Conceptualizing the world as 'female' or 'male': Further remarks on grammatical gender and speakers' cognition

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Abstract
Experimental research on grammatical gender and cognition provides evidence for grammatical gender effects on various aspects of speakers' cognition. Some researchers argue that such effects are limited to languages with a two-gender system. Other studies, however, find that the grammatical category of gender impacts on cognition also in languages with a three-gender system. Based on a sex attribution task, the present paper examines the relationship between grammatical gender and cognition in two languages with a three-gender system, Greek and German, and aligns with the second group of studies. The overall results are discussed in the light of previous research from a critical perspective.

Keywords: grammatical gender, cognition, linguistic relativity, sex attribution, Greek, German

1 The problem and its contextualization

The aim of this paper is to explore the relationship between grammatical gender and speakers' cognition. More specifically, we address the question whether the grammatical gender of nouns denoting inanimate objects guides Greek and German speakers' thinking about these objects as 'female' or 'male'. The present paper thus expands our previous work (Pavlidou & Alvanoudi 2013), in which our preliminary findings with respect to Greek were discussed.

As is well known, grammatical gender constitutes a semantically motivated morphological category with respect to human reference across different languages (cf., e.g., Hellinger & Bussmann 2001, 2002, 2003). More specifically, in languages that distinguish between a feminine and a masculine grammatical gender, there is a fit between the grammatical gender of a word denoting a person and the sex of this person; in other words, grammatically feminine nouns denote female persons, while grammatically masculine nouns denote male persons. In this study, we examine whether the fit between grammatical gender and sex in human reference is extended to the conceptualization of the inanimate world as 'female' or 'male', and whether different manifestations of this grammatical category, for example two- vs. three-gender systems, 'influence' speakers' cognition in specific ways.

Such questions have been examined within the framework of linguistic (structural) relativity, which addresses the role of grammatical categories in orienting speakers to habitual modes of thinking about the world and examines whether different languages guide their speakers to different views of the world (Bowerman & Levinson 2001; Gentner & Goldin-Meadow 2003; Gumperz & Levinson 1996; Lucy 1996; Niemeier & Dirven 2000; Pütz & Verspoor 2000; Whorf [1956] 1966). There are numerous studies by now that examine the influence of grammatical gender on speakers' thinking about the world as 'female' or 'male', but the results do not always converge. Some researchers report that grammatical gender effects appear only in languages with a two-gender system, such as Spanish, French or Italian (Sera et al. 2002; Vigliocco et al. 2005),[1] whereas others find that such effects hold also for languages with a three-gender system, such as Greek, German or Norwegian (Beller et al. 2015; Bender et al. 2016a, 2016b; Boroditsky et al. 2003; Boroditsky & Schmidt 2000; Imai et al. 2014; Mills 1986; Pavlidou & Alvanoudi 2013; Philips & Boroditsky 2003; Saalbach et al. 2012; Topsakal 1995). Moreover, Vigliocco et al. (2005) suggest that grammatical gender effects are confined to certain semantic categories, namely the category of animals, and do not hold for the category of artifacts. Other researchers, however, find no such restriction (Flaherty 2001; Mills 1986; Sera et al.

[1] Cf. also Cubelli et al. (2011) for grammatical gender effects on semantic judgments in Italian and Spanish, that is, two languages with a two-gender system, and Bender et al. (2011) for no grammatical gender effects on lexical decision tasks with a priming design in German, that is, a language with a three-gender system.

1994; Sera et al. 2002; Topsakal 1995).[2] (Pavlidou & Alvanoudi 2013: 113-114 and Bender et al. 2016b: 530-531 offer a critical review and discussion of the diverging results.)

