Article

Dehumanizing Gender: The Debiasing Effects of Gendering Human-Abstracted Entities

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Abstract

The propensity to "gender"—or conceptually divide entities by masculinity versus femininity—is pervasive. Such gendering is argued to hinder gender equality, as it reifies the bifurcation of men and women into two unequal categories, leading many to advocate for a "de-gendering movement." However, gendering is so prevalent that individuals can also gender entities far removed from human sex categories of male and female (i.e., weather, numbers, sounds) due to the conceptual similarities they share with our notions of masculinity and femininity (e.g., tough, tender). While intuition might predict that extending gender to these (human-abstracted) entities only further reinforces stereotypes, the current work presents a novel model and evidence demonstrating the opposing effect. Five studies demonstrate that gendering human-abstracted entities highlights how divorced psychological notions of gender are from biological sex, thereby decreasing gender stereotyping and penalties toward stereotype violators, through reducing essentialist views of gender. Rather than "de-gendering" humans, we demonstrate the potential benefits of "dehumanizing gender."

Keywords

gender stereotypes, essentialism, gendering, social roles, gender schema

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> There appears to be no other dichotomy in human experience with as many entities assimilated to it as the distinction between male and female.
>
> Bem (1981, p. 354)

There is no category as fundamental to social perception as gender (Bem, 1981, 1993; Starr & Zurbriggen, 2017). From a very young age, children come to believe that an individual's sex makes a difference in virtually every domain, where toys, clothing, hobbies, occupations, and behavior are differentially associated with, and appropriate for, males and females (Bem, 1981). As such, gender becomes a primary lens (i.e., schema) through which individuals process information and categorize stimuli, associating entities with men (masculine) or women (feminine). Observation of men and women enacting different behaviors and engaging in different activities reinforces notions of what is masculine and feminine, leading descriptive stereotypes to often become prescriptive norms (Bem, 1993; Bussey & Bandura, 1999).

Gendering Human-Abstracted versus Human-Connected Entities

The tendency to gender—or divide entities by masculinity and femininity—is so ubiquitous and pervasive that its application extends beyond human targets, whereby entities that are far removed from any relevant biological male versus female distinction (i.e., weather, numbers, sounds) are seen as gendered based on abstracted conceptual similarity. That is, entities which only share metaphorical similarities with men and women are perceived to be masculine or feminine, respectively (Bem, 1981; Starr & Zurbriggen, 2017). For example, people are perfectly capable of categorizing numbers (Wilkie & Bodenhausen, 2011), species (Bem, 1981), sounds (Slepian & Galinsky, 2016), and touch (Slepian, Weisbuch, Rule, & Ambady, 2011) by gender, despite the fact that these concepts have no content actually associated with male and female sex categories. This ability to gender human-abstracted entities is due to their conceptual similarities with human characteristics, whereby qualities associated with men, such as independence, roughness, and angularity, can be metaphorically transposed onto numbers ("1"), sounds ("gr"), shapes ("□"); similarly, qualities associated with women such as relationality, softness, and roundness can just as easily be transposed onto numbers ("2"), sounds ("sh"), and shapes

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("O"). When people gender entities that have no real connection to the male versus female sex, we term this the *gendering of human-abstracted entities*.

This ubiquitous focus on, and categorization by, gender is argued to hinder gender equality, as it bifurcates men and women into two unchangeable categories, with often an imbalance in value (Lorber, 2000), reifying and reinforcing gender stereotypes (Bem, 1993). However, the current work suggests that not all entities are created equally: We propose and demonstrate that the process of dividing *human-abstracted* entities (entities with no human connection to sex categories; for example, weather, species) by gender ironically offers an opportunity to *reduce gender stereotyping* (of humans).

That is, to apply gender toward something that is glaringly removed from male and female sex is to recognize that gender can be divorced from the distinction between male and female sex categories, and this recognition is to de-essentialize gender, which should serve to thereby reduce the endorsement of gender serotypes.

In contrast, we propose that when people gender entities more directly connected to human behaviors (e.g., aggressiveness vs. care-taking), goals (e.g., dominance vs. cooperation), and skills (e.g., physical vs. emotional), this will only serve to reinforce stereotypes. That is, to apply gender toward something that is closely connected to men and women is akin to noting the tight link between gender and male and female sex categories, which is to essentialize gender, known to increase the endorsement of gender serotypes. We term this latter process the *gendering of human-connected entities* and predict it to have negative effects for gender equality.

Implications of Gendering

It can be so effortless to classify entities that have nothing to do with male and female sex as masculine and feminine (e.g., eagle vs. butterfly) that the peculiarity of such a phenomenon can almost slip by one's attention. As sex has evolved to be a basic category for perception, it has been proposed that the gender schema is prioritized over many other schemata, being cognitively available and accessible in contexts dissociated from gender itself (Bem, 1981, 1993; Starr & Zurbriggen, 2017). However, the gender schema is problematic, as it reinforces gender distinctions and assigns men and women with different psychological qualities. As masculine characteristics are highly valued in domains of power and prestige, bifurcating human-connected entities based on gender often ascribes greater value and status to men (Eagly, 1987; Heilman, 2001). Moreover, gender prescriptions forbid men and women from engaging in feminine and masculine behavior, respectively. Consequently, women are penalized when engaging in the same behaviors that often help men become successful (Rudman & Phelan, 2008). As a result, gender psychologists and feminist scholars have called for a "de-gendering movement" to mitigate gender inequality (Bem, 1981; Lorber, 2000, p. 79; Martin & Phillips, 2017). Although scholars have posited and people believe[1] that gendering human-abstracted entities only serves to reinforce gender stereotypes (as applied to people), as previewed above, we make the opposing prediction.

We predict that gendering human-abstracted entities (i.e., those that have no clear human content) can reduce gender stereotyping of people. In making this prediction, we present a novel distinction absent from prior work on gender, distinguishing between the *process* of gendering *human-connected* and *human-abstracted* entities. As with past work, we believe that gendering human-connected entities reinforces gender bifurcation and stereotyping as it highlights ostensible differences tied to men and women's personality, behavior, skills, and biology. In contrast, we believe that gendering human-abstracted entities reduces gender stereotyping, as it divorces the concept of gender from human beings, thereby lessening biological and functional (i.e., essential) attributions for gender differences. Thus, while showing the harmful consequences of dividing human-connected entities by gender, we also demonstrate the utility of abstracting gender from humans as a potential intervention to reduce the harmful effects of gender stereotyping.

The Process of Gendering, Essentialism and Stereotyping

Unlike being exposed to *products* of gendering (which often reflect human-connected gendering; for example, the marked difference between toys for boys and toys for girls)—engaging in the *process* of gendering entities that are not directly connected to humans should bring benefits. For example, consider these questions: Is a pear masculine or feminine? What about a thunderstorm? We propose that the process of gendering these entities gives people the experience of stretching their gendering to its limits, which thereby makes clear just how abstracted these gendered qualities (that we attribute to humans) are, and how far from biology we are willing to apply them. In other words, engaging in the gendering of human-abstracted entities is to recognize that the very gendered qualities we ascribe to humans are ones we can also ascribe to abstract, nonhuman entities, and thus these qualities are not based only in biology. Highlighting that gender (rather than sex) is a psychological construct is to de-essentialize it; that is, recognize it as not biologically based but rather socially constructed (see Bastian & Haslam, 2006; Levy, Stroessner, & Dweck, 1998).

Essentialism is the belief that there are real underlying differences between social categories (Bastian & Haslam, 2006). When applied to gender, this means that human attributes and behaviors we strongly associated with masculinity and femininity lead people to view men and women as being fundamentally different. Of course, there is a *biological* difference between male and female. Consequently, people may also see *gender* as being *discrete*, whereby the boundary between men and women is sharp, as well as *immutable*. Yet, there is another aspect of essentialism relevant to the current

work: to essentialize gender is also to believe that knowing another person's gender is *informative* for knowing what that person is like (Bastian & Haslam, 2006).

The notion of a distinction between sex (the anatomy of one's reproductive system) and gender (identities and the social roles we ascribe to males and females) is rather recent. Many would agree it would not be unreasonable to assume a person's biological makeup from explicit knowledge of the nature of their reproductive system. Yet, to infer what a person is psychologically like from knowledge of their reproductive system would be to stereotype.

