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Real-time processing of gender-marked articles by native and non-native Spanish speakers

Casey Lew-Williams *, Anne Fernald

Department of Psychology, Stanford University, Stanford, CA 94305, United States

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ABSTRACT

Three experiments using online-processing measures explored whether native and non-native Spanish-speaking adults use gender-marked articles to identify referents of target nouns more rapidly, as shown previously with 3-year-old children learning Spanish as L1 (Lew-Williams & Fernald, 2007). In Experiment 1, participants viewed familiar objects with names of either the same or different grammatical gender while listening to Spanish sentences referring to one object. L1 adults, like L1 children, oriented to the target more rapidly on different-gender trials, when the article was informative about noun identity; however, L2 adults did not. Experiments 2 and 3 controlled for frequency of exposure to article–noun pairs by using novel nouns. L2 adults could not exploit gender information when different article–noun pairs were used in teaching and testing. Experience-related factors may influence how L1 adults and children and L2 adults—who learned Spanish at different ages and in different settings—use grammatical gender in real-time processing.

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Introduction

Adults learning a second language typically lack the fluency in understanding and speaking that is characteristic of native speakers. One aspect of morphosyntax that can be especially complicated for learners to master is grammatical gender—a system found in many of the world's languages that assigns nouns to noun classes and marks syntactically related words for agreement. Writer David Sedaris, a native English speaker, describes his difficulty learning the French gender-marked articles *la* and *le* ('the'), and his increasing reliance on the gender-neutral, plural article *les*: "My confidence hit a new low when my friend Adeline told me that French children often make mistakes, but never with the [gender] of their nouns. 'It's just something we grow up with,' she said. 'We just hear the gender once and think of it as part of the word.' Tired of embarrassing myself in front of two-year-olds, I've started referring to everything in the plural" (Sedaris, 2000, p. 190). Indeed young children learning a language with grammatical gender not only make fewer gender agreement errors than do older language learners (Karmiloff-Smith, 1979; Scherag, Demuth, Rösler, Neville, & Röder, 2004; Slobin, 1985), but also take advantage of gender-marked words in real time to interpret spoken sentences more rapidly (Lew-Williams & Fernald, 2007).

Here we explore how adults learning Spanish as a second language (L2 adults) process gender-marked articles, such as *la* and *el* ('the$_{[fem/masc]}$'), as compared to adults who learned Spanish as a first language (L1 adults). In Experiment 1, we asked whether native English-speaking adults learning Spanish as L2 were able to use potentially informative gender-marked articles to interpret familiar nouns more efficiently. These L2 adults were compared with adult native speakers of Spanish, and also with the 3-year-old children learning Spanish as L1 observed in our previous research (Lew-Williams & Fernald, 2007). Because native speakers have been exposed to the names of familiar objects and animals many more times than have non-native speakers, Experiments 2 and 3 equated frequency of exposure to the target nouns used in testing.

* Corresponding author. Address: Waisman Center, Infant Learning Lab, 1500 Highland Ave., Room 501, University of Wisconsin–Madison, Madison, WI 53705-2280, United States.

E-mail address: lewwilliams@wisc.edu (C. Lew-Williams).

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L1 and L2 adults were trained and tested on newly learned Spanish nouns preceded by gender-marked articles. Thus we sought to determine whether adult L2 learners of Spanish differ from native Spanish speakers in the efficiency with which they process both familiar and novel article–noun sequences in real-time language comprehension.

Processing of grammatical gender by native speakers

While research on grammatical gender in linguistics has documented the complex noun categorization systems that exist in many languages throughout the world (Corbett, 1991), psycholinguistic researchers have focused on the learning and processing of gender systems. Such studies explore how learners use phonological, semantic, and morphological cues to assign nouns to gender classes (Karmiloff-Smith, 1979; Pérez-Pereira, 1991) and to track gender agreement across words in both speech production (e.g., Andersen, 1984) and sentence comprehension (e.g., Bates, Devescovi, Hernandez, & Pizzamiglio, 1996).

