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# Grammatical Gender and Cognition

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## Abstract

Empirical research on “structural relativity” (Lucy 1996) has indicated that the grammatical structuring of languages impacts on speakers’ thinking. In particular, the experimental investigation of the relationship between grammatical gender and cognition has repeatedly brought evidence to correlations between the two. Some researchers argue, however, that grammatical gender effects appear only in languages with a two-gender system. Others suggest that the language of instructions for the experiments affects speakers’ performance of tasks. The present paper examines these two issues on the basis of experimental data from a three-gender language, Modern Greek, and suggests that the overall picture is not coherent on several levels.

## 1. Introduction

The aim of this paper is to present the first findings of an on-going project within the framework of linguistic relativity. Research on linguistic relativity, more specifically on what has been called “structural relativity”,<sup>1</sup> has shown that different encodings of color, time, space and number, across languages affect speakers’ thinking about these domains e.g. when speakers codify a scene or an event (experiencing for speaking, Levinson 2003: 302-303) or when they talk about it (thinking for speaking, Slobin 1996: 76).<sup>2</sup> Along these lines a number of studies have sought to examine the influence of grammatical gender on speakers’ thinking about the world as ‘female’ or ‘male’ (e.g., Sera et al. 1994,

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**1** Lucy (1996: 41, 52) uses the term ‘structural relativity’ to refer to the (possible) impact of the formal characteristics of a language on the thought or behavior of its speakers. He differentiates this kind of relativity from ‘discursive relativity’, i.e. the (possible) influence of patterns of use of a language on its users’ thought.

**2** Cf. e.g. Gumperz & Levinson 1996; Niemeier & Dirven 2000; Pütz & Verspoor 2000; Bowerman & Levinson 2001; Gentner & Meadow 2003.



Bowers et al. 1999, Sera et al. 2002, Boroditsky et al. 2003, Vigliocco et al. 2005, and partly Mills 1986 as well as Flaherty 2001).<sup>3</sup> Some of this research indicates that grammatical gender effects appear systematically in languages with a two-gender system and that they are confined to specific semantic categories. Another finding suggests that the language in which instructions are given may affect the speakers' behavior in performing the task. Drawing on this tradition of research, our project aims at the examination of two languages with a three-gender system (Greek and German), the impact of different semantic categories, and the influence of the language of instructions. At this stage, only results with respect to the Greek language are available. In what follows, we will first discuss the relevant studies (section 2), on the basis of which our research design (section 3) developed. We will then present some of our results (section 4). Finally, we will conclude with a more general discussion (section 5), embedding our findings in the overall picture of research on grammatical gender and cognition.

## 2. Previous Research on Grammatical Gender and Cognition

Studies on grammatical gender and cognition have employed various experimental tasks in order to illuminate possible effects of the gender system on the way we think about the world as 'female' or 'male'. One of the methods used is the sex attribution task, in which speakers are asked to assign a female/male proper name or voice to animals and objects (denoted by words, depicted, or actually presented). For example, Mills (1986) asked young adults and children to give proper names to toys (actual toys in the case of children, words denoting toys in the case of adult subjects). While the majority of adult English subjects attributed male sex to the toys, German adults consistently assigned male sex to animals/objects denoted by masculine nouns and female sex to animals/objects

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**3** There is another type of studies (e.g. Ervin 1962; Clarke et al. 1981; Konishi 1993; and, partly, Mills 1986 and Flaherty 2001), which investigate whether masculine and feminine nouns carry connotations of masculinity and femininity, respectively, using semantic differential tests. Such studies have been criticized on several grounds. For one, semantic differential tests reveal at best something about speakers' knowledge of grammatical gender rather than about their thinking of the world as 'male' or 'female' since participants were asked to judge words (cf. Sera et al. 2002). For another, these studies yield an unclear pattern of results (cf. Vigliocco et al. 2005). A further problem, in our opinion, lies in the association of the adjectives employed in the scales with properties of femininity and masculinity: as long as the criteria for this association are not explicated, such scales remain pretty arbitrary, simply reflecting gender stereotypes.

denoted by feminine nouns. However, given that sex attribution to toys tended to align with the younger subjects' own sex (a tendency that diminished with older age groups), Mills also suggested that grammatical gender cannot be the sole factor influencing sex attribution. Similar research designs were adopted by Topsakal (1995) for Greek and Flaherty (2001) for Spanish and English. Their conclusions are compatible with those of Mills (1986).