For those who do *not* assume psychological qualities from apparent biological sex (or at least do so less), they are still likely very much aware of gender stereotypes; they just do not see it as appropriate to apply them, and thus infer things that are unwarranted. That is, stereotyping interventions come in two broad forms, those that seek to reduce the *application* of stereotypes, and those that seek to replace stereotypes with counterexamples, seeking to actually reduce the strength of the cognitive *association* between a stereotype and social category (Dovidio, Kawakami, & Gaertner, 2000; Gawronski & Bodenhausen, 2006).

If one could "overwrite" an association between "men" and "dominant" and "women" and "caring," it would obviate the need to reduce application of the stereotype. Yet, replacing an association so entrenched—learned so early in development and so frequently reinforced and embedded in a larger culture—is no easy task. It can take decades to see change in people's associations (e.g., weakening the link between "male" and "math" is still an ongoing process). Luckily, this is not the only way to reduce stereotyping. Just because a stereotype exists, it does not mean a person should feel it has relevance to judging a person (i.e., they choose not to *apply* it). It is this latter process we believe we can intervene on in the current work. If one can be made to recognize that gender is actually somewhat removed from male and female sex categories, then, it follows that one should feel that it is less appropriate to *apply* gender stereotypes to people.

Such reductions in essentializing gender and applying gender stereotypes is sure to have implications for gender bias. Indeed, those who believe gender differences are due to biological (i.e., essential) sources are those who more often exaggerate differences between groups (Rothbart & Taylor, 1992), rationalize inequality between men and women (Hoffman & Hurst, 1990), prefer male leaders (Hoyt & Burnette, 2013), and allot greater penalty for stereotype violators (Dweck, Chiu, & Hong, 1995). Thus, reducing essentialist views of gender is likely to have benefits for gender equality, as lessening essentialist beliefs reduces the stereotype endorsement and legitimization that goes along with it. And hence, we predict through reducing essentialist thinking of gender, gendering human-abstracted categories should reduce gender stereotyping and diminish negative reactions to those who violate socially constructed gender stereotypes.

Overview of Studies

In five studies, we test the hypothesis that gendering human-connected entities increases, whereas gendering human-abstracted entities decreases, endorsement of gender stereotypes. We first examine and differentiate human-abstracted and human-connected gendering and show their divergent relationships with stereotyping (Studies 1-3) and then move toward ratings of specific targets (Studies 4 and 5). Furthermore, we examine the process through which this effect takes place—(de)essentialism. We hypothesize that gendering human-connected entities reinforces essentialized notions of gender, whereas gendering human-abstracted entities reduces them, influencing endorsement of gender stereotyping in general (Studies 2-3) and their specific application to evaluations of female leaders (Study 5).

Study 1: Measuring "Human-Connected" and "Human-Abstracted" Gendering

In our first study, we explored the basic question of whether the extent to which individuals gender human-connected and human-abstracted entities predicts gender stereotyping. For sufficient power, for our initial study, we used a sensitivity power analysis, choosing 200 participants as this can detect an effect size of a minimum of (r = .1966 at 1-β = .80, α = .05; Fritz, Morris, & Richler, 2012). From the results of Study 1, a power analysis (1-β = .80, α = .05, r = .33) determined 34 participants were needed per cell for the remainder of the studies; however, we felt this was not conservative enough, and to ensure adequate power, each subsequent design sought at least 40 participants per study cell.

Participants and Procedure

Participants (N = 206) were recruited from Amazon's Mechanical Turk to take part in a "scale validation" study on "attitudes and perceptions." Five participants were removed for failing an attention check, asking them to click "disagree" as an item within the gendering scale, yielding a final sample consisted of 201 (93 men; M_{age} = 35.89, SD = 11.28). Study 1 asked participants to what extent they believed human-connected and human-abstracted entities could be gendered in a within-subjects design and measured stereotype endorsement.

Independent Variable: Gendering Human-Connected and Human-Abstracted Entities

Participants were provided with 12 entities: six *human-connected entities* (skills, personality, interests, communication, desires, and emotions α = .93) and six *human-abstracted entities* (countries, nature, shapes, food, numbers, and colors,[2] α = .87), drawn from a pilot study. Per each randomly presented item, participants were asked to indicate

Table 1. Correlations Between Variables in Study 1 (N = 201).

Variable	*M*	*SD*	1	2	3	4	5	6
1. Connected gendering	3.99	1.61	(.93)					
2. Abstracted gendering	2.73	1.36	.49***	(.86)				
3. Abstracted–connected gendering	−1.26	1.51	−.62***	.38***	—			
4. Masculine stereotypes	0.89	0.84	.20**	−.15*	−.35***	(.79)		
5. Feminine stereotypes	1.33	1.00	.16*	−.17*	−.33***	.62***	(.91)	
6. All stereotypes	1.11	0.83	.20**	−.18*	−.37***	.88***	.92***	(.90)

Note. Values on the diagonal in parenthesis are alpha reliability coefficients.
*p < .05. **p < .01. ***p < .001.

whether they believed each entity could be gendered (i.e., divided based on masculine and feminine dimensions), from 1 = *strongly disagree* to 7 = *strongly agree*. An example item includes "shapes can be gendered."

Dependent Variable: Gender Stereotyping

Next, participants were presented with masculine stereotypes (competitive, aggressive, confident, leader, independent, and dominant; α = .79) and feminine stereotypes (warm, sympathetic, supportive, sensitive, affectionate, and gentle; α = .91). In one block, participants indicated how much each randomly presented trait was characteristic of the average woman, and in a second counterbalanced block, how much each randomly presented trait was characteristic of the average man (1 = *not at all* to 5 = *very*).

Stereotype endorsement was measured by taking the average *masculine* stereotypes for males, and for females (subtracting the latter from the former to yield masculine stereotyping; α_{M-F} = .79) and the average *feminine* stereotypes for females, and for males (subtracting the latter from the former to yield feminine stereotyping; α_{F-M} = .79); higher scores of the total average represent more traditional gender stereotype endorsement (Slepian & Galinsky, 2016).

Results and Discussion

As predicted, the more participants gendered *human-connected* entities, the more they endorsed traditional gender stereotypes, b = .10, SE = 0.036, t = 2.87, p = .005. In contrast, the more participants believed that *human-abstracted* entities were gendered, the *less* they endorsed traditional stereotypes, $b = -.11$ $SE = 0.043$, $t = -2.57$, $p = .01$.[3] Correlations, including the separation of masculine and feminine stereotypes, can be found in Table 1.

Study 2: Mediation Through Essentialism

Study 1 found that the more that individuals believed human-connected entities could be gendered, the more they endorsed traditional gender stereotypes. In contrast, the more that individuals believed human-abstracted entities could be gendered, the less they endorsed traditional gender stereotypes. Study 2 tests a key mediator to these effects, gender essentialism. If gendering human-abstracted (vs. human-connected) entities highlights that gender is abstracted from biology, then these effects should be mediated by the extent to which participants essentialize gender.

Method and Procedure

Participants (N = 85) were recruited from Mechanical Turk to take part in a study on "attitudes and perceptions," and three were removed for failing a manipulation check, asking categories they were asked to evaluate words on, yielding a final sample of 82 (52 men, M_{age} = 34.38, SD = 11.24). Participants were randomly assigned to one of two between-subjects conditions, either to engage in the process of gendering *human-abstracted* entities or to engage in the process of gendering *human-connected* entities. Critically, we did not predict that the mere opportunity to engage in the process of gendering human-abstracted entities versus human-connected entities would alone have downstream consequences, but rather only to the extent that participants engaged in the process of gendering these entities, did we predict diverging effects on stereotyping through essentialism, yielding a moderated mediation design (i.e., the *extent of gendering* predicting stereotyping through essentialism but moderated by condition, human-abstracted vs. human-connected).[4]

In both conditions, participants were told that we were "interested in whether certain categories could be gendered" and asked, "for each item listed, please indicate whether you think this category is gendered (i.e., divided based on masculine and feminine dimensions)." Participants were exposed to a series of entities and asked to indicate the extent to which they believed each entity could be gendered (1 = *not at all* to 5 = *very*).

In the *human-connected* gendering condition, participants were given the following entities from Study 1: personality, emotions, communication, interests, and desires. In the *human-abstracted* gendering condition, participants were given the following entities from Study 1: countries, numbers, sounds, nature, and shapes. An average was taken to create an extent of gendering score ($\alpha_{connected}$ = .83; $\alpha_{abstracted}$ = .81) for which to predict our dependent measures (moderated by the type of entity being gendered).

