GENDER ASSIGNMENT AND AGREEMENT IN THE ORAL PRODUCTION OF HERITAGE SPEAKERS OF ITALIAN LIVING IN GERMANY

GRAZIA DI PISA   THEODOROS MARINIS

ABSTRACT: This paper explores mastery of grammatical gender in adult heritage speakers (HSs) of Italian by investigating how noun gender and noun morphology affect gender assignment and agreement. Fifty-four Italian HSs and forty Italian controls completed an Elicited Production Task (EPT) measuring assignment and agreement in the production of sentences and a Gender Assignment Task (GAT) measuring assignment at the word level. In both tasks, gender (masculine vs. feminine) and noun morphology (opaque vs. transparent) were manipulated in order to examine HSs' potential overreliance on the default gender (masculine) and whether transparency would affect assignment and agreement. HSs performed almost at ceiling in both tasks, with higher performance in agreement (syntactic level) compared to assignment (lexical level). HSs performed better with masculine compared to feminine nouns, supporting masculine as a default gender strategy. In the EPT, we found a difference between assignment and agreement only for opaque nouns, suggesting greater difficulty in gender assignment with opaque nouns. Finally, both assignment and agreement were modulated by proficiency while Heritage Language (HL) use in the home was a significant predictor only for assignment, suggesting that consistent use of the HL in the home is beneficial for maintaining lexical gender knowledge.

KEYWORDS: heritage speakers, Italian, gender, production, default gender.

1. INTRODUCTION[1]

Heritage speakers (hereafter HSs) are bilinguals who grew up speaking a language other than the dominant language of the society in which they live (see e.g., Montrul 2008; Rothman 2009). In their childhood, they usually learn the heritage language (hereafter HL) from their parents in a home environment. However, at a certain point in childhood, typically coinciding with when they start to go to school, the amount of input and use of their HL decreases, while

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there is an increase in exposure to the societal or majority language (here-after ML). Different grammar domains have been investigated (for a review, see Polinsky 2018) and results have shown that HSs are a very heterogeneous group presenting a lot of variability in terms of HL proficiency and outcomes. In an attempt to explain why this variability occurs, different theoretical accounts have been put forward. Some posit that this variability in adult HSs is due to incomplete acquisition (Montrul 2008, 2016) or attrition (Polinsky 2006, 2011) as a consequence of reduced HL input and use during childhood. Alternative proposals have been advanced (Pires & Rothman 2009; Kupisch & Rothman 2018) suggesting that other possible factors could contribute to this variability, such as differences in the quality of the input and lack of formal education in the HL.

One domain that is particularly affected in HSs is morphosyntax. Various studies have investigated grammatical gender (hereafter gender) in different HLs in production and comprehension, with some showing that it is a vulnerable domain (i.e., Montrul *et al.* 2008; Polinsky 2008), whereas others showed that it is a robust domain in adult HSs (Alarcón 2011; Bianchi 2013;Fuchs 2019, Fuchs 2021; Irizarri van Suchtelen 2016; Kupisch *et al.* 2013; Van Osch *et al.* 2014). Gender is an inherent property of the noun reflected in agreement with other elements of a sentence (i.e., articles, determiners and adjectives). It is also considered one of the most complex grammatical categories (Corbett 1991) as well as one of the most interesting ones because it provides a window on both lexical access and syntactic processing (Carroll 1989; Corbett 1991). The acquisition of gender in gendered languages could be considered as a two-step process. First, we need to acquire gender at the lexical level by learning the meaning of the noun with its gender feature (*gender assignment*) and store it in our lexicon; then, at the syntactic level, we need to establish correct agreement between the noun and the other constituents in the sentence (*gender agreement*). In many languages, gender assignment and agreement are acquired by monolingual children around age 2-3. Some sources suggest that in Italian monolingual children, gender is acquired even earlier than that, with almost adult-like performance at age 3 (Cipriani *et al.* 1993; Eichler *et al.* 2013; Pizzuto & Caselli 1992). Regarding HSs, existing research has attested that they have a tendency to deviate more from monolinguals in their performance on gender assignment than on gender agreement (i.e., Bianchi 2013; Kupisch *et al.* 2013; Stöhr *et al.* 2012). What is still unclear, is what factors affect HSs' performance in gender assignment and agreement. The present paper addresses this question based on production data from adult Italian HSs.

The goals of the study are to: (i) contribute to the ongoing debate on whether HSs can achieve monolingual-like attainment in gender assignment

and agreement; (ii) assess HSs' performance on gender assignment vs. gender agreement; (iii) examine the effect of noun gender and possible reliance on "default" gender (masculine in Italian); (iv) assess the role of noun ending transparency on assignment and agreement; (vi) investigate the role of proficiency (in terms of lexical knowledge) in the HL and extra-linguistic factors (i.e., age, age of onset of bilingualism (AoO), quantity and quality of input, education) on HSs' performance on gender.

