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Research on grammatical gender and thought in early and emergent bilinguals

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Aims and Objectives/Purpose/Research Questions

This article reviews recent research on how speaking a language that marks gender grammatically might affect thinking, and on the relationship between grammatical gender knowledge of more than one language, and thinking, in both early and emergent bilinguals.

Design/Methodology/Approach

The paper provides a comprehensive review of previous research, as well as an introduction to, and an evaluation of, the articles in this special issue.

Findings/Conclusions

Several themes emerge in the research on grammatical gender and thinking in bilinguals. First, knowledge of more than one language could reduce the effects of grammatical gender on thinking. Second, these effects may depend on the combination of languages being acquired. Third, researchers are starting to identify other variables that might affect when and how grammatical gender influences thinking, including proficiency and the choice of tasks.

Originality

This manuscript synthesizes the previously scattered research on grammatical gender and thinking in bilinguals.

Significance/Implications

This is the first full-length overview paper about the relationship between grammatical gender and thinking in speakers of more than one language.

In the past decade a steadily increasing amount of research has revealed a relationship between grammatical gender systems and the perceived masculinity and femininity of referents. Native speakers of languages that have a grammatical gender system tend to think of objects, animals and abstract concepts as more masculine or more feminine in line with the referent's grammatical gender assignment. These findings are important contributions to the debate about the relationship between language and thinking, and in particular about 'linguistic relativity' and thinking for speaking. They also have practical implications for debates on gender equality in societies where a grammatical gender language is spoken.

Evidence of effects of grammatical gender on thinking raises interesting questions for researchers working on bilingualism and second language learning. How do bilinguals store and process grammatical gender if their two languages have different genders for the same referent? Does knowledge of more than one language link with a decrease in the effects of grammatical gender on thinking? If so, does this apply only to bilinguals from birth, or also to those who learnt an additional language learner in life? Can learning an additional language that has a grammatical gender induce novel gender biases?

Research on grammatical gender and thinking in bilinguals has so far appeared as individual papers published on a variety of journals and books, but no single publication has been devoted to the topic yet. The present special issue then presents a selection of representative recent empirical studies. This introduction briefly sets the scene by introducing grammatical gender and its relationship with thinking in monolinguals, and then presenting themes, methods and findings of research on grammatical gender and thinking in bilinguals.

Grammatical gender and its relationship with thinking

Grammatical gender is a morphosyntactic feature found in various languages, whereby nouns are assigned to classes called 'genders' (Corbett, 2006). A noun's grammatical gender is reflected in agreement, affecting the form of constituents such as adjectives, articles and pronouns, which are marked with the same gender as the noun they accompany or refer to (Corbett, 1991, 2006). Research on grammatical gender and thinking has investigated languages which have a so-called 'feminine gender' and a 'masculine gender' (plus 'neuter' in some cases), focussing on French, German, Italian and Spanish, and less frequently on other Indo-European languages (e.g., Russian) or Semitic languages. In these languages, gender assignment is based on both semantic and formal criteria. Some masculine nouns refer to biologically male referents and some feminine nouns refer to female referents, for instance the Italian masculine noun *gatto* ('male cat') and feminine *gatta* ('female cat'). However, in spite of a small 'semantic core', most gender assignments are based on the form (phonology and/or morphology) of the noun and are semantically arbitrary. For instance, most nouns ending in *-a* are feminine in Italian. Italian feminine nouns include many referents that are asexed, such as objects and abstract concepts (e.g., *porta*, 'door', *libertà*, 'freedom'), as well as referents of either sex ('epicene nouns' such as *vittima*, 'victim', and *rana*, 'frog'), and occasionally biologically male referents (e.g. *sentinella*, '[male] sentry'). This 'semantic residue' is much larger than the semantic core of gender assignments that are consistent with biological sex, that is to say, the majority of gender classifications are explained by formal criteria, with only a few being explained by semantic criteria.

There is then mostly no relationship between the grammatical gender of a noun and the properties of its referent. However, it is possible that gender categories affect speakers' categorisation of entities. Research on language and thinking then investigates the relationship between the morphosyntactic feature of grammatical gender and speakers' perceptions of masculinity and femininity of referents. This research is possible because different languages assign different genders to the same noun, particularly when they belong to different language families (Foundalis, 2002). This allows for cross-linguistic comparisons of speakers of languages that assign different grammatical gender to nouns with the same referents, such as 'butterfly' which is feminine in Italian (*la farfalla*) and masculine in German (*der Schmetterling*) and French (*le papillon*).

