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Explicit and automatic grammatical gender access in bilinguals

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Abstract

The present study investigated access to grammatical gender in French-Spanish bilinguals. Bilingual participants were shown target nouns whose translations were either gender congruent (e.g., dog is masculine in both languages) or gender incongruent with the targets (e.g., heat is masculine in Spanish but feminine in French). The participants' task was to check for gender congruency between the two languages

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(Experiment 1) or perform a gender decision task (Experiment 2) on the targets. In both tasks, response times were shorter for targets of the same gender in both languages than for targets with different genders, suggesting that gender retrieval processes in a given language are affected by the gender information in the non-presented language. In Experiment 3, no gender congruency effect was observed when Spanish and French monolinguals performed a gender monitoring task on the same targets as in Experiments 1 and 2. Our data suggest that bilingual readers automatically activate noun translations, as well as the grammatical gender of these nouns.

I. Introduction

In languages with grammatical genders, the form of items such as determiners and adjectives depends on the grammatical gender of the nouns in the utterance (Corbett, 1991). Determiners are subject to a gender agreement rule requiring the gender of an indefinite article preceding a masculine noun to be masculine (e.g.,"un" in French), and an article preceding a feminine noun to be feminine (e.g., "une" in French). Following these rules undoubtedly imposes a processing burden on the speaker, who is required to keep track of the relationships between the relevant items during speech production and retrieve grammatical gender information extremely rapidly from the mental lexicon.

However, the presence of these specific markers in spoken utterances may aid listeners by providing specific cues for decoding what they hear. Numerous studies have shown that a gender-marked article that precedes a noun can affect lexical activation (Grosjean, Dommergues, Cornu, Guillelmon, & Besson, 1994; Dahan, Swingley, Tanenhaus & Magnuson, 2000). In a cross-modal semantic priming study, Spinelli and Alario (2002) investigated whether gender information may constrain the activation of fully ambiguous words, e.g. homophones with two different genders (e.g., /sɛl/ which can mean either salt $_{\text{masculine}}$ or saddle $_{\text{feminine}}$). The study revealed that presenting homophones in isolation facilitates processing of targets related to both the masculine and feminine meanings of the homophones (e.g., "poivre", pepper, related to *le sel* and "cheval", horse, related to *la selle*). However, when homophones were presented with a gender-marked definite article (e.g., *la selle*, the saddle), facilitation occurred for gender-congruent targets only (e.g., "cheval"). No facilitation was observed for targets related to the meaning that mismatches the gender information (e.g., "poivre").

Grammatical gender systems are language-specific. In English for example, it is restrained to animate nouns as revealed in phenomena such as anaphoric pronouns. French and Spanish are languages in which nouns are classified into two

genders. Nouns are either feminine (e.g., *lune* in French or *luna* in Spanish, "moon") or masculine (e.g., *soleil* in French or *sol* in Spanish, "sun"). Across languages, animate noun gender categorization is mostly semantic, since nouns referring to males are generally masculine (for example *le garcon* in French "the$_{masc}$ boy$_{masc}$") and nouns referring to females are generally feminine (*la fille* in French "the$_{fem}$ girl$_{fem}$"). However, semantically-motivated gender categories are rare, and in French account for only 10.5% of all nouns (Séguin, 1969).

For languages such as French and Spanish where inanimate nouns are also associated with a gender, speakers are required to know the grammatical gender of such nouns since their meaning does not provide cues to grammatical gender. Because grammatical gender assignment is arbitrary (words with very similar meaning can have a different gender), it often happens that nouns are of opposite genders in different languages. For example, "heat" is feminine in French (la chaleur) but masculine in Spanish (el calor). This phenomenon also occurs with cognates such as *honey* which is masculine in French (le miel) and feminine in Spanish (la miel). The present study aimed to gain insight into gender retrieval mechanisms from this perspective. We investigated how French-Spanish bilinguals retrieve the gender of words that have opposite genders in the two languages.

