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GRAMMATICAL GENDER PROCESSING IN L2 SPEAKERS OF SPANISH
DOES COGNATE STATUS HELP?

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Abstract

One important finding in current literature is that native speakers of Spanish use gender marking on Spanish articles, such as *la* and *el,* to facilitate processing of upcoming Spanish nouns (e.g. Lew-Williams & Fernald, 2010). Conversely, native English speakers (for whom grammatical gender is absent in their first language) who are highly proficient speakers of Spanish and who have demonstrated mastery of the Spanish grammatical gender system, do not behave like native Spanish speakers in this respect. One question, however, is whether this result is modulated by the cognate status of the words. Cognates are words that are similar in form and meaning in the two languages (such as *guitar* in English and *guitarra* in Spanish). Here we investigate whether English learners of Spanish can more easily access gender information when words are cognates. We used an experimental eye-tracking technique known as the *Visual World Paradigm*. In this technique, participants hear instructions to click a picture displayed on a computer screen while their eye movements are being recorded. English-Spanish participants at Penn State were recruited as well as a group of monolingual speakers of Spanish (i.e., the control group) at the University of Granada. Results show that for the monolingual speakers, cognate status of words does not modulate grammatical gender processing. English-Spanish participants are expected to use grammatical gender only when words are cognates in English and Spanish. This research has important implications because it touches on critical aspects of language learning.

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Acknowledgements

Introduction

      It is widely known that adults who have learned a second language do not always reach the same fluency that native speakers of that language do. Mastering a second language can be especially difficult when structures are unique to the second language. This study looks specifically at grammatical gender processing in native English speakers who have learned Spanish during adulthood (henceforth L2 speakers of Spanish). Grammatical gender is the categorization of nouns into two or more genders, and it is a lexical property of nouns (Montrul, Foote, and Perpiñán, 2008). In Spanish, there are two gender categories, masculine and feminine. Other languages, such as Italian and French have grammatical gender systems.

      Every noun in Spanish is assigned a grammatical gender. For example, the noun *casa* "house" has feminine gender assignment and *libro* "book" has masculine gender. Gender assignment in Spanish is predominately morphologically-based, meaning that gender is assigned based on the ending of the word. Because *casa* ends in –*a*, it is assigned feminine gender, while *libro* ends in –*o* so it is assigned masculine gender. This is considered transparent gender. Grammatical gender can also be opaque in the sense that the word ending does not provide clues as to the gender assigned to the word. This is the case for Spanish words that end in –e or in consonants, but it still has grammatical gender. For example, *leche* "milk" ends in –*e*, but has feminine gender, while *coche* "car" also ends in –*e*, but is assigned masculine gender. This also occurs in Spanish words that end in consonants; for example words such as *azúcar* [sugar$_{MASC}$], *ciudad* [city$_{FEM}$], and *ratón* [mouse$_{MASC}$] all have grammatical gender, even though the consonants that end the words offer no evidence to support a particular gender. For the purposes of this experiment, only nouns with transparent grammatical gender will be used.

The presence of grammatical gender in Spanish has consequences for the morphosyntactic agreement of phrases. That is, elements such as determiners and adjectives, which typically accompany Spanish nouns, must agree with the noun in gender. To illustrate, in the sentence *La casa es bonita* "the house is pretty" [the$_{FEM}$ house$_{FEM}$ is pretty$_{FEM}$], the definite article *la*, the noun *casa*, and the adjective describing it (*bonita*) all have feminine grammatical gender agreement such that both the definite article and adjective match the gender of the noun. In this study, gender agreement between the definite article and the noun are of particular interest.

A large body of literature on the acquisition of grammatical gender has shown that native speakers rarely make mistakes when using grammatical gender in their native language and often perform at ceiling on tasks involving grammatical gender agreement. Achieving the same level in expertise is much more complicated for learners whose first language does not have a grammatical gender system (Montrul et al. 2008) and many studies have shown that a number of variables modulate the sensitivity to grammatical gender in L2 speakers.

A study by White, Valenzuela, Kozlowska-McGregor, and Leung (2004) showed that proficiency is a factor that affects how participants apply grammatical gender information. Using two production tasks as well as a picture identification task, White et al. found that despite the fact that L2 learners of Spanish were not as proficient at processing grammatical gender agreement as native speakers' proficiency in Spanish modulated this result. The participants in the low proficiency group were not able to utilize grammatical gender information. The intermediate and advanced participants showed results similar to one another and similar to a control group of native Spanish speakers. While the results were found consistently across the various tasks, the data collection methods used in this study caused the participants to pay great

attention to speech and grammatical gender, which may have influenced the results. This could have altered the natural responses of the participants and caused them to deliberately select their replies.

