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Effects of Grammatical Gender on Gender Inferences: Experimental Evidence From Italian Common Gender Nouns

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Abstract

Recent psycholinguistic research has focused on how different grammatical gender marking strategies affect people's mental representation of referents' gender. Such works particularly explored how explicitly encoded linguistic elements, such as grammatical gender markers, may drive the inferential process as attentional clues. Results of reading comprehension tasks in French and German have shown that the explicit encoding of masculine gender in plural forms of role nouns often leads to a male bias, a specific masculine inference corresponding to the grammatical gender clue, even when the masculine form was intended as generic, thus including women and men. Moreover, comparing generic masculine forms with gender-fair alternatives revealed that the latter significantly reduce this male bias. The present study examines the impact of three gender marking strategies on the construction of generic mental representations. Indeed, the experiment tested generic masculine against two gender-fair forms (split masculine/feminine forms and ambiguous syntactic reformulations) among 38 Italian speakers. No significant effect was found in generating a generic mental representation through form manipulation. However, ambiguous syntactic reformulation realised by presenting target nouns from the Italian common gender noun class and through the neutralisation of determiners' gender, increased the probability of a male-specific inference. Additionally, a keen interest in gender-fair language topics was linked to longer reaction times, indicating a higher cognitive effort during the inference process.

Keywords: Grammatical gender, Mental representations, Gender-fair language, Italian

1. Introduction

1.1 Mental Representations of Gendered Groups of People

The construction of mental representations during reading tasks, particularly those related to the gender of human referents, is a complex and multifaceted process. Drawing from the principles of the Mental Models Theory (Garnham, 1981; Garnham & Oakhill, 1996) and the Memory-based Approach (Cook et al., 1998; Gerrig & O'Brien, 2005), this construction relies on both explicitly encoded textual information, such as the feminine or masculine grammatical gender morphologically marked on nouns (1), and implicit information rooted in the reader's general knowledge, like gender stereotypes associated with role nouns (2).

(1) *Estetist-e*$_{FEM}$ (Note 1)

Beauticians.

(2) *Beauticians are predominantly women.*

This process involves a dynamic and incremental interplay between working and long-term memory, aiming to integrate information. Indeed, by looking at examples (1-2) the most probable mental representation is 'female beauticians'. Psycholinguistic research has extensively debated which of these two information types primarily influences the inferential process and the significance each holds within language processing, especially when explicit and implicit information clash, as illustrated in (3-4). Several experimental findings (Cacciari et al., 1997; Carreiras et al., 1996; Garnham & Yakovlev, 2015; Gygax et al., 2021; Ronca & Moscati, 2019) demonstrated that surface grammatical information tends to override stereotypical one during language processing. Therefore, while exposed to clashing information such as that of (3-4), people most likely have a mental representation of 'male beauticians'.

(3) Estetist-i$_{MAS}$.

Beauticians.

(4) *Beauticians are predominantly women.*

A key insight to interpret those findings is offered by the Thinking for Speaking hypothesis (Slobin, 2003), highlighting that, since language acts as a medium to encode event conceptualisation, processing a language activates linguistically emphasised features that bias our mental representations as 'attentional clues'. Indeed, certain language-specific patterns may direct and accentuate our attention to particular dispositions such as events or categories. Concerning the issue of this paper, the morphological encoding of gender does not directly drive our social thought. Still, it may drive speakers to consistently attend to gender information, even when it is irrelevant or detrimental to text comprehension, since mandatory gender marking makes gender a salient feature in the sentence (Gygax et al., 2021). Thus, facing a clash between grammatical and stereotypical gender, it is likely that the first one inhibits the activation of the second one if grammatical gender is formally encoded in the language with high frequency.

Significantly, one study on bilingual speakers (Sato et al., 2016), whose languages differ typologically in gender encoding, like English and French, reported a switch in gender inference type corresponding to language switching during the experiment, along with participants' proficiency levels in both languages. When bilingual participants were presented with professional nouns in English (e.g., dancers) their inference was driven by the immediate activation of the stereotype associated with the profession (e.g. 'a group of women'), since English is a natural gender language that does not show gender marking through nominal morphology. Otherwise, when the same participants were presented with analogue stimuli translated into French, a grammatical gender language, their inference corresponded to the explicit masculine gender mark of the noun (e.g. *dans-eurs*$_{MASC}$, 'dancers'), which inhibited the activation of the female stereotype (e.g. 'a group of men'). So, mental representations alternate as a function of language in use.

It is not only through cross-linguistic comparison that it is possible to observe different gender marking strategies. Indeed, although languages with grammatical gender typically encode gender morphologically on nouns, less conventional strategies can neutralise or obscure grammatical gender (Giusti, 2022; Robustelli, 2012; Thornton, 2022), and even within the same language, those different gender encodings may trigger different effects on mental representations.

Reflecting on these observations, this study presents experimental findings on the different mental representations elicited by stimuli with Italian typical grammatical gender encoding (e.g., explicit masculine or feminine markers) compared to atypical ones (e.g., ambiguous encoding, neutralisation of grammatical gender), particularly focusing on the mental representation obtained presenting stimuli that are considered gender-neutral both in surface and in stereotype information.

2. The Polysemic Meaning of Masculine Gender in Grammar and Mind

Italian is a sex-based grammatical gender system (Corbett, 2013; Thornton, 2003), where gender is arbitrarily assigned to inanimate entities, but semantically motivated when referring to humans or certain animals, reflecting the gender identity or biological sex of the referent. The Italian gender system operates quite systematically in denoting specific references to men or women, providing the accurate derivation of feminine nouns from their masculine counterparts through a process known as *gender motion* (Doleschal 1990; 1992), thereby exhibiting a consistent alternation of masculine and feminine markers and suffixes (Note 2). The same occurs with plural forms when referring to groups consisting only of men or only women, thus ensuring a complete alignment between gender marking and referents' gender. Nevertheless, there exist scenarios where this direct correspondence does not hold, including:

- Referring to a person whose gender identity does not conform to the binary options of man/woman.
- Mentioning undefined individuals (5) whose gender identity has not been or cannot yet be attributed to any specific referent, or in references to job positions where the role is open to any applicant (6).

(5) *Prima o poi, io e la mia compagna vorremmo avere un$_{MAS}$ figlio$_{MAS}$.*

Sooner or later, my partner and I wish to have a child.