2. BACKGROUND

2.1 Gender assignment and agreement in Italian

Italian has two genders: masculine and feminine. Gender assignment is transparent and follows both semantic and morpho-phonological rules (Chini 1995). The gender classification of nouns is arbitrary, although, for animate nouns, the biological gender rule applies, reflecting the gender of the referent (*amica*-F 'friend'; *amico*-M 'friend'). Furthermore, certain semantic classes are associated with one particular gender, for example, names of fruit are typically feminine ending with *-a* (*ciliegia*-F 'cherry') and those of trees are generally masculine ending with *-o* (*ciliegio*-M 'cherry tree'). The Italian nominal categorization system follows some formal regularities related to the distribution of noun endings. Most masculine nouns end with the vowel *-o* (*libro*-M 'book') and most feminine nouns end with the vowel *-a* (*sedia*-F 'chair') (Schwarze 2009). Nouns belonging to these classes are the most frequent ones and occur in the Italian lexicon with a frequency of 71.5% (Chini 1995). There are exceptions, such as nouns ending in *-a* which are masculine (*pianeta*-M 'planet'), and nouns ending in *-o* which are feminine (*mano*-F 'hand'). In addition, there is a large class of nouns ending with the vowel *-e* whose gender is ambiguous (Schwarze 2009). In these less frequent nouns, gender is not clearly marked and it could be either masculine (*fiume*-M 'river') or feminine (*mente*-F 'mind'). Nevertheless, some derivational suffixes can help to determine the gender of the noun, since they regularly co-occur with one of the two genders (see Table 1). For example, words ending in *-trice* (*lavatrice*-F 'washing-machine') are feminine, whereas nouns ending in *-one* (*maglione*-M 'jumper') are masculine (Chini 1998). In general, the gender of most Italian nouns could be easily predicted by the article that precedes that noun because it is obligatorily marked for gender and number, and by formal cues, even though there are exceptions.

Considering that nouns with canonical *-o/-a* endings are the most frequent ones in Italian and the most transparent in terms of gender, their acquisition

SUFFIX	ASSOCIATED GENDER	EXAMPLES
-ore	masculine	*colore* 'colour'
-one	masculine	*maglione* 'jumper'
-ente	masculine	*incidente* 'car crash'
-iere	masculine	*cavaliere* 'knight'
-ione	masculine	*stazione* 'station'
-trice	feminine	*lavatrice* 'washing machine'
-udine	feminine	*abitudine* 'habit'

TABLE 1: DERIVATIONAL SUFFIXES AND ASSOCIATED GENDER IN ITALIAN (ADAPTED FROM CHINI 1998).

should not be problematic for learners. In contrast, learners may have difficulties in assigning gender to words with non-canonical *-e* endings. This has been observed in previous studies in monolingual acquisition (Chini 1995), child bilingual acquisition (Cantone 1999), and adult second language acquisition (Chini 1998; Oliphant 1998). In Italian, masculine is considered the default or unmarked gender (D'Achille 2003), while feminine is considered marked, indicating a specific feature value (Corbett & Fraser 1999). Marked forms are considered more complex and less frequent than unmarked ones, thus their processing is also more disruptive. With regard to agreement in Italian, gender (and number) is marked on other constituents inside the nominal domain, e.g., determiners and adjectives, as well as on predicative adjectives and pronouns outside the nominal domain. The present study focuses on the mastery of gender agreement on attributive adjectives, as illustrated in 1(a) for feminine nouns and in 1(b-c) for masculine nouns.

(1)   a.   *L-a   mel-a   ross-a*
           The-F apple-F red-F

           'The red apple'

      b.   *Il   tavol-o ross-o*
           The-M table-M red-M

           'The red table'

      c.   *Il   pesc-e ross-o*
           The-M fish-M red-M

           'The red fish'

As shown in 1(a), the feminine determiner *la*-F 'the' and the adjective *rossa*-F 'red' both agree in gender with the feminine noun *mela*-F 'apple'. The fact that the determiner and the adjective in 1(a) agree with the feminine noun *mela* is seen clearly in its ending in *-a*, usually associated with feminine gender in Italian. The agreement mechanism is identical for the masculine noun in 1(b). As illustrated in 1(c), the noun *pesce* 'fish' has no overt morpheme to

mark the masculine gender as in *tavolo*-M 'table', however, the masculine determiner *il*-M 'the' unambiguously conveys information about the noun's gender and, thus, the agreement for the adjective *rosso*-M 'red' is masculine.

2.2 Gender assignment and agreement in German

Unlike Italian, German employs a three-gender system: masculine, feminine, and neuter D (Durrell 2013). With respect to gender assignment and in contrast to Italian, there is no reliable regular correspondence between the form of nouns and their gender. Gender assignment in German follows a complex interplay of semantic, morphological and phonological rules that makes the German assignment system less transparent compared to the Italian one (Köpcke 1982; Kupisch *et al.* 2021).

As for agreement, the German system is less regular/predictable than the Italian one, however, similar to Italian, gender is marked on determiners and adjectives occurring within the same determiner phrase (DP). Nevertheless, the gender of determiners and adjectives can sometimes be ambiguous because agreement also depends on the definiteness of the article (definite vs. indefinite), case (nominative, accusative, dative, genitive) and number (singular vs. plural) (Kunkel-Razum *et al.* 2009). Therefore, the surface realization of German agreement for gender is complex.