A recent study by Gillon Dowens, Vergara, Barber, and Carreiras (2009) has shown that immersion is a critical factor for L2 learners of Spanish. Using event-related brain potentials (ERP), the researchers tested English-Spanish speakers who had spent at least twelve years in a Spanish speaking country (with the average time being 22.1 years). Participants read sentences that contained violations of grammatical gender agreement. A P600 effect (a signature ERP wave sensitive to the detection of syntactic anomaly) was found for the immersed L2 Spanish learners, who performed qualitatively similar to native speakers.

Transfer effects from the L1 to the L2 can influence how L2 learners process grammatical gender information, as seen in other studies. Sabourin, Stowe and de Haan (2006) tested participants that were L2 Dutch speakers who had an L1 with a grammatical gender system similar to the system in Dutch (German), an L1 that has grammatical gender that operates differently (Romance language – Spanish, French, or Italian), or an L1 with no grammatical gender (English). It was found that morphological similarity between languages positively influenced processing, so that the more closely two grammatical gender systems related, the more easily participants accessed grammatical gender information in the L2. English-Dutch bilinguals performed at chance on an ERP task when processing noun and relative pronoun gender agreement, because English has no grammatical gender system, it is more difficult for these participants to utilize this information in the L2 in a highly proficient way. It has also been shown that the L1 and L2 are processed similarly when grammatical gender constructions are consistent across language types. When the system in the L1 is like that of the L2, bilinguals

process grammatical gender in both with near equal proficiency. However, when these lexically driven constructions differ between languages, neural processing as seen using ERP methodology, is not native-like for L2 language learners (Sabourin and Stowe 2008).

It has been further suggested that syntactic processing in the L2 depends significantly on how closely the rules correspond between the two languages. An experiment by Foucart and Frenck-Mestre (2010) manipulated grammatical gender agreement between nouns and adjectives. The study was conducted with L1 German L2 French speakers; both languages have grammatical gender systems. When the agreement rules were similar across the two languages, the P600 effect, the critical effect in the ERP study was found, but when the agreement rule varied across the languages, no effect was found.

The factors that affect sensitivity to grammatical gender are not only related to participants' variables but also to mode of testing. For example, whereas some L2 learners of Spanish have been shown to be more accurate on written tasks others (i.e., heritage speakers) perform better on oral production tasks (Montrul et al. 2008). These offline procedures illustrate L2 learners' ability to process and utilize grammatical gender under some circumstances, although the task themselves are not time-locked to online processing. Methods that look at processing of gender "online" (e.g., ERPs), have been able to provide more a consistent set of results because they capture processing as is happening, moment-by-moment. One disadvantage of these tasks, however, is that the materials used normally contain syntactic (or semantic) anomalies. This is so because the signature effects that have been found in ERPs are linked to the detection of semantic (N400) or syntactic (P600) anomalies (Dussias, Valdés Kroff, Guzzardo Tamargo and Gerfen, under review). To illustrate, the study by Gillon Dowens et al. (2009) used 120 sentences that manipulated gender agreement at the beginning and in the middle of

sentences. In particular, the first half exhibited article-noun agreement violations and the second half contained noun-adjective agreement violations. Because brain responses were measured as participants were reading ungrammatical sentences, a question remains as to the ecological validity of the technique, given that most of the time speakers hear and read grammatical (and not ungrammatical) sentences.

More recent studies have been able to examine language processing using more natural, ecologically valid contexts, in which participants are processing grammatical sentences for meaning. One example of this is a recent study by Lew-Williams and Fernald (2010). In order to measure real-time processing, this study employed a looking-while-listening technique to see whether L2 language learners of Spanish used grammatical gender information encoded in articles to facilitate the processing of upcoming nouns. L2 participants were low proficiency Spanish learners with 5.2-5.6 years exposure to the language. Participants were exposed to a two picture display in which the objects presented either matched in grammatical gender assignment (for example, *pelota* "ball" [ball$_{FEM}$] was shown alongside *galleta* 'cookie' [cookie$_{FEM}$]) or mismatched in grammatical gender assignment (such as *pelota* 'ball' [ballFEM] was placed alongside *carro* 'car' [car$_{MASC}$]). Participants heard simple sentences that contained one of the pictured objects and were expected to select the correct image by clicking on it. Researchers videotaped these head turns in order to see where the participant was looking in regards to when the time-locked sentence was played.

Three experiments in the Lew-Williams and Fernald (2010) study consistently showed that native Spanish speakers were able to orient their eyes to the correct image when the scene was informative (i.e., when there was a difference in grammatical gender between images, rather than same gender trials). This anticipatory effect elicited by native Spanish speakers suggests

that they are capable of using grammatical gender information in definite articles to more readily, correctly reference the image cued in the sentence before the actual noun is stated. L2 learners of Spanish were not shown to use the article to facilitate processing of the upcoming noun. This study concluded that gender marked articles immediately preceding a noun do not speed up lexical processing in L2 speakers. That is, L2 learners are not sensitive enough to this feature to utilize grammatical gender information to reference the upcoming noun.

