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We explored whether the grammatical gender of the native language (L1) affects the production of words in a second language (L2). Evidence from previous studies is contrasting. In the present investigation, Italian–Spanish bilinguals were instructed to name pictures in L2 (Experiments 1 and 2) or to translate words from L1 to L2 (Experiment 3), producing either the bare noun or the noun phrase (article + noun). Half of the nouns had the same gender in the two languages, while the other half had a different gender. In all experiments, responses were faster in the gender-congruent than in the gender-incongruent condition, irrespective of task (L2 picture naming or forward word translation) and syntactic type (bare noun and noun phrase). We propose that in the bilingual system, parallel to the semantic route, a direct lexical, nonsemantic route connects the languages and that the native language interacts at the level of grammatical gender with the lexical representations of the response language.

Keywords: Bilingualism; Grammatical gender; Second language picture naming; Word translation.

The aim of this study is to explore an issue that is probably one of the most neglected in the field of language production: the representation and processing of grammatical gender in the bilingual

mental lexicon. Most models agree that processing of the second language (L2) is influenced by the native language system (L1) previously acquired (Dijkstra, 2005; Kroll & Stewart, 1994).

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However, how different linguistic information interacts and what the influence is of grammatical gender during lexical selection in the bilingual system is still a matter of debate.

Studies on language production have demonstrated that the conceptual and formal properties of words interact in the bilinguals' language systems (Colomè, 2001; Costa & Caramazza, 1999; Costa, Caramazza, & Sebastián-Gallés, 2000; Hermans, Bongaerts, De Bot, & Schreuder, 1998; Macizo & Bajo, 2006; but see Costa, La Heij, & Navarrete, 2006, for a critical discussion). Evidence showing the semantic interference effect and the "cognates" facilitation effect in bilingual speakers supports the hypothesis of a coactivation of the two lexicons. For example, as reported by Costa, Miozzo, and Caramazza (1999), in a picture-word task Catalan-Spanish bilinguals name the picture of a violin slower when presented with a semantically related word in the language "other than" the language of production (like *drum*) than when presented with a semantically unrelated word (like *table*). On the contrary, in a L2 picture-naming task (Costa et al., 2000), they are faster in producing *violin* in Spanish (*violi* in Catalan) than in producing words with phonologically dissimilar translations like *apple* (*manzana* in Spanish, *poma* in Catalan). These effects suggest that the two language systems interact at the semantic and phonological levels. However, the interaction between L1 and L2 could depend on the level of representation (Kroll & Tokowicz, 2005). Furthermore, since both languages could have access to shared conceptual representations and phonological features, to derive hypotheses on the bilingual systems the processing of lexical and grammatical information is critical. In this study, we investigated whether the grammatical gender of the native language can affect L2 production in picture-naming and word translation tasks. Such an effect could provide important information regarding the way grammatical gender is represented within the lexical system and how the languages in the bilingual system interact.

In most prominent psycholinguistic models (Caramazza & Miozzo, 1997; Levelt, Roelofs, &

Meyer, 1999), grammatical gender is stored as a property of nouns at one representational level, which is different from those specifying the corresponding conceptual and phonological information. It has been postulated that the availability of gender information is an automatic consequence of the selection of one lexical-phonological node (Caramazza & Miozzo, 1997) or, alternatively, it results from a competitive process preceding the access of phonological forms (Cubelli, Lotto, Paolieri, Girelli, & Job, 2005; Levelt et al., 1999; Paolieri, Lotto, Leoncini, Cubelli, & Job, 2009). Additionally, it has been assumed that grammatical gender is selected only in producing noun phrases (Caramazza & Miozzo, 1997; Levelt et al., 1999) or, alternatively, even in bare noun production (Cubelli et al., 2005; Paolieri et al., 2009). According to the former hypothesis, grammatical gender is represented as a node linked to the lexical representation as well as to all nouns belonging to the same syntactic category, and it is selected only within a sentential context ("syntactic" hypothesis); therefore, gender effects cannot be observed when a noun is produced in isolation. On the contrary, according to the latter hypothesis, and from what is implied by the linguistic theories (for a discussion, see Cacciari & Cubelli, 2003), grammatical gender is an intrinsic part of the lexical representation, and it is always available when a noun is retrieved ("lexical" hypothesis); therefore, gender effects should emerge in all tasks requiring lexical access.

Current models of bilingual language processing assume that a shared semantic system activates the words of the two languages in parallel (Costa et al., 1999; Green, 1998; Hermans et al., 1998; Kroll & Stewart, 1994; La Heij, Hooglander, Kerling, & van der Velden, 1996; Potter, So, von Eckhardt, & Feldman, 1984; but see van Hell & de Groot, 1998). Regarding the structure of the bilingual gender systems, three different hypotheses can be considered. First, one can assume complete autonomy (gender segregated view) of the gender systems of the two languages (Costa, Kovacic, Franck, & Caramazza, 2003); hence in lexical selection tasks like L2 naming and word translation no grammatical

gender effects should be observed. Alternatively, the two languages can be thought of as interacting (integrated hypothesis), either because there is one single integrated gender system (Salamoura & Williams, 2007), or because the lexical representations of the two languages specifying gender information are functionally linked. Within the integrated view, if grammatical gender is selected to control syntactic agreement, gender effects are predicted only when the production of noun phrases is required (syntactic hypothesis); on the contrary, if grammatical gender is always available when lexical representation is accessed, gender effects should be observed also in bare noun production (lexical hypothesis).

Available evidence from different experimental paradigms is puzzling. In a series of L2 naming experiments with Croatian–Italian, Spanish–Catalan, and Italian–French highly proficient bilinguals, Costa et al. (2003) failed to obtain findings supporting the interaction between L1 and L2 in grammatical gender processing. They found an advantage for gender-congruent nouns in the Catalan–Spanish (24 ms, Experiment 4), Spanish–Catalan (23 ms, Experiment 4a), and Italian–French (19 ms, Experiment 5) bilinguals. However, given that a gender effect was found also in the control groups (Spanish monolinguals: 19 ms, Experiment 4b; and French monolinguals: 11 ms, Experiment 5a), no conclusion can be drawn: It is possible that the experimental material was not correctly selected. Only the Croatian–Italian bilinguals (Experiments 1, 2, and 3) showed no gender effect. Nevertheless, Croatian and Italian gender systems are rather different, with Italian having two gender values (feminine and masculine) and Croatian having three genders (masculine, feminine, and neuter). As argued by Costa et al. (2003), the asymmetrical structure of the Croatian and Italian gender systems could account for the absence of any gender effects.