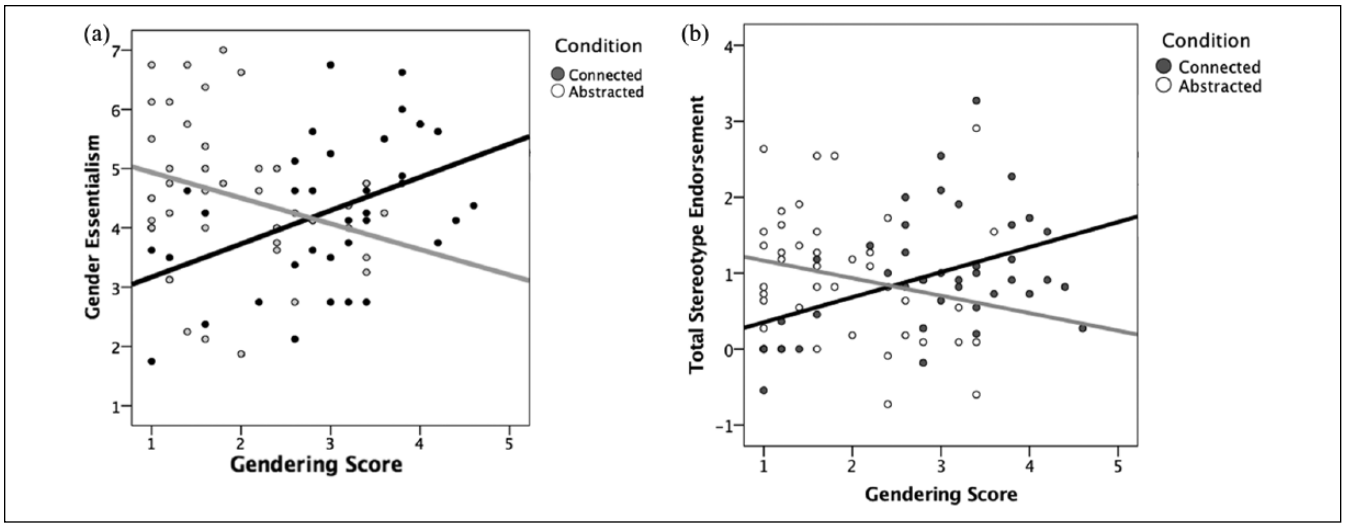

Figure 1. Condition × gendering graphs for (a) gender essentialism and (b) stereotypes in Study 2.

Dependent Measures

Mediator: Gender essentialism. Next, eight items from the *gender essentialism* scale measured the propose mediator (Coleman & Hong, 2008; for example, items, "the innate properties of a person's gender determine what the person is like" and "to a large extent, a person's gender biologically determines his or her abilities and traits." (1 = *strongly disagree* to 7 = *strongly agree* [α = .85]). See Supplementary Online Material for full scale.

Dependent variable: Gender stereotyping. For the dependent measure, per Study 2, participants were given two blocks of questions, where one block asked participants how much they thought masculine (competitive, aggressive, confident, leader, independent, and competent) and feminine (warm, kind, sympathetic, supportive, and sensitive) traits were characteristic of the average male, and the second counterbalanced block asked about the average female on a scale from 1 = *not at all* to 5 = *very*.

To measure stereotype endorsement, as per Study 1, a male minus female difference score for masculine stereotypes (α_{M-F} = .81) and female minus male difference score for feminine stereotypes (α_{F-M} = .87) were taken and averaged (α = .89), such that higher scores represent more traditional stereotype endorsement for the average male and female (Slepian & Galinsky, 2016).

Results and Discussion

Results were analyzed using a hierarchical linear regression, with condition (gendering type) and extent of gendering score entered in the first step, and both effects and their interaction entered in the second step.

Essentialism. There was no main effect of condition (gendering type), b = .48, SE = 0.31, t = 1.55, p = .12, or extent of gendering, b = .17, SE = 0.15, t = 1.11, p = .27; however, there was a significant condition (gendering type) × extent of gendering interaction, b = 1.00, SE = 0.29, t = −3.48, p = .001. Simple slope analyses revealed that the more individuals gendered in the human-connected entities condition, the more they endorsed gender essentialism, b = .56, SE = 0.18, t = 3.11, p = .003. In contrast, the more participants gendered human-abstracted entities, the marginally *less* they endorsed gender essentialism, b = –.43, SE = 0.22, t = –.1.95, p = .055. See Figure 1a.

Gender stereotypes. For gender stereotyping, there was no main effect of condition (gendering type), b = .09, SE = 0.21, t = .41, p = .68, or extent of gendering, b = .11, SE = 0.10, t = 1.05, p = .30. There was, however, a significant interaction on gender stereotyping, b = –.56, SE = 0.20, t = −2.81, p = .006. Simple slope analyses revealed that in the human-connected condition, the more individuals gendered, the more they endorsed gender stereotypes, b = .33, SE = 0.13, t = 2.62, p = .01. Although not significant, in the human-abstracted condition, the more participants gendered entities, the directionally less they stereotyped overall, b = –.23, SE = 0.16, t = −1.49, p = .14. As we report in Supplementary Online Material, this result is driven by the lack of effects for feminine, but not masculine, stereotyping. See Figure 1b. Recall that we predicted effects on stereotyping to operate through essentialism and that marginal paths do not preclude testing for an indirect effect (Hayes, 2009; Rucker, Preacher, Tormala, & Petty, 2011), which we examine next.

Moderated Mediation

We hypothesized that the divergent effects of gendering human-connected and human-abstracted entities on gender stereotyping would be mediated by gender essentialism. To test this

hypothesis, we used PROCESS Model 7 (Hayes, 2013, 2015). This analysis tests whether the path from the independent variable (IV, extent of gendering) on the dependent variable (DV, stereotyping) through the mediator (gender essentialism) is moderated by condition (human-connected vs. human-abstracted; Hayes, 2013; Preacher & Hayes, 2004, 2008).

Indeed, a formal test of moderated mediation (5,000 bootstrap resamples) that tested the indirect effect of extent of gendering on stereotype endorsement through essentialism, at each level of the moderator (condition) revealed significant, and divergent, indirect effects for human-connected gendering, indirect effect = .09, *SE* = 0.05, 95% confidence interval (CI) = [0.01, 0.22], and human-abstracted gendering, indirect effect = –.07, *SE* = 0.05, 95% CI = [–0.22, –0.004]. Dividing entities by gender predicted increased stereotype endorsement through increased essentialism in the human-connected condition. In contrast, dividing entities by gender predicted decreased stereotype endorsement through reduced essentialism in the human-abstracted condition. See Supplementary Online Material for Model 8.

Study 2 built on our previous study to support our hypotheses in several ways. First, we replicated the divergent effects of gendering human-connected and human-abstracted entities on stereotyping with a different design, which separated the gendering of human-connected from human-abstracted entities. Furthermore, we find support for our hypothesized mediator: gender essentialism, where gendering human-connected entities seems to reify gender (increasing essentialism and thereby stereotype endorsement), whereas gendering human-abstracted entities seems to dissociate, the biological, essential nature of gender differences from human men and women, thereby reducing stereotype endorsement.

Study 3: The Unique Effects of Gendering on Stereotyping and Essentialism

In Study 3, we implement a control condition to show the specific, and divergent, effects of human-connected and human-abstracted gendering, relative to a control rather than each other. We hypothesize that in the connected condition, relative to control, increased gendering will reinforce gender essentialism and gender stereotyping. In contrast, in the human-abstracted condition, relative to control, increased gendering will mean to reject essential connections between gender and male and female categories; that is, the more one genders nonhuman entities, the more one recognizes that gender transcends human categories, which should thereby lessen gender essentialism and stereotyping.

Participants and Procedure

To test this hypothesis, we recruited 233 participants from Amazon's MTurk to take part in a study on "Attitudes, Opinions, and Perceptions." Participants who did not generate examples relevant to the instructions (described below) were removed from analysis, yielding a final sample of 225 (130 men, 168 White, M_{age} = 36.87, *SD* = 12.09).

Participants were randomly assigned to one of three conditions (human-abstracted, human-connected, and control; see Supplementary Online Material for materials). In both gendering manipulations of interest, participants were given information about "gendering" and were asked to choose several entities they believed could be divided based on their masculinity and femininity. To examine the specific effects of gendering (relative to mere categorization), we compared these conditions to a control condition, where we gave participants information about "categorizing" and were asked to choose several entities they believed could be divided into smaller categories.