Although interesting, the results by Lew-Williams and Fernald (2010) are at best suggestive because the L2 participants were not proficient enough in the L2. Their L2 learners of Spanish were only moderately proficient and had been exposed to Spanish in middle school, high school, or college for a total average of 5.2-5.6 years. As discussed earlier (White et al., 2004), proficiency is an important factor in the ability of L2 learners of Spanish to utilize encoded grammatical gender information. Therefore, L2 learners who are more proficient in their L2 Spanish need to be recruited before any conclusion can be reached about differences between native speakers of Spanish and L2 learners of Spanish.

To this end, the present study examines grammatical gender processing in adult, highly proficient L2 learners of Spanish who are native speakers of English (a language without grammatical gender). Two variables are considered. The first one, a participants' variable, examines how level of proficiency modulates the ability of L2 learners to use gender anticipatorily. Two groups of adult L2 learners were recruited: a more proficient group and a less proficient group. The second variable examined deals with the cognate status of the noun.

Cognates are words that share phonological form and meaning between two languages. For example the word *guitarra* [guitar$_{FEM}$] in Spanish and the word "guitar" in English have phonological similarities as well as semantic; they both represent a stringed musical instrument.

There is uncontroversial evidence indicating that cognates have a special status in the mental lexicon because they are words that are shared between two languages. Form, syntactic information, and meaning are shared, making them more accessible than noncognates. A study by Sherkina-Lieber (2004), found that bilinguals perceive cognates to have higher frequency than noncognates do. Other studies have shown that when participants are instructed to name words aloud, cognates are named faster than noncognates. When participants are given pictures to name aloud, pictures that represent cognate words are read faster than pictures representing noncognates. Likewise during reading tasks, participants read cognates quicker than they read noncognates (Costa, Caramazza and Sebastian-Galles, 2000; Hoshino and Kroll, 2008).

Given the special status of cognates in the bilingual lexicon, it could be that their higher level of activation facilitates the access of gender information, which in turn may influence processing. Therefore, the second variable examined in the present thesis is the cognate status of words. This variable has to do with the nature of the materials used in this study. Bilinguals use cognates to facilitate semantic processing, acquisition, and translation (Kroll, 1997); therefore, if it is easier to access the meaning of a noun, it should be easier to access grammatical gender information during online processing.

The Present Study

Research Questions

Two research questions are examined:

(1) Do highly proficient L1 English-L2 Spanish speakers use the grammatical gender information imbedded in Spanish articles *el* and *la* to facilitate the processing of upcoming nouns as native Spanish speakers do?

(2) Are L1 English-L2 Spanish speakers more likely to use grammatical gender in articles to anticipate upcoming nouns when those nouns are cognates? Is the grammatical gender of cognates easier to access?

To study grammatical gender processing in L2 speakers, the present study considers two variables: the first is the proficiency level of L2 Spanish learners and the second is the cognate status of nouns. The participants are split evenly into two groups of proficiency, low and high proficiency Spanish speakers. The eye-tracking methodology known as the Visual World paradigm is the experimental procedure used here because it is more ecologically valid than other techniques that also examine processing, moment by moment.

Method

Participants

A group of 24 monolingual Spanish speakers and a group of 20 adult L2 learners of Spanish were recruited. The monolingual participants were recruited from the Facultad de Psicología at the Universidad de Granada, Granada, Spain. These were native Spanish speakers with little or no exposure to English. Twenty English-Spanish speakers were recruited from the Department of Spanish, Italian, and Portuguese at the Pennsylvania State University. All received monetary remuneration for their participation. All participants completed a series of behavioral measures in Spanish to assess proficiency in the first and second language. Three tasks were administered: a subsection of a Spanish Grammar test known as *DELE*, a picture naming task in Spanish, and a language history questionnaire.

The Diploma de Español como Lengua Extranjera (Diploma of Spanish as a Foreign Language, DELE) is a standardized grammar test that evaluates proficiency in Spanish at several levels administered by the Ministry of Education, Culture, and Sport of Spain

(http://diplomas.cervantes.es/en). To assess the knowledge of highly proficient bilinguals, the highest level of accreditation was administered to participants. This test contained a cloze test (20 questions), a vocabulary test (10 questions), and a multiple-choice grammar test (20 questions). With a top score of 50, participants received 1 point for correct answers and 0 points for incorrect answers. This task was used to separate participants into two groups; those who had low proficiency (10 participants) and those with high Spanish proficiency (10 participants). In order to determine if the mean incorrect responses for the two groups was statistically significant, an independent samples t-test was done between the high proficiency group (M=16 incorrect responses; SD=4) and the low proficiency group (M=30 incorrect responses, SD=2.6). Results show that the difference between the mean scores was statistically significant (t(18)=8.90, p<.001), indicating that the two groups behaved differently on the measured of Spanish grammatical competency employed.

