

## **Character Reference In Greek-German Bilingual Children's Narratives**

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### **Abstract**

This study investigates reference management of two groups of 8-12 year old Greek-German bilinguals, resident in Greece (Bilinguals\_GR N=38) and in Germany (Bilinguals\_GE N=39). We analyze the bilinguals' retellings in each language and compare them with data from two monolingual control groups of Greek and German children (Monolinguals\_GR and Monolinguals\_GE, N=20 respectively). We seek to establish how the use of referential forms in character introduction, maintenance and reintroduction in the bilinguals' narrative retellings is affected by language dominance and whether proficiency in each language patterns similarly with respect to dominance in input. Our results indicate that differences in choice of referential form can be attributed to language dominance. Bilingual production of referential expressions differed from that of monolinguals when exposure to one language outweighed the other, as in the case of Bilinguals\_GE. Similarly, proficiency in terms of vocabulary, verb diversity and syntactic complexity was affected in the weaker language for this group, which showed a strong dominance in German input. When exposure was more balanced (Bilinguals\_GR), proficiency measures in both languages were affected, but to a lesser degree.

### **1. Introduction**

In story-telling, discourse cohesion relies to a large extent on the narrator's management of character reference. The listener needs to know who the characters are and how they are involved in the episodes that make up the story. To this end, the narrator's choice of

referential expressions influences the extent to which character referents can be unambiguously identified by the listener. The narrator is required to evaluate two sets of choices: from the cognitive point of view, s/he needs to assess the accessibility of the character referent within the discourse context, and from the linguistic point of view, appropriate choices for encoding this accessibility ranking have to be made (Ariel 1990, 2001).

While referential expressions are universally subject to binding conditions that hold within and between sentences (Chomsky 1981), languages differ in terms of the repertoire of forms and the syntactic constraints governing their use in discourse (Ariel 1990, Hickmann et al. 1996, Hickmann and Hendriks 1999). During the process of language acquisition children need to develop (1) the cognitive principles to assess referent accessibility in the discourse context and (2) the linguistic forms and constraints that govern the mapping of accessibility onto the appropriate referential form in their native language. For bilingual children, this process becomes more challenging, as they have to map specifications of referent accessibility onto the language-appropriate linguistic forms.

In monolingual development, milestones in the development of character reference have been attested cross-linguistically around the ages 4, 7, and 10 (Hickmann et al. 1996). These are the age points at which story-telling moves from the pre-literacy narratives to literacy practices of primary school. Literacy development in bilingual children, however, is usually or predominantly in one of the two languages (Francis 2012). According to the dominance hypothesis (Yip and Matthews 2007), the input bilinguals receive is not balanced; thus, one of the two languages may develop faster or show greater complexity at a given age. Differences in the amount of exposure to each of the two languages of the bilingual child have been shown to affect the rate of acquisition and proficiency in different language

domains including phonological, lexical, morpho-syntactic, and discourse pragmatic development (Bedore et al. 2012, Unsworth 2014).

Our study investigates the management of character reference in the oral story-retellings of Greek-German bilinguals and how their choices diverge from those of their monolingual peers in each of their languages. Do bilinguals prefer different referential expressions when introducing, maintaining, or re-introducing character referents compared to monolinguals? Are bilinguals more likely than monolinguals to use ambiguous referential forms, e.g. pronouns, in contexts with competing characters? We hypothesize that language dominance measured by amount of input in each language may explain divergences between monolinguals' and bilinguals' character reference management. We expect that these effects of dominance in exposure will similarly affect proficiency measures in the bilinguals in our study.

## **2. Background**

### **2.1 Character reference in German and Greek**

Referential expressions are used to introduce, maintain and re-introduce characters in narrative discourse in order to ensure cohesion (Halliday and Hasan 1976). There is no unequivocal form-function mapping in reference marking and, often, more than one referential expression can be used to refer to a specific character. The choice of referential expression is constrained by universal cognitive factors affecting the accessibility of the referent and by language-specific factors concerning the availability of referential expressions and the morpho-syntactic constraints that govern them (Chafe 1994, Ariel 1990).

Ariel (1990, 2001) argues that the choice of referential expression is grounded on the referent's cognitive accessibility as the speaker assesses it for the addressee. Upon their first

mention in a narrative, characters are marked as ‘discourse-new’. In languages with a definite/indefinite article distinction, such as Greek and German, indefinite determiner phrases locally mark inaccessible, new referents in the discourse. In both languages, indefiniteness is expressed by indefinite articles in the singular (1a and 1b). Articles agree in gender, number and case with the noun they introduce. In the plural, indefiniteness is expressed by bare nouns in both languages. Bare plural nouns may be preceded by quantifiers in both languages (2a and 2b):

(1a) Greek<sup>i</sup>

Mia skilitsa kai enas lagos sinantithikan sto dasos.

a dog SG.F.N.INDF a rabbit SG.M.N.INDF

(1b) German

Ein Hundemädchen und ein Hasenjunge trafen sich im Wald.

a dog-girl SG.N.N.INDF a rabbit-boy SG.M.N.INDF

‘A dog-girl and a rabbit met in the forest.’

(2a) Greek

Mia mera sinantithikan dio fili sto dasos.

two friends PL.M.N.INDF

(2b) German:

Eines Tages trafen sich zwei Freunde im Wald.

two friends PL.M.N.INDF

‘One day, two friends met in the forest.’

Once a character has been introduced into discourse, it becomes accessible within the discourse model. Subsequently, the character’s accessibility can be maintained, or re-

introduced by a variety of referring expressions. These “are chosen according to the assessed degree of accessibility of the mental entities corresponding to them” (Ariel, 2001, p. 34) resulting in an implicational accessibility scale that ranks referential expression from lowest to highest accessibility.

full name > long definite description > demonstrative NP > stressed pronoun > unstressed pronoun > cliticized pronoun > verbal person inflection > zero (adapted from Ariel 2001: 31)

When a character has just been mentioned, it is highly accessible, and reference to it can be maintained by the use of referential expressions that have little informativity, low specificity and a reduced phonological form, such as overt or null pronouns. In line with Ariel (1990) and Leclercq and Lenart (2013), we refer to these forms collectively as ‘high accessibility markers’ (HAM). Characters that have not recently been mentioned or referred to are less accessible for the interlocutor and need to be re-introduced into the discourse by more informative referential expressions, such as definite determiner phrases (DPs) or proper names. We refer to such forms as low accessibility markers (LAM; cf. *ibid*).

With respect to the two languages in the study, Greek and German use articles that inflect for case, number and gender to mark definiteness on determiner phrases (DPs) (see 3a and 4a). Greek also uses articles to mark definiteness on proper names (3b). In Standard German, proper names are not preceded by an article (4b).

(3) Greek:

(a) O lagos prosehe oti i fili tou travouse ena karotsi.

the rabbit SG.M.N.DEF

‘The rabbit noticed that his friend pulled a cart.’

(b) O kamilopardalis ihe to paihnidi tou piso.

the giraffo SG.M.N.DEF

‘Giraffo had his toy back.’

(4) German:

(a) Der Hase bemerkte, dass seine Freundin einen Wagen...

the rabbit SG.M.NOM.DEF

...hinter sich herzog.

‘The rabbit noticed that his friend pulled a cart behind himself.’

(c) Giraffo hatte sein Spielzeug zurück.

Giraffo SG.M.NOM.DEF

‘Giraffo had his toy back.’

Even though German and Greek pattern together with respect to the use of definite and indefinite articles to demarcate new and given information, there are important differences with respect to the range and use of HAM. While null-subject languages like Greek, allow for null pronouns that can refer to highly accessible referents as subjects (5), languages like German require overt personal pronouns in finite clauses (6).

(5) Greek

O lagos<sub>1</sub> theli na voithisi tin fili tou<sub>2</sub>. Ø<sub>1</sub> Pige sto gero ligo<sub>3</sub>.

(he) SG.M.NOM

‘The rabbit<sub>1</sub> wanted to help his friend<sub>2</sub>. He<sub>1</sub> went to the old rabbit<sub>3</sub>.’

(6) German:

Haso<sub>1</sub> wollte seiner Freundin<sub>2</sub> helfen. Er<sub>1</sub> ging zu dem alten Hasen<sub>3</sub>

he SG.M.NOM

‘Bunny<sub>1</sub> wanted to help his friend<sub>2</sub>. He<sub>1</sub> went to the old rabbit<sub>3</sub>.’

In German, the use of zero forms when referring to highly accessible referents is limited to cases of a subject being shared between two coordinated sentences (7), or between

a finite matrix- and its non-finite complement clause (8), or - in colloquial varieties of German - when a highly salient discourse topic that occurs in clause-initial position is dropped (9), (cf. Grewendorf 1995, Hickmann and Hendricks 1999).

(7) German:

Er<sub>1</sub> lief zu dem alten Hasen<sub>2</sub> und  $\emptyset$ <sub>1</sub> fragte ihn<sub>2</sub> nach dem schönsten Luftballon.

he<sub>1</sub> SG.M.NOM (he<sub>1</sub>) SG.M.NOM

‘He<sub>1</sub> ran up to the old rabbit<sub>2</sub> and (he<sub>1</sub>) asked him<sub>2</sub> for the nicest balloon.’

(8) German:

Sie<sub>1</sub> fing an  $\emptyset$ <sub>1</sub> mit ihrem Freund<sub>2</sub> zu schimpfen.

she<sub>1</sub> SG.F.NOM (she<sub>1</sub>)

‘She<sub>1</sub> started (she)<sub>1</sub> to scream at her friend<sub>2</sub>.’

(9) German:

$\emptyset$ <sub>1</sub> hat Klaus<sub>2</sub> gesehen.

(he<sub>1</sub>) SG.M.NOM has Klaus<sub>2</sub> seen

‘He<sub>1</sub> has seen Klaus.’

Another syntactic difference between Greek and German concerns reference to highly accessible referents in object position. Whereas in Greek the use for preverbal object clitics (10) is preferred, in German, personal pronouns in the oblique cases are used (11):

(10) Greek:

$\emptyset$ <sub>1</sub> tous<sub>2</sub> agorazi dio balonia.

them PL.M.ACC

‘She<sub>1</sub> buys them<sub>2</sub> two balloons.’

(11) German:

Er<sub>1</sub> gab es ihr<sub>4</sub>, zurück.

it SG.N.ACC her SG.F.DAT

‘He<sub>1</sub> gave it back to her<sub>4</sub>.’

In Greek, the use of overt subject and strong object pronouns is marked. Such strong pronouns tend to mark a switch in reference to a non-topical, previously mentioned referent (12), i.e. they refer to a less accessible antecedent than the topic.

(12) Greek:

Ø<sub>1</sub> pige sto gero lago<sub>3</sub>. Aftos<sub>3</sub> ehi pola balonia.

he SG.M.NOM

‘He<sub>1</sub> went to the old rabbit<sub>3</sub>. That one<sub>3</sub> had lots of balloons.’

German also allows the anaphoric use of demonstrative pronouns for character reference. Among them, *der*-pronouns predominate in oral discourse, where they are used almost interchangeably with personal pronouns (Ahrenholz 2007). Besides this unmarked use (13a), they are also used as marked forms for switch-reference (13b). When used in discourse contexts with two competing antecedents, they refer back to non-topic/non-subject antecedents (Bosch and Umbach 2007), similarly to strong pronouns in Greek. Bittner (2013) has shown that the switch-reference function of *der*-pronouns poses a developmental challenge to children.

(13a) German

Und dann kam ein Elefant<sub>1</sub>. Und dann ist Tina<sub>2</sub> direkt zu dem<sub>1</sub> hingelaufen.

him 3.SG.M.DAT

‘And then an elephant<sub>1</sub> came. And then Tina<sub>2</sub> went straight up to him<sub>1</sub>.’

(13b) German:

Er<sub>1</sub> ging zu dem alten Hasen<sub>3</sub>. Der<sub>3</sub> hatte viele Ballons.

he 3.SG.M.NOM

‘He<sub>1</sub> went up to the old rabbit<sub>3</sub>. That one<sub>3</sub> had many balloons.’

To summarize, referential expressions encode accessibility to varying degrees according to an implicational accessibility scale. On the basis of the above-depicted cross-linguistic analysis of Greek and German, we expect some convergence and some differences in terms of the form-function<sup>ii</sup> distribution of referential expressions. Character introductions should pattern similarly, while character maintenance and reintroduction should be affected by the cross-linguistic differences outlined for overt, clitic and null pronominal forms. In Greek our participants should opt for null pronouns and object clitics to maintain reference to a character. In German, by contrast, personal pronouns are expected to be used for character maintenance. In addition, we expect that children will use names and definite DPs to reintroduce characters in both languages and also a proportion of strong pronouns in Greek to indicate topic-shift. Since, in German, *der*-pronouns do not always mark topic-shift and can also be used interchangeably with personal pronouns, we expect them to pattern differently from strong pronouns in Greek. In addition, there may be effects of development and, specifically, effects of bilingual development as attested in the literature, which we will turn to next.