(6) *Domani si eleggerà il$_{MAS}$ sindaco$_{MAS}$.*

Tomorrow, the mayor will be elected.

- Describing groups composed of individuals with mixed gender identities (7), or groups whose members' genders remain unspecified (8).

(7) *Gloria e Jay sono i$_{MAS}$ miei$_{MAS}$ attori$_{MAS}$ preferiti$_{MAS}$ della serie Modern Family.*

Gloria and Jay are my favourite actors from the series Modern Family.

(8) *Gli$_{MAS}$ interessati$_{MAS}$ possono rivolgersi all'inidrizzo e-mail.*

Interested parties can reach out to the email address.

The debate on non-binary designation in Italian is recent and unsolved. Without delving into this topic, it is merely noted that the current recommendation involves using symbols or letters (e.g., *, @, ə, u, x) as new grammatical gender markers distinct from those of the binary system. However, these symbols are not integrated into the standard orthographic and phonological repertoire, nor are they acknowledged in formal grammar education (see Comandini, 2021; Safina, 2023).

Considering the latter two points, the masculine gender marker is used in any referential context intended as generic, thus gender-unspecified, gender-ambiguous, or gender-mixed. The longstanding grammatical tradition that ties the generic meaning to masculine markers creates a formal asymmetry in the distribution of available meanings for the two values of the gender category (Marcato & Thüne, 2002). Concerning references to human beings, the feminine is configured as a marked member, since it displays fewer available meanings (e.g. only specific reference) than the unmarked member's polysemy (e.g., specific and generic reference) (Note 3). Furthermore, the feminine markedness results in fewer instances of occurrence, thus a lower frequency. Along with the structural markedness, the feminine gender also possesses a sociolinguistic markedness which is evident in cases of specific references to women in highly prestigious professional positions (e.g. *neurochirurg-a$_{FEM}$*, neurosurgeon). In such cases, different studies demonstrated that even women prefer a masculine auto-designation to avoid the derogatory, mocking connotation still associated with some feminine alternatives (Formato, 2018; Thornton, 2016; Voghera & Vena, 2016).

While it is unquestionable that the masculine gender is unmarked in Italian, both from a structural and a sociolinguistic point of view (Luraghi & Olita, 2006, pp. 30-32), what is called into question by some psycholinguists (Gygax et al., 2021) is the cognitive saliency of the unmarked, generic meaning associated with masculine forms. Such arguments are mostly based on French and German academic literature; however, since the generic use of the masculine is a common pattern found in different grammatical gender languages (Marcato Thüne 2002 for Italian; Bußmann and Hellinger 2003 for German; Schafroth 2003 for French), this strand of research can offer a theoretical basis for Italian as well.

Considering masculine forms as polysemic necessarily implies a disambiguation task in language processing, since the specific interpretation 'male' must be inhibited to include women in the mental representation. According to the activation-selection model of ambiguity resolution (Gorfein, 2001; Gorfein et al., 2007), each word possesses a set of weighted attributes reflecting its multiple structural and semantic features. The activation of one feature instead of another is context-dependent, but in the absence of a particular context, the activation depends on its current weight, which is based on frequency and cognitive accessibility. Relating to the issue of gender, the usage of the masculine singular to denote undefined referents occurs significantly less often than its application to refer to individual males (Gygax et al., 2021), and this may become central in giving more cognitive accessibility to the specific meaning, even when employed in the plural form, determining an automatic male bias, thus a passive interpretation of 'man/group of men' instead of 'generic individual/group of men and women'.

By employing different methodologies and tasks, empirical research in German (Esaulova et al., 2014; Irmen & Kurovskaja, 2010), Spanish (Carreiras et al., 1996; Nissen, 2002), Greek (Makri-Tsilipakou, 1989), Russian (Doleschal & Schmid, 2001), and French (Garnham et al., 2012; Gygax et al., 2012; Gygax & Gabriel, 2008; Lévy et al., 2014) demonstrated that the specific meaning of masculine forms overrides, to the extent of erasing, the generic one. For example, Gygax et colleagues (2008) started investigating male bias by using a sentence evaluation task based on two-sentence passages' anaphor resolution. The first sentence contained an antecedent in a plural masculine form intended as generic (e.g., *les spectateurs*$_{MAS}$, the spectators) and the second one presented an anaphoric element clashing with the grammatical gender of the antecedent (e.g., *plusieurs femmes*, several of the women) (Note 4). When participants had to decide if the second sentence was a sensible continuation of the first one, their positive judgments significantly decreased compared to those with a congruent continuation (e.g., *plusieurs hommes*, several of the men), with slower reaction times, indicating a cognitive effort in successfully resolving the feminine anaphoric element, and an immediate activation of a male-specific mental representation as soon as the role noun was read.

Interestingly, other experiments based on offline tasks (Braun et al., 1998; Stahlberg et al., 2001; Vervecken et al., 2015) demonstrated that such activation of the male-specific mental representation tends to resist also in a durable fashion, or even when participants were overtly instructed before the test about the possibility of interpreting masculine forms as generics (Gygax et al., 2012).

Along with the greater frequency and domains of occurrence of generic masculines, further factors fostering the male bias include that, from as early as primary education, the formal instruction of the gender category in gender-marked languages emphasises the dichotomy between masculine and feminine, with the generic connotation being acquired subsequently (Gygax et al., 2009). Lastly, concerning occupational roles, particularly those professions of high prestige previously mentioned, the predominant presence of men across various sectors enhances the cognitive accessibility of male referents when stimuli are presented in a generic masculine plural form. Alongside linguistic and sociolinguistic studies devoted to increasing

female visibility in language, several psycholinguistic experiments are concerned with testing the cognitive effectiveness of gender-fair forms in reducing male bias during reading tasks.

3. The Effect of Gender-fair Forms on Mental Representations

The psycholinguistic interest in male bias has frequently focused on job titles, both because these stimuli easily allow for the analysis of interactions between linguistic and extralinguistic information, and because notable findings in social psychology demonstrate how, particularly among women, the use of the generic masculines in a professional setting, such as in job advertisements or interviews, elicits negative attitudes about the perceived prestige of the job (Horvath et al., 2016; Vervecken et al., 2015) and even spontaneous emotions associated with social ostracism (Williams et al., 2000). Indeed, the study by Stout and Dasgupta (2011) on the English language found that, when confronted with texts containing only the pronoun *he* intended as generic, women felt significantly more excluded from the pool of potential candidates, believing the hiring of men to be more likely; moreover, they reported less motivation to apply for the job position and expressed lower identification with the job in terms of future personal satisfaction. When the authors presented participants with the same texts containing gender-fair strategies, both feminisation (e.g., *he and she*) and gender-neutralisation (e.g., *they*), negative feelings were significantly reduced. For these reasons, studies on male bias often relate to the discourse on gender-fair language and role nouns, as there is a growing effort to test the cognitive effectiveness of certain language policy proposals in those specific semantic domains where formal manipulations of language may have tangible effects on people's daily lives.

