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## Research Article

# Can Language Affect Our Cognition? The Case of Grammatical and Conceptual Gender

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### Abstract

The present study investigated the effect of grammatical gender on object categorization. To this end, two experiments were designed. In the first experiment, German and Arabic native speakers' perceptions of similarity between objects and people were compared via picture matching tasks in which the participants were asked to match a series of people's pictures to pictures of a series of inanimate objects along with body parts. The pictures chosen were of opposite grammatical gender in German and Arabic (none of the chosen pictures was neuter in German). The results indicated that there was a significant difference between both groups' choice pattern, i.e., each group had a tendency to match the pictures based on their mother tongues' grammatical gender. Further, to investigate the effects of grammatical gender on concepts of objects in bilingual speakers of two languages that assign opposite gender to the same object, the second experiment was implemented. In experiment two, similar to experiment one, picture matching tasks were carried out by Spanish native speakers and Persian-Spanish bilinguals as experimental groups and Persian native speakers as control group. The results revealed that there was a significant difference between Spanish native speakers and Persian native speakers' performances. However, the inferential analysis did not show any significant difference between Persian-Spanish bilinguals' performance with those of the other two groups. The overall findings showed that mother tongue significantly affects the cognition of the speakers while second language does not have such salience in affecting the cognition.

**Keywords:** Linguistics relativity; conceptual gender; grammatical gender; language cognition

### Introduction

#### An overview of grammatical gender

As one of the most puzzling categories of grammar, gender has been in the center of attention among both linguists and non-linguists (Corbett, 1991). With respect to linguists, Corbett (1991) recognizes two practical benefits, namely short term and long term. In the short term, it helps them meet the problems caused by gender in second language learning. The importance of gender in the longer term is twofold: “first, it can shed light on the way in which linguistic information is stored in the brain; and second, it has implication for natural language processing, notably for the elimination of local ambiguities in parsing” (p.1).

Hockett (1958, cited in Corbett, 1991, p.1) defines genders as “classes of nouns reflected in the behavior of associated words”. Unlike English and Persian many languages (such as Arabic, Spanish, French, and German) have a grammatical gender system whereby all nouns are assigned a gender. Many languages only have masculine and feminine genders, but some also assign neuter, vegetative, and other more obscure genders. When speaking a language with grammatical gender, speakers are required to mark objects as gendered through definite articles, gendered pronouns, and often need to modify adjectives or even verbs to agree in gender with the nouns.

In Spanish in order for indicating the grammatical gender of a word they make use of articles (*el, la, los, and, las*) as well as suffixes (*-a* for feminine nouns and *-o* for masculine nouns although some exceptions exist). Therefore, Spanish people call ‘tree’ (which is masculine in Spanish) ‘*el arbol*’ and ‘table’ (being feminine) ‘*la mesa*’.

In Arabic, on the other hand, gender is signaled by adding a feminine suffix *-a* (ة) to the word. Therefore, Arabic speakers call ‘tree’ (which is feminine in Arabic) ‘شجرة’ (shajara).

### **Is grammatical gender arbitrary?**

As Phillips and Boroditsky(2003) maintain there are two main assumptions that make people consider grammatical gender meaningless: First, assignment of grammatical gender to objects is semantically arbitrary. For instance, in German, the word for a girl (*dasMädchen*) is attributed neuter gender, while a turnip (*die Rübe*) is feminine, a tree (*der Baum*) is masculine, its bud (*die Knospe*) is feminine, and its leaf (*das Blatt*) is neuter.

Second, the grammatical genders assigned to names of particular objects vary greatly across languages (Braine, 1987). For example, the sun is feminine in German (*die Sonne*), but masculine in Spanish (*el sol*), and neuter in Russian (*Солнце*). The moon, on the other hand, is feminine in Spanish (*la luna*) and Russian (*Луна*), but masculine in German (*der Mond*). Or as previously mentioned above, the word tree, which is masculine in Spanish, is feminine in Arabic.

### **How can language affect thoughts?**

During the middle of the twentieth century at a time when American linguistics was still mainly carried out by eminent anthropologists, Edward Sapir and Benjamin Whorf produced arguments that the languages of Native Americans, such as the Hopi, led them to view the world differently from those who spoke European languages.

'*Sapir-Whorf hypothesis*' is often referred to as '*linguistic relativity*' because, as they claim, it seems that the structure of our language affects our perception of the world. In its weak version, this idea simply captures the fact that we not only talk, but to a certain extent probably also think about the world of experience, using the categories provided by our language (Yule, 2010).

Whorf concluded that, "people who use languages with very different grammars are led by these grammars to typically different observations and different values for outwardly similar observations" (Whorf & Carroll, 1956, p.20).

There is also a stronger version of the hypothesis, called '*linguistic determinism*', which maintains that language determines thought. If language does indeed determine thought, then we will only be able to think in the categories provided by our language.

