



HAL
open science

How Fair is Gender-Fair Language? Insights from Gender Ratio Estimations in French

Hualin Xiao, Brent Strickland, Sharon Peperkamp

► **To cite this version:**

Hualin Xiao, Brent Strickland, Sharon Peperkamp. How Fair is Gender-Fair Language? Insights from Gender Ratio Estimations in French. *Journal of Language and Social Psychology*, 2022, 42 (1), 10.1177/0261927x221084643 . hal-03841973

HAL Id: hal-03841973

<https://hal.science/hal-03841973>

Submitted on 7 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL
open science

How Fair is Gender-Fair Language? Insights from Gender Ratio Estimations in French

Hualin Xiao, Brent Strickland, Sharon Peperkamp

► **To cite this version:**

Hualin Xiao, Brent Strickland, Sharon Peperkamp. How Fair is Gender-Fair Language? Insights from Gender Ratio Estimations in French. *Journal of Language and Social Psychology*, SAGE Publications (UK and US), 2022, 10.1177/0261927x221084643 . hal-03841973

HAL Id: hal-03841973

<https://hal.archives-ouvertes.fr/hal-03841973>

Submitted on 7 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

How Fair is Gender-Fair Language? Insights from Gender Ratio Estimations in French

Hualin Xiao^{1,2,3} , Brent Strickland^{2,3,4},
and Sharon Peperkamp¹

Abstract

Heated societal debates in various countries concern the use of gender-fair language, meant to replace the generic use of grammatically masculine forms. Advocates and opponents of gender-fair language disagree on – among other things – the question of whether masculine forms leave women underrepresented in people’s minds. We investigated the influence of linguistic form on the mental representations of gender in French. Participants read a short text about a professional gathering and estimated the percentages of men and women present at the gathering. Results showed higher estimates of the percentage of women in response to two gender-fair forms relative to the masculine form. Comparisons with normed data on people’s perception of real-world gender ratios additionally showed that the gender-fair forms removed or reduced a male bias for neutral- and female-stereotyped professions, respectively, yet induced a female bias for male-stereotyped professions. Thus, gender-fair language increases the prominence of women in the mind, but has varying effects on consistency, i.e., the match with default perceptions of real-world gender ratios.

Keywords

grammatical gender, masculine generics, gender-fair language, *écriture inclusive*, French

¹Laboratoire de Sciences Cognitives et Psycholinguistique (ENS–PSL, EHESS, CNRS), Paris, France

²Institut Jean Nicod (ENS–PSL, EHESS, CNRS), Paris, France

³School of Collective Intelligence, UM6P, Rabat, Morocco

⁴Africa Business School, UM6P, Rabat, Morocco

Corresponding Author:

Hualin Xiao, Laboratoire de Sciences Cognitives et Psycholinguistique, Département d’Etudes Cognitives, Ecole normale supérieure, 29 Rue d’Ulm, 75005 Paris, France.

Email: xhualin92@gmail.com

Sex-based grammatical gender systems are found in languages across various language families (Corbett, 1991). In these languages, each noun has either feminine or masculine (or, in some languages, neutral) gender, triggering agreement in words such as articles, adjectives, and pronouns. When referring to groups of humans, the feminine and masculine plural genders are used asymmetrically. That is, feminine plural forms can typically be used only to refer to groups unambiguously and exclusively composed of women. Masculine plural forms, by contrast, are used to refer to: 1/ groups of men only, 2/ groups of men and women, and 3/ groups for whom the gender of the referents is unknown. In the latter two cases, the masculine gender has a generic meaning. (Very few languages assign a generic meaning to the feminine gender (Prewitt-Freilino et al., 2012)).

An example from French is shown in (1). If the plural subject is presented in the feminine form (1a), it unambiguously indicates that only female cashiers are on strike. However, if presented in the masculine form (1b), the sentence can be interpreted in three ways: 1/ male cashiers are on strike; 2/ male and female cashiers are on strike; 3/ cashiers whose gender is unknown are on strike.

- (1) a. *Les caissières sont en grève.*
 ‘The cashiers_{fem} are on strike.’
 b. *Les caissiers sont en grève.*
 ‘The cashiers_{masc} are on strike.’

The asymmetric roles of the feminine and masculine forms have intersected with heated social debates about gender equality in France and other countries (e.g., Elmiger, 2008), as this asymmetry in language might reproduce and perpetuate an unequal social status between men and women (Menegatti & Rubini, 2018). According to one view, the default for masculine forms to represent a mixture of both genders leaves women underrepresented in language and hence underrepresented in the mind. The idea is that in seeing or hearing the masculine form, people are less likely to think of women, which in turn affects the way that women’s roles in society are mentally represented. Proponents of this view thus argue for the replacement of the generic use of the masculine form by alternative, gender-fair, linguistic forms in order to increase the visibility of females in language, and consequently – by hypothesis – in people’s mental representations (for a review, see Sczesny et al., 2016).

There are several gender-fair alternatives to the generic use of the masculine form (Abbou, 2011). One common one is a “double-gender” form, illustrated in (2).

- (2) *Les caissiers et caissières sont en grève.*
 ‘The cashiers_{masc} and cashiers_{fem} are on strike’.

Another type of alternative is limited to written language only. It consists of the use of a contracted form, for instance by means of parentheses (*les caissiers(ères)*) or a slash (*les caissiers/ères*). In French, a more radical innovation in this area was instigated in 2015 by the *Haut Conseil à l’Égalité entre les femmes et les hommes*

(‘High Council for Equality between women and men’), namely a contracted form featuring a specific punctuation mark, that is, a mid-dot form, as shown in (3).

- (3) *Les caissier·ère·s sont en grève.*
 The cashiers_{masc.fem} are on strike’.

This form is largely known as *écriture inclusive* (“inclusive writing”), but here we will use the term “mid-dot form”, as *écriture inclusive* is really an umbrella term for multiple strategies against gender-stereotyped communication (see, for instance, the *Manuel d’écriture inclusive* by the French communication agency *Mots-Clés*¹).

Replacing the generic use of the masculine form with an innovative and inclusive language form is not restricted to French. For instance, German has seen the introduction of gender-neutral nominalized adjectives and participles, e.g., *die Studierenden* “the students” (cf. *studieren* “to study”), as well as that of a word-internal capital “I”, as in *LeserInnen* “readers_{masc-fem}” (c.f., *Leser* “readers_{masc}” and *Leserinnen* “readers_{fem}”; note that all German nouns are spelled with an initial capital). The latter is a spelling innovation that to some extent resembles the French mid-dot.

A possible skeptical position concerning the use of gender-fair alternatives to the masculine form argues that linguistic forms have little influence on how people think about gender roles. According to this view, the generic use of the masculine gender does not bias people’s mental representations against women and hence it is unnecessary to use a longer double-gender or an unconventional, deliberately invented form. In France, stronger forms of skepticism are targeted specifically towards the mid-dot form, which is particularly controversial, including among linguists.² This form is argued to damage orthography, creating confusion and obstacles in learning to read and write. In its solemn declaration, *L’Académie Française* admonished French society for the idea of “inclusive writing” (meant is the mid-dot form), warning people about its potential to estrange future generations from France’s written heritage, undermine the status of French as a world language, and even put French in mortal danger.³ Accordingly, in 2017 the prime minister recommended not to use it in official texts.⁴ Going one step further, a number of parliamentarians proposed a bill in 2021, aiming to prohibit and penalize the use of the mid-dot form in public administrations and organizations in charge of public services,⁵ and shortly after that, the minister of National Education ordered that it not be taught in schools.⁶ Despite these governmental restrictions, the mid-dot form has become more and more widespread over the years. For instance, it appears in most Parisian universities’ brochures for some of their 2019–2020 undergraduate programs (Burnett & Pozniak, 2021).

Societal debates notoriously take place without reference to empirical evidence. Yet, there is a growing body of experimental work assessing the interpretation of both the generic use of the masculine form and gender-fair alternatives. Below, we

review this research, identify outstanding questions, and introduce our approach to address these questions in the current study.

Previous Research

Previous studies on the interpretation of various linguistic forms have employed a variety of paradigms, with dependent measures such as sentence reading time, sentence plausibility judgment, proportion of women estimated to be present in a group of people described in a short text, and proportion of favorite women mentioned for a given profession. With regards to English, a natural gender language (i.e., a language that marks gender on personal pronouns only), the singular masculine pronoun *he* – which has both a generic and a specific interpretation – was found to favor the presence of men in people’s mental representations compared to *he/she* and singular *they* (e.g., Gastil, 1990).