Later studies, however, argue that the cognitive effects of grammatical gender vary across languages depending on the properties of the gender system itself. Sera et al. (2002), for example, conducted a series of comparative studies of sex attribution in Spanish, French, German and English. Among other things, speakers of these languages were asked to assign a male or a female voice to different items (humans, animals, and artificial or natural objects) presented in pictures.<sup>4</sup> Results yielded that speakers of Spanish and French made grammatically consistent gender assignments, while German speakers, aged 5-9 years,<sup>5</sup> did not. The effect of grammatical gender was more pronounced when the pictures were accompanied by labels (for subjects older than 7 years of age). Based on these findings, Sera et al. (2002) concluded that the effects of grammatical gender are limited to languages with a two-gender system, in which the high correlation between grammatical and natural gender leads to an overgeneralization of masculine and feminine traits to inanimate objects. With respect to English, which lacks the grammatical category of gender, Sera et al. (2002), but also Sera et al. (1994), found that speakers of this language tend to classify natural objects as 'female' and artificial objects as 'male'.

Similar conclusions were reached by Vigliocco et al. (2005), who examined the influence of grammatical gender on speakers' semantic representations of animals and objects in Italian and German. In a series of meaning-similarity judgment and semantic substitution error tasks, these researchers tested two hypotheses associated with language-learning mechanisms. According to the first (the 'similarity and gender' hypothesis), nouns of the same grammatical gender tend to have similar meanings. According to the second (the 'sex and gender' hypothesis), the association between grammatical gender (of nouns denoting humans) and sex (of these humans) is generalized to nouns which refer to animals or to nouns for whose denotation sex is not a relevant conceptual dimension. Words and pictures denoting/depicting animals and

<sup>4</sup> Half of the pictures were labeled with the noun denoting the depicted item, while the rest had no such labels.

<sup>5</sup> No adult German speakers were included in the sample because, according to Sera et al. (2002), it was not possible to find a sufficient number of native monolingual German-speaking adults.

artifacts were deployed as stimuli in order to check whether the grammatical gender effect is limited to the lexico-semantic representation of words or extends to the corresponding concept of the word. The study yielded such effects in Italian for the semantic category of animals (but not for that of artifacts); in other words, the sex and gender hypothesis was confirmed in this case. However, no comparable effects were observed in German. Vigliocco et al. (2005) thus concluded that grammatical gender effects are limited to languages with a two-gender system because of the high degree of transparent correspondence between the gender of nouns denoting humans and their sex in these languages, and that they are limited to certain semantic categories. Moreover, they argued that grammatical gender effects are limited to tasks that require verbalization, since no effects were detected when only pictures (without labels) were used as stimuli.

While the above-mentioned studies explore the influence of grammatical gender on speakers' thinking in their native language, a series of other studies (Boroditsky & Schmidt 2000; Phillips & Boroditsky 2003; Boroditsky et al. 2003) looks at the influence of grammatical gender on German and Spanish speakers' mental representations of objects when speakers think in a different, non-native, genderless language, such as English. According to these scholars, conducting experiments in the same language ensures that speakers of different languages understand the stimuli and instructions in the same way. Their experiments (testing the effect of grammatical gender on speakers' ability to remember word-name pairs, word description, and similarity rating of object-person pairs) provide evidence for the influence of grammatical gender on cognition –for both Spanish and German! More specifically in the memory task, Phillips & Boroditsky (2000) first 'taught' the subjects that 24 nouns with different grammatical genders in Spanish and German have specific proper names. They then tested the subjects' ability to remember these word-name pairs and found that both Spanish and German speakers' memory for word-name pairs was better "when the gender of the proper name was consistent with the grammatical gender of the word denoting the object than for pairs where the two genders were inconsistent" (Boroditsky et al. 2003: 68).