A picture naming task was created for the purposes of measuring the ability of the participants to utilize grammatical gender information prior to the experiment. An image, from the library of images used during the eye-tracking experiment, was presented to the participant, upon which the participant verbally produced the name of the item in Spanish, accompanied by its corresponding definite article. This gave participants the opportunity to familiarize themselves with the images and vocabulary used in the experiment. The images included the same pictures (80 pictures) that participants saw in the eye-tracking experiment as well as an additional 128 pictures, which were used as fillers. One point was awarded to correct answer, words that matched the image semantically and possessed matching grammatical gender. A maximum score of 208 was possible. This task is important because, as seen by Moreno and Kutas (2005), proficiency in vocabulary as measured by the picture naming task correlates to the ability of

participants to integrate these words into sentences. An independent samples t-test was conducted to determine whether the mean incorrect responses for the high proficiency (M=27 incorrect responses, SD = 9.2) and low proficiency group (M= 83 incorrect responses, SD = 21) was statistically significant. Results indicate that the difference between the mean scores is statistically significant (t(18)=7.67, p<.001). Again, this suggests that the high proficiency group performed better than the lower proficiency group.

In order to obtain an additional measure of each participant's knowledge of Spanish, a language history questionnaire was administered in which participants self-reported their proficiency by rating their skills on a scale with 1 being the lowest score and 10 being the highest score. They answered various questions concerning language dominance, level of proficiency in a foreign language in four language areas (speaking, reading, comprehension, and listening), as well as age of acquisition. Responses to the language history questionnaire revealed that the low proficiency participants were undergraduates students enrolled in Spanish courses at the Pennsylvania State University. The mean age of participants at the time of the study was 21.3 years old (with a range of 19 to 24 years old) and the mean age when they first began acquiring Spanish was 10.9 years old (with a range of 1 to 19 years old). This low proficiency group rated themselves on a 1 to 10 scale (1 being the lowest score and 10 being the highest score) to have an overall proficiency of 6.95 (range: 4.75-9.25). The high proficiency group of participants was comprised of Teaching Assistants enrolled in graduate studies at the Pennsylvania State University in either Spanish linguistics or Spanish literature. The mean age of these participants was 27.9 years old (with a range of 22 to 32 years old). The mean age of acquisition of these participants was 17.1 years old (with a range of 1 to 19 years). On the same scale as described above, the high proficiency group rates themselves as having an overall Spanish proficiency of 8

(range: 6.75-9.25). Table 1 presents a summary of the self-reported proficiency in Spanish for the low and high proficiency group.

Table 1: *Language History Questionnaire Results*

Participant Group	Comprehension	Writing	Speaking	Reading	Overall Proficiency
High – proficient	8.55	7.8	7.75	8.15	8.0
Low – proficient	7.8	6.4	6.9	7.1	6.95

Scale – 1= lowest score; 10 = highest score

Materials

The eye-tracking component of the experiment was created using the Visual World Paradigm, a compilation of visual and auditory materials. A list of words was compiled (see Appendix); all words were singular, concrete objects with transparent gender (see Introduction). Half of these words represented masculine gender objects and the other half, feminine. These masculine nouns were further broken down to whereas half were cognates and the other half were noncognates. This was done in the same way for the feminine words. All words were controlled for lexical frequency.

Words were matched in pairs based on frequency: a highly frequent word was presented with another highly frequent word and low frequency word with a word of similar frequency. Because cognates have a distinct advantage in processing for bilinguals, cognates were paired with other cognates and noncognates were paired together. This avoided a favored response to cognates by the participant due to an inherent preference for cognates in L2 learners. The words were paired with consideration to word onset and the complexity of the image that represented that word. Each participant saw 40 pairs of images that represented each word in which one was the target noun named in the auditory cue and the other was a distractor.

The pictures used in the experiment were previously normed for naming agreement. Ten individuals were presented with a picture and they were asked to name that picture aloud in English. Only pictures in which there was 100% naming agreement were selected for the experiment. In the experiment, each picture was presented as the target item or distractor and it was counterbalanced amongst participants.

In the experiment, there are 5 trials per 8 conditions. There were also 8 variations of the experiment which utilized each picture in a different pair combination to insure there was no preference to the pairs' orientation on the screen or picture bias. The conditions for the pairs are as illustrated in Table 2 below.