For languages with sex-based grammatical gender, several studies have provided evidence that the masculine plural form of nouns likewise evoked mental representations disfavoring women in speakers of French (e.g., Brauer & Landry, 2008; Gygax et al., 2008, 2012; Gygax & Gabriel, 2008) and German (e.g., Braun et al., 1998; Irmen, 2007; Kollmayer et al., 2018; Stahlberg et al., 2001). Most of these studies manipulated the gender stereotype of the noun – typically a role name (e.g., golfer, cashier, or spectator). As such stereotypes are automatically activated during reading (e.g., Banaji & Hardin, 1996; Reynolds et al., 2006), the generic – as opposed to the specific – interpretation of the masculine gender should be especially plausible for female-stereotyped groups.

Yet, a male bias was found even for those female-stereotyped groups. For instance, Gygax et al. (2008) presented French and German participants with two sentences. The first one named a group of professionals in the masculine plural form (e.g., *les espions* “the spies_{masc}”); the second sentence provided explicit gender information about one or more of the people in the group, and participants had to decide whether it was a sensible continuation of the first one. The authors compared three types of gender-stereotyped professions, chosen from a norming study they had run previously (Gabriel et al., 2008): masculine (e.g., spies), feminine (e.g., beauticians) or neutral (e.g., singers). Results showed that more positive responses were given when the second sentence explicitly referred to men rather than to women, regardless of the profession’s stereotype. Thus, French and German speakers were more likely to match professionals presented in a masculine plural form with men than with women, even for female-stereotyped professions. The study was also run in English, which does not have grammatically gendered nouns. English participants did show an effect of gender stereotype, such that continuation sentences referring to women or to men were deemed more likely for female- or male-stereotyped professions, respectively, suggesting that the male biases observed in French and German were due to the use of the masculine form.

In a follow-up study, Gygax et al. (2012) found that the biased interpretation of the masculine form could be reduced but not suppressed if participants were explicitly

reminded of the possible generic meaning of masculine forms, a finding that reveals a propensity in readers to interpret the masculine form as specific.

Other studies have compared masculine plurals with gender-fair alternatives (e.g., Brauer & Landry, 2008; Braun et al., 1998; Stahlberg et al., 2001; Stahlberg & Sczesny, 2001). Crucially, double-gender forms and – in German – the innovative capital-I and nominalized forms typically yield stronger representations of women than masculine forms. Only a few studies have examined whether this effect of grammatical gender is modulated by stereotype, with mixed results: Braun et al. (1998) presented German participants with a short text about an annual meeting of a professional group, and asked them a few hours later to estimate the percentage of women present in the group. They found that compared to the masculine form, the double-gender form yielded higher estimated percentages of women for male- but not for female-stereotyped professional groups. Applying the same paradigm to French, however, Brauer and Landry (2008) observed a global increase in estimated percentage of women when a double-gender form was presented relative to when a masculine form was displayed, but this effect was not modulated by gender stereotype.

Finally, the relatively recent introduction of innovative forms such as the mid-dot in French and the capital-I in German raises the question of a potential difference of these forms compared to the double-gender form. So far, this question has only been examined in two German studies. In Stahlberg et al. (2001), participants were asked to name famous people in a given category (e.g., singers or politicians). The use of the capital-I form in the question was found to yield higher proportions of women than that of a double-gender form (the latter yielding no higher proportion of women than the masculine form – a rare result). In Stahlberg and Sczesny (2001), participants were presented with the written name of a professional category, followed by a picture of a famous person; their task was to indicate whether the person belonged to the category. For female pictures, reaction times were (unsurprisingly) slowest when the name of the category was written in the masculine form; crucially, they were fastest when the name was written in the capital-I form, with the double-gender form yielding intermediate reaction times.

Outstanding Questions

In summary, previous research with sex-based grammatical gender languages such as French and German has shown that compared to the masculine plural form, the double-gender and innovative forms boost the presence of women in mental representations. Whether the effect of linguistic form is modulated by stereotype, though, is largely an open question. Furthermore, while in German there is a difference between double-gender forms and the innovative capital-I, with the latter yielding the largest difference compared to the masculine form, no research has yet examined the effect of the mid-dot writing form in French, and its potential difference in comparison with a double-gender form.

Quite different questions that have not yet been addressed at all concern what we will call the *accuracy* and *consistency*, respectively, of mental representations

induced by different linguistic forms. With accuracy, we refer to the fit between mental representations of gender ratios on the one hand, and true gender ratios – as reported primarily by governmental sources – on the other hand. Data on true gender ratios may be incomplete, outdated, or otherwise imperfect (Garnham et al., 2015), but using them as a benchmark would be the closest we can get to assessing if people's mental representations formed under the influence of linguistic forms deviate from the reality, and if so, to quantify these deviations. With consistency, we refer to the fit between mental representations formed under the influence of linguistic forms and what people would believe to be the actual gender ratios without the impact of linguistic forms. For this question, normed estimates of gender ratios, based on survey data, would serve as a benchmark. Accuracy in light of true gender ratios and consistency with respect to perceived gender ratios are different aspects of the question how fair gender-fair language really is. Both are worthy of investigation.

Current Study

Focusing on French, and using professional groups as test items, we aim to shed light on three open questions. First, do the double-gender and mid-dot forms induce different mental representations? Second, is the effect of linguistic form on the mental representations of gender modulated by stereotype? Third, to what extent are mental representations induced by different linguistic forms accurate and/or consistent? In other words, what is their fit with true and/or perceived gender ratios? Concerning the last question, there are to the best of our knowledge no objective data on true gender ratios in professional groups in France, yet an existing norming study provides data on *perceived* gender ratios in such groups (Misersky et al., 2013). We therefore concentrate on the consistency issue, but will return to the accuracy issue in the General Discussion.

We conduct two internet-based studies on the mental representations of gender in French speakers, by comparing the estimated gender ratios in professional groups presented in the masculine, double-gender, and mid-dot plural forms. Gender-neutral professions are examined in Study 1 and gender-stereotyped ones in Study 2. Importantly, a ratio estimation task is used to allow for a comparison between our participants' responses to independently normed estimates of the proportions of men and women in the relevant professions (Misersky et al., 2013).

Our experimental paradigm is an adapted version of the one used by Braun et al. (1998) and Brauer and Landry (2008), in which participants read a short text on a professional gathering and are asked to estimate the percentage of women present at the gathering. Our most important modifications are that a variety of professional groups are tested here, such as to ensure that any observed effect generalizes across professions, and that, for practical reasons, our participants are asked to provide their estimate immediately after having read the text rather than a few hours later. Additionally, a possible effect of question framing is controlled for as participants are asked to estimate the percentages of men and women on a response slider, with the order of appearance of the words 'men' and 'women' and the corresponding

slider layout being counterbalanced. Compared to Braun et al. (1998) and Brauer and Landry (2008), a shorter text is used, with two instead of four occurrences of the crucial piece of information. Like in these previous studies, though, participants are tested on a single trial, since exposure to multiple trials might make them become aware of the experimental manipulations and develop a response strategy.

The professions tested are chosen from the French part of Misersky et al.'s (2013) norming study, in which native speakers estimated the proportions of men and women for more than 400 role names (professions and non-professions). As in this norming study the influence of linguistic form was controlled at best (the endpoints of the rating scale showed the feminine and masculine forms, and the direction of the rating scale was counterbalanced across participants), these same norms also serve as the benchmark against which our participants' estimates are compared.

We acknowledge the fact that Misersky et al., collected their French data in Switzerland, while we test participants in France. Yet, this difference is unlikely to impact the benchmark's validity, given that high correlations were obtained across all seven languages investigated in the norming study (the six others were English (UK), German, Norwegian, Italian, Czech, and Slovak). We also acknowledge that despite being explicitly asked to estimate actual ratios of men and women, the participants in Misersky et al., might have been influenced by any normative beliefs they hold – what the gender distributions should be like – or by what they believed to be a socially and/or experimentally desirable answer.

