

The Gender Congruency Effect in bare noun production in Spanish

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Previous research in syntactic gender congruency effects has indicated that German and Dutch speakers exhibited priming effects in the production of noun phrases (La Heij, Mak, Sander & Willeboordse 1998; Schriefers 1993; Schriefers & Teruel 2000), whereas speakers of Spanish and Italian showed no such effects (Miozzo & Caramazza 1999; Costa, Sebastián-Gallés, Miozzo & Caramazza 1999). Until recently, the production of bare nouns had only been examined in Dutch (La Heij, et al. 1998) and no effect was found. It was concluded that gender information is only accessed when specifically required for the selection of agreement morphemes. Cubelli, Lotto, Paolieri, Girelli, and Job (2005), however, found an inhibitory gender congruency effect for bare noun production in Italian. The goal of the current experiment was to determine if such an effect could be elicited in Spanish. The current experiment examined the production of bare nouns and noun phrases (NPs) by native Spanish speakers within the picture-word interference paradigm, in which subjects named a picture accompanied by a distractor word which was either gender congruent or incongruent with the target. Congruency effects were determined by naming latencies. An analysis of the data showed that there was no gender congruency effect in bare noun production. Naming latencies in the two conditions were virtually identical ($f(1,15) = 0.017, p < 0.90$). In addition, separate analyses were performed on target words of each gender (masculine and feminine) and no gender specific effect was found. As predicted, there were no congruency effects for NP production. The fact that, in bare noun production, Spanish behaves like Dutch rather than Italian indicates that there is a critical difference between Spanish and Italian relating to gender access.

1. Introduction

Grammatical gender is a feature which is pervasive in Indo-European languages (Corbett 1991). The syntactic gender of a noun often determines which lexical items will be selected (determiners, gender inflected adjectives, etc.). The fact that this information is part of the noun's lexical entry leads us to wonder when and how exactly is syntactic gender represented in the lexicon and how it is accessed in speech production.

Much of the psycholinguistic research on gender has been done in the Picture-Word Interference Paradigm. In this paradigm, subjects are shown a picture and asked to name it while, at the same time, they are presented with a

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distractor word (either visually or auditorily). The features of the target and distractor word, be they semantic or syntactic, can be manipulated relative to those of the target word in order to gain insight into the process of lexical access and the structure of lexical items. The research done thus far indicates that not all languages behave alike with respect to the access of gender. In order to account for these language-specific differences, it is necessary to appeal to the theoretical models of lexical access as well as the features of the languages themselves. Such an analysis reveals that further investigation is necessary to determine how Spanish fits into the paradigm.

1.1 Previous Research on Gender Effects

In recent years, there has been quite a bit of research on the effect of gender congruency between the name of a picture and a distractor stimulus in the picture-word interference paradigm.

The first relevant study was by Schriefers (1992) and examined gender congruency effects in Dutch. For all practical purposes, Dutch has a two gender system (neuter and non-neuter) (La Heij et al. 1998) with no overt gender marking on nouns (Cubelli et al. 2005). Schriefers used the picture-word interference paradigm: subjects were asked to name a pictured object with a specified type of noun phrase. The noun phrase consisted of either a determiner, adjective and noun or just an adjective and noun. In Dutch, the determiner and adjective, when no determiner is present, must agree in gender with the noun. Please see the NPs in (1) for examples.

1. a. het rode bed
the(neuter) red bed(neuter)
- b. de rode stoel
the(non-neuter) red chair(non-neuter)
- c. rood bed
red(neuter) bed(neuter)
- d. rode stoel
red(non-neuter) chair(non-neuter) (La Heij, et al. 1998, 209)

The gender of the visually presented distractor word was either congruent or incongruent with the gender of the target word. Schriefers found that subjects' naming latencies were longer when the gender of the distractor word and target word were incongruent. Assuming that lexical representations in Dutch include links to "gender nodes", he attributed this slowdown to competition among the two

different gender nodes which were activated when the distractor and target words were accessed.

La Heij, Mak, Sander and Willeboordse (1998) sought to expand upon Schriefers' (1992) results. They used the picture-word interference paradigm with a visually presented distractor word. They asked their Dutch speaking subjects to produce an NP consisting of a determiner and a noun and replicated Schriefers' results for noun phrase production. They also, however, included a condition in which subjects were required to produce bare nouns as labels for the pictures. In this bare noun condition no gender congruency effect was found. La Heij et al. propose that this pattern of results indicates that the gender node is activated only when it is specifically required (i.e. necessary for the selection of gender marked determiners and/or agreement morphemes).

Schriefers and Teruel (2000) conducted a similar study in German. German has a three gender system (masculine, feminine and neuter) and, like Dutch, no overt (i.e. morphological) gender marking (although, in a sentential context, nouns may receive accusative, dative or genitive case endings which reflect their gender). Using the picture-word interference paradigm, with auditorily presented distractor words, the researchers asked subjects to produce NPs (either determiner+noun or determiner+adjective+noun) as labels for the pictures. The researchers varied the Stimulus Onset Asynchrony (SOA), i.e. the onset of the distractor word relative to the presentation of the picture. They also included an additional condition in this experiment: some distractors were semantically related to the picture (previous research had shown that at early SOAs, semantically related distractors slowed down picture-naming times). They found a semantic inhibition effect at early SOAs (-225, -150, -75 and 0) and a facilitatory gender congruency effect at later SOAs (+75 and +150) for both types of NPs. While it is not clear whether this effect is due to competition in the selection of abstract gender features associated with the lexical item or the selection of the gender appropriate article/gender inflected adjective, Schriefers and Teruel interpret this result as indicating competition between activated gender-related nodes.

In sum, both Dutch and German show gender congruency effects when subjects produce NPs, but not bare nouns. Research on gender congruency in Romance languages shows a different pattern of results. We should note at this juncture that the gender systems in Romance languages are different in important ways from the Germanic systems. First, they are binary (masculine and feminine) and overt morphological gender marking on nouns is prevalent. Another important distinction is that for some Romance languages (Spanish, Catalan and Italian) it is necessary to know the phonological form of the noun prior to selecting the appropriate definite determiner.

Miozzo and Caramazza (1999) conducted a study in Italian using the picture-word interference paradigm. The researchers found no gender congruency effects in the production of NPs (determiner + noun). The gender system of Italian differs from Dutch and German in that in order to select the gender appropriate definite article, it is necessary to know the phonological form of the corresponding noun. The masculine article can either be *lo*, *il* or *l'* and a feminine article can be *la* or *l'* depending on the nature of the first phoneme of the noun. If a masculine noun starts with *z*, *gn*, *ps* or *s*+consonant the definite article will be *lo*. If it begins with any other consonant or cluster of consonants, the article will be *il*. In addition, if a noun of any gender begins with a vowel, the article will be contracted to *l'*. Miozzo and Caramazza propose that because the selection of the gender-matched article must be delayed until the phonological form of the noun is retrieved, any gender congruency effects that might have occurred earlier in the process would have disappeared. They make a distinction between early selection languages (like Dutch and German) in which the gender of the noun is the only criterion for determiner selection and late selection languages (like Italian). This issue will become clearer when the production models are discussed in some detail below.