Our point of departure for the current study is the apparent contradiction in the results reported above, namely: Are grammatical gender effects on speakers' cognition found in languages with a three-gender system or are they confined to languages with a two-gender system? Do these effects hold for humans, animal and inanimate objects or for sexed entities only? We started exploring these questions with respect to Greek based on a sex attribution task (cf. Sera et al. 2002). Our preliminary findings, presented in Pavlidou & Alvanoudi (2013), indicated grammatical gender effects (in all semantic categories). However, although the statistical analysis then employed (based on chi-square tests) allowed us to detect general tendencies in the data, it neglected the within-subjects nature of the experimental design. Therefore, in this paper, we employ more powerful statistical tools and present the full results for Greek and German.

In sections 2 and 3, we present the design and the results of this study, respectively. In section 4, we discuss our findings in the light of previous research and draw some conclusions.

2 The present study

The research presented here aimed to explore two hypotheses:

1) Grammatical gender affects speakers' cognition in languages with a three-gender system, namely Greek and German.
2) Grammatical gender effects can be found in all semantic categories, namely 'human', 'animal', 'inanimate object'.

2.1 Method

To test these hypotheses, we designed a pencil-and-paper sex-attribution task, taking into account the critiques that have been formulated in the past with respect to similar

[2] Evidence for grammatical gender effects on cognition comes also from research on bilingualism (Boutonnet et al. 2012; Forbes et al. 2008; Kurinski et al. 2016; Kurinski & Sera 2011). However, in this area, too, results do not always converge. For example, Bassetti (2007) and Kousta et al. (2008) did not find a grammatical gender effect for bilinguals.

research designs (cf. Pavlidou & Alvanoudi 2013).[3] In our task, subjects were given a set of pictures (or drawings) and a list of (Greek or German) proper names; they were asked to name the depicted objects by choosing a name from the list. Given that all names in the two lists were unequivocal for male or female reference, the assumption was that giving a particular name to an object entailed attributing sex to it. In this way, we avoided the explicit mention of sex in the task (e.g., asking subjects to assign a 'male'/'female' voice to objects), which might give some indication about the purpose of the study and, thus, influence the results (cf. Vigliocco et al. 2005).

Moreover, we wanted to take into account Boroditsky et al.'s (2003) observation that the language in which instructions are given may affect the speakers' behavior in performing the task. If instructions in different languages lead to different understandings of the task, then the question is whether any cognitive differences found among speakers should be associated with "differences in thought" (Boroditsky et al. 2003: 67) or with different understandings of the task triggered by the different languages being used.[4] In order to ensure that any observed differences between Greek and German speakers are not due to different understandings of the task, triggered by the difference in the language of instructions, we tested our hypotheses under two different conditions. Under the first (Condition I), the language in which instructions for the task are given is the same as the language of investigation (i.e., Greek or German). Under the second (Condition II), English is used as language of instructions for both Greek and German subjects.

2.2 Participants

The experiments were conducted with 70 students from a Greek and 56 from a German University,[5] on a volunteer basis, with equal representation of men and women. The total number of participants was originally bigger than 126, but several students had to be excluded for various reasons (see below). The remaining 126

[3] The sex attribution test is a modified version of the tasks reported in Flaherty (2001), Mills (1986), Sera et al. (2002), Topsakal (1995).

[4] This argument is supported by Fuhrman et al.'s (2011) finding that the language of instructions influences speakers' performance. However, see Athanasopoulos (2007) for counter-evidence.

[5] The data were collected at the Aristotle University of Thessaloniki (winter semester of 2010-11) while the German data at the Freie Universität Berlin a year later. We would like to thank again all colleagues who facilitated the conduction of our experiments in their classes and, of course, all students, who participated in the experiments on a volunteer basis. A big thanks, once more, goes to our expert colleagues in statistics, prof. G. Kioseoglou and ass. prof. A. Batsidis, for their invaluable help with the statistical analysis.

students were all native speakers of Greek or German, did not come from bi-/multi-lingual families, and had not lived up to that point in a non-Greek-speaking or non-German-speaking country for longer than a year. For the greater part, participants were students from the Greek (48) or German (36) philology departments at their respective universities; these students participated in the task under Condition I. The rest of the participants, who were supposed to carry out the task under Condition II, was recruited from the English departments (22 Greek and 20 German students) at each university in order to ensure that they had sufficient knowledge of the English language.