Experimental studies show that L1 speakers of languages with grammatical gender use morphosyntactic cues to gender in real time to identify words and build sentence meaning. In one study, native speakers of French responded more rapidly to nouns preceded by an article correctly marked for gender than to nouns that were not (Grosjean, Dommergues, Cornu, Guillelmon, & Besson, 1994). In the first experiment, French-speaking adults participated in a gating task in which they heard incrementally longer portions of noun phrases beginning either with a gender-marked article (e.g., *une jolie plage*, '$a_{[f]}$ nice $beach_{[f]}$') or without a gender-marked article (e.g., *jolie plage*, 'nice $beach_{[f]}$'). Because the adjective *joli(e)* has the same pronunciation in both feminine and masculine forms, it served as an intervening word that was uninformative about gender in all article–noun pairs, allowing for more processing time. On trials with prenominal gender marking, participants needed to hear less of the target noun to determine its identity than on trials with no prenominal gender marking. In a second experiment, French-speaking adults listened to the same stimuli in a lexical decision task, indicating via a button-press whether nouns were real words or non-words. When prenominal gender marking was present, participants responded faster, showing that gender marking on articles affected speed of lexical access by native French speakers.

Gender information also facilitates interpretation for native speakers of Italian (Bates et al., 1996). In a series of studies using auditory naming and grammaticality judgments, adults were presented with adjective–noun pairs that were gender-congruent (e.g., *brutta casa*, '$ugly_{[f]}$ $house_{[f]}$'), gender-incongruent (e.g., $*$*brutto casa*, '$ugly_{[m]}$ $house_{[f]}$'), or gender-ambiguous (e.g., *grande casa*, '$large_{[amb.]}$ $house_{[f]}$'). Participants' latencies to repeat the noun or make a grammaticality decision were faster for gender-congruent pairs and slower for gender-incongruent pairs relative to the neutral baseline. Since processing was disrupted when Italian speakers encountered violations of gender agreement, these findings revealed inhibitory as well as facilitatory effects of gender priming. Differences in processing speed were also evident in research using event-related brain potentials, as native Spanish-speaking adults read complex sentences containing nouns that either agreed or disagreed in gender with the preceding article (Wicha, Moreno, & Kutas, 2004). These results revealed sensitivity at a neural level to violations of gender agreement, providing further evidence that native speakers use gender information in real time to form expectations about possible subsequent words.

One previous study has used eye tracking to investigate whether prenominal gender marking affects how listeners recognize spoken words (Dahan, Swingley, Tanenhaus, & Magnuson, 2000). French-speaking adults viewed scenes containing objects with names that shared phonological onsets but differed in grammatical gender (e.g., *vase*, '$vase_{[m]}$,' *vache*, '$cow_{[f]}$'). Eye-tracking studies investigating the cohort effect show that when listeners hear the first few phonemes of a noun, they are equally likely to look at a target picture or a cohort competitor that share a phonological onset; only with more speech information do listeners increasingly shift to the target picture. Dahan et al. proposed that the presence of a prenominal gender marker might guide listeners to the target with fewer false alarms to competitor objects. Participants heard gender-informative commands (e.g., *Cliquez sur* $le_{[m/singular]}$ *vase*) as well as gender-uninformative commands (e.g., *Cliquez sur* $les_{[neutral/plural]}$ *vases*, 'Click on the vases'). Listeners responded more rapidly to nouns preceded by a gender-informative singular article ($la_{[f]}$, $le_{[m]}$) than to nouns preceded by a gender-ambiguous plural article ($les_{[neut.]}$). Moreover, the gender-marked article eliminated interference from the phonological competitor. These findings were interpreted as evidence that gender-marked articles affect lexical access directly, by constraining the set of candidates considered as possible referents. Using diverse methodologies—including those that require metalinguistic judgments, like lexical decision, and those that reflect more naturalistic processing, like eye tracking—these studies show that gender information can enable adult native speakers to recognize familiar words more rapidly.

Such impressive efficiency in processing is not restricted to adults. Lew-Williams and Fernald (2007) found that 3-year-olds learning Spanish as L1 can also use gender-marked articles to more rapidly identify visual referents. Children looked at paired pictures of objects with names of either the same (e.g., *la pelota*, 'ball', *la galleta*, 'cookie') or different grammatical gender (*la pelota*, *el zapato*, 'shoe'), as they heard a Spanish sentence referring to one of the objects (*Encuentra la pelota*, 'Find the ball'). Eye movements were used as an index of listeners' latency to identify the target referent: children were faster to orient to the correct referent on different-gender trials, when the article was potentially informative, than on same-gender trials, when the article revealed nothing about the following noun. When the monolingual Spanish-speaking parents of these children were tested in the same procedure, they were faster than children overall on both trial types, but showed the same advantage on different-gender trials. This study provided the first evidence that young Spanish-learning children with only 500 words in their expressive vocabularies already demonstrated a processing advantage characteristic of adult native speakers. Similar findings have since emerged from studies with French- and Dutch-learning toddlers (van Heugten & Johnson, in press; van Heugten & Shi, 2009).