

Turkish- and German-speaking bilingual 4-to-6-year-olds living in Sweden: Effects of age, SES and home language input on vocabulary production

Ute Bohnacker
Uppsala University

Josefin Lindgren
Uppsala University

Buket Öztekin
Uppsala University

Abstract

This paper investigates vocabulary production in the minority home languages of 40 Turkish-Swedish and 38 German-Swedish bilingual preschoolers aged 4;0–6;11, growing up in Sweden. We explore how age, SES, and exposure via mother-tongue instruction and home language use in the family affect child vocabulary skills. This has not previously been investigated in Sweden. Cross-linguistic Lexical Tasks (CLTs; Haman, Łuniewska & Pomiechowska, 2015) were used to test noun and verb production in Turkish and German. Background information was collected using a parental questionnaire. The two bilingual groups performed equally well in their respective home languages, Turkish and German. There were no effects of age, socio-economic status (SES) or mother-tongue instruction on vocabulary. However, input in the home setting had a clear effect. Children whose parents used the home language to the child and to each other had significantly higher vocabulary production scores. Having additional home-language input providers such as friends also affected the scores. These results from a Swedish context echo findings from studies of other language combinations and reveal the importance of input for the development of expressive vocabulary.

Keywords: Bilingual, CLT (Cross-linguistic Lexical Task), German, input, preschoolers, Swedish, Turkish, vocabulary

Introduction

The multilingual population in Sweden is rapidly increasing. Nationwide, 25% of preschool and school-age children are growing up with a home language other than the majority language Swedish (Statistics Sweden, 2015); in larger cities the figure is around 50%. However, children's acquisition of these minority home languages has yet to be documented. Home languages are defined as languages that are not the majority language of society and are spoken in the family and/or community. Swedish legislation (Skollagen (Education Act), 2010:800;

Språklagen (Language Act), 2009:600) officially promotes multilingualism and entitles children to a certain amount of mother-tongue (minority home language) instruction. Despite official recognition of multilingualism, mother-tongue instruction plays a dwindling role. Children attend Swedish-medium preschools from an early age (typically before age 2), minority language use is not always encouraged, and societal forces push for Swedish only.

When investigating language proficiency in bilinguals, usually only the majority language, Swedish, is assessed. Bilingual children often perform below age-matched Swedish monolinguals, leading to confusion about what should be considered “typical” bilingual rather than language impairment. Home language proficiency is not often investigated systematically by either researchers or child healthcare professionals.

Internationally, many studies compare vocabulary in bilingual and monolingual age-peers and find significant differences: if only one language is considered, bilinguals obtain lower receptive vocabulary scores (i.e. comprehension) and expressive vocabulary scores (i.e. production). An explanation commonly cited for this are differences in exposure (input quantity) between the two groups. Since a child growing up bilingually is exposed to two languages, the amount of exposure to each single language is generally smaller than the amount of language exposure a monolingual child receives. It is generally agreed that the domain of the lexicon is greatly affected by exposure. In addition to sheer quantity, the quality of input has also been discussed as contributing to lexical development. Another factor that has been found to influence the development of vocabulary skills is socio-economic status (SES). Some factors may play more of a role at a certain age, or affect the majority language differently from the home language. It is, therefore, important to explore factors that contribute to the development of vocabulary skills in each language in bilingual children.

Perhaps surprisingly, the vocabulary skills of bilingual children in Sweden have not yet been investigated in relation to exposure (for studies in other countries, see below). Little norm-referenced data exists on the lexical proficiency of monolingual Swedish children age 3-6, and none for bilinguals. There are a handful of unpublished BA/MA theses and some work on word associations in Arabic-Swedish children (e.g. Holmström, 2015; Salameh, 2011), but no research on the home-language proficiency in relation to exposure and/or other environmental factors.

The present paper is a first attempt in addressing this issue. Here, we do not compare the vocabulary skills of bilingual minority children to those of monolinguals in the majority language Swedish. Instead, we document and compare the home-language vocabulary skills of 4-to-6-year-olds in two minority language groups: Turkish and German. Both are sizeable minority languages (Parkvall, 2016; Skolverket (Swedish National Agency for Education), 2015; Statistics Sweden, 2015). How children acquire Turkish and German in Sweden is not known. Whilst Turkish and German are typologically distant, German and Swedish belong to the same, Germanic, language family, with ca. 80% cognates in the lexicon.