Experimental conditions

Human-abstracted. Participants were told that a set of human-abstracted entities could be gendered because the qualities that we associate with men (tough, strong, independence) and women (tender, relational, curvy) can also be ascribed to abstract concepts. They were given 16 examples and asked which (e.g., shapes, nature, sounds) could be gendered (choosing none was an option if they did not believe any of the entities could be gendered). A count (0-16) of the number of human-abstracted entities they believed could be categorized by gender was taken.

Human-connected. Participants were told that a set of human-connected entities could be gendered because men and women are perceived to experience, or demonstrate, differences in relation to these entities. They were given 16 examples and asked which (e.g., personality, occupations, skills) could be gendered (again, choosing none was an option). A count (0-16) of the number of human-connected entities they believed could be categorized by gender was taken.

Control. Participants were told that a set of entities could be categorized because certain entities can be divided into multiple, smaller, and more specific subcategories. They were given 16 examples and asked which (e.g., water, blue, sand) could be divided into smaller categories (and again, choosing none was an option). A count (0-16) of the number of entities they believed could be categorized was taken.

Extent of categorization. Our predictions centered on not only which form of categorizing participants were engaging in but the extent to which they engaged in it. That is, with increasing categorization by gender specifically, we predicted increased essentialism and stereotyping but critically the direction of this effect to be different across our two experimental condition, relative to control. Specifically, we predicted increased dividing of *human-connected* entities by gender (vs. categorizing more generally) to predict increased gender essentialism and thereby increased stereotyping. In

Table 2. Extent of Gendering Human-Connected Entities on Essentialism and Stereotyping.

Stereotyping	*b*	*SE*	95% CI	*t*	*p*	Essentialism	*b*	*SE*	95% CI	*t*	*p*
Extent	.06	0.02	[.003, 0.09]	3.66	<.001	Extent	.06	0.03	[0.01, 0.12]	2.39	.02
Abstract condition	.67	0.20	[0.27, 1.06]	3.33	.001	Abstract condition	.64	0.33	[–0.01, 1.28]	1.96	.05
Control condition	.20	0.20	[–0.20, 0.60]	0.99	.33	Control condition	.24	0.33	[–0.41, 0.89]	0.72	.48
Extent × Abstract	−.11	0.03	[–0.17, –0.05]	−3.53	<.001	Extent × Abstract	−.14	0.05	[–0.23, –0.04]	−2.76	.006
Extent × Control	−.05	0.03	[–0.10, 0.01]	−1.63	.11	Extent × Control	−.06	0.05	[–0.15, 0.03]	−1.33	.18

Note. CI = confidence interval.

Table 3. Extent of Gendering Human-Abstracted Entities on Essentialism and Stereotyping.

Stereotyping	*b*	*SE*	95% CI	*t*	*p*	Essentialism	*b*	*SE*	95% CI	*t*	*p*
Extent	−.05	0.03	[–0.10, 0.004]	−1.82	.07	Extent	−.07	0.04	[–0.15, 0.01]	−1.74	.08
Connect condition	−.67	0.20	[–1.06, –0.27]	−3.33	.001	Connect condition	−.64	0.33	[–1.28, 0.005]	−1.96	.05
Control condition	−.47	0.20	[–0.87, –0.07]	−2.33	.02	Control condition	−.40	0.33	[–1.05, 0.24]	−1.23	.22
Extent × Connect	.11	0.03	[0.05, 0.17]	3.54	<.001	Extent × Connect	−.14	0.05	[0.04, 0.23]	2.76	.006
Extent × Control	.06	0.03	[–0.004, 0.13]	1.85	.065	Extent × Control	.08	0.05	[–0.03, 0.18]	1.41	.16

Note. CI = confidence interval.

contrast, we predicted increased dividing of *human-abstracted* entities by gender (vs. categorizing more generally) to predict reduced gender essentialism and thereby reduced stereotyping.

Mediator: Gender essentialism. The *gender essentialism* scale (from Study 2) measured the propose mediator, essentialism measured on a scale from 1 = *strongly disagree* to 7 = *strongly agree* ($\alpha = .85$).

Dependent variable: Stereotypes. Participants were shown traits for masculine ($\alpha = .83$) and feminine ($\alpha = .87$) stereotypes from previous studies (see SOM) and asked the extent to which they were more characteristic of men and women (1 = *much more characteristic of women* to 7 = *much more characteristic of men* [poles counterbalanced]). Stereotypes were scored such that higher scores represent greater gender stereotyping, where for masculine stereotypes, higher scores are more characteristic of men, and for feminine stereotypes, higher scores are more characteristic of women.

Results and Discussion

Analysis plan. Given our moderated mediation design, we implemented the standard approach to examining a three-level variable within regression-based modeling. We created three dummy variables, capturing experimental condition, one representing whether the participant was in the *abstracted* condition (1 = *abstracted*, 0 = *connected*, 0 = *control*), one representing whether the participant was in the *connected* condition (1 = *connected*, 0 = *abstracted*, 0 = *control*), and one representing whether the participant was in the *control* condition (1 = *control*, 0 = *abstracted*, 0 = *connected*). When entering any two dummy variables, they are independent of each other and relative to non-included dummy variable; hence, all three levels of condition are represented when entering two of the dummy variables.

Following standard procedure to account for interactions with a three-level variable, we entered the *extent of categorization variable*, two dummy variables, and their interactions to test whether *extent of categorization* predicted essentialism and gender stereotyping, but in different directions, depending on condition. Recall that when interaction terms are entered, what were before main effects become simple effects, each being the effect of when the other is equal to zero. To simplify the presentation of these results, in the main text, we report these simple effects on essentialism, on stereotyping, and then on stereotyping through essentialism (given that we find significant interactions between our dummy variables of interest and extent of gendering). Full regression results are presented in Table 2 to 4.

Human-connected gendering. The more participants believed that entities could be gendered in the human-connected condition, the more they believed gender was an essential, biological characteristic, $b = .064$, $SE = 0.027$, $t = 2.39$, $p = .018$. Likewise, the more participants believed human-connected entities could be gendered, the more they gender stereotyped, $b = .06$, $SE = 0.017$, $t = 3.66$, $p < .001$. See Figure 2.

Given that condition interacted with the extent of categorization to predict both essentialism and stereotyping (see Table 2-4), we ran a moderated mediation model that paralleled the above analyses (using PROCESS Model 9 to enter interactions with both dummy variables as required when examining interactions with a three-level moderator; Preacher & Hayes, 2008).

Table 4. Extent of Categorizing Entities (Control) on Essentialism and Stereotyping.

Stereotyping	*b*	*SE*	95% CI	*t*	*p*	Essentialism	*b*	*SE*	95% CI	*t*	*p*
Extent	.02	0.02	[–0.03, 0.06]	0.73	.46	Extent	.01	0.04	[–0.07, 0.08]	.15	.88
Abstract condition	.47	0.20	[0.07, 0.87]	2.33	.02	Abstract condition	.40	0.33	[–0.24, 1.05]	1.23	.22
Connect condition	−.20	0.20	[–0.60, 0.20]	−0.99	.33	Connect condition	−.24	0.33	[–0.89, 0.41]	−0.72	.48
Extent × Abstract	−.06	0.03	[–0.13, 0.004]	−1.85	.065	Extent × Abstract	−.08	0.05	[–0.18, 0.03]	−1.41	.16
Extent × Connect	.05	0.03	[–0.01, 0.10]	1.63	.11	Extent × Connect	.06	0.05	[–0.03, 0.15]	1.33	.19

Note. CI = confidence interval.

