories – Firstness, Secondness, and Thirdness – as real. The qualities possessed by Bucephalus and the species to which Bucephalus belongs are, for Peirce, every bit as real as the individual horse, and not mere names or concepts that we contingently associate with the horse.

On Peirce's account, it is Firstness and Thirdness that make his system scholastic realist.[33] He regarded nominalism as overemphasizing Secondness – individuals – such that commonalities between individuals are regarded as mere words and not real relations or laws. Peirce argued that science is concerned with Thirdness since it seeks not just an

enumeration of individuals and their features but the laws that guide the behaviour of individuals and the general categories under which individuals are subsumed. More radically, a science that takes seriously possibility and chance is also concerned with Firstness. On Peirce's view, developments in evolutionary theory, fluid dynamics, and statistical mechanics all integrally involve not just individuals and their covering laws, but stochastic causation – objective chance. Thus, on his account, a metaphysics that supports modern science must itself attribute equal importance to – and indeed allow for the equal reality of – all three categories, as his scholastic realism does.

Applying scholastic realism to the science of sex offers an alternative to both the binarism of mainstream biology and the anti-realism of critical sex studies. A scholastic realist sex science would attend with equal care to individuals and the particular sex traits they possess (Secondness), to variations within large populations (Firstness), but also to commonalities within those populations (Thirdness). Where traditional biological and clinical approaches have tended to pathologize deviations from the statistical norm in human sex trait expression and to regard non-binaristic sex traits in non-human populations as reducible to binaristic categories, the scholastic realist about sex would embrace sex trait variation as Firstness. On the other hand, where critical sex studies has tended to de-emphasize the considerable statistical convergences and theoretical stability that lurk behind binarism about sex, a scholastic realist account would attend to such convergences as Thirdness. In reifying statistical norms as binary sex categories, traditional sex science has overemphasized Thirdness and neglected Firstness. As a corrective to this, critical sex scholarship has neglected Thirdness and focused on Firstness. A Peircean account would urge that these converse approaches each only tell us

a part of the story of reproductive biology, that if we want the whole story, we need both Firstness and Thirdness.

Further, Peirce's triadic metaphysics describes the universe both synchronically and diachronically. For Peirce, the universe – the whole universe, not just its biological components – is evolving. It originated in Firstness – pure chance – and as it slowly takes on habits (Thirdness), those habits instantiate as Secondness and generalize as Thirdness. Ultimately, on Peirce's account, the telos of the universe is absolute Secondness. For Peirce, the laws of nature themselves are likewise evolving: they are habits the evolving universe has taken on, and as habits they are "of partial, varying, approximate, and statistical regularity."[34]

Since the laws of nature are evolving along with the universe, we can only approximate them. Peirce thinks this is revealed in the historical rise of non-Euclidean geometries:

> The absolute exactitude of the geometrical axioms is exploded; and the corresponding belief in the metaphysical axioms, considering the dependence of metaphysics on geometry, must surely follow it to the tomb of extinct creeds. The first to go must be the proposition that every event in the universe is precisely determined by causes according to inviolable law. We have no reason to think that this is absolutely exact. Experience shows that it is so to a wonderful degree of approximation, and that is all.[35]

In the philosophy of sex that Peirce's scientific metaphysics underwrites, male and female are norms, not types. They are useful terms to describe broad statistical patterns, but there is nothing particularly special, precise or permanent about convergence with these patterns. The scholastic realist about sex does not ignore the fact that large proportion of the human population sits in one of two statistical "bells" – one corresponding to the unambiguous expression of a variety of sex traits tagged female, the

other corresponding to the unambiguous expression of a variety of sex traits tagged male. However, neither do they ignore or dismiss the fact that a statistically significant portion of the population sits on a tail of one or both of those bell curves. For the scholastic realist about sex, male and female are bimodal distributions, not bivalent terms. In application, then, scholastic realism about sex allows us to retain pragmatically (and perhaps clinically) useful general terms without reifying them as essences, idealizing them, or exaggerating their significance, and without regarding those terms as normative for members of the population whose expression of sex traits is non-typical.

While I have so far focused on Peirce's scholastic realism, his fallibilism and pragmatic ethics of inquiry offer further advantages to the study of sex categories. One of the main themes that comes through in the critical sex scholarship I discussed earlier is the historical contingency of sex science. The authors I surveyed agree that scientists' and clinicians' implicit historico-cultural biases affect their account of human sexual biology. Peirce's scientific thought is capable of addressing such biases because of his emphasis on what he terms the "first rule of reason":

> Upon this first, and in one sense this sole, rule of reason, that in order to learn you must desire to learn, and in so desiring not be satisfied with what you already incline to think, there follows one corollary which itself deserves to be inscribed upon every wall of the city of philosophy:
>
> Do not block the way of inquiry.[36]

For Peirce, the ethics of inquiry enjoins us not to treat our current views as axioms. As scientists, we are no more entitled to assume as an axiom that an organism has a sex, or that sexes only come in twos, than we are to adopt as an axiom that light is a particle or that the sun orbits the earth. We may adopt any of these views as working

hypotheses and may even believe them, but we must be prepared to put them to the test when they conflict with the available evidence.