## **2.2 Character reference in monolingual and bilingual development**

With respect to the discourse-pragmatic constraints underlying referential cohesion, children have been found to use referring expressions differently from adults up until the age of about 9, going through developmental stages (Karmiloff-Smith 1981, Berman and Slobin

1994, Hickmann 2003, Berman, 2009). Cross-linguistic studies have shown that the adult-like marking of inaccessible, discourse new referents comes significantly later than the adult-like marking of accessible, discourse given information (Aksu-Koç and Nikolopoulou 2014, Hickmann et al. 1996). This effect seems mediated by language specific factors as Greek children acquire the use of indefinite markers to introduce discourse-new referents earlier than their English and Turkish speaking peers (Aksu-Koç and Nikolopoulou 2014).

Development has also been found in the use of character maintenance and reintroduction (Bamberg 1987, Wigglesworth 1990, Orsolini et al. 1996, Hickmann and Hendriks 1999). Children at pre-school age (i.e. 4 to 6 yrs.) begin to develop referential cohesion by means of the thematic subject strategy: irrespective of other factors that influence referent accessibility in the discourse, the main story protagonist is referred to by pronouns or zero anaphora (Bamberg, 1987, Orsolini et al. 1996). This strategy can result in the use of referentially ambiguous pronouns (Leclercq and Lenart 2013, Orsolini et al. 1996). From school-age onwards, children become more aware of the discourse-cohesive functions of referential expressions. They maintain reference to a character that has been mentioned in the previous clause through the use of HAM and reactivate reference to a character that has not been mentioned in the previous clause by LAM (Leclercq and Lenart 2013, Hickmann and Hendriks 1999, Orsolini et al. 1996). The exact sequence of development seems to depend on language specific factors, e.g. complexity and idiosyncrasy of the nominal and pronominal system (Aksu-Koç and Nikolopoulou 2014, Hickmann and Hendriks 1999).

In recent years, research on bilingual development has focused on discourse-pragmatics. Some of these studies report on how the use of referential expressions in narrative discourse differs in bilingual and monolingual children of the same age. Results from these studies are inconclusive with respect to effects of bilingualism and proficiency between the two developing systems. Álvarez (2003), who looked at the character

introductions in the long-term narrative development of an English-Spanish bilingual boy (between age 6 and 9), found that, by and large, his behavior followed the characteristic developmental patterns of monolinguals in the two languages. Only at the youngest age (6) was a developmental delay found in the use of indefinite in the weaker language (English). Serratrice (2007) found that Italian-English bilinguals (aged 6-8 yrs.) with regular exposure to both languages from birth behaved remarkably similar to their monolingual peers, with the exception of the use of object clitics in character maintenance in the Italian stories. Chen and Lei (2012), on the other hand, found significant differences in the choice of referential expressions in the narratives of early sequential Chinese-English bilinguals (aged 8-10 yrs.) compared to their monolingual peers in each language. The bilinguals' and monolinguals' choice of referential expressions in Chen and Lei's study diverged in character introduction in the English stories, where bilinguals significantly lagged behind in the use of indefinite markings compared to their monolingual peers. In character reintroduction differences between monolinguals and bilinguals emerged in the Chinese stories, with the bilinguals using significantly more definite expressions and significantly fewer null pronouns compared to their monolingual peers in Chinese. Both Serratrice (2007) and Chen and Lei (2012) suggest that the diverging bilingual behavior might be dominance-induced, a factor not controlled for in their studies, as in both cases the participants were assumed to be balanced bilinguals.

Overall, divergence between bilinguals and monolinguals appears to be related to developmental and language-specific factors that interact with the level of proficiency in the two languages. Younger monolinguals and bilinguals alike underspecify reference by using pronouns and clitics in contexts with competing antecedents. At the same time, they tend to overuse definite articles for the marking of new information. Since personal pronouns in German differentiate gender while null-subjects in Greek do not, we expect to find less

referential ambiguities in the use of the former than the latter. However, bilinguals and very advanced second language learners have been shown to use over-specified accessibility markers in maintenance, something not commonly found in monolingual adult narratives (Leclercq and Lenart 2013, Kang 2004). Any comparison of bilinguals and monolinguals, then, should involve a careful analysis of the relationship that holds between two languages: i.e. one needs to establish whether or not one of the languages is dominant, resulting in the other language being weak in linguistic terms and hence affected by developmental delay.

### **2.3 Bilingual Acquisition: dominance and proficiency**

It is widely acknowledged in the literature on bilingual acquisition that few children grow up as truly balanced bilinguals in the sense that they simultaneously acquire the two languages as autonomous systems to the same extent and at the same rate (e.g. Grosjean 1982, Döpke 1992). Many bilinguals grow up in contexts where one of their two languages is dominant in their environment. Exposure to the dominant language thus outweighs exposure to the weaker language in terms of quantity, quality and variety, and as a consequence, the dominant language develops faster and with more solidly established intuitions than the other (Matthews and Yip 2009). Owing to this chain of cause and effect, the term dominance has been used to describe imbalance between the two languages in different linguistic dimensions (Montrul to appear). It has been used to refer to the social status and functions of the two languages in a bilingual setting (ibid). It has also been used to refer to the amount of input bilinguals are exposed to in each language (Argyri and Sorraice 2007, Serratrice 2007). And it has been used to refer to the relative proficiency that a bilingual has in the two languages (Nicoladis and Genesee 1996, Matthews and Yip 2009,

Unsworth to appear). In this study, dominance is used to refer to imbalance in the amount and type of input that a bilingual is exposed to in each of the two languages acknowledging that this is a direct consequence of the social status and functions of the two languages. As a result, differences in proficiency in terms of a stronger and a weaker language can be expected. However, as has been shown by Iluz-Cohen and Armon-Lotem (2012), dominance does not directly translate into proficiency scores as balanced bilinguals can be found to have low levels of proficiency in both languages.

The extent to which one language is more dominant than the other may depend on the register (e.g. formal/informal) and the communicative context (e.g. at home/in school) and this may change over time (Nicoladis and Genesee 1996). Dominance patterns may shift as bilingual children grow older and enter educational institutions that typically favor one of the two languages in question as the dominant language of instruction (Kohnert et al. 1999, Kohnert and Bates 2002). Following Grosjean (2008), we assume that bilingual development is subject to the ‘complementarity principle’; i.e. the understanding that bilinguals tend to use each language in different communicative situations and for different communicative functions.

A number of studies have illustrated how experiential factors, such as onset, type, quality, and amount of exposure and interaction in the two languages induce differences in the development of the two linguistic systems (for an overview see Unsworth to appear) and, hence, potential differences in proficiency at any given age. The amount of input, for example, in each language affects the receptive vocabulary size (Bialystok et al. 2010), the semantic development (Bedore et al. 2012), and the lexical richness of language production (Treffers-Daller 2011) in the two languages. Dominance in exposure affects the rate of development of grammatical complexity in early bilingual acquisition (Hoff et al. 2012), verb morphology (Paradis 2011), complex syntax (Chondrogianni and Marinis 2011) and

morpho-syntactic development (Bedore et al. 2012). So far only a handful of studies have investigated how dominance affects discourse-related domains. When Unsworth (2014), for instance, investigated dominance effects on different domains in Dutch-English bilinguals, she found input effects on gender-marking of definite determiners, which involves both lexical and morpho-syntactic knowledge. The same children, however, did not show dominance effects on scrambling, which involves both information structural and syntactic processes. She concludes that different linguistic phenomena and domains will be affected differently by dominance in input. Given that dominance effects have been shown to be reflected linguistically, looking for such effects in bilingual reference management seems both a promising and - in the absence of evidence so far - necessary enterprise.

There is no consensus as to which experiential variable best captures dominance effects on the available input (Unsworth to appear and Bedore et al. 2012 for an overview). Bedore et al. (2012) found that age of first exposure was a less reliable indicator of language dominance than current language use (input and output) in predicting differences in semantic and morpho-syntactic proficiency. Also, for older bilingual children, the cumulative length of exposure from birth up to the child's current age has been taken as a measure affecting dominance as it reflects changes in dominance of input (Unsworth to appear). In terms of quality and variety of input, it has been found that the amount of literacy-related input (i.e. reading, storytelling) in the home has a strong effect on the vocabulary development of bilingual children (Scheele et al. 2009). Furthermore, for older bilingual children, dominance in school-language input has been found to affect the lexical production skills, leading to shifts in the relationship between the two languages and differential proficiency from pre-school to adolescent age (Kohnert et al. 1999). A pre-school age child growing up in Germany, for example, speaking Greek in the home with the parents and grandparents, and

German with older siblings and outside the home, will have considerably more exposure to German upon entering a regular German elementary school.

In this study, we hope to extend the research on dominance in bilingual development, by investigating which of the experiential variables, namely amount of parental language input, early literacy input, and current language use, correlate best with performance in reference management. Assuming that dominance translates into a distinction between a stronger and a weaker language proficiency, we use independent lexical and syntactic proficiency measures (i.e. productive vocabulary, verb diversity, and syntactic complexity) which will allow us to associate measures of language exposure with these linguistic reflections in a principled way. We expect that differences between bilinguals in terms of dominance measured as input exposure will lead to differences in character reference independently of measures of language proficiency.

### **3. Predictions**

(1) In terms of dominance, we predict that the bilinguals in our study will show different patterns due to the different bilingual settings they grow up in. Despite the fact that all bilinguals attend schools with German-dominant instruction, we expect that the bilinguals in Greece will receive more input in Greek than their bilingual peers in Germany and, hence, will be more balanced.

(2) We expect that this pattern of dominance affects their lexical and syntactic abilities, so that bilinguals in Greece will be more proficient than their bilingual peers in Germany in terms of (a) productive vocabulary, (b) verb diversity and (c) syntactic

complexity in Greek. We expect that the more German-dominant the bilingual children are, the less proficient they will be in the above lexical and syntactic measures in Greek.

(3) In terms of character reference, (a) we expect that the form-function distributions of referential expressions and the use of ambiguous forms in the bilinguals' narratives, will – to a large degree – compare to monolingual behavior, taking into account the language-specific constraints of accessibility marking. However, where we do find divergence from monolingual behavior, we expect this to occur either (b) only in the weaker language of the less-balanced bilinguals as a result of low proficiency or (c) in both languages as a result of balance in bilingualism.

## **4. The study**

### **4.1 Participant profiles**

Our study is based on a sample of 77 Greek-German bilingual children, 8 to 12 years old, 38 Greek-German bilinguals in Greece (Bilinguals\_GR) out of which 20 were boys and 39 Greek-German bilinguals in Germany (Bilinguals\_GE) out of which 20 were boys. At the time of testing, Bilinguals\_GR had a mean age of 10;2 years and Bilinguals\_GE had a mean age of 10;4 years. Additionally, we recruited two age- and grade-equivalent control groups of monolingual speakers recruited from mainstream schools in Greece and Germany. The Greek monolingual group (Monolinguals\_GR) consisted of 20 participants including 8 boys and had a mean age at time of testing (AoT) of 10;3 years. The German monolingual group (Monolinguals\_GE) also consisted of 20 participants including 7 boys and had a mean age at time of testing 10;2 years. We conducted paired sample T-tests between all four groups

(Bilinguals\_GR, Bilinguals\_GE, Monolinguals\_GR, Monolinguals\_GE) and found no significant differences in terms of AoT.

Comparability between non-verbal cognitive abilities in our groups was ensured by screening with Raven's Progressive Colored Matrices Test of nonverbal reasoning (Raven et al. 1998). All children scored between the 60<sup>th</sup> and the 95<sup>th</sup> percentile and paired sample T-tests between all four groups revealed no significant difference in non-verbal reasoning.

*Insert table 1 here.*

All bilinguals were literate in both languages, but in all schools we visited, German was the main language of instruction; hence, exposure to German exceeded exposure to Greek in all school contexts. The Bilinguals\_GR were recruited from the German school in Thessaloniki, where the program with German as main medium of instruction offers 4 hours of Greek language in all grades. The Bilinguals\_GE were recruited from two research sites: (1) Greek heritage-language afternoon classes in Cologne with 4 hours per week in the 3rd and 4th grades and 2 hours in the 5th and 6th grades and (2) a comprehensive school in Krefeld (starting in Grade 5), which offers a bilingual program for Greek heritage children providing 8 hours of instruction per week in Greek in the subjects of Religion, Language and Natural Sciences.