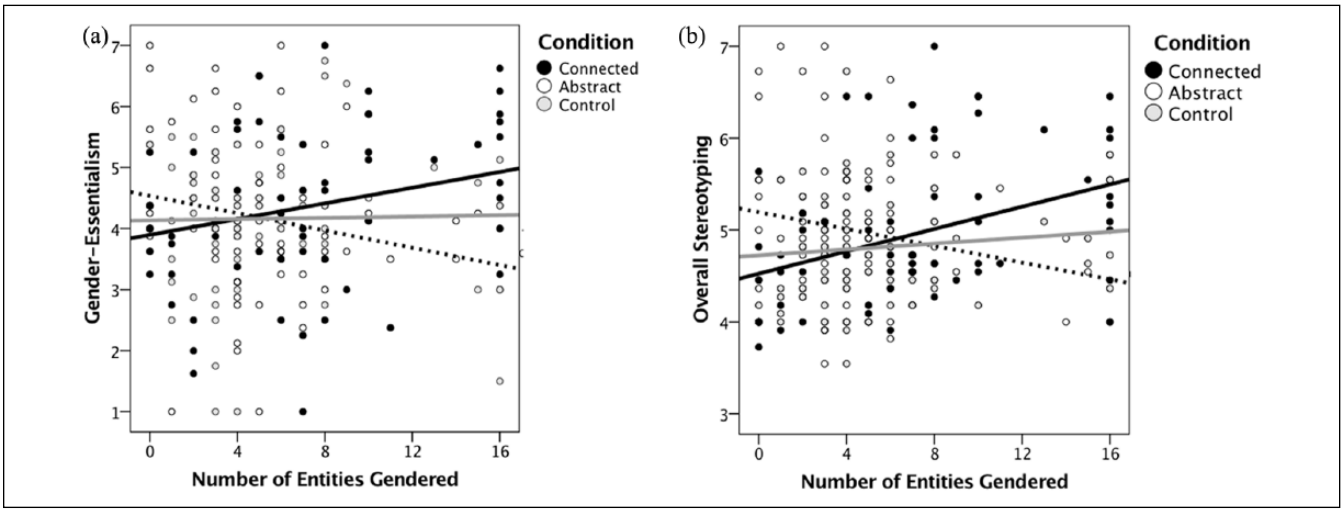

Figure 2. Gendering human-connected versus human-abstracted versus control entities on (a) gender essentialism and (b) stereotyping in Study 3.

As assessed within the human-connected condition (vs. control; moderator), extent of categorization (IV) predicted increased stereotype endorsement (DV) through increased essentialism (Mediator), $M_{\text{indirect effect}}$ = .0128, *SE* = 0.0059, 95% CI = [0.0038, .0261]. And thus, it is *not* the extent of dividing entities generally but the extent of dividing human-connected entities by gender that increased gender stereotyping through gender essentialism.

Human-abstracted gendering. The more entities participants believed could be gendered in the human-abstracted condition, the marginally less they believed gender was an essential, biological characteristic, *b* = –.071, *SE* = 0.041, *t* = 1.74, *p* = .08. Likewise, the more participants believed that human-abstracted entities could be gendered, the marginally less they stereotyped, *b* = –.046, *SE* = 0.025, *t* = −1.82, *p* = .07. See Figure 2. As we report in Supplementary Online Material, this marginal result is driven by the lack of effects for feminine, but not masculine, stereotyping.

We acknowledge the effect on our mediator and DV was marginal. Yet, marginal paths do not preclude testing for an indirect effect (Hayes, 2009; Rucker et al., 2011). We thus again ran a moderated mediation that paralleled the above analyses. Indeed, as assessed within the human-abstracted condition (vs. control; moderator), extent of categorization (i.e., IV) predicted decreased stereotype endorsement (DV) through decreased essentialism (Mediator), $M_{\text{indirect effect}}$ = –.0141, *SE* = 0.0091, 95% CI = [–0.0374, –0.0011].

Control categorizing. Finally, there was no simple effect of categorizing entities in the control condition on gender essentialism, *b* = .01, *SE* = 0.035, *t* = 0.15, *p* = .88. This demonstrates that the prior effects were specific to categorizing (human-abstracted vs. human-connected) entities by gender (i.e., gendering) and not an outcome of categorizing entities more generally. Likewise, no relationship was found between categorizing entities in the control condition and gender stereotyping, *b* = .02, *SE* = 0.022, *t* = 0.73, *p* = .46. Again, this result suggests that merely categorizing entities does not affect stereotyping of men and women. See Figure 2.

Moderated indirect effect. As in the preceding sections, we ran a moderated mediation that paralleled the above analyses. As would be expected for the above null simple effects, as assessed within the control condition, the extent of categorization did not predict stereotype endorsement through essentialism, $M_{\text{indirect effect}}$ = .0010, *SE* = 0.0086, 95% CI = [–0.0205, 0.0172].

Study 3 replicated our initial findings, showing that the extent to which individuals categorize human-connected and human-abstracted entities by gender influences gender stereotype endorsement through influencing gender essentialism. The more participants gendered human-connected entities, the more they endorsed gender stereotypes as function of increased endorsement of gender as a biological, essential construct. In contrast, the more participants gendered human-abstracted entities, the less they endorsed gender stereotypes as a function of seeing gender as less biological, and more socially constructed. Importantly, both effects were found relative to a control condition. And thus, these effects were not due to merely categorizing entities; but rather, the specific process of categorizing by gender divergently influenced stereotyping through essentialism.

Study 4: Target Stereotyping

In the next studies, we move from generalized gender stereotyping to stereotyping specific targets. That is, we examine how men and women are perceived (Study 4) and how women are evaluated, again testing the mediating role of essentialism (Study 5). Furthermore, having established that the extent of gendering human-connected versus human-abstracted entities divergently affects stereotyping, we sought to examine whether mere exposure to scientific abstracts about human-connected versus human-abstracted gendering would influence stereotyping of a specific human target, offering a unique intervention to change stereotype endorsement.

Participants and Procedure

Study 4 manipulated the belief that human-connected versus human-abstracted entities were gendered and examined participants' stereotyping of a male and female target. Participants (N = 240) were recruited from Amazon's MTurk to take part in a study on, "gauging academic interest" and "quick impressions and evaluation." This study used a 3 (condition: human-connected gendering, human-abstracted gendering, and control) × 2 (target gender: male and female) design. In total, 17 participants were removed for failing one of two manipulation checks, one about the content of manipulation and the other about the gender of the target, yielding a final sample of 223 (108 men, M_{age} = 34.78, SD = 10.86).

Independent variable. Participants were given one of four scientific abstracts: An abstract with findings supporting that either (a) "human existence" or (b) "abstract objects and concepts" could be divided based on gender (from Wilkie & Bodenhausen, 2011) or one of two control conditions (which we collapsed), either positing that (d)emotions were associated with different colors or (e) organizations were associated with different human qualities (see Supplementary Online Material for abstracts). We utilized two control conditions to ensure that any results relative to control were not contingent on the peculiarities of the specific control abstract used (treating each separately does not change the results). Participants rated the abstracts on believability, interest, clarity, and convincingness to support the cover story (articles did not differ on these qualities).

Dependent variable. Subsequently, participants were told that we were interested in how people make evaluations with very little information. They were asked to evaluate either a (randomly assigned) male (Matthew) or female (Katherine) target. A brief description of the target was provided, including details about the target's hometown (in upstate New York), hobbies (e.g., music, watching Netflix), relationships (spends time with friends, visits family), and socioeconomic status (lives comfortably, but not wealthy; adapted from North & Fiske, 2013; see Supplementary Online Material). Participants were asked, "In general, to what extent Matthew [Katherine] is. . ." (1 = *not at all* to 7 = *extremely*) competitive, dominant, leader, aggressive, independent (masculine, α = .74), warm, supportive, affectionate, gentle, kind (feminine, α = .81).]

Results and Discussion

We examined stereotyping with a 3 × 2 ANOVA, arbitrarily scaling the DV toward femininity (feminine–masculine stereotyping). We find no main effect of condition overall (p = .19), but (as would be anticipated) a main effect of target gender, $F(1, 217) = 15.05$, $p < .001$, $\eta p^2 = .065$, whereby participants stereotyped the male target as less feminine (M_{dif} = 1.08, SD = 1.16) compared to the female target (M_{dif} = 1.70, SD = 1.16).

This effect was qualified by a significant interaction, $F(2, 217) = 4.58$, $p = .01$, $\eta p^2 = .04$. As can be seen in Table 5, participants rated the male target as significantly less overall feminine than the female target in the control, $t(217) = -2.58$, $p = .01$, $d = -0.62$, and the human-connected, $t(217) = -4.18$, $p < .001$, $d = -1.04$, conditions. In the human-abstracted condition, there was no difference in overall stereotyping, $t(217) = 0.05$, $p = .96$, $d = 0.01$. See Table 5 for contrasts between and within conditions.

In other words, the human-abstracted condition removed the stereotyping effect seen at control condition (people stereotype at default). Notably, the neutralization of stereotyping in the abstracted condition was driven by reduced stereotyping of the female target, whereas the exacerbation of stereotyping in the connected condition was driven by increased stereotyping of the male target. There is a body of literature to support the differential application of stereotype endorsement for men and women, a point we return to in the General Discussion section.

Study 4 extended the prior results to stereotyping a specific target and demonstrated that an intervention based in

Table 5. Means and Contrasts for Study 4.

