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Bilingualism and thought: grammatical gender and concepts of objects in Italian-German bilingual children

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Abstract

This paper investigates whether bilinguals' and monolinguals' concepts of entities differ when the bilinguals' two languages provide two different representations of the same entity. Previous research shows that speakers of languages that have a grammatical gender system think of objects as being masculine or feminine in line with the grammatical gender of the objects' nouns. The present study investigates the effects of grammatical gender on concepts of objects in bilingual speakers of two languages that assign opposite gender to the same object. Italian-German bilingual children and Italian monolingual controls performed an on-line voice attribution task. All children were native speakers of Italian and living in Italy. Results show that Italian monolingual children attribute more female voices to objects whose noun is grammatically feminine in Italian. Monolinguals also show a preference for attributing voices consistently with Italian grammatical gender assignment. Italian-German bilingual children are not affected by Italian grammatical gender. It is argued that when the two languages of a bilingual represent a specific aspect of reality differently, the bilingual may develop different concepts from a monolingual. This is due to the knowledge of two specific languages rather than to bilingualism per se, and to linguistic rather than cultural factors.
(199 words)

Keywords
Bilingualism; linguistic relativity; grammatical gender; multicompetence; language and thought

1. Introduction

The idea that knowing more than one language may affect the way people think is appealing, but it has hardly been investigated. It is generally agreed that knowing more than one language confers 1) linguistic advantages, e.g. the ability to use a second language and improved abilities in the first language (e.g., D'Angiulli, Siegel, & Serra, 2001); 2) metalinguistic advantages, e.g. an earlier and/or higher development of metalinguistic awareness (Cook, 1997), and 3) general cognitive advantages, e.g. better attention skills and slower brain aging (Bialystok, 2005; Bialystok, Craick, Klein & Viswanathan, 2004). The possibility that bilingualism affects thought has not been widely investigated. As more and more research shows that speakers of different languages think differently, the time is ripe to address the question of how bilinguals think and whether they differ from monolinguals, given that they have access to more than one language and therefore more than one representation of reality. Since most of the world population is bi- or multilingual, it is certainly worth investigating whether bilingualism affects the way people think.

The past 15 years have witnessed a renewed interest in *linguistic relativity*, the idea that language affects thought. While most aspects of thought are probably common to all human beings, some specific areas seem to be affected by language. Linguistic research shows that languages differ in their representations of aspects of reality such as time, space, number, objects and colours, at the lexical and grammatical level (*linguistic diversity*). For instance, the English language represents number with a singular/plural distinction that does not exist in Chinese, while on the other hand Chinese classifiers assign entities to categories that have no equivalent in English. Recent cross-linguistic research has shown that these linguistic differences affect how native speakers of different languages represent the world. Differences have been found in areas such as representations of time and space, perception of colour and taste, and classification of objects and substances, as reflected in a variety of linguistic and non-linguistic tasks involving perception, memorisation and classification (e.g., Bowerman and Levinson, 2001; Gentner and Goldin-Meadow, 2003).

If speakers of different languages think differently, it is worth asking how people think when they know more than one language. When two languages represent the same entity or event differently and speakers of these two languages have different concepts of such an entity or event, then bilinguals who know both languages could have access to two different concepts, and could therefore think about this entity or event differently from monolingual speakers of either language. Still, notwithstanding the various calls for more research on bilingualism and thought (Green, 1998; Odlin, 2003; Pavlenko, 2005), very little research has addressed the issue (e.g., Athanasopoulos, 2006; Cook, Bassetti, Kasai, Sasaki and Takahashi, 2006). The present paper continues this line of research by reporting an experiment that compared the classification of objects in monolingual Italian-speaking children and Italian-German bilingual children. The German and Italian languages mark the nouns of all (in Italian) or many (in German) entities as grammatically masculine or feminine. Monolingual German and Italian speakers consider these entities more masculine or feminine depending on the grammatical gender of the entity's noun. Still, many entities have opposite gender in the two languages, and this may affect bilingual speakers' representations. The experiment therefore investigated whether bilingual children, who are native speakers of the same language as their monolingual counterparts and live in the same sociolinguistic environment, have different concepts of the same objects from monolinguals because of exposure to another language that assigns the object the opposite gender.

2. Grammatical gender and its consequences

2.1 Grammatical gender

Some languages have a *grammatical gender* system whereby all nouns belong to one of two or more classes (*genders*). *Assignment rules* (the rules whereby a noun is assigned a gender) may be based on the phonological form of the noun or on its inflectional morphology. For instance, the Italian language has two genders, masculine and feminine. The gender of the noun is marked in the phonological form, and adjectives, pronouns and determiners agree with it: nouns ending in /o/ are generally masculine, and take adjectives and determiners ending in /o/, whereas nouns ending in /a/ are feminine and take adjectives and determiners ending in /a/ (e.g., *il mio bellissimo tavolo*, "my very beautiful table", *la mia bellissima sedia*, "my very beautiful chair"). The German language has three genders: masculine, feminine and neuter. In German, grammatical gender determines the choice of adjectives, pronouns and determiners (for an overview of grammatical gender, see Corbett, 1991).

Unlike *natural* (or *semantic*) *gender*, which reflects the biological sex (from now on, "sex") of the word's referent (e.g., "she" for a female, "he" for a male), grammatical gender is used with asexual referents (e.g. *sedia* "chair" is feminine in Italian), with inconsistently sexed referents (e.g. the Italian word *sentinella* "sentry" is feminine although Italian sentries are men), and with referents of either sex (e.g., *persona* "person" and *oca* "goose" are feminine regardless of the sex of the referent). In Italian therefore the feminine class includes female human beings such as "grandmother" and "auntie", but also artifacts (armchair, pencil), animals (tiger, duck), abstract concepts (faith, death) and natural kinds (apple, rain); the masculine class includes grandfather and uncle, as well as mattress, toothbrush, snake, blackbird, love, work, flower and sun. Besides being often unrelated to biological sex, grammatical gender is arbitrary: with the exception of nouns with human referents, all the above examples of Italian feminine nouns are masculine in German, and all the above examples of Italian masculine nouns are feminine in German. This arbitrariness is obvious from cross-linguistic comparisons: a study (Foundalis, 2002) which compared the grammatical gender of 84 nouns of entities (animals, artifacts, natural kinds and abstract ideas) across 14 languages found little agreement among different languages, and also between gender assignment in the various languages and the gender attributed by a group of speakers of a genderless language (English). The only regularity appeared to be that languages belonging to the same family (Romance, Germanic, Slavic) assign gender similarly.

