Extended Sex: An Account of Sex for a More Just Society

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We propose an externalist understanding of sex that builds upon extended and distributed approaches to cognition, and contributes to building a more just, diversity-sensitive society. Current sex categorization practices according to the female/male dichotomy are not only inaccurate and incoherent (attributing nonreproductive properties to differences in vaguely defined reproductive roles), but they also ground moral and political pressures that harm and oppress people. We argue that a new understanding of sex is due, an understanding that would acknowledge the variability and, most important, the flexibility of sex properties, as well as the moral and political meaning of sex categorization. We propose an externalist account of sex, elaborating on extended and distributed approaches to cognition that capitalize on the natural capacity of organisms to couple with environmental resources. We introduce the notion of extended sex, and argue that properties relevant for sex categorization are neither exclusively internal to the individual skin, nor fixed. Finally, we spell out the potential of extended sex to support an active defense of diversity and an intervention against sex-based discrimination.

> I believe that we should refuse to use anatomy as a primary basis for classifying individuals and that any distinctions between kinds of sexual and reproductive bodies are importantly political and open to contest.
>
> —Sally Haslanger, "Gender and Race"

> We have been designed by Mother Nature to exploit deep neural plasticity in order to become one with our best and most reliable tools. Minds like ours were made for mergers.
>
> —Andy Clark, *Natural-Born Cyborgs*

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A New Understanding of Sex

Existing sex categories, female and male, are commonly thought to track a dichotomy: two exclusive, exhaustive, well-defined clusters of biological properties. Consequently, assignment of a person to a particular sex is commonly thought to be exclusively a matter of biology. We call this conception of sex *the naïve view*. In this work we put forth two proposals, a negative and a positive one. The negative proposal consists of a challenge to the naïve view: sex properties are not binary, and female/male categorization is not a purely biological issue, but a moral and political affair that contributes to an oppressive ideology. Our main focus is, however, the positive proposal of a new understanding of sex that acknowledges the variability and, most important, the flexibility of sex properties, as well as the moral and political meaning of sex categorization. Our goal is to design a conceptual tool (that is, an understanding of sex) that can help build a more just society, where people are not discriminated against on the basis of the sex they have been assigned within the female/male schema. In particular, we propose an externalist account of sex that focuses on properties instead of individuals, and argue that properties relevant for sex categorization are neither exclusively internal to the individual skin, nor fixed. We introduce the notion of *extended sex* and spell out its potential to support an active defense of diversity and an intervention against sex-based discrimination.

The proposal of extended sex is heavily shaped by our broader goal. When approaching a concept, in this case, sex, there are at least three different types of projects we might pursue: conceptual, descriptive, and ameliorative (Haslanger 2006). A conceptual analysis of a concept is aimed at revealing our ordinary use of it. The goal of a descriptive project is rather to identify the things in the world that the concept is supposed to track. Finally, an ameliorative project starts by stating the purposes of the analysis, and proposes an understanding of the concept that fulfills those purposes. Here we pursue an ameliorative project that relies on a descriptive analysis of the biology of sex properties. We start by criticizing the naïve view of sex and propose a new understanding of sex for a particular purpose: a notion of sex that allows for diversity and helps us in our quest for social justice. In sum, we aim for an ameliorative project that is descriptively correct.

We start with the negative part of our proposal and review biological, political, and moral reasons why sex categorization according to the female/male dichotomy is a problem we might want to solve. To build the foundation for the positive proposal, we briefly present extended and distributed approaches to cognition. Finally, we introduce the notion of *extended sex*, and list several ways in which such understanding of sex facilitates construction of a more just society.

Against the Naïve View of Sex: Problems of Female/Male Categorization

In this section we argue that the female/male categorization is problematic and contributes to several kinds of injustice. We are not the first to criticize the naïve view

of sex. The claim that sex categories track a well-defined dichotomy has been criticized because properties relevant for sex categorization are not binary, and individual variability with regard to sex properties is the norm, rather than an exception (Fausto-Sterling 2000; Jordan-Young 2010; Karkazis et al. 2012). The claim that sex is solely a matter of biology has been challenged by arguments that being female or male is a social property (Sveinsdóttir 2011), and by the evidence suggesting that at least some of the properties that are part of our traditional sex categories are molded by social arrangements (for example, testosterone levels; Gettler et al. 2011). We challenge the naïve view on these and new grounds. In what follows we review some of the reasons that have been put forward against the naïve view, and add new ones.