Study I

This study compares three plural forms in French that can be used to refer to a group of mixed genders: the masculine, double-gender and mid-dot forms. Importantly, it focuses on professions with a perceived neutral stereotype, which should encourage participants to interpret the masculine plural form as generic, referring to both men and women, and hence potentially treat it on a par with the double-gender and mid-dot forms. By comparing the masculine form to these alternatives, we test whether differences in linguistic form alter language users' inferences about gender ratios in the described scenarios. Specifically, we examine whether due to the ambiguity of the masculine form and its lack of explicit inclusion of female referents, this form disfavors women in mental representations relative to the other two forms. If this were the case, lower estimates of %-women in response to the masculine should be observed, compared to the double-gender and mid-dot forms.

Both double-gender and mid-dot forms are gender-fair forms, though they differ in two respects: First, the mid-dot is a more recent form than the double-gender and perceived as more militant by some part of the French society. For instance, the use of other contracted forms, using a slash or parentheses, has to our knowledge not been the subject of political debate of a similar scale. Second, the double-gender form can be read aloud straightforwardly while the mid-dot form is essentially a spelling convention. Differential effects of these gender-fair forms might therefore be observed,

although it is unclear which form would be expected to boost the mental representations of women more.

Finally, we examine for each form the extent to which the mean estimate of %-women deviates from people's perceptions of real-world gender ratios in the professions at hand. It is expected that in this respect, the double-gender and mid-dot forms fare better (i.e., yield a closer match) than the masculine form.

Unless otherwise specified, all aspects of the stimuli, procedure and analyses were preregistered (10.17605/OSF.IO/K649 W).

Method

Participants. A total of 195 participants were recruited. The data from 42 of them were removed from the analysis for the following reasons: one participated in a related study not reported on here, one did not complete the survey, 17 responded incorrectly at one or both attention check questions (see Procedure below), and 23 did not satisfy all of our recruitment criteria (three were non-native speakers, two did not live in France, and among the ones recruited on Foulefactory, 18 reported an age outside of the requested range). For the 41 participants who took the survey more than once, only the first response was kept.

The data analysis, thus, included 153 participants (67 women and 86 men). They were native French speakers living in France, aged between 22 and 39 years ($M = 30$, $SD = 2.7$). Three of them were recruited on the crowd-sourcing platform Clickworker (<https://www.clickworker.com/>), and all others on Foulefactory (<https://www.foulefactory.com>), the preregistered recruitment platform, has a large number of French workers, but presents two disadvantages compared to Clickworker. First, it only offers pre-specified age ranges, although a customized age range can be obtained for an extra 500€. Here, the pre-specified range 25–34 was chosen. Second, it lacks a good screening function: workers can do a task more than once, leading to considerable data loss. We therefore completed our sample by collecting the last three datapoints on Clickworker, with a customary age range of 20–40 years).

Stimuli. Six neutral-stereotyped professions were selected from the French part of Misersky et al.'s (2013) norming study. All the selected French profession names have grammatical gender marking, with one exception (*employé de banque* “bank employee”) whose masculine and feminine forms differ not only orthographically but also phonologically (The pattern of results was the same when the trials with this noun were removed from the analyses). The estimated proportions of women in these professions are between .47 and .51 ($M = .49$, $SD = .01$) (see Supplementary Materials Online, Table A1. Professions Tested).

We constructed the short passage shown in (4), describing a fictitious scenario where an annual gathering of some professionals took place. The profession name appeared twice in the text and no referential pronoun was used.

(4) *Le rassemblement régional des PROFESSION NAME a eu lieu cette semaine à Amiens. La localisation centrale de cette ville a été particulièrement appréciée. Les*

PROFESSION NAME ont aussi adoré l'apéro offert à l'hôtel de ville le premier jour.

The regional gathering of *PROFESSION NAME* took place this week in Amiens. The central location of this city was particularly appreciated. The *PROFESSION NAME* also loved the aperitif offered at City Hall on the first day.'

The words *régional* and *Amiens* were replaced with *européen* and *Francfort* respectively for three professions (i.e., *mathématicien* "mathematician", *douanier* "customs officer" and *astronaute* "astronaut"), for it would be more plausible for these professionals to have a Europe-wide gathering in a more internationally-oriented city than a regional one in a provincial city.

Three versions of this passage were constructed, each with a different linguistic form of the profession name (masculine vs. double-gender vs. mid-dot plural), as exemplified for one of the professions in (5). Note that the double-gender form was presented in 'masculine before feminine' order, following common practice in everyday communication; similarly, a normal dot '.' was used as a replacement for the mid-dot '·', which is not (yet) present on computer keyboards.

- (5) Three forms of sample profession *musicien* "musician"
- a. masculine: *musiciens*
 - b. double-gender: *musiciens et musiciennes*
 - c. mid-dot: *musicien.ne.s*

Two multiple-choice questions about the text were also constructed to serve as attention checks1:

- (6) Attention check questions
- a. *Qu'est-ce qui a été apprécié à propos d'Amiens ?*
"What was being appreciated about Amiens?"
 - b. *Qu'est-ce qui a été offert à l'hôtel de ville ?*
"What was offered at the City Hall?"

Procedure. The study was run via Qualtrics online software (<https://www.qualtrics.com>). Each participant was tested on a single trial, hence on only one profession presented in a single linguistic form, and was paid 0.50 € for their time.

Once they agreed on the informed consent, participants were told that in the survey, they would be shown two very short texts to read and answer a few questions about. After reading the first text, which unbeknownst to the participants was a warm-up text, they had to answer two multiple-choice questions related to its contents (see Supplementary Materials Online, B. Warm-up Text and Questions), with the text still being visible. Depending on their responses, they received either positive or negative written feedback. Before they moved on to the next page of the survey and were presented with the target text on the professional gathering, they were told that

questions about the following text would be more difficult. This was done to prompt them to read the following text with full attention.

Then, they first read the text at their own pace; after a button press, the text disappeared and three questions were shown. The first two were the attention check questions shown in (6) above; if participants made at least one error, they were still able to finish the study but their data were excluded from the analyses. The third question asked them to provide their estimate of the gender ratio in the fictional gathering. There were two versions of it, depending on the order of the words for men and women in the sentence. One version was framed as *Selon vous, quels étaient les pourcentages d'hommes et de femmes dans ce rassemblement?* ("In your opinion, what were the percentages of men and women in the gathering?") (men-women version) and the other, *Selon vous, quels étaient les pourcentages de femmes et d'hommes dans ce rassemblement?* ("In your opinion, what were the percentages of women and men in the gathering?") (women-men version). There were likewise two versions of the response slider, such that the labels for the left and right endpoints (i.e., pictograms of a man and a woman) reflected the framing of the test question. Instructions on how to use the slider were shown with the question and remained visible to participants during the test (see Supplementary Materials Online, C. Women-Men Version of the Response Slider and Instructions). Slider version (and hence, question framing), was counterbalanced within each of the three groups.

At the end of the survey, participants were asked to fill in information about their native language, country of residence, sex, and age.

Participants were randomly assigned to one of the six conditions (three linguistic forms x two slider layouts), and within each group, they were randomly presented with one of the six professions. The mean number of participants per condition was 25 (min = 24, max = 26). Each profession was presented in each of the linguistic forms between six and 10 times (mean: 8.5).

Results and Discussion

Boxplots of the estimated percentages of women as a function of linguistic form are shown in Figure 1. These data were fit with a linear mixed-effects model by using the *lme4* package (Bates et al., 2015) in the programming software *R* (R Core Team, 2020) and *Rstudio* (RStudio Team, 2020). Statistical significance was assessed by means of the *Anova* function in the *car* package (Fox & Weisberg, 2019), and effect sizes were computed using the *eta-squared* function in the *effect size* package (Ben-Shachar et al., 2020). Linguistic form was contrast-coded and set as fixed effect; a random intercept was added for Profession. As only one data point was collected from each person, the model did not include a random factor for Participant. Note that this model differs from the preregistered one in that it does not contain fixed factors for Slider version and its interaction with Linguistic form. As neither in this nor in the next study this counterbalancing factor or any of its interactions affected the estimated %-women, and as omitting these terms did not change any of the results, we report the simpler models in both studies for the reader's convenience. (The only