Grammatical gender therefore belongs to a different category of cross-linguistic differences, compared with the differences most commonly studied by linguistic relativity researchers, such as colours or numbers. Cross-linguistic differences can be of three types:

1) Different languages place the spotlight on different aspects of reality. For example, some languages distinguish singular and plural, completed and uncompleted actions, or witnessed and unwitnessed events. Speakers of different languages therefore have to notice, remember and specify how many entities there are, whether actions are completed or not, whether events were personally witnessed or not, or other aspects of the world around them.

2) Different languages carve different categories out of the same continuum. For instance, the colour spectrum is a continuum, but English identifies the two categories "pink" and "red" out of different shades of red, and Greek identifies the two categories *ghalazio* and *ble* out of different shades of blue. Saltiness is distinguished from umami by Japanese but not by English speakers (O'Mahony and Ishii, 1986). Speakers of different languages therefore have to categorize the same experiences (such as two shades of a colour or two savoury tastes) as being the same or as belonging to two different categories, depending on the language they speak.

3) Different languages create categories that are purely linguistic: such categories bear no correspondence with anything in the real world and are entirely arbitrary. Grammatical gender belongs to this type of cross-linguistic differences. While the female gender is assigned to biologically female beings, it is also used for inanimate objects, thus creating a category of entities that have nothing in common in the real world. Unlike the previous two types of cross-linguistic differences, grammatical gender creates categories that cannot be influenced by reality or perception, as is the case with number or colour. Linguistic relativity research on the effects of such purely linguistic categories is special, in that it investigates the pure effects of language, without the potential confounding effects of non-linguistic cognition. If grammatical gender affects how people categorize objects or animals, these effects can only be attributed to language, as they have no correspondence in the real world. Grammatical gender therefore appears as the ideal testbed for theories of linguistic relativity.

2.2 Effects of grammatical gender on concepts in monolinguals

Speakers of gender languages have to use the appropriate gender every time they talk about each single entity in the world, be they objects, animals, natural kinds or abstract concepts (in this paper, "gender" refers to grammatical gender only, not including natural gender). In the case of Italian and German speakers, this means choosing the appropriate form for adjectives, articles, ordinal numbers, pronouns and participles. Since childhood, Italian speakers learn that all entities belong to a "masculine" or "feminine" class, while German children also have a "neuter" class. When children learn this categorisation, they have no reason to think that it is arbitrary, and may think that the referents have characteristics whereby their nouns are masculine or feminine. Just like children learn that robins and penguins belong to the same category "birds", so they learn that chairs and straws belong to the same category "feminine", and desks and matches belong to the same category "masculine". Speakers of gender languages may therefore think of grammatically feminine entities as being feminine and grammatically masculine entities as being masculine.

Anecdotal evidence of the effects of grammatical gender on representations of entities has been reported in the past (e.g., Jakobson, 1966), and indeed philosophers for long believed that grammatical gender reflected natural properties of entities (see Fodor, 1959). The effects of grammatical gender can be seen in everyday life, for example in personifications of the sun as a man and the moon as a woman in Italian visual arts and of the sun as a woman and the moon as a man in German visual arts, or in the German representation of death as a woman in poetry and the visual arts. While such artistic representations may be attributed to culture rather than language, culture cannot explain why entities that are not represented in the visual arts or in the literature are consistently attributed male or female characteristics by speakers of a same language. For instance, a recent global advertisement campaign for a sportswear brand featuring a football that talks to the audience was localized using male or female voices for the football, to match the grammatical gender of the word "football" in different languages. The football speaks with a feminine voice in the Brazilian Portuguese advertisement, and with a masculine voice in the German advertisement, because the German audience expects the football to speak with a masculine voice and would not immediately relate a female voice to the football. It has indeed been found that grammatical gender affects consumers' behaviour. Researchers found that Spanish speakers prefer grammatically feminine brand names for products associated with women, and masculine brand names for products associated with men; they also prefer a name ending in *–a* than a name ending in *–o* for a brand that produces woman shoes, and prefer the fictitious brand name *Aizo* rather than *Aiza* for a beer (which is considered a man's drink) and the opposite for a margarita (a woman's drink; Yorkston and De Mello, 2005).

Recently, the effects of grammatical gender on concepts of objects have been investigated experimentally. These experimental studies can be roughly divided in two types: those involving judgments of gender (masculinity-femininity classifications, masculinity ratings, male or female voice attribution) and those involving tasks not explicitly related to gender (various semantic differential scales, memorisation, picture matching or sorting); furthermore, the materials can be linguistic (word lists) or non-linguistic (pictures).

A few early studies in the Seventies mostly found no effects of grammatical gender (Beit-Hallami, Catford, Cooley, Yull, Guiora & Paluszny, 1974; Guiora & Sagi, 1978, both summarized in Guiora, 1983). The languages investigated included Hebrew, a grammatical gender language; Finnish, a genderless language; and English, a natural gender language. Participants performed a *semantic differential task*, whereby they rated a series of nouns on a masculinity-femininity scale. Some referents had masculine or feminine connotations (e.g., "gun", "apron"); others were neuter ("toothbrush", "table"). There were 3 types of words: *consonant words*, whose grammatical gender matches their gender connotation (such as "skirt", which is grammatically feminine); *dissonant words*, whose grammatical gender does not match their gender connotation (such as "pregnancy", which is masculine); and *neutral words*, which have no gender connotation but are grammatically feminine or masculine (e.g., "table" (F), "window" (M)). For referents that had gender connotations, both adults and 5-year-old children decided on the basis of gender connotations, regardless of grammatical gender. Neutral words were mostly rated as neuter, and researchers concluded that grammatical gender had not affected their classifications. Notwithstanding the researchers' conclusions, an inspection of the results table in Guiora (1983) reveals that not a single answer was inconsistent with grammatical gender. Furthermore, about one third of adults rated "clock" as masculine, and 50% rated "teaspoon" as feminine. This means that, although objects were mostly classified as neuter, their grammatical gender had an effect. No such effects can be seen in the 5-year-old group; this could be due to their younger age or to differences in task administration. Another study that used the same paradigm to compare Arabic and English speakers found that Arabic speakers were affected by grammatical gender in their categorisation of both neutral and dissonant nouns (Clarke, Losoff, Dickenson and McCracken, 1981). While these early results reveal some effects of grammatical gender, conclusions are limited because the stimuli were words rather than pictures, so that findings may reflect effects of the grammatical gender of words rather than categorisation of objects. Furthermore, the Arabic participants in Clarke et al. (1981) were Arabic-English bilinguals living in the US, and it is possible that stronger effects may have been obtained with monolinguals.