A key issue in bilingual research concerns the extent to which linguistic representations in the two languages are processed independently of each other. A number of studies have shown that linguistic information from the first language (L1) is activated to some extent during processing of the second language (L2). Processing words in L2 activate phonologically, orthographically or semantically related words in L1 (Colomé, 2001). However, little data is available regarding the activation of L1 gender information during L2 processing, and the results are not clear. No gender congruency effects were observed in a picture naming task that manipulated gender translation congruency (Costa, Kovacic, Franck & Caramazza, 2003). Croatian-Italian bilinguals were able to name with equal speed Italian nouns that were gender congruent on one hand, and gender incongruent Croatian translations on the other, suggesting that L1 and L2 gender systems are autonomous. On the other hand, gender congruency priming effects were observed both in a grammatical judgment task and a picture naming interference task (Salamoura 2007). In this study, Greek-German bilinguals were faster at deciding that a noun phrase in L1 was grammatically correct when preceded by a noun phrase with similar gender in L2 than by a noun phrase with opposite gender in L2. In addition, they were able to name pictures in L2 more quickly containing gender congruent distractors in L1 than pictures containing gender incongruent distractors. These findings support a language-shared gender hypothesis (Salamoura, 2007).

The present study tested the language-shared gender hypothesis by investigating whether L1 gender information is activated during L2 word processing, and whether L2 gender information is activated during L1 word processing. In two experiments, Spanish-French bilingual participants were visually presented wtih nouns whose translations were gender congruent with the targets (e.g., *la* table in French and *la* mesa in Spanish, 'table') or gender incongruent (e.g., *la* couleur in French and *el* color in Spanish, 'colour'). Experiment 1 evaluated explicit gender access. The participants had to decide whether target words were of the same gender in both languages or differed in gender. In Experiment 2 we assessed automatic gender access by having the participants perform a gender monitoring task. In Experiment 3, Spanish and French monolinguals had to perform a gender monitoring task on the same targets as in Experiments 1 and 2. If there is a single gender system for Spanish-French bilinguals, we expected shorter response times for the gender congruent than the gender incongruent conditions of Experiments 1 and 2 since comparison/access involves a shared unit in the gender congruent condition versus two units in the gender incongruent condition. If there are two separate gender systems for Spanish-French bilinguals, no such difference should be observed since comparison/access involves activation of two separate units in both cases (gender congruent and gender incongruent conditions).

II. Material and methods

1. Experiment 1 (explicit gender access)

Participants

Ten Spanish-French bilinguals (Spanish dominant) participated in the experiment. Six of them live in Mexico whereas the other four reside in Grenoble, France. All participants had normal or corrected vision.

Stimuli

Sixty French words were selected (30 feminine and 30 masculine words, mean frequency: 37.4 occurrences per million, according to the Lexique 2 French data base (New, Pallier, Ferrand, & Matos, 2001); mean number of letters: 6.01; mean number of syllables: 1.65) that have the opposite gender in Spanish (e.g., *corne* 'horn', feminine in French but masculine in Spanish; gender Incongruent condition). Sixty other French words (30 feminine and 30 masculine words) matched in gender, frequency (36.5 occurrences per million), number of letters (6.01) and number of syllables (1.65) were selected that had the same gender in Spanish (e.g., *perle* 'perl', feminine in both French and Spanish; gender congruent condition).

Sixty Spanish words constituting the translation of the 60 French words of the incongruent condition (e.g., *cuerno* 'horn', masculine in Spanish but feminine in French, 30 feminine and 30 masculine words, mean frequency: 189.1 occurrences per million according to the LEXESP Spanish data base (LEXESP, Sebastián-Gallés, Martí, Carreiras & Cuetos, 2000), mean number of letters: 6.03; mean number of syllables: 2.53) were also selected, thus forming the Spanish gender incongruent condition. Sixty other Spanish words (30 feminine and 30 masculine words) matched in gender, frequency (193.6 occurrences per million), number of letters (6) and number of syllables (2.53) were selected that had the same gender in Spanish (e.g. *refran* 'proverb,' masculine in both French and Spanish; gender congruent condition). The French and Spanish stimuli were divided into 2 experimental lists (A and B, see Appendix) so that if participant X was shown list A in French, this same participant would subsequently be shown list B in Spanish (i.e. the translations of list B in French); and vice versa for participant Y.