Condition and target gender	All stereotypes (F–M)					Masculine stereotypes					Feminine stereotypes				
	M	*SD*	M–F Difference	*t*	*p*	*M*	*SD*	M–F Difference	*t*	*p*	*M*	*SD*	F–M Difference	*t*	*p*
Control															
Male	1.23_{a}	1.12	−0.69	−2.58	.01	3.65_{a}	0.66	0.35	1.86	.06	4.88_{a}	0.86	.34	1.87	.06
Female	1.93_{b}	1.14				3.29_{b}	0.81				5.22_{b}	0.70			
Connected															
Male	0.71_{c}	1.09	−1.11	−4.18	<.001	3.77_{a}	0.87	0.51	2.72	.01	4.48_{c}	0.74	.60	3.33	.001
Female	1.82_{b}	1.05				3.26_{b}	0.77				$5.08_{a,b}$	0.76			
Abstracted															
Male	1.31_{a}	1.21	0.01	0.05	.96	$3.52_{a,b}$	0.81	−0.17	−0.92	.36	4.83_{a}	0.72	.16	0.88	.38
Female	1.30_{a}	1.23				3.69_{a}	0.85				$4.98_{a,b}$	0.89			

Note. For each dependent variable means in each column that share different subscripts differ significantly $p < .065$.

abstracting gender from humans reduced a stereotyping effect participants demonstrated by default. Given the potential of our human-abstracted intervention to reduce stereotyping of women, we focus on a female target in Study 5.

Study 5: Penalties for Stereotype Violators

A final study examined a downstream outcome of viewing the world through psychological gender divides, examining economic and social penalties for stereotype violation. This is especially relevant to *female* stereotype violators, as men's communal behavior is sometimes rewarded (Heilman & Chen, 2005), unlike the backlash typically seen for women who act agentically (Rudman, 1998; Rudman & Phelan, 2008).

Methods and Procedure

This study used a three condition (human-connected, human-abstracted, and control) design. We recruited as many student participants ($N = 278$) as possible over a week-long recruitment period at a large, private, east coast university to take part in a study, ostensibly collecting information for the research laboratory on campus. In total, 14 students were removed for failing a manipulation check (assessing whether they properly read instructions), yielding a final sample of 264 participants (140 men, $M_{age} = 22.34$, $SD = 4.28$); several participants did not fully complete the study (all available data is analyzed, and thus degrees of freedom differ across dependent measures).

Similar to Study 4, participants were told that we were interested in their interest in academic research, receiving a "random" abstract, manipulating the belief that human-connected versus human-abstracted entities were gendered (or given a control topic, see Supplementary Online Material). Next participants answered several questions gauging their interest (to support the cover story) and the gender essentialism scale (Coleman & Hong, 2008).

Participants were then told we were pretesting a scenario for an ostensibly different study and read a vignette about Karen who was described as communicating disappointment with an employee and demanding improvement (i.e., "I am a tough, determined boss," "I demand that you take steps to improve"; Livingston, Rosette, & Washington, 2012).

Manipulation. As in Study 4, we randomly assigned participants to one of multiple abstracts per condition to ensure that any results were not contingent on a specific abstract. In the human-connected condition, they received an abstract on (a) personality or (b) communication being gendered. In the human-abstracted condition, they received an abstract on (a) numbers or (b) shapes being gendered. The control condition used the same abstracts as Study 4 (see Supplementary Online Material).

Dependent measures

Mediator: Essentialism. After reading the randomly assigned scientific abstract, participants completed the gender essentialism scale used in the prior studies (1 = *strongly disagree* to 7 = *strongly agree*; $\alpha = .76$).

Dependent variables

Boss effectiveness. To examine the extent to which people found Karen to be an effective boss, participants indicated agreement with seven statements regarding Karen's leadership effectiveness (e.g., Karen is good at her job, Karen is a good leader) on a scale from 1 = *strongly disagree* to 7 = *strongly agree*; $\alpha = .88$; Livingston et al., 2012).

Salary. To assess how much participants thought Karen should be paid, participants were told, "The salary for someone in Karen's position ranges from $100,000 to $500,000" and then asked "How much do you think Karen should be paid? (100,000 to 500,000)."

Results and Discussion

Gender essentialism. Overall, there was marginal variation on essentialism across the three conditions, $F(2, 262) = 2.60$, $p = .076$, $\eta p^2 = .02$. The marginal variation was caused by the control condition falling in between the two experimental conditions. Specifically, individuals in the human-abstracted gendering condition endorsed gender essentialism ($M = 3.39$, $SD = 0.98$) significantly less than those in the human-connected gendering condition ($M = 3.72$, $SD = 1.11$), $F(1, 262) = 4.96$, $p = .027$, $\eta p^2 = .02$. The control condition ($M = 3.48$, $SD = 0.95$) was not significantly different from the human-connected gendering, $F(1, 262) = 2.45$, $p = .12$, $\eta p^2 = .01$, or human-abstracted gendering, $F(1, 262) = 0.41$, $p = .52$, $\eta p^2 = .002$, conditions (see Figure 3a).

Boss effectiveness. There was significant variation on boss effectiveness by condition, $F(2, 261) = 4.45$, $p = .013$, $\eta p^2 = .033$. The control ($M = 4.46$, $SD = 1.19$) and human-connected condition ($M = 4.58$, $SD = 1.08$) were not significantly different from one another, $F(1, 261) = 0.57$, $p = .45$, $\eta p^2 = .002$. Yet, individuals in the human-abstracted gendering condition ($M = 4.93$, $SD = 1.02$) rated Karen significantly higher on boss effectiveness compared to the human-connected gendering, $F(1, 261) = 4.37$, $p = .037$, $\eta p^2 = .016$, and significantly higher than participants did in the control condition, $F(1, 261) = 8.25$, $p = .004$, $\eta p^2 = .031$ (see Figure 3b).

Salary. There was significant variation on offered salary by condition, $F(2, 237) = 3.35$, $p = .037$, $\eta p^2 = .03$. There was no significant difference between the human-connected ($M =$ US$248,000.00; $SD =$ 111,679.44) and control conditions ($M =$ US$256,204.31, $SD =$ 124,730.31), $F(1, 237) = 0.15$, $p = .70$, $\eta p^2 = .001$. Yet, those in the human-abstracted gendering condition ($M =$ US$297,619.05; $SD =$ 151,350.30) thought Karen should be paid significantly more than those in the control condition, $F(1, 237) = 4.12$, $p = .044$, $\eta p^2 = .02$, and significantly more those in the human-connected condition, $F(1, 237) = 5.68$, $p = .018$, $\eta p^2 = .023$ (see Figure 3c).

Mediation. Human-connected versus human-abstracted gendering influenced essentialism, and essentialism was related to both boss effectiveness and salary (see Table 6), meeting the conditions for testing an indirect effect. Again, as in the earlier studies, we implement the standard approach of testing for mediation with a three-level categorical variable (i.e., computing two dummy variables that when both entered represent all three levels). Specifically, using PROCESS Model 4 (with 5,000 bootstraps), we entered the critical dummy variable (1 = *abstracted*, 0 = *connected*, 0 = *control*), with the other dummy variable entered, as a covariate (1 = *control*, 0 = *abstracted*, 0 = *connected*), which tested for the presence of an indirect effect between the two experimental conditions on boss effectiveness and salary through essentialism. Indeed, relative to the human-connected condition, human-abstracted gendering increased ratings of boss effectiveness (indirect effect = .06, $SE = 0.04$, 95% CI = [0.01, 0.16]) and salary (indirect effect = 6,349.18, $SE =$ 4,600.35, 95% CI = [74.63, 18,837.96]) through reducing gender essentialism. Thus, manipulating the belief that human-abstracted versus human-connected entities were gendered influenced organizational outcomes of a stereotype violator (i.e., boss ratings and deserved salary) through reducing essentialist views of gender.

Effects of Gendering Human-Connected versus Human-Abstracted Entities Across Studies

For simplicity of presentation, we presented above effects on overall stereotype endorsement. Yet, given that people apply masculine stereotypes to men in a different manner than they apply feminine stereotypes for women (Diekman & Eagly, 2000), we also explore here masculine versus feminine stereotyping. Analyses of masculine and feminine stereotyping in each study can be found in Supplementary Online Material and in those analyses it appears that the effects of human-abstracted gendering are stronger for masculine stereotyping than they are for feminine stereotyping. Given apparent heterogeneity in the effect size across masculine and feminine stereotyping, we conducted an internal meta-analysis of each study that examined stereotype endorsement as an outcome (Studies 1 to 3). Following procedures outlined in Rosenthal (1991) for combining and comparing effect sizes, we performed a meta-analysis for stereotyping (see Goh, Hall, & Rosenthal, 2016). First, we examined overall stereotyping. For human-connected gendering, these analyses yielded an overall effect of $r = .28$, $p < .001$, whereby human-connected gendering reliably predicted increased stereotyping. In contrast, human-abstracted gendering yielded an overall effect of $r = –.19$, $p = .001$, showing that human-abstracted gendering reliably predicted decreased stereotyping.