In contrast with Costa et al. (2003), Bordag and Pechmann (2007) observed a grammatical gender congruity effect with Czech–German speakers. In L2 picture naming they showed a facilitation effect of gender congruency in producing both bare nouns and noun phrases (adjective + noun),

which speaks in favour of an interaction between the L1 and L2 systems at the grammatical level of representation. However, Bordag and Pechmann (2007) did not control the L1 names the participants used, for instance by asking them to name the stimulus pictures in L1 at the end of the experimental session. Therefore, the influence of some intervening variables cannot be excluded.

In a recent study, using the same task, Lemhöfer, Spalek, and Schriefers (2008) also found an effect of gender congruency in both bare noun production and noun phrase production with German–Dutch speakers: Dutch nouns with a “gender-compatible” German translation (German masculine and feminine gender corresponding to the Dutch common gender, and German neuter corresponding to Dutch neuter) were produced more accurately and faster than “gender-incompatible” stimuli. However, since the effect was modulated by the cognate status (it was larger for cognates than for noncognates), and the error rates were very high (up to 60% in Experiment 2 and 30% in Experiment 3), one can assume that the effect reflected a reduced ability in accessing the phonological form of the words to be produced rather than the processing of grammatical gender as intrinsic lexical information.

Also results derived from the word translation task are conflicting. In a task requiring the translation from Greek (L1) to German (L2), Salamoura and Williams (2007) found that nouns that had the same gender in both languages were translated faster than nouns with different genders, but only when the L2 target utterance required the adjective + noun production. In contrast, Bordag and Pechmann (2008) failed to obtain evidence for any gender congruency effects in three experiments where native speakers of Czech were required to translate bare nouns and gender-marked adjective noun phrases into German, their second language (L2).

Procedural aspects can account for this discrepancy. Salamoura and Williams (2007) employed a translation task from Greek (L1) to German (L2), two languages with three genders (masculine, feminine, and neuter). Participants were asked to translate the stimuli three times in the

bare noun translation condition, but responses to the first presentation of each target noun were discarded from the analyses, as they were assumed to be practice trials. So, it is plausible that considering only the following trials the effect of grammatical gender is no more visible. Bordag and Pechmann (2008) asked participants to translate from Czech (L1) to German (L2). In each block each target noun was presented three times: When it was presented in isolation, the bare noun was required (e.g., *srdce*, heart → *Herz*); when it was preceded by small dot, participants had to use the adjective *klein* (small; e.g., *srdce* → *kleines Herz*); when it was preceded by a large dot, they had to use the adjective *groß* (large); e.g., *srdce* → *großes Herz*). Furthermore, filler items were displayed in German and had to be translated into Czech. Therefore, within each block, participants were required to produce six different response types, switching from bare noun to noun phrase and from one language to another. It is possible that deciding which response had to be associated to each individual item took so much time that the effect of grammatical gender congruency dissolved.

In sum, the issue of the interaction of grammatical information in the bilingual lexicon is still confusing. In the present study, we used L2 picture-naming and word translation tasks with Italian–Spanish bilinguals and addressed the methodological questions raised by the papers previously discussed.

Spanish and Italian have quite similar gender systems with comparable morphological properties. They are languages with only two genders (masculine and feminine) and no neuter noun class. The link between grammatical gender and word meaning is arbitrary for most nouns denoting animals—the noun for *squirrel* is masculine in Italian (*scioiattolo*) and feminine in Spanish (*ardilla*), and that for *tiger* is feminine in Italian and masculine in Spanish, even if the orthographic–phonological form is identical in both languages (*tigre*)—and for nouns denoting objects—*bed* is masculine in Italian (*letto*) and feminine in Spanish (*cama*), while *fork* is feminine in Italian (*forchetta*) and masculine in Spanish (*tenedor*). In Experiments 1 to 3, we asked

Italian–Spanish participants to respond to pictorial or orthographic stimuli, by producing the bare noun or the noun phrase (article + noun). Different patterns of results can be predicted. According to the gender segregated view (e.g., Costa et al., 2003) no effects of grammatical gender congruency should be observed. In contrast, according to the gender integrated view (e.g. Lemhöfer et al., 2008), when the lexical representation of the target and the corresponding noun in L1 share the same grammatical gender information, a decrease of L2 naming latency should occur in all naming conditions (“lexical” hypothesis) or only in noun phrase production (“syntactic” hypothesis).

Both Italian and Spanish nominal categorization systems reveal formal regularities related to the distribution of noun endings (Chini, 1995; Harris, 1991). Most masculine nouns end with the vowel –o, and most feminine nouns end with the vowel –a (*cupboard* is “*armadio/armario*”, and “*chair*” is “*sedia/silla*”, in Italian and Spanish, respectively). However, in both languages, a small set of “irregular” nouns end with the vowel –o for feminine and the vowel –a for masculine—for example, the noun for *problem* is masculine (“*problema*”), while the noun for *hand* is feminine (“*mano*”): identical words in Italian and Spanish. Finally, in a large class of nouns, the ending vowel –e is unmarked for gender—*comb* is “*pettine/paine*” (masculine), and *key* is “*chiave/llave*” (feminine), in Italian and Spanish, respectively.

EXPERIMENT 1

In Experiment 1, Italian–Spanish bilingual participants were required to name the target pictures in their second language (L2). They were asked to produce either the bare noun or the noun phrase (article + noun). As mentioned, the presence or absence of gender congruency effect in these conditions would indicate whether the gender systems of the two languages are independent (no effect), integrated at the lexical level (congruency effects in all conditions) or integrated at the syntactic level (congruency effect only in the article + noun condition).

Method

Participants

The experimental data have been collected at the University of Granada. A total of 12 intermediate–high-proficient Italian–Spanish bilinguals (mean age = 25.17 years, range: 22–32 years) voluntarily participated in the experiment. The proficiency scores were obtained at the end of the experiment by means of a self-evaluation questionnaire on a 10-point scale, with 10 representing “native-speaker level” and 1 indicating “complete lack of knowledge of the language” (see Table 1). All the participants declared to have some experience with English as a third language (L3), but not with other languages having grammatical gender, and all had normal or corrected-to-normal vision.