2.3 Materials

Subjects were asked to complete a 'questionnaire' by writing a proper name (chosen out of a list of 20 Greek or German names) under each of 40 color pictures or drawings of humans, animals and inanimate (both natural and artificial) objects (see Appendix). They were told to use only ONE name for each picture and to use ALL of the 20 different names.

To reduce the possibility that subjects used grammatical gender as a strategy – a criticism articulated by Boroditsky et al. (2003) – pictures were presented with no labels, that is, words denoting the depicted items. Moreover, the pictures were chosen so as to ensure:

a) Sameness/difference of grammatical gender of the words denoting the depicted items in the two languages (cf. Boroditsky et al. 2003 and Sera et al. 2002): we, thus, had 18 items with the same grammatical gender in Greek and German, while 22 with different grammatical gender.
b) Inclusion of items denoted by words of neuter grammatical gender (cf. Mills 1986); we, thus, had 13 masculine words, 14 feminine and 13 neuter.
c) Exclusion of objects stereotypically connected with women, for example 'strawberry', or men, for example 'banana' (cf. Flaherty 2001)[6].

Preceding the lists of names/pictures, there was a short motivation for the task: "In a research project on intercultural education in Europe, we have been asked to prepare short plays for pre-school children in which the main characters are primarily various

[6] See also Beller et al. (2015) and Bender et al. (2016a).

animals and objects. Which Greek [or German] proper name from the following ones would YOU give to the animals, objects, etc. in the pictures below?" After the lists, subjects were asked to provide information on their age, sex, year of studies, etc. and, importantly, on their linguistic competence, with the ultimate aim to exclude subjects who did not have Greek [or German] as their first language, who came from bi-/multi-lingual families, and/or had lived in a non-Greek- [non-German-] speaking country.

2.4 Procedure

For the performance of the task, we asked colleagues to grant us some time towards the end of their classes for the completion of the questionnaires. In other words, participants belonging to the same audience all filled the questionnaire in the same room in which they had been attending their class. This led in a few cases to conversations/collaboration among the students, so that some of them had to be excluded.

3 Results

The starting point for our analysis was what subjects did with respect to masculine or feminine nouns, namely whether there was a fit between the grammatical gender of the word denoting a depicted item and the proper name (and, hence, the sex) attributed to this item. In case of a gender-sex fit, that is, a grammatically masculine word is associated with male sex and a grammatically feminine word is associated with female sex, we talk of 'matching answers'.

In order to test the first hypothesis, a One Sample T Test was conducted to determine whether the mean of matching answers differed from a specified constant (for our case 0.5). The mean of score on matching answers (sample M = .6788, sample SD = .12807) is statistically significant: $t(125) = 15.671$, $p = .000$. This suggests that with very high probability there is a fit between grammatical gender and the sex attributed to depicted items regardless of the semantic category they belong to.

More specifically, the mean of score on matching answers for items denoted by grammatically masculine nouns (sample M = .7141, sample SD = .13985) and the mean of score on matching answers for items denoted by grammatically feminine nouns (sample M= .6332, sample SD = .14746) is statistically significant: $t(125) =$

17.187, p = .000, and t(125) =10.141, p = .000 respectively. That is, there is a fit between masculine nouns and male sex attribution, and feminine nouns and female sex attribution. Moreover, a Paired Samples Test was conducted to compare the mean of matching answers on grammatically masculine nouns and the mean of matching answers on grammatically feminine nouns. There is a significant difference in the scores for masculine nouns (sample M = .7141, sample SD = .13985) and feminine nouns (sample M = .6332, sample SD = .14746); t(125) = 6.612, p = .000. In other words, the masculine grammatical gender seems to be more strongly associated with male sex than the feminine gender with female sex.

