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CONCEPTUAL ENGINEERING AND SEX**

Abstract

Current debates on the nature of human biological sex often revolve around the question “Is sex binary?” In this paper, I argue that framing the debate in these terms is problematic as it already constitutes a significant theoretical commitment which results in oversimplistic characterizations of human sex. I argue, thus, that neither the positive nor the negative answer to the question “Is sex binary?” is satisfactory and that a more nuanced approach is required. More positively, I suggest that conceptual engineering provides promising tools to engage in this debate more fruitfully and transparently. Finally, I defend *conceptual pluralism* about human biological sex, the view according to which the term ‘sex’ may be legitimately paired with more than one concept of sex.

Keywords: sex, binary, conceptual engineering, pluralism, dilemma

Is sex binary? Interestingly, we are likely to get very different answers to this question depending on who we ask. In an article published in *Nature*, Claire Ainsworth (2015) claims that “the idea of two sexes is simplistic. Biologists now think there is a wider spectrum than that.” In a similar vein, in her 2018 *New York Times* op-ed “Why Sex is Not Binary,” biologist Anne Fausto-Sterling claims that “two sexes have never been enough to describe human variety,” and that “it has long been known that there is no single biological measure that unassailably places each and every human into one of two categories – male or female.” Along similar lines, in a piece published in *Scientific American*, Simón(e) Sun (2019) claims that “actual research shows that sex is anything but binary.”

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In what might seem to be a sharp contrast, philosopher Alex Byrne (2018) argues in his reply to Fausto-Sterling (2018) that there are only two sexes, which are actually not that difficult to identify. He says: “Specifically, females produce large gametes (reproductive cells), and males produce small ones. (Since there are no species with a third intermediate gamete size, there are only two sexes.)”¹ Similarly, Kathleen Stock (2021), in her recent book *Material Girls*, devotes a chapter to defending the claim that “binary sex exists,” that is, the view that “humans are divided into females and males, and that this binary division is a natural state of affairs rooted in stable biological fact” (2021: 45).

In this paper, I argue that, contrary to appearances, this dispute does not involve any disagreement concerning *facts* about human sexual biology. I will argue, moreover, that at least part of the dispute stems from a tension around the term ‘binary,’ which allows for alternative interpretations when used to characterize sex. To anticipate, ‘binary’ can convey, on the one hand, (i) that there are just two relevant kinds, and on the other hand, (ii) that there are just two relevant groups of people. In other words, “Sex is binary” can be interpreted as the claim that there are just two sexes or, instead, as the claim that every human is either one or the other. As we will see below, however, while (i) may be consistent with the relevant biological facts, (ii) is false. As Paul Griffiths (2020) puts it: “Yes, there are only two sexes. No, this does not mean that every living being is either one or the other.” That being so, although sex might be said to be binary in the sense of (i), it clearly isn’t in the sense of (ii).

The first part of this paper, then, is devoted to partly summarizing the views of some of the contenders in this debate and showing how, initial appearances notwithstanding, there is no factual disagreement involved concerning the relevant biological facts – at least once they are appropriately formulated. In this sense, this first part of the paper is somehow conciliatory, in that I will contend that all parties end up agreeing on the relevant biological facts, which is not to say that there are no remaining issues in dispute.

In the second part, I argue, thus, that framing the debate in terms of the question “Is sex binary” is problematic as it introduces a false dilemma of sorts which forces us to choose between one of two alternatives, both of which, as we will see, are problematic. Still, I will show that although it is both unsatisfactory

¹Notice that some species of the fruit fly *Drosophila* produce three sperm sizes and one egg size, totaling four gamete sizes. In addition, some isogamous algae and fungi have gametes of equal size (see Roughgarden 2013: 24–25). I thank an anonymous reviewer for pointing this out.

to characterize sex as either “binary” or “not binary,” the former is significantly more pernicious as it is not only epistemically but also morally problematic.

Finally, in the third part of the paper I will argue that this dispute is conceptual and terminological in nature and, thus, that conceptual engineering is the more promising framework to engage with it. More specifically, I will draw a comparison with the species concept and defend what I call “sex pluralism,” the view that there is a plurality of valid or appropriate concepts of sex.

1. THE DISPUTE

In this section, I introduce what I take to be the two most important facts about human sexual biology for the dispute that concerns us here. Then, I summarize some rival views of the nature of sex by paying special attention to how their various authors position themselves *vis-à-vis* these two important facts. In doing so, I show how, contrary to appearances, there is no disagreement concerning either of them.

