How gender determines the way we speak about professionals

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Gender inequality persists in many professions, particularly in high-status fields, such as science, technology, engineering, and math. We report evidence of a form of gender bias that may contribute to this state: gender influences the way that people speak about professionals. When discussing professionals or their work, it is common to refer to them by surname alone (e.g., "Darwin developed the theory of evolution"). We present evidence that people are more likely to refer to male than female professionals in this way. This gender bias emerges in archival data across domains; students reviewing professors online and pundits discussing politicians on the radio are more likely to use surname when speaking about a man (vs. a woman). Participants' self-reported references also indicate a preference for using surname when speaking about male (vs. female) scientists, authors, and others. Finally, experimental evidence provides convergent evidence: participants writing about a fictional male scientist are more likely to refer to him by surname than participants writing about an otherwise identical female scientist. We find that, on average, people are over twice as likely to refer to male professionals by surname than female professionals. Critically, we identified consequences of this gender bias in speaking about professionals. Researchers referred to by surname are judged as more famous and eminent. They are consequently seen as higher status and more deserving of eminence-related benefits and awards. For instance, scientists referred to by surname were seen as 14% more deserving of a National Science Foundation career award.

gender | gender bias | reference | judgment | evaluation

Despite significant strides over the past decades, gender inequality in professional contexts persists. Men still outearn women in the United States (1), and women remain underrepresented in many high-status professional fields, including science, technology, engineering, and math (2). Potentially contributing to this unequal state is gender bias in implicit and explicit forms (3–7). This work provides evidence of a form of gender bias that manifests in the way that people refer to professionals when speaking about them and identifies the consequences of this bias.

In many countries, it is common to refer to professionals in certain fields by surname alone when speaking about them or their work; for example, scientists, politicians, authors, and others are frequently referred to by surname (e.g., Einstein, Obama, Hemingway). Might the gender of the professional influence the speaker's choice to refer to her or him by surname? And does this choice, in turn, have consequences for how others perceive the professional? Previous research hints at a gender bias in the use of surname references. First, during the 2008 Democratic primary in the United States, television news people were more likely to refer to Barack Obama than Hillary Clinton by surname (8). However, this difference may be explained by Hillary Clinton's more frequent use of her first name in her campaign, possibly as a way of distinguishing herself from her husband. Second, qualitative, descriptive work in sociology suggests that sports commentators are more likely to refer to male (vs. female) players by surname (9, 10). In the work reported here, over a series of eight studies, we test whether this gender bias exists and examine its consequences.

Across the first four studies, using archival and experimental approaches, we find that people more commonly refer to men than to women by surname in a variety of fields, including the academic, political, and scientific fields. The results of four additional experiments reveal the consequences of this gender bias. Specifically, professionals who are referred to by surname are perceived as more famous and eminent. When fame is brought to mind, such professionals enjoy an advantage with regard to eminence-related benefits; they are judged to hold higher status, to be more likely to win an award for their work, and to be more deserving of awards, such as the National Science Foundation (NSF) career award and its associated funding.

Note that we use "surname" to mean a reference by surname alone without a first name or a professional or common title (e.g., Dr., Ms.). In this work, we focus on third person references (speaking about a target) rather than forms of address (speaking to a target), and for the sake of simplification, we examine only cases in which the speaker is not personally acquainted with the target.

Study 1

In study 1, we tested whether people are more likely to refer to men than women by surname in the academic domain. Data were obtained from the website Rate My Professors, which allows students to rate and review their professors (e.g., "I love [surname redacted]'s lectures. He's a funny guy"). Data were collected for all professors in five departments (biology, psychology, computer science, history, and economics) from 14 universities chosen for their academic and geographic diversity. For each of the 4,494 comments that included a reference to the professor, we recorded the professor's gender, ratings (helpfulness, clarity, course interest, and course ease), and the form of reference used to refer to the professor in the review. Specifically, surname was contrasted

Significance

Across eight studies combining archival and experimental methods, we report evidence for a gender bias in how people speak about professionals. Men and women were, on average across studies, more than twice as likely to describe a male (vs. female) professional by surname in domains, such as science, literature, and politics. We find that this simple difference in reference affects judgments of eminence, with participants judging those professionals described by surname as more eminent and 14% more deserving of a career award. This gender bias may contribute to the gender gap in perceived eminence as well as in actual recognition and may partially explain the persistent state of women's underrepresentation in high-status fields, including science, technology, engineering, and math.

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with any other form of reference: full name, first name only, Prof/Dr. full name/surname, Mr./Ms./Mrs./Miss surname, or other.