In order to test the second hypothesis, a One Sample T Test was conducted to determine whether the mean of matching answers for *each* semantic category (humans, animals, inanimate objects) differs from a specified constant (in our case 0.5). The mean of score on answers for humans (sample M = .9444, sample SD = .14673) is statistically significant: t(125) = 34.001, p = .000. That is, for this semantic category, there is a fit between masculine grammatical gender and male sex and feminine grammatical gender and female sex. Similarly, the mean of score on answers for animals (sample M = .6680, sample SD = .22754) is statistically significant: t(125) = 8.287, p = .000. In other words, for animals too, there is a fit between masculine grammatical gender and male sex and feminine grammatical gender and female sex. Finally, the mean of score on answers for inanimate objects (sample M = .5816, sample SD = .15610) is statistically significant: t(125) = 5.869, p = .000. That is, also for this semantic category, there is a fit between masculine grammatical gender and male sex and feminine grammatical gender and female sex. These results suggest that with very high probability there is a fit between grammatical gender and sex for all three semantic categories.

Moreover, a Repeated Measures procedure was conducted to compare the mean of matching answers on humans, the mean of matching answers on animals and the mean of matching answers on inanimate objects. The mean of matching answers on humans is statistically significantly higher than the mean of matching answers on animals and the mean of matching answers on inanimate objects (p values = .000), and the mean of matching answers on animals is statistically significantly higher than the mean of matching answers on inanimate objects (p = .000) (sample M for humans = .9444, sample M for animal = .6680, sample M for inanimate object = .5816; sample SD for person = .14673, sample SD for animal = .22754, sample SD for

inanimate object = .15610). That is, these results show that with very high probability the fit between grammatical gender and attributed sex is strongest for humans, less strong for animals and even less inanimate objects. In other words, the following hierarchy is observed 'humans > animals > inanimate objects' for both Greek and German.

Beyond the main hypotheses of the study, some additional aspects of the association of grammatical gender and sex were examined. For one, an Independent Samples Test was conducted to compare the mean of matching answers under Condition I (Instructions + Stimuli in Native Language: Greek or German) and under Condition II (Instructions in English + Stimuli in Native Language: Greek or German). The difference between the scores for Condition I (sample M = .6539, sample SD = .12653) and Condition II (sample M = .7127, sample SD = .11751); t(124) = -2.516, p = .013) is marginally significant, namely at the 5% level of significance rather than at 1%. In other words, the language of instructions for the experimental task seems to have some influence on the results. More specifically, the association between grammatical gender and attributed sex seems to be stronger when instructions are given in English. For another, an Independent Samples Test was conducted to compare the mean of matching answers in Greek and German. No significant difference in the scores for Greek (sample M = .6709, sample SD = .11823) and German (sample M = .6767, sample SD = .1366); t(124) = -256, p =.798 was detected. That is, the language of investigation (Greek or German) does not seem to play a role in speakers' tendency to attribute male/female sex according to grammatical gender of the word denoting a depicted item.

Finally, an One Sample T Test was conducted to determine whether the mean of answers in which an item denoted by a grammatically neuter noun is attributed to male or female sex for all semantic categories for the two experimental conditions in Greek and in German differs from a specified constant (in our case 0.5). The mean of score on answers for neuter nouns classified as 'male' and neuter nouns classified as 'female' is not statistically significant: sample M = .5033, sample SD = .13188; t(112)[7] = .267, p = .790, and sample M = .4967, sample SD= .13188; t(112) = -.267, p = .790 respectively. This finding suggests that the neuter grammatical gender is

[7] We have to mention at this point that not all participants attributed a name for ALL items depicted by a noun with neuter grammatical gender. We excluded these cases and therefore we have here a total of 113 subjects.

almost evenly distributed over the two sexes. No statistically significant differences were found between Greek and German speakers (answers for neuter nouns classified as 'male' $p = .392$; $t(111) = .859$, answers for neuter nouns classified as 'female' $p = .392$; $t(111) = -.859$).