1.1. THE RELEVANT BIOLOGICAL FACTS

Before introducing the two relevant facts around which much of our subsequent discussion will revolve, an important disclaimer is due. In order to successfully assess whether or not the targeted dispute involves a factual disagreement, we need to formulate the relevant facts without using highly controversial terms such as ‘sex,’ ‘male,’ or ‘female.’ Indeed, significant issues depend on how these terms are used (see Chalmers 2011), and positioning oneself in this regard already constitutes an important commitment which, at this early stage, it is preferable to avoid. Moreover, it is precisely by stripping the relevant facts from this contested terminology that we will be able to appreciate that the contenders in this debate do not disagree with either of them. That being said, let us introduce these two facts, which I will label *DIMORPHISM* and *NON-EXHAUSTIVITY*:

DIMORPHISM: Some species reproduce sexually by fusing a relatively large gamete with a relatively small gamete. Many species exhibit further

morphological differences² associated with the production of each of these two gamete types. In the case of humans, producing³ relatively large gametes *tends* to cluster with other physiological properties, such as having XX chromosomes, having a vagina, having ovaries, etc., whereas producing relatively small gametes *tends* to cluster with other physiological properties, such as having XY chromosomes, having a penis, having testes, etc.

NON-EXHAUSTIVITY:⁴ The clustering of the property of producing one of the two gamete types and the other physiological features typically associated with it, although statistically disproportionate, is *not strict*. That is, sometimes, properties which in the vast majority of cases are associated with one of the two gametes co-occur with the other gamete. As such, there are individuals who instantiate properties of both clusters and, thus, cannot be located in either of them.⁵ In other words, the two groups of people that each have one gamete type and the properties typically associated with it *do not exhaust* the entire population.

In order to illustrate that there is, indeed, no disagreement regarding these facts, I will summarize some of the most important views of this issue. As shall be seen, none of the authors considered here disagrees with either *DIMORPHISM* or *NON-EXHAUSTIVITY*. I shall focus on two authors who argue against the view that sex is binary and two authors who defend this view, or at least a version of it.

²Monomorphic species do not exhibit additional morphological differences associated with the production of both gametes. Also, in some species called “simultaneous hermaphrodites,” the same individual organism produces both types of gametes.

³There are multiple reasons that might prevent an individual organism from producing either type of gamete. To name the most common, humans do not produce gametes throughout their entire life cycle. For this reason, it would perhaps be more precise to characterize this property in dispositional terms, or, as Byrne (2018) does, speak instead of the property of “being in the ‘developmental pathway’ that produces one gamete type or the other.”

⁴Later on, I will use *EXHAUSTIVITY* to refer to the negation of *NON-EXHAUSTIVITY*. That is, the view according to which sex characteristics strictly co-vary such that there are no cases that cannot be located in either of the two main clusters.

⁵Additionally, in a minority of cases, certain features that typically occur in one of two statistically dominant forms (e.g., genitalia as either a penis or a vagina; chromosomes as either XX or XY, gonads as either ovaries or testes) exhibit different forms. As such, it is impossible to associate them with one of the two gamete types (e.g., a 1 cm phallus: “too big to be a clitoris, too small to count as a penis,” XXY chromosomes, ovotestes, etc.). For a satirical depiction of the medical handling of “abnormal” phallus sizes in newborns, see: <http://alicedreger.com/phallometer>.

1.2. SOME OF THE CONTENDERS

(a) Fausto-Sterling

Anne Fausto-Sterling, who titled her 2018 *New York Times* op-ed “Why Sex is Not Binary,” has been arguing for several years (Fausto-Sterling 1993, 2000, 2016, 2018, 2020) against what she refers to as “absolute dimorphism” (Fausto-Sterling 2016: 194). That is, the view according to which each and every individual falls into either the male or the female category. She says:

On close inspection, absolute dimorphism disintegrates even at the level of basic biology. Chromosomes, hormones, the internal sex structures, the gonads and the external genitalia all vary more than most people realize. Those born outside of the Platonic dimorphic mold are called intersexuals. (Fausto-Sterling 2000: 20)

Fausto-Sterling takes absolute dimorphism to be not only false – as well-documented cases of intersex people show – but also morally problematic. This is so, she says, because assuming absolute dimorphism might lead to conceptualizing any sex ambiguity as abnormal, consequently possibly motivating so-called “normalizing” surgeries on intersex infants. Fausto-Sterling says:

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 a social ideal). Knowledge of biological variation, however, allows us to conceptualize the less frequent middle spaces as natural, although statistically unusual. (Fausto-Sterling 2000: 81)