Supporting our prediction, students were 55.9% more likely to refer to a male than female professor by surname: $\chi^2 = 35.76$, $P < 0.001$ (Fig. 1). The gender bias in use of surname remained significant when controlling for university, department, and year in which the comment was posted: $\chi^2 = 34.13$, $P < 0.001$ (*Materials and Methods* and *SI Appendix* have more information about this study and all studies in this paper). The gender bias was not explained by differences in students' favorability toward male and female professors or their courses; when the ratings of the professor's helpfulness, clarity, course ease, and course interest were added to the model, the professor's gender remained a significant predictor of use of surname: $\chi^2 = 43.46$, $P < 0.001$. We also assessed professor seniority using the difference in years between the oldest and most recent reviews. Although this is a very rough index of seniority, it positively predicted use of surname alone: $b = 0.033$, $\chi^2 = 8.13$, $P = 0.004$. However, gender remained a significant predictor of surname use controlling for seniority: $\chi^2 = 33.55$, $P < 0.001$. We also examined each of five departments separately. Within each department, students were numerically more likely to refer to male than female professors by surname; this difference was statistically significant in psychology [means (Ms) = 39.7 vs. 21.7%, $\chi^2 = 15.7$, $P < 0.001$], history (Ms = 31.1 vs. 23.0%, $\chi^2 = 4.03$, $P = 0.045$), and computer science (Ms = 48.4 vs. 18.1%, $\chi^2 = 16.7$, $P < 0.001$); was statistically directional in biology (Ms = 32.6 vs. 18.1%, $\chi^2 = 2.6$, $P = 0.106$); and did not reach statistical significance in economics (Ms = 52.1 vs. 48.6%, $P = 0.52$).

We next tested whether even male professors who were perceived as having more feminine traits were less likely to be called by their surname. Indeed, controlling for gender, reviews that contained a stereotypically female trait (pretty, cute, helpful, understanding, kind, supportive, emotional, or meek; adjectives chosen based on previous research) (11–13) were less likely to contain a surname reference: Ms = 0.32 (SE = 0.012) vs. 0.25 (SE = 0.019), $\chi^2 = 13.21$, $P < 0.001$. The converse was true as well; controlling for gender, reviews that contained a stereotypically male trait (analytical, easygoing, brilliant, tough, arrogant, or rude) (11–13) were more likely to contain a surname reference: Ms = 0.38 (SE = 0.034) vs. 0.31 (SE = 0.012), $\chi^2 = 4.25$, $P = 0.031$. These results provide convergent evidence for the importance of gender in differentiating surname usage.

Study 2

Does this gender bias extend beyond the academic domain? We hypothesized that, when discussing politics, pundits and other commentators would more commonly refer to male than female politicians by surname. Data were obtained from transcripts of the following popular, politically diverse American radio programs that regularly discuss current events: *All Things Considered*, *Fresh Air*, *Morning Edition*, *The Rush Limbaugh Show*, and *The Sean Hannity Show*. Overall, 9,572 references from 336 segments from 2014 and 2015 were coded. Speakers included the shows' hosts and various guests and correspondents, and the targets included mainly politicians as well as other individuals connected with the relevant news story.

Consistent with our hypothesis, speakers were more than twice as likely (126.42%) to use a surname when speaking about a man than when speaking about a woman (Fig. 1): $z = -4.60$, $P < 0.001$, odds ratio (OR) = 0.21 (0.11, 0.41). The same pattern emerged excluding references to Hillary Clinton, whose campaign slogans often referred to her by first name (e.g., Hillary for President), suggesting that the result was not driven solely by references to her: $z = -4.66$, $P < 0.001$, OR = 0.19 (0.10, 0.39). The result also remained significant when controlling for speaker gender and for the political affiliation of both target and speaker: $z = -4.51$, $P < 0.001$, OR = 0.21 (0.11, 0.41).

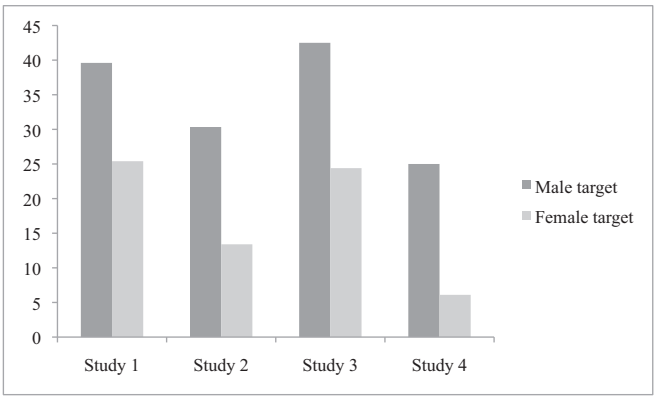

Fig. 1. Percentage of responses containing or reporting a reference by surname to male and female targets (studies 1–4). Numbers represent raw percentages (therefore, no error bars are included). Across the four studies, people were, on average, 141.58% more likely to refer (or report referring) to male professionals than female professionals by surname (averaged at the level of study).