The studies discussed above offer useful insights, but they are not without flaws. For example, it has been argued (Boroditsky et al. 2003) that in sex attribution tasks the subjects may be using grammatical gender as a strategy for performing the task itself. Moreover, the fact that explicit mention of sex is made, e.g. when asking the subjects to assign a 'male'/'female' voice to objects, as in Sera et al. (2002), can reveal the purpose of the study and, thus, influence the results (cf. also Vigliocco et al. 2005). On the other hand, alternative methods such as the similarity rating employed by Boroditsky et al. (2003), are open to similar skepticism. For example, in the picture similarity experiment the subjects may also be using grammatical gender as a conscious strategy for rating

an object as similar to a male or female person. Besides this, instructions in different languages may lead to different understandings of the task involved, eventually triggering different behaviors, which are not necessarily related to “differences in thought” (Boroditsky et al. 2003: 67). Finally, it is not self-evident that ‘words’ can be equated with ‘objects’ as it is implicitly done in the experiments conducted by Boroditsky et al. (2003).

### 3. Current Research Design

Taking into account the findings of previous research on grammatical gender and cognition, our study aims at examining a) the possible effects of grammatical gender in two languages, Greek and German, which both have a three-gender system, b) whether effects of grammatical gender are confined to certain semantic categories (animals) but do not affect others (inanimate objects), and c) whether the language in which instructions for the experimental tasks are given affects the results. Given, though, that none of the relevant studies is without weaknesses, we chose to adopt two experimental tasks that have been prominent in previous research, adapting them for our purposes in order to allow for comparability of the findings. For both tasks two different conditions were tested: in the first case (A) both instructions and stimuli were given in Greek, while in the second (B) stimuli were given in Greek but instructions in English. All participants (70 university students for the first and another 38 for the second task) were native speakers of Greek, equally divided into women and men. Additionally, those participants who conducted the task under condition (B) had a very good knowledge of the English language.<sup>6</sup>

Task one involved sex attribution to objects/animals/persons shown on pictures through the use of proper names distinct for men-women.<sup>7</sup> A set of 40 colored pictures or drawings depicting persons, animals and inanimate objects (both natural and artificial) together with a list of 20 Greek proper names for women and men in equal numbers was presented to all participants. The choice of pictures was made on the basis of two criteria: a) following Sera et al. (2002) and Boroditsky et al. (2003), the depicted items were matched for

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<sup>6</sup> We would like to express once again our sincere thanks to all students who participated in our experiments and to the staff of the School of Philology and the School of English Language and Literature who enabled our access to their audience during classes. Special thanks go to Despina Papadopoulou for providing us with the E-Prime software. For his assistance with the SPSS we would also like to thank Apostolis Batsidis.

<sup>7</sup> This is basically a modified version of the sex attribution tasks reported in Mills (1986), Topsakal (1995), Flaherty (2001), Sera et al. (2002).

same/different grammatical gender of the nouns denoting them in Greek and German (i.e. 18 items with the same grammatical gender in both languages, 22 items with different gender); b) following Flaherty (2001), care was taken to avoid objects stereotypically connected with women or men. Finally, we did not make use of labels, i.e. words denoting the depicted items, in order to avoid employment of grammatical gender as a strategy on the subjects' part (cf. section 2). Participants were asked to 'name' the objects by choosing a proper name from the list.

Task two replicated the memory experiment as conducted by Boroditsky et al. (2003), i.e. it involved memorizing pairs of words/objects and proper names (distinct for men/women). Participants were then tested, using the E-Prime software, for how well they could remember a given name for a word/object. The stimuli consisted of 28 words denoting animals and inanimate objects (whereby attempt was made to deploy as many of the items used in the previous task as possible) each appearing on the computer screen with a different proper name for five seconds, and was automatically followed by the next pair in random order. Each pair was presented only once. Male and female proper names were chosen to be similar (Vasilis/Vasiliki, Alekos/Aleka, etc.) in order to increase the difficulty of the task. After the 'learning' stage, participants completed a 1-2 minute distraction task unrelated to the study. In the final stage, each word/object from the learning set was presented on screen, this time followed by two similar proper names (e.g. Alekos/Aleka); participants were asked to indicate the proper name (feminine or masculine) that had been associated with that word by pressing one of the two keys on the keyboard.