4 Discussion and concluding remarks

Our findings, based on the sex attribution task described in section 2 above – an improved adaptation of similar tasks employed by other researchers in the past –, can now be summarized and compared with those by other researchers. First of all, our hypothesis that grammatical gender affects speaker's cognition in languages with a three-gender system, namely Greek and German (hypothesis 1), can be regarded is supported by the results. In other words, our findings align with those by Beller et al. (2015), Bender et al. (2016a, 2016b), Boroditsky et al. (2003), Boroditsky & Schmidt (2000), Imai et al. (2014), Mills (1986), Phillips & Boroditsky (2003), Saalbach et al. (2012), Topsakal (1995), but run counter to, for example Sera et al. (2002) and Vigliocco et al. (2005), who report grammatical gender effects only for languages with a two-gender system. Similarly, our hypothesis that grammatical gender effects can be found for all semantic categories, that is, humans, animals, inanimate objects (hypothesis 2), is supported by the results. This finding diverges from what Vigliocco et al. (2005) report, namely that the correlation between grammatical gender and sex is restricted to the semantic category of animals, but matches Flaherty's (2001), Mills' (1986), Sera et al.'s (1994), Sera et al.'s (2002), Topsakal's (1995), etc. results.

Moreover, our sex attribution task showed that the correlation between grammatical gender and attributed sex is strongest for humans, less strong for animals and even less for inanimate objects. A similar hierarchy has been identified by Bassetti (2014) who examined speakers' view of grammatical gender in Italian and German as semantically motivated and found that semantic motivation is stronger for animate and personifiable entities (such as the moon or the sun) rather than artifacts. The sex attribution task also indicated that the masculine grammatical gender is more strongly associated with male sex than the feminine gender with female sex. This unbalanced association, not reported by previous studies, may be pointing to possible structural effects of the internal organization of gender systems in Greek and German

(cf. Lucy 2016). For example, as reported by Pavlidou et al. (2004), although most nouns in Greek are of feminine grammatical gender, the denoting of human beings is achieved for the greatest part with masculine nouns (almost 62% as opposed to 33.6% for human reference via feminine nouns).

The sex attribution task also showed that the investigated language (Greek or German) does not impact on the results, in other words there is no difference between these two languages with a three-gender system. This finding gives rise to the expectation that inanimate objects, be it natural or artificial, will be consistently attributed male or female sex, if denoted by masculine or feminine nouns, respectively, in the two languages. On the other hand, the same task indicated that the language of instructions may marginally impact on the association between grammatical gender and sex. But the fact that the association between grammatical gender and attributed sex appears to be stronger when instructions are given in English cannot be assessed on theoretical and/or empirical grounds at this stage. Finally, the sex attribution task yielded that items denoted by a neuter noun were evenly distributed over the categories of male and female – a finding that runs counter to Mills (1986) who found that neuter nouns are mostly associated with male sex in German.

All in all, our results further enhance the incoherent picture sketched in our earlier work (Pavlidou & Alvanoudi 2013), namely that there is no one-to-one fit across the languages tested, the experimental tasks employed, and the claims made regarding the influence of grammatical gender effects on cognition. The discrepancy in the findings may be due to the different methodologies employed, such as sex attribution tasks (Beller et al. 2015; Flaherty 2001; Mills 1986; Pavlidou & Alvanoudi 2013; Sera et al. 2002; Topsakal 1995), meaning-similarity judgment and semantic substitution errors tasks (Vigliocco et al. 2005), memory task involving word-name pairs, object description task and similarity rating of object-human being pairs (Boroditsky et al. 2003), drawing inferences about properties (Imai et al. 2014; Saalbach et al. 2012), and a version of the Extrinsic Affective Simon Task (Bender et al. 2016a, 2016b). However, in our opinion, the reasons for the incongruent outcomes of research on grammatical gender and cognition have to be sought beyond the methodological variance of previous studies.