In order to profile the bilingual participants according to background variables, we administered a child interview on the basis of a background questionnaire prior to each testing and handed out parental questionnaires to supplement and verify the information from the child questionnaires. For the Bilinguals\_GR 78% of the parent questionnaires were returned, while 87% were returned for the Bilinguals\_GE. Hence, we resorted to the data from the child questionnaires for the background, except for information concerning parental education.<sup>iii</sup>

From the child questionnaires, we identified experiential variables that have been shown to impact on language dominance in bilinguals (cf. Appendix 1). We considered (1) the parental language input in terms of the proportion of oral language input by father and mother in each language (before 3, between 3-6 and after 6). In addition, we analyzed the answers to questions that reflect (2) the early literacy input that the children received prior to schooling in each language and (3) their current language use (i.e. input and output) in both languages with family members and friends.

For analysis of the questionnaire data, points were attributed for input in each language, accumulating according to the number of people interacting with the child at the different stages of development (before 3, between 3-6, after 6). For answers that stated that both languages were used to equal proportion, points were divided between the languages. Since the answers to the questions on (a) parental language input, (b) early literacy input and (c) current language use involved Likert scales, we tested their internal consistency by calculating the ordinal alpha (Gadermann et al. 2012). The children answered reliably to all, with good ordinal alpha scores ranging between 0.72 and 0.78. (a. ordinal alpha = 0.77, b. ordinal alpha = 0.72, c. ordinal alpha = 0.78). The questionnaire analysis gives us a complex language-input profile for the two groups of bilinguals (Table 2).

*Insert table 2 here*

In order to compare the input for the two groups of bilinguals, we conducted paired sample T-tests (1) for each input measure in each language and, where we found group differences, (2) between the languages. We found that the two groups differed in terms of parental input, with the bilinguals in Germany (Bilinguals\_GE) receiving more parental input in Greek. The parental input of the bilingual children in Greece (Bilinguals\_GR) appeared more balanced, since the difference between Greek and German input was not

statistically significant, whereas the bilinguals in Germany did receive significantly more Greek input from both parents ( $t(37)=7.355, p=.000$ , for mother's input and  $t(37)=8.121, p=.000$ , for father's input).

The two groups of bilinguals also differed in terms of their early literacy input. However, here we find a different dominance pattern, with Bilinguals\_GE receiving less literacy input in Greek than Bilinguals\_GR. Once again, for the Bilinguals\_GR we found more balance in early literacy input: The difference between input in Greek and German was not statistically significant for this input variable, whereas the dominance in early literacy input in German was highly significant for Bilinguals\_GE ( $t(37)=8.274, p=.000$ ).

In terms of current language use, the two bilingual groups did not differ in Greek and German ( $p>.5$  in all cases). Paired sample T-tests run separately for Bilinguals\_GR and Bilinguals\_GE showed that the input difference between Greek and German was not significant for Bilinguals\_GR ( $t(37) p=.068$ ), but significant for Bilinguals\_GE ( $t(38) p=.003$ ), with Bilinguals\_GE using significantly more German.

We can conclude that the two groups of bilinguals differed in terms of dominance of input in all experiential variables. The bilinguals from Greece (Bilinguals\_GR) received more balanced input in the two languages as concerns parental oral language input prior to schooling, as well as early literacy input. Also, in their current language use, they use the two languages more balanced. The bilinguals from Germany, on the other hand, received more unbalanced input. While Greek emerges as the dominant language of oral parental input prior to schooling, German emerged as the dominant language of literate input prior to schooling and also as the preferred language in their current language use.

## **4.2 Materials and procedure**

Following the background interview and the screening for mental age, we examined the children on their lexical and their narrative abilities. All verbal measures were elicited with similar or comparable instruments in an individual session for each language:

#### **4.2.1 Productive Vocabulary Proficiency**

We used productive vocabulary tasks normed for monolinguals in Greek (Vogindroukas et al. 2009) and in German (SET 5-10 Subtest 1; Petermann et al. 2010) to assess the bilinguals' productive vocabulary proficiency in each language. The Greek vocabulary task is an adaptation of the Renfrew Word Finding Vocabulary Test. It is a naming task and includes 50 pictures of nouns, while the German Vocabulary task (Petermann et al. 2010), also a naming task, consists of 40 pictures that elicit 30 nouns and 10 verbs.

#### **4.2.2 Narrative Retelling**

Two picture stories from the Edmonton Narrative Norms Instrument (ENNI; Schneider et al. 2005) were used to elicit oral retellings in each language. Since ENNI offers two structurally equivalent series, the A-series with elephant and giraffe as protagonists, and the B-series with dog and rabbit as protagonists, the bilinguals could be tested with equivalent measures in both Greek and German, while avoiding repetition and learning effects that have been shown to influence referential choices (Álvarez 2003). Each story consisted of 13 pictures and involved two main and two minor characters. We balanced out story-effects by

ensuring that 50% of the bilinguals retold story A (Elephant and Giraffe) in German and B (Dog and Rabbit) in Greek, and 50% of participants followed the opposite pattern. 50% of monolinguals retold story A and the other 50% story B.

Presenting children with model-stories along with the picture-prompts that they are then asked to retell has been shown to prevent misreadings of the pictures (Klein and Meibauer 2011) and to elicit longer, more detailed, and grammatically more accurate language samples (Hayward et al. 2007). Therefore, we constructed model-stories of comparable syntactic complexity and verb diversity in each language and subsequently recorded them. Participants were instructed to select one of three envelopes on a computer screen, with a different story in each (Serratrice 2007). Then, they heard the model story over headphones while watching the pictures two by two on the screen. Once the story finished, they saw a 13-picture synopsis of the complete story and were asked to retell the story to the uninformed examiner. In order to ensure that only those participants who understood the basic story line were included in the data analysis, comprehension questions (Schneider et al. 2006) were administered following the retelling.

### **4.3 Coding**

The elicited retells were audiotaped and transcribed in each language by trained native Greek and German speakers according to basic CHAT transcription conventions (MacWhinney, 2000). All transcriptions and codings were checked by a second rater and divergent assessments were solved by discussion. Following Berman and Slobin (1994), the transcripts were segmented into clauses as the basic unit of analysis. Clause fragments and asides were not included.

### 4.3.1 Coding verb diversity

In order to establish the verb diversity in the elicited oral retellings, we divided the number of different verbs (types) by the total number of verbs (tokens) in each story, resulting in a verbal type-token-ratio (verb TTR). For reasons of comparability between the two languages, verbal idioms, such as *Angst haben* (have fear) were not counted separately from their root verbs, e.g. *haben* (have), as Greek expresses many such forms with the same root verb and differentiating voice suffixes. In German, we excluded from the analysis any modal verbs that function as preverbal auxiliaries (14). In Greek, modal verbs function as main verbs of clauses that licence finite complement clauses (15). They were included in the analysis in the Greek data.

(14) German

|            |        |               |                   |                |
|------------|--------|---------------|-------------------|----------------|
| Der Hase   | konnte | keinen Ballon | für seinen Freund | kaufen [VERB]. |
| the rabbit | could  | no ballon     | for his friend    | buy            |

(15) Greek:

|            |                    |                    |                             |
|------------|--------------------|--------------------|-----------------------------|
| O lagos    | den borouse [VERB] | na agorasei [VERB] | ena baloni sti fili tou.    |
| the rabbit | not could          | that buy           | a ballon for.the friend his |

‘The rabbit could not buy a balloon for his friend.’

### 4.3.2 Coding syntactic complexity

Clauses were coded as either independent matrix clauses (16) or as subordinate clauses (17 and 18). German and Greek differ with respect to the distribution of finite and non-finite clauses subordinate clauses. Where, in German, we frequently find non-finite verbal complement clauses (17), in Greek predominantly finite complement clauses are used (18). To compare syntactic complexity in Greek and German, we counted every verbal predication (finite or non-finite) as an individual clause.

(16) Greek:

I evgeniki mitera tou dehthike amesos.  
 the kind mother his agree 3.SG.PST immediately  
 ‘His kind mother agreed immediately.’

(17) German:

Sie fing an...  
 she started 3.SG.PST  
 ...SUBORD [mit ihrem Freund zu schimpfen.]  
 [with her friend 3.SG.M.DAT to scream INF]  
 ‘She started [to scream at her friend.]’

(18) Greek:

Arhise SUBORD [na fonazi ston filo tis.]  
 started-3.SG.PST [to scream 3.SG.SBJ at.the friend her 3.SG.F.ACC]  
 ‘She started [to scream at her friend.]’

### 4.3.3 Coding character reference

We coded only mentions of the animate characters in the stories. These could appear as arguments, adjuncts, or copular predicates. We excluded from the analysis referential expressions in sentence fragments, asides and direct speech. In line with previous studies (Hickmann and Hendricks 1999), we did not include in our analysis possessive pronouns in German and possessive clitics in Greek, as well as relative pronouns in both languages. Each referring expression was coded for (a) morpho-syntactic form and (b) discourse function:

### (a) Morphosyntactic forms of referential expressions coded in Greek and German

**Indefinite DPs:** In both languages, all singular (19a) and plural (19b) indefinite DPs that referred to the characters in the stories were coded as [INDEF], e.g.

(19a) Greek:

Mia skilitsa [INDEF] kai enas lagos [INDEF] skefhtikan na pane mia volta.

a dog SG.F.N.INDF a rabbit SG.M.N.INDF

‘A dog-girl and a rabbit decided to go for a walk.’

(19b) German:

*Eines Tages trafen sich zwei Freunde [INDEF] im Wald.*

two friends PL.M.N.INDF

‘One day, two friends met in the forest.’

**Definite DPs:** In both languages, all definite DPs referring to the characters in the stories were coded as [DEF] (22a and 23a). Under this category, we also subsumed possessive nominal constructions (22b and 23b) and proper names in both languages (22c and 23c)<sup>iv</sup>.

(22) Greek:

- (a) O lagos [DEF]                      prosexe oti  
the rabbit SG.M.N.DEF
- (b) i fili tou [DEF]                                      travuse ena karotsi.  
the friend SG.M.N.DEF his SG.F.POSS  
‘The rabbit noticed that his friend pulled a cart.’
- (c) O kamilopardalis [DEF]              ixe to paixnidi tou piso.  
the giraffo SG.M.N.DEF  
‘Giraffo had his toy back.’

(23) German:

- (a) Der Hase [DEF]                      bemerkte, dass  
the rabbit SG.M.NOM.DEF
- (b) seine Freundin [DEF] einen Wagen hinter sich herzog.  
his SG.F.NOM.POSS friend  
‘The rabbit noticed that his friend pulled a cart behind himself.’
- (c) Giraffo [DEF]              hatte sein Spielzeug zurück.  
Giraffo SG.M.NOM.DEF  
‘Giraffo had his toy back.’

**Null pronouns:** In the Greek stories, we coded null-subjects as [N-PRN]:

(24) Greek

O lagos<sub>1</sub> ithele na voithisi tin fili tou<sub>2</sub>. [N-PRN]<sub>1</sub> pige sto gero lako<sub>3</sub>.

he SG.M.NOM

‘The rabbit<sub>1</sub> wanted to help his friend<sub>2</sub>. He<sub>1</sub> went to the old rabbit<sub>3</sub>.’



(28) German

Und dann kam ein Elefant<sub>1</sub>. Und dann ist Tina<sub>2</sub> direkt zu dem<sub>1</sub> [D-PRN] hingelaufen.

him 3.SG.M.DAT

‘And then an elephant<sub>1</sub> came. And then Tina<sub>2</sub> went straight up to him<sub>1</sub>.’

(29) German:

Er<sub>1</sub> ging zu dem alten Hasen<sub>3</sub>. Der<sub>3</sub> [D-PRN] hatte viele Ballons.

he 3.SG.M.NOM

‘He<sub>1</sub> went up to the old rabbit<sub>3</sub>. That one<sub>3</sub> had many balloons.’

**Dropped subjects in coordinated clauses:** In the German stories, wherever two coordinated clauses shared a subject and this was dropped (30), we coded the dropped subject as [COORD]:

(30) German:

Er<sub>1</sub> lief zu dem alten Hasen<sub>2</sub> und  $\emptyset$ <sub>1</sub> [COORD] fragte ihn<sub>2</sub> nach dem schönsten Luftballon.