For task one, our hypothesis was (given Topsakal's work for Modern Greek) that the subjects would assign male or female sex to objects/animals/persons according to the grammatical gender of the noun denoting those items. For task two, we hypothesized (given the work of Boroditsky et al.) that the subjects' memory would be better for word/object-name pairs when there is a fit between grammatical gender and sex than for those pairs in which there is no such fit. Finally, for both tasks the hypothesis was that the language of the instructions would impact on the results.

## 4. Results

In the following we present only some of the findings of our study due to limitations of space. Examination of the relationship between the grammatical gender of the noun denoting a depicted item and the sex attributed to it (via choice of proper name) yielded the following two tables for each of the two experimental conditions (A: INSTRUCTIONS + STIMULI IN GREEK, B: INSTRUCTIONS IN ENGLISH, STIMULI IN GREEK).

**Table 1A.**  
Grammatical Gender by Attributed Sex (Instructions + Stimuli in Greek)

attributed sex gram. gender	male	female	TOTAL	adj. residual
masculine	435 70.3%	184 29.7%	619 100%	10.8
feminine	256 38.2%	415 61.8%	671 100%	9.2
neuter	313 50.3%	309 49.7%	622 100%	1.3
TOTAL	1004 100%	908 100%	1912 100%	

$p \leq .000$

**Table 1B.**  
Grammatical Gender by Attributed Sex (Instructions in English, Stimuli in Greek)

attributed sex gram. gender	male	female	TOTAL	adj. residual
masculine	213 75.8%	68 24.2%	281 100%	9.9
feminine	96 31.8%	206 68.2%	302 100%	8.5
neuter	137 48.2%	147 51.8%	284 100%	1.3
TOTAL	446 100%	421 100%	867 100%	

$p \leq .000$

Tables 1A and 1B show that there is a high correlation between grammatical gender and the sex attributed to persons/animals/objects. Under condition A, 70.3% of the masculine nouns correlate with male sex and 61.8% of the feminine nouns correlate with female sex. Moreover, under condition B, 75.8% of the masculine nouns correlate with male sex and 68.2% of the feminine nouns correlate with female sex. In other words, the correlation is more pronounced when instructions are given in English. The neuter gender is almost evenly distributed between male and female under both conditions.

The above results were broken down by semantic category (persons, animals, inanimate objects), for each of the two experimental conditions.

**Table 2A.**  
Grammatical Gender by Attributed Sex – Persons (Instructions + Stimuli in Greek)

attributed sex gram. gender	male	female	TOTAL	adj. residual
masculine	129 91.5%	12 8.5%	141 100%	14.6
feminine	6 6.3%	90 93.8%	96 100%	10.0
neuter	1 2.1%	47 97.9%	48 100%	6.9
TOTAL	136 100%	149 100%	285 100%	

$p \leq .000$

**Table 2B.**  
Grammatical Gender by Attributed Sex – Persons (Instructions in English, Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
masculine	62	95.4%	3	4.6%	65	100%	10.6
feminine	0	0.0%	44	100%	44	100%	8.0
neuter	2	9.1%	20	90.9%	22	100%	4.1
TOTAL	64	100%	67	100%	131	100%	

$p \leq .000$

Tables 2A and 2B show that for persons there is an almost perfect fit between masculine nouns and male sex (91.5% under condition A and 95.4% under condition B) and feminine nouns and female sex (93.8% under condition A and 100.0% under condition B).<sup>8</sup>

Tables 3A and 3B below show that for animals the correlation between gender (masculine, feminine) and sex is at about the same level as the overall results (cf. Tables 1A and 1B): 71.3% (condition A) and 73.8% (condition B) of the masculine nouns were given male sex, while 67.8% (condition A) and 73.8% (condition B) of the feminine nouns were given female sex.