Procedure

The participants were tested individually in a quiet room. Stimuli were displayed at the centre of a computer screen and participants were required to decide, by pressing one of two response buttons as accurately and quickly as possible, whether the word they saw was of the same gender in both languages or differed in gender. Half of the subjects were intructed to press the "Same" button with their left forefinger and the "Different" button with their right forefinger, whereas the other half of the subjects were instructed to do the reverse. The order of language presentation was also counterbalanced across subjects. The experiment was controlled by E-prime Software (E-prime Psychology Software Tools Inc., Pittsburgh, USA). The computer clock was triggered by the presentation of the target on the screen and stopped by the subjects' response. Response latencies and errors were collected. Each session began with 10 practice trials and lasted approximately twenty minutes.

Results and discussion

Incorrect responses (1.9% of responses) and RTs exceeding 2000 ms (1.8%) were excluded, along with the data for six items that yielded an extremely high percentage of incorrect responses (*lézard* 'lezard', 90%; *ballon* 'balloon', 60%; *veau* 'veal', 80%; *pou* 'lice', 50%; *paille* 'straw', 100% and *estrofa* 'stanza', 80% of incorrect responses). ANOVAs analyses were conducted by subject ($F1$) and by item ($F2$) with gender congruency and language presentation factors as within-subject variables. For item analyses, gender congruency was a within-item variable and language presentation a between-item variable. Table 1 shows the mean RTs and mean error rates.

Table 1. Mean reaction times in milliseconds (ms). The standard deviations for correct responses to the word targets and error rates in Experiment 1 are in brackets.

Language presentation	**Gender congruent**	**Gender incongruent**	**Congruency effect**
Spanish (L1)	711 ms (109) 1.4%	1194 ms (125) 2.2%	483 ms 0.8%
French (L2)	684 ms (77) 1.1%	1209 ms (114) 3.2%	525 ms 2.1%

RT data revealed faster response times in the gender congruent condition than in the gender incongruent condition. This 504 ms effect was significant for both subjects and items ($F1(1, 9) = 147.3$, $p < .001$; $F2(1, 112) = 1470.2$; $p < .001$). However, no language presentation effect was observed (both Fs <1), nor was there any interaction between the two factors ($F1(1, 9) = 2.08$, ns.; $F2(1, 112) = 2.97$, $p < .09$). The error analyses revealed a gender congruency effect that was significant for items and marginally significant for subjects ($F1(1, 9) = 3.40$, $p < .09$; $F2(1, 112) = 4.87$, $p = .02$) with fewer errors in the gender congruent condition (1.2%) than in the gender incongruent condition (2.7%). However, no language presentation effect was observed (both Fs <1), nor was there any interaction between the two factors ($F1(1, 9) = 1.56$, ns.; $F2<1$).

These results show that participants were able to decide more quickly that nouns were the same gender in both languages than they were able to decide that nouns were of different gender. This gender congruency effect was observed when targets were presented in French (L2) and in Spanish (L1), suggesting that gender information affects L1 during L2 processing and vice versa. In this experiment, the participants were instructed to retrieve the grammatical gender of target word translations. In experiment two, retrieving the grammatical gender of targets translations was not needed for the task as participants were only instructed to perform a gender monitoring task on targets. Hence, if a gender congruency effect is still observed, it would mean that gender translations are accessed automatically.

2. Experiment 2 (automatic gender access)

Participants

Thirty-two Spanish-French bilinguals participated in the experiment. Twenty-eight of them live in Mexico whereas the other four live in Grenoble.