Study 3

In study 3, we investigated the gender bias in surname use in a broader range of domains using a different design and sample. One hundred ninety participants were shown two lists of well-known individuals in counterbalanced order (unless noted otherwise, participants in all studies were United States-based Amazon Mechanical Turk workers). One list consisted of figures in American politics (e.g., Susan Rice, Carly Fiorina, Joe Biden, Antonin Scalia), and the second was of well-known figures in various nonpolitical domains, including literature, science, and sports (e.g., Jane Austen, Charles Dickens, Carl Sagan, Marie Curie). Each list included an equal number of women and men roughly matched on average in terms of age, years active, position, and profession. Participants were asked to consider how they refer to each figure when talking about her or him in casual conversation and then estimate the percentage of time that they refer to each individual by surname, full name, first name, or some other form of reference, adding up to 100% [if participants did not who the figure was, they were instructed to choose N/A (not applicable) instead]. We found that participants were 74.18% more likely to report using a surname when referring to male than female figures: $\chi^2 = 223.62$, $P < 0.001$ (Fig. 1). We found no evidence that the effect differed depending on participant gender or political affiliation: Ps > 0.34.

Participants' estimates suggest that the target's gender may influence the form of reference that they use. However, we tested several alternative explanations: people may perceive the men on our list to hold more influential positions than the women, be better known, have more distinctive surnames or less distinctive first names, and/or be less likely to share their surname with a well-known family member. Any of these may, in turn, increase use of a surname reference and thus, may account for the result without directly implicating gender. To test these accounts, 217 participants in a new sample were randomly assigned to provide one of the following ratings about the figures used in study 3: how well-known each figure was, how distinctive each first name was, or how distinctive each surname was. An additional group of 44 students at Cornell University rated how influential each political figure's position was (e.g., attorney general, governor).

We found that targets who were better known and whose positions were judged to be more influential were more likely to be referred to by surname: $\chi^2_{\text{well known}} = 148.35$, $P < 0.001$, $\chi^2_{\text{influential}} = 10.29$, $P = 0.001$. Targets whose first names and surnames were perceived to be more common were more likely to be referred to by surname: $\chi^2_{\text{first name}} = 9.37$, $P = 0.002$, $\chi^2_{\text{surname}} = 29.81$, $P < 0.001$. Critically, when these variables were added to the model (either individually or simultaneously), gender remained a significant predictor of surname use: $\chi^2_{\text{full model}} = 49.19$, $P < 0.001$. Finally, gender remained a significant predictor of surname use when we excluded women who shared a surname with a well-known family member

(e.g., Hillary Clinton; $\chi^2 = 216.30$, $P < 0.001$) as well as when we both excluded these figures and added the previously discussed variables into the model ($\chi^2_{\text{full model}} = 47.20$, $P < 0.001$).

Study 4

In study 4, we sought to experimentally test whether people are more likely to use a surname to refer to a man than a woman even when gender is the only dimension on which they differ. Participants ($n = 184$) read information about a scientist presented in bullet point form (e.g., chemist and X-ray crystallographer, years: July 25th, 1920 to April 16th, 1958). The scientist's name, which appeared in bold font at the top, was either a female name (Dolores Berson) or a male name (Douglas Berson), determined randomly. All other information was identical between gender conditions. Participants were asked to rewrite the bullet points in full sentences, incorporating all of the information into their essays. We also tested whether the gender bias in use of surname might be limited to specific types of interpersonal exchanges: for instance, whether it would be eliminated in formal contexts when people potentially use more rigid rules with regard to forms of reference. To test this possibility, participants were randomly assigned to imagine that they were either lecturing about the scientist (formal expression condition) or telling a friend about the scientist in casual conversation (casual expression condition).

Supporting our predictions, participants writing about a male scientist were more than four times as likely (309.84%) to refer to him by surname than were participants writing the same information about a female scientist: $\chi^2 = 11.19$, $P < 0.005$ (Fig. 1). This pattern did not significantly differ between participants who were writing formally and those writing casually: $P = 0.43$. We found no evidence that male and female participants differed in their likelihood of exhibiting the gender bias: $P = 0.93$.

In studies 1–4, we found that people are less likely to refer to women by surname. How, then, do people refer to women? There was no single form of reference that was consistently applied to women more often than to men. Students (study 1) more commonly referred to women (vs. men) by a common title (Ms., Mrs., Miss, and Mr.). One potential explanation is that female instructors were less likely to hold a PhD and were, therefore, more often referred to by a common title [Ms = 0.06 (SE = 0.01) vs. 0.01 (SE = 0.003), $\chi^2 = 16.33$, $P < 0.001$]. Students were also more likely to refer to women by "Prof. [surname]" (refs. 14–16 have work on gender differences in use of professional titles) [Ms = 0.28 (SE = 0.02) vs. 0.22 (SE = 0.01), $\chi^2 = 8.86$, $P = 0.002$]. Pundits (study 2) were more likely to refer to women by first name (raw percentages = 29.51 vs. 11.3%, $z = 4.35$, $P < 0.001$, OR = 0.21), and participants (study 3)—by full name [Ms = 0.72 (SE = 0.02) vs. 0.55 (SE = 0.02), $\chi^2 = 208.84$, $P < 0.001$].