Various approaches explored the effects of gender-fair strategies on male bias reduction, both in direct (e.g., eye-tracking methodology) and deductive observations (self-paced reading, sentence evaluation task, questionnaires). The most employed gender-fair strategies in grammatical gender languages are feminisation and neutralisation, which display a variety of realisations along with formal and informal registers (Motschenbacher, 2014). Concerning only those strategies already accepted by Italian grammar, feminisation can be realised through syndetic or asyndetic coordinated masculine and feminine forms (e.g. *attori e attrici*, 'actors and actresses'), also called *split forms*. Otherwise, since the neuter gender does not exist anymore in many gender-marked languages or it is mostly associated with inanimate beings (Loporcaro, 2017; Luraghi & Olita, 2006), gender neutralisation is realised through syntactic rewordings including collective, epicene, or common gender nouns (Thornton, 2022) which avoid referents gender's specification.

Regarding feminisation, evidence in German (Braun et al., 2005; Hansen et al., 2016; Irmen & Roßberg, 2004; Körner et al., 2022; Schunack & Binanzer, 2022) and French (Brauer & Landry, 2008; Tibblin et al., 2023a, 2023b; Xiao et al., 2022) consistently shows that split forms enhance the presence of women in mental representations compared to generic masculines. Crucially, the impact of this strategy was significantly higher in experimental conditions where stereotype was controlled (Kim et al., 2023; Richy & Burnett, 2021; Tibblin, et al., 2023a; 2023b). Instead, the same empirical consistency is not observed for gender neutralisation. Considering German, some studies identified that gender-neutral expressions

mitigate male bias (Sato et al., 2016; Stahlberg et al., 2001), whereas other investigations reported that they perpetuate it (Braun et al., 2005; Irmen, 2007; Irmen & Roßberg, 2004).

Furthermore, studies that directly compared feminisation and neutralisation as two experimental conditions do not agree that the two strategies yield distinct effects in reducing male bias. In some cases, the feminisation strategy was significantly more effective than neutralisation one (Irmen and Roßberg, 2004; Tibblin et al., 2023b), whereas other studies demonstrated that both strategies were equally successful (Stahlberg et al., 2001 (Exp. 1); Tibblin et al., 2023a). In addition to methodological differences and statistical power variances that likely contributed to these divergent outcomes, there are also purely linguistic reasons that may explain why neutralised forms fail to reduce the male bias in grammatical gender languages.

As part of this strand of research, the present study aims primarily at bridging the scientific gap in Italian data on male bias in plural role nouns inferences during reading. Moreover, this work directly compares the effects of two different gender-fair strategies on mental representations of human groups by taking the stereotype variable under control, to focus only on the form's effect. Lastly, it will address the aforementioned linguistic factors that contribute to the possible ineffectiveness of the neutralisation strategy in Italian.

4. Experimental Study

The study involved a reading comprehension task using 18 brief texts, each describing a group of individuals engaged in an activity and followed by a related question. It aimed to explore the gendered mental representation evoked during reading through the manipulation of form. Participants were shown various pictures of human groups and asked to verbally choose the one that best depicted the group described in the text.

4.1 Stimuli and Conditions

Concerning the type of stimuli, the study tested plural forms of Italian common gender nouns (Thornton, 2022, p. 20) (e.g., *cantanti*$_{COM}$, singers) and English loans that exhibit the same morphosyntactic behaviour, such as *designer*, since they easily allow for gender neutralisation, and because a few studies investigated this noun class (Irmen, 2007; Richy & Burnett, 2021; Sato et al. 2016). Indeed, contrarily to Italian *symmetric nouns* (Thornton, 2022), also called *phonologically transparent* by Bates *et al.* (1996), which display two different forms denoting opposite genders (e.g., *Alcuni*$_{MAS}$ *maestri*$_{MAS}$*/Alcune*$_{FEM}$ *maestre*$_{FEM}$, some teachers), common gender nouns can be considered *phonologically opaque* since the controller is not inherently gendered and allows to the selection of both feminine and masculine targets of agreement (*Alcuni*$_{MASC}$*/Alcune*$_{FEM}$ *docenti*, some teachers).

Therefore, the experiment presented plural forms of common gender nouns in three different conditions according to the form manipulation: generic masculine, split masculine/feminine, and gender-neutral. In the first two conditions, gender was explicitly encoded in determiners (articles, prepositions, and quantifiers) and/or post-nominal modifiers (adjectives, verbs at past-participle form) in agreement with the controller, so that at least two elements in the sentence were gender-marked. Otherwise, the neutralised condition has been mostly obtained

by replacing gender-marked determiners with the expression *un gruppo di*, a group of, and replacing modifiers with opaque adjectives or syntactic rewordings able to avoid gender specification. The three experimental conditions can be summarised as follows:

- Gen_masc (generic masculine): *Tutti$_{MAS}$ i$_{MAS}$ contabili dell'azienda*. All the company's accountants.
- Split_mf (split masculine/feminine): *Tutti$_{MAS}$ i$_{MAS}$/Tutte$_{FEM}$ le$_{FEM}$ contabili dell'azienda*. All the company's accountants.
- G_neutral (gender-neutral): *L'intero gruppo di contabili dell'azienda.* The company's entire team of accountants.

The experiment adopted a between-subjects design, so the participants saw each target noun only once but were exposed to each experimental condition three times. For each name to be evaluated in all experimental conditions, three different test sets were created, and each participant was randomly assigned to one out of three test sets before starting the experiment. The presentation order of experimental and filler items was randomised.

To avoid stereotype interaction, the nine experimental stimuli were selected from the Italian section of Misersky and colleagues' norming study (2014) about gender stereotypes associated with roles and professions, by choosing only those nouns rated as gender-neutral (.45 - .55), such as *clienti$_{COM}$*, customers or *adolescenti$_{COM}$*, teenagers.