Inaccuracy of Female/Male Dichotomy

Traditional sex classification assumes biological dimorphism. But sex-relevant traits are not packaged neatly in two clusters. Each sex marker can take a spectrum of values. "[T]here are at least six markers of sex—including chromosomes, gonads, hormones, secondary sex characteristics, external genitalia, and internal genitalia—and none of these are binary" (Karkazis et al. 2012, 6).[1] This produces a range of individuals, each exhibiting a unique combination of sex-relevant features. The amount of individual variability is often underestimated because social practices actively mask deviations from the paradigmatic, idealized cases (by waxing, wearing specific clothes, and more radically, by surgical interventions on ambiguous genitalia). A lot of work goes into maintaining the appearance of absolute sexual dimorphism, despite all the evidence to the contrary.

Existing variability questions the appropriateness and accuracy of the female/male divide, but it does not completely invalidate the categorical divide between sexes. After all, most natural categories have exceptions. One approach to rescue sex dimorphism is to appeal to reproductive roles. Even if we recognize that people vary in sex properties, as long as we keep reproducing sexually, there will be two reproductive roles. The capacity to get pregnant and the capacity to produce sperm are commonly used as the markers of sex categorization, and this differential role in reproduction is often seen as the basic biological ground that can't be called into question (even within feminist approaches).

However, the notion of reproductive role itself is not as clearly defined as many wish to believe. Are we talking about actual or potential capacities? If we focus on the potential, how far from the actual capacity can one deviate while maintaining the "reproductive role"? How many properties involved in reproduction (attributes of chromosomes, hormone levels, eggs/sperm, uterus, genitals) can be omitted without losing membership in a particular reproductive role (and shift to the other, or to none)? Does it matter what prevents a person from performing a certain reproductive role (whether a person has no uterus because of a hysterectomy, has complete androgen insensitivity syndrome, or has the Y-chromosome)? If we focus on the outcomes of reproduction instead, it is too simplistic to reduce all that is relevant for

reproduction to sperm, egg, and uterus. *Successful* reproduction involves a wider range of things, such as providing food, care, and stimuli, things that do not require particular biological (chromosomal, and so on) properties on the part of the provider. Whether we appeal to actual or potential reproductive capacities, reproductive roles come short of grounding exhaustive and exclusive sex categorization. Moreover, as we explain next, reproductive roles account for only a small portion of sex categorization practices, and therefore can't be used to justify them in their entirety.

The Sex/Reproduction Gap

A grounding assumption of sex categorization is that existing sex categories are based on differential reproductive roles. However, there is a gap between what is relevant for reproduction and what is relevant for sex categorization. When categorizing someone as female or male, we are doing more than merely referring to their potential reproductive role. Sex categorization takes into account social practices and identities, whereas reproductive role is relevant only in a small subset of those practices. An employment website advertises "male jobs"; NPR airs a piece about "female senators"; a police officer reports detaining "a black male," hardly referring to these people's actual or potential role in producing offspring. We would go as far as to say that in ordinary speech, sex terms are used primarily to refer to nonreproductive properties. Such usage relies on the assumption of informativeness and inductive potential of sex categories that go beyond reproduction.

The compulsory sex categorization in passports in most countries is a good illustration of the sex/reproduction gap and associated assumptions. People are generally legally required to be categorized as either female or male (and not as both or neither), and to be *correctly* categorized, for purposes of identification. Sex categories can be used in settings that have nothing to do with reproduction because of the assumption that there are two well-defined clusters of properties, and, roughly speaking, that a person's genitalia can tell a lot about the rest of their attributes.

This assumption can be useful on many occasions. For example, if a person has a breast, one might predict that that person also has a vagina, a uterus, and a vaguely defined set of other properties, such as not having facial hair and—taking a more controversial but common step—a series of behavioral traits; often we see some such predictions confirmed. Nevertheless, there are several problems with such use of sex categories.

First, as we describe in the previous section, the correlation among sex-relevant features is weaker than is commonly thought. Although genetic, gonadal, and genital sex attributes are internally consistent in ~99% of people (the "3G sex"; Joel 2012), many anatomical and cognitive properties commonly used in sex-categorization are not reliably correlated with reproductive roles and among themselves. Research on sex/gender differences reporting such correlations has recently been extensively criticized on grounds of selective or biased presentation of results and misinterpretation of findings (Fine 2010; Jordan-Young 2010). Attempts may be misguided to locate an

individual on one side of a unidimensional continuum categorically divided in two sections anchored at female and male. Rebecca Jordan-Young proposes describing each individual's set of sex properties as their location in a multidimensional space, where every dimension represents a continuum along some trait (level of a hormone, breast size, genital shape, and so on) (Jordan-Young 2010). Within such a space, an individual's location along one dimension poses few constraints on their location along other dimensions, reflecting the existing amount of variability and flexibility of combinations among sex-relevant properties (regardless of the origin of this variability, and capturing all combinations of given and/or acquired features).