Costa et al. (1999) conducted a series of experiments on Spanish and Catalan in order to provide clarification on the issue of gender congruency effects in languages which require the phonological form of the noun prior to the selection of the determiner. Catalan is similar to Italian in that it is necessary to know the phonological form of the noun in order to select the appropriate article. Spanish, in contrast, is more similar to Dutch and German in that, for the most part, phonological information is not needed to select the article. (There is, however a small number of feminine nouns (less than 0.5% of nouns) in Spanish which, due to their phonological form, do not select the standard feminine article¹.) In all of the experiments, subjects were required to produce an NP (determiner + noun). Again, no gender congruency effects were observed for either language. Costa et al. adopt Miozzo and Caramazza's (1999) explanation of the Italian data: selection and retrieval of the phonological form of a word renders invisible any gender congruency effects that may have occurred during early lexical selection processes. While this explanation seems reasonable for Catalan, it is somewhat vexing for Spanish, a language in which, as per Costa et al., "late selection" of an article would occur for less than 0.5% of nouns.

Having laid the groundwork, it is now time to discuss the critical study: Cubelli, Lotto, Paolieri, Girelli and Job (2005). This study is pivotal in that these researchers examined the question of the production of bare nouns in a language

¹ If a feminine noun begins with an /a/ which has primary stress, the article will be *el*. In all other cases, the feminine article is *la*. Therefore, it is *el agua* and *el águila* but *la adolescencia* and *la aspirina*.

other than Dutch. They indeed found an effect in Italian which is evidence that the issue of gender congruency effects in bare noun production had been prematurely dismissed. The fact that the effect disappeared when subjects were asked to produce NPs is consistent with the previous studies in Romance.

The absence of gender congruency effects in the production of bare nouns has been “explained by assuming that nominal gender plays no role in the selection of a word's phonological representation and that lexical selection is supplied only by semantic information, without accessing the associated syntactic features” (Cubelli et al. 44). This may be the case but, as Cubelli et al. point out, it could also be due to some property which is specific to Dutch. For example, in Dutch, “[n]ouns are not overtly marked for gender” (46) but rather gender marking is realized on the determiners. In Italian, nouns are overtly marked for gender. Gender can be predicted from the nature of the last vowel (there are, of course, exceptions). In Italian, but not in Dutch, grammatical gender is relevant to the morphological structure of bare nouns. Cubelli et al. claim that “one can assume that grammatical gender has to be available early in Italian, at the level of selection of open class words, but late in Dutch, at the level of closed class words” (46). If this is true, there should be a gender congruency effect in the production of bare nouns in Italian but not in Dutch.

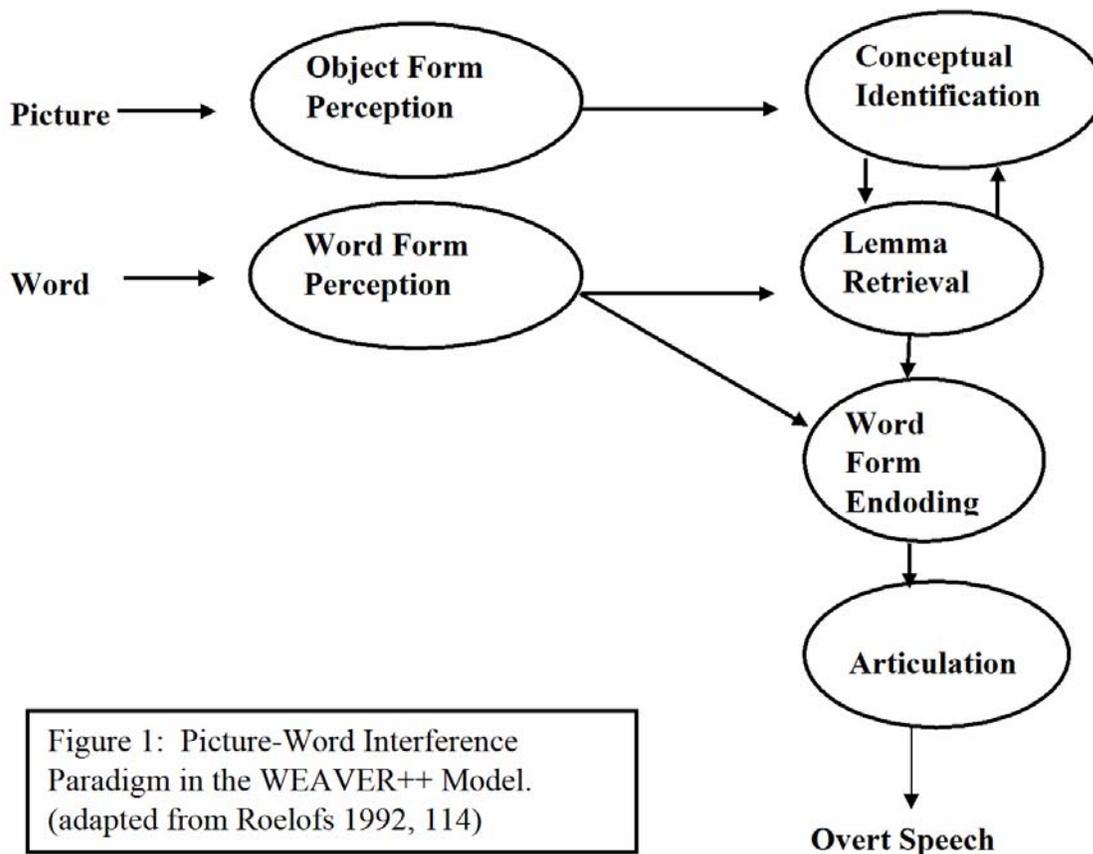
Cubelli et al., in a series of experiments conducted with the picture-word interference paradigm, examined the effect of both semantic relatedness and gender congruency and found consistent and robust effects for both in the production of bare nouns. These effects were inhibitory in both conditions: naming times were slower when the distractor word and the target word were semantically related and when the two were of the same syntactic gender. This effect was found when the target words were phonologically transparent (when the masculine or feminine gender of a word can be predicted based upon the final vowel, -o and -a, respectively) and phonologically opaque (when the final vowel, -e in the stimuli, can indicate either masculine or feminine). As previously mentioned, the gender congruency effect (but not the semantic inhibition) disappeared when subjects were asked to produce NPs.

2. Models of Word Production

We will now describe two prominent models of lexical access (the WEAVER ++ model (Roelofs 1992 and Levelt, Roelofs and Meyer 1999) and the Independent Network model (Caramazza 1997)) which will serve as the frameworks in which we will incorporate our results.