### Review of the related literature

Clarke et al. (1981) in their study found that Arabic speaking adults categorize "essentially asexual" objects/concepts in a markedly different way from English speaking adults, indicating that gender loading in Arabic influences Arabic speakers' perceptions of those objects/concepts.

Sera et al. (1994) conducted a series of experiments on English and Spanish speaking children and adults through two conditions; in one condition, pictures alone were presented; in the other condition, pictures were shown and labeled. They found that speakers of Spanish began to classify the objects according to the grammatical gender of the Spanish language unlike speakers of English. The effect of grammatical gender was more pronounced for speakers of Spanish when the objects were labeled, pointing specifically to the role of language in their classifications. They also found that English speakers were consistent in their judgments, often classifying artificial objects as male-like and natural objects as female-like. Spanish speakers were also sensitive to the natural female/ artificial-male conceptual division. Finally, they found that the artificial-male/ natural-female link was an earlier force in classification for speakers of English than grammatical gender was for speakers of Spanish, suggesting that grammatical classifications are superimposed on conceptual ones in development.

Flaherty (2001) conducted a study whose participants were from two language groups, one with a gender system, Spanish, and the other with a limited gender system, English. In each

language group, participants were from three age groups: 5-7 years old, 8-10 years old, and adult. In one experiment, participants were asked to put a typical male or female name to 20 objects. In another experiment, participants were asked to assign attributes to the objects. Language gender tags influenced the Spanish adults and the 8- to 10-year-olds in their choice of gender assignment, whereas perceived attributes influenced the younger Spanish children and English speakers (both adults and children). The results indicated that in a language with a grammatical gender system, such as Spanish, the gender system creeps into perception after the gender tags have been acquired.

Sera et al. (2002) in a series of studies, monolingual English-, Spanish-, French-, and German-speaking children and adults assigned male and female voices to inanimate objects. Results from Spanish and French speakers indicated effects of grammatical gender on classification; results from German speakers did not.

Phillips and Boroditsky (2003) in a series of studies conducted on three groups of German-English bilinguals, Spanish-English bilinguals, and German-Spanish-English trilinguals found effects of grammatical gender on people's perceptions of similarity between objects and people. This was true even though the tasks were performed in English (a language devoid of grammatical gender), even when the tasks were non-linguistic (e.g., rating similarities between unlabeled pictures), and even while subjects were engaged in a verbal interference task. Finally, results showed that cross-linguistic differences in thought can be produced just by grammatical differences and in the absence of other cultural factors.

In four separate experiments, Vigliocco et al. (2005) addressed the mechanisms by which grammatical gender (in Italian and German) may come to affect meaning. In Experiments 1 (similarity judgments) and 2 (semantic substitution errors), it was found that Italian gender effects for animals but not for artifacts; Experiment 3 showed no comparable effects in German. These results indicate that grammatical gender effects arise as a generalization from an established association between gender of nouns and sex of human referents, extending to nouns referring to sexuated entities.

Bassetti (2007) compared Italian monolingual and Italian-German bilingual children using a voice attribution task with pictures of artifacts that had opposite gender in Italian and German. Italian monolingual children preferred female voices for grammatically feminine objects; Italian-German bilinguals were not affected by Italian grammatical gender. The results indicate that knowledge of two languages with grammatical gender reduces the effects of L1 grammatical gender.

Forbes et al. (2008) used a non-linguistic gender attribution task to determine how French and Spanish grammatical gender affects bilinguals' conceptual gender. French-English and Spanish-English bilingual, as well as English monolingual adults were asked to assign a male

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or female voice to 32 color drawings depicting people, animals, and common objects. French-English and Spanish-English bilinguals classified items according to French and Spanish grammatical gender respectively. This effect was replicated for French-English bilinguals on those items whose grammatical gender was opposite in French and Spanish. Unexpectedly, Spanish gender similarly affected classifications by Spanish-English and English-Spanish bilinguals, as well as English monolinguals.

Kurinski, and Sera(2011) in a longitudinal study examined how the acquisition of Spanish grammatical gender influences categorization in native English-speaking adults. Results indicate that learning a second language as an adult can change the way one categorizes objects. However, the effect of Spanish grammatical gender was more limited in Spanish learners than in native Spanish speakers.

### **Research questions**

Despite the availability of extensive research on the effect of grammatical gender on the speakers' perception of objects, there is a paucity of research on Semitic languages such as Arabic. Furthermore, as noted above, there have been inconsistent results in the previous studies done on the issue. Thus, the following research questions were posed:

1. Does the grammatical genders assigned to objects by the language influence German and Arabic native speakers' perception of objects?
2. Does the grammatical genders assigned to objects by the language influence Persian-Spanish bilinguals' perception of objects?