‘He<sub>1</sub> ran up to the old rabbit<sub>2</sub> and asked him<sub>2</sub> for the nicest balloon.’

**Dropped subjects in non-finite clauses:** In the German stories, all dropped subjects in dependent non-finite complement clauses (30) were coded as [NONFINITE]:

(31) German:

Sie<sub>1</sub> fing an  $\emptyset$ <sub>1</sub> [NONFINITE] mit ihrem<sub>1</sub> Freund<sub>2</sub> zu schimpfen.

‘She<sub>1</sub> started to scream at her<sub>1</sub> friend<sub>2</sub>.’

**Topic-drop:** In the German stories, all referential null subjects in clause-initial position that referred to a highly salient discourse topic were coded as [TOPICDROP].

(32) German

Dann sah er<sub>1</sub> auf einmal seine Mutter<sub>2</sub>. Ø<sub>1</sub> [TOPICDROP] hat gefragt, ob sie<sub>2</sub> dann nicht einen Luftballon kaufen könnte.

‘Then he<sub>1</sub> suddenly saw his mother<sub>2</sub>. He<sub>1</sub> asked, if she could then not buy a balloon.’

### **(b) Discourse functions of character referents coded in Greek and German**

In order to compare our results to those of previous studies (Serratrice 2007, Chen and Lei 2012, Leclerqu and Lenhart 2013), we coded the discourse function of all referential forms as instances of character introduction, maintenance, and reintroduction (Bamberg 1987). The rationale behind this classification is the following: If a character has just been mentioned in the previous clause, it is highly accessible and reference to it can be maintained by the use of a HAM without creating ambiguity. Once this referential chain is interrupted by clauses that contain reference to other characters and do not refer back to the character itself a character should be reintroduced with a LAM in order to avoid ambiguity with other potential character referents. The following table summarizes the definitions of each discourse function and gives coding examples for the two languages:

*Insert table 3 here*

#### **4.3.3 Coding ambiguous reference**

We also coded each pronominal referential expression for referential ambiguity [R-AMB]. For this, native speaker raters identified all pronominal forms where the anaphoric relation to the character referent could not be unambiguously identified (33). In order to

avoid conflation of difficulties in grammatical gender assignment and difficulties in reference tracking, we excluded all referential ambiguities due to wrong gender assignment, i.e. where a right gender marking on the pronouns would have disambiguated the referential expression (34). The latter instances we coded [GR-AMB].

(33) German:

|                            |                         |                                   |
|----------------------------|-------------------------|-----------------------------------|
| Der Verkäufer <sub>1</sub> | wollte Geld dafür       | haben, 50 Cent.                   |
| the vendor 3.SG.M.NOM      | want PST money for this | have, 50 cents                    |
| Aber dann guckte           | er <sub>2</sub> [R-AMB] | in seinen Hosentaschen            |
| but then look PAST         | he 3.SG.M.NOM           | in his POSS.M. trouserpockets ACC |
| und da war                 | kein Geld.              |                                   |
| and there ist PAST         | no money.               |                                   |

‘The vendor<sub>1</sub> wanted money for this, 50 cents. But then he<sub>2</sub> looked in his pockets and there was no money.’

(34) German:

|                                      |   |              |
|--------------------------------------|---|--------------|
| Und dann ist                         | Haso <sub>1</sub>                       | weggegangen. |
| And then                             | Haso 3.SG.M.NOM                         | go.away PAST |
| Und da hat sie <sub>1</sub> [GR-AMB] | einen alten Hasenverkäufer <sub>2</sub> | gesehen.     |
| and then she 3.SG.F.NOM              | an old rabbit.vendor 3.SG.M.ACC         | see PST      |

‘And then Haso<sub>1</sub> went away. And then she<sub>1</sub> saw an old rabbit vendor<sub>2</sub>.’

## 5. Results

### 5.1 Vocabulary measures

Table 4 presents the mean results from the two independently measured productive

vocabulary tests for each group of bilinguals (out of 50 for the Greek test and out of 40 for the German test). We conducted paired sample T-tests and found statistically significant differences between Bilinguals\_GE vs. Bilinguals\_GR for the Greek vocabulary and the German vocabulary. The results show that Bilinguals\_GR had significantly higher vocabulary scores in Greek ( $t(37) = .6541, p = .025$ ), whereas the Bilinguals\_GE had significantly higher vocabulary scores in German ( $t(38) = .3245, p = .001$ ).

*Insert table 4 here*

## **5.2 Verb-diversity and syntactic complexity in the narratives**

Table 5 provides a summary of the verb diversity and syntactic complexity that the two bilingual and two monolingual groups displayed in the narratives. We measured verb diversity by calculating the type-token ratio of verbs (verb TTR). Along with other studies on child development (Miller and Chapman 2000, Schneider et al. 2005) we measured syntactic complexity by establishing a subordination index (no. of subordinate clauses/overall no. of clauses).

*Insert table 5 here*

We conducted between-group comparisons of the verb diversity indices in both Greek and German. Analyses of variance (one-way ANOVAs) revealed significant group effects for verb diversity only in Greek ( $F(3, 114)=6.238, p=.001$ ). Post-hoc tests using Bonferroni correction showed that in the Greek stories, Monolinguals\_GR produced a significantly higher diversity of verbs than both Bilinguals\_GR and Bilinguals\_GE ( $p=.049$

and  $p=.002$ , respectively), while Bilinguals\_GR produced a significantly higher diversity of verbs than Bilinguals\_GE ( $p=.011$ ). In the German stories, no significant differences between the three groups were found. Both groups of bilinguals displayed the same amount of verb diversity as their monolingual peers. Paired-samples t-tests conducted for Bilinguals\_GR and Bilinguals\_GE revealed that only the Bilinguals\_GE showed a significantly higher verb diversity in German than in Greek (Bilinguals\_GE:  $t(37)=6.513$ ,  $p=.000$ ).

We next conducted between-group comparisons of the subordination indices in both Greek and German. Analyses of variance (one-way ANOVAs) revealed significant group effects for both the Greek and German data ( $F(3, 114)=4.228$ ,  $p=.000$  and  $F(3, 114)=2.351$ ,  $p=.031$ , respectively). Subsequent post-hoc analyses using Bonferroni correction show that, in the Greek data, the main group effect resulted from the Bilinguals\_GE showing a significantly lower subordination index than both Bilinguals\_GR and Greek monolinguals ( $p=.000$  for all comparisons). In the German data, post-hoc analyses showed that Bilinguals\_GR used significantly more subordinate clauses than Bilinguals\_GE and Monolinguals\_GE ( $p=.003$ ,  $p=.001$ , respectively). Paired-sample T-tests conducted for Bilinguals\_GR and Bilinguals\_GE revealed that Bilinguals\_GE produced significantly more subordinate clauses in German than in Greek (Bilinguals\_GE:  $t(37)=2.892$ ,  $p=.003$ ).

Hence, we find proficiency effects in terms of verb diversity and syntactic complexity in both languages, but the number of differences in Greek outweighs the number of differences in German. In terms of verb diversity, both bilingual groups show significantly less diversity in Greek compared to their monolingual controls. With respect to syntactic complexity, we find that Bilinguals\_GE show a significantly lower degree of syntactic complexity in Greek compared to their bilingual and monolingual peers from Greece. In the

German stories, Bilinguals\_GR use more syntactically complex structures than both their bilingual and monolingual peers from Germany.

### **5.3 Character reference: form-function distributions**

In the following, we present the distribution of referential forms for each character reference function and language separately. For reasons of clarity, we show the mean frequencies (%) of each referential expression for the two groups of bilinguals and the respective monolingual control group in form of bar-charts (Figures 1-6). The statistical tests were, however, run with the raw scores. For each reference function and language we first ran a Kruskal-Wallis H test to determine whether the two bilingual groups and the respective monolingual group behaved differently in terms of form-function distribution. We then ran paired sample T-tests between the raw scores for each referential expression to determine the distributional pattern. Depending on whether the Kruskal-Wallis H test revealed group differences or not, these paired-sample T-test were conducted for each individual group separately or not. Due to the marginal occurrence of zero forms in the German data, we collapsed the three zero-categories (NONFINITE, COORD and TOPICDROP) labeled as  $\emptyset$  in the bar-charts.

#### **5.3.1 Character introduction in the German and Greek stories**

*Insert figure 1 here*

To examine whether Bilinguals\_GR, Bilinguals\_GE and Monolinguals\_GE differed in form-function distribution in character introduction in the German stories, we ran separate Kruskal-Wallis H tests for each category. In character introduction in the German stories, no statistically significant differences could be found between the groups. Hence, both groups of bilinguals behaved like their monolingual peers. They all preferred to introduce characters by means of indefinite DPs.

*Insert figure 2 here*

With respect to the character introductions in Greek, a Kruskal-Wallis H test revealed significant differences between the three groups in the use of INDEF and DEF ( $\chi^2 = 6.112$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 6.231$ ,  $df = 2$ ,  $p < .05$ , respectively). A Mann-Whitney test revealed that the Bilinguals\_GE used significantly more DEFs than both the Bilinguals\_GR and the Monolinguals\_GR ( $Z = -2.852$ ,  $p = .000$  and  $Z = -2.933$ ,  $p = .000$ , respectively). The same group difference holds for the use of INDEF, where the Bilinguals\_GE showed a significantly lower preference for this form compared to both the Bilinguals\_GR and the Monolinguals\_GR ( $Z = -2.779$ ,  $p = .000$  and  $Z = -2.831$ ,  $p = .000$ , respectively).

Paired sample T-test comparisons among the different referential expressions were run for each group separately. They showed that the expression with the highest preference in character introduction for the Bilinguals\_GR and Monolinguals\_GR was the INDEF (with significant differences to DEF:  $p < .05$ , S-PRON, N-PRON and C-PRON:  $p < .001$ ). The participants in these groups chose DEF as the second-preferred expression in introductions. DEF was used significantly more often than S-PRON, N-PRON and C-PRON ( $p < .001$  in all cases). Bilinguals\_GE, however, preferred to use DEF over all other referential expressions to introduce characters (INDEF:  $p < .05$ , S-PRON, N-PRON and C-PRON:  $p < .001$ ). As second most-frequent form in character introduction they chose INDEF, which they chose

significantly more often than S-PRON, N-PRON and C-PRON ( $p < .001$  in all cases). Hence, in the Greek character introductions, we find that Bilinguals\_GE with the German dominant input, diverge in their behavior from their monolingual and bilingual peers by preferring definite DPs over indefinite DPs. Overall, we find that in character introduction the bilinguals behave more like their monolingual peers in German than in Greek.

### 5.3.2 Character maintenance in the German and Greek stories

*Insert figure 3 here*

To examine differences in distribution of referential expressions in character maintenance in German, we ran the same tests as above. A Kruskal-Wallis H test revealed significant differences between the three groups in the use of personal pronouns (P-PRON) and *der*-pronouns (D-PRON) ( $\chi^2 = 6.534$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 6.721$ ,  $df = 2$ ,  $p < .05$ , respectively). A Mann-Whitney test showed that the Bilinguals\_GR use significantly more P-PRONs compared to the Bilinguals\_GE and the Monolinguals\_GE ( $Z = -2.123$ ,  $p = .001$  and  $Z = -2.872$ ,  $p = .003$ , respectively). Complementarily, they used significantly less D-PRONs compared to the Bilinguals\_GE and Monolinguals\_GE (Mann-Whitney:  $Z = -1.997$ ,  $p = .000$  and  $Z = -2.123$ ,  $p = .000$ , respectively).

Paired sample T-tests comparisons between the different referential expressions were run for each group separately. They showed that in all groups, participants preferred P-PRON in character maintenance. They preferred this form over all other referential expressions (with significant differences to the number of DEF,  $\emptyset$ :  $p < .05$ , and INDEF, D-PRON:  $p < .001$ , respectively). Across all groups, we find DEF and  $\emptyset$  as second most preferred expressions in maintenance in the German stories, with significant differences to

the number of INDEF:  $p < .001$  and D-PRON:  $p < .003$ , respectively. Finally the use of D-PRON is statistically more frequent than the use of the INDEF ( $p < .001$  for Bilinguals\_GE and Monolinguals\_GE and  $p < .005$  for Bilinguals\_GR). Even though, both groups of bilinguals show the same order of preferred referential expressions as their monolingual peers, Bilinguals\_GE use significantly fewer D-PRONS in this reference function compared to their monolingual and bilingual peers in Germany.