Materials

From the picture sets of Lotto, Dell’Acqua, and Job (2001), and Snodgrass and Vanderwart (1980), 32 pictures were selected: half with names having the same gender in Italian and Spanish (gender-congruent condition: e.g., *frying pan* is feminine in Italian, *padella*, and Spanish, *sartén*), and half with names of different genders in the two languages (gender-incongruent condition: e.g., the noun for *bed* is masculine in Italian, *letto*, and feminine in Spanish, *cama*). In each set, half of the nouns were masculine and

half feminine (see Appendix for the list of the stimuli).

The noun frequency (Alameda & Cuetos, 1995; CoLFIS, Corpus and Frequency Lexicon of Written Italian: Bertinetto et al., 2005) in the congruent and incongruent sets was not different (Spanish: 1 .6 vs. 1.4, $F < 1$; Italian: 1.8 vs. 1.7, $F < 1$). Furthermore, the stimuli were matched for the number of letters (Spanish: 5.9 vs. 6.1, $F < 1$; Italian: 6.6 vs. 6.8, $F < 1$) and the number of syllables (Spanish: 2.7 vs. 2.7, $F < 1$; Italian: 2.6 vs. 2.8, $F < 1$). The two sets of nouns did not differ for the number of letters shared by the Spanish target and the corresponding Italian translation (1.9 vs. 2.2 for same and different gender, respectively, $F < 1$). No *cognates* were included in the list. Finally, the congruent and incongruent conditions included the same number of nouns with transparent ($n = 12$) or opaque ($n = 4$) endings for grammatical gender in both Italian and Spanish.

In addition to the experimental items, a set of four filler pictures were selected, half of feminine and half of masculine gender. In each set, one filler had gender-congruent names in Italian and Spanish, and the other had gender-incongruent names in the two languages.

Design

Two factors were manipulated within participants: task (bare noun vs. article + noun) and gender

Table 1. Language history and self-evaluated proficiency scores of the Italian–Spanish bilinguals for Experiments 1, 2, and 3

| | Experiment 1 | Experiment 2 | Experiment 3 |
|-------------------------------------|--------------|--------------|--------------|
| Language history | | | |
| Onset of the L2 acquisition (years) | 21.8 (4.5) | 22.2 (4.5) | 24.7 (4.29) |
| Use of L2 (years) | 3.3 (2.1) | 3.2 (4.2) | 1.3 (1.4)* |
| Living in Spain (years) | 2.3 (1.4) | 1.8 (1.3) | 0.9 (0.8)*# |
| Self-evaluated proficiency | | | |
| Production | 8.3 (1.1) | 7.9 (1.4) | 7.3 (1.0)* |
| Comprehension | 8.7 (1.1) | 8.3 (1.6) | 8.7 (0.9) |
| Writing | 7.1 (1.3) | 6.4 (1.6) | 6.2 (1.0) |
| Reading | 8.0 (1.0) | 7.7 (1.6) | 7.0 (1.0)* |

Note. The proficiency scores were obtained by a self-evaluation through a questionnaire filled out by the subjects at the end of the experiment. The scores are on a 10-point scale, in which 10 represents native-speaker level and 1 complete ignorance of the language. L2 = second language. Mean values are shown, with standard deviations in parentheses.

* $p < .05$, Experiment 1 vs. Experiment 3. # $p < .05$, Experiment 2 vs. Experiment 3.

congruency (congruent vs. incongruent). The two naming conditions (bare noun vs. article + noun) were administered blocked across participants, with the order of presentation counterbalanced. For each task, the experimental blocks were preceded by a practice block of 8 trials. Within each task, the pictures were repeated in three blocks of 34 trials (32 experimental trials and 2 warm-up fillers at the beginning of each block, for a total of 102 trials), separated by a short break. All pictures appeared once in each block. Within each block, trial randomization was subjected to the following constraints: (a) The first 2 trials were fillers; (b) congruent or incongruent stimuli could appear in no more than 3 consecutive trials; (c) items belonging to the same semantic category could not appear in consecutive trials; (d) items with some phonological relationship could not appear in consecutive trials. Three different lists were created from the combination of the three blocks.

Procedure

The participants were tested individually and were instructed to name each picture as quickly and accurately as possible in Spanish (L2) by providing the corresponding bare noun or the definitive article and the noun. The experimenter was seated behind the participant to record errors and equipment failures. At the beginning of the experiment, each participant was familiarized with the set of pictures. In this phase, each picture was projected on the computer screen with the corresponding Spanish name printed below (no articles were presented). Participants were asked to inform the experimenter if they were not familiar with some L2 words. This procedure was adopted to ensure that they really knew the names of the pictures and to leave out the unknown items from the experimental analyses. Following the familiarization phase, the two naming conditions (bare noun and article + noun) were administered blocked across participants.

The stimuli were presented using E-Prime 1.1 (Schneider, Eschman, & Zuccolotto, 2002). The pictures appeared in black and white at the centre of the screen, could be included in a virtual square of about 6×6 cm, and were

centred at fixation. A trial consisted of the following events: a fixation cross presented at the centre of the screen for 500 ms; the stimulus until the response or for a maximum of 3,000 ms; a blank interval of 500 ms. Response latencies were measured from the onset of the stimulus until the beginning of the response. At the end of the experimental session, to ensure that each picture elicited the expected name (and the expected grammatical gender), each participant was asked to name the entire set of stimuli in their native language: thus, Italian.

Results and discussion

Four types of response were excluded from the analyses: (a) naming errors, verbal dysfluencies, and failures by the voice key to record the response; (b) responses longer than 1,900 ms and shorter than 300 ms; (c) unknown L2 words and trials for which there was a mismatch between the expected L1 name and the name provided at the end of the session; (d) responses exceeding 3 standard deviations from the participant's mean, following the procedure of analysis adopted by Costa et al. (2003).