2.3 Gender acquisition in L1 speakers and heritage speakers

Studies in L1 acquisition have revealed that monolingual children acquire gender easily and early in life, usually by the age of 2-3 (e.g., for Italian: Belletti & Guasti; Chini 1995; Cipriani *et al.* 1993; Leonard *et al.* 2002; Pizzuto & Caselli 1992; for German: Mills; Müller; Szagun *et al.* 2007; and see also: Eichler *et al.* 2013.). In contrast, research in L2 acquisition indicates that gender is problematic and is acquired relatively late. Several studies have shown persistent errors with gender assignment and agreement in L2 learners of different languages (e.g., Italian: Oliphant 1998; German: Rogers 1987; French: Dewaele & Véronique 2001); Spanish: Montrul *et al.* 2008; Dutch: Sabourin *et al.* 2006; Russian: Taraban & Kempe 1999). Moreover, previous studies on gender markedness have shown that native speakers and L2 learners overuse defaults or unmarked forms (McCarthy 2008; Vigliocco & Franck 1999, Vigliocco & Franck 2001; however, see Alemán Bañón & Rothman 2016; Alemán Bañón *et al.* 2017).

Relevant findings on the acquisition of gender in heritage Romance languages have shown that HSs have a tendency to overuse the default gender value (masculine) and overgeneralize the masculine forms of determiners and

modifiers (i.e., Montrul *et al.* 2008; however, see Fuchs 2019, 2021). For example, previous studies on heritage Italian and Spanish have revealed that HSs made more agreement errors with feminine nouns compared to masculine ones (e.g., for Italian: Bianchi 2013; for Spanish: Irizarri van Suchtelen 2016; Van Osch *et al.* 2014). Furthermore, studies of noun morphology have revealed an effect of noun endings on gender agreement: HSs are more accurate with endings of canonical nouns than with non-canonical or exceptional nouns (e.g., for Italian: Bianchi 2013; for Spanish: Alarcón 2011; Hur *et al.* 2020; Montrul *et al.* 2008, Montrul *et al.* 2013, 2014). These results suggest that factors such as morphological markedness and degree of transparency of the HL might play a role in gender acquisition. Finally, previous studies have found that gender assignment is more problematic for HSs than gender agreement, suggesting that difficulties primarily affect the lexical aspect of gender (i.e., Bianchi 2013; Goebel-Mahrle & Shin 2020; Kupisch *et al.* 2013; Montrul *et al.* 2008, 2013, Montrul *et al.* 2014; Stöhr *et al*. 2012).

3. RESEARCH QUESTIONS AND HYPOTHESIS

The goal of the present study was to examine gender assignment and gender agreement in Italian HSs by investigating the effects of noun gender (masculine vs. feminine) and noun ending morphology (transparent vs. opaque). Towards that aim, we addressed gender assignment by investigating concord between the article and the noun and gender agreement by investigating concord between the noun and the adjective. In doing so, we were able to separate the lexical level (gender assignment) from the syntactic level (gender agreement). Our research questions were as follows:
1. Are there differences in the production of gender marking between HSs of Italian living in Germany and L1 Italian speakers living in Italy, and if so, do these differences occur in both gender assignment and agreement?
2. How do noun gender and noun ending morphology affect HSs' accuracy on gender assignment and agreement?
3. Are gender assignment and agreement affected by proficiency in terms of lexical knowledge and/or extra-linguistic factors (i.e., age, AoO, quantity and quality of input, education)?

 The specific hypotheses guiding this study are the following:
1. Considering previous studies showing that gender assignment presents more difficulties for HSs than gender agreement (i.e., Alarcón 2011; Bianchi 2013; Kupisch *et al.* 2013; Montrul *et al.* 2008; Stöhr *et al.* 2012), we expect the heritage group to differ from Italian controls in their performance on gender assignment but not on gender agreement.

2. There should be a higher probability of correct gender assignment and agreement with:
    (a) masculine rather than feminine nouns;
    (b) transparent rather than opaque nouns.

3. Each of the two hypotheses in (2) should be affected by HL proficiency as well as HL use.

4. METHODS

4.1 Participants

Two groups of participants were recruited in this study: HSs of Italian living in Germany and Italian native speakers living in Italy. Fifty-five HSs were initially recruited, but one participant was excluded because she was exposed to three languages from birth. As a result, 54 adult Italian-German HSs (35 females; *M age* = 28.15; *SD* = 6.20; *range* = 18-41) participated in the study. All HSs grew up in Germany with two or one Italian-speaking parents and Italian was reported as the minority language while German as the majority societal language. Six HSs were not born in Germany (5 were born in Italy and 1 was born in Argentina) but they moved to Germany between 1 and 5 years old (*M age* = 2.5; *SD* = 1.64). All other participants were born in Germany. Thirty-three HSs were exposed to Italian and German from birth, hence they were simultaneous bilinguals. Twenty-one HSs had their first intensive contact with German between 3 and 6 years when they started school in Germany, hence they were early successive bilinguals. They all completed their schooling in Germany and were living in Germany at the time of testing. In addition, we included a control group of 40 Italian adult native speakers living in Italy (29 females; *M age* = 25.65; *SD* = 3.99; *range* = 18-39). They were all born and living in Italy at the time of testing and they grew up monolingually in Italy.