*Insert figure 4 here*

With respect to character maintenance in Greek a Kruskal-Wallis H test revealed significant differences between the three groups in the use of definite DPs (DEF), null pronouns (N-PRON) and object clitics (C-PRON) ( $\chi^2 = 4.312$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = .867$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 5.104$ ,  $df = 2$ ,  $p < .05$ , respectively). The Bilinguals\_GE used significantly more DEFs compared to the Bilinguals\_GR and the Monolinguals\_GR (Mann-Whitney:  $Z = -3.228$ ,  $p = .001$  and  $Z = -2.125$ ,  $p = .000$ , respectively). The reverse pattern holds for the use of N-PRONS, where the Bilinguals\_GE use significantly fewer N-PRONS compared to the Bilinguals\_GR and Monolinguals\_GR (Mann-Whitney:  $Z = -2.337$ ,  $p = .000$  and  $Z = -2.883$ ,  $p = .001$ , respectively). For the use of C-PRON a different pattern emerges. The Monolinguals\_GR used significantly more clitics than both groups of bilinguals (Mann-Whitney:  $Z = -2.419$ ,  $p = .001$  compared to Bilinguals\_GR and  $Z = -3.328$ ,  $p = .000$  compared to Bilinguals\_GE).

Paired sample T-tests between the different referential expressions showed that the expression with the highest preference in character maintenance for the Bilinguals\_GR and the Monolinguals\_GR was N-PRON (with significant differences to the number of C-PRON:  $p < .05$ , DEF:  $p < .03$  and S-PRON, INDEF:  $p < .001$ , respectively). The preference for C-PRON was higher than for DEFs ( $p < .05$ ), S-PRON and INDEF ( $p < .01$ ). The use of strong pronouns

(S-PRON) was found to be higher than the use of INDEF ( $p < .01$ ). Paired sample T-tests also revealed that the expression with the highest preference in character maintenance for the Bilinguals\_GE was the use of N-PRON which differed from all structures (DEF:  $p < .05$  C-PRON:  $p < .03$ , and S-PRON, INDEF:  $p < .001$ , respectively). The preference for the referential form DEF was higher than for C-PRON ( $p < .05$ ), S-PRON and INDEF ( $p < .01$ ). The use of C-PRON was found higher than the use of S-PRON ( $p < .01$ ). Overall, Bilinguals\_GE seem to avoid the use of object clitics and instead prefer to use DPs in maintenance circumstances (cf. Serratrice 2007, Sorace et al. 2009).

### 5.3.3 Character reintroduction in the German and Greek stories

*Insert figure 5 here*

For reintroduction in the German data, a Kruskal-Wallis H test, once again, revealed significant differences between the three groups in the use of D-PRON and P-PRON ( $\chi^2 = 7.628$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 5.632$ ,  $df = 2$ ,  $p < .05$ , respectively). Mann-Whitney tests revealed that the Bilinguals\_GR avoided D-PRONS in this function all together and instead used more P-PRONS compared to the Monolinguals\_GE and the Bilinguals\_GE ( $Z = -2.931$ ,  $p = .000$  and  $Z = -2.728$ ,  $p = .000$ , respectively).

Paired sample T-tests comparisons between the different referential expressions showed that the expression with the highest preference in character reintroduction for the three groups was the use of DEF which differed from all structures (P-PRON:  $p < .05$ , and INDEF, D-PRON and  $\emptyset$ :  $p < .001$ , in all cases). The preference for the referential form of P-PRON was higher than the use of INDEF, D-PRON and  $\emptyset$  ( $p < .01$ ). Hence, we find a similar pattern for character maintenance and reintroduction in the German stories: Even though,

both groups of bilinguals show the same order of preferred referential expressions as their monolingual peers, Bilinguals\_GE use significantly fewer D-PRONs compared to their monolingual and bilingual peers in Germany. Instead, they prefer to use more P-PRONs.

*Insert figure 6 here*

For the character reintroduction in the Greek data a Kruskal-Wallis H test revealed no statistically significant differences between the three groups. Paired sample T-test comparisons between the different referential expressions were run for each group separately. They showed that the expression with the highest preference in character reintroduction was the DEF which differed from all structures, but the difference with the strong pronoun (S-PRON) was less pronounced (S-PRON:  $p < .05$ , N-PRON:  $p < .001$ ). The frequency of S-PRON differed significantly from the frequency of null pronouns ( $p < .001$ ). Hence, character reintroductions in Greek did not show any differences between the groups of bilinguals.

#### **5.3.4 Correlations and regressions between input variables, proficiency measures and distribution of referential expressions**

Pearson's correlations revealed that all input variables correlated highly with each other. More specifically, parental input (mother and father) correlated significantly with early literacy input ( $r = .883$ ,  $p = .000$ ) and current language use ( $r = .445$ ,  $p = .000$ ). Early literacy input also correlated significantly with current language use ( $r = .785$ ,  $p = .000$ ). Out of the three input measures, early literacy input revealed the strongest correlations. In terms of the individual proficiency measures in the two languages, we found weaker correlations. The

Greek vocabulary scores correlated with the syntactic complexity and the verb diversity ( $r=.476$ ,  $p=.029$ ;  $r=.521$ ,  $p=.041$  respectively). With regard to the German data, the German vocabulary scores correlated with the syntactic complexity and the verb diversity ( $r=.389$ ,  $p=.032$ ;  $r=.452$ ,  $p=.045$  respectively).

In order to examine whether the distribution of referential expression in character reference was best predicted by dominance in input or by language proficiency in the respective language, we ran a backward elimination regression for all bilingual participants with the choice of referential forms per function as the output variable. For each referential function we examine the use of the most frequent forms by all children rather than the total number of forms in principle available (i.e. for introduction: DEF and INDEF for both languages, for maintenance: DEF, N-PRON and C-PRON for Greek; DEF, P-PRON and  $\emptyset$  for German; for reintroduction: DEF for both languages). Predictor variables were the proficiency measures (vocabulary scores, verb diversity and syntactic complexity) and the dominance in input. In order to avoid multicollinearity effects following previous findings in the literature (Thordadottir 2011), early literacy input was chosen as the only predictor variable in terms of input, since it correlated most highly with the other input measures.

In Greek, the resulting model (adjusted  $R^2 = .52$   $p<001$ ) revealed early literacy input (Beta = .41,  $p < 001$ ) and Greek vocabulary (Beta = .31,  $p < 001$ ) to be significant predictor variables for the use of INDEF in character introduction. Similarly, with respect to the use of clitic pronouns for character maintenance, the resulting model (adjusted  $R^2 = .56$   $p<001$ ) revealed Greek vocabulary (Beta = .44,  $p < 001$ ) and early literacy input (Beta = .38,  $p < 001$ ) with subordination index, too (Beta = .18,  $p < 01$ ) as significant predictor variables. For the use of DEF in reintroduction the resulting model (adjusted  $R^2 = .39$   $p<001$ ) shows early literacy input (Beta = .60,  $p < 001$ ) as the only significant predictor variable.

In German, the resulting model (adjusted  $R^2 = .48$   $p < .001$ ) suggests early literacy input (Beta = .43,  $p < .001$ ) and German vocabulary (Beta = .35,  $p < .001$ ) to be significant predictor variables for the use of INDEF for character introduction. For P-PRON in the function of maintenance the resulting model (adjusted  $R^2 = .37$   $p < .001$ ) revealed German vocabulary (Beta = .63,  $p < .001$ ) as the only significant predictor variable. For DEF in reintroduction the resulting model (adjusted  $R^2 = .39$   $p < .001$ ) revealed early literacy input (Beta = .55,  $p < .001$ ) as the only significant predictor variable.

#### **5.4 Character reference: pronoun ambiguity in maintenance and reintroduction**

Figure 7 shows the mean frequencies of referentially ambiguous pronouns in character maintenance and character reintroductions in the German data.

*Insert figure 7 here*

To examine whether the three groups differed in terms of the amount of referentially ambiguous pronouns in the German stories we ran a Kruskal-Wallis H test for maintenance and reintroduction separately. The test revealed significant differences between the three groups in the production of ambiguous P-PRONs for maintenance and reintroduction ( $\chi^2 = 4.224$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 5.123$ ,  $df = 2$ ,  $p < .05$ , respectively). Also, the groups differed in terms of the production of ambiguous D-PRONs in character reintroduction. The Bilinguals\_GR produced fewer ambiguous P-PRON in maintenance and reintroduction than the Bilinguals\_GE and Monolinguals\_GE (Mann-Whitney:  $Z = -3.541$ ,  $p = .003$  and  $Z = -3.524$ ,  $p = .001$ , respectively). They also produced fewer ambiguous D-PRONs in reintroduction than the Bilinguals\_GE and Monolinguals\_GE (Mann-Whitney:  $Z = -2.439$ ,  $p$

= .003 and  $Z = -2.853$ ,  $p = .003$ , respectively).

*Insert figure 8 here*

The same tests were run to compare the distribution of ambiguous pronouns in the Greek data. Figure 8 shows the mean frequencies of referentially ambiguous pronouns (%) in character maintenance and character reintroductions in the Greek stories. A Kruskal-Wallis H test revealed significant differences between the three groups in the distribution of ambiguous null pronouns (N-PRON) and ambiguous strong pronouns (S-PRON) in maintenance and ambiguous S-PRONs in reintroduction ( $\chi^2 = 6.127$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 5.943$ ,  $df = 2$ ,  $p < .05$ ,  $\chi^2 = 6.234$ ,  $df = 2$ ,  $p < .05$ , respectively). The Bilinguals\_GR produced significantly more ambiguous null pronouns in maintenance than the Bilinguals\_GE and the Monolinguals\_GR (Mann-Whitney:  $Z = -4.129$ ,  $p = .003$  and  $Z = -3.956$ ,  $p = .001$ , respectively). They also produced significantly more ambiguous strong pronouns than the Bilinguals\_GE and Monolinguals\_GR in maintenance (Mann-Whitney:  $Z = -2.765$ ,  $p = .003$  and  $Z = -2.427$ ,  $p = .003$ ) and in reintroductions ( $Z = -3.625$ ,  $p = .003$  and  $Z = -3.423$ ,  $p = .003$ ).

Paired sample T-test comparisons between the different pronoun types showed that the type with the highest proportion of ambiguities in maintenance was the null pronoun ( $p < .001$  in all cases), followed by strong pronouns (S-PRON) which were more ambiguous than clitics ( $p < .01$ ). In the reintroduction the construction with the highest proportion of ambiguities was S-PRON (vs. C-PRON  $p < .001$ ).

## 6. Discussion

Along the lines of our first prediction (1), we find that, by and large, language dominance measured through input variables is reflected in proficiency measures and choice of referential form in character reference.

With respect to prediction (2), we find that dominance in input and proficiency in the two languages are closely related, but dominance in input, as measured by our questionnaires, does not translate directly into proficiency for both of the bilingual groups under investigation. With respect to the Bilinguals\_GE, whose exposure was German dominant, we find a clear picture in terms of proficiency. In their productive vocabulary they are significantly better in German than in Greek. This pattern also holds for verb diversity and syntactic complexity in the narratives, where this group produced significantly higher scores of verb diversity and syntactic complexity in the German stories compared to the Greek. In terms of these measures, the Bilinguals\_GE behave like their monolingual peers in German, while they diverge significantly from their monolingual peers in Greek..

We find a less clear-cut picture for the Bilinguals\_GR: While the input measures suggest that Bilinguals\_GR are balanced, lexical proficiency measures show a different pattern for this group. In terms of productive vocabulary, they are significantly better in Greek than in German, which reflects the dominance of the language of the country of residence. With respect to the verb TTR, we find that the Bilinguals\_GR behave similarly to their monolingual and bilingual peers in German, but they differ marginally, albeit significantly, from their monolingual controls in Greek, producing slightly less verb diversity. When we consider this groups' performance in syntactic complexity, the picture changes again, as Bilinguals\_GR here behave like their monolingual peers in Greek. In German, they produce significantly more subordinate clauses than their monolingual and bilingual peers from Germany, which may be an instance of positive transfer from Greek to German.

We conclude that, although both groups of bilinguals are unbalanced in terms of productive vocabulary, they are unbalanced to different degrees. While Bilinguals\_GE show a pronounced dominance in German across input and proficiency measures, Bilinguals\_GR are more balanced. In comparison to Bilinguals\_GE, the differences to monolingual behavior in this group are less pronounced and clear-cut. This pattern is confirmed in character reference management, which we will turn to in the following.

With respect to our predictions (3) concerning character reference, we find that by and large, form-function distribution in character reference was similar for bilingual and monolingual participants in the respective languages. This confirms our expectation that bilinguals develop their two linguistic systems separately in terms of grammatical and discourse-pragmatic constraints.