Studies 5a and 5b

Does the choice of reference have consequences for how the target is perceived and judged? Referring to a target by surname may imply a certain level of fame and eminence; the more famous a target, the fewer identifying details are needed. Indeed, in study 3 we found that well-known and influential individuals are more likely to be referred to by surname (although this did not fully explain the gender difference). Thus, people might make the converse inference: that a surname reference signifies fame and eminence. In studies 5a and 5b, we tested this prediction.

In studies 5a and 5b, participants were presented with two pairs of fictional one-paragraph research proposals. Within each pair, one proposal referred to the researcher by surname, and the other referred to the researcher by full name (first name was gender neutral); the text associated with each condition was counterbalanced across participants. Participants were asked which of the two researchers within each pair was better known (study 5a, $n = 402$), more distinguished (study 5a, $n = 399$), or more eminent (study 5b, $n = 530$).

As predicted, researchers who were referred to by surname were selected as better known [$\chi^2 = 18.50$, $P < 0.001$, OR = 1.91 (1.44, 2.52)] and more eminent [$\chi^2 = 9.79$, $P = 0.002$, OR = 1.50 (1.18, 1.91)] but not significantly more distinguished ($P = 0.26$) than researchers referred to by full name (Fig. 2). These results suggest that surname references are associated with fame and eminence.

To test the possibility that participants evaluated the researchers differently because they thought that the quality of the writing was worse and sounded less smooth when the researchers were referred to by full name, we ran a new study, in which we presented participants with the same research proposals and asked them to rate how much the description of each proposal "read smoothly and made sense" on a one (not at all smooth) to seven (very smooth) scale. They also evaluated which researcher was better known. Replicating the result of study 5, we found that researchers who were referred to by surname (vs. full name) were judged as better known: $\chi^2 = 8.54$, $P = 0.003$, OR = 1.51 (1.17, 1.93). We found no evidence, however, that participants' judgments of smoothness differed depending on the type of reference: $P = 0.95$.

In this study and the rest of the studies in this paper, we used gender-neutral names. To test whether the reference effect on fame would emerge when the target is clearly female, we ran a study where we identified the researchers with the gender-neutral names as female (preregistration details are available at https://aspredicted.org/ij46t.pdf). Participants read the same proposals as the ones used in study 5, except that the researchers with gender-neutral names were identified using a female pronoun. Participants were asked which researcher was better known within each pair. We found that, replicating the result of study 5a, researchers who were referred to by surname were selected as better known: $\chi^2 = 18.53$, $P < 0.001$, OR = 1.71 (1.37, 2.14).

Study 6

We next tested whether the effect of reference type on fame would emerge when participants are not asked to directly compare the two types of reference and are only exposed to one type of reference. To that end, we ran a study that was similar to study 5a but that used a between-subjects design. Participants were assigned to read two research proposals, in which both researchers were referred to by either surname ($n = 463$) or full name ($n = 470$) varied randomly between participants. They were asked to estimate how well-known each of the researchers was on a scale of one (not at all well-known) to nine (extremely well-known). Consistent with our predictions, we replicated the result of study 5a; specifically, even when evaluating the researchers individually and without being exposed to both types of reference, participants who read about researchers referred to by surname rated them as significantly more well-known than participants who read about

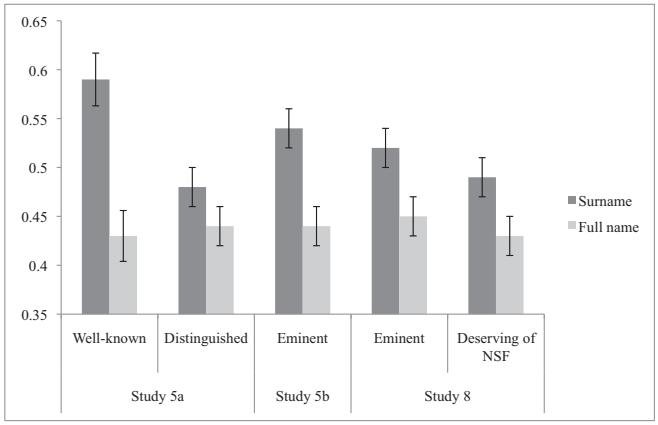

Fig. 2. Likelihood of selecting a given scientist referred to by surname vs. full name in studies 5a, 5b, and 8 (estimated marginal means). Error bars represent SEs.

researchers referred to by full name: Ms = 5.08 (SD = 1.59) vs. 4.57 (SD = 1.67), $t(931) = 4.81$, $P < 0.001$.