Second, for sex-related properties that seem correlated, it is misguided to assume that all relations among such properties necessarily stem from a common cause: reproductive biological dimorphism. Contrary to common belief, there is no solid evidence that differences in hormone exposure during prenatal development are causally linked to differences in nonreproductive properties (McCarthy and Konkle 2005; Fine 2010; Jordan-Young 2010). However, there is plenty of evidence that from an early age, people are treated differently depending on their assigned sex in situations where reproductive role is not even remotely relevant. Boys and girls are encouraged to play with different toys and engage in different activities (see Fausto-Sterling, Lamarre, and Coll 2012 for a review of relevant research). Recent research suggests that mothers are more responsive to baby girls' vocalizations than to baby boys' (Johnson et al. 2014). Gender-labeling studies show that differential treatment does not merely respond to underlying differences, but is rather imposed by our preexisting beliefs about sex/gender even when no such differences exist (Condry and Condry 1976; Burnham and Harris 1992). For example, when adults are asked to watch a video of a baby playing with a jack-in-the-box that suddenly pops up, their (experimentally manipulated) belief about the baby's sex affects their subsequent descriptions: when they believe it is a girl, they describe her as "afraid"; when they believe it is a boy, they see him as "angry." Adults did not modify their descriptions to fit the stereotypes; they genuinely "saw" different reactions. Although the specific causal mechanisms going from differential treatment of babies to their development of specific traits need further testing, we have solid evidence that as soon as we are told or infer the assigned sex, we assume the person exhibits a certain set of traits and act upon that assumption. It is reasonable to argue that some of the apparent uniformity in sex-relevant properties is a product of our beliefs and categorization practices, rather than a natural dichotomy innocuously tracked by our categories of female and male.

The tendency to impose categorical divides over continuous variability is not unique to sex categorization. Categorical perception is a basic cognitive phenomenon. For example, a set of artificially created auditory stimuli gradually changing in voice-onset-time from *ba* to *pa* is perceived as two discrete clusters of syllables, *ba* and *pa* (Volaitis and Miller 1992). But in contrast to categorical perception of speech sounds, which has no effect on the physical stimulus itself, categorical perception of sex can *create* sex differences by promoting differential treatment and punishing deviations from the dichotomy. Sex categorization does not merely respond to natural facts of the world; it creates a morally problematic phenomenon.

Harm and Oppression

Even though sex categorization is commonly assumed to be politically and morally neutral (for it is said to involve purely biological properties), sex categorization practices nevertheless carry moral and political weight. The moral charge comes with the prescriptive force of sex categories: once people are sex-categorized (usually as either a female or male), they are expected to adhere to a series of sex-appropriate norms and expectations. There are *right* and *wrong* ways to be female or male; one ought to be a *good* exemplar of her or his sex rather than a *bad* one (Bettcher 2011). Being a good exemplar usually involves exhibiting a coherent set of sex-properties, something that, as we indicated above, is not the norm in humans. This mismatch between what we impose and expect, and how our bodies actually are, results in personal struggles to conform to an ideal paradigm, and in social punishment for (intentional and nonintentional) *deviations*. Moreover, there is a strong medical and legal urge to categorize people as either female or male, and not both or neither (with especially harmful effects on intersex people); being categorized as one or the other brings about strong political and legal consequences (for example, being denied entry into a country for not matching the passport sex; being banned from participating in sports competitions).

The female/male categorization system locates people in an oppressive hierarchy by facilitating and justifying differential treatment based on a wrongly assumed correlation among biological properties related to reproductive role. This differential treatment is not only harmful but also oppressive, because it is part of a structure of systematically related barriers constraining a group of people (Frye 1983). We talk of the oppression of sex classification because the assigned or perceived sex is part of the explanation of certain cases of injustice.[2] When a person is not hired for a job or is systematically ignored for her academic merits because she is assumed to have certain properties that make her an inappropriate candidate, and these properties belong to the category of female, we can explain the decision not to hire her by appealing to the fact that she has been classified as female (whether or not the participants explain it in this way).