For one, it is not clear whether various approaches to grammatical gender effects understand basic concepts such as ‘cognition’ in the same way. For example,

do conceptualization of the inanimate world as human (anthropomorphization that includes sex as an inherent dimension), on the one hand, and meaning similarity judgments, semantic substitution errors, object description or memory, on the other, constitute similar and, thus, comparable aspects of cognition? If research on gender and cognition depends on different understandings of 'cognition', then the comparability and the interpretation of their findings cannot be taken for granted. Consequently, it may be better to talk about different aspects of cognition, some of which may be affected by grammatical gender while others are not. If this is the case, it should be established which aspects of cognition are testable through which experimental methods, and *when* and *how* grammatical gender effects operate, i.e. which mechanisms underlie language effects on thought (cf. Lucy 2016: 505-506). For example, it is not always clear whether the experimental tasks employed test the influence of language on speakers' *thinking for speaking* (Slobin 1996), that is, when speakers' thinking is attuned with the categories of the language they speak, or *experiencing for speaking* (Levinson 2003), that is, when speakers code a scene in terms appropriate for later expression in their language. As Lucy (2016: 498) argues, conceptualizing cognitive effects is an enduring problem for research on linguistic relativity.

Moreover, the incoherence of results across languages may lie in the difficulty to separate language and cognition from culture and dissociate linguistic effects from cultural effects (cf. Lucy 1992) when testing the relationship between grammatical gender and cognition. For example, Sera et al. (1994) and Sera et al. (2002) found that English speakers tend to classify natural objects as 'female' and artificial objects as 'male'. In other words, sex attribution in English is influenced by cultural factors, such as the association between natural objects and 'femaleness', and artificial objects and 'maleness' (Sera et al. 1994: 262). Beller et al. (2015) report that culture was a more decisive factor than grammatical gender in attributing sex to certain nouns used as allegories or denoting stereotypes in Norwegian.

Finally, it may be the very nature of gender as a grammatical category that eludes 'measurement' in the usual experimental ways. As Lucy (2016: 499-500) points out, research on grammatical gender and cognition tends to neglect structural diversity across gender systems, such as lexical inflection, adjective agreement, nominal case marking, and verb concord. However, it is possible that the way in which gender systems are internally organized has structural effects on speakers'

thinking. The fact that such an influence is not taken into consideration by previous research may partly explain the inconsistent findings reported in the field, according to Lucy (2016: 500).

Future research is then confronted with the double challenge of developing both a better theory for understanding the relation between grammatical gender and cognition and more suitable empirical tools for 'measuring' grammatical gender effects on cognition.

References

Athanasopoulos, P. (2007). Interaction between grammatical categories and cognition in bilinguals: The role of proficiency, cultural immersion, and language of instruction. *Language and Cognitive Processes* 22(5): 689-699.

Bassetti, B. (2007). Bilingualism and thought: Grammatical gender and concepts of objects in Italian-German bilingual children. *International Journal of Bilingualism* 11(3): 251-273.

Bassetti, B. (2014). Is grammatical gender considered arbitrary or semantically motivated? Evidence from young adult monolinguals, second language learners, and early bilinguals. *British Journal of Psychology* 105(2): 273-294.

Beller, S., K.F. Brattebø, K.O. Lavik, R.D. Reigstad & A. Bender (2015). Culture or language: What drives effects of grammatical gender? *Cognitive Linguistics* 26(2): 331-359.

Bender, A., S. Beller & K.C. Klauer (2016a). Lady Liberty and Godfather Death as candidates for linguistic relativity? Scrutinizing the gender congruency effect on personified allegories with explicit and implicit measures. *The Quarterly Journal of Experimental Psychology* 69(1): 48-64.

Bender, A., S. Beller & K.C. Klauer (2016b). Crossing grammar and biology for gender categorisations: Investigating the gender congruency effect in generic nouns for animates. *Journal of Cognitive Psychology* 28(5): 530-558.