In order to asses proficiency, participants completed an adapted version of the Italian placement test that was originally created by Meara and associates (Alderson 2005: 80) for the DIALANG test battery. The test consisted of 50 real words (full verbs) and 25 pseudo-words that required a Yes or No response. In our adaptation, the items appeared on the screen one at a time. Participants were instructed to press on their keyboard key F (Yes) if they thought the word existed or key J (No) if they did not. Scoring consisted of giving one point for each correctly identified real word and for each correctly rejected pseudo-word. Thus, the maximum possible score was 75. As shown in Figure 1, HSs had lower proficiency than native speakers of Italian living in Italy and their scores displayed a much larger degree of variation (*M* = 60.33; *SD* = 6.49;
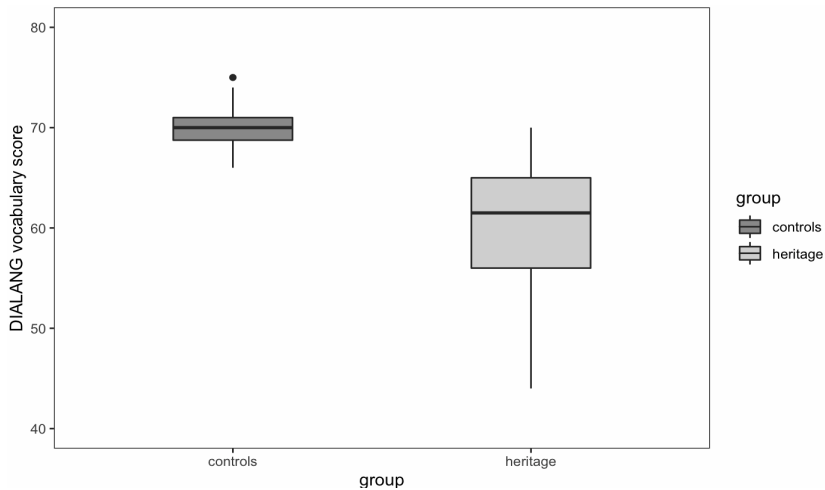
FIGURE 1: CONTROLS AND HERITAGE SCORES ON THE ITALIAN VOCABULARY TEST DIALANG (RAW SCORE).

range = 44-70) compared to the Italian controls (*M* = 69.90; *SD* = 2.28; *range* = 66-75).

To assess the effect of HL use on the production of gender in Italian, all participants completed a detailed language and social background questionnaire adapted from Lloyd-Smith *et al.* that was specifically designed for HSs to quantify aspects of Italian use across the lifespan. The questionnaire captured the quantity and quality of Italian input and use in the past and now, as well as age, AoO and education. In addition, all participants completed the Language and Social Background Questionnaire (LSBQ) (Anderson *et al.* 2018), which documents the rate of language exposure and use in different activities and environments. From the LSBQ, we used two factor scores: *HL use in the home* (possible range: -13.9 to 24.163) and *HL use in the society* (possible range: -7.5 to 80.304). For both factors, a higher score indicates more engagement in the HL (Italian) while a lower score indicates more use and exposure in the ML (German). We observed a mean score of 7.28 for *HL use in the home* (*SD* = 3.84; *range*: -0.21-14.92) and a mean score of 13.96 for *HL use in the society* (*SD* = 10.41; *range*: -1.69-47.97) indicating that the HSs in our study use their ML German more than their HL Italian in their daily life at home and in the society. These scores, in addition to other factors from the questionnaire (i.e, age, AoO, quantity and quality of Italian input, education), were used for further analyses in predicting accuracy in the production data.[2]

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[2] A table summarizing the indices obtained in the questionnaire is accessible on OSF through the

4.2 Tasks

Elicited Production Task

The Elicited Production Task (henceforth EPT) aimed to test the ability to produce correct assignment between article and noun as well as correct agreement between noun and adjective. Participants were shown pictures together with the beginning of a sentence and the noun and adjective (with no gender marking) they should use to complete the sentence (see examples in (2) for masculine nouns and in (3) for feminine nouns). The stimuli comprised of 48 sentences.[3] Noun gender was manipulated such that in half of the sentences (N = 24) the trigger noun was masculine and in the other half (N = 24) it was feminine.
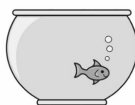
(2)   PROBE:

Marco ha comprato ___ pesce   ross__ .
Marco bought   ___ fish-M red-M.

'Marco bought ___ red fish.'

MARCO HA COMPRATO...

TARGET:

Marco ha_comprato il/un pesce   rosso.
Marco bought   the/a fish-M red-M.

'Marco bought the/a red fish.'

(3)   PROBE:

Laura ha usato ___ vernice opac__ .
Laura used   ___ paint-F matte-M.

'Laura ___ matte paint.'

[3] A complete list of all the target sentences is accessible on OSF through the following link: `https://mfr.osf.io/render?url=https%3A%2F%2Fosf.io%2Fjdfah%2Fdownload`.

LAURA HA USATO...   VERNICE   OPAC_

TARGET:

Laura ha_used l-a/un-a vernice opaca.
Laura used   the/a   paint-F matte-F.

'Laura used the/a matte paint.'

The task was presented by sharing the researcher's screen on Zoom using a PowerPoint presentation containing instructions, 2 practice items and then the experimental items. The task lasted 5 to 10 minutes. All words and images were presented on a white slide in 18-pt Arial font in black.