Study 7

Impressions of fame and eminence can have critical consequences. The Matthew Effect (17) refers to a rich-get-richer phenomenon in science and academia, such that "recognition is awarded partly on the basis of past recognition" (18). This notion was first suggested in 1968 and has since been shown repeatedly in various disciplines (19–24). For instance, reviewers are more likely to accept papers by famous authors when they know the authors' identity than when they are blind to it (22). Given that a surname reference leads to perceptions of fame and eminence, targets may also enjoy the benefits that follow from such judgments. In the final two studies, we tested whether surname (vs. full name) references influence judgments relating to the researcher's work as well as whether these judgments are tied specifically to initial inferences about fame and eminence.

In study 7 ($n = 517$), we tested whether researchers referred to by surname (vs. full name) are judged as being of higher status and as being more likely to win an award for their work. We hypothesized that these effects would emerge more strongly when the researcher's fame is explicitly brought to mind. The design was identical to that used in studies 5a and 5b, except that participants were asked which of the two researchers was of higher status in the relevant field and who was more likely to win a prize for their work. Either before or after these measures (randomly determined), participants were asked which of the two researchers was better known.

Replicating the results of study 5a, researchers referred to by surname were perceived as better known than those referred to by full name [Ms = 0.58 (SE = 0.02) vs. 0.48 (SE = 0.02), $\chi^2 = 8.95$, $P = 0.003$, OR = 1.51 (1.18, 1.93)], and the effect did not significantly interact with question order: $P = 0.13$. As predicted, the effect of reference type on judgments of status and likelihood of winning a prize was qualified by question order ($\chi^2_{\text{status}} = 9.13$, $P = 0.003$, $\chi^2_{\text{prize}} = 6.00$, $P = 0.014$); when fame was brought to mind first, researchers who were referred to by surname (vs. full name) were perceived as holding higher status [Ms = 0.71 (SE = 0.03) vs. 0.43 (SE = 0.03), $\chi^2 = 30.24$, $P < 0.001$, OR = 3.12 (2.15, 4.51)] and as more likely to win a prize for their work [Ms = 0.64 (SE = 0.03) vs. 0.49 (SE = 0.03), $\chi^2 = 10.85$, $P = 0.001$, OR = 1.86 (1.30, 2.67)]. When fame was not first brought to mind, the effects on status and prize-winning likelihood were statistically marginal [Ms = 0.54 (SE = 0.03) vs. 0.46 (SE = 0.03), $\chi^2 = 3.20$, $P = 0.074$, OR = 1.37 (0.98, 1.93)] and nonsignificant ($P = 0.91$), respectively.

Study 8

Some professional outcomes, such as career awards, are particularly tied to eminence. In study 8 ($n = 554$), we tested whether researchers referred to by surname (vs. full name) are judged as more deserving of a fictitious NSF career award and award-related funds. The design was similar to that used in studies 5a and 5b, with two differences. First, because deservingness of award is based on research findings rather than proposed research, the research proposals from studies 5a and 5b were altered to describe research findings instead of research proposals (e.g., "X hypothesizes" was changed to "X found"). Second, participants were asked which of the two researchers was more eminent, which should receive the prestigious and lucrative NSF career award given to the most eminent scientists, and if the $500,000 prize money was distributed to more than one researcher, how the money should be allocated between the two researchers.

We found that researchers referred to by surname were perceived as being more eminent [replicating the result of study 5b; $\chi^2 = 4.76$, $P = 0.029$, OR = 1.31 (1.04, 1.66)] and as 14% more deserving of an NSF career award [$\chi^2 = 4.34$, $P = 0.037$, OR = 1.29 (1.02, 1.64)] than those referred to by full name (Fig. 2). Researchers referred to by surname were also allocated a larger share of the award money by 6%: $F(1,551) = 4.61$, $P = 0.032$ (Fig. 3).

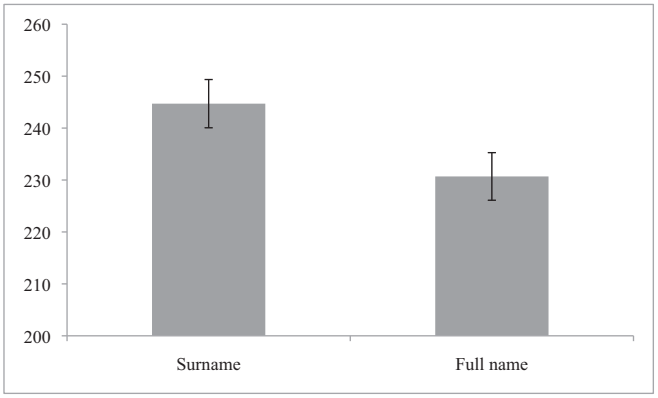

Fig. 3. Amount (in thousands of dollars) of the NSF career award allocated to a given scientist referred to by surname vs. full name in study 8 (estimated marginal means). Error bars represent SEs.