We investigate the expressive vocabulary of 78 Turkish-Swedish and German-Swedish children with the Cross-linguistic Lexical Task (CLT), (Haman et al., 2015). The CLT is a picture-based vocabulary task querying nouns and verbs, which has recently been developed for many languages and is suitable for bilinguals (see Method).

We explore environmental factors that may explain the variance in the children's vocabulary skills, using background information from parental questionnaires. We investigate SES, exposure via mother-tongue instruction and home language use patterns. This has never been done in Sweden before. Our findings are discussed in light of the international research literature on home language vocabulary development.

Background: Home language vocabulary development in bilingual children

Age

We learn new words all our lives, from earliest childhood into old age. It therefore comes as no surprise that studies around the world document clear vocabulary gains with age in bilingual children (e.g. longitudinal studies of Turkish-Dutch preschoolers in the Netherlands (Leseman, 2000) and Spanish-English toddlers in the USA (Hoff, Rumiche, Burridge, Ribot & Welsh, 2014)).

There is ample evidence that lexical proficiency increases with age in the majority language, which is often the children's second language (L2) and their language of schooling. For instance, in a cross-sectional study of 331 Welsh-English children aged 2-15, receptive vocabulary scores in the majority language English increased with age (Gathercole, Thomas, Roberts, Hughes & Hughes, 2013). Similarly, in a cross-sectional study of 169 Russian-L1 children aged 4-7, there was a clear increase for vocabulary production scores with age in the majority language German or Hebrew (i.e. German for 90 Russian-German children in Berlin, and Hebrew for 79 Russian-Hebrew children in Israel (Gagarina et al., 2014)).

Interestingly however, the relationship between age and lexical proficiency in the minority (home) language of bilinguals is much less clear. Some researchers find clear vocabulary gains in the home language with age, whilst others do not. Such inconsistent results may also be due to differences in method (e.g. relying on parental reports estimating their child's vocabulary versus actual vocabulary tests; different types of vocabulary measures (receptive vs. expressive modality; nouns only vs. nouns and verbs), varying levels of test difficulty, and different age groups (infant, preschool, school-age)).

For instance, in the abovementioned study by Gagarina et al. (2014), Russian-L1 children whose L2 vocabulary increased significantly with age, showed only slight expressive vocabulary gains or exhibited a flat growth curve for age 4-7 in their home language Russian. Gathercole et al. (2013) found that while the receptive vocabulary scores of younger Welsh-English bilingual children improved with age for both English and Welsh, vocabulary gains in the minority language Welsh were smaller than in the majority language English for older children.

Why would lexical knowledge in the minority home language of bilinguals be less clearly age-related than in the majority language? A likely explanation is that vocabulary acquisition is strongly influenced by other factors than age, and that these other, environmental factors are

crucial for home language vocabulary. Lexical development is greatly affected by exposure (see Exposure/Input); thus, when the child starts (pre)school in the majority language, the proportion of home-language exposure typically goes down and vocabulary growth may stagnate as a function of reduced input (Boeschoten & Verhoeven, 1986; Gathercole & Thomas, 2009; Hoff et al., 2014; Sheng, Lu & Khan, 2011). This can blur or even wipe out the relation between age and home language vocabulary development.

Socio-economic status (SES)

Many studies document clear effects of social class, educational level and economic status of the parents/family on vocabulary development. These studies have primarily been carried out on monolinguals in the USA and Canada, where “typically, children from low SES backgrounds have lower levels of both receptive and expressive language skills than more affluent children” (Calvo & Bialystok, 2014, p. 279; cf. Hart & Risley, 1995).

SES is defined and operationalised in different ways: via highest parental occupation, family earnings, highest or mean parental educational level, maternal education level, etc., which can make it hard to meaningfully compare studies. SES can affect vocabulary development differently depending on the age of the child (Rowe, 2012), the society/country the family resides in and the extent to which affordable childcare/schooling is available there. In Sweden, SES is rarely explored in language studies (Berglund, Eriksson & Westerlund, 2005; Eriksson 2016). Educational levels are generally high, education is not directly tied to family earnings, childcare is, as a rule, affordable and available to everyone, and low-SES children in Sweden are not generally living in poverty as they may do elsewhere. SES may therefore play less of a role for vocabulary development than in some other countries.