In her account of existing gender (and race) terms, Sally Haslanger builds hierarchy into the definitions (Haslanger 2000). Being a woman in a particular context, she proposes, is being systematically subordinated *as a woman* along some dimension in that context. She reacts against this form that gender takes and proposes "the political possibility of constructing non-hierarchical genders" (43). We are motivated by the recognition that the form that the sex concept takes in our common categorization practices is also hierarchical and oppressive. Our goal is, like Haslanger's, to develop a theoretical account that can be effectively used to fight injustice. But whereas she seems willing to keep females and males,[3] we propose to construct non-hierarchical sexes, focusing our intervention on the concept of sex.[4]

So far we have identified several problems with the female/male categorization system: sex categories are inaccurate; there is a gap between sex categorization and reproduction, although the latter is often thought to ground and justify the former; female/male categorization causes harm in virtue of its prescriptive force, and is

imposed in many political, medical, and legal practices; and finally, sex categorization embodies an oppressive hierarchy, for it classifies people based on the assumption of internal consistency among properties in a way that facilitates and promotes systematic disadvantage of those who are assumed to exhibit a particular set of these properties.

Given these problems, we think that a better account of sex is due. Our goal here is to develop one such account, articulating criteria for relevance of properties for sex categorization in a way that acknowledges the social and political significance of sex categorization practices and offers an understanding of sex that helps us toward a more just society. We propose an account of extended sex, and argue that sex should not be defined exclusively by inside-the-skin features.[5] This anti-internalist impetus is inspired by externalist accounts of cognition, which we review next.

Inside or Outside of the Skin: When Location Doesn't Matter

Our sensorimotor capacities are not limited, in principle, to the capacities of our bodies. Tools (a telephone, a hammer, a stone) and appropriately arranged environments (a shelter) can augment our skills and enable new actions (hearing someone who is many miles away; nailing or cutting; surviving in extreme weather). Nor are our cognitive capacities limited, in principle, to the workings of our brains. Since the Upper Paleolithic, technologies have constituted part of human cognition (Donald 1991). Outsourcing of cognitive processes is not unusual: using a phone or a notebook to record and manipulate information needed in daily-life tasks essentially delegates the functions of biological memory to an external resource. Likewise, a skilled bartender lines up different glasses on the counter to represent a long list of cocktails ordered at once. Sometimes we rely on external resources not only to alleviate internal load, but to be able to do what could not be possible by the naked brain alone. We engage with external symbols that can be abstract (for example, collective schemata) or physical (for example, diagrams), as well as with artifacts (phone, pencil, paper) and even other people (for example, our close friends when remembering an event or developing ideas). Sometimes we get so engaged with external resources that we do not notice them anymore, such as glasses, a walking stick, or an internalized schema.

The complexity and richness of humans' relationship with external resources have been emphasized by recent approaches in the philosophy of cognitive science, such as distributed cognition (Hutchins 2001) and the extended mind (Clark and Chalmers 1998; Menary 2010; Sutton 2010). Since we rely on these approaches to introduce our proposal of extended sex, we present them here in more detail.

Cognition Distributed and Extended

Instead of the traditional internalist story according to which cognition happens inside the individual, distributed and extended approaches to cognition (D&E) disregard the skin boundaries and see cognitive processes as spread across a heterogeneous

(biological and nonbiological, material and abstract) set of entities. D&E invite us to take seriously the idea that a notebook, a cellphone, and other resources outside of our heads can be part of our mental machinery. Their cognitive status has less to do with their composition or spatial location, and more with the role they play in the total functional organization of the (cognitive) system.

D&E emphasize the ease and frequency with which our embodied brains couple with environmental resources. This capacity for coupling comes as no surprise once we recognize the parasitic, opportunistic (and plastic) character of our brains: they exploit "what problem-solving resources are readily available and recruit them into temporary problem-solving wholes" (Clark 2006, 1). We have a natural capacity for incorporating external resources into our cognitive and physical problem-solving routines.

Research on sensory substitution systems provides great examples of this capacity for incorporation and extension. These devices translate information from one sensory modality to another. For example, the tactile-visual substitution system takes images captured by a head-mounted camera, converts them into low-voltage pulse trains, each corresponding to a pixel, and delivers them to the back or tongue (Bach-y-Rita 1972). After wearing the tactile-visual system while engaged in different kinds of goal-driven activity, subjects report that the tactile sensations that they feel at the beginning eventually fade, to be replaced with visual-like experiences.[6]

Other well-known cases of extension involve artificial limbs and prostheses. Artificial limbs not only affect the way someone moves, but the way someone experiences the world. Similarly, a sensory extension shapes (and enhances) our motor capacities. The way the first author's grandfather used a walking stick illustrates this: he would use it primarily to improve his motor skills, but after daily use, it started serving as a sensory extension, as he would count on it to, for example, check the stability of a walking surface. His walking stick got to be transparent in use, to the extent that it was at the end of the stick, and not at the end of his hand, where he was encountering the world. It became a transparent technology, one of "those tools that become so well fitted to, and integrated with, our own lives and projects that they are pretty much invisible-in-use" (Clark 2003, 28).