Discussion

The way that we speak about others influences and is influenced by the way that we think about them (25). Across four studies using diverse research methods, we find evidence of a gender bias in the way that we speak about professionals in a variety of domains. Specifically, analyses of archival data revealed that students reviewing their professors online were more likely to refer to their male professors than their female professors by surname alone (study 1) and that pundits and other commentators speaking about politics on the radio were more likely to refer to male than female targets by surname alone (study 2). Participants' reports regarding the way that they speak about well-known figures, including authors, athletes, politicians and others, showed the same pattern (study 3). Finally, participants paraphrasing biographical information about a fictional male scientist were more likely to refer to him by surname alone than participants writing about an otherwise identical female scientist (study 4). Taken together, the results suggest that gender predicts the way that we speak about professionals, such that men are more likely than women to be referred to by their surname. The results of four additional studies suggest that this gender bias may be consequential: participants judged fictional researchers referred to by surname as better known and more eminent in their field than researchers referred to by full name both when making a direct comparison (studies 5a and 5b) and when evaluating the researchers individually (study 6). Evidence suggests that this inference of fame and eminence, in turn, led to increased judgments of status, likelihood of winning an award, and deservingness of the NSF career award and associated funding (studies 7 and 8).

What might explain the gender bias in use of surname references? First, surname may be more associated with men, because in many cultures, women's surnames are traditionally less permanent, commonly changing to a male partner's surname upon marriage (26). Second, including a first name can often be used to mark the target's gender. Male is the assumed default (27, 28), perhaps particularly in high-status professions, such as science, which are often male dominated (2); thus, this gender marking may (intentionally or unintentionally) be deemed more necessary for a female target. Third, people may be more likely to attend to a woman's first name, because it marks her atypical gender in male-dominated professions; women's first names may, therefore, come to mind more easily and be used more often.

The evidence reported here across experimental and archival data documents a gender bias in professional reference. The implications may include biased, unwarranted judgments of female professionals as less well-known and eminent than their equivalent male counterparts and consequently, less deserving of the associated benefits. If people use the full name of female professionals to highlight women's participation and contribution,

the consequences may be ironic, leading to lower judgments of eminence, status, and deservingness.

Materials and Methods

Additional details on the materials and methods are in *SI Appendix*.

Study 1.

Data. Data were obtained from Rate My Professors (www.ratemyprofessors.com), a website that allows students to evaluate their professors and the classes that they teach on several dimensions (detailed below) and to post an accompanying open-ended comment. Data were collected for all professors (for whom reviews existed) in five departments (biology, psychology, computer science, history, and economics) from 14 universities. We chose universities that are considered academically rigorous (Cornell University, Columbia University, Brown University, and the Massachusetts Institute of Technology), universities with an active social scene (Bucknell University, Colgate University, Tulane University, Lehigh University, and University of Mississippi), and universities that are relatively conservative (Hillsdale University, Houston Baptist University, Harding University, Texas A&M University, and Liberty University). We did not collect data for any other universities.

For each of 18,046 reviews (of 1,674 professors), we recorded the professor's gender; her/his university and department affiliations; the state and city in which the university is located; the reviewer's ratings of helpfulness, clarity, easiness, and interest (included in most but not all comments); and the year that the review had been posted. If the review was accompanied by an open-ended comment (94.5% of reviews, n = 17,055), we checked whether the comment contained a reference to the professor. If it did (24.9% of reviews, n = 4,494), the comment was coded according to the type of reference used: by surname, full name, first name, Prof. full name, Prof. surname, Dr. full name, Dr. surname, common titles (Mr./Ms./Mrs./Miss surname), or other reference. Seniority was computed by taking the difference between the years of the most recent and the oldest reviews of a professor and adding one. We also recorded whether the reviewer described the professor using any stereotypically female or male traits. This coding as well as the coding of common titles were conducted at a later date than the initial coding; these variables were coded for all reviews except those of professors in five groups (biology at Cornell University, economics at Brown University, and computer science, economics, and biology at Columbia University), for which technical difficulties prevented us from obtaining the comments' texts again. Of the reviews that included a reference to the professor, 71.5% (n = 3,212) were to male professors, and 28.5% (n = 1,282) were to female professors.

Analysis. We focused on the comments that contained a reference to the professor (n = 4,494). To compare use of surname references to male and female professors, we created a dummy variable for each reference type; for example, in the main analysis, surname references were coded as one, and all other references (full name, first name, etc.) were coded as zero. We used a Generalized Linear Model to determine the effect of professor gender on the use of a particular reference type with repeated reviews of the same professor.

Study 2.