Research on grammatical gender and thinking started appearing steadily around the year 2000 (e.g., Flaherty, 1999; Boroditsky & Phillips, 2000, Sera et al., 2002), with rarer earlier examples (e.g., Guiora & Sagi, 1978). Overall, results show that native speakers of a grammatical gender language attribute feminine characteristics to the referents of grammatically feminine nouns and vice versa, although results are affected by various factors and are not always consistent across studies. These effects have consistently been found in gender attribution tasks such as the voice attribution task and the name attribution task, whereby participants choose a male or female voice or name for objects and/or animals to appear in a cartoon movie. Speakers of grammatical gender languages tend to choose voices and names that are consistent with the grammatical gender of the entity's noun (Flaherty, 1999; Mills, 1986; Ramos & Roberson, 2010; Sera et al., 2002). Effects are also found in object-human similarity judgment tasks, as participants tend to rate objects and/or animals as more similar to men or women in line with the entity's grammatical gender (Flaherty, 1999; Martinez & Shatz, 1996). Gender attribution tasks force participants to make binary judgments of gender. The way in which gender influences participants' thinking could be through strategic adoption of gender knowledge to make the attributions (Herold, 1982).

Tasks that do not explicitly require a gender judgment produce less consistent results. Researchers found grammatical gender effects on paired associate learning task, whereby German and Spanish participants performed better in learning proper names for objects (such as learning that an apple was called *Patrick*) if the name had the same grammatical gender as the object's noun (Boroditsky & Schmidt, 2000), although another study found effects only with Spanish but not with German speakers (Koch, Zimmermann, & Garcia-Retamero, 2007). Crucially, the task was performed in English, which rules out effects of thinking for speaking, and all entities had opposite genders in the two languages under analysis, which rules out effects of characteristics of the entities themselves. On the other hand, grammatical gender may only affect similarity ratings of entities when the entities are presented as words but not as pictures. Italian speakers sorted animals as more similar to each other if they had the same grammatical gender than if they had opposite gender when animals were presented as words, but no grammatical gender effects were found with pictures (Vigliocco, Vinson, & Paganelli, 2005), and effects of grammatical gender on similarity ratings were found with word stimuli but not with picture stimuli in Portuguese speakers as well (Ramos & Roberson, 2010). Some studies asked participants to rate items (words or pictures) on a masculinity-femininity scale; some researchers found grammatical gender effects (Clarke, Losoff Clarke, Mark Dickenson, McCracken, Still 1981; Sera et al., 2002) and others did not (Guiora & Acton, 1979; Guiora & Sagi, 1978). Studies that used the semantic differential

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technique (SDT) also produced inconsistent evidence. Such tasks measure masculine and feminine connotations of entities by means of ratings on a series of bipolar adjective scales, such as 'strong-weak'. Participants are not aware that these scales measure masculinity and femininity. The first study to use SDTs to study grammatical gender effects was Hofstätter (1963). No differences were found between Italian and German speakers' ratings of 'sun' and 'moon', which have opposite gender in the two languages. Other studies found lower ratings on scales of potency for objects and animals that are grammatically feminine (Bassetti, 2011; Koch, Zimmermann, & Garcia-Retamero, 2007; Konishi, 1993), and lower ratings on scales of extraversion for grammatically feminine affect nouns such as 'grief' than for masculine ones (Zubin & Köpcke, 1984). However, when effects are found in SDT tasks, they are weaker than in straightforward gender assignment tasks (Flaherty, 1999).

A major issue with this line of research is the robustness of results. Some published studies found no effects of grammatical gender (e.g., Hofstätter, 1963; experiment 3 in Ramos & Roberson, 2010), and others failed to replicate published findings (e.g., Mickan, Schiefke, & Stefanowitsch, 2014, failed to replicate the widely cited study by Boroditsky et al., 2003). It is not unusual for social science research to yield inconsistent results, and research on bilinguals particularly so, due to the huge variation in the populations under study. However, if grammatical gender had no bearing on thinking, no effects would have been found. So it is the case that we need to collect more evidence, and to try to identify factors that may modulate the effects of grammatical gender on thinking.