Trials excluded from the analyses accounted for 19.0% and 19.1% of the data points for the bare noun and the article + noun production task, respectively. Separate analyses were carried out for participants and items yielding F_1 and F_2 statistics, respectively. Since the items were repeated three times in each blocked condition, and the order of the conditions was also counterbalanced, we performed first an analysis of variance (ANOVA) with task (bare noun vs. article + noun), grammatical gender (congruent vs. incongruent), and repetition (first, second, third) as within-subject factors and order of condition (bare noun–article noun vs. article noun–bare noun) as between-subjects factor. The results of these analyses showed that grammatical gender did not interact with order of condition or with repetition (both $ps > .05$). Hence, the effects of order or repetition are not considered any further.

The results of the ANOVA with task (bare noun vs. article + noun) and grammatical gender (congruent vs. incongruent) as within-subject

factors showed that the main effect of the grammatical gender was significant, revealing that gender-congruent stimuli led to faster naming latencies than gender-incongruent ones, $F_1(1, 11) = 7.13$, $MSE = 2,596.51$, $p = .021$; $F_2(1, 15) = 8.64$, $MSE = 3,847.00$, $p = .010$. Moreover, neither the main effect of the task, $F_1(1, 11) = 0.16$, $MSE = 8,443.41$, $p = .69$; $F_2(1, 15) = 0.49$, $MSE = 1,675.14$, $p = .49$, nor the interaction with the grammatical gender, $F_1(1, 11) = 0.71$, $MSE = 419.27$, $p = .42$; $F_2(1, 15) = 2.32$, $MSE = 859.64$, $p = .15$, was significant, indicating that comparable patterns of results were observed across tasks.

The errors analysis showed no main effect of the grammatical gender, $F_1(1, 11) = 0.49$, $MSE = 26.44$, $p = .48$; $F_2(1, 15) = 0.10$, $MSE = 689.81$, $p = .76$. Moreover, neither the main effect of the task, $F_1(1, 11) = 0.009$, $MSE = 9.95$, $p = .93$; $F_2(1, 15) = .016$, $MSE = 30.31$, $p = .90$, nor the interaction with the grammatical gender, $F_1(1, 11) = 0.70$, $MSE = 3.25$, $p = .42$; $F_2(1, 15) = 0.37$, $MSE = 32.63$, $p = .55$, was significant. The mean response times (RTs) for correct responses and error rates in percentages are reported in Table 2.

The results show that the grammatical gender of nouns in the nonresponse language (L1) affects naming in the response language (L2), resulting in faster RTs when the L2 targets and the corresponding L1 nouns have the same grammatical gender. The same pattern of results was observed in bare noun and in noun phrase production, thus supporting the hypothesis that the selection of the lexical node involves the obligatory access to the syntactic features and that, independently from the task demands, the grammatical properties of the native language affect L2

picture naming, as predicted by the lexical hypothesis. This observation is in line with the results found in the Alario, Ayora, Costa, and Melinger (2008)'s study with monolinguals, where the gender facilitation effect was observed and was attributed to a noncompetitive mechanism of closed class word selection. Moreover, these findings are consistent with Bordag and Pechmann (2007) who found that naming times were faster when the L2 target and the corresponding L1 noun had the same grammatical gender in producing bare nouns and noun phrases (adjective + noun). At variance with Bordag and Pechmann, we were able to ascertain whether the expected picture names in the nonresponse language were implicitly used in the naming task, by asking participants to name the pictures in L1 at the end of the experimental session. Further, to assure that expected L2 nouns were used, in the familiarization phase each picture was presented with the Spanish name written below.

Also Costa et al. (2003) found an advantage for gender-congruent stimuli in bilingual participants speaking Romance languages (Catalan–Spanish, Spanish–Catalan, and Italian–French). However, the same gender effect was also observed in monolingual participants when asked to name the target pictures in the same language. It could be argued that the gender effect reflected a poor selection of the nouns used as stimuli that might vary for some relevant, but uncontrolled, factors, thus leading to that unexpected pattern of results.

To rule out the possibility that in the Experiment 1 of the present study a faulty selection of the set of stimuli could be responsible for the observed pattern of findings, in Experiment 2 we used the same testing materials and asked

Table 2. Mean response latencies, standard deviations, and error percentages in the different experimental conditions in Experiment 1

| Condition | Bare noun production | | | Article + noun production | | |
|--------------------|----------------------|-----|-------|---------------------------|-----|------|
| | Mean | SD | E% | Mean | SD | E% |
| Gender congruent | 787 | 102 | 10.24 | 793 | 161 | 9.90 |
| Gender incongruent | 822 | 114 | 8.77 | 837 | 174 | 9.29 |
| Gender effect | –34 | | | –44 | | |

Note: Mean response latencies in milliseconds. SD = standard deviation. E% = error percentage.

monolingual speakers and a new group of bilingual participants to produce the bare noun. If faster responses in the gender-congruent condition are observed in both groups of participants, then the results of Experiment 1 have to be considered an artefact. On the contrary, if a gender congruency effect is found only with bilingual participants, then the soundness of the previous findings will be supported. In Experiment 2, only the bare noun condition was tested, since it is the condition where the different hypotheses make stronger predictions (the gender segregation and syntactic integration hypotheses predict no effect, whereas the lexical integration hypothesis predicts a gender congruency effect).

EXPERIMENT 2

In Experiment 2, Italian–Spanish bilinguals and Spanish monolinguals were required to name the target pictures in Spanish. They were asked to produce the bare noun.

Method

Participants

A total of 12 intermediate–high-proficient Italian–Spanish bilinguals drawn from the same population as that in Experiment 1 (mean age = 25.25 years, range 19–33 years; see Table 1 for the description of the participants) took part in this experiment. All the participants declared to have some experience with English as L3, but not with other languages having grammatical gender. None of them participated in the previous experiment. In addition, 24 native Spanish-speaking university students (mean age = 20.33 years, range = 18–27 years), with no knowledge of Italian and of any languages other than Spanish that have grammatical gender, voluntarily participated.

Materials, design, and procedure

The same material, procedure, and analyses as those in the previous experiment were used. Bilingual and monolingual participants were

instructed to respond to the target picture by providing the bare noun in Spanish.

Results and discussion

Trials excluded from the analyses accounted for 12.3% and 9.3% of the data points for the bilingual and the monolingual groups, respectively. As in Experiment 1, to check for possible effects of repetition, we performed an ANOVA with language, grammatical gender, and repetition as within-subject factors. Again, the results of this analysis indicated that repetition did not interact with grammatical gender ($p > .05$). Thus it is not considered further.