Data. Data were obtained from transcripts of the following politically diverse (i.e., conservative and liberal) American radio programs that regularly discuss politics and current events: *All Things Considered* (1,982 references from 124 segments; September 20, 2013 to November 8, 2015), *Fresh Air* (1,389 references from 17 segments; August 13, 2014 to October 15, 2015), *Morning Edition* (1,256 references from 101 segments; January 22, 2015 to November 30, 2015), *The Rush Limbaugh Show* (2,022 references from 66 segments; October 5, 2015 to December 4, 2015), and *The Sean Hannity Show* (2,923 reference from 28 segments; August 25, 2015 to December 1, 2015). Overall, 9,572 references were coded.

For programs that broadcast both political and nonpolitical content, only political segments were coded. Clearly scripted speech was not coded; we instead focused on interview segments, which are less scripted and thus, less likely to be constrained by journalistic reference conventions. For each reference to a third party, research assistants recorded the type of reference used (surname, full name, first name, title and full, title and surname, or other) and whether it was the first reference to the target in that segment as well as the following information about both the target and speaker: full name, gender, political affiliation (if known), and position or title.

Analysis. We used a multilevel, crossed effects logistic regression to determine the effect of target gender on reference use. Our statistical model included a fixed effect of target gender and random effects of target and speaker identity to account for the nonindependence of each speaker's and target's observations in our dataset. Reference use was treated as a binary dependent variable (e.g., surname = 1 and any other reference = 0).

Participants (Studies 3–8). Participants in studies 3–8 completed the study through Amazon's Mechanical Turk in exchange for monetary compensation. Participation was restricted to respondents within the United States. The only exception was one of two separate samples of participants in study 3 who were recruited later to rate the stimuli; they were Cornell undergraduate students. Data were obtained from 190 participants in study 3 [96 women, 94 men, mean age = 35.17 y old, SD = 11.48; two additional samples were recruited later to rate the stimuli in this study: one sample of 217 participants (120 men, 97 women, mean age = 38.34 y old, SD = 12.70) and another of 44 participant students (9 men, 35 women, mean age = 19.73 y old, SD = 1.33)], 183 participants in study 4 (93 women, 87 men, 2 other, mean age = 33.27 y old, SD = 10.09, 1 did not report age and gender), 801 participants in study 5a (376 women, 419 men, 3 other, mean age = 36.2 y old, SD = 11.45, 2 did not report both gender and age, 1 did not report only gender, 1 did not report only age), 530 participants in study 5b (287 women, 231 men, 2 other, mean age = 35.06 y old, SD = 11.29, 10 did not report gender, of which 5 also did not report age), 933 participants in study 6 (544 women, 378 men, 7 other, mean age = 36.49 y old, SD = 11.91, 4 did not report gender, of which 1 also did not report age), 517 participants in study 7 (302 women, 209 men, 4 other, mean age = 34.92 y old, SD = 11.26, 5 did not report gender, of which 3 also did not report age), and 554 participants in study 8 (333 women, 215 men, 3 other, mean age = 34.64 y old, SD = 10.57, 3 did not report gender). Additional participants failed to complete the entire study (42, 114, 41, 50, 30, 45, and 64 participants in studies 3, 4, 5a, 5b, 6, 7, and 8, respectively), failed the attention check (82, 3, 89, and 54 participants in studies 5b, 6, 7, and 8, respectively), or did not follow instructions (in study 4, 3 participants copied the bullet points instead of rephrasing the information in their own words, and 1 participant did not include any of the information from the bullet points in the response) and were excluded from all analyses.

Procedures Common to Studies 3–8. For all studies with participants (studies 3–8), informed consent was obtained at the beginning of the study. After the study, participants filled out a demographic questionnaire and provided information for payment. All procedures for these studies were approved by the Institutional Review Board of Cornell University.

Study 3.

Procedure and materials. Participants were presented with two lists of well-known individuals. One list consisted of figures in American politics, and the other consisted of well-known individuals in various other domains (e.g., literature, science, and sports). One-half of the individuals in each list were women, and one-half were men. The lists were presented individually on consecutive pages in counterbalanced order, and the order of the individuals within each list was randomized. *SI Appendix* has a list of the figures.

Participants were asked to think about how they refer to each figure when talking about her or him in casual conversation and to estimate what percentage of the time they refer to her or him by surname, full name, first name, or in some other way. The total had to add up to 100%. If they did not know who the individual was, they chose the N/A option instead.

Two separate groups of participants provided additional ratings of the stimuli. Participants in one group were randomly assigned to provide one of the following ratings: how well-known each individual was, how distinctive each first name was, or how distinctive each surname was. An additional group rated how influential each position of the political figures was (e.g., attorney general, governor). Finally, the researcher noted any women who shared a surname with a well-known family member (Hillary Clinton, Sarah Palin, Nancy Pelosi, Louisa May Alcott, Marie Curie, Serena Williams, Virginia Woolf). These variables were used as controls in subsequent analyses. Participants then reported their political identity on a scale from one (very liberal) to five (very conservative).