To answer each question, one separate experiment was carried out.

### **Experiment 1: German native speakers and Arabic native speakers**

#### **Participants**

To accomplish the objectives of this experiment, a total of 32 (13 male and 19 female) participants were selected. 16 participants were German native speakers and 16 participants were Arabic native speakers. Participants ranged in age from 15 to 23 years ( $M=18.2$  years old). The German native speakers were accessed through personal connections and they all resided in Germany. The Arabic native speakers participated in the study were Arab-Iranian residing in the south-western province of Khouzestan in Iran. The variety of Arabic spoken by this ethnic group is Khouzestani Arabic, a dialect of Mesopotamian Arabic. Due to long-term contact with Persian, this dialect of Arabic has a few differences with Modern Standard Arabic. Therefore, after consulting with an expert who had a profound knowledge of both varieties, the words whose grammatical genders were identical in both languages were

chosen for the purpose of the study. The rationale for choosing these participants was a combination of purposive and availability sampling.

### Materials

The materials used in this study comprised 8 pictures of inanimate objects, along with human body parts, and 4 pictures of people. Of the pictures of people, 2 were pictures of females (a queen and a bride), and 2 were pictures of males (a groom and a king). Of the objects, half were items whose names were masculine in German but feminine in Arabic while the other half were feminine in German and masculine in Arabic (Please see Appendix A).

### Procedure

Each participant was given a sheet of paper with two separate columns. The first column included 5 pictures of different people while the second column consisted of pictures of 5 inanimate objects and body parts. The participants were required individually to match the pictures in the objects' column to the pictures of the people's in the other column based on their own perceived similarity. It was tried not to draw the attention of the participants to the focal element of the study (i.e., grammatical gender) and the reason they were matching the pictures.

### Results and discussion

The first research question of the study sought an answer as to whether grammatical genders assigned to objects by the language influence German and Arabic native speakers' perception of objects. The descriptive analysis of the gleaned data indicated that there was a difference between the categorization of inanimate objects by German and Arabic native speakers.

In order to see whether these differences between the means of each group were significant, an independent samples *t*-test was conducted.

**Tab. 1:** Paired Samples *t*-test for experiment 1

	<i>N</i>	Mean	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Arabic Native	16	2.43	.43	3.84	30	0.001*
German Native	16	1.91	.31			

\**p* < .05

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As tabulated in Table 1, the results showed that there was a significant difference between the performances of German native speakers ( $M=1.91$ ,  $SD=0.31$ ) and Arabic native speakers ( $M=2.43$ ,  $SD=0.43$ );  $t(30) = 3.84$ ,  $p = 0.001$ .

The results revealed that both German and Arabic native speakers tended to classify the inanimate objects based on the categorization of grammatical gender in their mother tongues. These findings suggest that the way people perceive the genders of objects is influenced by the grammatical genders assigned to those objects in a language. The findings are in line with those of Phillips and Boroditsky(2003). They concluded that “experience with a language that uses grammatical gender appears to bias one’s representations of objects” (p.930).

Since the tasks were designed in a way to pinpoint the sole effects of grammatical gender and all other extraneous cultural factors were tried to be excluded, it can be concluded that mother tongue can significantly affect the cognition of the speakers of a language.

## **Experiment 2: Persian-Spanish Bilinguals**

### **Participants**

To accomplish the objectives of this experiment, a total of 36 (20 male and 16 female) participants were selected. The participants were made up of 12 Spanish native speakers (coming from Spain, Peru, and Chile), 12 Persian native speakers, and 12 Persian-Spanish bilinguals. Participants ranged in age from 17 to 39 years ( $M=26.9$  years old).

The Persian-Spanish bilingual participants had enrolled in advanced levels at a Spanish language institute in Iran. These participants, whose first language was Persian, were chosen because they were proficient speakers of Spanish. By doing so, it was intended to see if their profound knowledge of Spanish grammatical gender had affected their categorization of inanimate objects. The rationale for sampling these participants was mainly due to convenience and opportunity.

### **Materials**

Materials used in this study comprised 16 pictures of inanimate objects and animals, and 8 pictures of people. Of the pictures of people, 4 were pictures of females (a witch, a queen, a bride, and a nun), and 4 were pictures of males (a groom, a king, a soldier, and a priest). Of the objects, half were items whose names were grammatically masculine and the other half whose names were grammatically feminine in Spanish (Please see Appendix B).

### **Procedure**

Similar to the first experiment, the participants were tested individually. Each participant was presented with a sheet of paper composed of two separate columns. The first column included

8 pictures of different people while the second column consisted of 8 pictures of inanimate objects and body parts. The participants were required to match the pictures in the objects' column to the pictures of the people's in the other column based on their own perceived similarity.