Following the rediscovery of linguistic relativity, more recent studies found effects of grammatical gender in adult and child speakers of a variety of languages, performing a variety of tasks with both linguistic and non-linguistic materials. In one study, German and Spanish speakers rated nouns of artifacts on a series of semantic differential scales (Konishi, 1993). Participants rated grammatically masculine words higher on scales of potency, a measure strongly associated with masculinity. German and Spanish speakers' ratings differed when the two languages assigned opposite gender to the same object. In another study, English and Spanish monolingual native speakers rated a series of pictures of artifacts and natural kinds on a masculine-feminine scale (Sera, Elieff, Forbes, Burch, Rodríguez and Dubois, 2002). The ratings of Spanish speakers were affected by the Spanish grammatical gender of the entity. The effect was stronger when the picture was accompanied by a linguistic label, confirming that linguistic rather than cultural factors were at play. In a second experiment, participants attributed a male or female voice to the same pictures. Spanish speakers were affected by the Spanish grammatical gender of the object; English speakers were affected by the natural/artificial distinction, and attributed more male voices to artificial objects and more

female voices to natural kinds. Spanish speakers were clearly not using grammatical gender as a strategy to perform the task, first because their answers were not 100% consistent with grammatical gender, and second because they were affected by the natural-artificial distinction, which should have no effects if they were consciously relying on grammatical gender. In a study that used non-linguistic materials (Flaherty, 1999), French, English, Japanese and Spanish adults saw line drawings of objects and animals and performed three tasks: they gave a name to each item, matched it with a picture of a boy or a girl, and then rated it on a series of two-point scales, such as small/big and beautiful/ugly (the former attributes are feminine and the latter masculine). The researcher counted as feminine each item that was rated as feminine on 3 or more of the 5 scales. Results show effects of grammatical gender in French and Spanish participants. Again answers were not 100% consistent with grammatical gender, showing that participants were not using grammatical gender to perform the task, but were affected by it.

An important question is at what age grammatical gender effects appear. Martinez and Shatz (1996) studied English and Spanish children aged 3 to 5 performing a picture-sorting task. Pictures included female and male humans as well as animals and objects. In the free sorting task, while both groups mostly sorted using the animate/inanimate distinction, 33% of Spanish children sorted grammatically masculine objects and animals together with male humans. Flaherty (2001) tested English- and Spanish-speaking adults and children using the same tasks as Flaherty (1999). Grammatical gender affected children above 8 and adults, but not children aged 5 to 7, who were instead affected by their own gender, with boys choosing more male names and girls choosing more female names. The effects of grammatical gender were stronger in the gender attribution tasks than in the semantic differential task. Results also show that some items, such as "snake" and "house", are considered masculine by both English and Spanish speakers. Sera et al. (2002) also tested both adult and child (aged 6, 8 and 10) speakers of English, French and Spanish using a voice attribution task. Participants attributed a female or male voice to pictures of artifacts, animals and natural kinds. Grammatical gender affected the voice attributions of French and Spanish adults and children above age 8. When natural kinds and artifacts had the same gender in the two languages, French and Spanish speakers attributed them the same voice; when they had opposite gender, French and Spanish children attributed opposite voices to natural kinds but not to artifacts. It appears that the effects of grammatical gender are established by age 8.

Another interesting question is whether grammatical gender affects speakers of some languages more than others. In their second experiment, Sera et al. (2002) tested German and English children aged 5, 7 and 9 using a voice attribution task. No significant differences were found, and researchers concluded that grammatical gender may not affect German speakers, or that effects may appear at a later age. Another study compared adult speakers of German and Italian, as well as English-speaking controls (Vigliocco, Vinson, Paganelli and Dworzynski, 2005). Participants performed a triadic similarity task where they had to match two of three animals or artifacts as being more similar. Italians sorted together animals that have the same gender in Italian, but not artifacts. German speakers did not differ from English controls, showing that German grammatical gender does not affect classification the same way as Italian grammatical gender does. When pictures were used instead of words, no effects were found in Italian speakers either. Vigliocco and colleagues concluded that languages with 3 gender classes might affect cognition less than languages with only a masculine and a feminine class. On the other hand, Zubin and Kopcke (1984) found effects of German grammatical gender. German speakers rated affect nouns (e.g., "sadness", "courage") on a series of semantic differential scales such as small/large and warm/cold. Results show that grammatically feminine terms are rated as more introverted (a feminine characteristic) and grammatically masculine terms as more extroverted (a masculine characteristic). It appears

that German grammatical gender affects its speakers' concepts, but probably less than languages such as Spanish or Italian. The reasons why German may have weaker effects are not clear. While Vigliocco et al. argued that German grammatical gender has weaker effects because it has three rather than two categories, the opposite may in fact be true. Since German has a neuter gender, a higher proportion of grammatically feminine and masculine words refer to feminine and masculine referents, whereas in languages where all words must be either masculine or feminine a higher proportion of masculine and feminine words have asexual referents. A more likely reason for German's weaker effects is the complexity of the German grammatical gender, which has a different form for each case. This higher number of forms, compared with languages such as Spanish that only distinguish two forms, may lead German gender to affect categorisation less than simpler gender systems such as the Spanish one.

In conclusion, research done in the past 15 years shows that grammatical gender affects concepts of artifacts, animals and natural kinds in monolingual speakers of gender languages. The effects are evident after age 8, although the entity of the effect varies depending on the materials, the languages and the tasks involved.