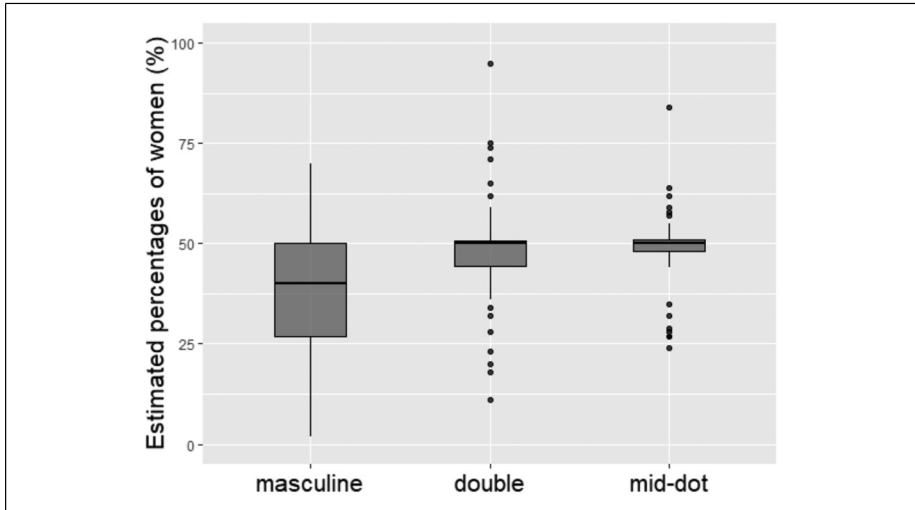


Figure 1. Boxplots of estimated percentages of women as a function of linguistic form.

other studies we know of that looked at order effects are the norming studies by Gabriel et al. (2008) and Misersky et al. (2013)). For some languages, these studies reported higher estimates for women when the question framing and response slider showed a women-men order, but there was no such effect for French.)

The results of the mixed-effects model, shown in Table 1, revealed an effect of Linguistic form. Restricted analyses with corrections for multiple comparison (mvt method), carried out with the *emmeans* package (Lenth et al., 2020), showed that compared to the masculine plural form, higher estimates of %-women were obtained for the double-gender ($\beta = 9.92$, $SE = 2.64$, $t(146) = 3.76$, $p < .001$) and the mid-dot form ($\beta = 9.63$, $SE = 2.63$, $t(146) = 3.67$, $p < .001$). By contrast, there was no difference between the double-gender and mid-dot forms ($|t| < 1$).

Next, non-preregistered post-hoc analyses were carried out to compare the results to Misersky et al.'s (2013) norming data (shown in Supplementary Materials Online, Table A1. Professions Tested). As it is currently not possible in mixed-effects designs to apply errors-in-variables models, which are ideally used to compare two distributions to each other, we compared the distributions of our experimental data to the means of the norming data. This method can underestimate beta coefficients, but given that there is little variance in the norming data, both within and across items (the SE's for the individual professions are all between 0.01 and 0.03), the correction factor to be applied according to Frost and Thompson (2000) is virtually equal to 1. We subtracted the normed %-women from the participant's estimate for each profession and each participant, and constructed intercept-only models with this difference score as dependent measure and a random intercept for Profession. In these models, a positive estimate for the intercept would thus indicate an overestimation of the presence of women compared to the benchmark and a negative estimate an underestimation. The "lmer"

Table 1. Results of Linear Mixed-Effects Model for Study 1.

	β	SE	t	χ^2	Df	p	partial η^2
Form				18.54	2	< .0001	0.11
double	3.41	1.53	2.23				
mid-dot	3.11	1.52	2.04				

function of the *lmerTest* package (Kuznetsova et al., 2017) was applied such as to obtain p -values. These analyses revealed that the masculine form yielded an underrepresentation of women compared to the benchmark ($\beta = -10.66$, $SE = 2.73$, $t = -3.91$, $p < .02$), while estimates for the double-gender and mid-dot forms did not differ from the benchmark values (double: $\beta = -0.80$, $|t| < 1$; mid-dot: $\beta = -1.01$, $|t| < 1$). In other words, these results suggest that the masculine plural induces an 11% point of male bias, while both the alternative forms induce a representation that closely matches the perceived proportion of women.

No previous study has focused specifically on a neutral stereotype. Yet, our finding that participants inferred a higher percentage of women when the double-gender or mid-dot form was presented relative to the masculine form meshes well with the results of Gygax et al. (2008, 2012), who examined neutral-stereotyped role names alongside male- and female-stereotyped ones. Indeed, using a different paradigm they observed a male bias regardless of stereotype in both French and German.

Study 2

Study 1 showed an influence of linguistic form on estimations of gender ratios for professions without a gender stereotype. The present study focuses on male- and female-stereotyped professions, and compares the same linguistic forms as before (i.e., masculine, double-gender and mid-dot). This design allows us to examine whether the effect of linguistic form is modulated by stereotype. As double-gender and mid-dot forms might promote women's visibility especially in groups where they are typically a minority gender, we expect – if anything – a larger effect of linguistic form for male-stereotyped professions than for female-stereotyped ones. Furthermore, given the lack of a difference between the double-gender and mid-dot forms in Study 1, these two forms are expected to likewise yield similar results. Finally, as in Study 1, we also examine to what extent participants' estimates in the experimental context reflect people's perceived gender ratios in the real world, by comparing the results to the norming data of Misersky et al. (2013). If the double-gender and mid-dot forms yield more consistent mental representations, they should fare better than the masculine form.

Unless otherwise specified, all aspects of the stimuli, procedure and analyses were preregistered on OSF (10.17605/OSF.IO/FCEWA).

Method

Participants. A total of 438 participants were recruited. The data from 133 of them were removed from the analysis for the following reasons: 33 did not complete the survey, 36 participated in Study 1 or a related study not reported in this article, 28 responded incorrectly at one or both attention check questions, and the remaining ones did not satisfy all of our recruitment criteria: 15 were non-native speakers, two did not live in France, 12 recruited on Foulefactory were older than 34, and seven recruited on Clickworker were younger than 20 (For the same reason as in Study 1, the selected age range for participants on Foulefactory was 25–34, while the range for those on Clickworker was 20–40. The data from the 12 on Foulefactory who indicated being older than 34 were again removed because of the conflict with the registered age in Foulefactory’s database, even though they indicated being younger than 40). For 38 participants who took the survey twice, only the first response was kept.

The data analysis thus included 305 participants (158 women, 145 men, and 2 other gender). They were native French speakers living in France, aged between 20 and 40 years ($M = 28$, $SD = 5.3$). They participated on the crowd-sourcing platforms Foulefactory ($N = 79$) and Clickworker ($N = 226$) and none of them had participated in Study 1.

Stimuli. Six male-stereotyped professions (e.g., *électricien* “electrician_{masc}” – *électricienne* “electrician_{fem}”) and six female-stereotyped ones (e.g., *caissier* “cashier_{masc}” – *caissière* “cashier_{fem}”) were selected from the same norming study (Misersky et al., 2013) as used in Study 1. For all professions, the feminine plural form of their French name differs from the masculine one not only orthographically but also phonologically. The mean estimated proportions of men or of women, respectively, were above .70 (male-stereotyped: $M_{men} = .81$ $SD = .03$; female-stereotyped: $M_{women} = .78$, $SD = .05$; $t(10) = 1.12$, $p = 0.3$). The 12 professions, together with Misersky et al.’s (2013) normed estimates of %-women in those professions, are shown in Supplementary Materials Online, Table A1. Professions Tested.

The same testing passage in the same three versions as in Study 1 was used, shown in (4) and (5) above.

Procedure. Participants were randomly assigned to one of 12 conditions obtained by crossing the two stereotypes, three linguistic forms, and two slider versions. Within each group, participants were randomly shown one of the six professions from the relevant list (male- or female-stereotyped). The procedure was otherwise identical to the one for Study 1.

The mean number of participants per condition was 25 (min = 24, max = 28). Each profession was presented in each of the linguistic forms between six and 12 times (mean: 8.5).

Results and Discussion

Boxplots of estimated percentages of women as a function of linguistic form and stereotype are shown in Figure 2. As in Study 1, the data were fit with a linear

mixed-effects model. The model contained fixed factors for contrast-coded Stereotype, Linguistic form, and their interaction, as well as a random intercept for Profession. The results, shown in Table 2, revealed effects of Stereotype and Linguistic form, but no interaction.

Relative to female-stereotyped professions ($M = 60.8$, $SD = 19.6$), lower percentages of women were obtained for male-stereotyped ones ($M = 34.6$, $SD = 18.7$; $\beta = -13.2$, $SE = 1.73$, $t = -7.64$, $p < .001$). Restricted analyses with corrections for multiple comparison (mvt method) showed that compared to the masculine form, higher estimates of %-women were obtained for the double-gender form ($\beta = 7.16$, $SE = 2.55$, $t(290) = 2.81$, $p < .02$) and the mid-dot form ($\beta = 9.44$, $SE = 2.57$, $t(290) = 3.67$, $p < .001$), while there was no difference between the latter two ($t < 1$).