Bender, A., B. Sieghard & K.C. Klauer (2011). Grammatical gender in German: A case for linguistic relativity. *The Quarterly Journal of Experimental Psychology* 64(9): 1821-1835.

Boroditsky, L. & L.A. Schmidt (2000). Sex, syntax, and semantics. *Proceedings of the 22nd Annual Meeting of the Cognitive Science Society*, 42-47.

Boroditsky, L., L.A. Schmidt & W. Phillips (2003). Sex, syntax, and semantics. In D. Gentner & S. Goldin-Meadow (eds.), *Language in the mind: Advances in the study of language and thought*. Cambridge, MA: The MIT Press, 61-79.

Boutonnet, B., P. Athanasopoulos & G. Thierry (2012). Unconscious effects of grammatical gender during object categorization. *Brain Research* 1479: 72-79.

Bowerman, M. & S.C. Levinson (eds.) (2001). *Language acquisition and conceptual development*. Cambridge: Cambridge University Press.

Cubelli, R., D. Paolieri, L. Lotto & R. Job (2011). The effect of grammatical gender on object categorization. *Journal of Experimental Psychology* 37(2): 449-460.

Flaherty, M. (2001). How a language gender system creeps into perception. *Journal of Cross-Cultural Psychology* 32(1): 18-31.

Forbes, J.N., D. Poulin-Dubois, M.R. Rivero & M.D. Sera (2008). Grammatical gender affects bilinguals' conceptual gender: Implications for linguistic relativity and decision making. *The Open Applied Linguistics Journal* 1: 68-76.

Fuhrman, O., K. McCormick, E. Chen, H. Jiang, D. Shu, S. Mao & L. Boroditsky (2011). How linguistic and cultural forces shape conceptions of time: English and Mandarin time in 3D. *Cognitive Science* 35(7): 1305-1328.

Gentner, D. & S. Goldin-Meadow (eds.) (2003). *Language in the mind: Advances in the study of language and thought*. Cambridge, MA: The MIT Press.

Gumperz, J. & S.C. Levinson (eds.) (1996). *Rethinking linguistic relativity*. New York: Cambridge University Press.

Hellinger, M. & H. Bussmann (eds.) (2001). *Gender across languages: The linguistic representation of women and men* (vol. 1). Amsterdam: John Benjamins.

Hellinger, M. & H. Bussmann (eds.) (2002). *Gender across languages: The linguistic representation of women and men* (vol. 2). Amsterdam: John Benjamins.

Hellinger, M. & H. Bussmann (eds.) (2003). *Gender across languages: The linguistic representation of women and men* (vol. 3). Amsterdam: John Benjamins.

Imai, M., L. Schalk, H. Saalbach & H. Okada (2014). All giraffes have female-specific properties: Influence of grammatical gender on deductive reasoning about sex-specific properties in German speakers. *Cognitive Science* 38(3): 514-536.

Kousta, S.-T., D.P. Vinson & G. Vigliocco (2008). Investigating linguistic relativity through bilingualism: The case of grammatical gender. *Journal of Experimental Psychology: Learning, Memory and Cognition* 34(4): 843-858.

Kurinski, E., E. Jambor & M.D. Sera (2016). Spanish grammatical gender: Its effects on categorization in native Hungarian speakers. *International Journal of Bilingualism* 20(1): 76-93.

Kurinski, E. & M.D. Sera (2011). Does learning Spanish grammatical gender change English-speaking adults' categorization of inanimate objects? *Bilingualism: Language and Cognition* 14(2): 203-220.

Levinson, S.C. (2003). *Space in language and cognition: Explorations in cognitive diversity*. Cambridge: Cambridge University Press.

Lucy, J. (1992). *Grammatical categories and cognition: A case study of the linguistic relativity hypothesis*. Cambridge: Cambridge University Press.

Lucy, J. (1996). The scope of linguistic relativity: An analysis and review of empirical research. In J. Gumperz & S.C. Levinson (eds.), *Rethinking linguistic relativity*. New York: Cambridge University Press, 37-69.