Turning to the nine filler items, gender opaqueness of common gender nouns was disambiguated using proper personal names, or by presenting independent nouns (e.g., *damigelle*, bridesmaids), in which gender is lexically encoded, and the word inflects only for number information (Thornton, 2022). Indeed, since the nouns are inherently feminine or masculine, they should denote only the corresponding gender identities.

4.2 Participants and Procedure

The data collection phase took place between June and July 2023. The sample includes 44 native speakers of Italian, balanced for gender identity, and aged 18 to 40. According to the results of a sociodemographic questionnaire, the sample was strongly targeted toward young people who completed university studies and were highly interested in the topic of gender-fair language, mostly showing positive attitudes.

Before starting the test, participants signed a consent form authorising the researcher to use the data for scientific purposes and ensuring voluntary participation in the test. The entire experimental procedure was previously validated by the local Ethics Committee for Research with Human Subjects in the Non-biomedical field, on May 31st, 2023. The experiment was hosted by the Urban/Eco Research Centre in Naples, and participants took the test one at a time in a private and quiet room. Participants were introduced to the test with written instructions and one familiarisation trial. The task was briefly presented as a reading comprehension without explicating the specific research goal to avoid possible bias in their responses, but further scientific clarification was provided by the researcher at the end of the test.

The experiment was implemented using a PowerPoint presentation to present the stimuli. The PC audio and video channels were recorded using the OBS-Studio software. The reading comprehension task consisted of 18 passages, each one composed of a first slide with a brief text, a second one containing a comprehension question about the text, and a third slide with multiple-choice answers. Participants were allowed to move on from one slide to the next autonomously, but it was forbidden to go backwards. This condition was verified by checking the recorded videos. Each text was articulated into three sentences, two sentences were meant to construct the scenario, and one target sentence described a group of people doing an action (9). The comprehension question asked who was doing the action in the target sentence (10).

(9) The concert will last from afternoon to evening. The newly arrived singers will perform at 3 p.m. Rehearsals will be held in the morning.

(10) Who will start singing at 3 p.m.?

The multiple-choice answers were provided as pictures portraying a male-only group, a female-only group, a mixed-gender group, and a filler picture with a group of people doing an action semantically incongruent with respect to the scenario (Figure 1). Each picture showed an associated alphanumeric code (e.g., T1), so participants had to reply to the question by saying the code of the selected image after a beep sound.

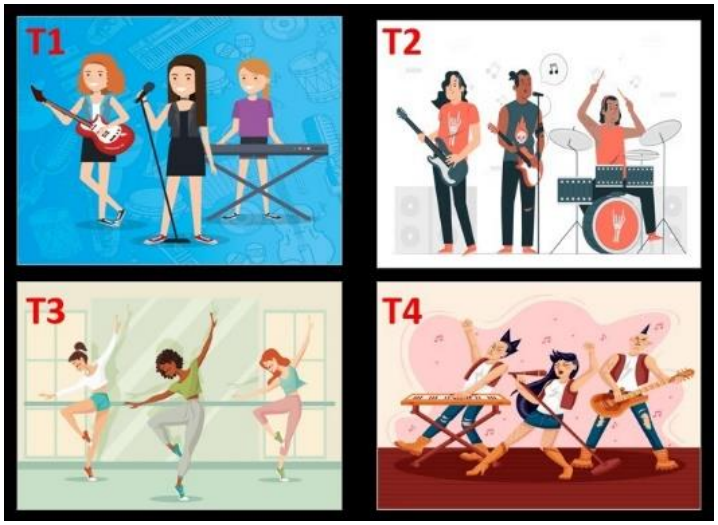

Figure 1. Slide with multiple-choice answers. Test set 1, Item n ٥

After completing the reading comprehension of 18 passages, participants were asked to fill out an anonymous sociodemographic questionnaire aimed at collecting data about their age, gender identity, education level, and interest in gender-fair language. Concerning gender-fair language, two questions measured the score of interest for each participant: the first one explored participants' knowledge about the topic by providing a three-level answer (e.g., *I am familiar with the debate; I have heard about it; I do not know it at all*). The second question presented a five-point Likert scale to investigate how close the subject was to the debate on gender-fair language, considering 1 as the lowest and 5 as the maximum engagement with the topic. The duration of the full experiment, considering instructions and the final questionnaire

ranged from seven to eleven minutes.

4.3 Dependent Variables and Measurements

The manipulated variable that served as a predictor was the form of the role noun. The three levels of this categorical variable were: generic masculine, split masculine/feminine, and gender-neutral. Another predictor for the analysis was the score of participants' interest in gender-fair language obtained through the sociodemographic questionnaire. The outcome variables measured for the analyses will be the following:

a) Participants' answers (e.g., the picture selection among multiple-choice answers). This categorical variable had three levels: Male-Only Group (MOG), Female-Only Group (FOG), and Mixed-Gender Group (MGG).
b) Reaction times of the picture selection in milliseconds.

RTs were measured by recording the audio during the experiment and using Praat (Boersma & Weenink, 2021), a phonetic analysis software. Looking at the sonogram, the interval between the onset of the beep sound and the onset of the occlusive [t] pronounced by participants (Figure 2) was considered. Namely, the explosive phase in [t] pronunciation easily allowed for onset detection on the sonogram; that is the reason why the alphanumeric code in multiple-choice answers always started with *T* (e.g. T1; T2). Consequently, using a Praat script, reaction times for the 18 items within each audio file were automatically marked.