Separate analyses were carried out for participants and items with language (Spanish, L1 vs. Spanish, L2) as between-subjects factors and grammatical gender (congruent vs. incongruent) as within-subject factor.

The results showed a significant effect of language, $F_1(1, 34) = 22.17$, $MSE = 16,304.57$, $p < .001$; $F_2(1, 30) = 98.84$, $MSE = 3,114.71$, $p < .001$, revealing that monolingual speakers named the pictures faster than bilingual speakers, and a significant effect of grammatical gender in the subjects analysis, $F_1(1, 34) = 13.41$, $MSE = 508.04$, $p = .001$; $F_2(1, 30) = 2.53$, $MSE = 3,270.68$, $p = .12$, revealing that gender-congruent stimuli led to faster naming latencies than did gender-incongruent stimuli. More importantly, the interaction between grammatical gender and language reached significance in the subjects analysis, $F_1(1, 34) = 12.02$, $MSE = 508.04$, $p = .001$; $F_2(1, 30) = 2.60$, $MSE = 3,270.68$, $p = .12$. Planned comparisons revealed a gender congruity effect in bilinguals, $F_1(1, 11) = 13.04$, $MSE = 742.28$, $p = .004$; $F_2(1, 15) = 3.83$, $MSE = 4,375.44$, $p = .068$, but not in monolingual speakers, $F_1(1, 23) = 0.04$, $MSE = 396.01$, $p = .85$; $F_2(1, 15) = 0.0004$, $MSE = 2,165.92$, $p = .98$. The errors analysis showed no main effect of language, $F_1(1, 34) = 1.97$, $MSE = 18.20$, $p = .17$; $F_2(1, 62) = 2.08$, $MSE = 19.92$, $p = .15$. Moreover, neither the main effect of the grammatical gender, $F_1(1, 34) = 1.89$, $MSE = 4.33$, $p = .18$; $F_2(1, 62) = 1.31$, $MSE = 17.53$, $p = .26$,

Table 3. Mean response latencies, standard deviations, and error percentages in the different experimental conditions in Experiment 2

| Condition | Bilingual speakers | | | Monolingual speakers | | |
|--------------------|--------------------|-----|------|----------------------|----|------|
| | Mean | SD | E% | Mean | SD | E% |
| Gender congruent | 804 | 102 | 6.68 | 673 | 89 | 4.86 |
| Gender incongruent | 844 | 89 | 5.64 | 675 | 91 | 4.47 |
| Gender effect | -40 | | | -2 | | |

Note: Mean response latencies in milliseconds. *SD* = standard deviation. *E%* = error percentage.

nor its interaction with language, $F_1(1, 34) = 0.39$, $MSE = 4.33$, $p = .54$; $F_2(1, 62) = 0.50$, $MSE = 17.53$, $p = .48$, was significant. The mean RTs for correct responses and error rates in percentages are reported in Table 3.

The results of Experiment 2 replicated and strengthened those obtained in the previous one. In this experiment, a new group of bilingual Italian–Spanish participants and a control group of Spanish monolinguals were required to respond to the target picture by providing only the bare nouns. We found that the grammatical gender of nouns in the nonresponse language affects naming in the response language: Faster RTs were observed when the target nouns in L2 and the corresponding nouns in L1 have the same grammatical gender. Critically, the grammatical gender effect was shown only by the bilinguals, suggesting that it reflects the activation of the nontarget language in bilinguals. Indeed, as this effect has not been observed in the monolingual group, it cannot be ascribed to a faulty selection of the material we used; rather, it seems to reflect a functional architecture in which, consistent with what is predicted by the lexical hypothesis, the lexical representations of the two languages are connected.

To explain the present findings one can assume that the gender effect in L2 naming task is located at the lexical level and that in bilingual speakers the semantic representation of the target picture activates the lexical representation of nouns in both languages. Given the connection between the two lexicons, an L2 noun receives activation from both the picture and the L1 noun (Figure 1a): The more similar the lexical representations of the two nouns are the more

activated the L2 noun will be. It follows that when two nouns share the same syntactic information, an L2 noun should receive more activation, thus producing a decrease of L2 naming latency—that is, the effect of gender congruency facilitation. This interpretation predicts that when L1 lexical knowledge is accessed, it always influences the selection of nouns from L2 lexicon. Therefore, in all tasks involving a possible access to L1 but response in L2, grammatical gender effects should be observed. In Experiment 3, we tested this prediction by including a L1 to L2 word translation task, one of the most employed paradigms to study the dynamics of activation of lexical information in bilinguals (Kroll & Stewart, 1994). The translation from L1 to L2 has been labelled “forward” translation (La Heij et al., 1996). If the effect of gender congruency observed in Experiments 1 and 2 using the L2 picture naming task was due to the activation of the L1 lexical representations, this effect should also be observed in the word translation task where the L1 lexical representation is activated by the target written word (Figure 1b). In the next experiment the translation from Italian (L1) to Spanish (L2) was employed. Consistent with the previous experiments, a gender congruity effect is predicted in producing both bare nouns and noun phrases.

EXPERIMENT 3

In Experiment 3, Italian–Spanish bilinguals were required to translate nouns from Italian into Spanish, by producing the bare noun or the noun phrase.

