

THE EFFECTS OF INPUT, LITERACY & UPDATING ON VOCABULARY GROWTH OF SEQUENTIAL BILINGUALS

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ABSTRACT

The present study investigates whether the vocabulary growth of sequential bilingual children with Greek as their home language and German as the language of the community is predicted by the input and literacy that they receive and, also, by their cognitive (i.e. updating) abilities. Previous studies have found that language input of both home and community are important for vocabulary growth. Similarly, more recent studies have manifested the role of literacy in both languages (biliteracy) as a crucial factor for both vocabulary and general language development. In addition, the impact of cognitive abilities on vocabulary growth have been also verified in numerous studies. The current study aims to consider all the aforementioned factors by testing fifty-eight children aged 8 to 12 years, who live in Germany, by means of a child questionnaire, two expressive vocabulary tests (in Greek and in German, respectively) and an updating task. The findings reveal differences in participants' performance in both vocabulary tasks; hence vocabulary knowledge is more width in Greek compared to German. Interestingly, regression analyses have shown that input, literacy practices in both languages and cognitive (i.e. updating) skills predict bilinguals' vocabulary knowledge in both Greek and German. The findings suggest that (a) not only input in both languages, but also biliteracy, should be promoted and (b) updating skills are required for a successful vocabulary development.

Keywords: Vocabulary growth, sequential bilinguals, input, literacy, updating.

INTRODUCTION

Previous studies on vocabulary development have shown that consistent language input in both languages enhances the equal vocabulary growth (Pearson, 2007; Kohnert, 2010; Thordardottir, 2011; Hoff et al., 2012; Branum-Martin et al., 2014). More specifically, recent studies in sequential bilingual children have highlighted the necessity of using consistently the minority language at home environments (De Houwer, 2007); whilst the majority language (the language of the community) should be consistently used at school environments in order to have a rapid vocabulary growth (Kan & Kohnert, 2005; Duursma et al., 2007; Kohnert, 2010). In addition, other theories suggest that input is essential for language learning in children that still develop their language (De Bot, Lowie & Verspoor, 2007). Others claim that language input also enhances cognitive processing skills that are required in order to learn new words (Marchman, Fernald & Hurtado, 2010).

Literacy also seems to play a crucial role in bilingual language development. More recent studies emerged the positive literacy effects in both languages (biliteracy) on aspects of general language development (Dosi, Papadopoulou & Tsimpli, 2016). The role of home and family is also important in order to promote biliteracy practices (Bialystok, 2001). Apart from the improvement of language abilities, cognitive abilities are also enhanced by biliteracy

practices and the attendance of a bilingual educational setting (Cobo-Lewis et al., 2002; Oller & Eilers, 2002).

Continuing this line of reasoning, cognitive abilities, and more specifically, working memory skills have found to correlate with vocabulary learning (see Baddeley et al., 1998, for review). Hence the better verbal working memory skills a speaker has, the faster they learn new words. Nonetheless, at this point, we should note that by definition bilingual speakers cannot have the same vocabulary size with a monolingual speaker. Notwithstanding they have the same amount of conceptual vocabulary (Bedore et al., 2005; Kan & Kohnert, 2005; Pearson et al., 1993).

LITERATURE REVIEW

In bilingual development input has found to be an important factor (for a review, see Valian 1999). Input is essential for language learning in children that still develop the language (De Bot, Lowie & Verspoor, 2007). It is found that the ideal situation is when bilingual speakers, and especially sequential bilinguals, are exposed to the minority language at home and the majority language at school/community (Duursma et al., 2007, Dixon et al., 2012). Studies have shown that sequential bilingualism (i.e. exposure to the second language after the age of 3) is very different in terms of acquisition processes from that of simultaneous bilingualism (i.e. simultaneous exposure to two languages before the age of 3 years; Genesee, Paradis & Crago, 2004). Input is also important for the vocabulary development, especially for sequential bilinguals (Thordardottir, 2011, Chondrogianni & Marinis, 2011, Bedore et al., 2012; Cheung et al., 2018). Many studies have highlighted the consistent use of both languages as an important factor of vocabulary growth (Pearson, 2007; Kohnert, 2010; Thordardottir, 2011; Hoff et al., 2012; Branum-Martin et al., 2014). Therefore they claim that in sequential bilinguals the best practice to follow for a rapid and successful vocabulary growth is the consistent use of the minority language (first language) at home (De Houwer, 2007); and the use of the majority language (second language) at school in a similar consistent way (Kan & Kohnert, 2005; Durrsma et al., 2007; Kohnert, 2010). Apart from language abilities, language input also boosts cognitive processing skills that are linked to vocabulary acquisition (Marchman, Fernald & Hurtado, 2010).