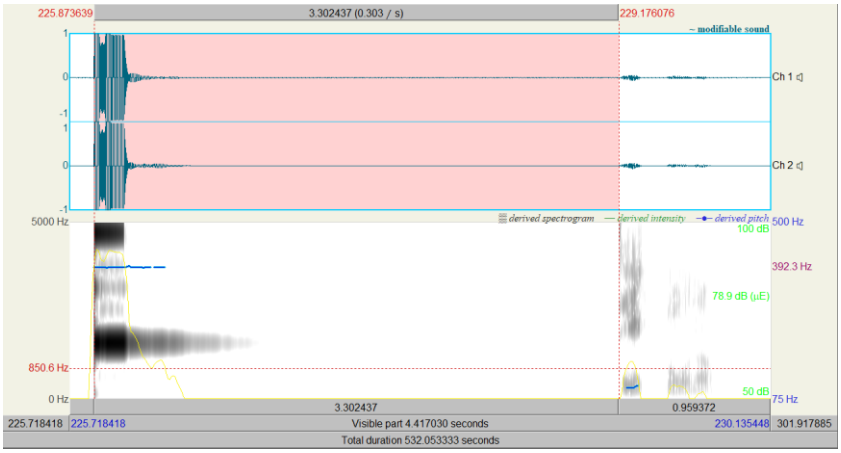

Figure 2. Time range between the beep and the T sound in RT calculation on Praat

4.4 Hypotheses

Taking the score of selected Mixed-Gender Group pictures as the reference measurement to investigate the mental representations of gendered multitudes, the analysis of participants' answers and RTs aims to verify whether the following hypotheses hold true:

H1: the probability of selecting MGG pictures will be lower in the generic masculine condition than in the two gender-fair conditions. Conversely, the highest scores for Male-Only Group selections are expected to be elicited by generic masculine forms.

H2: The comparison between the two gender-fair conditions is expected to unveil significant differences. Primarily, corroborating the findings of Irmen and Roßberg (2004) and Tibblin et

al. (2023b), which discuss the varying effectiveness of feminisation and neutralisation strategies in reducing the male bias, it is hypothesised that the MGG selections will be higher in the split form relative to the gender-neutral condition. Moreover, it is anticipated that split forms will elicit the highest Female-Only Group selection scores.

H3: According to participants' engagement in gender-fair language, it is expected that high levels of interest will lead to higher selections of MGG pictures. Furthermore, given the ideological nature of the debate on gender-fair language, slower RTs are expected at high levels of interest, indicating greater reflexivity of the participants before the response.

H4: Concerning response time, slower RTs are expected at gender-fair conditions compared to the generic masculine one, as in Nadal and Bove (2024). This is attributed to feminisation and neutralisation being comparatively less typical gender-marking strategies in Italian. Specifically, given the inherent ambiguity of the gender-neutral condition, where the role noun lacks both formal and stereotypical gender clues, it is foreseen that participants will exhibit slower RTs in retrieving the gender information than in the other two conditions.

In summary, a male bias induced by generic masculine forms is expected to be mitigated through gender-fair strategies. Additionally, it is postulated that the use of atypical gender encoding strategies, such as feminisation and neutralisation, will necessitate increased cognitive effort in building gendered mental representations of human referents' groups. Lastly, it is anticipated that the closeness to the debate on gender-fair language will prompt participants to show less spontaneity in their responses, both in answers and RTs.

4.5 Data Preparation

Prior to the statistical analysis, the data were reorganised by the following modifications: concerning interest in gender-fair language, the transformation was aimed at generating a singular score derived from two specific questionnaire items, namely, the three-tier question concerning familiarity with the subject matter, and the five-point Likert scale question regarding closeness to the topic. Consequently, a multiplication was carried out between the values selected by each participant for both questions (e.g., value 3 for Question 1 X value 5 for Question 2 = score 15, high interest). The obtained scores, ranging from 1 to 5 (low interest), 6-10 (moderate interest), and 11-15 (high interest) served as a three-level predictor in the upcoming analyses.

Furthermore, responses to the filler items were scrutinised, and all participants who committed more than two errors out of nine filler items were excluded from the sample (n = 6). The data were then analysed with R (R Core Team, 2021) by using separate models for answers and RTs.

5. Results

5.1 Answers Data

Before presenting the results of the inferential analyses, the following lines provide descriptive data about selected pictures grouped by the form of the role noun (Figure 3).

The selection of Mixed-Gender Group pictures was largely preferred by participants regardless of the experimental conditions. Particularly, the barplot shows that participants expressed a general tendency to select respectively Mixed-Gender Group (56% - 68%), Female-Only Group (23% - 24%), and more rarely Male-Only Pictures (8% - 21%).

Contrarily to Hypothesis 1, not only the proportion of MGG answers was not significantly lower when participants were presented with the generic masculine form, but also the two gender-fair forms did not increase the probability of selecting MGG pictures. Indeed, looking at the leftmost bars in Figure 3 (e.g. generic masculine form), participants largely preferred MGG pictures (65%), while only 12% of answers related to MOG selections. Interestingly, the gender-neutral form, which was supposed to trigger generic interpretations, shows instead the lowest proportion of MGG answers (56%) and the highest proportion of MOG ones (21%).

Along with Hypothesis 2, data reported in the central and rightmost bars in Figure 3 seem to confirm a difference in the effectiveness of the two gender-fair strategies in triggering inclusive mental representations. Indeed, split forms elicited a higher proportion of MGG answers (68%) than gender-neutral forms (56%). However, the proportion of FOG answers remained almost identical regardless of the experimental condition, around 20%. Despite female visibility was not related to the feminisation strategy, the proportion of answers in split form highlighted not only that the participants largely preferred MGG answers, but that split forms seem to obscure the presence of men in participants' mental representations since the feminisation elicited the lowest proportion of MOG selections (8%).