All participants had normal or corrected vision and none of them had participated in Experiment 1.

Stimuli and procedure

The stimuli were the same as in Experiment 1. Participants were tested individually in a quiet room. The stimuli were displayed at the centre of a computer screen and the participants had to perform a gender decision task on the visual targets by pressing as accurately and as quickly as possible one of two response buttons. Half of the subjects pressed the "feminine" button with their left forefinger and the "masculine" button with their right forefinger. The reverse pattern concerned the other half of the subjects. The experiment was controlled by E-prime Software (E-prime Psychology Software Tools Inc.; Pittsburgh, USA). The computer clock was triggered by the presentation of the target on the screen and stopped by the subjects' response. Response latencies and errors were collected. The session began with 10 practice trials and lasted approximately ten minutes.

Results and discussion

We excluded incorrect responses (6.7% of responses), RTs exceeding 2000 ms (1.4%) as well as data for two items that led to an extremely high percentage of incorrect responses (*cal* 'lime', 71% and *thesis* 'thesis', 43%). ANOVA were carried out by subjects ($F1$) and by items ($F2$) with Gender Congruency and Language Presentation factors as a within subject variables. For item analyses, gender congruency was a within item variable and Language Presentation a between item variable. Mean RTs and mean error rates are presented in Table 2.

Table 2. Mean reaction times in milliseconds (ms). The standard deviations for correct responses to the word targets and error rates in Experiment 2 are in brackets.

Language presentation	**Gender Congruent**	**Gender incongruent**	**Congruency effect**
Spanish (L1)	832 ms (175) 3.1%	833 ms (156) 5.1%	1 ms
	Fast subjects: 712 ms (62)	Fast subjects: 741 ms (67)	Fast subjects: 29 ms
French (L2)	905 ms (169) 7.5%	920 ms (168) 10.9%	15 ms
	Fast subjects: 792 ms (68)	Fast subjects: 805 ms (52)	Fast subjects: 13 ms

Unlike the results of Experiment 1, the RTs showed a language presentation effect ($F1(1, 31) = 20.5$, $p < .001$; $F2(1, 116) = 42.6$; $p < .001$) with faster response times when stimuli were presented in Spanish (832 ms) than in French (912 ms). No gender congruency effect was observed (both Fs <1), nor was there any interaction between these two factors (both Fs <1). However, the errors analyses revealed a significant gender congruency effect for both subjects and items ($F1(1, 31) = 7.94$, $p < .05$; $F2(1, 116) = 6.36$, $p = .02$) with fewer errors in the gender congruent condition (5.3%) than in the gender incongruent condition (8%). A language presentation effect was also observed for the latter two factors, with fewer errors in Spanish (4.1%) than in French (9.2%) but no interaction between the two factors (Both Fs <1).

Because gender monitoring is a task that takes a relatively long time, we hypothesized that the automatic effects might disappear in slow responses. We therefore divided the RT data into two groups: the 16 fastest subjects (mean RTs: 762 ms) and the 16 slowest subjects (mean RTs: 982 ms), and in so doing evaluated the congruency effect for these two groups. The gender congruency effect of 21 ms was significant for the subset of fast subjects ($F1(1, 15) = 4.9$, $p < .04$), with faster response times in the gender congruent condition (752 ms) than in the gender incongruent condition (773 ms).

These results indicate that the participants were faster at retrieving the gender of nouns whose counterpart in the other language was the same gender, relative to counterparts of the opposite gender. In addition, the participants made more errors when the target's translation was of the opposite gender. In Experiment 3, we tested to determine whether our effect might be attributable to specific properties of our stimuli rather than the activation of automatic gender translation. Therefore, we carried out experiment 2 with monolingual participants, for whom no gender congruency effect was expected.

3. Experiment 3 (monolinguals)

Participants

Thirty-eight monolinguals participated in the experiment. Twenty-four were native speakers of French from the Grenoble area and fourteen were native speakers of Spanish from Mexico. All participants had normal or corrected vision.