The effects of SES on the lexical proficiency of bilingual children are less clear-cut than for monolinguals. SES is often reported to affect vocabulary learning in the majority language of bilingual children (often their L2). High-SES groups tend to outperform low-SES groups on receptive and/or expressive vocabulary tests as found for example in Cobo-Lewis, Pearson, Eilers & Umbel (2002a) and Buac, Gross & Kaushanskaya (2014) for the English of Spanish-English bilinguals or Calvo & Bialystok (2014) for the L2 English of Canadian children aged 6-7 with a variety of home languages. Yet SES does not seem to affect vocabulary development in the home language of bilinguals in the same way. As Pearson (2007) puts it, “social class and economic status have a demonstrated effect on learning a majority language, but their role in minority language maintenance is less consistent” (p. 405). For instance, Cobo-Lewis, Pearson, Eilers & Umbel (2002b), in a large-scale study of 704 Spanish-English bilinguals in Miami, found few differences between high-SES (professional) and low-SES (working-class) groups concerning L1-Spanish vocabulary scores. If anything, low-SES children outperformed the high-SES groups on expressive vocabulary. Leseman (2000), in a study of 31 Turkish-Dutch preschoolers in the Netherlands, found that SES (mean parental educational level) was related to the children’s vocabulary in the majority language Dutch, but not to their home-language Turkish vocabulary scores (receptive and productive) at ages 3;2-4;2. A more recent study of 111 Turkish-Dutch children aged 5;5-6;10 arrived at similar results (Prevo et al., 2014).

We are not aware of any studies on SES and the vocabulary of bilinguals in Sweden. Why might family SES levels affect the vocabulary skills of bilingual children in the majority language and not so much in the minority home language? SES can be related to language input and language choice. As Pearson (2007) states, higher SES levels are often associated with greater economic independence, more assimilation into a new culture and orientation towards the majority language, with ensuing literacy and academic pursuits in the majority language. This de facto increases majority-language use in and outside the home at the expense of the minority language, even though high-SES parents may state that they value the minority language more. Low-SES minority-language parents are stereotypically associated with lower majority-language proficiency as a result of their lower educational levels, and lesser orientation towards the majority language and culture. This may create a context where low-SES parents maintain the minority language better and pass it on orally to their children. Whilst such a view is contentious, it has been repeatedly put forward by a number of researchers (including Cobo-Lewis et al., 2002b; Pearson, 2007; Prevoo et al., 2014).

Exposure/Input

Many studies have shown that lexical development in monolingual and bilingual children is greatly affected by exposure/input. (The two terms *exposure* and *input* are used as synonyms here.)

Quantity-oriented approaches relate the amount of exposure that a child receives to measures of child vocabulary in a given language. Exposure is rarely measured independently but usually estimated on the basis of questionnaires or interviews. Parents are asked to report the proportion of use of the minority vs. majority language at home and at day-care/school, or fill in an hour-by-hour diary for a typical day or week. Often only parents are focused on as primary input providers, though information on input from siblings, extended family and friends is increasingly being included. Sometimes cumulative length of exposure is calculated as well. These studies typically find a positive correlation between input quantity and child vocabulary, especially pronounced at younger ages, where much of the variance in vocabulary in a group of children can be accounted for by the relative amount of exposure. However, the precise relation between input quantity and child vocabulary varies between studies and does not appear to be the same for receptive vs. expressive vocabulary (e.g. Gathercole et al., 2013; Hammer et al., 2014; Thordardóttir, 2011).

Quality-oriented approaches try to evaluate variety and richness of input (e.g. extracurricular activities, number of input providers, native vs. non-native input) and relate these qualities to child vocabulary. Findings on the effects of input quality measures are mixed. Certain qualities may also affect child vocabulary differently at different ages. For instance, it has been suggested (Rowe, 2012) that input quantity is important for the vocabulary development of toddlers, whilst input quality (sophisticated/rare words; decontextualized language such as narratives) has virtually no vocabulary-enhancing effect at such an early age, but is crucial for older children.

Concerning the home language, several studies of Spanish-English bilinguals in the USA have investigated the amount of exposure to Spanish in the home in relation to children's lexical

proficiency. In an early study, Pearson, Fernández, Lewedeg & Oller (1997) tallied parental estimates of children's Spanish knowledge at 8-30 months (CDIs, Communicative Development Inventories) with questionnaire data on parental language use. A significant correlation emerged between Spanish input and child vocabulary.