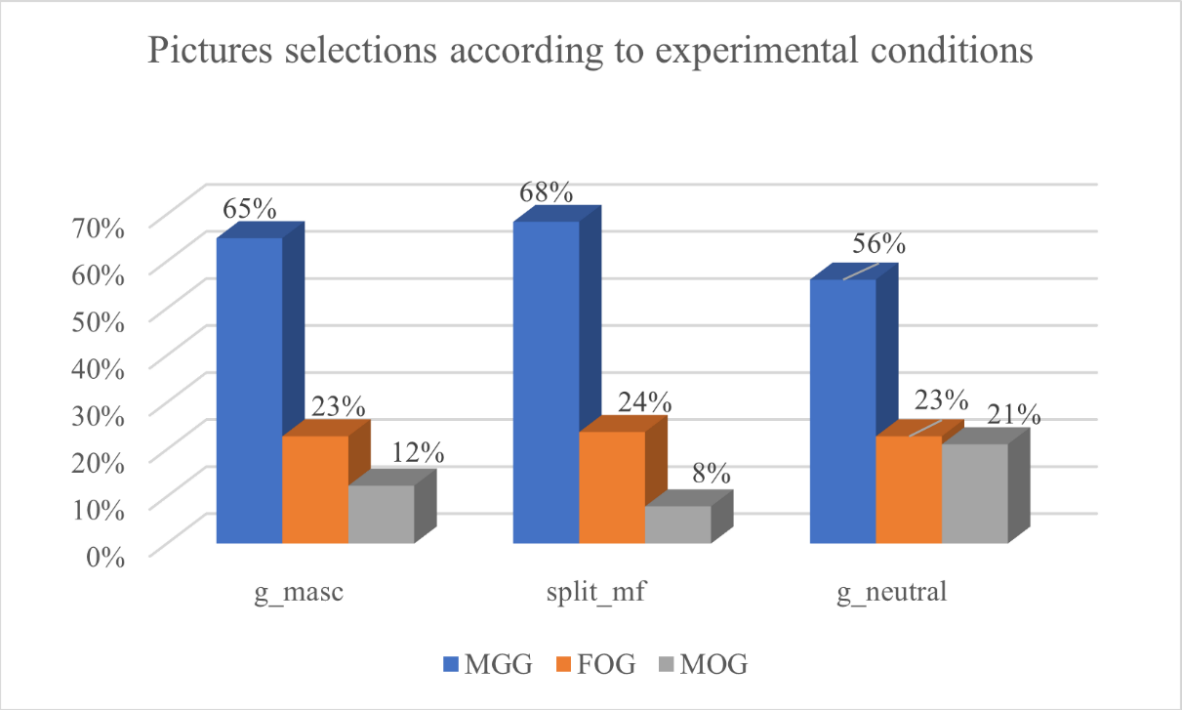

Figure 3. Percentage of picture selections grouped by form ('MGG' mixed-gender group, 'FOG' female-only group, 'MOG' male-only group)

Turning to the inferential analysis, since participants were exposed to all experimental

conditions, the present analysis adopts a multinomial modelling, using the *multinom* function of the VGAM package (Yee, 2015). The model has been built using participants' answers as the dependent variable, while Form and Interest were used as predictors. The specific masculine representation (MOG pictures) was set as the corner point of the model, to observe the effects of those predictors on the selection of MGG and FOG pictures. Based on the sample, the model showed significant effects produced by both predictors.

Concerning Form, the probability of selecting an MGG picture was significantly reduced ($p < 0.05$) in the gender-neutral form compared to the other two experimental conditions. Considering the Interest, instead, the model confirmed Hypothesis 3 by reporting a positive effect of the scores 11 to 15 on participants' responses, such that high scores of interest in the topic corresponded to a higher probability of giving MGG ($p < 0.01$) or FOG ($p < 0.05$) answers.

Table 1. Summary of the multinomial model parameter estimates on the dependent variable Answers

Predictors	**Estimate**	**Std. Error**	**z value**	**p-value**
Intercept: MGG	0.8072	0.6086	1.326	0.1847
Intercept: FOG	-0.4326	0.7857	-0.551	0.5819
$Form_{split\_mf}$:MGG	0.5039	0.4613	1.092	0.2746
$Form_{split\_mf}$:FOG	0.4883	0.5113	0.955	0.3396
$Form_{g\_neutral}$:MGG	-0.7029	0.3823	-1.838	**0.0660**
$Form_{g\_neutral}$:FOG	-0.5561	0.4398	-1.264	0.2061
$Interest_{moderate}$:MGG	0.5208	0.6085	0.856	0.3921
$Interest_{moderate}$:FOG	0.8180	0.7863	1.040	0.2982
$Interest_{high}$:MGG	1.3038	0.6160	2.117	**0.0343**

5.2 Reaction Times Data

Regarding reaction times, the descriptive analysis does not reveal statistically significant differences in the RT mean across the three experimental conditions. Nonetheless, the boxplot presented in Figure 4 reveals that both gender-fair strategies were associated with marginally slower reaction times compared to the generic masculine forms (5326 ms): specifically, 5469 ms for split forms and 5790 ms for gender-neutral forms, the latter of which exhibited the most prolonged average reaction time.

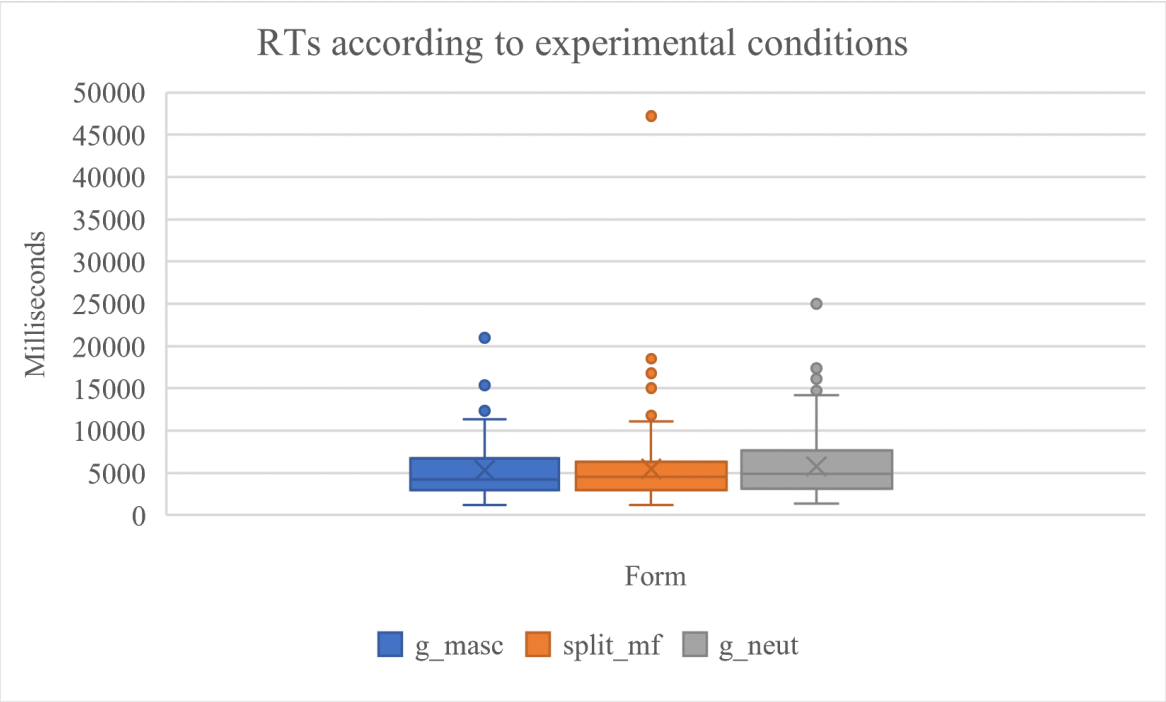

Figure 4. Mean reaction times (in ms) of picture selections grouped by form

Descriptive data about RTs were then tested by adopting linear modelling, using the *lm* function integrated with R. As for participants' answers, Form and Interest were set as the independent variables, $R^2 = 0.02354$. Based on the sample, the only independent variable that significantly influenced reaction times is the interest in gender-fair language (Table 2). This is evidenced by a statistically significant decrease in reaction times at both moderate ($p < 0.01$) and high ($p < 0.001$) levels of interest, aligning with the predictions outlined in Hypothesis 3. In contrast, alterations in the encoding of grammatical gender have failed to produce any notable impact on RTs, thus not confirming Hypothesis 4.