The participants' oral responses were untimed and transcribed by the researcher. Responses were coded for correct or incorrect gender marking on the article (gender assignment) and on the adjective (gender agreement) for each participant. Thus, there were two possible points for each item, one for assignment [correct match for determiner+noun] and one for agreement [correct match for noun+adjective]. In the analysis for agreement, those nouns that had incorrect assignment but correct agreement referring to the gender assigned to the noun were considered as correct. For example, if a participant assigned the masculine article *il*-M 'the' to the feminine noun *torre*-F 'tower', this was considered as an assignment error, however if the adjective concordant with the noun was masculine *antico*-M 'ancient', then this was considered as correct agreement.

All critical nouns were masculine and feminine nouns ending with –*e*, whose gender cannot be reliably determined based on the properties of the root. However, for nouns ending in -e specific derivational suffixes (see Table 1) could help to determine the gender of the noun. Thus, we manipulated and controlled for noun ending transparency: for both masculine and feminine gender, half of the trigger nouns (N = 12) were opaque, hence gender could not be recovered from surface form (e.g., *ponte*-M 'bridge'; *fonte*-F 'source'), while the other half consisted of trigger nouns ending with a derivational suffix (N=12) that provided a cue about gender, making them (relatively more) transparent (e.g., *maglione*-M 'jumper'; *lavatrice*-F 'washing-machine'). Since in the Italian gender system there is no neuter gender, nouns that had neuter gen-

der in German were not included. A log frequency count for all nouns was obtained from the CoLFIS corpus (Corpus e Lessico di Frequenza dell'Italiano Scritto, Bertinetto *et al.* 2005). The masculine nouns ($M = 1.56$; $SD = 0.64$) and feminine nouns ($M = 1.71$; $SD = 0.81$) were matched with respect to frequency, $t(48) = - .731$, p > .1.

Gender Assignment Task

To check whether HSs assigned target gender to the nouns used in the EPT using a meta-linguistic task, a Gender Assignment Task (henceforth GAT) was carried out that included all Italian nouns (N = 48) from the experimental sentences. For each of the trigger nouns, participants were asked to select the corresponding definite article (*il*-M 'the' or *la*-F 'the') accordingly if the noun presented on the screen was masculine or feminine by using the keys F (*il*) and J (*la*) on their keyboard. The nouns were presented one after the other in isolation on a white screen in 18-pt Arial font in black. At the end of the task, participants were asked to indicate whether they knew each word and its meaning.

4.3 Recruitment and procedure

All participants were recruited online. Prior to the experiment, participants provided informed consent and filled out the questionnaire. Participants then completed the proficiency test, the EPT and finally the GAT. We used Gorilla Experiment Builder (www.gorilla.sc) (Anwyl-Irvine *et al.* 2020) to create and host our experiment and Zoom for the EPT. Participants received a compensation for their participation. The study was approved by the research ethics committee of the University of Konstanz.

5. ANALYSIS

For the EPT, control participants were 100% correct. Therefore, the statistical analyses were done only on the heritage group. For both tasks, we only included trials comprising nouns for which the HSs knew the word and its meaning. As a result, 6% of the trials were excluded. Accuracy data in both tasks were analysed with mixed effects logistic regression. For the EPT, we fit a model including the following fixed factors: *task* (assignment vs. agreement), *gender* (masculine vs. feminine), and *ending* (opaque vs. transparent), as well as their *interactions* (pairwise, as well as the interaction of all three variables), with random intercept and slope for *gender* conditioned on *subject*. A model with an additional random intercept conditioned on *item* was

ASSIGNMENT (ARTICLE + NOUN)			AGREEMENT (NOUN + ADJECTIVE)		
GENDER	M(%)	SD	GENDER	M(%)	SD
feminine	94	0.24	feminine	95	0.22
masculine	95	0.21	masculine	98	0.12

TABLE 2: MEAN ACCURACY PERCENTAGES AND STANDARD DEVIATIONS FOR *Feminine* AND *Masculine* IN *Assignment* AND *Agreement* FOR THE HSs IN THE EPT.

attempted but failed to converge. Categorical variables (*task, gender* and *ending*) had two levels each and default treatment contrasts with one reference level set as 0 and the other set as 1 were used. Similar linear mixed effects models that included *proficiency* (score from the vocabulary test) and extra-linguistic factors (age of the HSs at time of participation, AoO, HL use in the home, HL use in the society, level of education, self-rated proficiency, language use before 6 years old, language use after 6 years old, HL use in the past, HL use in the present, quality of HL use, quantity of HL use) as predictors were fit to the heritage group data. For the GAT, we fitted similar linear mixed effects models that also included *group* (controls vs. heritage) as fixed factor. Bottom-up stepwise model comparison based on the Akaike Information Criterion (Akaike 1974: 716-723) was used to check whether adding different predictor variables (with and without interactions and random slopes) improved the predictive power of the models.[4] All analyses were conducted using the *lme4* package (Bates *et al.* 2020) in R (R Core Team 2016), and figures were produced using the package *ggplot2* (Wickham 2016). *p*-values were obtained using Satterthwaite's approximation for degrees of freedom with the *lmerTest* package for R (Kuznetsova *et al.* 2017: 1-26). We only report significant effects and interactions.