> The last philosophical obstacle to the advance of knowledge [writes Peirce] ... is the holding that this or that law or truth has found its last and perfect formulation — and especially that the ordinary and usual course of nature never can be broken through. "Stones do not fall from heaven," said Laplace, although they had been falling upon inhabited ground every day from the earliest times. But there is no kind of inference which can lend the slightest probability to any such absolute denial of an unusual phenomenon.[37]

By Peirce's own lights, while the idea that male and female are polar opposites may seem to some to accord with the ordinary and usual course of nature, we must remain open to the possibility that the ordinary and usual course of nature can be broken through.

Further, on Peirce's view, scientific inquiry is fundamentally communal. When we inquire within a community, we are exposed to the views of others. Some of these views come into conflict with our own, thereby stimulating doubt and leading us to further inquiry and correction. When Peirce in his "first rule of reason" warns against dogmatism, his solution to dogmatism is not skepticism but community. Thus, while the science of sex at any moment may reflect its historico-cultural context, the antidote to such biases lies in ensuring that researchers are exposed to a range of perspectives. Fallibilism, then, consists not so much in adopting "I might be wrong" as a mantra as in adopting community as a method.[38]

4. Practical consequences

My focus here has been on Peirce's scholastic realism but it is worth remembering his pragmatism, and in particular his view that the measure of a concept is its practical consequences. Accordingly, let me conclude by sketching some of the possible practical

consequences of adopting a Peircean philosophy of sex, these consequences relating to the treatment of intersex people and the focus on preclinical sex differences in health research.

At the outset of this chapter, I described the way in which evidence about intersex people is often evoked in online debates about trans people. Some of this no doubt relates to confusion about the difference between intersex people and trans people and to the conflation of sex and gender categories. Much of the popular use of intersex people as exemplars of the "beyond the binary" view of gender is the result of twenty years of teaching and scholarship in women's and gender studies (broadly construed) that instrumentalizes intersex in the service of social constructivist theses about sex and gender.[39]

Almost twenty years ago, Koyama and Weasel found that intersex existence is understood and presented by women's studies instructors "largely as a scholarly object to be studied in order to deconstruct the notion of binary sexes (and thus sexism and homophobia) rather than as a subject that has real-world implications for real people."[40] Chief among those real-world implications are the historical and, in many regions, ongoing clinical practice of "correcting" intersex conditions through medically unnecessary surgery and hormonal treatments, and the selective termination of intersex fetuses.[41] Other real-world implications include regulations that discriminate against intersex athletes.[42]

Framed in Peircean scholastic realist terms, we can understand the ways in which intersex experiences are often appropriated and instrumentalized within gender studies in the service of "beyond the binary accounts" of gender as an overemphasis on Firstness,

and medical and regulatory discrimination against intersex people as an overemphasis on Thirdness. In the first instance, gender studies scholars seeking to resist exclusionary and binaristic accounts of sex and gender focus on intersex people as statistical outliers in order to destabilize sex and gender norms. In the second case, clinical standards and athletic regulations are geared to assert the statistical norm and eliminate outliers from it. On both sides, intersex people end up on the losing end. Adopting a Peircean scholastic realist metaphysics of sex would help us to remember to keep Firstness, Secondness and Thirdness in mind in the study of sex and would thereby help to avoid the harms – especially to intersex people – attendant upon overemphasizing Firstness or Thirdness.

Correspondingly, Peirce's ethics of inquiry reminds us that treating intersex people as "poster children" for social constructivism and eliminating intersex people through clinical or regulatory means, each in its own way, blocks the path of inquiry. Subsuming intersex to social constructivism blocks inquiry by closing off other modes of philosophical understanding of intersex, including modes favoured by many intersex scholars themselves. More seriously, the elimination of intersex people either by prohibiting their full participation in society or by reducing the incidence of intersex by means of medical interventions, including selective pregnancy termination, blocks inquiry by excluding intersex people from the community of inquirers – sometimes violently.

We have seen how a Peircean philosophy of sex grounded in scholastic realism and guided by Peirce's ethics of inquiry could help to avoid reductionism – either constructivist or eliminativist – about intersex. Recent scholarship on the use of

preclinical sex differences in health research provides just one example of the need for a non-reductionist account of sex well beyond intersex.