Notice, then, that if we contrast Fausto-Sterling’s ideas with the two relevant facts introduced above, we can safely say that her main goal consists in defending *NON-EXHAUSTIVITY* against assumptions to the contrary. That is, Fausto-Sterling stresses the non-strict co-variation of the different sex-relevant properties and, consequently, the existence of cases that do not fall into either of the two major categories. In this sense, although Fausto-Sterling rejects, as she puts it, “absolute dimorphism,” she does not argue against the more modest *DIMORPHISM*. Quite to the contrary, she often assumes it and sometimes even explicitly endorses it. For instance, in an earlier work (1993) she suggests introducing three additional sex categories (‘herms,’ ‘ferms,’ and ‘merms’) in order to acknowledge and give visibility to those people whose bodies exhibit characteristics of both

typical males and typical females.⁶ Importantly, however, these new categories are introduced to *complement* the extant ‘male’ and ‘female,’ not to replace them. Fausto-Sterling, moreover, acknowledges that the male and female categories include the vast majority of people, as she estimates the proportion of intersex people to be 1.7%.⁷ That is, according to her own view, the remaining 98.3% of the population falls neatly into either the female or the male category. Even more straightforwardly, she acknowledges: “Our data on humans show that anatomically and physiologically, humans are almost dimorphic with regard to genitalia and chromosomes but that when one considers intersex conditions, there are infrequent intermediate states” (Fausto-Sterling 2016: 190).

Accordingly, Fausto-Sterling’s goal in characterizing sex as “non-binary” should not be interpreted as aiming to deny *DIMORPHISM* but rather as intending to emphasize *NON-EXHAUSTIVITY*. We may conclude, therefore, that Fausto-Sterling does not disagree with either of the relevant biological facts we are focusing on.⁸

(b) *Ziemińska*

Renata Ziemińska (2020, 2022) has also challenged the “binary notion” of sex. Like Fausto-Sterling, her main objection to this notion is that it fails to acknowledge the existence of people with intersex traits. Ziemińska argues that the binary notion is too simple to capture the diversity of sex characteristics, and that this misrepresentation is a form of epistemic injustice (Fricker 2007) that can turn into practical harm. She says:

The simple binary female/male divide is a kind of epistemic oversimplification that ignores a great deal of empirical data about people with intersex traits. I claim that “normalizing” surgery is the expression and reinforcement of epistemic injustice as it is visible physical harm done by public institutions and allowed by the law; however, the

⁶Fausto-Sterling (2020: 112–113) has since retreated from this specific proposal, on the basis that in attempting to legitimize other sets of genitals she ended up focusing too much on genitals as an identity-determining feature.

⁷The frequency of people with intersex traits is a matter of dispute. See, for instance, Sax (2002), who criticizes Fausto-Sterling’s numbers. Notice, however, that at least part of the problem is conceptual in nature as it involves defining INTERSEX in a broader or narrower way. See footnote 13 for more on this issue.

⁸Fausto-Sterling has been criticized (see Stock 2021: 57) for suggesting that sex should be conceptualized as a “continuum,” which, indeed, does not seem the best terminology to convey *DIMORPHISM*. Although it is true that Fausto-Sterling uses this terminology in some of her very early work, she has since clarified that sex, as a whole, cannot be conceptualized as a continuum (Fausto-Sterling 2016: 189).

epistemic injustice exists before the surgery. Before physical violence, there is symbolic violence. This is physical violence towards a minority group of people in the name of norms created by the dominant group. Children with intersex traits feel “the knife of the norm” on their bodies. (Ziemińska 2020: 60–61)

Again, although Ziemińska’s main goal in arguing against the binary notion is to emphasize *NON-EXHAUSTIVITY*, she does not reject *DIMORPHISM* in order to do so. Quite to the contrary, she accepts it when she says that “the idea of sex dimorphism applies to most people, but it cannot be applied to all people and serve as a criterion to divide people into two groups” (Ziemińska 2018: 179).⁹ That is, she acknowledges that most people do fall within the male and female categories, but she stresses the importance of recognizing that not everyone does. We may conclude, then, that although she challenges the binary notion, Ziemińska does so to emphasize *NON-EXHAUSTIVITY*, not to deny *DIMORPHISM*.

Let us turn now to considering those who sympathize with the binary notion.

(c) Stock

In her recent book, *Material Girls*, Kathleen Stock (2021) devotes a whole chapter to arguing that “binary sex exists” (2021: 45); that is, in her words, the view that “humans are divided into females and males and that this binary division is a natural state of affairs rooted in stable biological facts” (Stock 2021: 45). In order to do so, Stock distinguishes three alternative accounts of sex, namely “the gamete account,” “the chromosome account,” and “the cluster account,” which she then confronts with potential objections.¹⁰

It seems clear, then, that at least part of Stock’s goal when she insists on the reality of “binary sex” is to defend *DIMORPHISM*. Indeed, she further clarifies that – no matter which of the three accounts of sex one favors – “for the majority of humans, there will be a clear answer as to whether someone is male or female” (Stock 2021: 48). Notice, however, that Stock *also* recognizes *NON-EXHAUSTIVITY* as she acknowledges that “there are occasional cases of DSDs

⁹In this paper, Ziemińska presents her proposal as an argument against “sex dimorphism.” Within our current framework, though, it would be more accurate to characterize her argument as challenging “*absolute* dimorphism” in order to make clear that her main contention is directed against *NON-EXHAUSTIVITY*, and that she does not deny *DIMORPHISM* as formulated above in section 2.1.