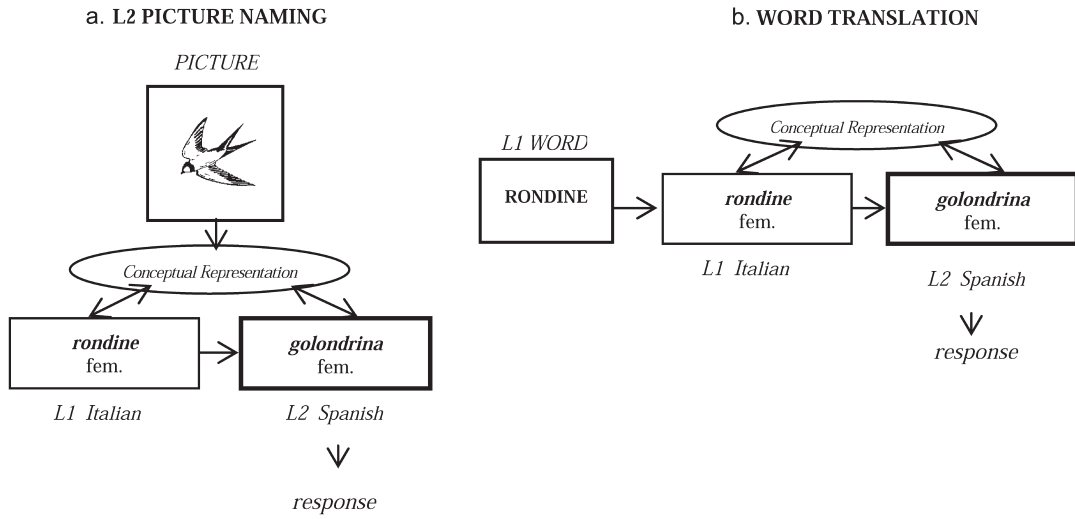


Figure 1. Schematic representation of the gender congruency effect in L2 picture naming task (a) and word translation task (b), with Italian (L1) and Spanish (L2) bilinguals.

Method

Participants

A total of 12 intermediate–high–proficient Italian–Spanish bilinguals drawn from the same population as that in Experiments 1 and 2 (mean age = 26.17 years, range: 19–36 years; for further information see Table 1) voluntarily participated in the experiment. All but 1 participant declared to have some experience with English as L3, but no other languages that have grammatical gender. None of them had participated in the previous experiments.

Materials, design, and procedure

The same materials and analyses as those in the previous experiments were used. In Experiment 3, participants were presented with Italian written words and were asked to translate them by providing the corresponding Spanish noun, in isolation or preceded by the definitive determiner into Spanish, as fast and accurately as possible. Bare noun and noun phrase translation tasks were blocked across participants, and the order of presentation of the blocks was balanced across participants. At the beginning of the experiment, each participant was familiarized with the set of Italian words and their Spanish translations; only bare nouns, both for Italian and Spanish, were presented. In this phase, the written nouns were projected on the computer screen with the corresponding Spanish noun printed below. Participants were asked to inform the experimenter if they were not familiar with some L2 words. As in the previous experiments, this procedure was adopted to ensure that participants knew the Spanish translation of the L1 Italian nouns and to exclude the unknown items from the experimental analyses. Following the familiarization phase, a practice block of 8 trials was administered. Finally, the experimental blocks were presented. Target nouns were presented in black Courier New 24 lower-case font on white background at the centre of the screen. The procedure of the experiment was similar to that of Experiments 1 and 2: On each trial, a fixation cross was presented for 500 ms at the centre of the screen, followed by the Italian target word

until the response or for a maximum of 3,000 ms and by a blank interval of 500 ms. Latencies were measured from the onset of the target.

Results and discussion

Trials excluded from the analyses were 29.2% and 31.8% of the data points for the bare noun and the article + noun condition, respectively. Again, we assessed the effect of order and repetition. As in previous experiments, these effects did not interact with grammatical gender (both p s > .05); therefore, they will not be considered any further. The main effect of the grammatical gender reached significance, revealing again that responses to gender-congruent nouns were faster than those to gender-incongruent nouns, $F_1(1, 11) = 25.76$, $MSE = 2,929.021$, $p = .0001$; $F_2(1, 15) = 6.37$, $MSE = 14,780.00$, $p = .02$. Moreover, neither the main effect of the task, $F_1(1, 11) = 1.59$, $MSE = 11,078.96$, $p = .23$; $F_2(1, 15) = 3.87$, $MSE = 3,277.26$, $p = .07$, nor its interaction with the grammatical gender, $F_1(1, 11) = 2.41$, $MSE = 1,520.88$, $p = .15$; $F_2(1, 15) = 0.63$, $MSE = 3,020.21$, $p = .44$, was significant. The errors analyses showed no main effect of the grammatical gender, $F_1(1, 11) = 1.78$, $MSE = 39.72$, $p = .21$; $F_2(1, 15) = 0.08$, $MSE = 17.72$, $p = .78$. Moreover, neither the main effect of the task, $F_1(1, 11) = 1.70$, $MSE = 11.96$, $p = .22$; $F_2(1, 15) = 0.018$, $MSE = 17.08$, $p = .89$, nor its interaction with the grammatical gender, $F_1(1, 11) = 2.05$, $MSE = 4.41$, $p = .18$; $F_2(1, 15) = 0.05$, $MSE = 98.62$, $p = .82$, was significant. The mean RTs for correct responses and error rates in percentages are reported in Table 4.

In Experiment 3, with a forward translation task with Italian–Spanish bilinguals, we replicated the effect observed with the L2 picture naming task. L2 translation times in the gender-congruent condition were faster than those in the gender-incongruent condition.

To account for these results, we propose that in the forward translation task, the lexical representation of L1 noun activates directly the corresponding L2 noun; when the two lexical representations share the same grammatical

Table 4. Mean response latencies, standard deviations, and error percentages in the different experimental conditions in Experiment 3

| Condition | Bare noun production | | | Article + noun production | | |
|--------------------|----------------------|-----|-------|---------------------------|-----|-------|
| | Mean | SD | E% | Mean | SD | E% |
| Gender congruent | 863 | 132 | 13.80 | 884 | 137 | 14.24 |
| Gender incongruent | 925 | 148 | 15.36 | 980 | 165 | 17.53 |
| Gender effect | –62 | | | –97 | | |

Note: Mean response latencies in milliseconds. *SD* = standard deviation. *E%* = error percentage.

gender information, the activation is stronger, and its selection is facilitated, thus leading to a decrease in latency.

GENERAL DISCUSSION

The present study showed that the grammatical gender of L1 nouns affects the production of the L2 translation. This effect appears to be reliable as it has been observed in three experiments with different groups of Italian–Spanish bilinguals, different tasks (L2 picture naming and forward translation), and different response types (bare noun and noun phrase).

In L2 naming, when the nouns of the two languages had the same grammatical gender, L2 naming latencies were shorter than when the grammatical gender was different. Consistent with Bordag and Pechmann (2007), these results suggest that the language not in use is activated and interacts at the level of grammatical gender with the lexical representations of the response language. At variance with Costa et al.'s (2003) study, where an advantage for gender-congruent stimuli was found with both bilinguals and monolinguals, we did not observe any gender-congruent effects with Spanish monolinguals. The absence of the gender effect with Spanish monolinguals rules out the possibility that uncontrolled variables can account for the present results.