Cobo-Lewis et al. (2002b) were some of the first to document effects of (reported) input quantity on (tested) home language vocabulary for a large number of children (n=704). They showed that Spanish-English bilinguals with Spanish-only exposure in the home before age 5 outperformed peers with other exposure patterns on all Spanish vocabulary measures, particularly for expressive vocabulary. Similarly, in a study of 58 L1-Spanish/L2-English 5-7-year-olds (Buac et al., 2014), the amount of exposure to Spanish in the home (reported during a typical week) was strongly related to the children's Spanish expressive vocabulary scores, but not to Spanish receptive vocabulary. Hoff et al. (2014) carried out a longitudinal study with CDIs and expressive vocabulary tests with 48 Spanish-English children aged 1;10-4;0. The children were matched for SES and age, but differed in parent-to-child home language use. The largest expressive Spanish vocabulary gains were found for children whose parents both spoke Spanish to them. If only one parent addressed the child in Spanish, there was a relative decline in the child's Spanish productive vocabulary over time.

In Germany, Klassert & Gagarina (2010) investigated 45 Russian-German 4-6-year-olds, matched for SES, siblings, age, and age-of-onset (of L2 German), but differing in parent-to-child home language use. Those children who were addressed *mainly in Russian* by their parents had significantly higher Russian noun and verb vocabulary production scores than the children who were addressed *mainly in German* or *50/50 in Russian and German*. Expressive vocabulary in the home language was thus positively related to the reported amount of home language exposure. Similar results were obtained for 169 Russian-L1 children in Germany and Israel (Gagarina et al., 2014).

In an often-cited study from Wales, Gathercole & Thomas (2009) and Gathercole et al. (2013) measured the receptive vocabulary skills of Welsh-English bilingual children, (vocabulary production was not tested). On the basis of parental report, children were assigned to three different home exposure groups: those whose parents used only/mostly Welsh to the child; those whose parents used both languages; those whose parents used only/mostly English. Children from Welsh-only homes outstripped all others on Welsh vocabulary comprehension, especially at early ages, and for less frequent vocabulary items, they continued to outperform all others also at higher ages (Gathercole & Thomas, 2009). Parental language use was thus directly related to the children's lexical comprehension.

In the Netherlands, Prevoe et al. (2014) showed, on the basis of interview data from 111 second-generation Turkish immigrant mothers and vocabulary tests of their 5-6-year-old bilingual Turkish-Dutch children, that the proportion of maternal Turkish input to the child was positively related to the child's Turkish receptive vocabulary scores (vocabulary production was not investigated).

Another study in the Netherlands followed 91 children who were exposed to Frisian and Dutch to varying degrees longitudinally from age 2;6-4;0 (Dijkstra, Kuiken, Jorna & Klinkenberg, 2016). Children with predominant exposure to the minority language Frisian from parents and

other caregivers scored significantly higher on Frisian vocabulary tests than children with less Frisian exposure. Interestingly, this input effect was much more pronounced for Frisian vocabulary production than for comprehension. Frisian and Dutch are closely related languages with a very high proportion of lexical cognates. The results reported by Dijkstra et al. suggest that knowledge of the majority language Dutch mitigates gaps in the child's receptive Frisian vocabulary, as missing words can often still be understood by knowing the cognate word in Dutch. However, gaps in Frisian word production cannot be filled so easily by Dutch cognates (as producing a Dutch word on a Frisian vocabulary test would be scored as incorrect). A lesson to be learnt here is that the proportion of exposure to one language is not a monolithic construct; input effects may be mediated by other factors such as language distance and availability of shared forms, such as cognates.

We are not aware of any studies investigating vocabulary and input for bilinguals in a Swedish context. In Sweden, children, including minority-language children, typically attend full-time majority-language preschools from age 1-2, which is earlier than in many other countries (e.g. the Netherlands or USA). After preschool entry, relative vocabulary growth in the home language might decline as a function of reduced home-language input. Yet children with more home-language input and/or a higher number of input providers (parents, siblings, friends, extended family, home language instructors) might fare better. We explore how different input variables impact on children's home language vocabulary, focusing on vocabulary production, as other studies have found the clearest effects there.