¹⁰Most of these objections go beyond the scope of this paper and do not interfere with its main argument. As such, I won’t address them here.

not easily characterized as either male or female” (Stock 2021: 43).¹¹ Although this idea is formulated here in epistemic terms (i.e., she seems to suggest that the difficulty involves a limitation on *knowing* whether an individual is female or male), she actually commits to the more radical view that there are cases where there is simply no unequivocal answer as to whether an individual *is* male or female. Instead, Stock acknowledges that different accounts of the sexes might result in these categories having different membership conditions. She says:

On both the chromosome and gamete accounts, ‘male pseudohermaphrodites’ are still male because they have a Y chromosome and are on a small-gamete-producing pathway, albeit disrupted and with a non-standard sexed body shape, relative to the norm. Equally, ‘female pseudohermaphrodites’ are female because they lack a Y chromosome and are on a large-gamete-producing pathway, again with the caveat above. It’s true these results are at odds with what some people with CAIS and CAH would say about themselves, but that is not necessarily a reason to reject the conclusions. On the cluster account, meanwhile, ‘male pseudohermaphrodites’ and ‘female pseudohermaphrodites’ can potentially count as male or female, depending on how we collectively decide to weight the importance of external morphology over other characteristics in the female and male clusters. (Stock 2021: 57–58)

Accordingly, I take it that Stock does not deny *NON-EXHAUSTIVITY* when she argues that “binary sex exists.” Quite to the contrary, although her goal is to stress *DIMORPHISM*, she also acknowledges *NON-EXHAUSTIVITY*.

(d) Byrne

Alex Byrne (2018) suggests that there are two interpretations of the claim “Sex is binary”: (1) “there are only two sexes”; and (2) “everyone is either female or male, and no one is both.” Byrne commits only to the former and admits that, given the existence of some “unclear cases,” it might be more problematic to insist that sex is binary in the second sense. That is, when Byrne claims that sex *is* binary, he intends to convey the view that “there are only two sexes.” Byrne considers this to be in line with how sex is spoken about by biologists, who, indeed, distinguish the sexes (across species) by the relative size of the gametes they produce: males produce relatively small gametes and females produce relatively large gametes.

¹¹ Stock favors the term ‘DSD’ (i.e., difference/disorder in sex development) for referring to intersex traits. Notice, however, that although there is no consensus within the intersex community on the preferred terminology, many reject the terminology of ‘DSD’ as pathologizing (see <https://interactadvocates.org/interact-statement-on-intersex-terminology>). I will use ‘intersex’ in the remainder of the paper.

That being so, Byrne claims: “Since there are no species with a third intermediate gamete size, there are only two sexes.”¹²

Now, Byrne is right to take this definition of sex to be the one that biologists employ when talking about sex as a cross-species phenomenon and as a reproductive strategy. Consider, for instance, philosopher of biology Paul Griffiths, who says:

It’s uncontroversial among biologists that many species have two, distinct biological sexes. They’re distinguished by the way that they package their DNA into ‘gametes,’ the sex cells that merge to make a new organism. Males produce small gametes, and females produce large gametes. Male and female gametes are very different in structure, as well as in size. This is familiar from human sperm and eggs, and the same is true in worms, flies, fish, molluscs, trees, grasses and so forth. (Griffiths 2020)

Griffiths refers to this as the “biological definition of sex” but makes an important clarification that we introduced at the beginning and which is worth keeping in mind: there being two sexes does not entail that every organism must be either one or the other. Griffiths clarifies:

Many people assume that *if* there are only two sexes, that means everyone must fall into one of them. But the biological definition of sex doesn’t imply that at all. As well as simultaneous hermaphrodites, which are both male and female, sequential hermaphrodites are first one sex and then the other. There are also individual organisms that are neither male nor female. The biological definition of sex is not based on an essential quality that every organism is born with, but on two distinct strategies that organisms use to propagate their genes. (Griffiths 2020)

That is, there being two sexes is, according to Griffiths, perfectly compatible with *NON-EXHAUSTIVITY*.