Table 2: *Example of experimental, eye-tracking trials*

Condition	Gender Pair	Example	Cognate Status
1	Feminine-Feminine	computadora + pizza	Cognate
2	Feminine-Feminine	cereza + mochila	Noncognate
3	Feminine-Masculine	pera + diccionario	Cognate
4	Feminine-Masculine	mesa + libro	Noncognate
5	Masculine-Masculine	cono + micrófono	Cognate
6	Masculine-Masculine	zapato + cerdo	Noncognate
7	Masculine-Feminine	aluminio + guitarra	Cognate
8	Masculine-Feminine	pañuelo + rueda	Noncognate

During the experiment, the participants heard a sentence (*Encuentra el/la* _____/Find the _____), which would prompt them to click on a picture on a computer screen. These sentences were broken down into two parts which were recorded separately. The sentenced contained the word *encuentra* ("find" in English) and is followed by the article, *el* or *la*. These two words were recorded together, and then the target noun that corresponded to one of the pictures was recorded separately. For example, one sentence is "*Encuentra la guitarra"* which means "find the guitar." These sentences were recorded in two parts to assure that there was no phonetic coloring of the nouns. This way, the onset of the target noun would not influence the pronunciation of the article, which could subtly contribute to a participant response.

The sentences were recorded by a female native speaker of Peninsular Spanish who is also a linguist. The sentences were recorded 3-5 times. These recordings were done in a sound attenuated chamber using a Shure SM57 microphone and a Marantz Solid State Recorder PMD670. Standard intonation was used in order to eliminate any emphasis on target nouns. One token of each master of recordings was taken. The definite article, *el* (masculine) and *la* (feminine), was manually edited to a duration of 147 ms ± 3ms using Praat to match the durational properties of native spoken Spanish. This precise timing was selected by sampling the master recordings to find the mean duration of both the masculine and feminine articles. Therefore, the auditory cue that signaled grammatical gender before participants heard the onset of the target noun was identical across all items, independent of grammatical gender. The sentences were digitally strung together to assure natural timing. This provided a way to time-lock the Eyelink 1000 eye-tracking equipment to the sentences so that the data showed the fixations of the participant at the precise time an acoustic signal occurred.

Procedure

The experimental session began by consenting participants. After this, participants were asked to complete the picture naming ask. Next, participants were administered the eye-tracking portion of the experiment. For this portion of the experimental session, participants were seated at a table in front of a computer monitor and mouse with their chins resting comfortably in a chin rest. The eye movements of the participants were recorded using an Eyelink 1000, a table mounted eye-tracking system. This equipment exactly measures the duration and movement of fixation points by the participant as they proceed in the experiment. A camera records the eye movements as infrared light reflects off the cornea of the eye.

To begin, the computer was calibrated. Next, participants saw a fixation point at the center of the monitor, indicating the beginning of a trial, after which two images were displayed on the screen and a Spanish sentence was played simultaneously. Participants were instructed to click on the corresponding image when they heard the prerecorded sentence in Spanish (e.g. *Encuentra la guitarra*). The eye movements of the participant were exactly time-locked to the speech signal as they continued with the task. Each participant completed 6 practice trials and 40 experimental trials.

Upon completion of the eye-tracking experiment, participants were then instructed to fill out a language history questionnaire and the DELE.

Results

The minimum latency to plan and launch a saccade has been estimated to be approximately 200 ms (e.g., Fischer, 1992; Saslow, 1967). Thus, approximately 200 ms after target onset is the earliest point at which one expects to see fixations driven by acoustic information from the target word. Visually, we plot the time-course of proportion of fixations

towards target items, following Lew-Williams and Fernald (2007, 2010). To delineate where the model calculates the first change point estimates for each condition, we overlay short vertical segments on top of the time-course plots (See Figure 1).

Monolingual Spanish speakers

Figure 1 shows that for different-gender trials, participants oriented their eyes toward the target sooner than for same-gender trials. An examination of Figure 1 suggests that this effect was similar for cognates and for non-cognates (a finding that would be expected given that cognate status should have no bearing in monolingual speakers). Paired sample t-tests comparing the proportion of looks for cognate items at intervals of 100ms windows (starting at 200 ms and ending at 700) ms) revealed that at the 300ms window, participants oriented their eyes sooner on different gender trials than on same gender trials ($t(23)= 0.79$, $p = 0.43$). Similar statistically significant findings were obtained at the 400ms window ($t(23)= 3.26$, $p = 0.003$). At the 500ms window, no statistically significant results were found ($t(23)= 1.58$, $p = 0.12$). Overall, the findings indicate that Spanish monolinguals use information in the articles as a facilitatory cue during real-time speech.