In line with previous studies (Serratrice 2007; Chen and Lei 2012), we do, however, observe instances where the bilinguals' choices of referential expressions diverge significantly from their monolingual peers'. These differences are predominantly found in the Greek stories produced by the bilinguals from Germany. We attribute this to the German dominance effect in early literacy input that also affected verb diversity and syntactic complexity in the Greek stories. Both Serratrice's (ibid.) and Chen and Lei's (ibid.) participants were assumed to be native-like in both languages; i.e. balanced bilinguals. We assume that early literacy input in addition to the dominance in the language of schooling (i.e. German) has contributed to the more age-appropriate choices of referential forms in the German stories compared to those made in the Greek stories. This is confirmed by our regression analysis, which revealed that – along with vocabulary measures – this background measure was mainly responsible for the choice of referential forms in the bilinguals.

In character introduction in the Greek stories, we found that Bilinguals\_GE underused indefinite DPs when compared to their bilingual and monolingual peers from

Greece. This cannot be attributed to cross-linguistic influence from German, as also in German, the preferred form for character introduction is indefinite. However, from a developmental perspective, indefinite marking of newness has been shown to come later in development than other character reference functions (Hickmann et al. 1996, Aksu-Koç and Nicolopoulou 2014). We therefore consider the persistence of definite DPs in Greek by Bilinguals\_GE as a delay imposed by exposure effects; in other words, it is related to our findings for dominance.

The bilinguals from Germany also showed different preferences for form-function mappings in character maintenance. They used significantly more definite DPs and used significantly less null pronouns than their bilingual and monolingual peers from Greece, when referring to highly accessible character referents. This effect, once again, must be related to the German dominant early literacy input that these bilinguals displayed. Similarly to the L2 learners in Kang's (2004) and Leclercq and Lenart's (2013) studies, the German dominant bilinguals chose significantly more definite DPs to maintain reference, i.e. they use more informative referential forms than would necessarily be needed in order to unambiguously identify the character referent. Leclercq and Lenart (2013) suggest that this is an ambiguity avoidance strategy that also has been observed for L2 learners in non-narrative contexts. When in doubt they choose a lexically more informative form in order to avoid ambiguity.

In maintenance, clitics in the Greek stories were significantly less frequent in both bilingual groups compared to the stories of the monolingual controls. This is in line with findings by Serratrice (2007) according to whom balanced Italian-English bilinguals used significantly fewer object clitics than their monolingual peers. Note that both Serratrice's study and ours are concerned with the typological intersection of a null-subject/clitic language with a no-null-subject/no clitic language, and there maybe a problem with the

placement of clitics on the accessibility scale. In this kind of cross-linguistic configuration, bilinguals might be opting for a ‘third way’ grammar. In other words, bilinguals use the same accessibility preferences in both of their languages, even though the two grammatical systems differ (cf. Torregrossa et al. 2014), something to be explored further.

In the German data, the only significant differences in the form-function mappings between the groups concern the distribution of *der*-pronouns vs. personal pronouns in character maintenance and reintroduction. We find that Bilinguals\_GR avoid the use of *der*-pronouns, whereas both the Bilinguals\_GE and the monolinguals from Germany make use of this form. Paired sample T-tests per group revealed no significant differences for the use of *der*-pronouns in maintenance vs. reintroduction circumstances. *Der*-pronouns are not used in switch-reference function by Monolinguals\_GE and Bilinguals\_GE, otherwise we should have found a significantly higher proportion in reintroductions, as we found for strong pronouns in Greek. Instead, Bilinguals\_GE and monolingual German children seem to use *der*-pronouns as an alternative to personal pronouns, as it has been found in corpora of adult oral German, including informal varieties (Ahrenholz 2007). We assume that this informal use of *der*-pronouns is not as prominent in the input that Bilinguals\_GR receive, which would explain their avoidance of this form.

With respect to the occurrence of referentially ambiguous pronouns in character maintenance and reintroduction, the means show that the use of referentially ambiguous forms is rare across all groups, pronominal forms and functions. This confirms previous studies that show that children get better at unambiguously marking character reference for the interlocutor once they enter school (Leclercq and Lenart 2013, Orsolini et al. 1996). Contrary to our expectations, however, we do find that bilinguals diverge in the proportion of referentially ambiguous forms compared to their monolingual peers. However, these differences cannot be explained by the dominance profile that attested for the differences in

most of the other measures. We found that Bilinguals\_GE produced fewer ambiguous pronouns than their bilingual and monolingual peers in Greek., while the Bilinguals\_GR produced significantly fewer ambiguous pronouns than their bilingual and monolingual peers from Germany in the German stories. It almost appears as though bilinguals in Greece pay more attention to unambiguous reference identification in German, whereas the bilinguals in Germany pay more attention to unambiguous reference identification in Greek.

## **7. Conclusion**

All in all, we find our predictions confirmed. (1) We found that dominance in exposure patterns differently when we compared the Bilinguals\_GR to Bilinguals\_GE. While Bilinguals\_GR were more balanced in terms of input in the two languages, Bilinguals\_GE were clearly German dominant, with more exposure to German in terms of early literacy input and current language use. (2) Dominance in exposure affected their lexical and syntactic proficiency. While their productive vocabulary reflected the dominance of the language of the country of residence in both groups of bilinguals, lexical diversity and syntactic complexity in the retold narratives reflected the dominance in German input in the Bilinguals\_GE. The more balanced Bilinguals\_GR did not differ as pronouncedly in these proficiency measures to their monolingual peers in both languages. (3) With respect to character reference, we found that dominance did indeed affect the choices of referential expressions in character reference. We found that dominance in input explained most of the diverging behavior between bilinguals and monolingual controls. However, not all choices in character reference could be explained by dominance. The avoidance of clitic pronouns

seems to be an effect of bilingualism that has also been observed for other balanced bilingual groups.

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## **9. Appendix**

### **9.1 Questions that elicited input variables in the child questionnaire**

(1) parental language input:

Q: *Do you remember which languages you heard from and used with your mother/ father, when you were a baby/ entered kindergarten/ entered school?:*

Possible answers: *mainly Greek - both - mainly German*

(2) early literacy input:

Q: *Did your parents or other people read you books with stories and fairytales when you were younger? If yes, I would like you to tell me, in which language they did this?*

Possible answers: *My mother/ father/ grandparent/ older sibling/ another person read to me mostly in Greek – about the same in both languages - mostly in German - in another language*

(3) current language use:

Q: *And today? Who speaks which language to you and which language do you use when you talk to that person?*

Possible answer: a. *My mother/ father/ older sibling/ younger sibling/ grandparents/ friends talk to me mainly in Greek – in both languages – mainly in German.*

b. *I talk to my mother/ father/ older sibling/ younger sibling/ grandparents/ friends mainly in Greek – in both languages – mainly in German.*

## 10. Figures and tables

|                 | Participants (N) | Sex (N of boys) | Age of Testing mean (SD); range | Raven's scores mean (SD); range |
|-----------------|------------------|-----------------|---------------------------------|---------------------------------|
| Bilinguals_GR   | 38               | 20              | 10;2<br>(1.2)<br>7.42-11.78     | 34,8<br>(1.8)<br>22-36          |
| Bilinguals_GE   | 39               | 20              | 10;4<br>(1.7)<br>8.8-11.8       | 34,1<br>(2.1)<br>25-36          |
| Monolinguals_GR | 20               | 8               | 10;5<br>(1.3)<br>7.3-11.9       | 34,4<br>(1.5)<br>23-36          |
| Monolingulas_GE | 20               | 8               | 10;57<br>(1.5)<br>8.4-12.02     | 35<br>(2)<br>27-34              |

Table 1. Number of participants, gender, mean age of testing (SD; range) and mean Raven's scores (SD; range) of the two bilingual and the two monolingual control groups

|               | Parental input - mother |                      | Parental input - father |                     | Early literacy input |                       | Current language use |                      |
|---------------|-------------------------|----------------------|-------------------------|---------------------|----------------------|-----------------------|----------------------|----------------------|
|               | Greek                   | German               | Greek                   | German              | Greek                | German                | Greek                | German               |
| Bilinguals_GR | 56<br>(7.2)<br>12-100   | 44<br>(6.4)<br>5-84  | 55<br>(4.8)<br>25-97    | 45<br>(4.7)<br>5-86 | 53<br>(6.5)<br>9-83  | 47<br>(4.9)<br>11-100 | 49<br>(5.8)<br>6-87  | 51<br>(6.2)<br>8-85  |
| Bilinguals_GE | 64<br>(5.3)<br>25-100   | 36<br>(5.8)<br>10-87 | 62<br>(5.3)<br>14-100   | 38<br>(4.5)<br>7-92 | 41<br>(7.1)<br>11-97 | 59<br>(5.4)<br>4-93   | 44<br>(5.2)<br>11-97 | 56<br>(4.9)<br>11-92 |

Table 2. Input in Greek and German in percentages (SD; range)

| discourse function: | character introduction (INTR):  | character maintenance (MAINT):  | character reintroduction (REINTR):   |
|---------------------|---|---|--|
|                     | first mention of a character referent in the story  | reference to a character that was referred to in the immediately preceding clause   | reference to a character that was NOT referred to in the immediately preceding clause  |
| <b>English</b>      | (a) ‘One day, <u>a giraffe</u> (INTR) and <u>an elephant</u> (INTR) went to a nearby swimming pool.’<br><br>(b) ‘... And there came <u>another elephant</u> (INTR).’          | (a) ‘Then Hundina <sub>a</sub> was very angry and <u>ZERO</u> <sub>1</sub> (MAINT) shouted at Haso <sub>2</sub> .’<br><br>(b) ‘Then, Haso <sub>2</sub> saw an old rabbit <sub>3</sub> with lots of balloons. <u>He</u> <sub>2</sub> (MAINT) ran fast to <u>the old rabbit</u> <sub>3</sub> (MAINT)’<br><br>(c) ‘Then, Elefantina <sub>1</sub> was happy that <u>they</u> <sub>1+2</sub> (MAINT) were friends again.’              | (a) ‘The dog <sub>2</sub> was holding a ballon. There was also a rabbit <sub>1</sub> there. And <u>the dog</u> <sub>2</sub> (REINTR) suggested that they play with the ballon.’<br><br>(b) The others <sub>1+2+3</sub> watched her <sub>4</sub> admirably. And she <sub>4</sub> gave it back to <u>the boy</u> <sub>2</sub> (REINTR).  |
| <b>Greek</b>        | (a) Mia mera mia skilitsa (INTR) kai enas lagos (INTR) pigan sto dasos.’<br><br>(b) ‘... Kai ksafnika irthe enas alos elefantas (INTR).’                                      | (a) ‘I skilitsa thimose poli kai <u>N-PRON</u> <sub>1</sub> (MAINT) arxise na fonazi ston lago <sub>2</sub> .’<br>(b) ‘O lagos <sub>2</sub> ide enan gero-lago <sub>3</sub> me pola balonia. <u>Aftos</u> <sub>2</sub> (MAINT) etrexe grigora pros <u>ton gero-lago</u> <sub>3</sub> (MAINT)’<br><br>(c) ‘Meta, i elefantina <sub>1</sub> itan xaroumeni pou <u>N-PRN</u> <sub>1+2</sub> (MAINT) itan fili.’                      | (a) ‘I skilitsa <sub>1</sub> kratouse ena baloni. Eki itan kai enas lagos <sub>2</sub> . Kai i <u>skilitsa</u> <sub>1</sub> (REINTR) protine na pexoun me to baloni.’<br><br>(b) I ipolipi <sub>1+2+3</sub> tin <sub>4</sub> kitazan me thafmasmo. Kai afti to edose <u>sto agoraki</u> <sub>2</sub> (REINTR).                         |
| <b>German</b>       | (a) Eines Tages kamen <u>eine Giraffe</u> (INTR) und <u>ein Elefant</u> (INTR) in ein nahe gelegenes Schwimmbad.<br><br>(b) ... Und da kam <u>ein anderer Elefant</u> (INTR). | (a) Dann war Hundine <sub>1</sub> sehr böse und [ <u>COORD</u> ] <sub>1</sub> (MAINT) beschimpfte Haso <sub>2</sub> .<br><br>(b) Da sah Haso <sub>2</sub> einen alten Hasen <sub>3</sub> mit ganz vielen Luftballonen. <u>Er</u> <sub>2</sub> (MAINT) rannte schnell zu <u>dem alten Hasen</u> <sub>3</sub> (MAINT).<br><br>(c) Da war Elefantina <sub>1</sub> froh, dass <u>sie</u> <sub>1+2</sub> (MAINT) wieder Freunde waren. | (a) ,Das Hundemädchen <sub>1</sub> hatte einen Ballon. Und da war auch ein Hund <sub>2</sub> . Und <u>das Hundemädchen</u> <sub>1</sub> (REINTR) schlug vor, dass sie mit dem Ballon spielen.’<br><br>(b) Die anderen <sub>1+2+3</sub> haben ihr bewundernd zu. Und sie hat es <u>dem Jungen</u> <sub>2</sub> (REINTR) zurück gegeben. |