**Table 3A.**  
Grammatical Gender by Attributed Sex – Animals (Instructions + Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
masculine	102	71.3%	41	28.7%	143	100%	4.5
feminine	46	32.2%	97	67.8%	143	100%	7.0
neuter	92	64.3%	51	35.7%	143	100%	2.5
TOTAL	240	100%	189	100%	429	100%	

$p \leq .000$

**Table 3B.**  
Grammatical Gender by Attributed Sex – Animals (Instructions in English, Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
masculine	48	73.8%	17	26.2%	65	100%	4.1
feminine	17	26.2%	48	73.8%	65	100%	5.3
neuter	39	59.1%	27	40.9%	66	100%	1.2
TOTAL	104	100%	92	100%	196	100%	

$p \leq .000$

<sup>8</sup> This is a rather expected result if one takes into account the findings reported in Pavlidou et al. (2004) with respect to the grammatical gender-sex fit in the Greek vocabulary.



Finally, tables 4A and 4B below show that for inanimate objects there is a correlation between gender (masculine, feminine) and sex, but this correlation is less pronounced than the one found in the case of animals (and, of course, persons): 60.9% (condition A) and 68.2% (condition B) of the masculine nouns were assigned male sex respectively, while 52.8% (condition A) and 59.1% (condition B) of the feminine nouns were given female sex respectively. Once again, these correlations are higher under condition B.

**Table 4A.**

Grammatical Gender by Attributed Sex – Inanimate Objects (Instructions + Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
masculine	204	60.9%	131	39.1%	335	100%	3.7
feminine	204	47.2%	228	52.8%	432	100%	2.7
neuter	220	51.0%	211	49.0%	431	100%	.7
TOTAL	628	100%	570	100%	1198	100%	

$p < .001$

**Table 4B.**

Grammatical Gender by Attributed Sex – Inanimate Objects (Instructions in English, Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
masculine	103	68.2%	48	31.8%	151	100%	4.8
feminine	79	40.9%	114	59.1%	193	100%	3.7
neuter	96	49.0%	100	51.0%	196	100%	.9
TOTAL	278	100%	262	100%	540	100%	

$p < .000$

Examination of the relationship between attributed sex and type of object (natural vs. artifact) for each grammatical gender did not yield consistently significant results for the masculine and feminine genders.<sup>9</sup> Only in the case of neuter, attribution of maleness-femaleness seems to be dependent on the type of inanimate object, i.e. it being an object of nature or an artifact, as tables 5A and 5B below indicate.

<sup>9</sup> Results are statistically significant only under condition B for the masculine gender, in which case artificial objects get associated with maleness much more frequently than with females.

Table 5A.  
Attributed Sex by Type of Inanimate Object – Neuter (Instructions + Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
natural	57	39.9%	86	60.1%	143	100%	3.3
artificial	163	56.6%	125	43.4%	288	100%	3.3
TOTAL	220	100%	211	100%	431	100%	

p < .001

Table 5B.  
Attributed Sex by Type of Inanimate Object – Neuter (Instructions in English, Stimuli in Greek)

attributed sex gram. gender	male		female		TOTAL		adj. residual
natural	20	30.3%	46	69.7%	66	100%	3.7
artificial	76	58.5%	54	41.5%	130	100%	3.7
TOTAL	96	100%	100	100%	196	100%	

p < .000

As seen from the two tables above, natural objects are associated more frequently with the female rather than with the male sex; artifacts, on the other hand, are associated slightly more frequently with the male rather than the female sex. This is the case under both experimental conditions, whereby the association of 'naturalness' with the female sex and of 'artificiality' with the male sex is more pronounced when instructions are given in English. In other words, there seems indeed to be a kind of cultural bias with respect to the conception of inanimate objects as male, if 'artificial', or female, if 'natural', which is overridden, however, by grammatical gender and its association with 'maleness' if masculine, and 'femaleness' if feminine.