If simple tools such as a walking stick can bring alterations of our usually local, skin-bounded sense of embodiment, do we experience extension every time we use a tool? Are hammers and knives parts of our body every time we are hammering a nail or peeling potatoes? There are limits to what and how external resources can be incorporated into the body, although these limits are still to be established. Helena De Preester and Manos Tsakiris postulate a normative body-model that imposes restrictions on incorporation. They argue that only resources sufficiently similar to body parts can be incorporated in a way that brings about an experience of completeness (as opposed to addition). They admit, however, that an experience of completion might also happen with tools that allow expression, as happens with musical instruments in the hands of skilled musicians (De Preester and Tsakiris 2009).[7]

Andy Clark distinguishes incorporation from mere use on the basis of changes in the body-schema, an unconscious and implicit model of the body defined in terms of its capabilities for action (Clark 2007).[8] Whereas during tool use the point of contact

between the body and the tool is salient and we must *infer* the actions that the tool affords us to do, in cases of incorporation, and due to the expansion of the body-schema, the body–tool interface becomes transparent and the salient point of contact is the one where the tool encounters the world. Recent research shows that when a person is engaged in goal-directed actions (for example, reaching an object), tool use leads to changes in the body-schema (Maravita and Iriki 2004). Just as with sensory substitution, the agent's active engagement in goal-oriented activity is critical for incorporation.

Biological Construction

Our capacity for extension and manipulation of external resources can be seen as a capacity to reinvent ourselves in an ongoing, dynamic process of interaction with our environment (Clark 2007). We reinvent ourselves through the construction of our bodies and environment according to our particular goals at any given moment. At this point, it becomes problematic to keep separating environment construction from body construction, since the construction of the body (in the sense of incorporating external resources) is done as part of the construction of the environment, and vice versa.[9] Moreover, the constructions shape each other. Constructing the environment to better cope with the challenge we are facing at a particular moment might require constructing our body in a new way, different from the body we constructed to succeed in a previous task. For example, we might benefit from a body-extended-into-a-walking-stick for walking, turning the TV on, petting the dog, waving "hi" to passers-by, signaling directions, drawing attention, testing the stability of a surface, or grabbing clothes from the floor (assuming we are as skilled with it as the first author's grandfather). But we might want to go back to a body-not-extended-into-a-walking-stick when sleeping or solving a crossword puzzle. Similarly, we may only rely on our smartphone to remember our friends' birthdays or successfully navigate city streets. Moreover, as the above examples illustrate, one and the same external resource can be used in a flexible and context-dependent manner. In the same way that our fingers can serve different purposes (to count, hold food, type) depending on the task we are involved in, each external resource can serve different purposes, and thus can be incorporated in different ways.

We call this agent–environment, dynamic interaction and continuous reinvention *biological construction*. It is *biological* because it is a natural, intrinsic capacity of our embodied brains. It is not advanced technology that allows extension, but our plastic brain. It is not only the case that nowadays we are not "bound and restricted by the biological skin-bag" (Clark 2003, 4–5); we have *never* been bound by it. Smartphones make it more obvious, but our extension-hungry mind was there in the first place. On the other hand, it is a *construction* because we are not talking of a finished, ready-made system that is given. It is an active move on the agent's part, an active transformation of the material and cognitive resources that are available at any given moment.

Important to note is that biological construction requires neither physical insertion of external resources inside the skin, nor cutting-edge technology. A cochlear implant does not have a higher potential to transform our capacities and skills just because of its location inside the skin. What matters in a body reconstruction is not that there is some extra material inserted into the original biological setup, but whether the new extra source (material or abstract) is fluidly integrated into the sensorimotor and cognitive profile of the subject, and how, as a consequence, it transforms the subject's capacities, skills, and lifestyle. We emphasize this to establish distance from the classical image of the cyborg, which brings to mind wires and metal embedded in the flesh.

Extended Sex

Sex Dichotomy Meets Manipulation of Sex-relevant Properties

Everything we said in the previous section draws and expands on the idea that features internal to our skin do not exclusively define what we are (for example, humans, cognizers). Our move here is to say that in the same way that *qua* biological organisms we manipulate our environment and adapt our bodies in order to modify our skills, we can negotiate our sex, manipulating the physiology of our bodies and producing sex exemplars that do not fit into the female/male dichotomy.