These cognitive skills seem to be further boosted by biliteracy practices and bilingual educational settings (Cobo-Lewis et al., 2002; Oller & Eilers, 2002; Dosi, Papadopoulou & Tsimpli, 2016). Thus biliterate bilinguals, compared to their monoliterate bilingual peers, often exhibit a higher performance in cognitive tasks (Leikin et al., 2009). Similarly, both linguistic and cognitive abilities of bilingual children found to be better when they attended a bilingual educational setting, which equally supports both languages (Cobo-Lewis et al., 2002; Oller & Eilers, 2002). A study of Tsimpli and colleagues (2015) has shown that bilingual children who attended a bilingual educational setting and lagged behind in the expressive vocabulary scores (in one of their languages), performed similarly to a bilingual group attending a monolingual educational setting. The researchers attributed this finding to the effect of the bilingual educational setting that positively affected their cognitive capacity. Similarly, in a study of Dosi, Papadopoulou & Tsimpli (2016), where biliterate and monoliterate bilinguals were tested, the results manifested that better cognitive skills in biliterate bilinguals compensate for lower vocabulary knowledge resulting in non-significant differences between the two bilingual groups in a sentence repetition task.

Cognitive skills, and more specifically working memory skills, have found to positively correlate with vocabulary learning (see Baddeley et al., 1998, for review). Previous studies indicate that bilinguals, compared to monolinguals, rely more on working memory resources to acquire and retrieve new words. Verbal working memory skills found to be a strong predictor of vocabulary acquisition in children (Gathercole & Adams, 1993, 1994; Gathercole et al., 1999).

When it comes to bilinguals, we should keep in mind that vocabulary knowledge is distributed across two languages and their vocabulary size cannot be the same as this of monolinguals. Thus recent studies take into account the conceptual vocabulary knowledge of bilinguals (Bedore et al., 2005; Kan & Kohnert, 2005; Pearson et al., 1993). Conceptual vocabulary refers to the total number of independent concepts that are distributed across two languages. For instance, a bilingual child might not know the word in one language but they know it in the other (i.e. *dog* and/or *perro*); therefore the concept is there. Hence, many studies have found that when bilingual children were tested for their vocabulary size in one language, they scored significantly lower than their monolingual counterparts; however they had comparable conceptual knowledge to their monolingual peers (Pearson et al., 1993).

To date no studies have tested the impact of updating skills in bilingual vocabulary growth. Addressing this gap, the present study aims to investigate the role of input, literacy and updating in vocabulary development.

METHODOLOGY

Participants

Fifty-eight Greek-German sequential bilingual children from 8 to 12 years old, who lived in Germany, participated in the present study. Most of them (N=32) were early sequential bilinguals; thus they were exposed to German from the age of 3 up to the age of 4; while the other twenty-six (N=26) children were late sequential bilinguals; hence they were exposed to German from the age of 4 up to the age of 6. All children were recruited by Greek state schools in Germany; they were predominately instructed in Greek (21 hours/week) and to a lesser extent in German (10 hours/week). The teachers were Greek native speakers with good knowledge of German. Additionally, their classmates are Greek speaking. Thus, children tend to predominately speak in Greek and they use German only in the German language course; therefore they use both languages on a daily basis not only in an oral but also in a written manner.

Our participants did not differ in terms of socioeconomic status. In this study, similar to other studies (Oller & Eilers, 2002; Smithson, Paradis, & Nicoladis, 2014), by socioeconomic status, we refer to maternal education, which was between 9 and 12 years for the bilinguals of the present study.