2.1 WEAVER++

Roelofs (1992) posits four levels of processing in the naming of a perceptually presented object: (1) “object identification based on perceptual input” (113), (2) lemma retrieval (the retrieval of the bundle(s) of abstract semantic and syntactic features that comprise a lexical item), (3) word-form (phonological) encoding and (4) articulation. Roelofs assumes that there is bidirectional communication between the conceptual identification level and the lemma retrieval level. When a written word is presented, the lemma retrieval and word-form encoding levels will be activated independently (so, from word-form encoding the process will proceed to articulation and, therefore, visually presented distractor words will be encoded even though the subject will not produce them). Research indicates (Glaser and Glaser 1989, La Heij, et al. 1990, Glaser & Dünghoff 1984) that the word-form can be accessed directly from a written representation of a word in a production task.



With regard to the structure of the lexical network there are three strata (see Figure 2).

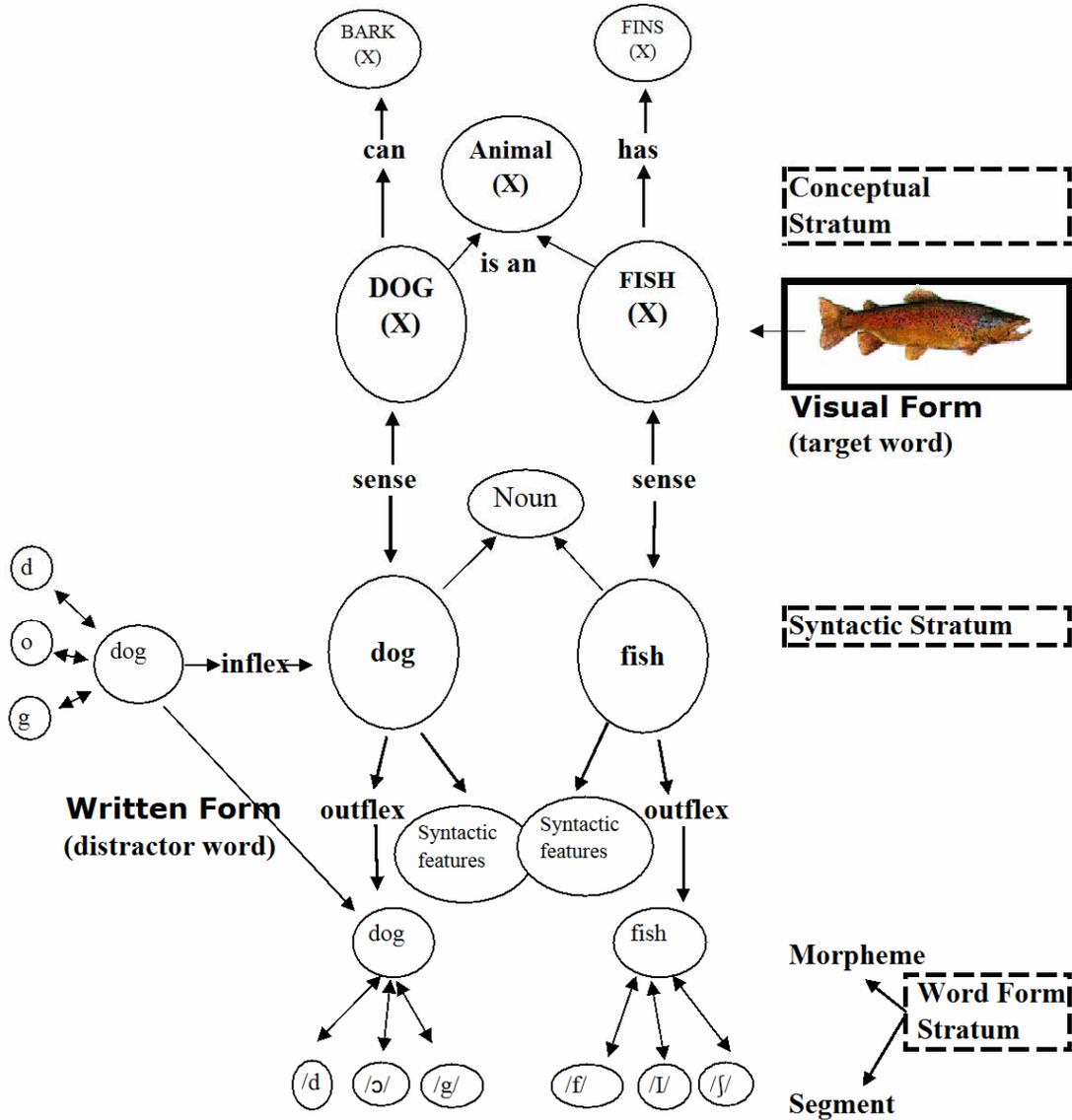


Figure 2: The lexical network involved in the picture-word interference paradigm in the WEAVER++ Model. (adapted from Roelofs 1992, 116)

First there is the conceptual stratum (containing conceptual nodes) in which semantic features are specified. Roelofs posits numerous ‘relation’ nodes (CAN, HAS, IS-A, etc.) which link the representations at the conceptual stratum to their semantic features and hypernyms. This stratum has the visually presented object as its input and SENSE (the conceptual specifications for the lemma) as its output. Second, there is the syntactic stratum (containing lemma nodes) in which syntactic features such as syntactic category and gender are specified. Please note that, as the example in Figure 2 is in English, there are no gender nodes specified. The nodes marked “syntactic features” represent the location of gender features in this model.

This stratum has INFLEX (orthographically presented input lexeme) as its input and OUTFLEX (output lexeme which links the syntactic and word-form strata) as its output. In addition, it provides feed-back to the conceptual stratum in the form of the two-way SENSE link. Lastly, the third level is the word-form stratum where morphological, phonological and prosodic features are specified. This stratum has also INFLEX as its input in addition to OUTFLEX (the output of the syntactic stratum).

Roelofs' spreading activation model characterizes lemma retrieval as "a very simple process" in which "[t]he activation level of the node of the to-be-verbalized concept is enhanced, followed by the spread of the activation from the conceptual stratum towards the syntactic stratum, and a selection of the highest activated lemma node" (117). In the picture-word interference experiment, the "retrieval system must select the lemma activated by the picture, and prevent selection of the lemma activated by the distractor word" (117). He accounts for the semantic inhibition effect observed in previous experiments (Glaser and Dunkelhoff 1984) by positing that when the object and distractor word are semantically related, each activates the other's lemma node. For example, in Figure 2, the object in the picture is a fish and the distractor word is *dog* so the lemmas of both are activated. The target is *fish*. When the path from the distractor word to the target lemma node (dog - DOG (X) - ANIMAL (X) - FISH (X) - fish) is longer than from the picture to distractor lemma node (FISH (X) - ANIMAL (X) - DOG (X) - dog), there is semantic inhibition because the picture will, therefore, prime the distractor word lemma more than the distractor word will prime the target lemma for the picture. The distractor word, therefore, receives higher activation than the target. This is the cause of the semantic inhibition. In the unrelated condition, the two lemmas which are active do not activate each other and there is no conflict.