Stimuli and procedure

The stimuli and procedure were the same as those used in Experiment 2 except that participants were only shown the word list for their mother tongue.

Results and discussion

We eliminated incorrect responses (3.5% of responses) and RTs slower than 2000ms (0.02%). ANOVA were conducted by subjects (*F*1) and by items (*F*2), including Gender Congruency and Language group/presentation (French, Spanish) as factors. Gender Congruency was a within-participants and within-item factor while Language group was a between-participants and between-item factor. Mean RTs and mean error rates are presented in Table 3.

RT data revealed no language group ($F1(1, 36) < 1$; $F2(1, 118) = 1.52$; ns.) or gender congruency effect (both Fs <1), nor was there any interaction between these two factors (both Fs <1). Error analyses showed a language group effect ($F1(1, 36) = 27.3$, $p < .001$; $F2(1, 118) = 55.5$, $p < .001$) with fewer errors in Spanish (1.4%) than in French (7.2%). No gender congruency effect (Both Fs <1) or interaction between gender congruency and language group were observed (both Fs <1).

Table 3. Mean reaction times in milliseconds (ms). The standard deviations for correct responses to the word targets and error rates in Experiment 3 are in brackets.

Participants language	**Gender congruent**	**Gender incongruent**	**Congruency effect**
Spanish	697 ms (213) 1.4%	697 ms (192) 1.4%	0 ms 0%
French	704 ms (119) 7.6%	696 ms (100) 6.9%	-8 ms -0.7%

III. Discussion

We conducted three experiments to investigate grammatical gender access by Spanish-French bilinguals, and in particular to determine whether there are two separate gender systems for Spanish-French bilinguals or only one. Our results revealed that gender retrieval is influenced by the gender information in the non-presented language. Gender retrieval was facilitated when the gender of the target was the same in the two languages and hindered when the gender was different (Experiments 1 and 2). In addition, there were fewer errors in the gender congruent condition than in the gender incongruent condition. However, Spanish-French bilinguals made more gender assignment errors in French than in Spanish (Experiment 2). This effect cannot be ascribed to French being L2 for these subjects since it was replicated in monolinguals (Experiment 3). French monolinguals made more gender errors than Spanish

monolinguals, perhaps due to a better gender predictability on the basis of word endings in Spanish than in French.

The gender assignment task was found to be susceptible to sublexical factors, such as the predictive value of the noun ending related to gender classes (see for example Desrochers, Paivio and Desrochers, 1989). Although some French noun endings exhibit phonological regularities (for example, some nouns in French are more associated with one gender than the other, such as the ending *–ette* as in *fourchette* "fork," which is feminine in 98% of cases), these regularities are not on a par with Spanish, whose genders exhibit fairly regular phonology, i.e. most masculine words in Spanish end in *o* and most feminine words in *a*.

However, despite the fact that Spanish gender marking is very transparent, in Experiment 2 gender retrieval for Spanish words with gender incongruent translations was slower than for Spanish words with gender congruent translations. This finding suggests that when a bilingual reader processes a word in L1, the word's translation and the grammatical gender thereof are automatically activated in L2, even if the word is presented in the reader's dominant language. Moreover, although the gender monitoring task focuses on activation of the target's grammatical gender, it requires neither the activation of the translations nor of their grammatical genders. The observed gender interference effects with this task thus suggest that both kind of linguistic properties (lexical and syntactic) are automatically activated during word processing by bilingual subjects. For monolingual readers, Meunier, Seigneuric and Spinelli (2008 in press) have shown an automatic gender access with derivationally suffixed French nouns. These authors investigated the gender assignment of derivationally suffixed French nouns whose stems have the same or opposite gender of the derived noun. For example, *camionette* (van/panel truck) is a feminine noun that is derived from *camion* (truck), which is a masculine noun. The subjects in the aforementioned study were asked to perform a gender decision task on morphologically complex words whose gender was the same as their stem (e.g., *maisonette* $_{\text{feminine}}$ "small house" is derived from *maison* $_{\text{feminine}}$ "house"). It was found that gender decisions were slower for morphologically complex words comprising a stem with an opposite gender compared to words whose stem genders matched the derived noun. This suggests that the stem is activated along with its gender information during gender identification of derived words.