Material

In these participants a large battery of tasks was administered: (a) a child questionnaire, (b) a non-verbal intelligence task, (c) two expressive vocabulary tasks (one per language) and (d) an updating task.

The child questionnaire (Mattheoudakis, Chatzidaki & Maligkoudi, 2014) contained questions regarding (a) home language history, (b) current language use, (c) early literacy practices and (d) current (bi-) literacy. *Home language history* refers to language exposure to each language from birth until the age of schooling (i.e. until the age of six). *Current*

language use refers to the language preferences for daily activities (i.e. memorizing phone numbers, calculating, telling the time or watching television), oral interaction with family members and friends and the language that they feel they understand or speak better. *Early literacy practices* pertain to activities such as shared-book reading in preschool age. Finally, *current (bi-) literacy* entails questions regarding language preferences for writing (texting, emailing, writing cards or lists) and reading (book or comics reading, reading aloud, visiting websites, video gaming) and also questions about the language that they feel more comfortable to read and write in and about the language classes they attended in either language.

The testing in terms of their non-verbal abilities verifies that all children have normal or above normal non-verbal intelligence (Raven, Raven, & Court, 1998). In terms of the non-verbal intelligence task, no significant differences between the participants were attested ($p = .1$), which implies that any differences in the tasks are not due to non-verbal intelligence skills.

The vocabulary knowledge of the participants was tested by means of two standardized expressive vocabulary tasks (one in Greek, Vogindroukas, Protopapas, & Sideridis, 2009; and one in German, Petermann, 2010).

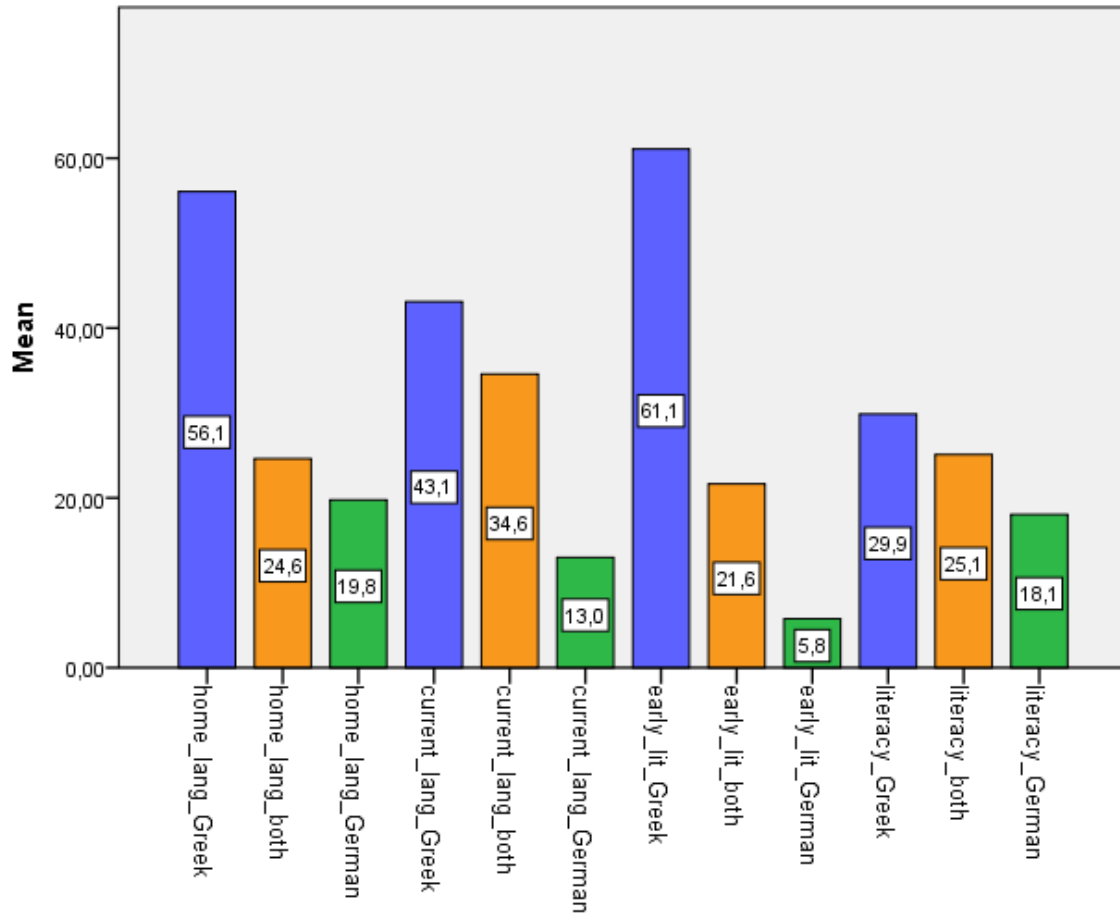
Finally, the updating task tested participants' ability to delete useless information and replace it with more useful one in order to complete a task (Kirchner, 1958). Thus, the updating task measured standard "executive" working memory (Kane et al., 2007). The procedure was the following: the participant is shown a sequence of digits (2, 5, 7, 8), each presented one by one for 500 ms, followed by a blank 2,500 ms inter-stimulus interval. The participants were instructed to press the "J" on the keyboard if the current digit displayed was identical to the one introduced two steps back or refrain from pressing any key if the digit presented was not identical (for a more detailed presentation of the task, see Dosi et al. 2016).