Table 3. Definitions of discourse reference functions according to Bamberg (1987) and coding examples for Greek and German

| Group         | Participants (N) | Greek Vocabulary (/50), (SD; range) | German Vocabulary (/40), (SD; range) |
|---------------|------------------|-------------------------------------|--------------------------------------|
| Bilinguals_GR | 38               | 32.3<br>(4.2)<br>18-49              | 21.3<br>(15.6)<br>16-31              |
| Bilinguals_GE | 39               | 21.4<br>(8.3)<br>13-47              | 35<br>(2.4)<br>29-40                 |

Table 4. Bilinguals' mean vocabulary scores (SD; range) in Greek and German

| Group           | Verb Diversity (TTR)         |                              | Subordination Index (no. of subordinate clauses/ overall no. of clauses) |                            |
|-----------------|------------------------------|------------------------------|--|----------------------------|
|                 | Greek                        | German                       | Greek  | German                     |
| Bilinguals_GR   | 0.61<br>(1.1)<br>0.47-0.84   | 0.67<br>(0.098)<br>0.32-0.74 | 0.89<br>(1.3)<br>0.20-0.80   | 0.85<br>(1.1)<br>0.06-0.89 |
| Bilinguals_GE   | 0.54<br>(1.3)<br>0.37-0.72   | 0.67<br>(0.092)<br>0.54-0.78 | 0.63<br>(1.5)<br>0.08-0.73   | 0.74<br>(1.4)<br>0.09-0.88 |
| Monolinguals_GR | 0.71<br>(0.097)<br>0.52-0.88 | -----                        | 0.93<br>(1.1)<br>0.30-0.89   | -----                      |
| Monolinguals_GE | -----                        | 0.69<br>(0.1)<br>0.47-0.81   | -----  | 0.76<br>(1.1)<br>0.30-0.84 |

Table 5. Groups' mean scores (SD; range) for verb diversity and syntactic complexity

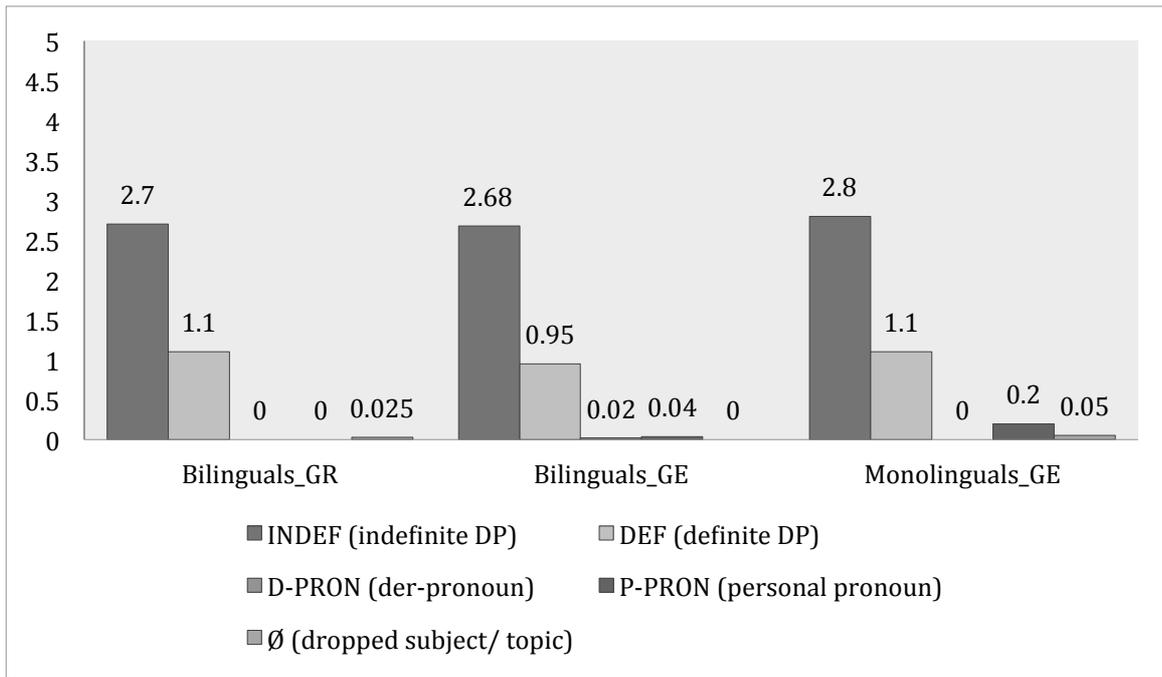


Figure 1. Mean frequencies of referential expressions in character introduction in German

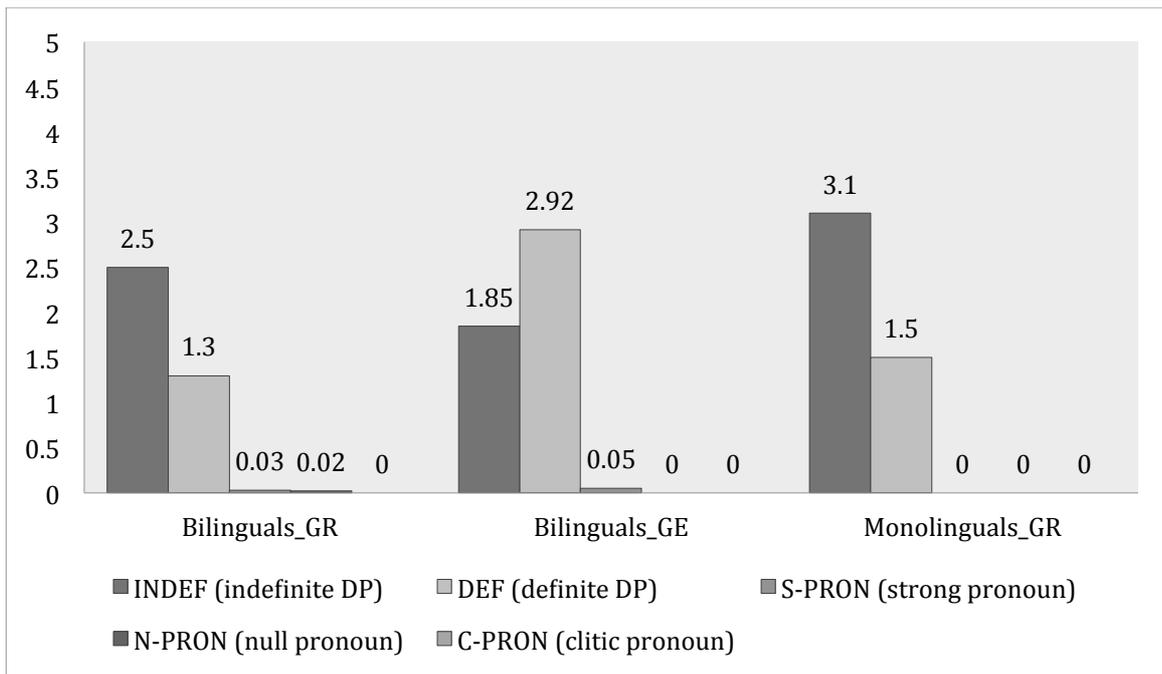


Figure 2. Mean frequencies of referential expressions in character introduction in Greek

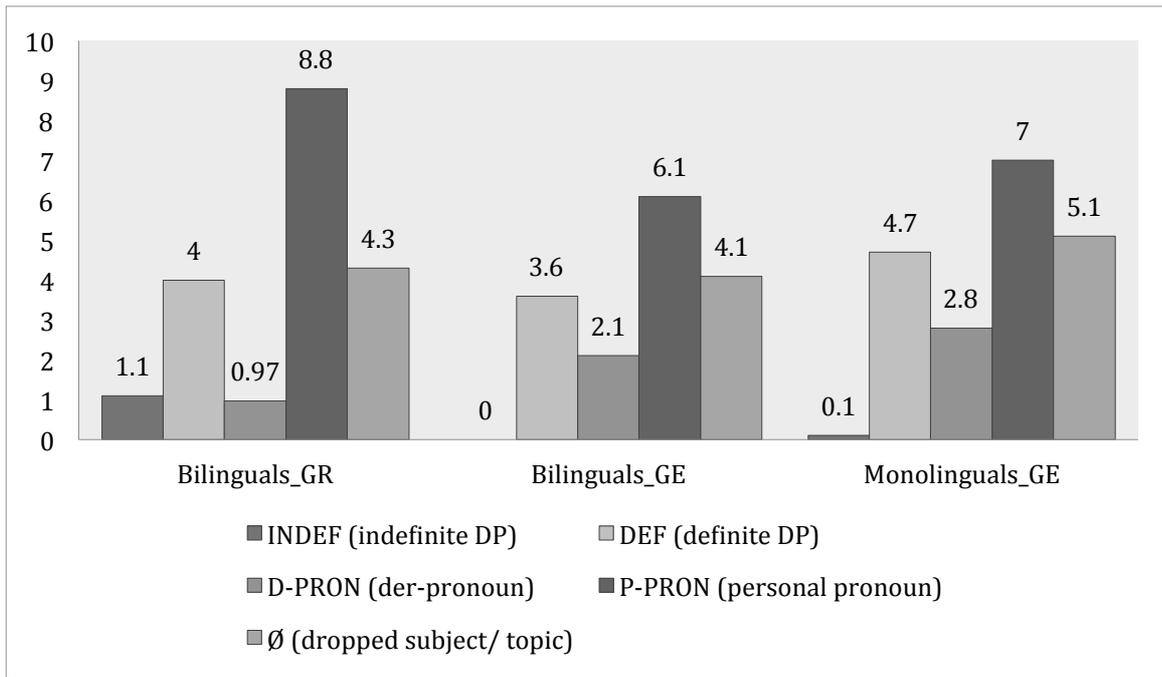


Figure 3. Mean frequencies of referential expressions in character maintenance in German

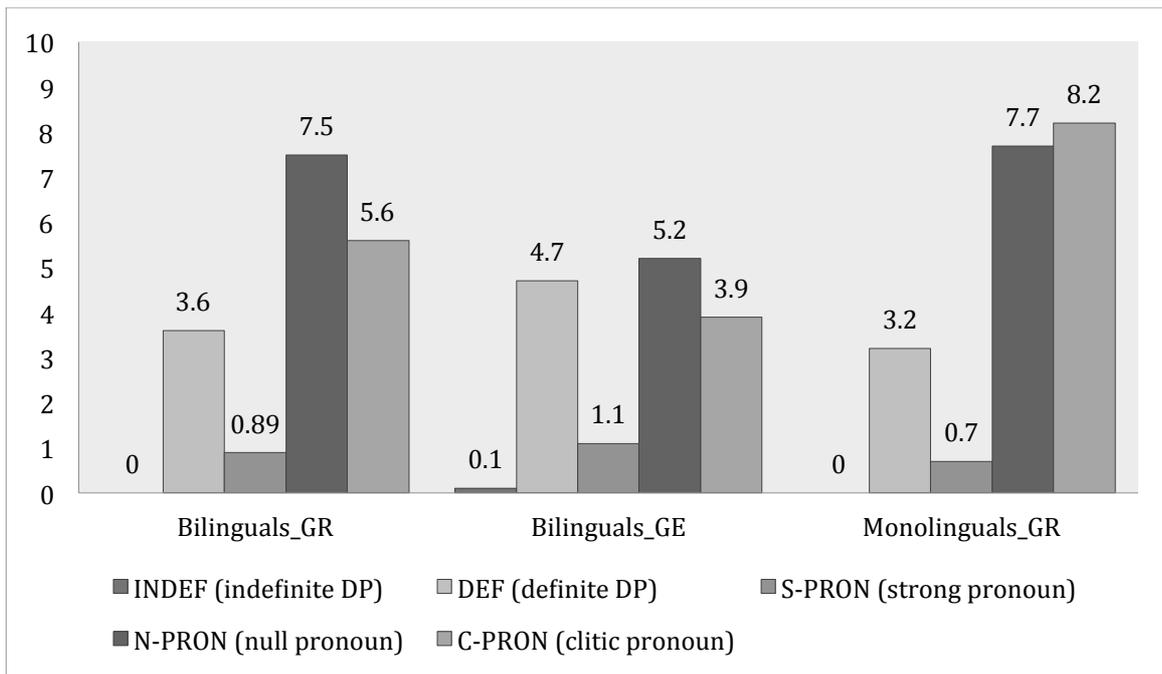


Figure 4. Mean frequencies of referential expressions in character maintenance in Greek