It has also been found that gender activation is mandatory in naming bare nouns (Cubelli, Lotto, Paolieri, Girelli and Job 2005). A picture-word interference experiment with Italian speaking participants revealed a grammatical gender effect in bare-noun production with slower naming latencies for picture–word pairs with the same grammatical gender. Hence the aforementioned studies support the idea that gender information activation is both automatic and irrepressible.

With respect to gender access for bilingual participants, the gender congruency effect we observed supports the language-shared gender hypothesis (Salamoura, 2007), which holds that there is a unique gender system for both languages (see Figure 1).

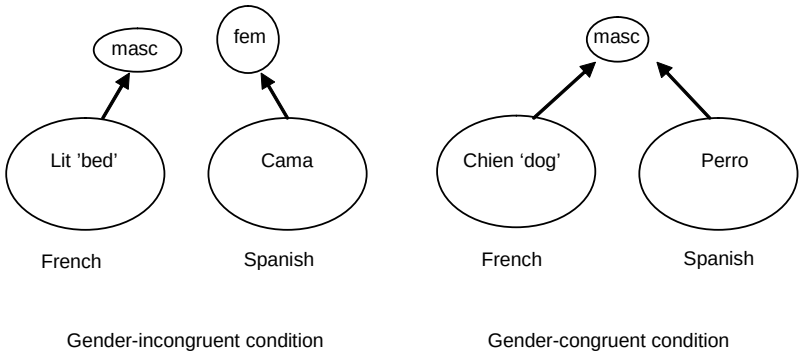

Figure 1. Shows gender access in the gender incongruent and gender congruent conditions. In the gender congruent condition, comparison/access brings into play a common gender unit, whereas the gender incongruent condition involves dual gender units. This gender access model for bilinguals could account for the data obtained in our Experiments 1 and 2. These data also have implications for studies of the mental representation of gender, inasmuch as it is widely accepted that the word-form level is language specific for bilinguals, whereas higher level processes are not.

Appendix

List A

FRENCH gender incongruent					FRENCH gender congruent				
TARGET	gender	frequency	nb letters	nb syllables	TARGET	gender	frequency	nb letters	nb syllables
corne	f	8.32	5	1	**perle**	f	8.39	5	1
dent	f	9	4	1	**dose**	f	9	4	1
clarinette	f	2.23	10	3	**compassion**	f	4.26	10	3
couleur	f	99.81	7	2	**vitesse**	f	86.48	7	2
tornade	f	1.9	7	2	**tunique**	f	4.74	7	2
saveur	f	9.55	6	2	**salade**	f	8.87	6	2
période	f	101.61	7	2	**matière**	f	122.26	7	2
banane	f	2.45	6	2	**limace**	f	1.97	6	2
cour	f	99.52	4	1	**base**	f	93.9	4	1
caserne	f	7.39	7	2	**boisson**	f	7.06	7	2
crevette	f	1.1	8	2	**boussole**	f	3.16	8	2
vitre	f	22.68	5	1	**piste**	f	22.45	5	1
lèvre	f	11.32	5	1	**vigne**	f	11.42	5	1
cuisse	f	11.9	6	1	**moelle**	f	7.81	6	1
chaussure	f	5	9	2	**vaisselle**	f	15.71	9	2
serpent	m	11.13	7	2	**matelas**	m	13.87	7	2
miel	m	11.03	4	1	**veau**	m	10.03	4	1
rat	m	12.26	3	1	**bal**	m	12.55	3	1
signal	m	16.06	6	2	**ballon**	m	17.42	6	2
sable	m	61.68	5	1	**chien**	m	69.68	5	1
drapeau	m	15.16	7	2	**bouquet**	m	17.16	7	2
raisin	m	4.39	6	2	**lézard**	m	4.52	6	2
sourcil	m	4.45	7	2	**coussin**	m	4.58	7	2
roman	m	54.45	5	2	**poète**	m	40.97	5	2
portail	m	10.94	7	2	**fromage**	m	12.52	7	2
berceau	m	10.06	7	2	**panneau**	m	12.16	7	2
lit	m	196.39	3	1	**jeu**	m	183.71	3	1
mot	m	214.23	3	1	**feu**	m	156.29	3	1
tarif	m	6.61	5	2	**savon**	m	9.94	5	2
genou	m	14.61	5	2	**gamin**	m	12.32	5	2
	mean	34.6	5.9	1.67			32.8	5.9	1.7