In recent years, North American and European health organizations have instituted policies requiring the use of both male and female tissues and other materials in pre-clinical studies. The intention is good – to bend the stick in the other direction after a long history in which female biological materials were often excluded from preclinical research, often to the detriment of women's health care outcomes. However, feminist science scholars (including Richardson) argue that these new policies place too much emphasis on patient sex in the study of health phenomena that are actually not affected (or not primarily affected) by sex markers (such as chromosomal complement or reproductive organs).

Richardson et al point to research on zolpidem (Ambien) as an example.[43] Owing to higher rates of adverse drug events (ADE) to zolpidem by women than men, the Food and Drug Administration in 2013 reduced the recommended dosage of zolpidem for women. However, research since then into the mechanism for women zolpidem users' higher rate of ADE revealed that body weight, not sex, explains the differential reaction. Moreover, it turns out that study results into sex-based differences in zolpidem's effects were confounded by a gendered (as opposed to sex-based) difference: among male and female subjects whose brain waves register the same level of impairment, the males tend to rate themselves as less impaired.[44] That is, when men and women are equally impaired physiologically, the men are more likely to downplay their level of impairment – a behaviour that is more likely due to socialization than to biology. By reducing men and women to males and females, Richardson et al argue, the new health research policies

neglect "the embodied interaction of human sex- and gender-related variables in sex differences."[45] Put differently, the new policies may make it harder for researchers to notice gendered phenomena because they are primed to notice sexed phenomena.

These two chapters in health research – first excluding female tissue and cell samples and then requiring them – are two successive examples of assumptions that block the path of inquiry. The assumption that female samples are irrelevant to health research blocked inquiry into some sex-based health differences, but the assumption that different gendered health outcomes reduce to "sex itself" at the level of genes, cells, or tissues blocks inquiry in a different way.

As the science of sex and health science at the intersection of sex and gender continue to rapidly develop, Peircean fallibilism and scholastic realism can help us both to keep the path of inquiry open and to take seriously both Thirdness – the patterns across populations – and Firstness – the deviation from these patterns.

I began this chapter by contrasting two broad approaches to sex: "binaristic biology" and "critical sex studies." In some ways, the metaphysical dispute between these two camps concerns which of sex and gender to treat as fundamental and which to treat as epiphenomenal. Binaristic biology treats sex as fundamental and gender as emerging from that fundament. Critical sex studies flips it and treats gender as the fundament upon which sex is constructed. A Peircean philosophy of sex settles this dispute by denying that either sex or gender – or the putative distinction between them – is fundamental. It thereby leaves the path of inquiry into sex and gender open for discoveries that we can yet barely imagine. In short, Peirce provides us with the tools we need for a non-reductionist philosophy of sex that treats the science of sex as a science like any other.

Shannon Dea

University of Regina

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[2] But see Section 4 on such rhetorical uses of intersex people.

[3] My own work is part of that explosion and deploys "beyond the binary framing." See Shannon Dea, *Beyond the Binary: Thinking About Sex and Gender* (Peterborough: Broadview, 2016).

[4] Ellen Feder and Katrina Karkazis, "What's in a Name? The Controversy over 'Disorders of Sex Development'." *Hastings Center Report* 38.5 (2008): 35.

[5] Morgan Holmes, "The Intersex Enchiridion: Naming and Knowledge." *Somatechnics* 1.2 (2011): 388-411.