The gender-congruent effect was replicated with the forward translation paradigm. Again, we found that the grammatical gender of L1 nouns affected L2 translation times, with faster response times when the L1 target and the corresponding L2 translation had the same gender. At variance with Salamoura and Williams (2007),

who found the effect of grammatical gender congruency only in noun phrase production, we observed it also in bare noun translation.

Overall, the results of the present study support the gender integrated view (e.g., Lemhöfer et al., 2008), and, since the same pattern has been observed with both bare noun and noun phrase production, they confirm the “lexical hypothesis”.

From our data, however, we cannot rule out that some semantic mediation is involved in the gender congruency effect. The revised hierarchical model (RHM) proposed by Kroll and Stewart (1994) assumes that the conceptual representations are shared among the languages, while the lexical representations are language specific (see also Kroll & de Groot, 1997). However, an increasing amount of empirical evidence shows that conceptual representation can be shaped by the syntactic properties of nouns. For example, Konishi (1993) and Boroditsky, Schmidt, and Phillips (2003) proposed that arbitrary syntactic features such as grammatical gender of nouns are part of the conceptual representation of the objects they refer to. If it were the case, when both L1 and L2 nouns have the same grammatical gender, the corresponding concepts share more features than concepts corresponding to nouns with different gender in the two languages. For Italian–Spanish bilinguals, for example, the conceptual representation of the cork (the Spanish noun *corcho* and the Italian noun *tappo* are both masculine) should be thought of as more “masculine” than the concept of the rifle, which is designated by two nouns having different gender (the Italian noun, *fucile*, is masculine, whereas the Spanish noun, *escopeta*, is feminine; see Cubelli, Paolieri, Lotto, & Job, 2009, for a

review). In addition, recent evidence suggests that semantic mediation can also be involved in forward translation (see Duyck & Brysbaert, 2004; Sunderman & Kroll, 2006).

However, the important point here is that lexical selection involves access to gender information. The findings of the present study can be explained by assuming that in bilingual speakers the L1 lexical representation of the target noun that is activated by the picture (in L2 picture naming task) and by the written word (in forward translation task) spreads activation to the L2 lexical representation, both directly and through the semantic system, thus modulating response times in congruent and incongruent conditions. These results are consistent with the hypothesis that the selection of one lexical node involves the obligatory access to syntactic features (e.g., Cubelli et al., 2005).

Two further issues merit being investigated in the field of grammatical gender processing in bilinguals: the effect of similarity of the two language gender systems, and the effect of L2 age of acquisition and proficiency. The advantage of gender congruency could be restricted to languages that have the same number and type of genders, like Italian and Spanish. In addition, according to Kroll and Stewart's (1994) model, the balance between lexical and conceptual links changes as proficiency increases. Therefore, the more proficient bilinguals are, the more conceptual mediation will occur, reducing the influence of the lexical route and therefore the effect of gender congruency. Alternatively, one can assume that the efficiency of the direct lexical route improves with proficiency; therefore, larger gender congruency effects could be predicted in skilled bilingual speakers. In all cases, as other effects show (e.g., the *cognates* effect), the magnitude of the congruency effect should vary with participants' proficiency. In the same way, it is possible that the magnitude of the gender congruency effect could vary with participants' age of acquisition.

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REFERENCES

- Alameda, J. R., & Cueto, F. (1995). *Diccionario de frecuencias de las unidades lingüísticas del castellano* [Frequency dictionary for lexical items in Castilian Spanish]. Oviedo, Spain: Servicio de Publicación de la Universidad de Oviedo.
- Alario, F. X., Ayora, P., Costa, A., & Melinger, A. (2008). Grammatical and nongrammatical contributions to closed-class word selection. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *34*, 960–981.
- Bertinetto, P. M., Burani, C., Laudanna, A., Marconi, C., Ratti, D., Rolando, C., et al. (2005). *CoLFIS (Corpus e Lessico di Frequenza dell'Italiano Scritto) [CoLFIS (Corpus and Frequency Lexicon of Written Italian)]*. Retrieved July 6, 2006, from <http://www.istc.cnr.it/material/database>
- Bordag, D., & Pechmann, T. (2007). Factors influencing L2 gender processing. *Bilingualism: Language and Cognition*, *10*, 299–314.
- Bordag, D., & Pechmann, T. (2008). Grammatical gender in translation. *Second Language Research*, *24*, 139.
- Boroditsky, L., Schmidt, L., & Phillips, W. (2003). Sex, syntax, and semantics. In D. Gentner & S. Goldin-Meadow (Eds.), *Language in mind: Advances in the study of language and cognition* (pp. 61–80). Cambridge, MA: MIT Press.
- Cacciari, C., & Cubelli, R. (2003). The neuropsychology of grammatical gender: An introduction. *Cortex*, *39*, 377–382.
- Caramazza, A., & Miozzo, M. (1997). The relation between syntactic and phonological knowledge in lexical access: Evidence from the “tip-of-the-tongue” phenomenon. *Cognition*, *64*, 309–343.
- Chini, M. (Ed.). (1995). *Genere grammaticale e acquisizione* [Grammatical gender and acquisition]. Milan: Franco Angeli.
- Colomè, A. (2001). Lexical activation in bilinguals' speech production: Language-specific or language-independent? *Journal of Memory and Language*, *45*, 721–736.
- Costa, A., & Caramazza, A. (1999). Is lexical selection in bilingual speech production language-specific? Further evidence from Spanish–English and English–Spanish bilinguals. *Bilingualism: Language and Cognition*, *2*, 231–244.
- Costa, A., Caramazza, A., & Sebastián-Gallés, N. (2000). The cognate facilitation effect: Implications for the models of lexical access. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *26*, 1283–1296.