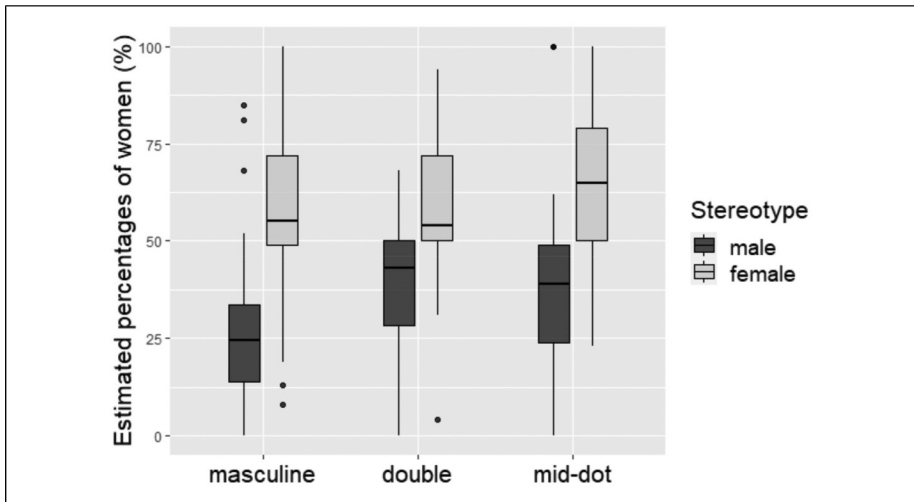


Figure 2. Boxplots of estimated percentages of women as a function of linguistic form and stereotype.

Table 2. Results of Linear Mixed-Effects Model for Study 2.

	β	SE	t	χ^2	Df	p	$partial \eta^2$
Stereotype(male)	-13.2	1.73	-7.64	58.4	1	< .0001	0.85
Form				14.8	2	< .001	0.05
double	1.62	1.48	1.10				
inclusive	3.91	1.49	2.62				
Stereotype \times Form				3.82	2	0.15	0.01
male:double	2.66	1.48	1.80				
male:mid-dot	-0.38	1.49	-0.26				

The lack of a global interaction between linguistic form and stereotype is unexpected, as such an interaction was observed in an almost identical pilot study with less participants ($N = 142$). In this pilot, the increase in the estimations with the gender-fair forms was indeed restricted to male-stereotyped professions (see Supplementary Materials Online, D. Pilot Study). A potential interaction between stereotype and linguistic form in the present data was further examined in two additional, non-preregistered, analyses.

First, in order to compare the results of this study to the ones by Braun et al. (1998) and Brauer and Landry (2008), who also investigated a possible interaction but tested only a masculine and a double-gender form across both stereotypes, we ran the same regression analysis without the data for the mid-dot form. The results of this analysis did reveal an interaction of small effect size ($\beta = 2.45$, $SE = 1.27$, $t = 1.98$, $\chi^2 = 3.92$, $p < .05$, partial $\eta^2 = 0.02$), such that for male-stereotyped professions, the double form yielded higher estimates of %-women than the masculine form ($\beta = 12.0$, $SE = 3.52$, $t(194) = 3.42$, $p < .001$), while for the female-stereotyped professions no difference was found between the linguistic forms ($t < 1$).

Second, a pooled data analysis was run in which the data from Study 2 were combined with those of the pilot mentioned above. This pooled dataset contains a total of 447 participants aged between 20 and 40 ($M = 29.3$, $SD = 5.6$), with on average 71 participants per condition (min = 32, max = 42). (None of the participants in Study 2 had participated in the pilot.) The same regression model as the one for the analysis of Study 2 revealed not only effects of Stereotype and Linguistic form, but also an interaction, as shown in Table 4.

The pattern of results of this pooled analysis is identical to that of the pilot analyzed separately: First, the effect of Linguistic form reveals that compared to the masculine form, higher estimates of %-women are obtained for the double-gender form ($\beta = 11.2$, $SE = 2.19$, $t(435) = 5.11$, $p < .0001$) and the mid-dot form ($\beta = 11.4$, $SE = 2.16$, $t(435) = 5.29$, $p < .0001$), while there is no difference between the latter two ($t < 1$). Second, restricted analyses of the interaction show that this pattern is most prominent for male-stereotyped professions (masculine vs. double: $\beta = 17.8$, $SE = 3.05$, $t(438) = 5.84$, $p < .0001$; masculine vs. mid-dot: $\beta = 12.4$, $SE = 3.07$, $t(435) = 4.05$, $p < .0003$; double vs. mid-dot: $\beta = -5.40$, $SE = 3.05$, $t(438) = -1.74$, $p > .1$); for female-stereotyped professions, the differences between the masculine form on the one hand and the gender-fair forms on the other hand, are indeed smaller and significant only for the mid-dot form (masculine vs. double: $\beta = 4.59$, $SE = 3.15$, $t(432) = 1.46$, $p > .1$; masculine vs. mid-dot: $\beta = 10.4$, $SE = 3.04$, $t(435) = 3.47$, $p < .002$; double vs. mid-dot: $\beta = 5.84$, $SE = 3.06$, $t(435) = 1.91$, $p > .1$). Compared to the results of the pilot study, the effect size (partial η^2) of the interaction is smaller (0.02 vs. 0.05) but the χ^2 statistic is higher (10.6 vs. 6.53). This pooled data analysis, then, adds evidence supporting the hypothesis that gender-fair language forms increase the presence of women in mental representations especially for male-stereotyped professions. Yet, given its small effect size, we conjecture that a large sample size is needed in order to reliably observe the relevant interaction.

Finally, non-preregistered post-hoc analyses were carried out to compare the results to Misersky et al.'s (2013) norming data shown in Supplementary Materials Online,

Table A1. Professions Tested. As in Study 1, the standard errors of the means of the norming data are uniformly low (between 0.02 and 0.03). Thus, we could compare our distributions to the means of the norming data without having to apply a correction factor to counter a potential underestimation of the beta coefficients. We followed the same procedure as in Study 1, subtracting the normed %-women from the participant's estimate for each profession and each participant, and constructing intercept-only models with this difference score as dependent measure and a random intercept for Profession. (In two of the models, that is, male stereotype with double-gender form, and female stereotype with mid-dot form, the random factor was not taken into account by *lmerTest* because its estimated variance was zero or close to zero.) For the male-stereotyped professions, the double-gender and mid-dot forms yielded an overrepresentation of women (double-gender: $\beta = 19.26$, $SE = 2.02$, $t = 9.52$, $p < .0001$; mid-dot: $\beta = 19.18$, $SE = 3.00$, $t = 6.40$, $p < .003$), with the masculine form trending in the same direction ($\beta = 7.47$, $SE = 3.19$, $t = 2.34$, $p < .07$). For the female-stereotyped professions, conversely, all three forms induced an underrepresentation of women, which – as indicated by the values of the beta coefficient – is numerically largest for the masculine and smallest for the mid-dot form (masculine: $\beta = -20.24$, $SE = 3.63$, $t = -5.57$, $p < .003$; double-gender: $\beta = -17.89$, $SE = 2.97$, $t = -6.02$, $p < .002$; mid-dot: $\beta = -12.39$, $SE = 2.83$, $t = -4.37$, $p < .0001$).

The results of this study show, first of all, that both stereotype and linguistic form affect inferences about gender ratios in male- and female-stereotyped professions. The overall effect of linguistic form was similar to the one observed for neutral-stereotyped professions in the previous study: the double-gender and mid-dot forms yield higher estimates of %-women than the masculine form, and they do so to the same extent.

The modulating effect of stereotype was not observed in the current study, except in a restricted analysis without the data for the mid-dot form. The same interaction pattern was present in the German data of Braun et al. (1998), but not in the French data of Brauer and Landry (2008). That said, a global interaction was observed in a previous pilot, as well as in a pooled analysis in which the data of the present study were combined with those of the pilot. As the effect sizes of the interactions are small, whether in the restricted analysis, the analysis of the pilot data, or the pooled data analysis, statistical power might be at issue to explain the overall now-you-see-it-now-you-don't pattern.