RESULTS

The results have shown that our bilinguals used more their home language (Greek; 56.1%) before the age of schooling (6 years) compared to either both languages (24.6%) or just German (19.8%) ($t(57) = 6.236, p < 0.001$; $t(57) = 7.876, p < 0.001$; respectively). This practice has changed when they attended the school, where they used either Greek (43.1%) or both languages (34.6%) ($t(57) = 1.663, p = 0.102$); while the use of German has dropped (13%) (see Figure 1).

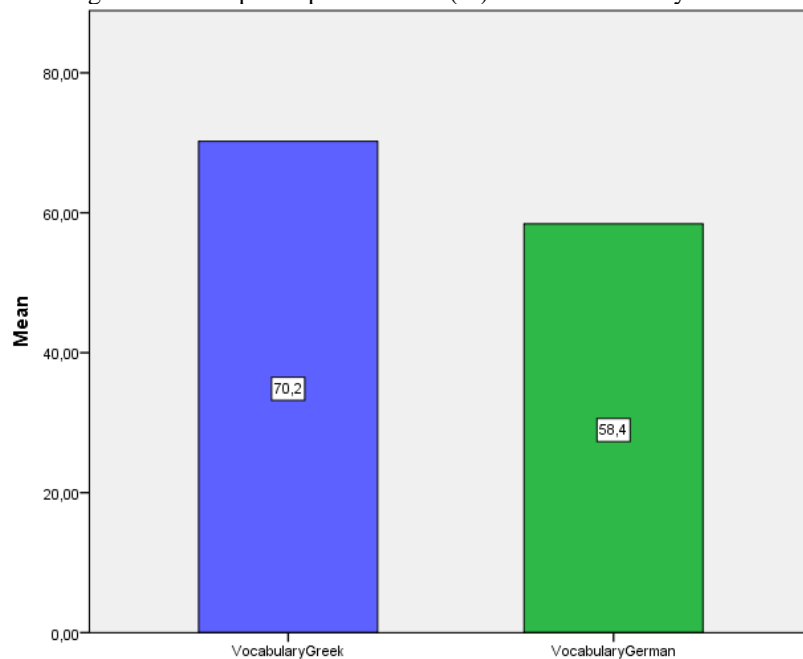
In terms of their literacy practices, they perform in a similar fashion. More specifically, in their early literacy practices their parents supported significantly more the Greek language (61.1%) compared to the use of both languages (21.6%; $t(57) = 4.581, p < 0.001$) and even less the use of the German language (5.8%; $t(57) = 8.472, p < 0.001$). In respect to the literacy practices during the school years, the practices have changed; hence participants received literacy either in Greek (29.9%) or in both languages (25.1%) ($t(57) = 1.108, p = 0.273$), if we consider that the school they attend was a bilingual one (see Figure 1).