The memory task yielded no statistically significant results under either condition A or condition B. In other words, no connection between *the grammatical gender-attributed sex fit*, on the one hand, and *memory*, on the other, could be detected – a fact that runs counter to the results reported in Boroditsky et al. (2003).<sup>10</sup>

In sum, then, the first hypothesis was confirmed, the second hypothesis was not confirmed, while the third hypothesis was confirmed for task one but not for task two.

<sup>10</sup> It is important to note here that we originally intended to use only pictures of objects (without labels) in the memory task in order to avoid the implicit equation of 'word' and 'object' (cf. section 2) in the Boroditsky et al. (2003) design. However, a first pre-test we ran with 14 pictures yielded no mistakes at all in the subjects' recalling of names for depicted objects. Assuming that the number of items used was too small, and hence the object-name pairs too easy to memorize, we increased the number of items to 26, and ran a second pre-test, but the pattern of mistakes detected this time was not systematic with respect to grammatical gender.

## 5. Discussion

As we have seen in the previous section, the sex attribution task yielded that grammatical gender correlates with the sex attributed to depicted items even in the case of a three-gender language. It also yielded that this correlation is not restricted to the semantic category of animals, but also holds for inanimate objects. Moreover, it showed that such correlations are stronger when the language of instructions is English. We could thus claim that our work provides evidence for grammatical gender effects on cognition in Modern Greek. On the other hand, the memory task showed no effects of the congruence between the gender of nouns for animals/objects and the gender of names given to these animals/objects on the subjects' ability to remember these names, regardless of the language of instructions. Therefore, on these grounds, we could conclude that no evidence for correlations between grammatical gender and cognition can be provided. This is a rather peculiar situation that needs to be accounted for.

A first question to ask is: how do these results fit in with the landscape of research on grammatical gender and cognition? The answer is not a simple one, given that there is no unilateral alignment between our findings and those of other scholars. Due to space limitations, we can only hint here at some convergences and divergences between what we have found and what others report, without providing a detailed account. For one, as it has already been mentioned, our memory task results contradict what is reported in Boroditsky et al. (2003); on the other hand, our work aligns with theirs in so far as the language of instructions was found to impact on the sex attribution task. Moreover, our results are compatible with all those reporting gender effects in languages with a three-gender system (e.g., Mills 1986; Topsakal 1995; Boroditsky et al. 2003), though not necessarily with regard to all semantic categories, but diverge from those in Sera et al. (2002) and Vigliocco et al. (2005) who found no such effects. Finally, with respect to semantic categories our findings for *animals* and *inanimate objects* diverge from Vigliocco et al. (2005) and Sera et al. (2002), respectively, but match those in Mills (1986) and Topsakal (1995).

Taking into account the fact that some of these scholars criticize the work of one another<sup>11</sup> (cf. section 2), one could invoke one or several methodological divides among the various approaches in order to account for this unclear pattern of results. However, the partial match of our findings across different experimental paradigms may well point to inherent methodological problems in

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**11** Curiously, though, among scholars working on gender and cognition there is a kind of selective reading of the available literature. For example, Sera et al. (1994, 2002), Boroditsky et al. (2003), Phillips & Boroditsky (2003) do not refer to Mills (1986) or Flaherty (2001).

each one of them. Additionally, it may also raise the issue of the comparability of the findings. Presumably, all studies understand grammatical gender in the same way; but can we say the same for e.g. 'cognition' or 'speakers' thinking for speaking' and so on? In our opinion, it is such matters that have to be adequately resolved before an intervention of culture in the relationship between grammatical gender and cognition is appealed to.<sup>12</sup> But it is also these issues that make the field of grammatical gender and cognition even more complex than language and cognition already is, and an area that one should fear to tread.<sup>13</sup>

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**12** Researchers working within the framework of linguistic relativity commonly argue that it is difficult to separate cultural effects from linguistic effects in experiments testing the relationship between language and cognition (cf. e.g. Lucy 1992).

**13** It may be accidental, but it is certainly interesting that Gleitman & Papafragou (2005) in their excellent article on language and thought, do not include grammatical gender in their survey of the "semantic arenas of the present day language–thought investigation".

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