Next, we examined masculine stereotyping and feminine stereotyping separately. For human-connected gendering, separate meta-analyses revealed a reliable effect for both increased masculine, $r = .30$, $p < .001$ and feminine, $r = .24$, $p < .001$ stereotyping. And for human-abstracted gendering, separate meta-analyses revealed a reliable effect of both decreased masculine, $r = –.20$, $p < .001$, and feminine, $r = –.14$, $p < .05$, stereotyping. In both cases, gendering *human-abstracted* attributes reliably predicted *reduced* stereotyping; although it seems these effects are particularly powerful for reducing the application of masculine, compared with feminine stereotypes. These effects are consistent with past work showing feminine stereotypes are more entrenched and persistent, due to their essential and biological associations (Park, Banchefsky, & Reynolds, 2015) compared to

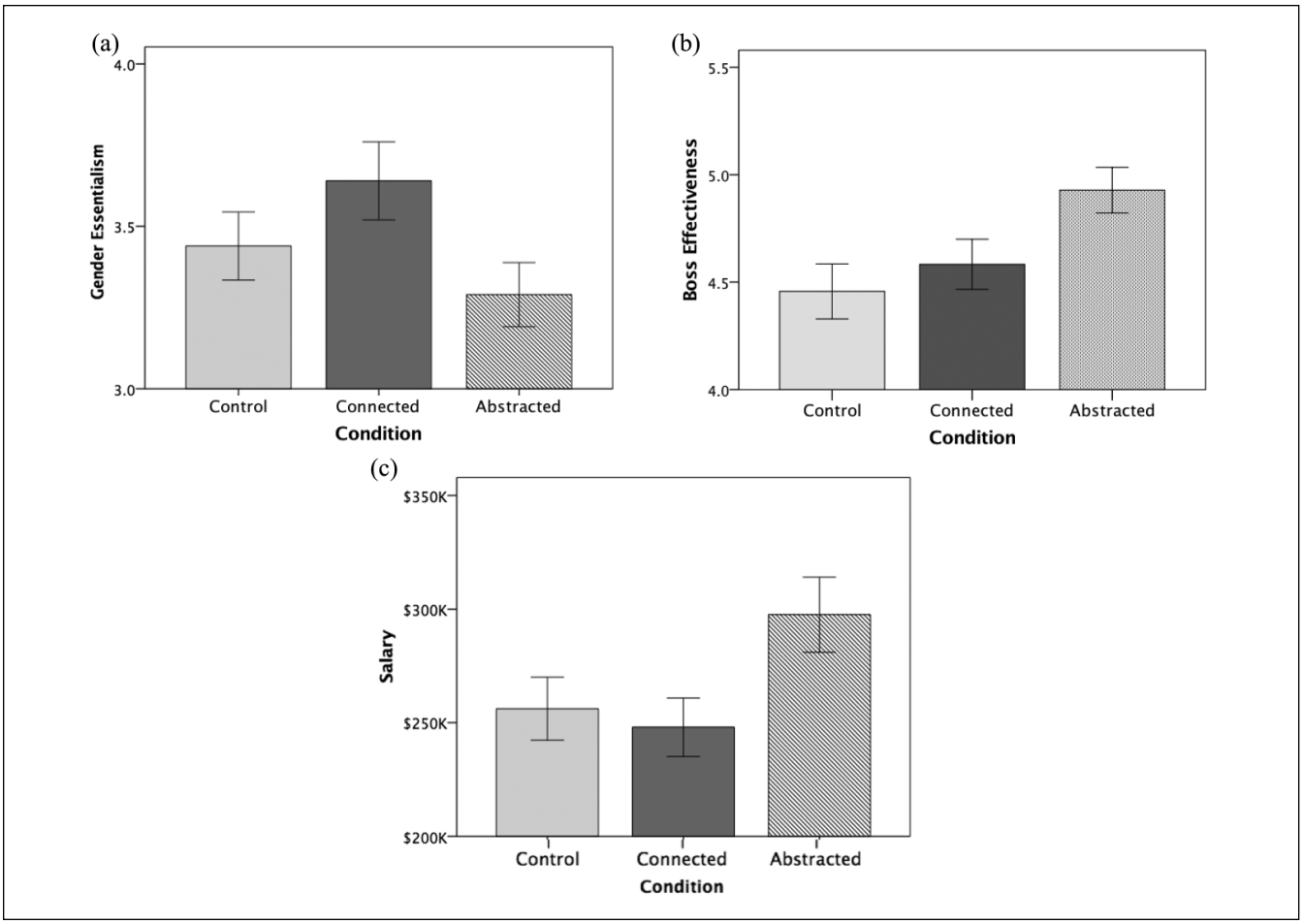

Figure 3. Endorsement of (a) gender essentialism, (b) boss effectiveness, and (c) salary by condition in Study 5.

Table 6. Correlations Between Variables in Study 5.

Variable	*M*	*SD*	1	2	3
1. Condition (abstract vs. connect)	1.48	0.50	*N/A*		
2. Essentialism	3.52	1.02	.16*	(.76)	
3. Boss ratings	4.66	1.11	−.16*	−.17**	(.88)
4. Salary	268K	132K	−.18*	−.17**	.43***

Note. Values on the diagonal in parenthesis are alpha reliability coefficients.
*$p < .05$. **$p < .01$. ***$p < .001$.

masculine stereotypes which are more dynamic and thus more flexibly applied due to women's increasing representation in masculine domains (Cejka & Eagly, 1999; Diekman & Eagly, 2000).

General Discussion

Gender stereotyping and gender bias clearly represent a societal obstacle that must be overcome. Gendering has been assumed to be a contributor to gender biases, as it leads individuals to see women as fundamentally different from men on a number of dimensions, undermining their competence and holding them to different and higher standards (Biernat, 2012; Lorber, 2000). Accordingly, feminist and gender scholars have called for a "degendering" movement, claiming that gendering entities leads to more bias. Yet, the current work critically evaluated this claim, while making theoretically novel distinctions. That is, rather than examining the holistic effects of gender-schematic processing, we discriminate between the gendering of human-connected and human-abstracted entities.

While gendering human-connected entities should only reinforce human gender stereotypes, the current work

proposed that the process of gendering human-abstracted entities would have the opposing effect. That is, taking psychological gender divisions (which are already somewhat separated from human biology of male sex vs. female sex) and applying them to human-abstracted concepts highlights just how abstracted from biology gender divisions can be. Indeed, five studies demonstrated that gendering human-connected entities—such as personality, desires, and interests—increases gender stereotyping and exacerbates penalties for stereotype violators; in contrast, we demonstrate that gendering human-abstracted entities—such as numbers, shapes, and sounds—have the opposite effect, reducing gender bias and penalties for a female stereotype violator. We further demonstrate the role of gender essentialism in accounting for these effects, whereby gendering human-connected entities reinforces the notion that men and women are innately different, and gendering human-abstracted entities diminishes these beliefs, reflecting the idea that gender is socially constructed. These findings make several theoretical and practical contributions to work on stereotyping, bias, and gender schemas.

Gender Stereotypes and Bias

Stereotypes are powerful, pervasive, and pernicious, and often resistant to change (Macrae, Stangor, & Hewstone, 1996). It is for this reason that we focused our theorizing and designs on changing whether people applied the stereotypes to targets or endorsed the stereotype of which they were aware. As gender is the most essentialized social category (Prentice & Miller, 2007), gender stereotypes are often seen as functional, stemming from biological foundations, and therefore highly endorsed and reinforced (Valian, 1999), legitimizing the current gender inequality pervasive in nearly every domain of power. As such, it is critical to find interventions that de-essentialize gender.