Analysis. The modal response for reported use of references was a 100% for one of the options (with full name being the most common choice) and zeroes for the other options. Thus, the percentage of surname use was severely right skewed, with mostly zero choices. Therefore, we created a binary distinction between zero and any other percentage. We used Generalized Estimating Equations to determine the effect of figure gender on the use of a particular reference type while controlling for differences in surname use between figures and between participants. We also ran all analyses with the raw data, in which reported use of each reference was continuous, using a mixed linear model. The results were very similar across approaches. All statistics reported in the text and *SI Appendix* reflect the results of the binary approach; however, the results were statistically significant for both unless noted otherwise.

Study 4.

Procedure and materials. Participants read information about a scientist presented in the form of a list of bullet points (e.g., chemist and X-ray crystallographer, worked in physical chemistry laboratory, 1945: earned PhD). The scientist was inspired by Rosalind Franklin. The scientist's name, which appeared in bold font at the top of the list, was either female (Dolores Berson) or male (Douglas Berson). Both names are uncommon today but were roughly equally popular early in the 20th century when the fictional scientist was active [based on the online Name Voyager tool (www.babynamewizard.com/voyager), which uses information reported by the Social Security Administration]. All other information was identical between gender conditions. Participants were then randomly assigned to either imagine that they were asked to give a lecture about the scientist (formal expression condition) or imagine that they were telling a friend about the scientist in the course of casual conversation (casual expression condition). They were asked to type in their lecture or conversation, making sure to incorporate all of the information from the bullet points in full sentences.

Analysis. The distributions of the average number of each type of reference in an essay were all right skewed, with most essays containing either one or no references of a given type. Thus, for each type of reference, we created a binary distinction between any instances of that reference in an essay (coded as one) and no instances of that reference in an essay (coded as zero). A logistic regression was performed to test the effects of researcher gender on the likelihood that participants used a surname reference in their essay.

Studies 5a and 5b.

Procedure and materials. Study 5a was preregistered on Open Science Framework (DOI:10.17605/osf.io/bh7aa). Participants in this study were asked to imagine themselves as an employee of a funding agency evaluating research proposals by academics. They then read four one-paragraph summaries of fictional research proposals (*SI Appendix* has an example proposal). The proposals made up two pairs (four proposals) pretested to differ minimally on any of the dependent variables when no names were mentioned. The critical difference was that, in one of the proposals in each pair, the researcher was referred to by surname (Boland, Hastings, Wiggins, and Hirst), whereas in the other, the researcher was referred to by full name with a gender neutral first name (Jamie and Casey; chosen based on a pretest testing the extent to which different names are seen as gender neutral). The assignment of reference type to any given proposal within a pair was counterbalanced between participants. After reading all proposals once, participants chose between proposals within each pair; they either answered "In your estimation, which of the two researchers is better known?" or "In your estimation, which of the two researchers is more distinguished?"

Study 5b was very similar to study 5a, except that participants were asked about eminence instead of fame: "What is your best guess as to which of the two researchers is more eminent?" Eminence was defined for participants as "fame or recognized superiority, especially within a particular sphere or profession."

Analysis. We used Generalized Estimating Equations to determine the effect of type of reference on target evaluations with repeated measures (each participants chose between two pairs of proposals). In all analyses, we controlled for the specific proposal and researcher name.

Study 6.

Procedure and materials. The study was similar to studies 5a and 5b but used a between-subjects manipulation of reference type. Participants read two short research proposals, and in both research proposals, the researcher was referred to using the same reference type: for one-half of the participants by surname (Berson and Boland) and for one-half by a gender-neutral full name (first names: Alex and Riley). After reading each proposal, participants were asked "in your estimation, how well-known is this researcher?" on a scale of one (not at all well-known) to nine (extremely well-known).

Analysis. The ratings of the two researchers were averaged for each participant. The ratings of researchers referred to by surname vs. full name were compared using a two-tailed *t* test.

Study 7.

Procedure and materials. The study was very similar to study 5b, except that participants were asked about each pair "What is your best guess as to which of the two researchers is of higher status in their field?" and "What is your best guess as to which of the two researchers is more likely to win a prize for their work?" They were also asked "What is your best guess as to which of the two researchers is better known?," and this question was presented either first or last, randomly determined.

Analysis. Identical to Studies 5a and 5b.

Study 8.

Procedure and materials. The study was similar to study 5b, except that participants imagined working specifically for the NSF. The proposals were altered to reflect research findings (e.g., "Hastings is interested in exploring" was changed to "Hastings explored"). Participants were asked three questions about the researchers within each pair: who was more eminent, who "should receive the prestigious and lucrative career National Science Foundation award, given to the most eminent scientists in the country?," and how much of the $500,000 award money they would allocate to each researcher if they did not have to give the award to just one person.

Analysis. Identical to Studies 5a and 5b.

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