As to the comparison with the norming data, the results suggest that none of the linguistic forms induces mental representations that match the perceived proportion of women for either male- or female-stereotyped professions. This contrasts with results for neutral-stereotyped professions in Study 1, where the gender-fair language forms indeed matched the normed ratios. Table 3 provides an overview of the comparisons with the norming data both for this study and the previous one, by showing the models' estimated differences, measured in percentage points, between our participants' estimates and the norms. A positive value indicates a female bias, a negative one a male bias.

These data suggest that gender-fair language forms can rectify the male-biased representation induced by the masculine form for neutral-stereotyped professions, while they create a female bias for male-stereotyped professions and fail to correct the male bias for female-stereotyped professions.

Table 3. Estimated Percentage Point Differences Between Participants' Estimates in Studies 1 and 2 and Misersky et al.'s (2013) French Norms.

Stereotype	Linguistic form		
	Masculine	Double-gender	Mid-dot
Male	+ 7.5	+ 19.3	+ 19.2
Neutral	-10.7	-0.8	-1.1
Female	-20.2	-17.9	-12.4

Table 4. Results of Linear Mixed-Effects Model for Pooled Data Analysis (Study 2 and a Pilot Study).

	β	SE	t	χ^2	Df	p	partial η^2
Stereotype (male)	-14.3	1.69	-8.48	71.9	1	< .0001	0.87
Form				36.2	2	< .0001	0.08
Double	3.66	1.27	2.90				
mid-dot	3.88	1.25	3.12				
Stereotype \times Form				10.6	2	.005	0.02
male:double	4.08	1.27	3.23				
male:mid-dot	-1.54	1.25	-1.24				

Note: significant values are shown in boldface type, with positive ones indicating a female bias, and negative ones a male bias.

General Discussion

In two internet-based studies, we investigated the influence of linguistic form and gender stereotype on the presence of women in mental representations of groups of people. French participants read a short text on a professional gathering and estimated the percentage of women present in the gathering. We deliberately opted for a complete between-participants design in which each participant was tested in a single trial, such as to avoid the emergence of response strategies. In each study, the masculine form – which is ambiguous since its interpretation can be both specific (i.e., referring to men only) and generic (i.e., referring to men and women) – was compared to two unambiguous alternatives for mixed-sex groups (i.e., double-gender and mid-dot form). Neutral-stereotyped professions were tested in Study 1, and male- and female-stereotyped ones in Study 2. In addition, all experimental results were compared to norming data from Misersky et al. (2013). These comparisons allowed us to establish for each stereotype which linguistic forms yield mental representations in accordance with people's perceptions of gender ratios in the real world and which ones generate biased representations. Our results can be summarized as follows.

In both studies, lower estimates of %-women were evoked by the masculine form than by the double-gender and mid-dot forms. Study 2, additionally, revealed an effect of stereotype, with lower estimates for male- compared to female-stereotyped

professions. This effect interacted with that of linguistic form only in a post-hoc analysis that left out the data for the mid-dot form, showing higher estimates of %-women for male- but not for female-stereotyped professions when the double-gender form was shown. Compared to the norming data, a male bias was found for neutral-stereotyped professions presented in the masculine form, but consistent estimates were observed when they were shown in the gender-fair forms. However, for male-stereotyped professions, this comparison showed consistent estimates with the masculine form but a female bias with the gender-fair forms, and for female-stereotyped professions it suggested a male bias with all linguistic forms.

As to the relatively increased representation of women induced by the gender-fair plural forms compared to the masculine plural, our results are in accordance with previous studies on both French (e.g., Brauer & Landry, 2008; Gygas & Gabriel, 2008) and German (e.g., Braun et al., 1998; Kollmayer et al., 2018; Stahlberg & Sczesny, 2001; Stahlberg et al., 2001). Both these languages have an innovative neutralizing form alongside the more conventional double-gender, used in written language only, that is, mid-dot in French and capital-I in German. For German, there is evidence that capital-I yields even higher representations of women than the double-gender form (Stahlberg & Sczesny, 2001; Stahlberg et al., 2001), while for French, no previous research has examined the effect of the mid-dot form.

Our studies, however, suggest that there is no gradient effect of linguistic form, as no difference was found between the estimates for the double-gender and mid-dot conditions in either study. Possibly, the diverging results are due to the fact that in German the innovative form is highly similar to the feminine form in writing and indistinct from it in pronunciation (German, e.g.: *LeserInnen* versus *Leserinnen*; French, e.g.: *électricien.ne.s* versus *électriciennes*, but *caissier.ère.s* versus *caissières* and *éboueur.euse.s* versus *éboueuses*). In this respect, a case study on Swedish is worth mentioning. Swedish is largely a non-gendered language but like English, it has gender marking on personal pronouns. In 2015, an innovative, neutral, singular personal pronoun *hen*, which complements male *han* “he” and female *hon* “she” was officially adopted in Sweden, after having reached widespread adherence in the preceding few years (Gustafsson Sendén et al., 2015). This contrasts sharply with the situation in France, where the use of mid-dot has remained an ideologically divisive issue. Yet, similar to what we found for French, Lindqvist et al. (2019) observed no difference in mental representations induced by the neutral *hen* compared to the double-gender form *han/hon*. More research, though, is necessary to examine the possible differing effects of double-gender and mid-dot forms in French.

There is one caveat to be mentioned concerning the results for the masculine form. Gygas and Gabriel (2008) showed that the interpretation of the masculine plural as specifically referring to men was enhanced when participants had read short, unrelated, texts containing double-gender forms just before the actual study. (They did not test if using a mid-dot has the same effect, but there is no reason to think it would not.) As participants come to a study with all their previous language experience, the co-existence nowadays of gender-fair forms and generically intended masculine forms might have made our participants on average less inclined to embrace the

generic interpretation than would have been the case before gender-fair language became more frequent. Hence, the estimates of %-women in response to the masculine form might have been lower than what we would have seen one or more decades ago. As long as generically intended masculine forms co-exist with gender-fair forms, this pragmatic backlash effect is expected to similarly be present in people's text interpretations in real-life situations. For future research, it would be interesting to examine whether participants' use of, familiarity with, or even adherence to gender-fair language affects their interpretation of the masculine plural.

The effect of stereotype has been shown many times (e.g., Gygax et al., 2008, 2012; Gygax & Gabriel, 2008; Imren, 2007). Given that none of the three linguistic forms imply anything about the gender ratio in groups of mixed gender, it is easy to see why stereotype information influences judgments on this ratio. One might expect, though, that male and female stereotypes have differential effects when one of the gender-fair forms is presented. Specifically, the use of a double-gender or mid-dot form might boost the presence of women in mental representations to a larger extent for male-stereotyped than for female-stereotyped professions. We found only limited evidence for this, despite the clear presence of such an interaction in our pilot study (see Supplementary Materials Online, D. Pilot Study) and in our pooled analysis. Given the small effect sizes observed, a much larger sample size will be needed in order to be able to reliably detect the potential modulating effect of stereotype.

Recall that the two previous studies that examined the effect of linguistic form across two stereotypes compared the masculine to a double-gender form only (Brauer & Landry, 2008; Braun et al., 1998). Both adopted in essence the same paradigm as ours, but with just a single profession per stereotype, such that it is unknown whether their findings are generalizable across different professions. For French, Brauer and Landry (2008) observed no interaction; with 73 participants, though, their sample size was probably too small. For German, by contrast, Braun et al. (1998) did report the expected interaction: the double-gender form increased the percentage of estimated women for male- but not for female-stereotyped professional groups. Further research would be welcome to shed more light on the issue of differential effects of various gender-fair language forms depending on the associated gender stereotype. One specific question in this respect concerns a possible difference between the double-gender and mid-dot forms, as suggested by the fact that it is the mid-dot form that prevents a global interaction in Study 2. That is, as the mid-dot is still relatively infrequent, its processing might take up resources that would otherwise be allocated to processing information on stereotype. To examine this possibility, future studies can compare participants' reading times and eye movements while they are processing information presented in double-gender and mid-dot forms.