Table 2. Summary of the linear model parameter estimates on the dependent variable RTs

Predictors	**Estimate**	**Std. Error**	**z value**	**p-value**
Intercept	2.9562	1.0314	2.866	0.00441
Interest$_{_moderate}$	2.1994	1.0444	2.106	**0.03595**
Interest$_{_high}$	2.7175	1.0267	2.647	**0.00851**
Form$_{split_mf}$	0.1425	0.5513	0.258	0.79626
Form$_{g_neutral}$	0.4642	0.5513	0.842	0.40041

5.3 Further Analysis

Further analysis aimed at examining a potential effect, both on responses and RTs, of some sociodemographic variables, such as age, education level, and gender identity. Following the statistical models previously employed, sociodemographic variables did not exhibit any significant effect on the dependent variables. However, given that gender identity was the sole sociodemographic variable balanced within the sample, some observations arising from the descriptive analysis will be raised herein.

Concerning participants' answers (Figure 5), no statistically significant differences emerge between men and women with respect to the general tendency across the three conditions, as well as for the stimuli presented in the generic masculine form. In contrast, data concerning the two gender-fair conditions highlight different trends due to the gender of the participants. When presented split forms, women showed the highest percentage of Mixed-Gender Group responses overall (77%). Moreover, when encountering split-form stimuli, male participants were observed to select pictures representative of exclusively Female-Only Groups with a frequency double that of their female counterparts (32% versus 16%, respectively). Contrarily, within the gender-neutral condition, female participants demonstrated a propensity to choose FOG pictures with a frequency double that of male participants (32% compared to 14%). Furthermore, comprehensive statistical analysis conducted on the entire sample revealed a significantly reduced probability of selecting inclusive pictures under the gender-neutral condition (see 5.1). This trend is accentuated when examining the responses of female participants exclusively, who exhibit the lowest percentage of MGG responses (46%).

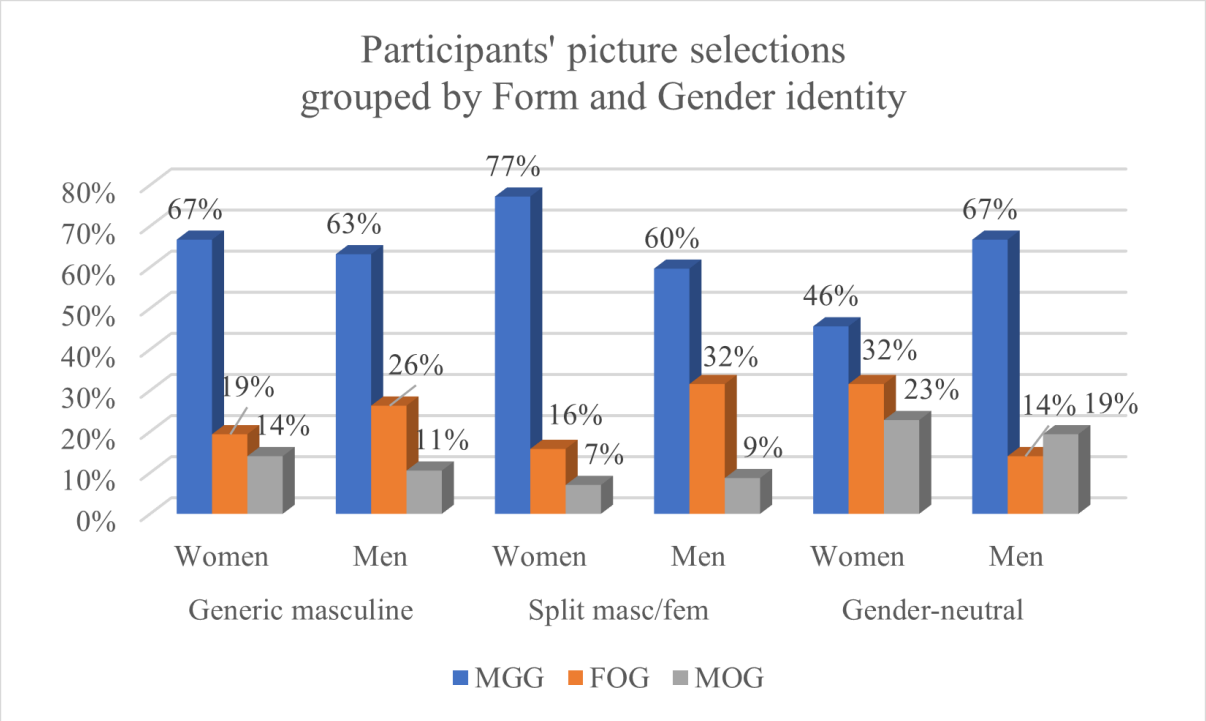

Figure 5. Percentage of picture selections grouped by form ('MGG' mixed-gender group, 'FOG' female-only group, 'MOG' male-only group) and participants' gender identity

Turning to the influence of participants' gender identity on RTs on average, female participants exhibited marginally shorter reaction times across all experimental conditions (5,357 ms versus 5,699 ms for male participants) with no significant difference. This discrepancy was particularly pronounced within the context of the split forms, where the average reaction time for women was 4,952 ms in contrast to 5,985 ms for men.

Although the descriptive analysis showed the above-mentioned interesting differences, after integrating gender identity as a predictor in the two separate models, no significant effect was observed on Answers and RTs.

6. Discussion

The objective of this article was to mirror the findings for different gender-marked languages concerning the specific masculine interpretation (male bias) of masculine grammatical gender intended as generic. It further aimed to assess whether this bias could be mitigated or eradicated through the employment of atypical gender encoding strategies in the Italian language.