### Results and discussion

The second research question of the study relates to whether the grammatical genders assigned to objects by the language influence Persian-Spanish bilinguals' perception of objects. The descriptive analysis of the collected data revealed that there was a difference between the Spanish native speakers and the Persian-Spanish bilinguals (experimental groups) and the Persian native speakers (control group).

Further, as tabulated in Table 2, a one-way between subjects ANOVA was conducted to compare the effect of the languages that the participants speak on categorization of the inanimate objects by the speakers of those languages among Spanish native speakers, Spanish-Persian bilinguals, and Persian native speakers.

**Tab. 2:** The result of analysis of variance of experiment 2

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Between Groups	.511	2	.256	3.710	.035*
Within Groups	2.274	33	.069		
Total	2.785	35			

\* $p < .05$

As illustrated in table 2, ANOVA results indicated that a significant difference exists among the three groups ( $F(2, 33) = 3.710, p = 0.035$ ).

To see where this difference lies, the post hoc test of Tukey HSD was performed. Table 3 depicts the results of the post hoc test.

**Tab. 3:** The result of Post hoc test of Tuckey of experiment 2

		<i>Mean Difference</i>	<i>Std. Error</i>	<i>p</i>
Spa Native	Per-Spa Biling.	.156	.107	.322
	Per Native	.291	.107	.027*
Per-Spa Biling.	Spa Native	-.156	.107	.322
	Per Native	.135	.107	.428
Per Native	Spa Native	-.291	.107	.027*
	Per-Spa Biling.	-.135	.107	.428

\* $p < .05$

Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Spanish native speakers group ( $M = 2.28$ ,  $SD = 0.14$ ) was significantly different from the Persian native speakers group ( $M = 1.98$ ,  $SD = 0.40$ ). However, the Persian-Spanish bilingual group ( $M = 2.12$ ,  $SD = 0.15$ ) did not significantly differ from the other groups.

Taken together, the results indicated that Spanish native speaker subjects found greater similarity between people and inanimate objects of matching grammatical gender than between people and objects of non-matching gender, while Persian native speakers performed randomly on the test. On the other hand, Persian-Spanish bilinguals had a slight tendency towards selecting pictures of matching grammatical gender, yet this tendency was not as significant as it was among Spanish native speakers. This finding is indicative of the fact that second language acquisition is not as influential as mother tongue on the cognition of the speakers. Meaning that in order for the language to exert its effect to the utmost degree, it requires sufficient time and since first language is embedded in the mind of its speakers it can greatly impact the speakers' world perception and worldview.

### Conclusion

The present study investigated the influence of aspects of language that vary across different languages on the way people perceive inanimate entities. With the two experiments described earlier in the present study, we could demonstrate the existence of the effects of grammatical gender on people's perceptions of similarity between objects and people.

In the first experiment, which examined the difference between categorization patterns of German and Arabic native speakers, it was found that speakers in each group categorized

inanimate objects based on their mother tongues. The results were in line with the previous studies such as Flaherty (2001), Sera et al. (2002), Phillips and Boroditsky (2003), and Vigliocco et al. (2005). They similarly found evidence for the effects of grammatical gender on perceptions of the speakers of a language.

To investigate whether bilinguals are also affected by the aspects of their second language, a further experiment was conducted. This second experiment revealed that the existence of grammatical gender in second language cannot significantly influence people's semantic processing. The findings were in contrast with the findings of Forbes et al. (2008), and Kurinski, and Sera(2011) as they found that grammatical gender influences the cognition of the bilinguals. However, they findings are in conformity with those of Bassetti (2007) as she found that bilinguals' judgment was not affected by the grammatical system of their second language.

To put it all together, the findings indicate that grammatical gender can lead speakers of a language to think about inanimate objects in terms of characteristics that they associate with biological gender.

#### Appendix A. Experimental materials employed in Experiment 1

Type of object	Object	German noun	Arabic noun
<b>Masculine in German, Feminine in Arabic</b>	Table	Tisch	منضدة
	Tree	Baum	الشجرة
	Spoon	Löffel	المعلقة
	Umbrella	Regenschirm	مظلة
<b>Feminine in German, Masculine in Arabic</b>	Sock	Socke	الجوراب
	Door	Tür	الباب
	Cup	Tasse	الكأس
	Nose	Nase	الأنف

**Appendix B. Experimental materials employed in Experiment 2**

Type of object	Object	Spanish noun
<b>Masculine in Spanish</b>	Tree	Arbol
	Car	Coche
	Shoe	Zapato
	Book	Libro
	Fork	Tenedor
	Pencil	Lapiz
	Radio	Radio
	Clock	Reloj
<b>Feminine in Spanish</b>	Glasses	Gafas
	Door	Puerta
	Spoon	Cuchara
	Sofa	Sofa
	Table	Mesa
	Chair	Silla
	Flower	Flor
	Window	Ventana

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