Turning now to the non-cognate trials, we find a somewhat similar pattern of result. Paired sample t-tests comparing the proportion of looks for cognate items in intervals of 100ms windows (starting at 200 ms and ending at 700) ms) revealed a marginally significant difference at the 300ms window ($t(23)= 2.07$, $p = 0.054$), suggesting that participants oriented their eyes sooner on different gender trials than on same gender trials. Statistically significant findings were obtained at the 400ms window ($t(23)= 3.70$, $p = 0.001$) and the 500ms window ($t(23)= 2.83$, $p = 0.009$), again indicating that Spanish monolinguals also use information in the articles for non-cognate words as a facilitatory cue in real-time speech.

Figure 1. Proportion of fixations to targets over time for different gender and same gender trials (split by cognate status). Monolingual Spanish speakers.
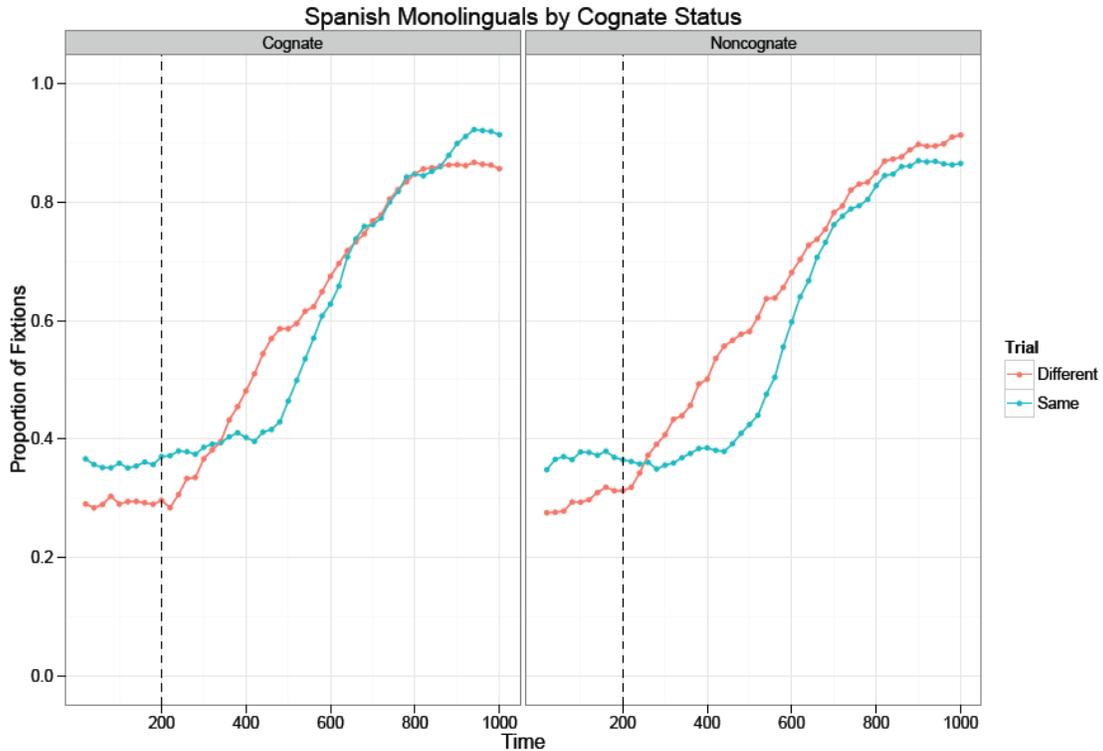
L2 speakers of Spanish

We begin by discussing the low proficiency group. As shown graphically in Figure 2, for this group there is no evidence of an anticipatory effect either for cognate words or for noncognate words. The different gender trials (red line) and the same gender trials (blue line), follow the same trajectory and the lines are almost on top of each other. For these participants, not only is gender information not used in a manner similar to that of monolingual Spanish speakers, but the cognate status of words does not seem to modulate the results.