Now, analyzing Byrne’s own position regarding *NON-EXHAUSTIVITY* demands some caution because even though Byrne acknowledges that sex traits do not always strictly co-vary, his view on whether there are individuals that fall beyond the male and female categories is not completely clear. Indeed, on occasions he seems to concede that there are individuals that “are outside the binary.” He says:

The existence of some unclear cases shows that it would be incautious to announce that sex (in humans) is binary. By the same token, it is equally incautious to announce that it isn’t – let alone that this is an established biological fact. And even if

¹²See footnote 1.

some people are outside the binary, they are a miniscule fraction of the population, nothing like the frequently cited 1–2 percent figure, which draws on Fausto-Sterling’s earlier work. (Byrne 2018)

Although Byrne disagrees with the figure presented by Fausto-Sterling concerning the incidence of intersex cases,¹³ he seems to concede here that there are some people, few as they may be, who fall outside the binary. In a footnote, however, he seems to explicitly deny that there are such cases and insists that “no one clearly falls beyond [the female/male binary].”

I submit, though, that, despite this apparent unclarity, Byrne’s own view regarding the non-strict co-variation of sex traits commits him to *NON-EXHAUSTIVITY*, as formulated above. Indeed, Byrne concedes, as he must, that the non-strict co-variation of sex traits results in there being people who instantiate properties of both typical males and typical females. He mentions, for instance, the case of Congenital Adrenal Hyperplasia, saying:

Consider, for example, the “intersex” condition Congenital Adrenal Hyperplasia – one of many “disorders of sex development” (DSDs). XX individuals with this rare condition can have an enlarged clitoris at birth (sometimes very penis-like), due to high levels of androgen hormones in the womb. They have progressed some considerable way down the developmental pathway that produces eggs (they have the usual ovaries and fallopian tubes), and have not even started down the (male) sperm-producing pathway. They are sometimes assigned male at birth, but are usually raised as girls, and indeed many of them go on to have children. Whether they are raised as girls or boys, the scientific literature correctly classifies them as female. (Byrne 2018)

As can be seen, though, even while acknowledging the non-strict co-variation of sex traits, and thereby conceding *NON-EXHAUSTIVITY* (as formulated above), Byrne insists that cases such as the above do not fall outside the binary as the “scientific literature correctly classifies them as female.” Notice, however, that what allows Byrne to insist on this point is his commitment to the biological definition of sex – and its corresponding meanings of ‘male’ and ‘female’ – which, as we have seen, relies only on the relative size of gametes to individuate the sexes. What Byrne fails to acknowledge, however, is that – useful as it may be for studying sex as a cross-species phenomenon – the biological definition of sex is

¹³Stock also disagrees with Fausto-Sterling’s numbers regarding the incidence of intersex cases. According to Stock (2021: 56), only 0.018% of individuals exhibit a trait in virtue of which it is difficult to locate them in the female or male categories. Byrne suggests that the actual frequency of intersex cases is 0.015% of the population.

not the *only* (scientifically) meaningful way of defining sex. Quite to the contrary, it is very likely that different purposes will require alternative concepts of MALE and FEMALE (more on this on section 4).

That being so, we are now in a position to see that Byrne also acknowledges *NON-EXHAUSTIVITY* and, thus, does not deny either of the relevant biological facts. Additionally, our foregoing discussion also serves to vindicate the point made earlier regarding how important it is that we formulate the relevant biological facts (*DIMORPHISM* and *NON-EXHAUSTIVITY*) without employing contentious terms such as ‘sex,’ ‘female,’ or ‘male.’ As the recent debate exemplifies, although everyone is likely to agree with the relevant biological facts, a terminological dispute around these facts could very easily arise, since not everyone seems to be willing to use them in the same way. Byrne, for instance, would perhaps want – even while acknowledging *NON-EXHAUSTIVITY* – to advance a *terminological* view according to which the terms ‘female’ and ‘male’ should *only* be used to refer to the kinds corresponding to the relative size of the gametes, and ‘sex’ *only* to refer to what is captured by the so-called biological definition of sex. Without going deeper into this issue, however, notice that this is a terminological dispute that is compatible with there being no disagreement regarding the relevant biological facts.

2. A FALSE DILEMMA?

Let us take stock. After this partial survey of the views of Fausto-Sterling, Ziemińska, Stock, and Byrne, we may conclude that the dispute over the binary nature of sex involves no factual disagreement. Hence it seems that ‘binary’ can convey different ideas when used to characterize sex. On the one hand, ‘binary’ can convey the idea that there are just two relevant kinds; that is, along the lines of *DIMORPHISM*. On the other hand, it can alternatively be used to convey the idea that there are just two relevant groups of people; that is, along the lines of *EXHAUSTIVITY* (i.e., the negation of *NON-EXHAUSTIVITY*). Although sex is binary in the first sense, it clearly isn’t in the second.