2.3 Effects of grammatical gender on concepts in bilinguals

Anecdotal evidence shows that the gender assignments of a linguistic group can be puzzling for speakers of other languages. For instance, speakers of other languages do not understand why German artists represent sin as a woman ("sin" is feminine in German; for examples, see Corbett, 1991, and Jakobson, 1966). Adult second language (L2) learners may have negative attitudes towards the L2 gender system; for instance, English-speaking learners of French may find grammatical gender "silly" (Jones, 1996). Child L2 learners may have fewer problems than adults in accepting L2 gender, but still struggle trying to make sense of it. Kenyeres (1938) reports an entertaining diary study of a 7-year-old speaker of Hungarian (a genderless language) trying to make sense of gender assignment in L2 French. The girl understands that nouns that take *le* are masculine and those that take *la* are feminine. She therefore cannot accept that stains are feminine because they are ugly; she also rejects the idea that ribbons and gardens are masculine, because ribbons are beautiful and gardens are the mothers of flowers. Similarly, Taeschner's book on bilingual first language acquisition, *The Sun is Feminine*, takes its title from a conversation between two Italian-German bilingual children who talk about the sun in Italian using the feminine gender, and when corrected ask whether the sun is a boy, before forcefully protesting that the sun is a girl (Taeschner, 1983).

In spite of many anecdotes, experimental research on the effects of grammatical gender on bilinguals' thought is scarce. In the earliest study (Ervin, 1962), Italian-English bilingual speakers rated a series of written Italian pseudo-words along various scales. The pseudowords had a masculine marker *–o* or a feminine marker *–a*. Italian speakers rated feminine pseudowords as prettier, weaker and smaller than masculine pseudowords, showing that gender markers lead to perceiving a noun as possibly representing a male or female entity even when the noun's referent is unknown. Still, these effects seem to have appeared only in the Italian-dominant bilinguals, who had moved to the US after age 9 and were faster at picture naming in Italian than in English. There were no effects in the English-dominant bilingual group, who had acquired English before age 6 and were faster in English. A recent study (Andonova, Gosheva, Schaffai and Janyan, 2007) found effects of second language learning on the re-assignment of gender to first language words. Bilinguals and L2 learners attributed a masculine or feminine gender to a list of neuter L1 words. Results show that the attribution of a new gender to an L1 word is influenced by the grammatical gender of the word in the second language, both in Bulgarian-speaking high school students who had studied German or Spanish as foreign languages for 4 years and in German-French and German-Russian bilinguals with about 12 years of L2 exposure. The control groups, who had

studied English, performed randomly. Both the studies reported above involved linguistic materials (words), and it is not clear whether participants were simply using grammatical gender as a strategy to perform an unusual task.

Evidence of grammatical gender effects on bilinguals' thought comes from a series of studies that compared German-English and Spanish-English bilinguals using English materials and instructions (Boroditsky and Schmidt, 2000). The purpose of these studies was not to study bilinguals, as researchers chose L2 speakers of English in order to be able to use a genderless language to test native speakers of gender languages. Still, the results of these experiments shed light on the effects of grammatical gender in the mind of bilinguals. In the first experiment participants learnt proper names for a series of artifacts, animals and natural kinds, for instance learning that an apple was called "Patricia", and then were tested for recall of the item-name pairs. All objects had opposite grammatical gender in German and Spanish, and proper names were either masculine or feminine (e.g., Patricia or Patrick). Participants remembered item-name pairs better when the name was consistent with the gender of the item in their first language. English controls performed equally well with all items. In the second experiment, participants wrote three English adjectives to describe a series of English words representing the same items used in the first study. Participants described grammatically feminine nouns using more feminine adjectives, and grammatically masculine nouns using more masculine adjective; for instance, the bridge was described as "elegant" by German speakers and "strong" by Spanish speakers. Both the experiments above show that German-English and Spanish-English bilinguals, despite their knowledge of a genderless second language, are still affected by the grammatical gender of their first language.

While bilingualism per se does not seem to eliminate the effects of a gendered first language on thought, bilingualism involving two gender languages may have an effect, if the two languages assign opposite gender to the same entities. One study looked at bilinguals' concepts of entities that have opposite grammatical gender in their two languages (Phillips and Boroditsky, 2003). In a picture similarity task, a group of Spanish-German and German-Spanish bilinguals rated the similarity of a series of picture pairs in a picture similarity task. Each pair consisted of a picture of a human being (either male or female) and a picture of an object or animal. Objects and animals had opposite genders in Spanish and German. The task was performed in English, the participants' third language. German and Spanish monolingual controls rated grammatically feminine objects and animals as more similar to women and masculine ones as more similar to men. In bilinguals, the effects of grammatical gender correlated with self-reported fluency in each language: those who rated themselves as more fluent in German were more affected by the German grammatical gender, and those more fluent in Spanish were more affected by the Spanish grammatical gender. An obvious limitation of this study is that the bilingual group included both German-L1 Spanish-L2 bilinguals and Spanish-L1 German-L2 bilinguals. Differences between the bilingual group and the two monolingual groups could therefore be due to the fact that half of the bilinguals were German native speakers and half were Spanish native speakers, rather than being caused by their bilingualism.

In conclusion, it appears that grammatical gender may affect bilinguals differently from monolinguals if the bilinguals' two languages assign opposite genders to the same entities, but due to the limitations of previous studies more research is needed.

3. The current study: Aims and hypotheses

The aim of this study was to compare native-speaking Italian children who are monolinguals and native-speaking Italian children who learnt German at an early age to test the hypothesis that Italian grammatical gender affects object classification in Italian monolinguals but not in Italian native speakers who know another language that assigns

opposite gender to the same objects. From around age 8, native speakers of gender languages show effects of grammatical gender on their concepts of various entities, as revealed in voice attribution tasks (Sera et al., 1994). The question then is: what happens if children are exposed to two gender languages before age 8, and the two languages assign opposite genders to various entities? Bilinguals may realize that grammatical gender is just an arbitrary linguistic feature, and could then not be affected by the grammatical gender of one language. This is one of the outcomes of bilingualism proposed by Cook as part of his multicompetence theory (Cook, 2002; Cook et al., 2006): bilinguals may develop new concepts that are in-between the concepts of their two languages, or different from either.

Furthermore, the study aimed at disentangling the effects of language from the effects of culture. Many studies on the effects of language on thought can be criticized for potentially reflecting effects of culture rather than language. This study tackled this question by comparing two groups of children who had been living in the same sociolinguistic environment throughout their lives.

4. Method

In this experiment, Italian-German bilingual children and Italian monolingual children were asked to assign a male or female voice to pictures of objects. All pictured objects had opposite grammatical gender in the two languages. There were two types of objects: *masculine objects* were grammatically masculine in Italian and feminine in German; *feminine objects* were grammatically feminine in Italian and masculine in German. It was predicted that the Italian monolingual children would choose a male voice for objects whose noun is grammatically masculine in Italian and a female voice for objects whose noun is grammatically feminine in Italian; the Italian-German bilingual children would not be affected by the Italian grammatical gender in choosing a voice for objects. Response times were also recorded and analysed, as research shows that bilinguals may perform some tasks more slowly than monolinguals, but no specific predictions were made.