Roelofs' model provides an adequate framework for lexical access within the context of the picture-word interference paradigm. The only condition he examines, however, is semantic relatedness. Levelt, Roelofs and Meyer (1999) advance the model by providing a more in depth analysis of its properties relating to syntactic, morphological, phonological and phonetic selection. The key insight for the current analysis is that the syntactic features of a lemma become available only after the lemma is selected for production, not by mere activation (4). There is no spreading activation from active but not-selected lemmas. While activation from the conceptual stratum may spread to various lemmas, this lemma-level activation will spread to the syntactic nodes, and the word-form level, only when the lemma with the highest activation is selected. Another important point made by Levelt, Roelofs and Meyer (1999) is that they assume that "recognizing a word, whether spoken or written, involves accessing its syntactic potential, that is, the perceptual equivalent of the lemma [and, therefore,] activation of the

corresponding lemma-level node" (7). In other words, word recognition (lexical access) always involves the access of that word's syntactic features (i.e. potential). The implication is that "distractor words will have direct access to the lemma stratum" (11) and according to the assumption cited above, they should access syntactic features.

This model predicts that the "gender congruency effect should only be obtained when agreement has to be computed" (Levelt, Roelofs and Meyer.1999, 14). While all lemma nodes of nouns point to their corresponding gender node, these connections are one way. Activating the gender node of one lemma will not influence the level of activation of another lemma. Levelt et al.'s model "makes a distinction between the activation of the lexical network and the actual selection of nodes" (14). The gender node will only be selected when gender information is necessary for the selection of gender congruent determiners, adjectives, etc. This model, therefore, predicts gender congruency effects in the picture-word interface paradigm when subjects are required to produce noun phrases but not when they produce bare nouns.

2.2. Independent Network Model

Caramazza's (1997) model of lexical access addresses more directly the issue of the representation of syntactic features and provides valuable insights into the nature of grammatical gender. Caramazza maintains that it is critical to distinguish between a lexical-semantic level and the word-form level but disputes Roelofs (1992)'s assertion of the existence of the lemma as an obligatory intervening step between the lexical-semantic and word-form levels. He argues that this intervening lemma level, in which, as per Roelofs, syntactic information is specified, is superfluous and, therefore, need not exist. He proposes the Independent Network (IN) model in which the representation of syntactic information is autonomous from that of semantic and phonological information (see Figure 3). In the IN model, there is a lexical-semantic network representing "word meanings as sets of semantic properties, features or predicates" (194) and a lexical syntactic network representing "features such as grammatical category, gender, auxiliary type, tense," (194) etc. In the lexical-syntactic network, there are subnetworks for different grammatical features (grammatical category, gender, etc.). "Nodes within a subnetwork have inhibitory links since they are in competition" (194). His IN model contains no modality independent lexeme representations but rather distinct lexeme representations for the oral and orthographic modalities (P-lexemes and O-lexemes, respectively).

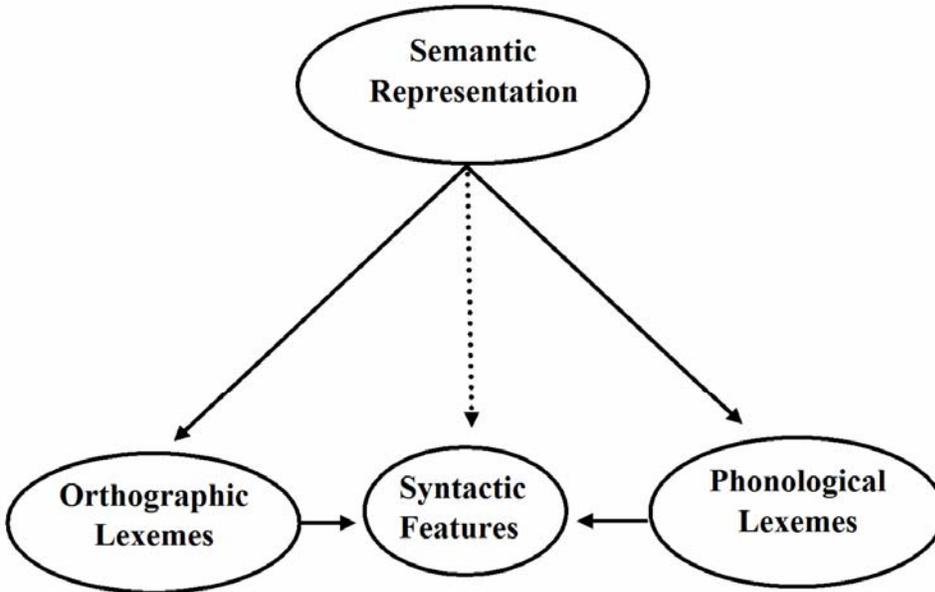


Figure 3: The lexical access network in the Independent Network Model (adapted from Caramazza 1997, 196)

Word production, then, involves the following. The activation of a lexical-semantic representation spreads to the lexical-syntactic network and to either a P-lexeme or an O-lexeme network. Caramazza states that “[n]ot all syntactic features can be activated by the semantic network” (194), and a prime example of this is grammatical gender. Even though some grammatical features, like grammatical category, are activated by the semantic network, the level of activation is not sufficient for the feature to reach threshold and be selected. The syntactic network itself must be activated by the selection of the modal-appropriate lexeme. Syntactic features are selected prior to the selection of the specific phonological/orthographic form of the word. The spread of activation from the lexical-semantic representation to the lexical-syntactic and lexeme levels is independent and simultaneous.

This model makes clear predictions for gender congruency effects in the picture-word interference paradigm. Gender as a syntactic feature is not accessed until the output form is selected so gender as a property of a noun would not be a prerequisite for the selection of a bare noun for production (as opposed to semantic features). With regard to noun phrases, which do require the access of gender information for production, it is possible that, as Caramazza & Miozzo (1997) propose, gender congruency effects in the production of NPs is due to competition in the selection of determiners. If two different gender marked determiners are activated equally by the distractor word and target word, then they will compete. Gender congruent picture-word pairs will not be subject to competition and so

response latencies will be faster. The IN model, therefore, predicts a null effect in bare noun production and a facilitatory effect in NP production.