6. RESULTS

6.1 EPT

The Italian control group performed 100% accurately with respect to gender assignment and agreement in the EPT, hence in the analysis we only focused on the HSs. As illustrated in Figure 2, overall accuracy was very high for both feminine and masculine nouns. However, for masculine nouns performance was better in agreement compared to assignment (see Table 2 for detailed mean accuracy percentages and standard deviations).

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[4] All models' specifications and output summaries are accessible on OSF through the following link: https://mfr.osf.io/render?url=https%3A%2F%2Fosf.io%2Fb6sk7%2Fdownload.
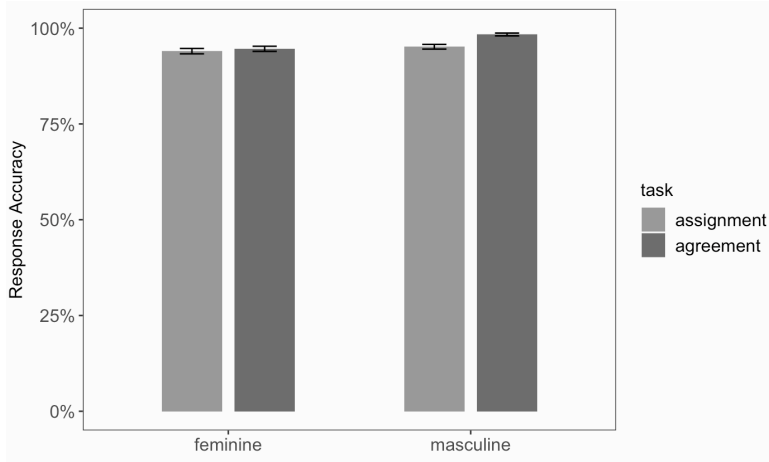
FIGURE 2: OVERALL ACCURACY (PERCENTAGE) FOR *Feminine* AND *Masculine* IN
Assignment AND *Agreement* FOR THE HSS IN THE EPT. THE WHISKERS REPRESENT THE
STANDARD ERROR TO THE MEAN.

As shown in Figure 3, accuracy was also very high for both opaque nouns
(non-suffixal *-e*) and transparent nouns (suffixal *-e* ending). HSs were more
accurate in assignment with transparent nouns (95%) compared to opaque ones
(94%), while in agreement they were more accurate with opaque nouns (97%)
compared to transparent ones (96%) (see Table 3 for detailed mean accuracy
percentages and standard deviations).

ASSIGNMENT (ARTICLE + NOUN)			AGREEMENT (NOUN + ADJECTIVE)		
ENDING	M(%)	SD	ENDING	M(%)	SD
opaque	94	0.24	opaque	97	0.17
transparent	95	0.21	transparent	96	0.20

TABLE 3: MEAN ACCURACY PERCENTAGES AND STANDARD DEVIATIONS FOR NOUNS
WITH *Opaque* AND *Transparent* ENDING IN *Assignment* AND *Agreement* FOR THE HSS IN
THE EPT.

The model found a main effect of *task* [agreement] (β = 0.69, *SE* = 0.28, *z*
= 2.443, *p*< .05), *gender* [masculine] (β = 1.87, *SE* = 0.74, *z* = 2.509, *p*< .05),
and *proficiency* (β = 1.02, *SE* = 0.20, *z* = 4.881, *p*< .001), as well as an interac-
tion between *task* [agreement] and *ending* [transparent] (β = -1.15, *SE* = 0.40,
z = -2.830, *p*< .01). Thus, HSs were more accurate in gender agreement com-
pared to assignment, as well as more accurate with masculine nouns compared
to feminine ones. In addition, proficiency played a role at the lexical as well
as syntactic level. Finally, the significant interaction between *task* and *ending*
suggest that gender assignment is more problematic with opaque nouns.
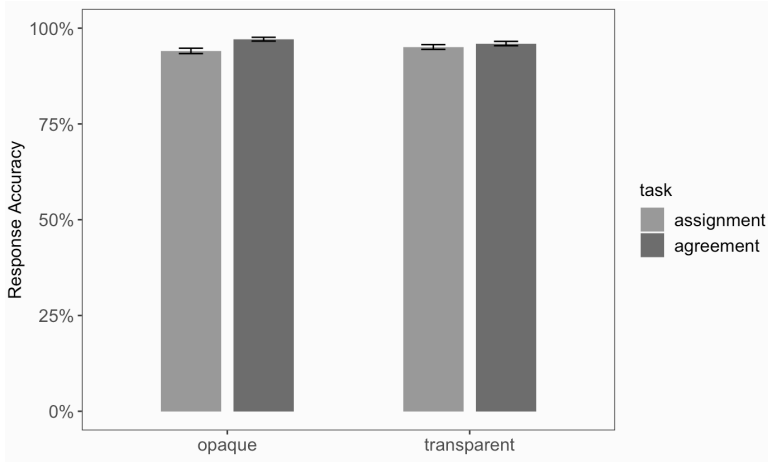
FIGURE 3: OVERALL ACCURACY (PERCENTAGE) FOR NOUNS WITH *Opaque* AND
Transparent ENDING IN *Assignment* AND *Agreement* FOR THE HSS IN THE EPT. THE
WHISKERS REPRESENT THE STANDARD ERROR TO THE MEAN.