4.1 Participants

Twenty-one monolingual Italian children and twenty-one Italian-German bilingual children participated in the experiment. All children were native speakers of Italian and were living in the same town in Italy; the bilingual children were attending a school where German was the language of instruction. All the bilinguals had acquired Italian from birth (one child had acquired it at age 4) and most of them spoke Italian at home with at least one parent (89%). They had all started acquiring German before age 4 (58% from birth, 42% by age 4), and 74% of them spoke German at home with at least one parent (63% spoke both languages at home, 11% only spoke German; percentages do not include 2 children who did not fill in the questionnaire). Children's answers to a questionnaire revealed that they could be considered balanced bilinguals:

1) They did not show preference for speaking one language or the other (no preference = 47%, Italian preference = 32%, German preference = 21%)
2) They considered themselves equally good at speaking both languages (equally good = 68%, better at Italian = 21%, better at German = 11%).
3) They mostly rated their own speaking proficiency as native-like in both languages: 73% considered themselves as good at speaking Italian as Italian native-speaking children, 63% considered themselves as good at speaking German as German native-speaking children, and nobody considered him/herself as "much worse" than native-speaking children in either language. Some (16%) rated their speaking proficiency as equally good in both languages, but lower than native speakers of both. Only a few considered themselves less proficient than

native speaking children in only one of their languages (11% worse in Italian, 21% worse in German).

The two groups had similar gender composition (monolinguals: M=10, F=11; bilinguals: M= 9, F= 12) and age (monolinguals = 9;4, bilinguals = 9;7). This age range was chosen because, according to previous findings, the effects of grammatical gender on the concepts of objects become apparent at age 8 (Sera et al., 2002). Both groups attended privately run schools, reflecting a similar socio-economic background. All children had studied English, a genderless language.

4.2 Materials

Materials consisted of 14 black-and-white line drawings of familiar concrete objects; two more drawings were prepared for the practice session. All objects were artifacts, in order to avoid the confounding effects of having a mixture of artifacts and natural objects, as previous research had shown a general trend to consider natural objects as feminine and artificial objects as masculine (Mullen, 1990; Sera et al., 1994). Black-and-white line drawings were used in order to avoid the gender connotations of colours (Flaherty, 2001). Care was taken to ensure that no object had male or female connotations, avoiding objects such as skirts or perfumes which are generally associated with women (Clarke, Losoff, Dickenson, & McCracken, 1981), because previous research shows that children classify such objects as masculine or feminine depending on who normally uses the object (Leinbach, Hort and Fagot, 1997; Mullen, 1990).

Six objects had a grammatically masculine noun in Italian and a grammatically feminine noun in German, and 6 objects had a feminine noun in Italian and a masculine noun in German. There were two control items, one object that has a feminine noun in both languages and is typically used by females ("necklace"), and one object that has a masculine noun in both languages and is typically used by males ("hammer). The objects' nouns and grammatical genders were established with a naming pre-test whereby Italian and German adult native speakers were shown the drawings and asked to write down the objects' nouns preceded by a definite article. Objects and their nouns are listed in Appendix 1.

For each object, two audio files were created as follows: the same short Italian sentence was recorded twice, once by a male voice and once by a female voice. All sentences were questions appropriate to the object, in the form "do you like [noun]" or "would you like to [verb]", e.g. the straw asked "*Ti piace il succo d'arancia?*" ("Do you like orange juice?"). Sentences did not provide grammatical gender information about the object's noun. The female voice was recorded by a female Italian native speaker; the male voice version was obtained from the same recording using Praat (Boersma and Weenink, 2005).

4.3 Procedure

The task was run on a Macintosh computer using the Psyscope software (Cohen, MacWhinney, Flatt and Provost, 1993). All children were tested individually in a quiet room in their school by the same experimenter, a native speaker of Italian; all interactions were exclusively in Italian. After receiving oral instructions, the child was given a practice trial of 2 items. Children were asked to imagine that the object on the screen could talk, and to choose the most appropriate voice for each object by pressing a key on the computer. The line drawing of an object appeared on the screen for 2,000msec, and then disappeared. After 500msec, the object appeared again for 2,000msec together with the recording of a male or female voice saying a short sentence. The object disappeared for 500msec, and then it appeared again for 2,000msec and repeated the sentence with a voice of the opposite gender. It then remained on screen until the child pressed a designated key on the keyboard, the key marked as "1" if they preferred the first voice they heard, or the key marked as "2" if they

preferred the second voice. The computer recorded response and response time; there was no time-out condition. After a pause of 1,500msec, the next line drawing appeared. All children saw the line drawings in the same sequence, but the order of female and male voices was randomized by the computer so that each child heard a different combination of objects and voices. Children were invited to take a rest after the first half of the trials.

At the end, the child answered some biographical questions, and explained how s/he chose the appropriate voice for each object. The bilingual children later filled in a written questionnaire regarding their language background, which was administered in the classroom.

5. Results

In line with predictions, the Italian monolingual children showed an effect of the Italian grammatical gender in their choice of the appropriate voices for objects, whereas the Italian-German bilingual children were not affected. The Italian monolingual children chose more female voices for objects that are grammatically feminine than for objects that are grammatically masculine in Italian. No effect of grammatical gender appeared in Italian-German bilingual children.

5.1 Preliminary tests

First of all, results from the two control items were analysed to make sure that children had understood the instructions. Both groups mostly chose the female voice for the necklace (bilinguals=91%, monolinguals=95%) and the male voice for the hammer (both groups = 86%). This is in line with previous findings that objects with female connotations are considered feminine and objects with male connotations are considered masculine. Children were also asked the question "Was [this task] easy, difficult, or so-so?", to which none of the children answered "difficult"; 64% of bilinguals and 71% of monolinguals considered it "easy" and the remaining ones considered it "so-so". These results confirm that children had understood the task.

Second, to check whether the children's own gender affected their choice of voices, an ANOVA was conducted with children's gender as a between-subject variable and the number of *female voice choices* as the dependent variable. No effects of children's gender were found ($F(1,40) = .37$, ns). This is in line with previous findings that at this age the child's own gender does not affect the number of male or female voice choices in a similar task (Sera et al., 1994), although effects have been found with younger children performing a name attribution task (Flaherty, 2001), and with adults performing a different task (Andonova, D'Amico, Devescovi and Bates, 2004). Children's gender was therefore eliminated from analysis.