An extension of sex is an active construction of (at least) some of the properties that are usually seen as relevant for sex categorization. For example, a breastfeeding device, a simple tool consisting of a milk bottle connected to a tube that can be attached to a nipple, allows one to breastfeed[10] regardless of whether the person is lactating. In this case, the person is actively constructing a capacity to feed a baby independent of the physiological properties of the body that would, under common classification strategies, justify categorizing that person as a male or female. That is, whatever our initial physiological properties are, we can actively transform some of them *via* extension. A dildo can also be incorporated in a way that extends one's sex.[11] Extending sex is not about either constructing female/male individuals, or female/male properties, but about transforming one's relation to the world by enhancing one's capacities for particular actions. Incorporating a breastfeeding device or a dildo affords certain actions, which are in principle independent of femaleness/maleness.

It is critically important that such extension be dynamic and constantly revised depending on our particular goal-directed actions. What characterizes extension of sex properties is neither the nature of the tools nor their similarity (functional or in appearance) to any biological and/or internal-to-the-skin part or capacity,[12] but the agent's intentions and the bidirectional relation the agent establishes with the external devices.

Extending sex can be seen as both an individual, personal move, and as a political action. Under the former reading, extending sex through a noninvasive, flexible, and

temporal construction of our body (as opposed to a more invasive, more stable and durable, less task-dependent construction, for example, through hormone intake or surgical interventions) is just another way to construct and actively design our personal space (body and environment included), to enhance the landscape of potential actions in a dynamic way, depending on our time-framed goals. In other words, it is a way of overcoming the constraints that our skin-bag might be imposing on the actions we might want to perform at any given time.

The second reading points toward using the body as a site of political activism, as a material surface for social change. The idea is that by constructing at least some of the properties that are usually considered to be relevant for sex categorization (for example, being able to breastfeed by incorporating a breastfeeding device), we are challenging the sex dichotomy. Even if particular extensions of sex are not recognized as political statements of resistance, they are still political. The (social) meaning of an agent's act is neither exhausted by that agent's intentions, nor determined by what a particular audience takes the act to be. A sexist speech act is still sexist even if performed among an audience that does not recognize it as such.

It is an empirical question in which cases and to what extent external structures can be incorporated in a way that is relevant for sex. We already have some evidence of extended phenotypes (integration of artificial limbs),[13] extended body-schema (Maravita and Iriki 2004), extended senses (sensory-substitution devices), and of extended and distributed cognitive processes. If this were also true for at least some cases where we manipulate (at least some) sex traits, we can conclude that the boundaries of skin are not the boundaries of sex.

Note that this appeal to flexibility and variability is based not on the socially constructed nature of sex properties, but on a *natural* capacity of biological organisms to continuously and actively manipulate the boundaries of their biological properties to better fit their needs. In the same way as some of our cognitive processes should not be defined exclusively by inside-the-head mechanisms, sex should not be defined exclusively by inside-the-skin features. This allows for as many different sex-profiles as there are ways to incorporate external resources into our body for different tasks.[14]

Extended Sex: A Tool to Craft a Better Society?

Our notion of extended sex paves the way for a practical intervention toward a better society, where people are not categorized on the basis of internal, anatomical, and assumedly fixed properties according to a hierarchical binary system that subordinates and causes harm to many.

First, there is a theoretical and a practical way in which extended sex helps us escape the oppressive force at work in female/male categorization practices. Theoretically, given that the oppression operates there on the basis of the assumed existence of two natural kinds of self-contained bodies, by understanding sex as constituted by both internal and extended properties, we reject the assumption that sex properties

are the exclusive fixed dictum of an internal nature. In practice, by creating new alternative combinations of sex properties, we voluntarily and visibly contest the wrongly assumed correlation among sex-relevant properties. This exposes the nature of sex properties that is neither fixed nor binary. Both theoretically and in practice, we contest and resist the female/male dichotomy and its hierarchical character by the creation of nonhierarchical sexes.

Second, extended sex supports the view of sex properties as varying along a continuum (Jordan-Young 2010) and is consonant with increasing recognition of individual variability (Joel 2011; Karkazis et al. 2012). By incorporating a breastfeeding device a person is not constructing a stable female property or a female individual, but rather creates a here-and-now problem-solving capacity. This capacity is unconstrained by other sex-relevant properties of the individual, and does not have to be stable in order to successfully extend an individual's capacities. By extending sex, we make it explicit that breastfeeding or peeing standing up are neither stable, discrete properties, nor are they necessarily correlated with having these or those genes or genitals. Extended sex exposes and emphasizes the diversity and variability that common practices of "masking deviations" try to hide.