Method

Participants

The participants were 40 Turkish-Swedish and 38 German-Swedish bilingual children aged 4;0–6;11, growing up in the Greater Stockholm area of Sweden. They had either Turkish or German as their home language, whilst Swedish was the language of schooling and society at large. The children were recruited by contacting a large number of preschools as well as through other types of channels. These included municipal *mother-tongue* teachers of Turkish or German who established direct contacts with families through word-of-mouth recruitment within the Turkish and German diaspora, social media, as well as personal connections.

Parents of children willing to participate signed a consent form and filled in a language and social background questionnaire. Only children who were able to speak both Swedish and the home language were included in the study. No child had any type of diagnosed language impairment or hearing disorder. Most children were bilingual, but a few trilinguals participated as well (e.g. Turkish-Kurdish-Swedish, German-Chinese-Swedish).

Table 1 gives an overview of the participants. The Turkish-Swedish and the German-Swedish groups were comparable in terms of group size, mean age as well as age range. Most children were born and had lived in Sweden all their lives. As is common in Sweden, all children attended preschool on a daily basis, most of them for 25-40 hours per week. Nearly all children attended Swedish-only preschools, but seven attended a bilingual German-Swedish preschool.

Table 1: Participants.

	Turkish-Swedish	German-Swedish
n	40	38
Boys/girls	14/26	13/25
Mean age	5;6 (SD 0;10)	5;7 (SD 0;11)
Age range	4;0–6;9	4;0–6;11

Table 2 provides an overview of the native languages (L1s) of the parents. “Mixed” families with one native Swedish parent and one native minority-language parent, were common in the German-Swedish group (60.5%), whereas this family type was almost absent in the families with Turkish roots (10%). We believe that this is not a sampling artifact but representative of the two minority communities in Sweden.

Table 2: Native languages (L1s) of the parents (HL=Home language).

	Turkish-Swedish	German-Swedish
Both parents L1=HL	62.5% (25)	36.9% (14)
One parent L1=HL	10% (4)	60.5% (23)
No parent L1=HL	15% (6)	2.6% (1)
Information missing	12.5% (5)	0% (0)
Total	100% (40)	100% (38)

In the Turkish-Swedish group, in most cases both parents were first-generation immigrants from Turkey or one first-generation and one second-generation parent. First-generation immigrants had moved to Sweden either as children or as adults, with residence lengths of 1-30 years. In some cases, both parents were born in Sweden but had Turkish roots and had grown up bilingually themselves. Very few Turkish-Swedish children (10%) had a Swedish-L1 parent. For six children (15%), both parents had an L1 other than Turkish (Kurdish, Arabic).

In the German-Swedish group, all parents whose L1 was German had moved to Sweden as adults. All had been born in a German-speaking country (most in Germany, and some in Austria or Switzerland). Their length of stay in Sweden varied from 2-20 years.

Parental education levels in the two groups differed. In the Turkish-Swedish group, all levels of education from less than six years of primary education to completed MA degrees, and in one case a PhD degree, were represented. However, the majority of these parents had completed secondary school but had no tertiary education.

In the German-Swedish group, there were no parents with primary education only; all had completed secondary school. Moreover, all parents except two had also completed tertiary education, including a number of PhDs. We believe that this distribution is not due to skewed

recruitment but reflects the different characteristics of the two minority language populations in the Greater Stockholm region.

Materials

Cross-linguistic Lexical Task (CLT)

The Cross-linguistic Lexical Task (CLT) is a picture-based vocabulary task consisting of four parts: noun comprehension, verb comprehension, noun production, and verb production. The CLT was developed by an international group of researchers (Working Group 3) in the EU COST Action IS0804 Language Impairment in a Multilingual Society: Linguistic Patterns and the Road to Assessment (2009-2013). The rationale behind the task was to create a comparable test of lexical ability for many different languages, which can also be used with bilingual children (Haman et al., 2015). The CLT has so far been developed for 23 languages, using a shared picture database and a common list of concepts for objects and actions/events (corresponding to nouns and verbs) that have translation equivalents in these languages. From this common list of concepts, target words were chosen for each language version that are culturally appropriate and constitute an appropriate mix of different levels of difficulty. The Turkish version of the CLT was developed by Özlem Ünal-Logacev, Aylin Müge Tuncer and Pinar Ege, and the German version by Tanja Rinker and Natalia Gagarina. For a detailed description of the CLT and of how it was constructed, see Haman et al. (2015).