- Costa, A., Kovacic, D., Franck, J., & Caramazza, A. (2003). On the autonomy of the grammatical gender systems of the two languages of a bilingual. *Bilingualism: Language and Cognition*, 6, 181–200.
- Costa, A., La Heij, W., & Navarrete, E. (2006). The dynamics of bilingual lexical access. *Bilingualism: Language and Cognition*, 9, 137–151.
- Costa, A., Miozzo, M., & Caramazza, A. (1999). Lexical selection in bilinguals: Do words in the bilingual's two lexicons compete for selection? *Journal of Memory and Language*, 41, 365–397.
- Cubelli, R., Lotto, L., Paolieri, D., Girelli, M., & Job, R. (2005). Grammatical gender is selected in bare noun production: Evidence from the picture–word interference paradigm. *Journal of Memory and Language*, 53, 42–59.
- Cubelli, R., Paolieri, D., Lotto, L., & Job, R. (2009). *The effect of grammatical gender on object categorisation*. Manuscript submitted for publication.
- Dijkstra, A. F. J. (2005). Bilingual visual word recognition and lexical access. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 178–201). New York: Oxford University Press.
- Duyck, W., & Brysbaert, M. (2004). Forward and backward number translation requires conceptual mediation in both balanced and unbalanced bilinguals. *Journal of Experimental Psychology: Human Perception and Performance*, 30, 889–906.
- Green, D. W. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language and Cognition*, 1, 67–81.
- Harris, J. W. (1991). The exponence of gender in Spanish. *Linguistic Inquiry*, 22, 27–67.
- Hermans, D., Bongaerts, T., De Bot, K., & Schreuder, R. (1998). Producing words in a foreign language: Can speakers prevent interference from their first language? *Bilingualism: Language and Cognition*, 1, 213–229.
- Konishi, T. (1993). The semantics of grammatical gender: A cross-cultural study. *Journal of Psycholinguistic Research*, 22, 519–534.
- Kroll, J. F., & De Groot, A. M. B. (1997). Lexical and conceptual memory in the bilingual: Mapping form to meaning in two languages. In A. M. B. de Groot & J. F. Kroll (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 169–199). Mahwah, NJ: Lawrence Erlbaum Associates.
- Kroll, J. F., & Stewart, E. (1994). Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language*, 33, 149–174.
- Kroll, J. F., & Tokowicz, N. (2005). Models of bilingual representation and processing. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 531–553). New York: Oxford University Press.
- La Heij, W., Hooglander, A., Kerling, R., & van der Velden, E. (1996). Nonverbal context effects in forward and backward translation: Evidence for concept mediation. *Journal of Memory and Language*, 35, 648–665.
- Lemhöfer, K., Spalek, K., & Schriefers, H. (2008). Cross-language effects of grammatical gender in bilingual word recognition and production. *Journal of Memory and Language*, 59, 312–330.
- Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioural and Brain Sciences*, 22, 1–75.
- Lotto, L., Dell'Acqua, R., & Job, R. (2001). Le figure PD/DPSS. Misura di accordo sul nome, tipicità, familiarità, età di acquisizione e tempi di denominazione per 266 figure [PD/DPSS pictures: Name agreement, typicality, familiarity, age of acquisition norms and naming times of 266 pictures.]. *Giornale Italiano di Psicologia*, 28, 231–245.
- Macizo, P., & Bajo, M. T. (2006). Reading for understanding and reading for translation: Are they equal? *Cognition*, 99, 1–34.
- Paolieri, D., Lotto, L., Leoncini, D., Cubelli, R., & Job, R. (2009). *Differential effects of grammatical gender and gender inflection in the picture–word interference paradigm*. Manuscript submitted for publication.
- Potter, M. C., So, K. F., von Eckhardt, B., & Feldman, L. B. (1984). Lexical and conceptual representation in beginning and more proficient bilinguals. *Journal of Verbal Learning and Verbal Behavior*, 23, 23–38.
- Salamoura, A., & Williams, J. N. (2007). The representation of grammatical gender in the bilingual lexicon: Evidence from Greek and German. *Bilingualism: Language and Cognition*, 10, 257–275.
- Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime user's guide* (Version 1.1). Pittsburgh, PA: Psychology Software Tools.
- Snodgrass, J. G., & Vanderwart, M. (1980). A standardized set of 260 pictures: Norms for name agreement, image agreement, familiarity, and visual complexity. *Journal of Experimental Psychology: Human Learning and Memory*, 6, 174–215.

Sunderman, G., & Kroll, J. F. (2006). First language activation during second language lexical processing: An investigation of lexical form, meaning, and grammatical class. *Studies in Second Language Acquisition*, 28, 387–422.

Van Hell, J. G., & De Groot, A. M. B. (1998). Conceptual representation in bilingual memory: Effects of concreteness and cognate status in word association. *Bilingualism: Language and Cognition*, 1, 193–211.

APPENDIX

Stimulus material

| <i>Gender-incongruent condition</i> | | | | <i>Gender-congruent condition</i> | | | |
|-------------------------------------|---------------|----------------------------|----------------------------|-----------------------------------|---------------|----------------------------|----------------------------|
| <i>Spanish target</i> | <i>Gender</i> | <i>Italian translation</i> | <i>English translation</i> | <i>Spanish target</i> | <i>Gender</i> | <i>Italian translation</i> | <i>English translation</i> |
| almohada | fem. | cuscinò | pillow | bufanda | fem. | sciarpà | scarf |
| Cama | fem. | letto | bed | falda | fem. | gonna | skirt |
| mesa | fem. | tavolo | table | mariposa | fem. | farfalla | butterfly |
| mochila | fem. | zaino | rucksack | maleta | fem. | valigia | suitcase |
| tapadera | fem. | coperchio | lid | ventana | fem. | finestra | window |
| bota | fem. | stivale | boot | golondrina | fem. | rondine | swallow |
| paloma | fem. | piccione | pigeon | abeja | fem. | ape | bee |
| escopeta | fem. | fucile | rifle | sartén | fem. | padella | pan |
| coche | masc. | macchina | car | apio | masc. | sedano | celery |
| enchufe | masc. | spina | plug | corcho | masc. | tappo | cork |
| tenedor | masc. | forchetta | fork | queso | masc. | formaggio | cheese |
| zorro | masc. | volpe | fox | perro | masc. | cane | dog |
| sobre | masc. | busta | envelope | vaso | masc. | bicchiere | glass |
| cepillo | masc. | spazzola | brush | tomate | masc. | pomodoro | tomato |
| mono | masc. | scimmia | monkey | reloj | masc. | orologio | clock |
| zapato | masc. | scarpa | shoe | taburete | masc. | sgabello | stool |

Note: fem. = feminine; masc. = masculine.