To further explore these results, we fitted a model for each task. For assignment, we found main effects of *gender* [masculine] ($\beta = 1.97$, $SE = 0.92$, $z = 2.145$, $p < .05$), *proficiency* ($\beta = 1.51$, $SE = 0.30$, $z = 4.966$, $p < .001$) and *HL use in the home* ($\beta = 0.68$, $SE = 0.28$, $z = 2.433$, $p < .05$). For agreement, we found main effects of *gender* [masculine] ($\beta = 2.73$, $SE = 1.20$, $z = 2.266$, $p < .05$) and *proficiency* ($\beta = 0.97$, $SE = 0.35$, $z = 2.777$, $p < .01$). Thus, for both assignment and agreement, HSs were more accurate with masculine nouns compared to the feminine ones, and proficiency played a role at both lexical and syntactic level. Moreover, we found an effect of *HL use in the home* only for assignment, thus at the lexical level, suggesting that the more use of the HL at the home is reflected in more accuracy in assigning the correct gender in the DP.

6.2 GAT

As illustrated in Figure 4, overall accuracy was very high in both controls and HSs, showing that participants did not have difficulties with assigning the right gender to the nouns used in the task. Both groups were at ceiling in most of the conditions;[5] only for nouns in the condition *Feminine opaque*, HSs mean accuracy score was 89% (see Table 4).

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[5] The controls did not have 100% accuracy. We believe this is related to the nature of the task (fast paced, testing words in isolation) that may have led to performance error.
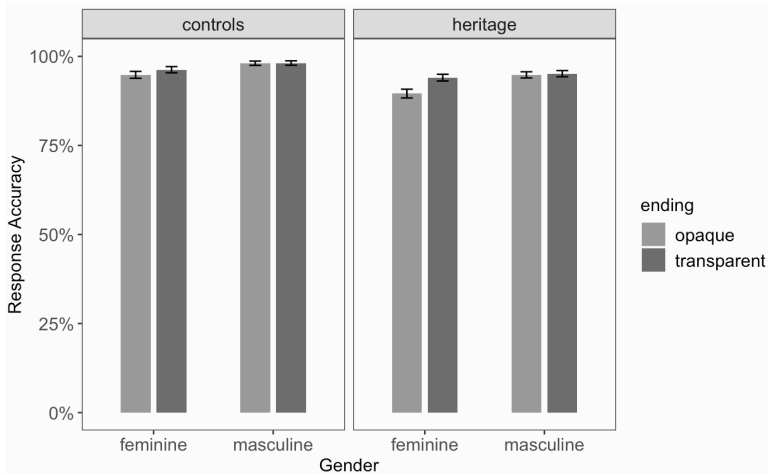
FIGURE 4: OVERALL ACCURACY (PERCENTAGE) FOR *Feminine* AND *Masculine* NOUNS
WITH AN *Opaque* AND *Transparent* ENDING PER GROUP IN THE GAT. THE WHISKERS
REPRESENT THE STANDARD ERROR TO THE MEAN.

GROUP	GENDER	ENDING	M(%)	SC
heritage	feminine	opaque	89	0.30
		transparent	94	0.24
	masculine	opaque	94	0.22
		transparent	95	0.21
controls	feminine	opaque	94	0.22
		transparent	96	0.19
	masculine	opaque	98	0.14
		transparent	98	0.13

TABLE 4: MEAN ACCURACY PERCENTAGES AND STANDARD DEVIATIONS IN THE GAT
FOR BOTH GROUPS.

The model comparing groups found a main effect of *gender* [masculine]
(β = 2.53, *SE* = 1.18, *z* = 2.137, *p* < .01) and *proficiency* (β = 1.74, *SE* = 0.72,
z = 2.425, *p* < .01) but no interactions. These results indicate no difference
between HSs and Italian controls in assigning gender to trigger nouns.

In order to understand whether accuracy in gender assignment in HSs
varies depending on some extra-linguistic factors, we fitted a model with the
following factors as predictors: age, AoO, HL use in the home, HL use in the
society, education, self-rated proficiency, language use before 6 years old, lan-
guage use after 6 years old, HL use in the past, HL use in the present, quality
of HL use, quantity of HL use. The model revealed only a main effect of *gen-
der* [masculine] (β = 2.24, *SE* = 0.73, *z* = 3.057, *p* < .01) and *proficiency* (β =
0.73, *SE* = 0.20, *z* = 3.611, *p* < .001). Similar to the results in the production

task, HSs were more accurate with masculine compared to feminine nouns and proficiency played a role at the lexical level.

7. DISCUSSION

We have investigated mastery of gender in both assignment and agreement in a group of HSs of Italian living in Germany compared to a group of Italian native speakers living in Italy. Participants completed a language and social background questionnaire, a vocabulary test, an EPT and a GAT.