5.2 Voice choices

To test whether the Italian grammatical gender of objects affects bilingual and monolingual children's voice choices, a one-way repeated-measures ANOVA was conducted for each group, with Grammatical Gender as the within-subjects factor and the frequency of female voice choices as the dependent variable.

For the monolingual group, grammatical gender significantly affected the number of female voice choices, $F(1, 20) = 7.97$, $p = .011$, $\eta^2 = .29$. This means that monolingual Italian children chose more female voices for objects that are grammatically feminine in Italian (69%), compared with grammatically masculine objects (52%; respectively $M = 4.12$, $SD = 1.20$ and $M = 3.10$, $SD = 1.45$).

For the bilingual group, grammatical gender did not affect the number of female voice choices, $F(1, 20) = 1.35$, ns. This means that the number of female voice choices was not significantly different for objects that are feminine in Italian and masculine in German (59%, $M = 3.55$, SD

= 1.24) versus objects that are masculine in Italian and feminine in German (51%, *M* = 3.05, *SD* = 1.66).
The ANOVA results were confirmed by tests against chance level, which were performed to ascertain whether the number of female voice choices for each type of object for each language group was different from chance level. Tests against chance probability were done by *t*-tests. For objects that were grammatically feminine in Italian, bilinguals and monolinguals showed different patterns of response. Italian monolingual children made female voice choices at significantly above-chance levels ($t(20) = 4.26$, $p < .001$). Italian-German bilingual children approached but did not reach significance ($t(20) = 2.02$, $p = .06$). For objects that were grammatically masculine in Italian, both groups performed at chance level (monolinguals: $t(20) = .30$, ns; bilinguals: $t(20) = .13$, ns).

5.3 Subject analysis

To further examine the effects of Italian grammatical gender on the two groups, an overall grammatical gender preference was calculated for each participant, whereby each participant was classified as having an *Italian gender preference*, a *German gender preference*, or *no preference*. In line with previous research on bilinguals' classification preferences (Cook et al., 2006; Imai and Gentner, 1997), a participant was classified as having an Italian gender preference if s/he made 7 or more voice choices (out of 12) that were consistent with the Italian grammatical gender of the object. Vice versa, a German gender preference was attributed to a participant who made 7 or more voice choices that were consistent with the German grammatical gender of the object. The pattern was scored as no preference when the participant made 6 choices that were consistent with the Italian gender and 6 choices that were consistent with the German gender. Table 1 shows the percentage of children classified by preference by group.

Group	Italian preference	German preference	No preference
Monolinguals	71% (15)	19% (4)	10% (2)
Bilinguals	52% (11)	33% (7)	14% (3)

Table 1 Percentage of participants classified as Italian preference, German preference or no preference by group (number in brackets)

Binomial tests were conducted to test whether the number of participants in each cell differed from the probability expected by chance. The chance probabilities for *Italian preference* and *German preference* were both .39, and that for *no preference* was .22. The monolingual group showed a preference for Italian grammatical gender, with 71% of participants being classified as having an Italian preference (corresponding to 15 out of 21 participants). This exceeded the number expected by chance ($p < .005$). In the bilingual group, 11 children had an Italian preference and 7 had a German preference, and tests against chance level were not significant.

5.4 Item analysis

An item analysis was performed to reveal whether particular objects were classified according to chance by each group. A series of chi-square tests was performed to compare the number of children who made a female voice with the chance level number (10.5) for each object. Both groups chose female voices significantly above the chance level for the feminine control item "necklace" (bilinguals: N = 19, $\chi^2 = 13.76$, $p < .001$; monolinguals: N = 20, $\chi^2 = 17.19$, $p < .001$) and chose male voices significantly above the chance level for the male control item "hammer" (both groups: N = 18, $\chi^2 = 10.71$, $p = .001$). For grammatically masculine objects,

both groups performed at chance level on all objects. The two groups differed in their treatment of grammatically feminine objects. Table 2 shows the proportion of participants in each group who made a female voice choice for grammatically feminine objects. A higher than chance number of monolingual children made a female voice choice for half of the grammatically feminine objects, whereas bilingual children did not make higher than chance female voice choices. Among monolingual children, "key" and "plug" were not attributed a female voice more often than the chance level, possibly because these objects may have masculine connotations in an Italian environment, where men normally unlock the house door and deal with electrical equipment. Such items would therefore belong to what previous research termed "dissonant words", i.e. nouns whose grammatical gender is in conflict with the gender connotation of the referent.

Object	Female voice choices		*p* value	
	Bilinguals	Monolinguals	Bilinguals	Monolinguals
Straw	62% (13)	86% (18)	.28	.001**
Pencil	57% (12)	76% (16)	.51	.02*
Armchair	62% (13)	71% (15)	.28	.05*
Ball	57% (12)	67% (14)	.37	.09
Key	52% (11)	57% (12)	.83	.51
Plug	62% (13)	52% (11)	.28	.83

Table 2. Percentage of female voice choices for objects that are grammatically feminine in Italian and masculine in German by group (numbers in brackets), and results from chi-square comparisons against chance levels.

5.5 Response times

Response times were analysed to check whether there were differences between bilingual and monolingual children, or between grammatically feminine and masculine objects. Results revealed no significant difference between the response times of the bilingual and monolingual children, but the monolingual children took longer to choose a voice for feminine than for masculine objects.

To test for differences between the response times of bilingual and monolingual children, an ANOVA was performed with group as the between-subjects factor and response times as the dependent variable. Although the bilingual children were on average slower than the monolingual children (8,965msec vs. 8,362msec), the difference was not significant, $F(1,40) = 2.56$, ns.

To check whether children were slower with masculine or feminine objects, two repeated-measures ANOVAs were then performed on the two groups. The monolingual children were slower with grammatically feminine objects than with grammatically masculine objects (8,710msec and 8,015msec respectively, $F(1,20) = 5.90$, $p < .05$, $\eta^2 = .228$). The bilingual children showed no significant difference (9,050msec and 8,880msec respectively, $F(1,20) = .47$, ns).