However, the findings from the current experiment showed a great countertrend to the reference psycholinguistic literature. Indeed, the generic interpretation was largely preferred regardless of experimental conditions, and the employment of the generic masculine form (*Alcuni*$_{MAS}$ *cantanti*) failed to elicit a specific masculine representation. More surprisingly, a significant probability of rejecting the generic interpretation in favour of the masculine one emerged in the gender-neutral condition (*Un gruppo di cantanti*).

Looking instead at the elements of continuity with related studies, it is evident that this experiment underscores a notable disparity in the cognitive processing between feminisation and neutralisation strategies (Irmen and Roßberg, 2004; Tibblin et al., 2023b). Indeed, the overt encoding of both masculine and feminine markers in coordinated forms (*Alcuni*$_{MAS}$*/Alcune*$_{FEM}$ *contabili*) enhanced the generic interpretation of role nouns over those formulations where the encoding of the referents' gender remained ambiguous (*un gruppo di contabili*$_{COM}$).

Given this countertrend, it becomes crucial to explore the underlying factors that possibly led participants to report a low sensitivity to the manipulation of linguistic forms and a significantly higher probability of interpreting gender-neutral forms as masculine-specific.

First of all, it is necessary to interpret these findings in light of the composition of the sample: the cohort under investigation predominantly comprised younger individuals (M = 29 years old), with a considerable proportion having attained higher education (74% had pursued University education, amongst whom 40% were holders of a Master's degree). Additionally, a notable affinity for the subject of gender-fair language was evident, with 55% of participants identifying as significantly aligned with the topic; a mere 5% expressed disinterest or lack of awareness. Moreover, the recruitment process was partially informed by enlisting individuals who had engaged in a preceding study concerning gender-fair strategies the year prior. Given these conditions, despite instructions for participants to provide instinctive responses, it cannot be discounted that they may have adopted a response strategy, leading them to opt for

generic interpretations independently of the experimental conditions. This inclination could stem from a confirmation bias, predicated on the presumption that the current study paralleled that previous one, or a social desirability bias, wherein the participants' profound engagement with the topic might have compelled them towards more inclusive responses, diverging from their natural inclinations.

Gabriel et al. (2018, p. 853) articulate that "gender-fair language might require actively inhibiting the use of the masculine form only, requiring speakers to reflect upon or monitor their language use, thus detecting when a linguistic device (e.g., the masculine form) may be inappropriate in the semantic context". The act of monitoring for the most appropriate answer was also mirrored in the significantly protracted RTs observed amongst participants deeply invested in gender-fair language. Furthermore, the absence of a temporal constraint on responses enabled some participants to deliberate for extended RTs, up to 20 or even 50 seconds, before submitting their answers, indicating a considerable level of reflection.

Turning to the employed methodology, the experiment faced some limitations, including the use of mixed semiotic elements (textual, auditory, visual) in the comprehension task, which may have compromised result accuracy. Moreover, the stimuli lacked prior validation for equal accessibility and familiarity (Tibblin *et al.*, 2023a, p. 27), and perceptions of gender-neutrality might have evolved since Misersky et al.'s norming study. (2014).

Critically, the between-subjects design proved challenging, limiting each condition to a few items and potentially affecting mental representations due to the exposition to varied gender encoding types. According to the *competition-based hypothesis* proposed by Gygax and Gabriel (2008, p. 144), readers were more inclined towards a male-biased interpretation of masculine generics when the text also included feminine-inflected forms, as opposed to when the text exclusively contained masculine generics. In this instance, the hypothesis might apply to gender-neutral forms; namely, since participants were also exposed to the double-gendered split forms, they may have encountered greater difficulty in interpreting as generic those forms where the gender remained ambiguous.

The linguistic interest lies in understanding why such difficulties with ambiguous stimuli often led to masculine interpretations. One reason could be that masculine functions as the default gender in Italian morphology (Thornton, 2003), so it is likely that readers recall masculine gender when facing ambiguous linguistic cues. Furthermore, despite the gender ambiguity of target nouns, they were always introduced by the quantifier "a group of", which, by convention, adopts a masculine form in Italian. This raises critical questions regarding the ease with which nouns of common gender may be interpreted as generic in the presence of determiners that are explicitly gendered. In the Italian language, a significant majority of phonologically transparent nouns, and most agreeing adjectives, assume a masculine form ending in *-o* in the singular and *-i* in the plural (e.g., *maestr-*o_{SING}*/maestr-*i_{PL}) (Bates et al., 1996, p. 993; Thornton, 2022, p. 19). Consequently, even when the plural ending *-i* applies to phonologically opaque nouns (e.g., *docent-*e_{SING}*/docent-*i_{PL}) the lack of clear gender markers may prompt participants to lean towards masculine interpretations, influenced by these phonological patterns (e.g., the *-o* in *grupp-o*, and the *-i* in target nouns).

In light of these considerations and the Thinking for speaking hypothesis (Slobin, 2003), it remains to be clarified, through methodological refinement, whether in a language like Italian, where grammatical gender is explicitly marked on the vast majority of nouns and their related elements, the use of *functionally ambiguous words* (Cacciari et al., 1997) constitutes an effective gender-fair strategy. Additionally, it is worth investigating whether the mandatory and highly frequent exposure to grammatical gender in the language inevitably prompts participants to attend gender specification, therefore activating one of the two binary genders, even when faced with an ambiguous stimulus.

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Notes

Note 1. This paper adopts the formal marking *fem* for feminine, *mas* for masculine, and *com* for common gender nouns, as in Corbett (2014).

Note 2. The term *motion* is an adaptation from the German *Movierung*, used to refer to all word-forming processes used to derive nouns designating human or animate beings of a certain gender from the noun designating a being of the same species or function but of the opposite sex (Thornton, 2004). Gender motion in Italian can also show the opposite direction, from feminine to masculine. Still, attested cases are rare and the phenomenon is not as productive as the motion from masculine to feminine.

Note 3. There is a restricted group of feminine nouns of the epicene class possessing generic meaning (e.g., *persona*$_{FEM}$, person; *vittima*$_{FEM}$, victim). Those nouns select the feminine target of agreement regardless of the gender of the referent.

Note 4. This kind of clashing mixed-gender agreement between generic masculine controllers and feminine target elements are fairly accepted by several grammatical gender languages.

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