A few factors modulating the effects of grammatical gender on thinking have been identified. For instance, there are developmental changes, such that effects of grammatical gender on thinking have only rarely been reported for children under the age of 8 years (Flaherty, 2001; Karmiloff-Smith, 1979; Mills, 1986; Nicoladis & Foursha-Stevenson, 2012; Sera, Berge, & del Castillo Pintado, 1994), although one study found effects with Italian children as young as two-three years in a forced-choice gender categorisation task with animals (Belacchi & Cubelli, 2012). Children learning a grammatical gender language are often quite accurate in gender assignment from the age of about two to three years (Clark, 1985; Granfeldt, 2005; Karmiloff-Smith, 1979), so it is not clear why another five years of development are required for the effects on thinking to appear (see Karmiloff-Smith, 1979, for discussion). Participants' language is another important factor, as effects are more robust in speakers of Romance languages than in German speakers. For instance, Koch, Zimmermann, and Garcia-Retamero (2007) found effects with Spanish but not German speakers; Flaherty (1999) and Saalbach and colleagues (Saalbach et al., 2009) found effects in German speakers, but Vigliocco and colleagues did not (Vigliocco et al., 2005). A plausible reason is that German has neuter gender and a more complex grammatical gender system. Grammatical gender effects are also found more often with animate referents (animals) and much less so with inanimate referents (Forbes, Poulin-Dubois, Rivero, & Sera, 2008; Sera et al., 2002; Vigliocco et al., 2005). Vigliocco and colleagues (Kousta, Vinson, & Vigliocco, 2008; Vigliocco et al., 2005) proposed that grammatical gender effects are limited to animate categories for which biological sex is a meaningful property. However, various studies found effects with inanimate referents, for instance a study that found effects of the grammatical gender of pseudowords associated with musical instruments that have masculine or feminine characteristics (e.g., tubular shape and large size vs. round shape and small size, Vuksanović, Bjekić, & Radivojević, 2014). Gender class appears to be another relevant factor. The feminine gender seems to lead

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to perceptions of femininity of referents more than the masculine gender leads to masculine perceptions (e.g., Bassetti, 2007; Segel & Boroditsky, 2011), possibly because in the gender systems under analysis there are fewer feminine than masculine nouns, meaning that there is a larger proportion of grammatically feminine nouns with a female referent than there are grammatically masculine nouns with a male referent. Also, some studies found grammatical gender effects when stimuli were words or labelled pictures, but not with pictures (e.g., Ramos & Roberson, 2010; Sera et al., 1994). All these findings have implications not only for evaluating the nature and extent of grammatical gender effects, but also for the design of research studies.

The reasons why grammatical gender may affect conceptions of the masculinity or femininity of asexed referents are not clear. Bowerman (1985) argued that children use language as a guide for the distinctions they should make within a domain of meaning. Specifically with reference to gender, Vigliocco and colleagues (Vigliocco et al., 2005) proposed that speakers would notice the correspondence between grammatical gender classes and biological sexes, and on that basis infer that members of the same class should be more similar to each other than they are similar to members of the other class. Karmiloff-Smith (1979) argued that the conceptual development necessary for these connections would emerge around the age of seven or eight years. There is indeed evidence that children rely on biological sex in determining grammatical gender when the two conflict, for instance choosing the feminine pronoun rather than the target neuter pronoun for the German *Rotkappchen* ('Little Red Riding Hood', Wegener, 2000). Looking at adults, monolinguals tend to accept the gender assignments of their native language as appropriate, and to explain them mostly in terms of perceived gender connotations of referents, for instance linking referents of grammatically feminine nouns with perceived feminine characteristics such as beauty, grace, elegance, warmth or smallness (Bassetti, 2014).

Another possibility is that grammatical gender is one of several possible ways in which cultural attitudes are communicated and passed on through generations. English does not have a grammatical gender system. Yet, Nicoladis and Foursha-Stevenson (2012) showed that even monolingual English speakers share intuitions about how to assign gender to animals and inanimate objects. These intuitions remain fairly consistent from preschoolers to adults. Similarly, Wilkie and Bodenhausen (2012) showed that English monolinguals tended to think of odd numbers as masculine and even numbers as feminine. These researchers have not shown exactly how English monolinguals might end up with gender intuitions, but it is possible that cultural attitudes are conveyed through a variety of linguistic means (e.g., adjective use, gendered pronouns referring to who uses an object or cares for an animal, etc.). Grammatical gender, where available, may be one of the linguistic means by which these attitudes are conveyed.