Figure 2. Proportion of fixations to targets over time for different gender and same gender trials (split by cognate status). L2 Spanish speakers.
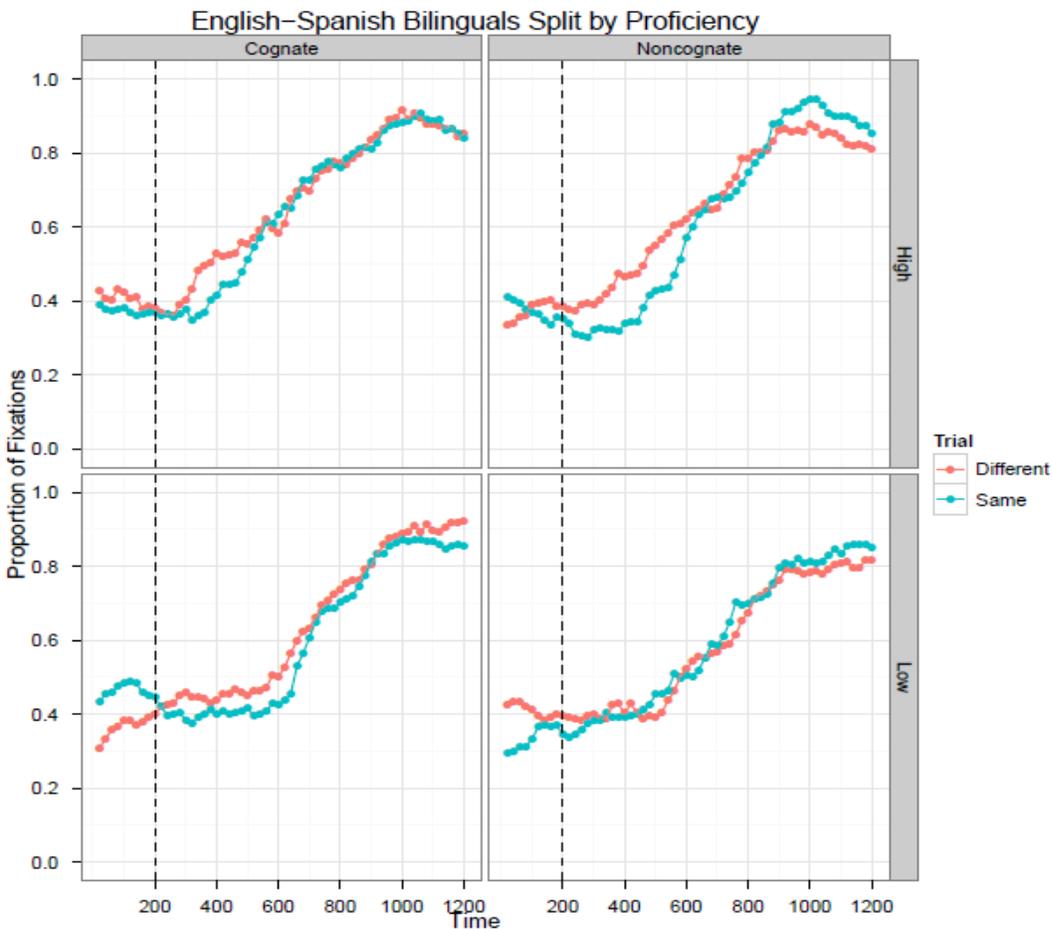
For the high proficiency group, a different kind of result emerges. Paired sample t-tests comparing the proportion of looks for noncognate items at intervals of 100ms windows (starting at 200 ms and ending at 700 ms) revealed that marginally significant difference at the 400ms window ($t(9)$= 1.99, $p = 0.07$) and the 500 ms window ($t(9)$= 2.03, $p = 0.07$). This finding suggests that at least for these items, English-Spanish learners can use gender information encoded in the article anticipatorily (although these findings should be taken with caution because the results are only marginally significant). Interestingly, for cognate trials, these participants did not show any facilitation effects at any of the examined time windows.

Discussion

In this study two variables were examined, proficiency of L2 Spanish learners and cognate status of words, to determine whether nonnative speakers of Spanish can use grammatical gender information encoded in articles to facilitate processing of upcoming nouns. Participants were comprised of a monolingual control group and two L2 Spanish groups with varying proficiency levels: a low proficiency group and a high proficiency group. The eye-tracking experiment was conducted by displaying two images on a screen while an audio fragment was played. Participants were instructed to select the corresponding image while the Eyelink 1000 recorded their eye movements.

The results showed that, as expected, monolingual Spanish speakers displayed an anticipatory effect for different gender trial regardless of cognate status of the noun, suggesting that they were able to use grammatical gender information in articles to facilitate processing of upcoming nouns. Turning to the L2 group, the low proficiency L2 learners of Spanish did not use grammatical gender in articles to more easily reference upcoming nouns. These results were obtained both for cognate words and non-cognate words. While these participants show knowledge of the rules of grammatical gender assignment and grammatical gender agreement in Spanish (as evidenced by the picture naming task described earlier), they appear not to be able to use this information during online processing. The highly proficient group, however, show a completely different picture. When words were noncognates, high proficiency L2 Spanish speakers showed what seems to be anticipatory effect. The effect seemed to disappear when words were cognates. Why might cognate show a weaker effect relative to non-cognates? Cognates have been found to facilitate or inhibit processing. As mentioned earlier, in lexical decision tasks, cognates facilitate naming, because the overlap in form and meaning help

participants to decide whether strings of words are legal words of the language. In other words, cognates boost that decision making because there are two sequences of letters being processed that converge across languages into a single entry and facilitate recognition of the word and make it faster to produce.