We can see, then, how a defender of the “binary view” could characterize sex as “binary” to convey something along the lines of *DIMORPHISM* without thereby committing to *EXHAUSTIVITY*. A defender of the “non-binary view,” on the contrary, could take ‘binary’ to convey *EXHAUSTIVITY* and, therefore,

insist on characterizing sex as “*non*-binary,” precisely in order to emphasize *NON-EXHAUSTIVITY* and give visibility to those who fall outside the binary.¹⁴

On the face of it, I submit that framing this discussion in terms of the question “Is sex binary?” amounts, to some extent, to introducing a false dilemma which unduly restricts the scope of potential characterizations of human sex.¹⁵ More precisely, this terminological framework, particularly approaching the debate on human sex through this either-or question, constitutes a problematic commitment as it only allows for oversimplistic positive or negative answers, both of which, as seen above, have the potential to convey wrong ideas about human sex. In other words, it is problematic to claim both that “sex is binary” and “sex is not binary” as the former may falsely convey *EXHAUSTIVITY*, while the latter may falsely negate *DIMORPHISM*. In what follows, however, I take a brief detour to show that the claim “sex is binary” is significantly more problematic than its counterpart as it is not only epistemically problematic, but also morally problematic.

2.1. THE HARM OF CONVEYING *EXHAUSTIVITY*: THE IMPORTANCE OF VISIBILITY FOR STIGMATIZED IDENTITIES

Conveying *EXHAUSTIVITY* amounts to denying the existence of intersex people. This is particularly harmful, as a lack of awareness of the existence of people with intersex traits can accentuate the stigma around intersex identities. In her paper “For the Sake of the Children: Destigmatizing Intersexuality,” Sharon E. Preeves explains:

¹⁴Both Byrne and Stock seem to be aware that ‘binary,’ when applied to sex, leaves room for alternative interpretations. Byrne, for instance, considers two plausible interpretations of the claim “Sex is binary.” He says: “In this sense, sex is binary: there are only two sexes. However, the interpretation of ‘sex is binary’ relevant to the present debate is different: everyone is either female or male, and no one is both” (Byrne 2018). In a similar vein, Stock also distinguishes two possible meanings of ‘binary’ in relation to sex. She says: “So do what Fausto-Sterling calls ‘true hermaphrodites’ show that sex isn’t a binary? Only if ‘binary’ means that every entity in the world must clearly fall into one state or the other. Properly understood, the ‘sex binary’ requires only that the vast majority of people fall into one category or the other” (Stock 2021: 59). Although Stock suggests that only the latter is the “proper” understanding of ‘binary,’ she does not provide any evidence for this.

¹⁵Notice that if the meaning of “binary” or “sex” is specified, it might then be possible to claim (truly) that sex is binary or non-binary. For instance, as suggested above, if ‘binary’ is used to convey *EXHAUSTIVITY*, the claim ‘sex is not binary’ would be true. Still, given the remaining ambiguity around these terms, I insist that framing the debate through the question “is sex binary?” *tout court* (that is, without further specification) leads to a false dilemma where none of the alternative answers is fully satisfactory. I thank an anonymous reviewer for pointing this out.

The social expectation is that babies are born as one of two clearly delineated anatomical types – female or male – as ascertained by genital presentation at birth. . . . The specific response to intersexual “deviance” is so strong that we have developed institutional means of covering up or erasing the violation, so that the initial social expectation of sex binarism may be upheld. More specifically, we have created medical means of surgically and hormonally engineering bodies that adhere to a two-sex social system.

Why would a cultural institution go to such great lengths to uphold a two-sex system when there are clearly consistent exceptions to this norm? One reason is that, because intersex is incongruent with the predominant, binary understanding of sex and gender, it generates the potential for social stigma and identity confusion. (Preeves 1999: 52–53)

Along similar lines, Cheryl Chase, an intersex activist and the founder of the Intersex Society of North America, claims:

Poor surgical outcomes are not the only – or even the primary – reason former patients feel harmed. The primary source of harm described by former patients is not surgery per se, but the underlying attitude that intersexuality is so shameful that it must be erased before the child can have any say in what will be done to his or her body. Early surgery is one means by which that message is conveyed to parents and to intersexed children. (Chase 1999: 147)

More generally, a lot of work has been carried out in order to emphasize the crucial role of political activism and *visibility* as a means for stigmatized individuals to gain pride in their identities. This strategy for combating stigma has been studied in relation to other minorities (see Anspach 1979, Becker 1981, Cass 1979) and also fits the intersex narrative. Preeves, again, in sharing the results of more than 40 interviews carried out with adults born with intersex traits, reports:

The first half of most interviews was laden with tales of pain, sorrow, bewilderment, and anger; the second half encompassed accounts of empowerment, identification, and reappropriation of intersexuality as a positive aspect of self. Though their association with various intersex support and/or advocacy organizations, all participants related narratives of coping with the stigma of difference through “coming out” rather than assimilating to the norm. (Preeves 1999: 59)

Intersex groups and organizations, of course, are very aware of the importance of visibility and thus coordinate activities and events such as Intersex Awareness Day¹⁶ – recognized by the U.S. Department of State and the United Nations, among other institutions – in order to address this important gap.