Evidence that grammatical gender may affect thinking has practical implications for societies where grammatical gender languages are spoken. It is important to note that research has shown that grammatical gender affects real-life behaviour, outside of laboratories and experimental settings. For instance, visual artists represent abstract concepts such as time and faith as men or women depending on their grammatical gender in the relevant language, even when there is no tradition of visual representation as for instance for 'necessity' or 'silence' (Segel & Boroditsky, 2011). Children's tales present anthropomorphised animals and objects as male or female according to their grammatical gender of their nouns (Mills, 1986). Consumers prefer brands whose grammatical gender matches the gender connotation of the product (e.g. favouring masculine *Aizo* for a beer, and feminine *Aiza* for a fruit

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cocktail among speakers of Spanish, Yorkston & De Mello, 2005). Grammatical gender also affects deductive reasoning in children, as they for instance use grammatical gender as a guide in attributing sex-specific properties to animals. That is to say that, when determining whether an animal has a (fictitious) property or not, children attribute the same property to animals that have the same grammatical gender (Saalbach, Imai, & Schalk, 2012). It is then even possible that grammatical gender may have negative effects for gender equality. There is indeed evidence that the use of a masculine noun to refer to a group of people of mixed genders, e.g. the French noun *assistants sociaux*, 'social workers' (masculine), leads speakers of grammatical gender languages to infer that the referents are male. For instance, readers are slower in evaluating the acceptability of sentences that referred to the same group as women, compared with sentences that refer to the group as men (Gygax, Gabriel, Sarrasin, Pakhill, & Garnham, 2008). At a more global level, countries that have a grammatical gender language score significantly worse on the Global Gender Gap than countries with a genderless or a natural gender language (Prewitt-Freilino, Caswell, & Laakso, 2012). It is then not surprising that the Royal Spanish Academy argued that grammatical gender is part of sexist language, and suggested for instance replacing the generic masculine ending *-os* (as in the epicene *niños* '[male] children' used for children of both sexes) with gender-fair *-@s* (e.g., *niñ@s*, Bosque, 2012). The public debate that followed is testimony of the relevance of grammatical gender to people's real lives.

Grammatical gender and thinking in bilinguals

Given the importance of grammatical gender in real life behaviour, the possibility that knowing more than one language may reduce the effects of grammatical gender is intriguing. In the very early days of linguistic relativity, Edward Sapir and Benjamin Lee Whorf argued that language-induced biases in people's worldviews could be eliminated by learning additional languages (Sapir, [1921] 2004; Whorf, [1941] 1956). However, this hypothesis has only started being investigated very recently.

The recent buoyant research on bilingual cognition has indeed shown various positive effects of knowing more than one language on thinking (for overviews, see Bassetti & Cook, 2011; Pavlenko, 2011). It is possible that knowing two languages that represent the same entity or event differently may alert speakers to the arbitrariness of linguistic representations of that entity or event, leading to specific effects of knowing a specific set of languages on thinking about a specific entity or event. For instance, a native speaker of Italian who learns German will learn that *farfalla* ('butterfly'), which is feminine in Italian, is masculine in German, and may start questioning their perceived femininity of butterflies. Also, speaking two languages means having to refer to the same entity with different genders. An Italian monolingual will habitually refer to butterflies as females, using female pronouns and adjectives, but when speaking about butterflies in German will use male pronouns. The inconsistent use of language may affect habitual thought. Other outcomes are also possible. For instance, language may only affect so-called 'thinking for speaking'. In this case, bilinguals would perform differently when tested in one or the other of their languages, showing grammatical gender effects in line with the gender system of the language of interaction. Indeed, there is evidence for all of these possibilities, and various factors seem to be at play, such as relative proficiency and frequency of use of the languages.

Experimental research on grammatical gender and thinking in bilinguals started with a pioneering study by Ervin (1962), in which Italian-English bilingual

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immigrants to the US rated Italian pseudowords with masculine or feminine gender markers on semantic differential scales measuring masculinity-femininity, such as beautiful-ugly and good-bad. The grammatical gender of the pseudoword affected ratings in Italian-dominant late bilinguals but not in English-dominant early bilinguals. This study established a relationship between grammatical gender assignments and perceptions of masculinity and femininity, therefore paving the road for more recent research that investigated the same effect using real words or pictures.

Various methods and tasks have been used to test the relationship between grammatical gender and thinking in speakers of more than one language, in line with cross-linguistic studies of monolinguals. Many studies used gender attribution tasks, such as name attribution or voice attribution tasks (e.g., Flaherty, 1999; Sera et al., 2002). Other tasks where the link between task and gender is obvious include: the object-human similarity judgment task, whereby target objects are rated for similarity to male or female human beings (Phillips & Boroditsky 2003); a gender reassignment task which involves assigning a masculine or feminine grammatical gender to an L1 word that has neuter gender in the native language (Andonova et al., 2007), or for child participants classifying toys as 'boys' and 'girls' (Nicoladis & Foursha-Stevenson, 2012). When grammatical gender effects are found in such studies, it is possible to argue that grammatical gender was used as a task-dependent strategy. However, performance is never entirely consistent with predictions based on gender assignments, showing that participants are not strategically relying on grammatical gender, or not exclusively.