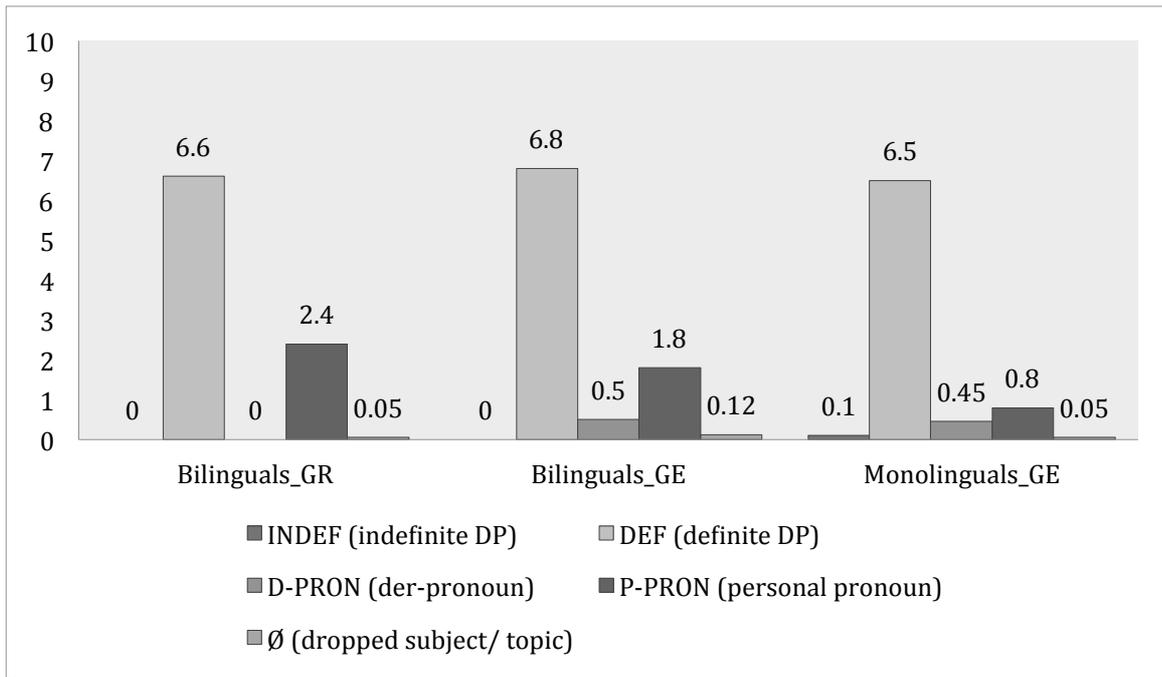


Figure 5. Mean frequencies of referential expressions in character reintroduction in German

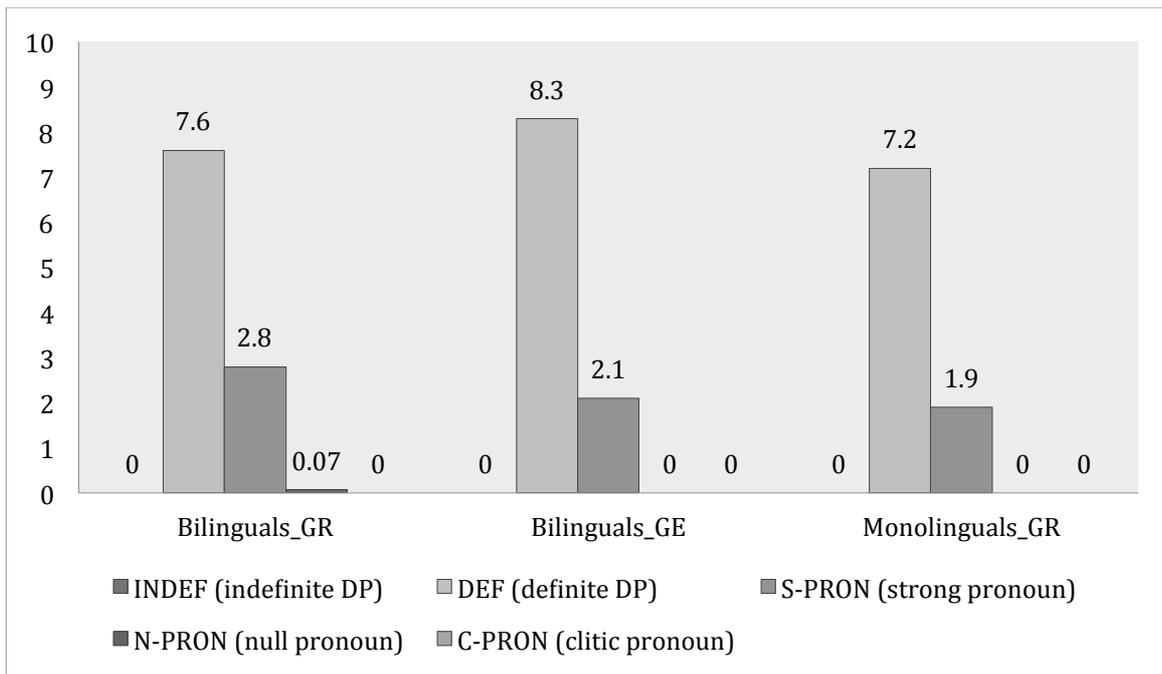


Figure 6. Mean frequencies of referential expressions in character reintroduction in Greek

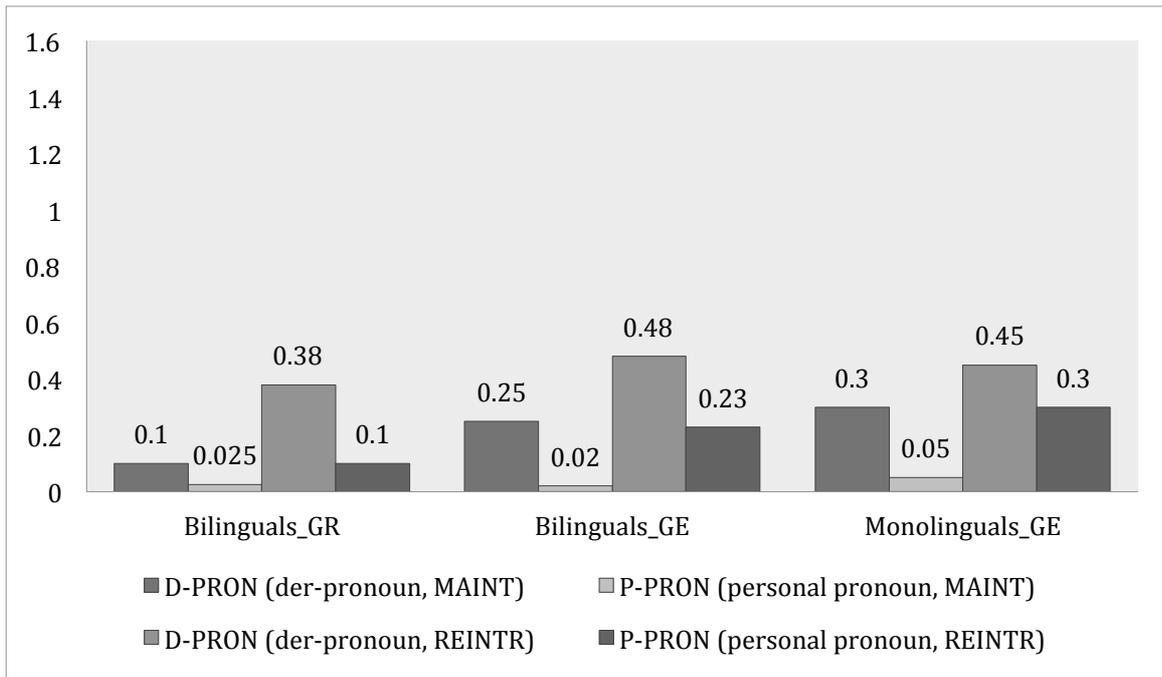


Figure 7. Mean frequencies of referentially ambiguous pronouns in German stories

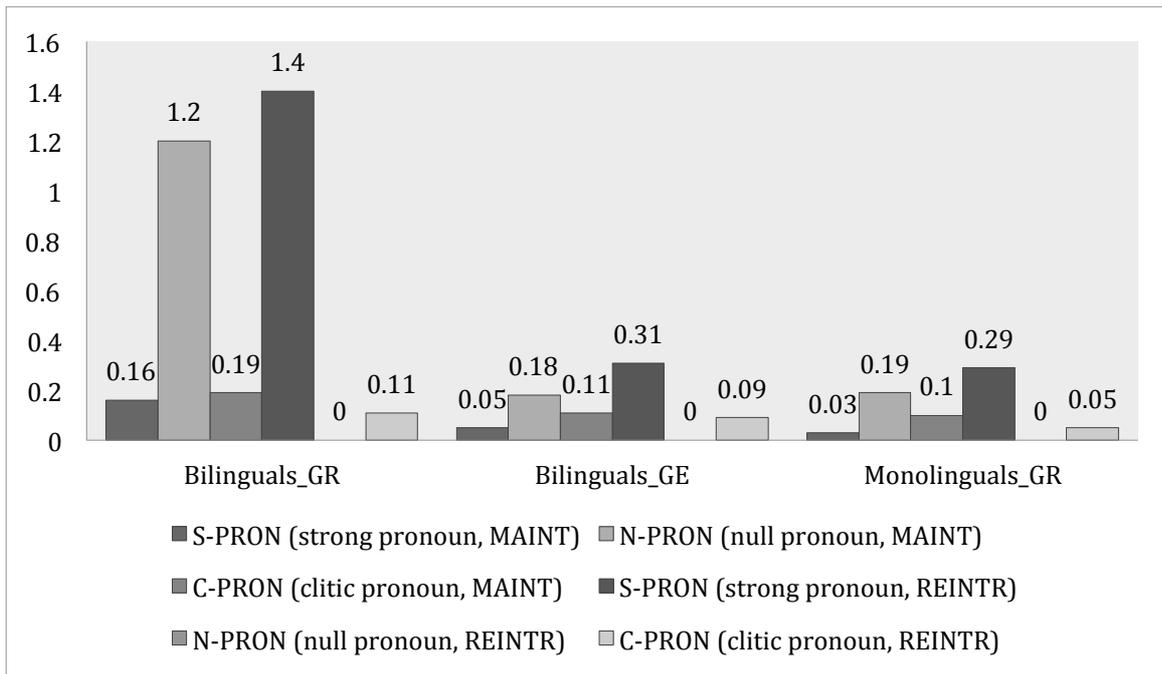


Figure 8. Mean frequencies of referentially ambiguous pronouns in Greek stories

## 11. Notes

<sup>i</sup> Examples of referential expressions are underlined and given within clausal context. The following gloss is only used for the underlined referential form. The English translation of the whole clause is given in single inverted commas with the referential expression underlined again. Coindexation is used to indicate co-reference between referential forms.

<sup>ii</sup> See *Section 4.3.3. (b) Discourse functions of character referents coded in Greek and German* for detailed definitions of the three discourse functions ‘introduction’, ‘maintenance’ and ‘reintroduction’.

<sup>iii</sup> Parental Education was measured on a 5-point scale according to the highest educational level attained from compulsory primary education to tertiary education, which we adapted from the UBILEC (Unsworth 2012). Internal consistency of the parents’ information on highest educational level was satisfied (ordinal alpha = 0.83). We conducted paired sample T-tests and we found that the two groups of bilinguals differed significantly in terms of parental education. Both mothers and fathers of the bilinguals in Greece had a significantly higher level of education than the bilinguals that we studied in Germany. More specifically, the mothers from Greece had a mean of 4.7 points compared to the mothers from Germany having a mean of 3.5 ( $t(29)=7.244$ ,  $p=.000$ ), whereas the fathers from Greece had a mean of 4.6 points compared to the fathers from Germany having a mean of 3.2 ( $t(27)=7.96$ ,  $p=.000$ ).

<sup>iv</sup> In regional varieties of German, proper names are often introduced by definite articles. We found such constructions in our data and included them as definite DPs in the analysis.