¹⁶<https://interactadvocates.org/intersex-awareness-day/>

This hopefully makes clear how visibility and awareness are fundamental for dealing with stigmatized identities such as intersex. That being so, we are now in a better position to understand in what sense it might be, not only epistemically, but also morally problematic to characterize sex in a way that conveys *EXHAUSTIVITY*, thereby denying the existence of intersex people.

3. CONCEPTUAL ENGINEERING AND SEX

By surveying part of the debate on the nature of human sex, we have seen that, contrary to appearances, this dispute does not involve any disagreement concerning relevant facts about human sexual biology – once appropriately formulated. This analysis has further exposed that framing the discussion in terms of the question “Is sex binary?” already constitutes a problematic commitment that is better avoided.

Now, if this dispute, as considered, does not involve a factual disagreement, it seems only reasonable to look for a disagreement at the terminological or conceptual level. Indeed, as we have already seen, this seems to be the case when it comes to the term ‘binary’: while some authors use it to convey *EXHAUSTIVITY* and, thus, rightly characterize sex as “non-binary,” others use it to convey *DI-MORPHISM* and, thus, rightly characterize this term as “binary.” It is important to notice, moreover, that this terminological and conceptual dispute goes beyond the term ‘binary’ as it also affects related terms such as ‘sex,’ ‘male,’ or ‘female.’ For instance, it seems plausible to think that those sympathetic to the binary characterization of sex also favor a specific usage of the term ‘sex’ which pairs it with a concept of sex understood as a reproductive strategy. On the other hand, those sympathetic with the non-binary characterization will tend to favor an alternative usage of the term ‘sex’ which pairs it not with a reproductive strategy but instead, for instance, with a looser cluster of biological properties. Indeed, concepts do not exist in isolation from one another but form complex representational networks. As such, there being a conceptual and terminological dispute on the notion ‘binary’ is a good indicator that the same will occur regarding the terms ‘sex,’ ‘male,’ or ‘female.’

Now, although it is not my purpose to engage in a defense of one of the two usages of the term “binary” seen above,¹⁷ I do believe that exposing the conceptual nature of this dispute constitutes a significant step forward in this debate. Indeed, I suggest that seeing this debate as an implicit negotiation on how these terms or concepts should be used makes better sense of what is going on and gives us better tools to assess and make substantive progress.

In the next section, I take a more positive approach and defend conceptual pluralism about human sex.

3.1. SEX PLURALISM

Another closely related problem of the binary/non-binary framework, I argue, is that the question “Is sex binary?” *tout court* may lead to the assumption of *sex monism*, namely the view according to which there is *just one* appropriate concept of sex – just one good definition of what sex is.

Indeed, whenever formulated in an absolute and unspecified way, the question “Is sex binary?” seems to lead to the assumption that there is a single and context-independent definition of ‘sex’ which, in turn, is susceptible to being characterized – appropriately or not – as ‘binary.’ I wish to argue, though, that *sex monism* should not be accepted without question. I contend, in fact, that there are compelling reasons to prefer a pluralist alternative according to which the term ‘sex’ may be legitimately paired with more than one concept of sex, depending on the context and the relevant purposes at hand.

One such reason, I submit, is that a single concept of sex, whichever one wishes to favor, cannot adequately fulfill the vast range of expectations that different agents and institutions across various domains place upon it. This is not an isolated view. Griffiths, for instance, seems to advocate for this sort of pluralistic approach when he says:

While the biological definition of sex is needed to understand the diversity of life, that doesn’t mean it’s the best definition for ensuring fair competition in sport or adequate access to healthcare. We can’t expect sporting codes, medical systems and family law to adopt a definition simply because biologists find it useful. Conversely,

¹⁷Still, if the above arguments are on the right track, we have strong reasons to avoid characterizing sex as binary *tout court*. This is so because, as explained, this characterization is not only epistemically problematic, but also morally problematic.

most institutional definitions of sex break down immediately in biology, because other species contradict human assumptions about sex. (Griffiths 2020)

Notice, in addition, that pluralism is a common stance when it comes to other important biological concepts. For instance, “Species Pluralism,” the view according to which multiple concepts of species can coexist in the vicinity of one another and serve different fields and purposes, is probably the most popular stance among philosophers of biology (Dupré 1993, Ereshefsky 2001, Kitcher 1984, 1987). Indeed, there are currently at least seven well-accepted concepts of species (Ereshefsky 1998: 103).