Figure 1. Participants' profile (%) based on responses of the questionnaire



In the vocabulary tasks participants performed higher in vocabulary test in Greek (70.2%) compared to the vocabulary test in German (58.4%) ($t(57) = 3.318, p = 0.002$).

Figure 2. Participants' performance (%) on the vocabulary tasks



In the updating task participants scored quite high (47,3%), if we consider the difficulty of the task, in which monolinguals score significantly lower (see Dosi, 2016; Dosi et al., 2016; Dosi, 2019).

Detecting predictor variables that might explain the bilingual performance, correlations were initially performed. The results suggested that the vocabulary growth in Greek correlates with *home language in Greek* ($r=0.348$, $p=0.008$), *early literacy in Greek* ($r=0.373$, $p=0.004$), *current literacy in both languages* ($r=0.432$, $p=0.001$) and *updating skills* ($r=0.409$, $p=0.001$). These variables were entered in a stepwise regression analysis, the results have exhibited that *updating skills*, *the current use of Greek* and *biliteracy* predict 35.2% of vocabulary growth ($R^2=0.352$, $F(1,54)=4.432$, $p=0.040$; $\beta_1=0.322$, $p_1=0.006$; $\beta_2=0.454$, $p_2<0.001$; and $\beta_3=0.248$, $p_3=0.040$ respectively). The results of the correlations in the German vocabulary showed that the performance on the German version correlates only with *literacy in German* ($r=0.450$, $p=0.001$) and *the updating skills* ($r=0.307$, $p=0.019$). Regression analyses revealed that both factors predict the performance on the German vocabulary task ($R^2=0.425$, $F(1,55)=41.257$, $p=0.026$; $\beta_1=0.652$, $p_1<0.001$; $\beta_2=0.283$, $p_2=0.026$).

DISCUSSION

The main and most important finding of the present study indicates that vocabulary growth in Greek-German sequential bilingual children is mainly affected by updating skills, the current language use and biliteracy practices.

In the present study, our bilinguals show a clear dominance in Greek compared to German. Despite that they live in Germany, the finding is plausible, if we consider that their early language use and print exposure was in Greek and that their current language use and literacy practices are either in Greek or in both languages; and also that the Greek community in Germany is very active. Their scores on the updating task are high compared to the findings of similar studies of the author in age-matched monolingual children (Dosi, 2016; Dosi et al., 2016; Dosi & Papadopoulou, 2019).

The predictor variables are not the same per language; hence in the Greek vocabulary task updating skills, the current use of Greek and biliteracy predict the vocabulary growth in Greek; while in the German vocabulary task literacy in German and updating skills predict the vocabulary growth in this language (similar to previous findings, Gathercole & Adams, 1993, 1994; Gathercole et al., 1999). Similar findings were also detected in previous studies (Unsworth et al., 2012; Dosi, 2016; Andreou et al., to appear), indicating that predictor variables cannot be the same in bilingual performance. Nonetheless, at this point we should note that some of the predictor variables, such as current language use and updating skills found to be similar.

The importance of these findings is also significant if we consider that language use should be equally supported for the development of the vocabulary in both languages (Cobo-Lewis et al., 2002; Oller & Eilers, 2002). Similarly, bilingual speakers should receive literacy in both languages, confirming the findings of previous studies (Rothman, 2007; Dosi et al., 2016, Andreou et al., to appear).

As previous studies found, working memory is required for the acquisition of new words (see Baddeley et al., 1998, for review; Dosi & Harris, 2019). To date no studies have tested the role of updating, i.e. standard “executive” working memory (Kane et al., 2007), on the

vocabulary growth. The present findings, indeed, verify that in order to acquire new words, the speaker should update the information that they have and add new data when needed.

CONCLUSIONS

The current study provided insights into factors, such as home and current language use, literacy practices and cognitive skills, that affect vocabulary growth. By definition vocabulary knowledge of a bilingual speaker cannot be as wide as the vocabulary of a monolingual speaker; however it is not an acceptable practice the home language to be neglected in favor of the use of majority language. From the findings of the present study we may deduce that in bilingual lexical knowledge (a) both languages should be equally used and (b) biliteracy practices should be promoted; (c) finally, updating skills are required for the acquisition of new words.

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