2.3 The Double Selection Model

Cubelli et al.'s (2005) finding of *inhibition* (or interference) with congruent gender defied the predictions of the two models of lexical access during language production discussed thus far. In order to account for these data, Cubelli et al. developed the Double Selection model. As Cubelli et al. note,

Our findings, [. . .], allow us to propose that in contrast to what is assumed by the WEAVER++ model, the selection of a noun's grammatical gender, at least in Italian, is mandatory (i.e., it occurs also when the noun has to be produced outside a sentential context), and that, in contrast with what is assumed by the IN model, it is not automatic (i.e., it reflects a competitive process). (52)

Cubelli et al. suggest that both lexical-semantic and lexical-syntactic information must be selected before accessing the phonological form of a word. The two feature types (semantic and syntactic) are selected independently of each other and both are competitive selection processes. Only after the competition at both levels has been resolved can the phonological form of the word be accessed. Competition at the semantic or conceptual stratum is assumed in both of the models of lexical access (WEAVER++ and IN). When representations at this semantic level are similar, they are both highly activated and compete for selection. Cubelli et al. propose that the same competitive selection process occurs with syntactically similar lemma representations (i.e., representations which share the same gender). See Figure 4. “[C]ompetition at the lemma level produces the selection of the abstract, full description, either semantic or syntactic, of a given noun” (53) not a semantic category or gender node. In other words, the semantic and syntactic features of a lexical item are contained in two independent, abstract representations (rather than in a feature network).

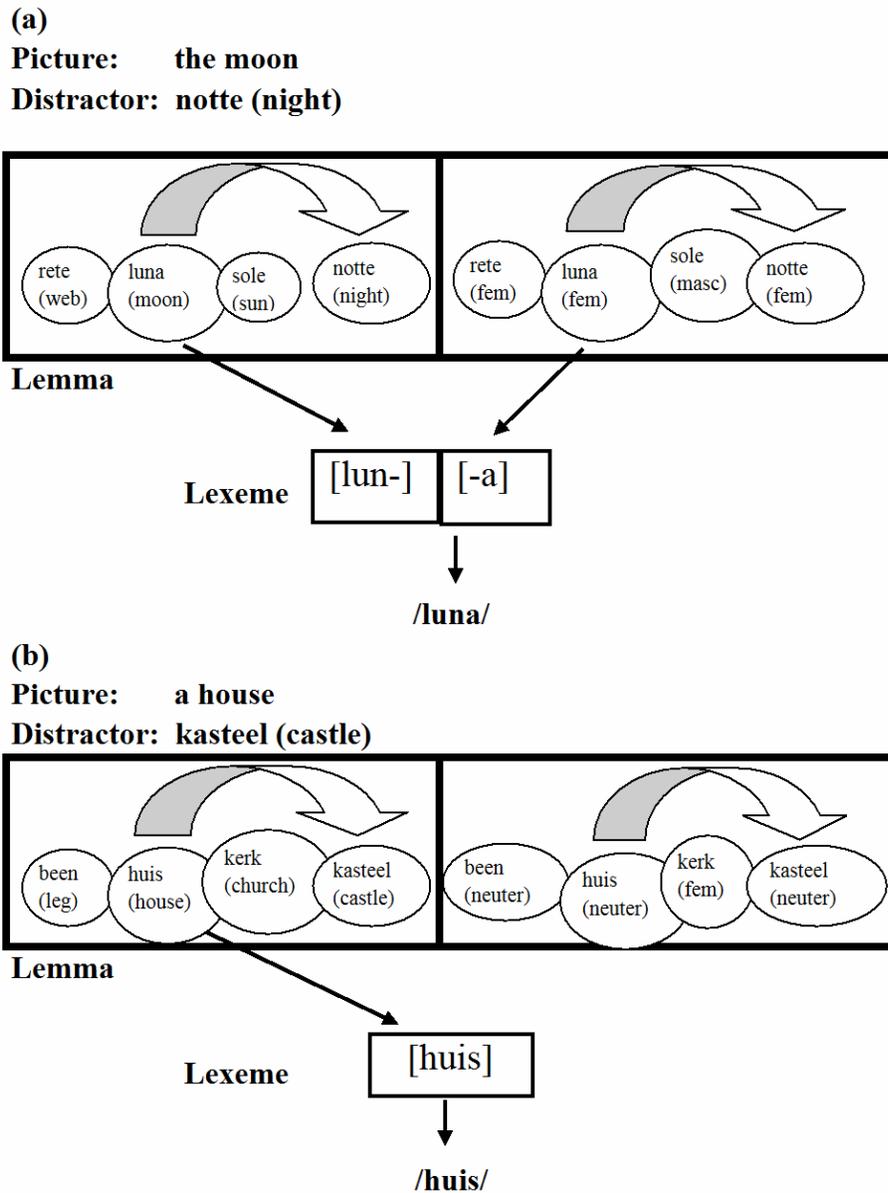


Figure 4: Bare noun production in Italian (a) and Dutch (b) in the Double Selection model. (adapted from Cubelli, et al. 2005, 54)

Figure 4 (Cubelli et al. 54) provides a graphic representation of the production of bare nouns in Italian (A) and Dutch (B) in Cubelli et al.'s Double Selection model. The left hand box shows the semantic representations while the right hand box shows the syntactic representations. The arrows connecting the representations within a box indicate activation while the arrows connecting the lemma to lexeme indicate selection. Cubelli et al. assumes that the selection of the

grammatical gender feature is only required in languages like Italian in which almost all nouns have a complex morphological structure related to gender, as opposed to Dutch which has no such structure. Cubelli et al. describe the process of accessing the correct form for the target in Italian as follows:

At the lemma level, the semantic competition occurs first. Then, if the target and distractor nouns have the same grammatical gender, their syntactic representations compete for selection, thus slowing the access to the correct vowel ending. Therefore, the gender interference effect originates at the level of representation that precedes the level specifying the morpho-phonological form. (54)

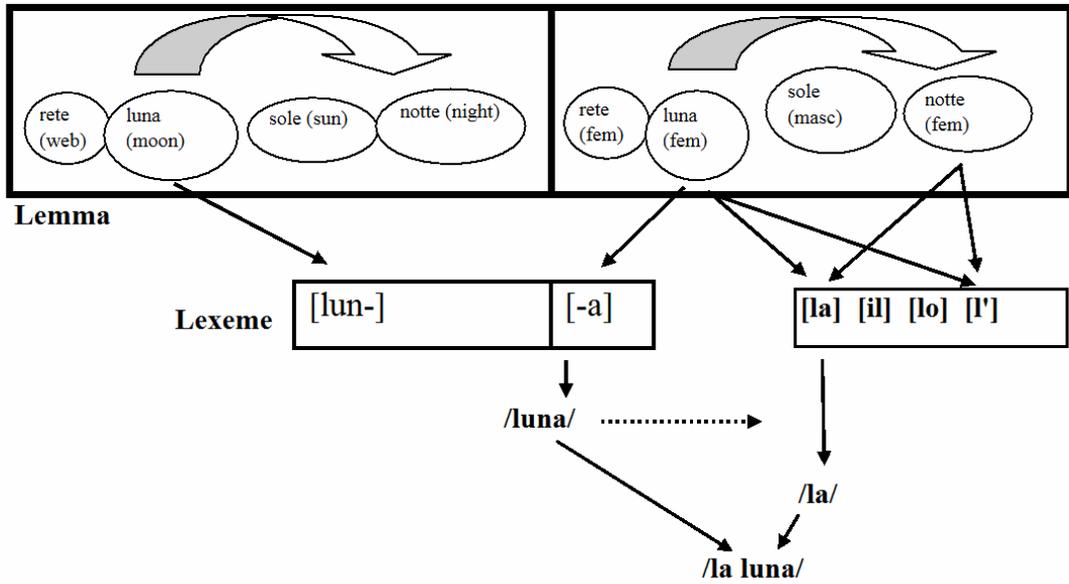
In Dutch, no inflectional information needs to be selected in the production of bare nouns so the selection of semantic information is sufficient in order to access the phonological form of a noun. The selection of grammatical gender is, therefore, irrelevant outside of a sentential context in Dutch and, so, there is no gender congruency effect in the production of bare nouns. This account is consistent with the WEAVER++ model in that it posits that grammatical information must be selected before accessing word form, however, in contrast to the WEAVER++ model, Cubelli et al. also proposes a direct link between semantic representations and phonology.