LIST B

FRENCH gender incongruent					FRENCH gender congruent				
TARGET	gender	frequency	nb letters	nb syllables	**TARGET**	gender	frequency	nb letters	nb syllables
cidre	m	2.42	5	1	**merle**	m	2.32	5	1
sang	m	143.45	4	1	**vent**	m	141.39	4	1
palmier	m	2.55	7	2	**poulain**	m	2	7	2
pistolet	m	9.29	8	3	**théorème**	m	9.35	8	3
beurre	m	24.48	6	1	**marbre**	m	27.1	6	1
nez	m	95.94	3	1	**vin**	m	64.97	3	1
cil	m	1.35	3	1	**pou**	m	1.32	3	1
balai	m	7.71	5	2	**phare**	m	8.13	5	2
bracelet	m	5.55	8	2	**vinaigre**	m	5	8	2
mélange	m	33.81	7	2	**cerveau**	m	28.23	7	2
papillon	m	13.03	8	3	**domicile**	m	13.9	8	3
mensonge	m	16.61	8	2	**scandale**	m	16.32	8	2
mur	m	100.87	3	1	**roi**	m	106.61	3	1
but	m	96.58	3	1	**sud**	m	79.16	3	1
lait	m	44.9	4	1	**trou**	m	47.97	4	1
chaleur	f	82.52	7	2	**machine**	f	81.65	7	2
méthode	f	86	7	2	**culture**	f	80.94	7	2
valeur	f	152.32	6	2	**nature**	f	203.55	6	2
douleur	f	52.9	7	2	**logique**	f	50.52	7	2
meringue	f	0.45	8	2	**vertèbre**	f	1.03	8	2
tumeur	f	7.13	6	2	**mairie**	f	10.16	6	2
tomate	f	3.52	6	2	**résine**	f	3.97	6	2
bague	f	9.1	5	1	**laine**	f	7.81	5	1
trousse	f	2.52	7	1	**mouette**	f	3.32	7	1
paille	f	26.71	6	1	**courbe**	f	30	6	1
voiture	f	123.13	7	2	**musique**	f	126.74	7	2
figue	f	1.06	5	1	**prune**	f	1.55	5	1
fourchette	f	6.16	10	2	**grenouille**	f	6	10	2
chaussette	f	2.26	10	2	**patrouille**	f	3.55	10	2
gueule	f	55.97	6	1	**gloire**	f	41.87	6	1
		40.3	6.2	1.63			40.2	6.2	1.6