Next, we turn to the comparison with people's baseline perceived gender ratios, as indicated by Miserky et al.'s (2013) norming data. To the best of our knowledge, objective data on gender ratios in professional groups are currently not available for France, but there is evidence that people's estimates reflect such objective data quite reliably. For example, in a study on the distribution of men and women in professions in the UK, Garnham et al. (2015) found that while the norming data provided by the English

sample in Misersky et al. (2013) showed less extreme values for the most gender-imbalanced professions than objective data from governmental sources, there was overall a remarkably good correlation between the two datasets. (For a discussion on the role of prejudice and possible intricacies in the causal relationship between perceived and true gender ratios, see Gygax et al., 2016.) As English marks gender only on personal pronouns, it would of course be useful to run a similar study in French (or German). Indeed, one might wonder to what extent norming data are themselves influenced by linguistic representations, either as encountered in daily life or as used in the norming questionnaire. As to the latter, the endpoints of the rating scale for gender-marked profession names in Misersky et al. (2013) showed the masculine and feminine forms, respectively, and the direction of the rating scale was counterbalanced across participants. The influence of language forms on perceived gender ratios was thus experimentally controlled at best, leaving open the possibility that these norming data are likewise good estimates of objective data. We therefore conclude that while our comparisons with the benchmark provide straightforward answers to the question of consistency (i.e., the match with perceived gender ratios), they tentatively also shed light on what we called accuracy (i.e., the match with true gender ratios as approximated by objective data, such as those provided by governmental sources).

Recall that our results showed that the gender-fair forms matched perceived gender ratios, and hence possibly true gender ratios, only for professions with a neutral stereotype. For male-stereotyped professions they overshoot their objective, while for female-stereotyped ones they fail to provide enough of a boost. It would be interesting to consider professions in a larger range of stereotypicality, as we only tested professions for whom the norming data either showed an almost perfect gender balance (estimated proportions of women between .47 and .51) or a largely unbalanced one (estimated proportions of women below .30 or above .70). For female-stereotyped professions, one may also wonder if putting the feminine form before the masculine, e.g., *les caissières et caissiers* “the cashiers_{fem/masc}”, would render the presence of women in mental representations more salient, thus yielding more consistent and, by extension, possibly more accurate representations.

In the current study, the double-gender form was presented in a ‘masculine before feminine’ order, as in everyday communication the ‘feminine before masculine’ presentation is standard in only a few cases where a mixed-sex group of people is addressed (e.g., *Mesdames et messieurs* “Ladies and gentlemen”, and *Bonjour à toutes et à tous* “Hello to all_{fem-masc} of you”), but otherwise quite unusual. That said, previous research suggests that the order of words in a binomial phrase concurs with differential cognitive accessibility and relevance to a context. For instance, Kesebir (2017) showed when “women” was mentioned before “men” in a binomial phrase, people were more likely to think of women as member of a group of activists, relative to when “women” was mentioned after “men”. Thus, reversing the order might indeed render the presence of women in mental representations more salient. Future studies are welcome to examine the potential influences of word order on people’s mental representations of gender distributions by comparing the two ways of presenting the double-gender form.

Finally, we briefly turn to the social impact of gender-fair language. Depending on one's view on gender roles, it might be argued that the mismatches observed between our experimental results and people's perceptions of gender ratios in the real world – with gender-fair language forms resulting in more balanced gender ratios for male- and females-stereotyped professions than those found in the norming data of Misersky et al. (2013) – are *desirable*. Specifically, the practice of using gender-fair language could weaken stereotypes (e.g., Horvath & Sczesny, 2016; Vervecken et al., 2015), and hence over time, traditionally male- and female-dominated professions might attract more women and men, respectively. In other words, the use of gender-fair language could play a normative role in promoting more balanced real-world gender ratios in the long term.

That being said, there may be some side effects from the backlash against the use of gender-fair language in the short run. For instance, there is evidence that female job applicants are evaluated less favorably in a hiring process when introduced with feminine job titles than with masculine ones (Budziszewska et al., 2014; Formanowicz et al., 2013), and that professions presented with gender-fair language are estimated to earn lower salaries than with masculine forms (Horvath et al., 2016). The above-mentioned studies were run with Polish, German and Italian participants. A fourth, smaller-scale, study with French participants did not find any influence of gender-fair language on the appreciation of professions (Gygax & Gesto, 2007). As observed by Gustafsson Sendén et al. (2015), people's attitudes toward gender-fair language can become positive over time, thus any backlash effects might diminish with more exposure to the presence of gender-fair language forms. In this respect, more longitudinal data are needed to allow for a better understanding of the social impacts of gender-fair language in the short and long run.

Conclusion

The current article has shown that the generic use of the masculine plural and gender-fair alternatives differentially impact how people mentally represent and estimate gender ratios. In addition to adding important data to fuel public debate around gender-fair language, our results also lead to new questions. For example, how do people prioritize consistency and accuracy of mental representations vs. gender fairness when these come apart in their views about which linguistic forms are most desirable? And how do proponents of gender-fair language weigh the obvious orthographic drawbacks of the mid-dot form against its potential advantage in terms of representational consistency and accuracy compared to the double-gender form? Whatever the answers to these questions end up being, it is clear that existing and future empirical data should be a driving force in informing the trade-offs that must be considered in arriving at coherent policy decisions.

Acknowledgments


The research leading to these results received funding from the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013) / ERC Grants

324115–FRONTSEM (PI: Schlenker) and ERC H2020 Grant Agreement No. 788077–Orisem (PI: Schlenker), as well as from the Agence Nationale de la Recherche, grants ANR-17-EURE-0017 and ANR-17-CE28-0007-01 and from the China Scholarship Council. The authors would like to thank two anonymous reviewers for their helpful comments and questions.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the ERC H2020, Agence Nationale de la Recherche, China Scholarship Council, European Research Council, (grant number 788077–Orisem, ANR-17-CE28-0007-01, ANR-17-EURE-0017, 324115–FRONTSEM).

ORCID iD

Hualin Xiao  <https://orcid.org/0000-0003-2471-7084>

Supplemental Material

Supplemental material for this article is available online.

Notes

1. <https://www.motscles.net/ecriture-inclusive>.
2. See for instance <https://www.marianne.net/agera/tribunes-libres/une-ecriture-excluante-qui-s-impose-par-la-propagande-32-linguistes-listent-les>.
3. <https://www.academie-francaise.fr/actualites/declaration-de-lacademie-francaise-sur-lecriture-dite-inclusive>.
4. <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000036068906>.
5. https://www.assemblee-nationale.fr/dyn/15/textes/115b4003_proposition-loi.
6. <https://www.education.gouv.fr/bo/21/Hebdo18/MENB2114203C.htm>.

References

- Abbou, J. (2011). Double gender marking in French: A linguistic practice of antisexism. *Current Issues in Language Planning*, 12(1), 55–75. <https://doi.org/10.1080/14664208.2010.541387>
- Banaji, M. R., & Hardin, C. D. (1996). Automatic stereotyping. *Psychological Science*, 7(3), 136–141. <https://doi.org/10.1111/j.1467-9280.1996.tb00346.x>
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48. <https://doi.org/10.18637/jss.v067.i01>
- Ben-Shachar, M. S., Makowski, D., & Lüdtke, D. (2020). *Compute and interpret indices of effect size*. CRAN. <https://github.com/easystats/effsize>.
- Brauer, M., & Landry, M. (2008). Un ministre peut-il tomber enceinte? L'impact du générique masculin sur les représentations mentales. *L'Année psychologique*, 108(2), 243–272. <https://doi.org/10.4074/S0003503308002030>
- Braun, F., Gottburgsen, A., Sczesny, S., & Stahlberg, D. (1998). Können Geophysiker Frauen sein? Generische Personenbezeichnungen im Deutschen. *Zeitschrift Für Germanistische Linguistik*, 26(3), 177–195. <https://doi.org/10.1515/zfgl.1998.26.3.265>