In other studies, there was no evident link between the task and gender. For instance, participants were asked to describe objects using three adjectives, which were then coded as masculine or feminine (Boroditsky et al., 2003). Various studies used similarity-rating tasks that require matching two animals or objects out of a triad, and tested whether animals or objects with the same gender were sorted together (Martinez & Shatz, 1996; Vigliocco et al., 2005). Other studies used semantic differential tasks (Bassetti, 2011). Studies can also be divided in those that use linguistic stimuli and those that avoid them, in an attempt to test 'pure' effects of grammatical gender on thinking. Ervin's (1962) study was an extreme case of use of linguistic stimuli, as she used pseudowords, where performance on the task depended entirely on the grammatical gender of the pseudoword, in the absence of any semantic information. As with monolinguals, some researchers found that grammatical gender effects only appeared in tasks where stimuli were words, but not with pictures (Ramos & Roberson, 2010; Vigliocco et al., 2005), and indeed various studies used only pictures as stimuli (e.g., Forbes et al., 2008), however, even when stimuli are pictures, participants are likely to activate lexical entries. For instance, Cubelli and colleagues (Cubelli, Paolieri, Lotto, & Job, 2011) found that grammatical gender affects Spanish speakers' categorisation of pictures of objects, with objects that share the same grammatical gender being categorised faster than gender-incongruent objects. However, there were no effects when the categorisation task was performed under an articulatory suppression condition. This shows that lexical items are activated during the decision making process, and therefore using pictures does not guarantee the absence of 'thinking for speaking'. Indeed, there is ERP evidence that grammatical gender is activated automatically during picture sorting tasks (Boutonnet, Athanasopoulos, & Thierry, 2012).

Research on grammatical gender and thinking in bilinguals has so far produced two main findings. First, knowledge of more than one language may reduce the effects of grammatical gender on thinking in bilinguals, compared with

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monolingual speakers of the same language, and this applies to both early bilinguals and later learners. Second, the effects of bilingualism depend on the language combination involved, as follows: positive effects of bilingualism are found in those with two grammatical gender languages, who show weaker effects of native language's gender assignments on items that have opposite assignments in the two languages; no effects of bilingualism are found in native speakers of a grammatical gender language whose second language has no grammatical gender, who keep displaying effects of native language's gender assignments; finally, native speakers of a language with no grammatical gender who learnt a grammatical gender language may show effects of the grammatical gender of the second language.

To start with a widely cited study, Phillips and Boroditsky (2003) investigated German-Spanish and Spanish-German bilinguals performing an object-human similarity judgment task in English. Participants' performance was more affected by the language they reported being more fluent in. The results are hard to interpret, because the bilingual group included both native speakers of German and of Spanish, so effects may have been due to the native language rather than relative proficiency in the two languages. A study that used a voice attribution task found that Italian-German bilingual children were not affected by Italian grammatical gender, whereas Italian monolingual children preferred female voices for grammatically feminine objects (Bassetti, 2007). In the same line, Italian-German bilingual adults were less affected by native gender assignments than Italian monolinguals when rating animals on a semantic differential task measuring potency (e.g., strong-weak, Bassetti, 2011). It appears then that knowledge of more than one grammatical gender language may reduce the effects of native grammatical gender assignments on thinking are not clear. As stated above, bilinguals may realise that gender assignments are semantically arbitrary, or may differ from monolinguals in habitual thought because they have to refer to the same entity with one gender in one language and another gender in the other language. Bassetti (2014) found that bilingual young adults with two grammatical genders considered L1 grammatical gender assignments as more arbitrary than monolinguals, whereas the latter tended to justify the native gender assignments of nouns of entities (animals, abstract concepts, natural kinds and artefacts) in terms of masculine and feminine connotations of the referent. This result applied both to early bilinguals and to instructed learners in the early stages of L2 learning, although the former considered gender mostly a quirk of grammar, and the latter considered it mostly a reflection of cultural differences.