In accordance with the current data and that of Miozzo & Caramazza (1997), the model predicts that the gender congruency effects will disappear when subjects produce an NP (see Figure 5).

(a)

Picture: the moon

Distractor: notte (night)



(b)

Picture: a house

Distractor: kasteel (castle)

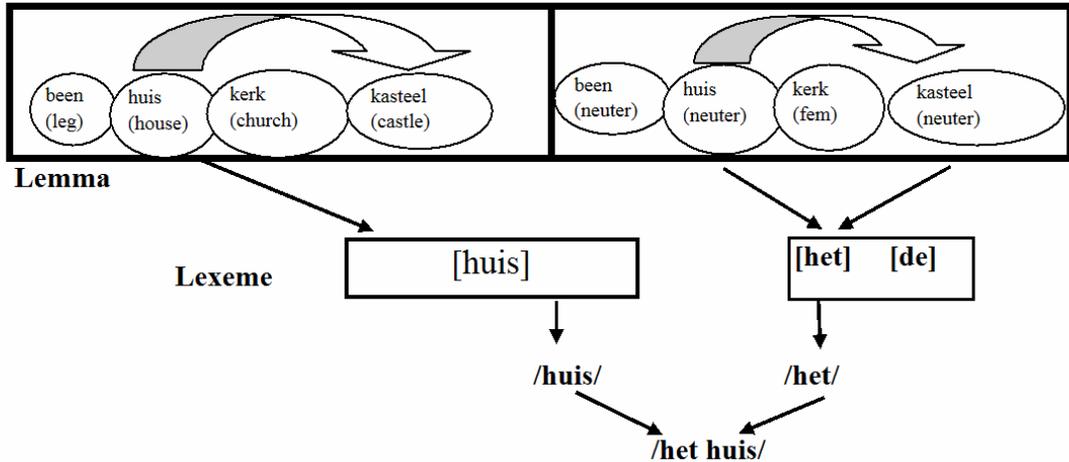


Figure 5: NP production in Italian (a) and Dutch (b) in the Double Selection model. (adapted from Cubelli, et al. 2005, 55)

In Italian (Figure 5a), when the distractor word and target are gender congruent, they do send activation to the same set of determiners but, ultimately, the selection of the determiner is postponed until the phonological form of the noun is available (indicated by the dashed arrow), so that any effects based on the

congruency between the two nouns have dissipated. In Dutch (Figure 5b), the selection of the determiner can be made prior to the selection of the phonological form as there is no relationship between the two. The increased activation of the definite article gives rise to the facilitatory effects observed in previous research (Schriefers 1992, La Heij et al. 1998).

2.4 Conclusions

The predictions of the WEAVER++ and Independent Network models—that congruency effects will arise in the production of NPs but not bare nouns—hold for Dutch and German but not Italian, Catalan and Spanish. With regard to NP production, several factors can be examined in an attempt to account for this data. First, as has been previously noted, Italian, Catalan and Spanish require phonological form information in order to select between gender appropriate determiners whereas Dutch and German do not. This distinction between early and late selection languages could explain the contrasting data (Miozzo and Caramazza, Costa et al.). The group of possible determiners would be activated but not selected until the phonological form of the noun is specified. It is doubtful, however, if Spanish can be included in the late selection group because phonological form information is relevant to determiner choice for a tiny minority of nouns. Schriefers and Teruel (2000) observe that gender congruency effects are found in languages in which there is a one-to-one relationship between the gender node of the noun and its determiner (as opposed to the one-to-many relationship in the Romance languages). It appears that the nature of the mapping from gender node to determiner establishes whether or not a gender congruency effect will be obtained. Again, such an explanation appears plausible for Italian and Catalan but it remains uncertain that Spanish belongs in the one-to-many category.

The conflict between the Dutch and Italian data for bare noun production is very important as it establishes that not all languages will pattern like Dutch. The Double Selection model provides an account for Cubelli et al.'s (2005) findings based on the morphological differences between Italian and Dutch. The critical question is, will the predictions of the Double Selection model for bare noun production hold for other Romance languages?

3. The Current Study: Gender Congruency in Spanish

The results of Cubelli, et al. for Italian lead us to ask whether such a result could be obtained in other Romance languages. Spanish, the object of the current study, provides an excellent opportunity to address this question. The gender system of the Spanish language is similar to that of Italian but it has some important

differences. After discussing the relevant features of the Spanish language, the previous research on Spanish will be assessed and the parameters for the current study will be set forth.

Spanish, like Italian, has a two gender system (masculine and feminine). Put simply, there are phonologically transparent nouns which end in *-o* or *-a*, for masculine and feminine respectively, as well as phonologically opaque nouns which end in *-e* and can be either masculine or feminine. But also, there are derivational morphemes which are associated with specific genders (*-ción* tends to be feminine while *-dor* tends to be masculine, for example) and word final letters form phonologically opaque nouns (*-z*, *-s*, *-l*, etc.). There are also irregular forms which bear a morpheme typically associated with one gender but are actually the other gender. For example, in *la radio* (radio), the word final vowel typically indicates a masculine noun but the word is feminine. Likewise with, *el mapa* (map), the word final *-a* typically indicates a feminine noun but the word is masculine.

Also like Italian, but unlike Dutch and German, Spanish has overt gender marking in the morphology of nouns; nouns that end in *-o* are masculine (*el carro* (car), *el libro* (book)) and nouns that end in *-a* are feminine (*la taza* (cup), *la tienda* (store/tent)). The gender of a noun, therefore, is relevant to the realization of its form and, therefore, to the production of nouns both within and outside of a sentential context (the NP and bare noun conditions, respectively). It can be proposed that, as per Cubelli et al., grammatical gender is available in Spanish, as in Italian, at the level of selection of open class words.

3.1 Predictions of the Current Study

The goals of the current experiment, conducted in the picture-word interference paradigm, were to determine if the gender congruency effect found in Italian by Cubelli et al. could be replicated in Spanish. Based on the previous research and specific features of Spanish the predictions of the current study are as follows:

- 1) A gender congruency effect in the production of bare nouns.
- 2) No gender congruency effect in the production of NPs.
- 3) Picture naming latencies for masculine and feminine targets in the NP production will differ.