Consider, for instance, the biological species concept (BSC), which defines a species as “a group of interbreeding natural populations that is reproductively isolated from other such groups and can produce fertile offspring” (Mayr and Ashlock 1991: 26). This concept is popular among biologists because it allows them to determine the level of genetic connection between two organisms by testing their ability to interbreed and produce fertile offspring. However, BSC is not effective when applied to asexual organisms or fossils because the former do not interbreed, while the latter are extinct and cannot be studied for reproductive behavior. In these cases, biologists often turn to alternative concepts that are better suited to their specific objects of study. For example, paleontologists often rely on the phylogenetic species concept (PSC), which focuses on tracking phylogenetic relations (ancestry) and uses morphological traits to distinguish between species.

It seems, thus, that certain particularly complex and multifaceted phenomena such as sex or species, which stir a very vast range of interests and are used in many different domains, resist absolute and once-and-for all characterizations.¹⁸ To illustrate, let us again consider the so-called biological definition of sex that individuates the sexes by the relative size of the gametes they produce. Although, as mentioned earlier, this definition of sex is particularly useful for understanding

¹⁸ Given this, we should be wary of attempts to definitively determine the frequency of individuals who do not fall within the binary, or, similarly, the frequency of intersex people. Indeed, notice that ‘intersex’ is not generally defined negatively as “those individuals that do not fall within the male and female categories.” Rather, ‘intersex’ is used as an umbrella term to refer to “a variety of conditions in which a person is born with a reproductive or sexual anatomy that doesn’t seem to fit the typical definitions of female or male” (see https://isna.org/faq/what_is_intersex/). As such, the dispute over the frequency of intersex is not, despite appearances to the contrary, factual either. Instead, it involves a terminological and conceptual dispute regarding whether or not certain specific conditions should be counted as intersex. Bluntly put, everyone agrees that the frequency of people with late-onset CAH is 1.5% of the population; the disagreement involves deciding whether or not these cases should be counted as intersex.

sex as a cross-species phenomenon and as a reproductive strategy, it clearly becomes insufficient as soon as we turn to other domains more specifically focused on human sex and whose interests are not limited to gamete size. In the context of medicine, for instance, sex is often defined in terms of reproductive organs, systems, and associated hormonal levels, without focusing specifically on relative gamete size.

Notice, moreover, that one could make the case in favor of adopting – in certain contexts and for certain purposes – a *social* concept of sex. That is, a concept of sex which tracks not a biological property but a social one. Without entering into the specifics of the proposal, notice that Ásta (2018), for instance, has argued against the traditional feminist distinction between sex and gender and has defended the idea that sex is also better conceived as a social property. Very roughly, Ásta’s idea is that being of a certain sex is a “conferred property”¹⁹ which features in the explanation of many social facts, such as the distribution of social resources, privileges, burdens, etc. This explanatory role, on her view, is a strong indicator that sex is a social property and not a biological one.

Now, while Ásta’s view of sex as social may indeed have a certain degree of appeal and plausibility, I contend that this is conditionalized to her view being integrated within a broader pluralist framework that allows *also* for *biological* concepts of sex. Indeed, although a social concept of sex might feature in explanations of various social phenomena, it is hardly deniable that biological concepts of sex will feature in useful explanations and generalizations of other domains such as biology or medicine. For instance, apart from the already discussed gamete-based (biological) concept of sex, useful when studying sex as a cross-species phenomenon, alternative biological concepts of sex that define it in terms of reproductive organs and hormone levels will most likely feature in medical and physiological explanations and generalizations.

The pluralist framework in favor of which I advocate, thus, is rather conciliatory in that it allows both social and biological accounts of sex to coexist in the vicinity of one another. It is important, however, not to confuse pluralism with the idea that anything goes. On the contrary, any existing or ameliorated concept of sex will have to be thoroughly assessed from both an epistemic and

¹⁹According to Ásta, a social property is a “conferred property.” That is, it is a property that someone else has conferred on them. “This property is a social status consisting in constraints on and enablements to the individual’s behavior in a context (behavioral constraints and enablements)” (Ásta 2018: 2).

a moral perspective. Providing an exhaustive list of criteria according to which any potential concept of sex will need to be assessed is beyond the scope of this paper and will likely be the object of future discussions and research. Indeed, it is important to keep in mind that adopting a pluralist stance towards sex does not amount to solving the existing debates on the nature of sex. This was not, however, the goal of this paper. The aim, rather, has been to advocate for a change of framework which, hopefully, will allow for more fertile and fruitful discussions than the binary/not binary framework does.

CONCLUSION

In this paper I have analyzed the current debate on the nature of human sex, and I have argued that framing the discussion, as it is generally done, in terms of the question “Is sex binary?” is problematic as it results in oversimplistic characterizations of sex. I have instead suggested that this debate does not involve a factual disagreement and, as such, that conceptual engineering is the more appropriate framework to make progress in this dispute. More precisely, drawing from the species case in biology, I have defended “sex pluralism,” the view according to which the term ‘sex’ may legitimately be paired with more than one concept of sex.

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