These arguably positive effects of bilingualism may be limited to those with two grammatical gender languages. Knowing a grammatical gender-less language such as English does not appear to eliminate the effects of knowing a grammatical gender one. For instance, German and Spanish native speakers who had learnt English and were tested in English still showed effects of the gender assignments of their first language in an adjective generation task and in a paired associate learning task, whereby participants performed better in learning proper names for objects (such as learning that an apple was called *Patrick*) when the name's gender was consistent with the grammatical gender of the object in their native language, even though the task was performed in English with English names (Boroditsky et al., 2003). Similar effects of native gender assignments were also found in French-English and Spanish-English emergent bilinguals performing a voice attribution task for objects and animals in English (Forbes et al., 2008); simultaneous French-English bilingual children differed from English monolingual peers in a gender assignment task with toys representing objects and animals, because they were affected by French

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grammatical gender (Nicoladis & Foursha-Stevenson, 2012); French-English bilingual adults were affected by French gender assignments in the interpretation of English role nouns (such as *social workers* or *musicians*) as males or females (Sato, Gygas & Gabriel, 2013). However, Sato and colleagues also found that effects of grammatical gender decreased with increased levels of English proficiency, a finding that deserves more attention precisely because it is not in line with all the evidence from bilinguals with English as an additional language (see also Ervin, 1962, for evidence that Italian natives are not influenced by Italian grammatical gender if they are English-dominant). Finally, ERP evidence shows that Spanish-English bilinguals activate Spanish grammatical gender when performing a picture-sorting task in English in an English environment, as revealed by more negative Left-Anterior Negativity amplitudes in gender-inconsistent than in gender-consistent picture pairs (Boutonnet, Athanasopoulos, & Thierry, 2012).

Finally, learning an additional language that has grammatical gender may result in language-induced biases in native users of a language with no grammatical gender. For instance, English-speaking child learners of Spanish were affected by Spanish grammatical gender in a voice attribution task, and effects were stronger in those with higher Spanish proficiency, confirming the linguistic origin of this bias (Kurinski & Sera, 2011). There is indeed evidence at least from an early diary study that children with a grammatical gender-less native language acquiring a grammatical gender additional language try to interpret L2 gender assignments with perceived masculine or feminine connotations of the referent, such as the ugliness of 'stain' or the prettiness of 'ribbon' (Kenyeres, 1938). Looking at adult English speakers, briefly learning a micro artificial language with a grammatical gender system results in rating objects as more similar to female or male human beings and describing them with more stereotypically masculine or feminine adjectives in line with the grammatical gender they had just learnt for these objects (Boroditsky et al., 2003). While this classification could be just a short-term artefact of the experiment, the study may show evidence for how a second language grammatical gender may affect cognition, or at least how recent exposure to a gender system attracts attention to gender. If the latter is correct, then learning an additional language with grammatical gender may result in an overall increased attention to gender. Wasserman and Weseley (2009) found that English native-speaking female learners of Spanish scored higher on a sexism scale if they had read a passage from *Harry Potter* in Spanish, compare with those who had read the same passage in English. Possibly recent use of a grammatical gender language results in paying increased attention to gender differences. However, no effects were found in male learners of Spanish or in learners of French of either gender, so results are difficult to interpret. It is however possible that recent use of a grammatical gender language may prime gender, resulting in an enhanced attention to gender.

A number of factors appear to modulate the effects of grammatical gender in bilinguals. An obvious one is relative proficiency in the two languages. Native speakers of a grammatical gender language who learnt a natural gender language at high levels of proficiency are not affected by L1 gender assignments, whereas those with lower levels of proficiency are (Sato, Gygas & Gabriel, 2013); native speakers of a grammatical gender language who learnt another grammatical gender language are affected more by the gender assignments of the language they are more fluent in (Phillips & Boroditsky, 2003; Kurinski & Sera, 2011). On the other hand, only minimal exposure to a grammatical gender system is needed or effects to appear (ten weeks in Kurinsky & Sera, 2011; a short training session in studies of artificial

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language learning in Boroditsky et al., 2003). Various researchers have looked at fluency, proficiency, or length of exposure, but more research is needed to draw conclusions.

An obvious limitation of this line of research is that evidence is not consistent, as various studies failed to find any effects of bilingualism (e.g., Hofstätter, 1963; Mickan, Schiefke, & Stefanowitsch, 2014). These results should then be taken with a pinch of salt, also bearing in mind the file drawer problem, and more evidence is needed. This line of research has obvious implications for bilingualism research, especially for those investigating bilingual cognition, but can also illuminate questions that cannot be answered by cross-linguistic research on monolinguals, and is therefore relevant also to psychologists and other researchers working on language and thought in monolinguals. For instance, studying bilinguals can help clarify whether relationships between grammatical gender and thinking are effects of language or of culture, two factors that cannot be disentangled in cross-linguistic comparisons of monolinguals. Also, some effects of grammatical gender may be due to thinking-for-speaking rather than showing effects of language on thinking. This can be tested by asking bilinguals to perform tasks in a second language that does not have grammatical gender. If grammatical gender has effects when bilinguals are tested in English, this cannot be explained as thinking-for-speaking. Finally, if knowledge of more than one language decreases the effects of grammatical gender, such a result would have practical implications for language learning and teaching and language policy. This line of research is then very timely and relevant.