Third, extended sex contests the very validity of female and male categories. Our natural capacity as biological organisms to manipulate our bodies and exploit the environment makes flexible and dynamic the (biological) properties that existing sex categories are aimed to track, and therefore deprives those categories of accuracy and utility. This is an advantage as long as we recognize that these categories are morally problematic.

Fourth, since extending sex is an active move on the part of the agent, the extended understanding of sex makes agents responsible for their sex-relevant properties, instead of being the passive recipients of a categorization practice that forcibly locates them in a hierarchical social scene.

Fifth, extended sex allows us to escape the need to determine an ideally unbiased metaphysical account of what is given by nature and what is not (that is, what is socially constructed). That this is a significant advantage in designing effective strategies against injustice associated with sex categorization becomes clear when we take a look at the feminist critique scene. The origins of observed distribution of properties across sex/gender categories have been the subject of long-lasting, heated debates. Is sex/gender-correlated property X a natural difference or a product of social organization? Nowadays, the biological/social divide is considered to be a false dichotomy, and so we find it an advantage of our proposal that it makes that question completely irrelevant. By proposing extended properties of sex (that is, external, although not socially constructed), we shift the focus from the *nature* of properties to their *changeability*, independent of their nature. Extended-sex properties are biological yet changeable, that is, free from "biological fate."

Sixth, by contesting the external/internal boundary, extended sex takes away the privileged status of the *internal* in the way we reason about sex, which has harmful consequences. The common internalist approach takes internal properties to be the *real* ones, to reveal the *real* sex of someone, which prescribes what counts as (correct)

sex, with the result of disregarding sex identities that do not necessarily rely on the genes-gonads-genitalia set. Practices of mispronouncing and violence against trans* people are often derived from this insistence on the priority of the internal. The extended-sex scenario offers an alternative where this problem does not arise. Since we integrate internal and external properties related to sex, the former neither determine us nor can they be appealed to in order to discriminate.

What Extended Sex is Not

It is possible, and perhaps tempting, to read extended sex as a(nother) way of implementing femaleness/maleness. But that is not what we propose. Our interpretation of extended sex resembles, in this sense, Malika Auvray and Erik Myin's approach to sensory substitution devices. According to them, the kind of perception that sensory substitution devices afford does not belong either to the substituted (visual) nor the substituting (auditory) modality, but to an alternative, new one. "[T]he experience after sensory substitution is a transformation, extension, or augmentation of our perceptual capacities, rather than being something equivalent or reducible to an already existing sensory modality" (Auvray and Myin 2009, 1036). Likewise, extended sex is neither female nor male, but a qualitative alternative to both. By overcoming the female/male dichotomy and introducing sex properties that are neither male nor female, extended sex raises a question of what counts as a sex-relevant property and sets the stage for this important discussion.

Is extended sex abolishing sex? In a nutshell, no. Similarly to Haslanger's account of existing gender terms, *woman* and *man*, we denounce and reject existing sex categories, *female* and *male*. But, like Haslanger with regard to gender, we do not reject the possibility of sex taking other forms that might be free of the problems that our current categories have. In fact, our proposal suggests how to construct such nonhierarchical alternatives. Extending sex does not mean either that sex properties evaporate. In the same way that there is no loss of cognitive properties in cases of cognitive extension, sex extension does not mean or imply loss of sex properties or capacities.

Extended sex does not question the biological character of sex-relevant properties. Under approaches that separate sex from gender, properties are assumed to fall into one of the two clusters: internal, biological, and, therefore, fixed properties on the one side (sex), and external, socially constructed, and, therefore, changeable properties on the other (gender). Our proposal uncouples biology from being internal and fixed, and establishes the external and changeable nature of at least some biological properties. One might complain that extended properties are not biological constructions, for they include nonbiological elements. Our response to this is to distinguish, mirroring Haslanger's distinction of two ways in which the social operates in construction (Haslanger 2003), between *causally biologically constructed* and *constitutively biologically constructed* properties. Although an extended property could perhaps be accused of not being biologically constructed constitutively, it is, however, at least

biologically constructed causally, for biological factors (that is, our natural capacity to incorporate and our natural plasticity) are critical to enabling it.

Finally, how does extended sex stand in relationship to common practices of masking *deviations* from the ideal of assigned sex (for example, with clothing and make-up)? These masking practices illustrate the performative nature of gender, as it is produced through actions (Butler 1990). But the use of clothing, make-up, and other external resources to perform gender differs from extending sex in an important way. Within masking practices, actions derive their meaning from gender: "wearing make-up is a woman thing." Although an individual may wear make-up for gender-independent reasons (for example, to protect lips from UV radiation), wearing make-up *as a masking practice* happens only in relation to gender, whether one *conforms* to it or *contests* it. In contrast, in extending sex, the emphasis is on accomplishing actions that go toward their own end (breastfeeding in order to nourish a baby). The relevant actions have been pre-classified as male or female by common sex categorization, but the meaning of an action can be divorced from these categories.