- Budziszewska, M., Hansen, K., & Bilewicz, M. (2014). Backlash over gender-fair language: The impact of feminine job titles on men's and women's perception of women. *Journal of Language and Social Psychology, 33*(6), 681–691. <https://doi.org/10.1177/0261927X14544371>
- Burnett, H., & Pozniak, C. (2021). Political dimensions of gender inclusive writing in Parisian universities. *Journal of Sociolinguistics, 25*(5), 808–831. <https://doi.org/10.1111/josl.12489>
- Corbett, G. G. (1991). *Gender*. Cambridge University Press.
- Elmiger, D. (2008). *La féminisation de la langue en français et en allemand: Querelle entre spécialistes et réception par le grand public (Vol. 30)*. Honoré Champion.
- Formanowicz, M., Bedynska, S., Cislak, A., Braun, F., & Sczesny, S. (2013). Side effects of gender-fair language: How feminine job titles influence the evaluation of female applicants. *European Journal of Social Psychology, 43*(1), 62–71. <https://doi.org/10.1002/ejsp.1924>
- Fox, J., & Weisberg, S. (2019). *An R companion to applied regression* (3rd. ed.). Sage.
- Frost, C., & Thompson, S. G. (2000). Correcting for regression dilution bias: comparison of methods for a single predictor variable. *Journal of the Royal Statistical Society: Series A (Statistics in Society, 163*(2), 173–189. <https://doi.org/10.1111/1467-985X.00164>
- Gabriel, U., Gygax, P., Sarrasin, O., Garnham, A., & Oakhill, J. (2008). Au pairs are rarely male: norms on the gender perception of role names across English, French, and German. *Behavior Research Methods, 40*(1), 206–212. <https://doi.org/10.3758/BRM.40.1.206>
- Garnham, A., Doehren, S., & Gygax, P. (2015). True gender ratios and stereotype rating norms. *Frontiers in Psychology, 6*, 1023. <https://doi.org/10.3389/fpsyg.2015.01023>
- Gastil, J. (1990). Generic pronouns and sexist language: The oxymoronic character of masculine generics. *Sex Roles, 23*(11), 629–643. <https://doi.org/10.1007/BF00289252>
- Gustafsson Sendén, M., Bäck, E. A., & Lindqvist, A. (2015). Introducing a gender-neutral pronoun in a natural gender language: The influence of time on attitudes and behavior. *Frontiers in Psychology, 6*, 893. <https://doi.org/10.3389/fpsyg.2015.00893>
- Gygax, P., & Gabriel, U. (2008). Can a group of musicians be composed of women? Generic interpretation of French masculine role names in the absence and presence of feminine forms. *Swiss Journal of Psychology, 67*(3), 143–151. <https://doi.org/10.1024/1421-0185.67.3.143>
- Gygax, P., Gabriel, U., Lévy, A., Pool, E., Grivel, M., & Pedrazzini, E. (2012). The masculine form and its competing interpretations in French: when linking grammatically masculine role names to female referents is difficult. *Journal of Cognitive Psychology, 24*(4), 395–408. <https://doi.org/10.1080/20445911.2011.642858>
- Gygax, P., Gabriel, U., Sarrasin, O., Oakhill, J., & Garnham, A. (2008). Generically intended, but specifically interpreted: when beauticians, musicians, and mechanics are all men. *Language and Cognitive Processes, 23*(3), 464–485. <https://doi.org/10.1080/01690960701702035>
- Gygax, P., & Gesto, N. (2007). Féminisation et lourdeur de texte. *L'Année Psychologique, 107*(2), 239–255. <https://doi.org/10.4074/S0003503307002059>
- Gygax, P. M., Garnham, A., & Doehren, S. (2016). What do true gender ratios and stereotype norms really tell us? *Frontiers in Psychology, 7*, 1036. <https://doi.org/10.3389/fpsyg.2016.01036>
- Horvath, L. K., Merkel, E. F., Maass, A., & Sczesny, S. (2016). Does gender-fair language pay off? The social perception of professions from a cross-linguistic perspective. *Frontiers in Psychology, 6*, 2018. <https://doi.org/10.3389/fpsyg.2015.02018>
- Horvath, L. K., & Sczesny, S. (2016). Reducing women's lack of fit with leadership positions? Effects of the wording of job advertisements. *European Journal of Work and Organizational Psychology, 25*(2), 316–328. <https://doi.org/10.1080/1359432X.2015.1067611>

- Imren, L. (2007). What's in a (role) name? Formal and conceptual aspects of comprehending personal nouns. *Journal of Psycholinguistic Research*, 36(6), 431–456. <https://doi.org/10.1007/s10936-007-9053-z>
- Kesebir, S. (2017). Word order denotes relevance differences: The case of conjoined phrases with lexical gender. *Journal of Personality and Social Psychology*, 113(2), 262–279. <https://doi.org/10.1037/pspi0000094>
- Kollmayer, M., Pfaffel, A., Schober, B., & Brandt, L. (2018). Breaking away from the male stereotype of a specialist: gendered language affects performance in a thinking task. *Frontiers in Psychology*, 9, 985. <https://doi.org/10.3389/fpsyg.2018.00985>
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. (2017). LmerTest package: tests in linear mixed effects models. *Journal of Statistical Software*, 82(13), 1–26. <https://doi.org/10.18637/jss.v082.i13>
- Lenth, R., Singmann, H., Love, J., Buerkner, P., & Herve, M. (2020). *emmeans: Estimated Marginal Means, aka Least-Squares Means* (1.4.4) [Computer software]. <https://CRAN.R-project.org/package=emmeans>.
- Lindqvist, A., Renström, E. A., & Gustafsson Sendén, M. (2019). Reducing a male bias in language? Establishing the efficiency of three different gender-fair language strategies. *Sex Roles*, 81(1), 109–117. <https://doi.org/10.1007/s11199-018-0974-9>
- Menegatti, M., & Rubini, M. (2018). Gender bias and sexism in language. In H. Giles & J. Harwood (Eds.), *The Oxford encyclopedia of intergroup communication* (Vol. 1, pp. 451–468). Oxford University Press.
- Misersky, J., Gygas, P. M., Canal, P., Gabriel, U., Garnham, A., Braun, F., Chiarini, T., Englund, K., Hanulíková, A., & Oetl, A. (2013). Norms on the gender perception of role nouns in Czech, English, French, German, Italian, Norwegian, and Slovak. *Behavior Research Methods*, 46(3), 841–871. <https://doi.org/10.3758/s13428-013-0409-z>
- Prewitt-Freilino, J. L., Caswell, T. A., & Laakso, E. K. (2012). The gendering of language: A comparison of gender equality in countries with gendered, natural gender, and genderless languages. *Sex Roles*, 66(3), 268–281. <https://doi.org/10.1007/s11199-011-0083-5>
- R Core Team (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Reynolds, D. J., Garnham, A., & Oakhill, J. (2006). Evidence of immediate activation of gender information from a social role name. *The Quarterly Journal of Experimental Psychology*, 59(05), 886–903. <https://doi.org/10.1080/02724980543000088>
- RStudio Team (2020). *RStudio: Integrated Development Environment for R* (1.3.959) [Computer software]. RStudio, PBC. <http://www.rstudio.com/>.
- Sczesny, S., Formanowicz, M. M., & Moser, F. (2016). Can gender-fair language reduce gender stereotyping and discrimination? *Frontiers in Psychology*, 7, 25. <https://doi.org/10.3389/fpsyg.2016.00025>
- Stahlberg, D., & Sczesny, S. (2001). Effekte des generischen Maskulinums und alternativer Sprachformen auf den gedanklichen Einbezug von Frauen. *Psychologische Rundschau*, 52(3), 131–140. <https://doi.org/10.1026/0033-3042.52.3.131>
- Stahlberg, D., Sczesny, S., & Braun, F. (2001). Name your favorite musician: effects of masculine generics and of their alternatives in German. *Journal of Language and Social Psychology*, 20(4), 464–469. <https://doi.org/10.1177/0261927X01020004004>
- Vervecken, D., Gygas, P. M., Gabriel, U., Guillod, M., & Hannover, B. (2015). Warm-hearted businessmen, competitive housewives? Effects of gender-fair language on adolescents' perceptions of occupations. *Frontiers in Psychology*, 6, 1437. <https://doi.org/10.3389/fpsyg.2015.01437>

Author Biographies

Hualin Xiao is a PhD researcher in psycholinguistics and social psychology. She did her PhD research at the Département de Sciences Cognitives of Ecole normale supérieure, Paris. Her research focuses on language and gender, including topics such as gender-inclusive language and gender bias in hiring.

Brent Strickland is a research scientist in cognitive science at the CNRS, where he is a member of the Institut Jean Nicod in the Département de Sciences Cognitives of Ecole Normale Supérieure, Paris. He is also an affiliate professor at the Africa Business School (UM6P; Rabat, Morocco), and a co-founder of the UM6P School of Collective Intelligence. His research focuses on language, perception, and cognitive bias.

Sharon Peperkamp is a Senior research scientist (CNRS) in psycholinguistics. A member of the Laboratoire de Sciences Cognitives et Psycholinguistique of the Département de Sciences Cognitives at Ecole normale supérieure in Paris, she carries out research on language processing and acquisition.