Lucy, J. (2016). Recent advances in the study of linguistic relativity in historical context: A critical assessment. *Language Learning* 66(3): 487-515.

Mills, A.E. (1986). *The acquisition of gender: A study of English and German*. Berlin: Springer.

Niemeier, S. & R. Dirven (eds.) (2000). *Evidence for linguistic relativity*. Amsterdam: John Benjamins.

Pavlidou, Th.-S. & A. Alvanoudi (2013). Grammatical gender and cognition. In N. Lavidas, T. Alexiou & A.M. Sougari (eds.), *Major trends in theoretical and applied linguistics* 2(2). Versita/de Gruyter, 109-124.

Pavlidou, Th.-S., A. Alvanoudi & E. Karafoti (2004). [in Greek] Grammatical gender and semantic content: Preliminary remarks on the lexical representation of social gender. *Studies in Greek Linguistics* 24: 543-553.

Phillips, W. & L. Boroditsky (2003). Can quirks of grammar affect the way you think? Grammatical gender and object concepts. In R. Alterman & D. Kirsh (eds.), *Proceedings of the 25th Annual Meeting of the Cognitive Science Society*. Boston, Massachusetts: Cognitive Science Society, 928-933.

Pütz, M. & M.H. Verspoor (eds.) (2000). *Explorations in linguistic relativity*. Amsterdam: John Benjamins.

Saalbach, H., M. Imai & L. Schalk (2012). Grammatical gender and inferences about biological properties in German-speaking children. *Cognitive Science* 36(7): 1251-1267.

Sera, M.D., C.A. Berge & J. del Castillio Pintado (1994). Grammatical and conceptual forces in the attribution of gender by English and Spanish speakers. *Cognitive Development* 9(3): 261-292.

Sera, M.D., C. Elieff, J. Forbes, M. Clark Burch, W. Rodriguez & D. Poulin-Dubois (2002). When language affects cognition and when it does not: An analysis of grammatical gender and classification. *Journal of Experimental Psychology, General* 131(3): 377-397.

Slobin, D.I. (1996). From 'thought and language' to 'thinking for speaking'. In J. Gumperz & S.C. Levinson (eds.), *Rethinking linguistic relativity*. New York: Cambridge University Press, 70-96.

Topsakal, M. 1995. *The influence of the grammatical gender on the perception of gender in Modern Greek: Comparison with German and English.* Unpublished MA Thesis, Department of Linguistics, School of Philology, Aristotle University Thessaloniki.

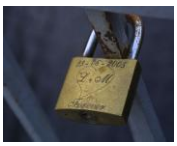
Vigliocco, G, D.P. Vinson, F. Paganelli & K. Dworzynski (2005). Grammatical gender effects on cognition: Implications for language learning and language use. *Journal of Experimental Psychology, General* 134(4): 501-520.

Whorf, B.L. ([1956] 1966). *Language, thought and reality: Selected writings of Benjamin Lee Whorf*. Cambridge, MA: MIT Press.

APPENDIX: Materials

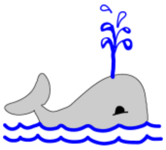
List of proper names

Greek	**German**
Μαρία	*Julia*
Γιώργος	*Peter*
Ελένη	*Stefanie*
Γιάννης	*Klaus*
Κατερίνα	*Gerda*
Νίκος	*Andreas*
Χριστίνα	*Maria*
Κώστας	*Luis*
Αγγελική	*Christine*
Βασίλης	*Jan*
Δήμητρα	*Martina*
Θανάσης	*Alexander*
Αναστασία	*Leonie*
Σπύρος	*Viktor*
Βασιλική	*Daniela*
Ανδρέας	*Anton*
Ιωάννα	*Simone*
Παναγιώτης	*Johannes*
Γεωργία	*Erika*
Θοδωρής	*Michael*



List of depicted items









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