The current work offers a simple debiasing strategy: having individuals engage in the process of applying gender divisions to human-abstracted entities. While individuals are able to do this, the process of doing so highlights that gendered attributes are clearly divorced from biology; otherwise, one could not apply it to such far removed concepts as numbers and weather, and so on. This strategy is simple but effective, and it moves beyond traditional stereotype reduction interventions that focus on dissociating targets from their associations through contact (e.g., Pettigrew & Tropp, 2000) and training (e.g., Devine, Forscher, Austin, & Cox, 2012). Seeking to change cognitive associations from an experiment, with long-lasting impacts is a daunting (although an incredibly important process). Emerging research in this domain has focused on making environments more inclusive to slowly make headway in, for instance, making women more productive in science, technology, engineering, and mathematics (STEM) domains, which thereby increases visible counterexamples to influence the associations we hold. In the meanwhile, we can also focus on individuals' tendency to apply the stereotypes of which they are aware. Instead of re-conceptualizing the way we see women or men, the present strategy involves re-conceptualizing how we see gender itself as a construct, making it seem less appropriate to apply to people, and thereby providing a simple intervention to diminish stereotyping.

In her revolutionary book, *Lenses of Gender* (1993), Sandra Bem noted that to achieve equality, we must look *at* the culture's gendered lenses, rather than *through* them. Here, we offer an intervention to do just that. By realizing that gender can extend beyond humans, people may realize and reevaluate their gendered perceptions. And hence, our work suggests practical ways to intervene on gender stereotyping. Rather than trying to change the associations people have with gender, our novel take is that people should change the way they think gender applies to people. For instance, an intervention that asks people to classify shapes, number, symbols, and so on by gender could show participants how willing they are to see gender when it is not really there, and hence, one should consider the next time one infers something from gender when it comes to a person, and whether this is appropriate.

Gender Schema Theory

These findings contribute to gender schema theory (Bem, 1981), which posits that "gender" is a primary schema through which we process and categorize information (Bem, 1993; Starr & Zurbriggen, 2017). Gender schema theory has been cited in over 1,000 papers, many times as showing stereotype exacerbation and subsequent consequences (usually negative) of gender-schematic processing, with implications for career choices (Martin & Dinella, 2008), health, and even self-worth (Borchert & Heinberg, 1996). However, almost universally, this work has conflated human-connected and human-abstracted components. That is, the meaning one attributes to the process of gendering entities may depend on how close those entities are related to humans. We demonstrate that when people gender entities that are far removed from humans, the process of gendering (normally thought to increase gender bias) may actually reduce the very stereotyping it is said to enforce and reify.

Limits to Generalizability and Directions for Future Research

Although we consistently demonstrate divergent effects of human-abstracted and human-connected gendering, there were several notable differences on both masculine feminine stereotyping and for male and female targets. First, we find that while human-connected gendering notably increased both masculine and feminine stereotyping, human-abstracted gendering more strongly reduced masculine stereotyping. We hypothesize that this is due to the greater dynamism of masculine stereotyping, as women enter into traditionally male roles (see Cejka & Eagly, 1999) and the entrenchment of feminine stereotypes,

due to their biological attributions (Park et al., 2015). Future research is necessary to find ways to more strongly intervene on feminine stereotyping, as stereotypes limiting men from communal (domestic) roles must also change for gender equality to be achieved (Moss-Racusin, 2014).

In addition, in two studies, we find that relative to a control condition, human-abstracted gendering decreases gender stereotyping of female targets from the baseline. In contrast, in Study 4, we found human-connected gendering exacerbated gender stereotyping of a male target. This result is curious and warrants future research to understand the causes and consequences of these effects. However, regardless of the baseline, we consistently find that gendering human-connected and human-abstracted entities have divergent effects on stereotyping. Moreover, when the control condition was more closely matched to the process of gendering (i.e., prompting participants to categorize entities more generally but not by gender), we found effects of human-abstracted gendering and human-connected gendering, each relative to control.

These findings offer ample opportunity for future research. Although this research found positive effects of gendering abstract concepts and objects, there is a fine line between human-connected and human-abstracted entities. For example, one might abstractly gender a pear as feminine, due to its conceptual similarity to associations women's "pear-shaped" bodies; however, one might also gender a pear due to a human-connected stereotype that women prefer healthy foods (see Zhu, Brescoll, Newman & Uhlmann, 2015). Likewise, blue and pink may seem to have no real relation to male and female, and thus one might assume these colors to be only conceptually, and metaphorically related to gender (human-abstracted). However, people often see baby boys and girls wrapped in blue and pink, respectively, making the connection feel somehow real and entrenched, and thus making them feel particularly human-connected. Human preferences and abstract concepts can overlap (see Note 2). As such, this strategy must be applied very carefully. Future research is necessary to provide a nuanced understanding of exactly when gendering seemingly human-abstracted entities has benefits. In particular, certain domains and cultures may provide boundary conditions to the current demonstration.

In addition, there may be several limits to generalizability. Certainly, different cultures have stronger and weaker beliefs about the malleability of human qualities (Prentice & Miller, 2007) and greater and weaker emphasis placed on traditional social roles and gender stereotypes (Costa, Terracciano, & McCrae, 2001). As such, there may be differences in the extent of human-abstracted gendering between cultures as well as the outcomes of it. Furthermore, there may be individual differences in one's propensity to gender human-connected and human-abstracted entities, not accounted for in these studies. That is, gendering human-connected and human-abstracted entities may relate to certain beliefs (e.g., political orientation), social identities (e.g., gender identity), or personality factors (e.g., openness). Future research should examine individual differences in propensity to gender human-abstracted and human-connected entities. In addition, this research examined the effects of human-abstracted gendering on social cognition. Future research is warranted to examine the potential for human-abstracted gendering for the self-concept, self-perception, and self-esteem—all domains affected by gender-schematic processing. Finally, research should examine these effects in other realms, such as workplace domains and male-female interactions.

Conclusion

There are sure to be benefits of "de-gendering" humans, that is, de-emphasizing the importance of *gender* differences as applied to humans. While this strategy should decrease bias, it is unlikely that we will ever be able to fully "de-gender" humans, as we cannot take gender out of biological sex. However, it seems possible that we can "de-humanize" gender itself and take the biological sex out of gender, providing an avenue to decrease stereotyping of men and women.

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Notes

1. To test this assumption, we gave 100 MTurk participants a definition and examples of "human-abstracted" gendering (see Supplementary Online Material) and asked, "Do you think that gendering abstract concepts and objects would lead to more or less gender bias (i.e., stereotyping, inequality, etc.)?" where 0 = *more*, 1 = *less.* We find that 81% of participants believed that gendering nonhuman entities would lead to *more* gender bias, reflecting a lay belief about gendering human-abstracted entities perpetuating gender stereotypes.
2. A principle components factor analysis (varimax rotation) revealed two distinct factors. The category "colors" loaded more highly on Factor 1 (*human-connected*) than Factor 2 (*human-abstracted*); given its ambiguity, we do not use this construct in the current or subsequent studies, replacing it with "sounds" in Studies 2 and 3.
3. Equivalent to testing for an interaction, we also examined an index of abstracted minus connected predicting stereotyping, and the more participants gendered human-abstracted relative to human-connected entities, the less they stereotyped overall, $b = –.21$, $SE = 0.036$, $t = −5.69$, $p < .001$. Furthermore, including these variables as simultaneous predictors reveals that both human-connected and human-abstracted gendering have independent effects in the predicted directions for stereotyping (human-connected: $b = .20$, $SE = 0.039$, $t = 5.03$, $p < .001$; human-abstracted: $b = –.23$, $SE = 0.046$, $t = −4.85$, $p < .001$). See Table 1 for correlations.

4. Furthermore, to support our theory that gendering nonhuman entities dissociates stereotypical gendered traits from humans and thus should not affect other forms of prejudice, we measured several forms of prejudice, namely modern (denial of inequality), benevolent (women as "wonderful," yet dependent on men), and hostile (antagonistic beliefs about women) sexism. See Supplementary Online Material for details. We find a significant interaction for modern sexism, $b = –.37$, $SE = 0.17$, $t = −2.17$, $p = .03$, though not for benevolent ($b = –.33$, $SE = 0.35$, $t = –.95$, $p = .35$) or hostile ($b = –.43$, $SE = 0.31$, $t = −1.40$, $p = .17$) sexism. Consistent with past research (see Meagher, 2017), gendering human entities led to more modern ($b = .29$, $SE = 0.11$, $t = 2.73$, $p = .008$), benevolent ($b = .42$, $SE = 0.22$, $t = 1.94$, $p = .056$) and hostile ($b = .55$, $SE = 0.20$, $t = 2.79$, $p = .007$) sexism. In line with our hypothesis, gendering nonhuman entities did not affect participants' endorsement of benevolent, hostile, or modern sexism ($ps > .56$).

Supplemental Material

Supplementary material is available online with this article.

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