5.6 Voice choice criteria

Children's self-reports of how they selected the appropriate voice for objects were elicited in order to check whether children were using grammatical gender to perform the voice attribution task. Such strategy was reported by 3 bilingual children and 1 monolingual child. Still, none of these children made 100% grammatical-gender-consistent voice choices, and their data were therefore not eliminated from analysis.

An analysis of the other answers revealed that the most common strategy among monolingual children was imagining that the object was talking (48%). Bilingual children reported a wider variety of strategies: choosing a female voice for soft objects and a male voice for hard objects, choosing a female voice for small objects, imagining who would normally ask that question, or imagining themselves being the object. A similar number of children in both groups reported choosing randomly or following their instinct (33% of monolinguals and 38% of bilinguals). Two of the monolingual children reported choosing only male or only female voices, but this strategy was probably developed in mid-task and their results still showed effects of the Italian grammatical gender. The voice choice criteria did not highlight noticeable differences between the two groups, apart from the slightly higher number of bilinguals who reported using grammatical gender as a strategy for voice attribution and the wider variety of strategies adopted by the bilingual children.

6. Discussion

The purpose of this study was to understand whether knowledge of two languages that represent the same aspect of reality differently affects bilinguals' thought, by looking at the classification of artifacts as masculine or feminine in two groups of Italian native-speaking children: a monolingual group and a bilingual group with knowledge of German, a language that assigns opposite gender to all the artifacts under analysis. Results confirm the hypothesis that bilinguals classify these artifacts differently from monolinguals. Monolingual children chose more female voices for grammatically feminine objects than for grammatically masculine objects, chose more female voices than expected by chance for feminine objects, were slower at choosing voices for female than male objects, and showed an overall Italian grammatical gender preference. Bilingual children were not significantly affected by the Italian grammatical gender. It appears that speaking two languages that assign the opposite gender to the same object affects concepts of objects, so that Italian native-speaking children who know German think of the same objects differently from Italian native-speaking monolingual children.

It should be noted that bilinguals also show a small preference for female voices for objects that are grammatically feminine in Italian, although not strong enough to be statistically significant. There are two possible explanations. Previous research suggests that Spanish gender assignment may be more akin to the assignment of speakers of genderless languages, compared with German gender assignment (Sera et al., 2002). When the Italian and German languages assign opposite gender to the same object, Italian gender assignment, which for historical reasons is very close to Spanish assignment (Foundalis, 2002), may be somehow more 'natural' than German assignment. An alternative explanation is that Italian-German bilingual children, notwithstanding their bilingualism, are still affected by the Italian gender system, i.e. bilingualism is reducing but not eliminating the effect. If the latter explanation is correct, then bilingualism would be having weaker effects than if the former explanation is correct.

With regards to the effects of grammatical gender on monolinguals' representation of objects, results show that feminine grammatical gender affects voice choices but masculine gender does not; furthermore, voice attribution seems to be more difficult for grammatically feminine than masculine referents, as revealed in longer response times for feminine objects. It is worth investigating why the feminine gender leads monolingual children to think of objects as being more feminine, whereas the masculine gender does not lead them to think of objects as being masculine. A possibility is that the feminine gender in Italian is marked. Italian has more masculine than feminine nouns; furthermore, since Italian does not have a neuter gender, many objects that were neuter in Latin have a masculine noun in Italian. This

means that a lower proportion of grammatically feminine nouns have a semantically neuter referent, compared with masculine nouns. This may make Italian children more prone to think of feminine nouns as referring to a semantically female referent, and less prone to thinking of masculine nouns as referring to male referents.

The results of the item analysis show that more than two thirds of monolingual children attributed a female voice to all grammatically feminine objects except two: the key and the plug. As mentioned above, both items may have male connotations in an Italian context. This shows that the effects of grammatical gender on thought can be mitigated by real world experience. Still, it can be argued that research on grammatical gender and thought is much less affected by real world experience than research on other aspects of linguistic diversity. While real world experience may interfere with linguistic effects in tasks testing the effects of language on colour perception or memory for number, the effects of grammatical gender are purely linguistic, because there is no alternative explanation as to why a straw is attributed a feminine voice while a toothbrush is not, or why an armchair is perceived as feminine but a mattress is not. Grammatical gender is indeed a fruitful area for investigations of the effects of language on thought in both bilinguals and monolinguals.

Finally, children's explanations of the criteria used for voice assignment did not reveal differences between the monolingual and the bilingual group. Still, three monolingual children reported using the Italian grammatical gender as a strategy for performing the voice attribution task, compared with only one monolingual. This may be purely casual, it may be evidence of a heightened level of metalinguistic awareness in bilingual children (see Bialystok, 2005), or alternatively bilingual children may rely more on such formal clues because, unlike monolingual children, they do not perceive masculine or feminine characteristics in objects.

7. Conclusions and implications

This study contributes to the growing body of research showing that knowing two languages that represent the same aspect of reality differently affects the way people think about that aspect of reality (Athanasopoulos, 2006; Cook et al., 2006; Pavlenko, 2003). As a consequence, bilinguals might think differently from monolinguals, although it should be noted that this is not an effect of bilingualism per se, but a consequence of knowing a specific pair of languages that differ in their representations of a specific entity.

The difference between bilinguals and monolinguals in this experiment can only be attributed to language. A problem with a number of studies that investigate the effects of language on thought is the potential confounding variable of culture. When bilinguals have experienced living in the L2 sociocultural environment, differences between bilinguals and monolinguals may be attributed to biculturalism, rather than bilingualism. Bilingual children who have lived in two countries may have been exposed to different representations of the same entity in children tales, picture books, advertisements or cartoons, where one culture may represent the entity as masculine and one culture as feminine. For instance, Italian-German bilingual bicultural children may have been exposed to stories of frogs that become princesses in Italy (as in Calvino's fairytale *Il principe che sposò una rana*, Calvino, 1956/1993), and to stories of frogs that become princes in Germany (as in the brother Grimm's fairytale *The Frog King*, which in the Italian translation becomes a toad). While cultural influences cannot be entirely excluded, choosing children who live in the same city reduces the possibility that cultural rather than linguistic influences are at play. This may be an important issue in the light of findings of Cook et al. (2006), who showed that only bilinguals with more than 3 years of stay abroad categorize objects and substances differently from monolinguals, but bilinguals with a shorter stay perform more like monolinguals, regardless of language proficiency. Cook et al.'s results seem to point to effects of exposure to

two sociocultural environments as well as to two languages, whereas the results of the present study can only be attributed to language effects.