Our first question was whether there were differences in the production of gender marking between the two groups, and if so, whether these occur in both gender assignment and agreement. Although in the EPT the HSs did not perform at 100% like the controls, their performance was almost at ceiling (94% to 98% correct depending on the condition) and they were significantly better in gender agreement compared to assignment. This is in line with our predictions based on previous studies on adult HSs reporting similar results (i.e., Bianchi 2013; Goebel-Mahrle & Shin 2020; Kupisch *et al.* 2013; Montrul *et al.* 2008, 2013, 2014; Stöhr *et al.* 2012). This leads us to conclude that morpho-syntax in HSs is not vulnerable to incomplete acquisition or attrition. The fact that HSs learn grammatical gender early, in a naturalistic setting, much like monolingual children (Belletti & Guasti 2015), suggests that gender agreement is a stable and robust property that does not undergo attrition in adult HSs. Our results showed that gender assignment is instead more vulnerable in HL acquisition, hence HSs have acquired the agreement rules, but have some difficulties with lexical gender knowledge of the nouns. This was confirmed in the GAT that tapped into the participants' meta-linguistic abilities for gender assignment. HSs overall accuracy was very high (above 90%) pointing more towards quantitative rather than qualitative differences between the groups.

Our second question regarded how noun gender (masculine vs. feminine) and noun ending (opaque vs. transparent) affect HSs' accuracy on gender assignment and agreement. Regarding noun gender, our results showed that HSs were more successful in masculine compared to feminine nouns in both gender assignment (both in the GAT and the EPT) and agreement. HSs of Italian showed more difficulties in assigning the correct gender, however, this was overcome by choosing the default masculine gender. This could be explained in terms of morphological markedness because masculine is regarded as the default gender in Italian, while feminine is regarded as marked (D'Achille 2003). Previous research on Romance languages has revealed that native speakers as well as L2 learners overuse masculine as the unmarked form (for Spanish: Mc-

Carthy 2008; for Italian and French: Vigliocco & Franck 1999, 2001; however, for Spanish, see Alemán Bañón & Rothman 2016 and Alemán Bañón et al. 2017). It is still unclear how markedness affects heritage grammar systems because there are no relevant data yet systematically manipulating markedness in HSs, although some previous studies have shown that HSs are more accurate with masculine compared to feminine nouns (i.e., Alarcón 2011; Bianchi 2013; Goebel-Mahrle & Shin 2020; Irizarri van Suchtelen 2016; Montrul et al. 2008; Van Osch et al. 2014). Our study adds to the current literature on heritage language bilingualism showing that HSs tend to overuse masculine as default gender at least in heritage Romance languages. Regarding noun ending morphology, there was a difference between assignment and agreement for opaque nouns (94% vs. 97%), but not for transparent nouns (95% vs. 96%). In the EPT, we found a significant interaction between task and ending, suggesting that gender assignment is more difficult with opaque nouns. This is consistent with other studies that reported more difficulties with nouns presenting non-canonical gender marking in HSs (i.e., Alarcón 2011; Bianchi 2013; Hur et al. 2020; Irizarri van Suchtelen 2016; Montrul et al. 2008, 2013, 2014; Van Osch et al. 2014) as well as in L1 speakers (i.e., for Italian: Padovani & Cacciari 2003). Furthermore, it is worth mentioning that Italian noun morphology is characterized by a high degree of transparency reflected in the last vowel of the noun while other Romance languages, for example French, show a transparency effect restricted to only a few suffixes. This property of Italian makes the gender of a noun quite predictable and plays an important role both in learning Italian as a mother tongue (Caselli et al. 1993) as well as a second language (Chini 1995).

Our third question explored whether each instance of correct gender assignment and agreement could be explained in terms of proficiency and extra-linguistic factors such as age, AoO, quality and quantity of HL use, education, HL use in the home and in the society. Our results showed that both assignment and agreement were modulated by proficiency, thus the higher the score in the vocabulary test, the higher was the accuracy in assigning gender in the GAT and in the EPT as well as in using the correct concord between noun and adjective. Regarding extra-linguistic factors, we only found an effect of *HL use in the home* for assignment in the EPT but no correlation with proficiency. This suggests HL proficiency does not necessarily have to be related to current HL use in the home, especially at the lexical level and for a phenomenon like gender that is early acquired.[6] Consistent exposure and use of the HL in a home environment is beneficial for developing and maintaining lexical gender

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[6] Of course, it is also possible that the proficiency measure used was not sensitive enough.

knowledge of nouns, while gender agreement is not subject to differences in exposure and use of the HL.

8. CONCLUSION

The high accuracy in gender assignment and agreement found in this study suggests that the acquisition of gender in adult HSs does not suffer from reduced input during childhood and does not deteriorate with age. Our results are in line with previous studies reporting monolingual-like performance on gender for HSs (i.e., Alarcón 2011; Bianchi 2013; Fuchs 2019, 2021; Kupisch *et al.* 2013; Stöhr *et al.* 2012) contradicting the assumption of incomplete acquisition or attrition in the acquisition of gender in HSs (Montrul 2016; Polinsky 2011). We demonstrated that mastery of gender in HSs can be attained and retained in adulthood both at the lexical and syntactic level. Gender assignment and agreement in heritage Italian are modulated by noun gender and ending morphology as well as by proficiency in the HL. Furthermore, consistent exposure and use of the HL at home can be beneficial for the acquisition of lexical gender knowledge of nouns.

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Grazia Di Pisa
University of Konstanz, Department of Linguistics
Postfach 177 – 78457 Konstanz
Germany
e-mail: `grazia.di-pisa@uni-konstanz.de`

Theodoros Marinis
University of Konstanz, Department of Linguistics
Postfach 177 – 78457 Konstanz
Germany
e-mail: `t.marinis@uni-konstanz.de`