The present special issue

This special issue brings together a selection of original empirical studies that tested the effects of grammatical gender on thinking in bilinguals. Researchers looked at both early bilinguals (or ‘simultaneous bilinguals’) and emergent bilinguals (or ‘sequential bilinguals’, those who learnt an additional language later in life), in order to gain insight into the role of age and experience with language. Most of these papers investigated emergent bilinguals, because it is important to establish whether a language learnt later in life may affect thinking. Researchers investigated children and adults with a variety of first and second languages (including English, French, Hungarian, Russian and Spanish), including those who know one grammatical gender (as a first or as an additional language) and those who know two grammatical genders, and controls who spoke one or more grammatical gender-less languages. The researchers, who included applied linguists and psychologists, used a variety of tasks: object categorisation, paired associate learning, perspective switching, voice attribution, and (for children) classifying objects as ‘girls’ or ‘boys’. Variables that were investigated include levels of proficiency, amounts of exposure to the language, and language of interaction among others. The results mostly converge, showing that knowledge of one or more than one grammatical gender language affects performance in a variety of tasks, in both early and emergent bilinguals. However, results are not consistently found, and whether grammatical gender affects thinking or not seems to depend on various factors, including above all task, but also children’s age and amount of exposure to the grammatical gender language, among others. The variety of results reflects findings of the field as a whole, while also adding new evidence and contributing to ongoing debates about both bilingualism and linguistic relativity.

The first paper, ‘Discourse relativity in Russian-English bilingual preschoolers’ classification of objects by gender’, by Elena Nicoladis, Natalie Da Costa and Cassandra Foursha-Stevenson, looks at early bilingual children who know

a language with grammatical gender and one without. These children are younger (three to six years) than the age when grammatical gender effects start appearing (see e.g., Flaherty, 2001; Karmiloff-Smith, 1979). This study can then elucidate the nature of linguistic relativity effects as follows. Grammatical gender effects may be due to grammatical gender marking, which is a local effect of language, likely to appear at a later age (Lucy, 1996). Alternatively, children's thinking may be influenced by discourse patterns, such as the choice of adjectives describing nouns. For example, if cats are consistently described as cute and cuddly and dogs are consistently described as aggressive, young children may think of cats as more feminine and dogs as more masculine, regardless of the grammatical gender in their language. Similarly, if a language has more frequent masculine gender markings than feminine or neuter gender markings, children may think that most objects are masculine. To test for this possibility, Nicoladis and colleagues investigated Russian-English bilingual children who were living in an English-speaking environment. Children categorized objects as 'boys' or 'girls', once in Russian and once in English. Russian has a three-way grammatical gender system, and the majority of its nouns are grammatically masculine. The children showed little evidence of categorizing objects in line with Russian grammatical gender, in either language. This finding suggests that their categorization was not yet influenced by grammatical gender. However, they did show a greater tendency to categorize objects as boys in Russian than in English. This result suggests that children's categorizations were influenced by a global property of Russian, that is to say that most words are grammatically masculine. In other words, these results are consistent with a developmental account of linguistic relativity in which children's thoughts are sensitive to discourse structures earlier than grammatical structures (Lucy, 1996).

In 'Do grammatical-gender distinctions learned in the second language influence associative learning in the first language?', Margarita Kaushanskaya and Samantha Smith tested whether the post-puberty learning of a second language that has grammatical gender affects performance in an object-name paired-associate learning task in native speakers of a grammatical gender-less native language tested in their first language. Participants were adult English native speakers with high levels of exposure to Spanish, low levels of exposure, or no exposure (English monolinguals). They performed a Paired Associate Learning task, whereby they had to learn proper names for a series of inanimate objects. The objects' names were either consistent with the grammatical gender of the object in L2 Spanish (e.g., 'Patrick' for 'corn', which is grammatically masculine in Spanish), or inconsistent (e.g., 'William' for 'beach', which is grammatically feminine). English native speakers with high levels of exposure to L2 Spanish recalled fewer names that were inconsistent with Spanish grammatical gender. No effects of grammatical gender consistency were found in either English monolinguals or emergent bilinguals with low levels of exposure to L2 Spanish. L2 proficiency did not seem to modulate grammatical gender effects, as the two emerging bilingual groups had the same levels of Spanish proficiency (as measured by a receptive vocabulary test). The paper then shows that learning an additional language later in life can influence thinking, but crucially only in those with high levels of day-to-day exposure to the additional language, possibly pointing in the direction of language effects on habitual thought.