The present results provide evidence for Cook's multicompetence theory (Cook, 2002; Cook et al., 2006). In particular, Cook suggested various outcomes of bilingualism: bilinguals 1) may not acquire concepts encoded in their second language, 2) may have two separate sets of concepts, or 3) may integrate L1 and L2 concepts, and either develop concepts in-between those of the two languages, or develop concepts different from those of either language. The first outcome probably does not apply to these balanced simultaneous bilinguals. This study also found no evidence for the second outcome: if children had two separate sets of concepts, they should have performed in line with Italian monolingual children, because they were operating in Italian and so should have activated Italian-encoded concepts. Results support the hypothesis that bilinguals integrate L1 and L2 concepts and think differently from monolinguals. On the other hand, effects of language mode cannot be ruled out, as bilingual children might have differed from monolinguals more, had they been tested in German. The present results provide evidence for the last outcome, that bilinguals whose two languages represent different concepts may integrate L1 and L2 concepts and end up having different concepts from those of monolingual speakers of their first language.

These results may have implications for research on the acquisition of second language grammatical gender. It appears that for monolingual native speakers grammatical gender is not simply grammatical but also conceptual. Native speakers not only hardly ever make gender errors, but also somehow perceive entities, or at least some entities, as having masculine or feminine characteristics. Children who acquired two gender languages from an early age, like those in the present study, seem not to have concepts of objects as being masculine or feminine. Children who acquire a second language at a later age try to match L2 gender assignment with masculine or feminine characteristics of referents (see Kenyeres, 1938). Adult L2 learners only see grammatical gender as part of grammar, but grammatical gender seems to be more than linguistic for native speakers of gender languages. In monolinguals' mental lexicons, the gender of at least some entities may be part of the concept, rather than of the lemma. An important issue may also be the age of onset of acquisition of the second language. Since the effects of grammatical gender on object categorisation are established after age 8 in monolinguals, the gender system of a second language acquired after that age may not affect conceptual development. There could be a 'conceptual critical period' after which the acquisition of a gender language may not affect concepts of entities, or a 'conceptual sensitive period', after which the effects may be weaker and weaker. On the other hand, there is some evidence that adult second language acquisition may also affect concepts of objects as masculine or feminine. Phillips and Boroditsky (2003) found that bilinguals' self-reported proficiency in their two languages correlated with the effects of the grammatical gender of each language on picture matching, and had stronger effects than their L1. If the most proficient language is the one that affects concepts more, this means that adults' concepts can be affected by second language acquisition. Age of acquisition may therefore be an interesting factor to explore.

The present study may also have implications for cross-linguistic research on monolinguals. Unlike much research that uses bilinguals to confirm or refute theories and findings related to monolinguals, this study was set up to study bilinguals. Since most of the population in the world is bilingual, it makes sense to investigate the effects of bilingualism on thought as an independent research area, and to consider bilinguals a population worth investigating on its own merits, rather than as controls for the supposedly 'normal' population of monolinguals. On the other hand, these findings are relevant for research on monolinguals. First of all, the study confirmed the effects of language on thought hypothesised by proponents of linguistic relativity. In particular, it confirmed that grammatical gender affects

concept formation in childhood, and that these effects are in place by age 9. Second, this study eliminates some of the limitations of cross-linguistic research on monolinguals: using instructions and materials in the same language eliminates the possibility that differences are due to participants receiving different instructions, and comparing two groups living in the same sociocultural environment eliminates the possibility that differences are due to culture rather than language. Neither language of instruction nor cultural differences can be controlled in cross-linguistic studies. Third, this study confirms what Ervin had already proposed in the Sixties, that bilingual informants should not be used as representatives of monolingual populations, because they differ from monolinguals (Ervin, 1961). For reasons of convenience, cross-linguistic studies often use speakers of a language as participants without checking whether they also know other languages; it is also common to recruit native speakers of other languages who are living in the researcher's own country, and are therefore bilinguals. Researchers should not equate "native speaker" with "monolingual", as a "native speaker" may know more than one language, may be dominant in another language, or may have other unusual characteristics caused by the presence of two languages in one mind.

Future research could look into a variety of issues that could not be addressed in such a small-scale study. The design involved a comparison of bilingual and monolingual children in order to test children with the same sociocultural background, and in order to test all of them in the same language. Future research could include monolingual German and monolingual Italian children, each tested in their own L1, as well as bilinguals tested in either Italian or German. This may show whether language mode has an effect, i.e. whether Italian-German bilinguals perform more like German monolinguals when tested in German. Furthermore, since previous research shows that German grammatical gender has weaker effects than the Spanish and French ones, future research may look at Italian-Spanish and Italian-French bilinguals. Regarding materials, the present study only included artifacts in order to avoid the confounding variable of having different types of entities. Future research using pictures of animals may find stronger effects in monolinguals, and therefore reveal stronger differences between monolingual and bilingual children than can be found with artifacts. Future research may also use a larger number of items, include both objects that are assigned opposite genders and objects that are assigned the same gender in the two languages, and avoid objects that may have gender connotations. Different tasks could also be used, in particular tasks not explicitly related to gender. The voice attribution task is in fact a gender attribution task, as children have to choose between two voices that only differ for their gender; and previous research found stronger effects of grammatical gender in tasks explicitly involving gender attribution than in semantic differential tasks (Flaherty, 2001). Alternative tasks may include picture sorting, semantic differential ratings and memorisation tasks.

In conclusion, the present study shows that knowledge of two languages that represent the same entity differently affects bilingual children's concept of that entity. This paper contributes to discussions of whether bilingualism affects thought, a question that is well worth investigating in an increasingly bilingual world.

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Appendix 1. Objects used as stimuli

Type of object	**Object**	**Italian noun**	**German noun**
M in Italian, F in German	Newspaper	Giornale	Zeitung
	Mattress	Materasso	Matratze
	Clock	Orologio	Uhr
	Toothbrush	spazzolino	Zahnburste
	Drawer	Cassetto	Schublade
	Violin	Violino	Violine
F in Italian, M in German	Armchair	Poltrona	Sessel
	Pencil	Matita	Bleistift
	Straw	Cannuccia	Strohhalm
	Plug	Spina	Stecker
	Key	Chiave	Schlussel
	Ball	Palla	Ball
Control items	Hammer (M)	Martello	Hammer
	Necklace (F)	Collana	Kette