As the central goal of this study was to determine if Cubelli et al.'s findings for Italian hold for Spanish, the lack of experimental results in Spanish drawn from a full range of SOAs² will not be addressed in this experiment but rather in future research. The purpose was to merely determine whether or not Spanish exhibits

² Schriefers & Teruel (2002) noted this as a criticism of Costa et al.'s (1999) findings for Spanish, however, Cubelli et al. (2005) elicited gender congruency effects at an SOA of 0 ms.

any gender congruency effects in the production of bare nouns and NPs at an SOA of 0ms and whether there are any gender specific effects. Predictions 1 and 2 are based on Cubelli et al (2005) and Costa et al (1999), respectively, while prediction 3 is a conjecture based on the fact that only feminine nouns are affected by form dependency in determiner selection. This last question was not addressed by Costa et al.

3.2 Method

3.21 Subjects

Data were collected from a total of 16 subjects. All of the subjects were Spanish/English bilinguals for whom Spanish was the dominant language. A total of 25 subjects were tested in the experiment. Two had to be excluded due to the fact that they were English dominant and seven more had to be excluded due to problems with the recording equipment. The ages of the participants ranged from 18 to 45 (average age was 31.3).

3.22 Stimuli

Fifty-five pictures (line drawings) were selected from Lotto, Dell'Acqua and Job's (2001) database (thirty for the gender conditions, fifteen for the semantic conditions and ten for the training phase). This database was also the source of Cubelli et al.'s picture stimuli. All of the targets (picture names) for the gender condition ended in either *-a* or *-o* (for feminine and masculine, respectively) while some of the nouns in the semantic conditions ended in *-ón* (masculine). Of the thirty pictures were selected for the gender conditions fifteen had masculine targets and fifteen had feminine targets. The words in each of the two lists (masculine and feminine) were matched against each other for frequency and word length (Feminine targets: Avg. Frequency = 301.1 (per 6,750,000), Avg. Length = 4.3; Masculine targets: Avg. Frequency = 307.6, Avg. Length = 4.4). Frequency information was obtained from Davies' (2005) Corpus del Español.

One hundred and ten distractor words were chosen. For the gender conditions, sixty canonically gender marked nouns (all bearing the *-a* or *-o* morpheme), all the same frequency and length, were chosen as the distractor words. Thirty distractor words were chosen for the semantic conditions and twenty for the training phase. As the distractor words were presented auditorily, recordings were

made of a native Spanish speaker pronouncing all of the distractor words. In addition, a non-word speech sound ([m:]³) was recorded in order to have a baseline.

Six conditions, differing as to the relationship between the target and distractor, were employed in this experiment. They are as follows:

TABLE 1

Condition	Target (example)	Distractor (example)
Gender congruent	bota (boot-feminine)	seda (silk-feminine)
Gender incongruent	bota (boot-feminine)	queso (cheese-masculine)
Gender baseline	bota (boot-feminine)	[m:] (baseline)
Semantically related	piña (pineapple)	frutas (fruit)
Semantically unrelated	piña (pineapple)	lobo (wolf)
Semantic baseline	piña (pineapple)	[m:] (baseline)

Each picture appeared three times per session as each target was matched with three different distractors. In the gender congruent condition, the target and distractor were of the same gender. In the incongruent condition they were of different genders. Lastly, in the baseline condition, the picture was accompanied by the non-word speech sound ([m:]). In the semantic conditions the targets were presented similarly (accompanied by a semantically related distractor, an unrelated distractor and the non-word speech sound). The remaining ten pictures were incorporated into a training phase which mimicked the arrangement of the experimental items.

Subjects participated in two sessions. In one session, they were asked to produce a bare noun in the picture-naming task and in the other they were asked to produce a noun phrase (definite article + noun). The picture-word pairs were the same in both sessions but the order of presentation was in a different random order in each session.

3.23 Procedure

After the subject filled out a consent form and language history questionnaire, the experimenter showed the subject hard copies of all of the pictures that would appear in the experiment and asked him/her to name the objects depicted. This warm-up activity (lasting between 5 and 10 minutes) was conducted exclusively in Spanish. Next, the subject performed the experimental tasks in a sound attenuated booth. In each trial, subjects saw an orienting cross prior to being presented (simultaneously) with the picture and distractor word. Subjects were instructed to

³ This sound in informal transcription is “ummmm”.

name the object shown in the picture as quickly and accurately as possible. Naming latencies were measured from the onset of the distractor word. Display of stimuli, recording of naming latencies and the creation of Digital Audio (*.wav) files of subjects' responses was achieved with the DMDX software package developed at the University of Arizona by J.C. Forster (Forster & Forster, 2003). Each session lasted about fifteen minutes. The order of the sessions (Bare noun/NP, NP/bare noun) was balanced across subjects. All sessions were recorded on cassette tape (as a back-up to the digital *.wav files).

3.24 Results

In bare noun production, 7.18% (155) of responses was excluded from the analysis, 25.16% (39) of which were naming errors. In NP production, 7.59% (164) of responses was excluded from the analysis, 33.53% (55) of which were naming errors. The mean correct response times (RTs) are plotted in Table 2.

TABLE 2: Reaction Times for Bare Noun and NP Production in All Conditions

Bare Noun Production		p value			p value
<i>Condition</i>	<i>RT</i>		<i>Condition</i>	<i>RT</i>	
Gender Congruent	845		Semantic Related	898	
Gender Incongruent	846		Semantic Unrelated	853	
Gender Baseline	786		Semantic Baseline	755	
<i>Difference (Congruent – Incongruent)</i>	-1		<i>Difference (Related –Unrelated)</i>	45*	p = .029
Noun Phrase Production					
<i>Condition</i>	<i>RT</i>		<i>Condition</i>	<i>RT</i>	
Gender Congruent	829		Semantic Related	847	
Gender Incongruent	827		Semantic Unrelated	836	
Gender Baseline	769		Semantic Baseline	768	
<i>Difference (Congruent – Incongruent)</i>	2		<i>Difference (Related –Unrelated)</i>	11	

An analysis of variance (ANOVA) was performed on these data and the only significant finding is the semantic inhibition effect in bare noun production ($f(1,15) = 5.866, p = 0.029$). The 11 ms. inhibitory effect in the noun phrase production task does not approach significance ($f(1,15) = 0.784, p = 0.390$). Overall naming latencies in bare noun production were longer than in noun phrase production but this did not approach significance (for all items with distractor words: difference = 23, $f(1,15) = 1.363, p = 0.261$; overall including the base line items: difference = 16, $f(1,15) = 0.890, p = 0.360$). While table 1 reflects the collapsed analysis in which masculine and feminine targets are lumped together, Table 3 shows the average reaction times for target words in the gender conditions broken down by gender.