Taking Stock

We have argued that current sex categorization practices according to the female/male dichotomy present a problem. Besides being inaccurate and incoherent (attributing nonreproductive properties to differences in vaguely defined reproductive roles), the dichotomy grounds moral and political pressures that harm and oppress people. To resolve this problem, we proposed an extended understanding of sex, capitalizing on the natural capacity of organisms to manipulate their bodies noninvasively, producing sex exemplars with flexible and dynamic properties that do not fit into the female/male dichotomy. The extended-sex proposal is an intervention against injustice involved in ordinary sex categorization, and it can contribute to building a better, diversity-sensitive society.

Notes

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1. Moreover, sex properties develop at different times, and in many organisms, at the beginning of each stage of sexual development the structure can develop in either direction (Fausto-Sterling 2012).

2. Adjusted from Cudd 2006.

3. Haslanger writes: "I believe it is part of the project of feminism to bring about a day when there are no more women (though, of course, we should not aim to do away with females!)" (Haslanger 2000, 46). Haslanger's reason to maintain some sex categories is that a just society needs to be able to protect bodies whose potential reproductive capacities make them more vulnerable than others. She notes, however, that "in imagining 'alternative' genders we should be careful not to take for granted that the relevant biological divisions will correspond to what *we* consider 'sex'" (50, original emphasis), leaving the door open for alternative classifications. We strongly believe that in order to effectively pursue that goal, we do not need the female/male categorization practice.

4. Our focus on sex does not imply committing to any particular position about how different or similar sex and gender are. Whether or not they track the same thing, we are dealing with different concepts and different, or at least not-completely-overlapping, sets of categorization practices. This distinguishes our ameliorative project about the concept of sex from Haslanger's ameliorative project about the concept of gender.

5. Alternatively, sex could be reduced to "3G sex," which may help avoid the problematic assumption of correlation beyond the cluster of genetic, gonadal, and genital properties. Evaluation of this solution and analysis of how it compares to our proposal is an interesting and important endeavor that lies beyond the scope of this paper.

6. Agents' engagement in goal-oriented activities and active motor control over the external device are crucial for successful incorporation.

7. The idea that tools that allow expression might facilitate incorporation and a feeling of completeness is highly relevant for our proposal, although we do not explore it here.

8. The body-schema, a pre-reflective motor program, is different from the body-image, a conscious model that can inform our reasoning about our own body (Gallagher 1986).

9. Such "promiscuity" of cognitive systems presents both a challenge and an invitation: it challenges the unity and integrity of cognitive science (Adams and Aizawa 2001), and it invites us to drag cognitive science into the desirable although muddy territory of interdisciplinarity (Sutton 2010).

10. The relevant property here is not having the milk coming from inside the body, but having the baby positioned next to the feeder's body, and having the milk feeding the baby as a consequence of the baby sucking from the feeder's breast. This is compatible with saying that there are other contexts where the relevant property is *having the milk coming from inside the body*.

11. By no means do we want to imply that wearing a dildo always or necessarily involves a construction of sex. Again, we can relate to external tools in many ways, and depending on the goal we want to achieve and the conditions under which we relate to them, the results will vary enormously.

12. We are not proposing to use external resources to *compensate* or *fix* a body that is otherwise defective. We do not sympathize with making extension dependent on physical

or functional similarity between internal and external elements, a condition that we do find in common cases of prosthesis incorporation, where the external element is usually thought to compensate for a missing or lost internal part in function and/or appearance. Our proposal takes sides with the second wave of the extended mind hypothesis (Sutton 2010), which departs from the first wave by not demanding functional similarity between inner and outer elements, and in fact stressing the differences between them.

13. An incorporated artificial limb might even elicit similar emotional reactions as a nonartificial one (Ehrsson et al. 2007).

14. We differ from feminist approaches to technology that either capitalize on the possibility of (digital) technology for disembodiment (for example, cyberfeminists), or that see technology as a way to fight nature (Firestone 1972). We emphasize embodiment and see biological capacities not as a space of subordination to be freed from, but rather as facilitators of that freedom. Extended sex (an extension of Clark's cyborg; Clark 2003) is no doubt a close relative of Haraway's cyborg (Haraway 1991). However, there is an important difference between our projects: Haraway focuses on how the social produces the biological (including our own bodies). In contrast, we emphasize the opposite direction of influence: from the biological to the external and social.

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