The CLT consists of four parts, each containing 30 test items and 2 practice items, with a maximum score of 120 points. The two comprehension parts are picture-identification tasks where the child is shown a page with four coloured pictures and is then asked to point to the correct picture (in response to questions such as *Where is the ant?*). The two production parts are picture-naming tasks, where the child is shown coloured pictures one by one and is asked to name the depicted object or action/event (by answering questions such as *What is she doing?* in the verb production part).

Our participants did the four parts of the CLT in the majority language Swedish and in their home language Turkish/German on separate occasions as part of a larger test battery (see below). As the focus of the current study is expressive vocabulary in the home language, we only report scores from the CLT production parts here. For CLT vocabulary production, the maximum score is 60 points.

Parental questionnaire

The parental questionnaire used in this study was specifically developed in 2014 for a childhood multilingualism research project at Uppsala University, Sweden (Language impairment or typical language development? Developing methods for linguistic assessment of bilingual children in Sweden). Different existing parental questionnaires, including the Parental Bilingual Questionnaire (PABIQ, COST Action IS0804, 2011; Tuller, 2015), the Alberta Language Environment Questionnaire (ALEQ, Paradis, 2011), as well as forms from Swedish speech-language pathology practice were used as a starting point to create our own questionnaire. A prototype of the questionnaire was first created in Swedish, then translated into Turkish and German (as well as back-translated into Swedish) by native-speaker linguists,

discussed with minority-community members and speech-language pathologists and then finalised after making some minor changes.

The parental questionnaire consists of 36 questions about the child's language development, health history, linguistic environment and education, input quality and quantity in both languages, and family background and attitudes.

The parents filled in the questionnaire either in their home language (Turkish/German) or in Swedish. This was usually done before or during child testing, and in a few cases after the testing period.

Here we analyse the answers to the following questions from the questionnaire:

- What is the level of education of each parent?
- Does the child receive home language instruction (mother-tongue instruction)?
- Which language(s) do the parents speak with each other?
- Which language(s) does each parent speak to the child?
- Does the child hear the home language from: (i) siblings, (ii) friends/playmates of the child, (iii) extended family and friends of the family?

These factors have been known to impact on children's home-language development.

Procedure

Each child was seen on two separate occasions, one in Swedish, and one in the home language (Turkish or German). The children did the same type of tasks in both languages. The time between sessions was from three days to three weeks. The order of the language of the first and second sessions was counterbalanced. The child was assessed with the CLT as part of a test battery that also included narrative tasks (e.g. the Multilingual Assessment Instrument for Narratives, MAIN (Gagarina et al., 2012)), and a non-word repetition task for Turkish (Topbaş, Kaçar-Kütükçü & Kopkalli-Yavuz, 2014). Tasks were administered by linguistically trained native or near-native speakers. The tests were carried out in a quiet room either in the preschool or at the child's home. Each session lasted 30-45 minutes. The total time for CLT comprehension and production was usually around 15 minutes. All sessions were audio- and video-recorded, so that child responses could be checked afterwards.

The CLT was administered as a paper-and-pencil task, following the standard procedure described in Haman et al. (2015). Each test item was presented on a separate page. The same type of neutral feedback, such as *aha* or *okay*, was given for both correct and incorrect responses. The child responses were written down on the answer sheet if they differed from the target words. After finishing the last part of the task, the child was always praised, irrespectively of how well s/he actually did. The children received a sticker for completing each task and a certificate for their participation after having been tested in both languages.

Coding and analysis

Scoring of the CLT

The maximum score for vocabulary production was 60 points (30 nouns + 30 verbs). Scoring was done by a group of native-speaker linguists. If the child produced the intended target word, e.g. German *krabbeln* [crawl] on the German CLT or Turkish *emekliyor* [crawling] on the Turkish CLT in response to a picture of a baby crawling, this scored one point. In addition to the CLT target words, the following were also scored as correct: (i) adult-like synonyms (e.g. German *fegen/kehren* [sweep]; Turkish *çizme/bot* [boot]), (ii) words that were more specific than the target words and corresponded to the pictures (e.g. German *Uhu* [great horned owl] instead of target *Eule* [owl]; Turkish *çorba pişiriyor* [cooking soup] instead of target *yemek yapıyor* [making food]), and (iii) word forms that were phonologically slightly off-target (e.g. Turkish *keyi* instead of *keçi* [cat], with a word-medial palatal glide instead of the target palatal affricate). Other types of responses, including paraphrases, forms belonging to a different word class, words not in the target language, and forms that were phonologically and/or morphologically so different that they were not recognizable or resulted in a different lemma, were scored as incorrect. The scoring of all items was carefully checked for consistency. Unclear cases were resolved through discussion. This resulted in individual CLT production scores for each child and language.