[6] Patrick Geddes and John Arthur Thomson. *The Evolution of Sex*. (London: W. Scott, 1889): 267.
[7] This by way of contrast with sequentially hermaphroditic species, in which the type of gamete an individual produces depends upon what stage in the life cycle it is at. Various fish and amphibian species are sequentially hermaphroditic.
[8] Sea Studios Foundation, *The Shape of Life*, 2001. Video.
[9] Joel Parker, "A major evolutionary transition to more than two sexes?" *Trends in Ecology and Evolution* 19.2 (2004): 86.
[10] Ibid., 84
[11] Sarah Richardson, *Sex Itself: The Search for Male and Female in the Human Genome*. (Chicago and London: University of Chicago Press, 2013): 15.
[12] On which, see Section 4.
[13] Simone de Beauvoir, *The Second Sex*. Trans. Constance Borde and Sheila Malovany-Chevallier. (New York: Vintage, 2011): 3.
[14] See Suzanne Kessler and Wendy McKenna, *Gender: An Ethnomethodological Approach* (Chicago: University of Chicago Press, 1985) and Suzanne Kessler, "The Medical Construction of Gender: Case Management of Intersexed Infants." *Signs* 16.1 (1990): 3-26. Kessler and McKenna do not distinguish between sex and gender because they regard the distinction as ill-founded and often muddled. They thus use "gender" for both social and biological demarcations.
[15] "Gender assignment" is the term for the first declaration that is made of an infant's gender – the moment, for example, that the attending obstetrician says "It's a boy!" "Gender reassignment" is the term for a neo-natal revision to that declaration that is sometimes made in the case of intersex infants.
[16] Thomas Laqueur, *Making Sex: Body and Gender from the Greeks to Freud*. (Cambridge, MA: Harvard University Press, 1990)
[17] Laqueur, *Making Sex*, 10.
[18] Anne Fausto-Sterling, "The Five Sexes: Why Male and Female Are Not Enough." *The Sciences* 33.2 (1993): 20-24.
[19] Anne Fausto-Sterling, "The Five Sexes Revisited." *The Sciences* 40.4 (2000): 17-23.
[20] Melanie Blackless, Anthony Charuvastra, Amanda Derryck, Anne Fausto-Sterling*, Karl Lauzanne, and Ellen Lee, "How Sexually Dimorphic Are We? Review and Synthesis." *American Journal of Human Biology* 12 (2000): 76.
[21] Alice Domurat Dreger, *Hermaphrodites and the Medical Invention of Sex*. (Cambridge, MA: Harvard University Press, 2000)
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[24] Christopher Kilmartin, *The Masculine Self*. Second Edition. (Boston: McGraw-Hill Higher Education, 2000)
[25] Charles S. Peirce, 1931–58. *The Collected Papers of Charles Sanders Peirce.* 8 vols. Vols. 1–6 edited by Charles Hartshorne and Paul Weiss. Vols. 7–8 edited by Arthur W. Burks. (Cambridge, Mass.: Harvard University Press): 1.330, emphasis mine.
[26] Thank you to Kees for pointing this out to me.

[27] Charles S. Peirce, *The Collected Papers of Charles Sanders Peirce.* 8 vols. Vols. 1–6 edited by Charles Hartshorne and Paul Weiss. Vols. 7–8 edited by Arthur W. Burks. (Cambridge, Mass.: Harvard University Press, 1931–58): 6.173.
[28] Charles S. Peirce, *The Essential Peirce: Selected Philosophical Writings*. Vol. 2 edited by the Peirce Edition Project (Bloomington: Indiana University Press, 1998): 2.3, 2.338.
[29] Peirce, EP 2.2.
[30] Peirce, EP 2.1-3.
[31] Peirce, EP 2.3.
[32] Peirce, CP 1.6.
[33] I discuss this more fully in Shannon Dea, "Peirce and Spinoza's Pragmaticist Metaphysics," *Cognitio* 15.1 (2014): 25-35.
[34] Robert Burch, "Charles Sanders Peirce," *The Stanford Encyclopedia of Philosophy* (Winter 2021 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2021/entries/peirce/>.
[35] Peirce, CP 1.400.
[36] Peirce, CP 1.135.
[37] Peirce, CP 1.140.
[38] Thank you to Kees for pushing me on this point.
[39] An International Day Against Homophobia, Transphobia and Biphobia (IDAHOT) guide on "How to be an Ally to the Intersex Community" cautions "Don't use intersex to prove a theory about sex and gender. Don't expect intersex people to dismantle a gender binary": https://gate.ngo/wp-content/uploads/2020/03/IDAHOT-018-English-Intersex.pdf.
[40] Emi Koyama and Lisa Weasel, "From Social Construction to Social Justice: Transforming How We Teach about Intersexuality." Women's Studies Quarterly 30.3/4 (2002): 170.
[41] Morgan Holmes, "Mind the gaps: Intersex and (re-productive) spaces in disability studies and bioethics." *Journal of Bioethical Inquiry* 5.2-3 (2008): 169-181.
[42] Rachel Savage, "False start for intersex athletes barred from Olympics," *Reuters Healthcare* (2021): https://www.reuters.com/article/olympics-2020-athletics-intersex-idUSL8N2OW50W.
[43] Sarah S. Richardson, Meredith Reiches, Heather Shattuck-Heidorn, Michelle Lynne LaBonte et al, "Focus on preclinical sex differences will not address women's and men's health disparities," *Proceedings of the National Academy of Sciences* 112.44 (2015): 13419-13420.
[44] Heather Shattuck Heidorn and Sarah Richardson, "Focusing on differences between the sexes is leading medical researchers astray," *The Washington Post* (May 30, 2019): https://www.washingtonpost.com/outlook/2019/05/30/focusing-differences-between-sexes-is-leading-medical-researchers-astray/.
[45] Richardson et al, "Focus on preclinical sex differences."