TABLE 3: Reaction Times in Gender Conditions for Each Gender

Bare Noun Production		Noun Phrase Production	
<i>Condition</i>	<i>RT</i>	<i>Condition</i>	<i>RT</i>
Gender Congruent – Feminine	832	Gender Congruent – Feminine	832
Gender Incongruent – Feminine	835	Gender Incongruent – Feminine	826
<i>Difference</i>	-3	<i>Difference</i>	6
Gender Congruent – Masculine	857	Gender Congruent – Masculine	825
Gender Incongruent – Masculine	856	Gender Incongruent – Masculine	829
<i>Difference</i>	1	<i>Difference</i>	-4

Clearly no congruency effects were elicited for either gender (the reaction times are virtually identical). It is, however, interesting to note that, contrary to our predictions, masculine targets elicited longer response latencies than feminine targets, overall (including the baseline), in the bare noun production task (difference = 30, $f(15) = 4.159, p = .059$).

4. Discussion

As predicted, there were no gender congruency effects in noun phrase production and, thus, the findings of Cubelli, et al. (2005), Costa, et al. (1999) and Miozzo and

Caramazza (1999) were successfully replicated. This reinforces the notion that Spanish can be included in the same category with respect to determiner selection as Italian and Catalan, in spite of the fact that the form dependency in Spanish is nowhere near as pervasive. It was also predicted that there would be a difference in the behavioral response to masculine and feminine target nouns. This was indeed the case but the difference was limited to the bare noun condition. It seems that, overall, naming latencies are slower for masculine targets. There is no obvious form-related reason for this difference. In the set of target words, there were two feminine targets (*flecha* (arrow) and *fresa* (strawberry)) and one masculine target (*globo* (globe)) with complex onsets. In addition, there were two feminine targets which had an onset (*olla* (pot) and *uva* (grape)) and there were three such masculine targets (*apio* (celery), *ajo* (garlic) and *hongó*⁴ (mushroom)). The rest of the target words have a single consonant as an onset. There does not appear to be a significant difference in onset quality that would merit such divergent reaction times. While this finding inspires contemplation, it does not shed light on the issues relating to gender congruency or determiner selection and, as it did not reach statistical significance, we will leave it as a potential topic of future research.

The critical prediction of the study was not supported. There were no gender congruency effects of any kind found in bare noun production. From this result, it must be concluded that in Spanish, as in Dutch, syntactic gender is not accessed in bare noun production. This finding is in direct contrast to that of Cubelli et al. findings for Italian—recall, they found gender congruency inhibition effects with bare nouns—and leads us to wonder if there is some critical, previously overlooked, difference between Spanish and Italian that could affect the access of gender information in lexical access. As has been previously stated, phonological form dependency in determiner selection is less pervasive in Spanish than in Italian but this should not have any bearing on the bare noun production condition. One difference between the two languages that could have some bearing on issues relating to gender access is that, almost without exception, Italian nouns end with a vowel. Italian, therefore has a limited number of segments that can appear word finally in nouns (*-a, -o, -e, -i, -à, -ì, -è, -ò, -ù*) (Altiere Biagi 1973). Naturally, the *-a* and *-o* endings represent transparent gender marking while the *-e* and *-i* endings are ambiguous with respect to gender. Cubelli et al. takes the *-e* (which is far more common than the *-i*) to be “opaque inflection” (51) but a gender marked inflectional ending all the same, albeit phonologically opaque. Adopting Cubelli et al.’s view, we will consider these unaccented noun final vowels to represent inflectional morphemes. The remaining noun-final vowels, which bear primary accent, are typically either derivational morphemes themselves or the nucleus of a

⁴ While there is an orthographic consonant in this word, the “h” is silent and the phonological word has no consonant as an onset (/ongó/).

derivational morpheme. While the gender of derived nouns is often predictable, the word-final morpheme designates the word class, not the gender (it is not gender inflection).

Spanish has a similar system in that there are word-final vowels which can be construed as gender inflection (-a, -o and the ambiguous -e), but Spanish allows coda consonants in word final position. This is critical because, while in Italian, if a word-final morpheme ends in a consonant, a gender marked inflectional morpheme (a vowel) must also be selected, in Spanish, this does not occur.

1.	Spanish:	a. la opin-ión	d. la actr-iz	g. el vende-dor
	Italian:	b. l'opin-ion-e	e. l'attr-ic-e	h. il vendi-tor-e
	English:	c. opinion	f. actress	i. vendor

In Cubelli et al.'s Double Selection model, the Italian syntactic representation of *opinione* would compete with other activated feminine representations in order to “access the correct vowel ending” while the Spanish *opinión* would not require any gender inflection.

We can then conclude that Spanish, by virtue of permitting coda consonants word finally, has fewer nouns than Italian that will require gender inflection and, therefore, Spanish has more nouns than Italian for which gender information is not necessary to access the phonological form. In this respect, Spanish seems to be more like Dutch and German. It follows from these observations that Spanish would pattern like Dutch and German in bare noun production. In terms of Cubelli et al.'s Double Selection model, it seems as though the gender marked syntactic representations of Spanish nouns are not in competition but rather, as Cubelli et al. sets forth for Dutch, “the selection of semantic representation is sufficient to access the whole lexical form of a given noun” (54).

The data from Spanish fits nicely in the existing models (WEAVER++ and the IN model), indeed it conforms exactly to their predictions. It is Cubelli et al.'s Italian data that did not fit these models. The findings of the current study do not confirm or detract from the Double Selection model as an account of Cubelli et al.'s findings, but they do show that the predictions of the model do not hold for Spanish and, therefore, further research will be necessary to validate the proposed processes in the access of syntactic features.

5. Conclusion

The goal of the current experiment was to determine if a gender congruency effect could be achieved in Spanish using the picture-word interference paradigm. No effect was predicted for NP production, pursuant to the previous findings of Costa

et al. (1999) but here was sufficient reason to believe, due to Cubelli et al.'s (2005) findings, that an effect could be elicited from Spanish speakers in the bare noun production task. The fact that no effect was found in bare noun production necessitated a closer examination of the gender systems of Spanish and Italian in order to account for the divergent findings. This analysis gave rise to the conclusion that Spanish nouns, with regards to gender marking morphology, is not identical to Italian and indeed bears some similarities to Dutch. It was, therefore, not surprising that the findings for Spanish in bare noun production were consistent with those of Dutch. The lack of gender congruency effects in NP production reaffirms the inclusion of Spanish in the "late selection" class of languages, together with Italian and Catalan, even though Spanish is not identical to either language with regard to the need for phonological form information in determiner selection. Lastly, the speculation that because only (a small proportion of) the feminine nouns in Spanish are affected by form dependence in determiner selection, there would be some difference in naming latencies between masculine and feminine nouns in the NP production task was not borne out. In conclusion, this research has had the interesting result of (1) confirmed the predictions of the WEAVER++ and IN models, and (2) showed that the mere fact that Spanish and Italian are both Romance languages does not guarantee that the access of syntactic gender during lexical access is identical for the two.

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