However, other studies show that cognates do not always produce advantages. A study by Jacobs (2007) looked at whether L2 Spanish language learners approximated target like pronunciation of Spanish words more readily when they were cognates, hypothesizing that approximation would have been closer to native targets if the words were cognates. Instead, Jabocs found that L2 Spanish speakers were less target-like at producing native like pronunciation with cognates, suggesting that getting rid of nonnative pronunciation is difficult when there is a great deal of overlap between the two languages (as would be the case with cognates). In other words, the similarity between the two languages makes it problematic to learn a new pronunciation.

It would appear that a similar phenomenon could explain the results for the high proficiency L2 learner group. Although it was hypothesized that cognates would boost facilitation/access to the morphosyntactic information in articles with encoded grammatical gender, what seems to be happening is quite different. Because one language, Spanish, has grammatical gender and the other language, English, does not, cognate status seems to inhibit the use of gender. When there are noncognates, grammatical gender boosts facilitation and recognition. When the words are cognates, the presence of grammatical gender is obscured. Thus, cognate status appears to compete with gender information to result in a diminished anticipatory effect.

Appendix

Names of objects pictured in the eye-tracking experiment

acuario	cigarillo	insecto	pizza
aeropuerto	circo	jirafa	planta
aguja	cocina	ladrillo	queso
alfombra	cocodrilo	lago	regalo
almohada	cola	lampara	rosa
aluminio	computadora	langosta	rueda
ambulancia	cono	lata	semaforo
anillo	cortina	libro	servilleta
atomo	cuaderno	llave	sombrero
banana	cuadro	luna	tarantula
barba	cucaracha	mantequilla	tarjeta
basura	cuchillo	manzana	taza
bata	cuna	mariposa	telefono
bicicleta	diccionario	medalla	telescopio
blusa	dinamita	microfono	templo
bolsa	dinosaurio	microscopio	toalla
bomba	disco	mono	toro
bota	domino	monstruo	tortuga
brazo	edificio	montana	trompeta
bufalo	ensalada	motocicleta	tumba
burro	escritorio	ojo	una
caballo	espejo	oso	vaca
cabana	estadio	pajaro	vela
cadena	estereo	palmera	vestido
calculadora	estomago	paloma	vino
calendario	fruta.	panda	zanahoria
cama	fuego	panuelo	zapato
camara	gato	pasta	
camello	globo	patata	
campana	gorila	pavo	
canguro	guitarra	pera	
carpintero	hamaca	periodico	
carta	helado	perla	
castillo	helicoptero	perro	
cebra	hipopotamo	piano	
cepillo	hoja	pierna	
cerdo	hueso	pinguino	
cerveza	huevo	pipa	
chaqueta	iglesia	pirata	

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Academic Vita

Education	**The Pennsylvania State University, University Park, PA**	**May 2012**

Schreyer Honors College: Paterno Fellow
The College of the Liberal Arts
Bachelor of Arts in Spanish
Bachelor of Arts in Italian; Language and Literature
Bachelor of Arts in Global and International Studies
Minor in Linguistics

Relevant Courses

Linguistics Research Abroad	Spanish Research	Phonology
Language Acquisition	Spanish Phonology	Sociolinguistics
Spanish Translation	Italian Translation	Syntax

Italian Language, History, and Visual Arts Program **May-July 2010**
Todi, Italy
· Lived in a homestay immersion program
· Completed three courses in advanced Italian grammar, art history, and studio visual art

Research **The Pennsylvania State University, University Park, PA** **Dec 2010-Present**
Partnership for International Research and Education (PIRE),
A National Science Foundation Research Collaboration
Center for Language Sciences, Dr. Giuli Dussias
Undergraduate Researcher
· Designed in collaboration with Primary Investigator Dr. Giuli Dussias and executed a unique experiment using the Visual World Paradigm
· Used eye-tracking equipment to conduct experiment with over 70 participants
· Collected data from over 60 participants at the Universidad de Granada (Spain) and conducted research entirely in Spanish
· Presented findings, attended weekly laboratory meetings, and oversaw three of my peers as Research Assistants

The Pennsylvania State University, University Park, PA **Aug-Dec 2010**
Sony eReader Project
English Department, Diana Greundler
Research Assistant and Teaching Assistant
· Worked with an honors course of 30 students who received their books on a Sony eReader
· Collected data through video interview responses of the use and effectiveness of Sony eReader
· Helped department transition into current technology, using a digital recording technique
· Incorporated video responses in analyzed data which was presented to Sony Corporation in order to improve the product

The Pennsylvania State University, University Park, PA **Jan-May 2009**
German Language Acquisition Lab
Research Assistant to Dr, Carrie Jackson
· Conducted sentence reading experiment with eye-tracking equipment
· Collected, extracted, and analyzed data and presented the results

Skills **Language**
English: Native in speaking, writing, and reading
Spanish: Intermediate/Advanced in speaking, writing, and reading
Italian: Intermediate/Advanced in speaking, writing, and reading