Steven Samuel, Karen Roehr and Debi Roberson ("She says he says": Does the sex of an instructor interact with the grammatical gender of targets in a perspective-taking task?) investigated the interaction between the grammatical gender of the referent and the biological sex of the instructor on bilingual adults'

performance in a perspective-switching task, in order to test for the possibility of the influence of a network of grammatical gender associations. Various studies have found grammatical gender effects on gender attribution tasks (voice attribution task, name attribution task, etc.). These results suggest that speakers are attributing natural-gender characteristics to objects through grammatical gender. However, it is possible that this apparent attribution is no more than superficial association. That is, having heard feminine marking associated with a particular word, and having heard those same markings associated with other words indicating natural gender (like words for man or woman), the apparent attribution of natural gender to objects may simply reflect this network of associations. Samuel and colleagues then tested whether hearing a male or female voice instructing participants to pick a particular object affected their reactions. Crucially, in some trials, the gender of the instructor was different from the grammatical gender of the object in the participants' first language (incongruous trials). In other trials, the gender of the instructor was the same as the grammatical gender of the object (congruous trials). If participants had simply associated natural gender with grammatical gender, then they would have been slower and/or less accurate with the incongruous trials than with the congruous trials. This was not the case. These results are consistent with the interpretation that speakers attribute natural gender characteristics to the objects themselves.

The next paper, 'Second grammatical gender system and grammatical gender-linked connotations in adult emergent bilinguals with French as a Second Language' by Amelia Lambelet, looked at effects of L2 French grammatical gender on a voice attribution task in adult emergent bilinguals with various L1s and various levels of L2 French proficiency (beginner to advanced). Voice attributions were strongly affected by the objects' L1 grammatical gender, confirming a number of previous findings. Effects of L2 French were also found, but interestingly it was not the L2 gender assignment that linked to voice attributions, but the gender assigned to the noun by each participant. That is to say, an object was more likely to be attributed a male voice if the participant thought the noun was masculine in L2 French than if s/he thought it was feminine. No effects were found for the noun's actual French grammatical gender. This finding shows that there is a link between grammatical gender assignments and perceived masculinity and femininity of referents, as well as confirming the effects of a grammatical gender language learnt later in life.

The final paper is a longitudinal study by Elena Kurinski, Emöke Jambor and Maria Sera, entitled 'Spanish grammatical gender: Its effects on categorization in native Hungarian speakers'. The researchers investigated the effects of learning Spanish grammatical gender on categorisation in emergent learners with just a few weeks of L2 Spanish instruction. Participants were native speakers of Hungarian, a language with no grammatical gender. Object categorisation was affected by L2 Spanish grammatical gender, with effects appearing after just ten weeks of L2 instruction, which coincided with the gradual acquisition of grammatical gender. The study also shows that the emergent bilinguals' first language plays a role, as the Hungarian native speakers in this study were affected by L2 Spanish gender earlier and more strongly than English native speakers in a previous study (Kurinski & Sera, 2011). The authors suggest that this may be due to differences between the Hungarian and English languages, as the former lacks grammatical gender entirely, whereas the latter marks grammatical gender on pronouns. Results then provide additional evidence that knowing an additional gender with grammatical gender influences categorisation, and that the effects of L2 grammatical gender are modulated by various factors, such as characteristics of the native language.

Future directions

Collectively, these studies show that grammatical gender can affect thought in bilinguals and suggest avenues of future research. How grammatical gender effects on thought change over the course of acquisition (Kaushanskaya & Smith, this volume; Kurinski et al., this volume; Lambelet, this volume; Nicoladis et al., this volume) remains understudied. One possibility is that the effects of grammatical gender reflect habits of thought (Whorf, 1956) and habits require time and experience to construct.

The exact mechanism(s) behind the effects of grammatical gender on thought remain understudied as well. The results of Lambelet (this volume) suggest that an individual speaker's conceptualization of the gender drives the effects. Samuel et al. (this volume) present research consistent with thinking that speakers are attributing the gender to the objects themselves, not simply in superficial associations with co-occurring gendered voices.

An important line of future research is to test how bilingualism affects attitudes toward gender. As noted earlier, only a few studies have addressed the question of whether knowing more than one language can reduce sexist attitudes and behaviours. It is important to test whether the specific language pairs (e.g., two grammatical gender languages vs. only one grammatical gender language) and proficiency affect attitude changes.

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