LIST A

SPANISH gender incongruent					SPANISH gender congruent				
TARGET	gender	frequency	nb letters	nb syllables	**TARGET**	gender	frequency	nb letters	nb syllables
sidra	f	11	5	2	**sepia**	f	11	5	2
sangre	f	1033	6	2	**fuerza**	f	939	6	2
palmera	f	3	7	3	**estrofa**	f	7	7	3
pistola	f	150	7	3	**botella**	f	177	7	3
mantequilla	f	35	11	4	**carretilla**	f	7	10	4
nariz	f	296	5	2	**fecha**	f	290	5	2
pestaña	f	4	7	3	**cafeína**	f	5	7	3
escoba	f	16	6	3	**aduana**	f	16	6	3
pulsera	f	19	7	3	**cordura**	f	19	7	3
mezcla	f	238	6	2	**huelga**	f	280	6	2
mariposa	f	35	8	4	**turquesa**	f	38	8	4
mentira	f	216	7	3	**pérdida**	f	284	7	3
pared	f	373	6	3	**punta**	f	232	6	3
meta	f	149	4	2	**hoja**	f	144	4	2
leche	f	303	5	2	**tarea**	f	376	5	2
calor	m	460	5	2	**deseo**	m	565	5	2
método	m	347	7	3	**tabaco**	m	327	7	3
valor	m	585	5	2	**cielo**	m	620	5	2
dolor	m	556	5	2	**gesto**	m	598	5	2
merengue	m	8	8	3	**orificio**	m	8	8	3
tumor	m	87	5	2	**vicio**	m	85	5	2
tomate	m	38	6	3	**casino**	m	38	6	3
anillo	m	83	6	3	**dibujo**	m	113	6	3
estuche	m	36	7	3	**letrero**	m	34	7	3
tallo	m	20	5	2	**cloro**	m	20	5	3
coche	m	688	5	2	**suelo**	m	829	5	2
higo	m	8	4	2	**rubí**	m	8	4	2
tenedor	m	21	7	3	**cartero**	m	21	7	3
calcetín	m	?	8	3	**cangrejo**	m	8	8	3
hocico	m	16	6	3	**oyente**	m	16	6	3
	mean	201.2	6.2	2.6			203.8	6.2	2.7

LIST B

SPANISH gender incongruent					SPANISH gender congruent				
TARGET	gender	frequency	nb letters	nb syllables	**TARGET**	gender	frequency	nb letters	nb syllables
cuerno	m	36	6	2	**refrán**	m	34	6	2
diente	m	39	6	2	**tambor**	m	38	6	2
clarinete	m	3	9	4	**ganchillo**	m	4	9	3
color	m	721	5	2	**sueño**	m	740	5	2
tornado	m	21	7	3	**bálsamo**	m	20	7	3
sabor	m	137	5	2	**disco**	m	126	5	2
período	m	348	7	3	**material**	m	355	8	3
plátano	m	14	7	3	**martillo**	m	30	8	3
patio	m	271	5	2	**salón**	m	257	5	2
cuartel	m	104	7	2	**cabello**	m	142	7	3
camarón	m	2	7	3	**calmante**	m	6	8	3
vidrio	m	103	6	2	**mármol**	m	104	6	2
labio	m	45	5	2	**gallo**	m	45	5	2
muslo	m	42	5	2	**timón**	m	37	5	2
zapato	m	73	6	3	**marino**	m	84	6	3
serpiente	f	63	9	3	**margarita**	f	83	9	4
miel	f	103	4	1	**ruta**	f	109	4	2
rata	f	70	4	2	**raíz**	f	75	4	2
señal	f	233	5	2	**tesis**	f	237	5	2
arena	f	218	5	3	**playa**	f	235	5	2
bandera	f	193	7	3	**montaña**	f	193	7	3
uva	f	25	3	2	**cal**	f	34	3	1
ceja	f	24	4	2	**lupa**	f	20	4	2
novela	f	505	6	3	**prensa**	f	624	6	2
reja	f	18	4	2	**duna**	f	19	4	2
cuna	f	69	4	2	**sopa**	f	84	4	2
cama	f	764	4	2	**piel**	f	717	4	2
palabra	f	984	7	3	**persona**	F	968	7	3
tarifa	f	33	6	3	**fábula**	f	31	6	3
rodilla	f	52	7	3	**galaxia**	f	50	7	3
mean		177.1	5.7	2.4			183.4	5.8	2.4

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