Statistical analysis

To start with, we compared the mean home-language vocabulary production scores of the Turkish-Swedish and German-Swedish groups using an individual-samples t-test. The main statistical analysis consists of two parts. First, we analysed the effects of individual factors on the vocabulary scores of the two bilingual groups. Second, we conducted a multifactorial analysis in the form of a linear regression analysis, including only the significant individual factors in the analysis.

The following factors were analysed for the two languages separately: *age* (in months), *SES*, *mother-tongue instruction* (MTI), *language use between parents*, *language use of parent to child*, *hearing home language from siblings*, *hearing home language from friends/ playmates*, and *hearing home language from extended family and friends of the family*. For all factors except age, individual-samples t-tests were carried out on the mean vocabulary production scores. Age was correlated with vocabulary production scores.

Parental education was used as a proxy for SES. This was done because in language studies, level of education is generally regarded a better proxy for SES than type of occupation. (Also, Sweden does not have a national income index that could transform occupations into occupational earnings and socio-economic rank.) Parents' written answers to our open-ended question about their education were coded according to the United Nations ISCED (2011) 9-level classification. We chose to include the education of both parents and not only maternal education (as is often done elsewhere), as in a Swedish context it would be wrong to a priori assume the mother to be the primary caregiver and therefore for her education to affect child language development more. (Parental leave in Sweden is taken by both sexes and children

usually attend preschool for a large part of the day from age 1 or 2.) From the 9-level classification, we calculated the average level of education of the parents. Then we combined ISCED levels 0-3 into *low SES* (education up to and including completed secondary education), and levels 4-8 into *high SES* (tertiary education up to and including PhD). The children thus fell into two SES groups, low and high. Calculating SES based on the highest level of education obtained by one of the child's parents yielded identical results. For children growing up in single-parent households and for families for whom we only had data for one parent, SES was assigned based on the educational level of that one parent.

The factors MTI, hearing home language from siblings, hearing home language from friends/playmates, and hearing home language from extended family and friends of the family were each queried by a yes-or-no question (e.g. *Does your child hear Turkish/German from siblings?*). Based on the parents' answers, the children were divided into *yes* or *no* groups.

The questionnaire also asked an open question about language use between parents. Here, answers were classified either as *only home language* or as *other*. The category of *other* contained parents who used both the home language and Swedish or another language (e.g. Kurdish), only Swedish, or only another language. Concerning the language use of parent to child, parents judged on separate scales how much of each language each parent spoke to the child. The scales ranged from *almost only home language* (95%) to *almost only Swedish* (95%), and parents could add their own distribution. Only when both parents chose (*almost*) *only home language* or *mainly home language* was the child assigned to the group of *mainly home language*. Thus, children from a variety of family types were classified as *other*, including families employing the one-parent-one-language (OPOL) strategy, families where both parents spoke Swedish and the home language ca 50% of the time, and families where one parent sometimes spoke the home language and the other only spoke Swedish. The rationale behind this classification was that we wanted to find those children who received a predominant amount of home language exposure from both parents and compare their vocabulary scores with those of the other children.

Results

We first compare the home-language vocabulary production scores, Turkish for the Turkish-Swedish bilinguals (n=40) and German for the German-Swedish bilinguals (n=38). Mean scores, standard deviations (SDs), and (score) range are shown in Table 3.

Table 3: Mean vocabulary production scores for Turkish and German. Max score=60.

	Turkish	German
Mean score	40.6	40.7
SD	10.13	10.75
Range	14–56	17–56

Mean vocabulary scores are very similar (40.6 for Turkish, 40.7 for German), with no significant difference between groups. The spread of scores within the groups is also similar, for both standard deviation and score range. Note that the range is relatively large; some children score close to ceiling and others have quite low scores. Results for the different background factors, including statistical tests (t-tests), are reported separately for the groups, in order to provide more detail. The multifactorial (linear regression) analysis is carried out on the data from all children, since this type of analysis benefits from a larger sample size.

Age

There was no correlation between the child's age in months and the vocabulary production score in the home language. The lack of a correlation is seen in Figure 1. The figure also makes it clear that there were no floor or ceiling effects.

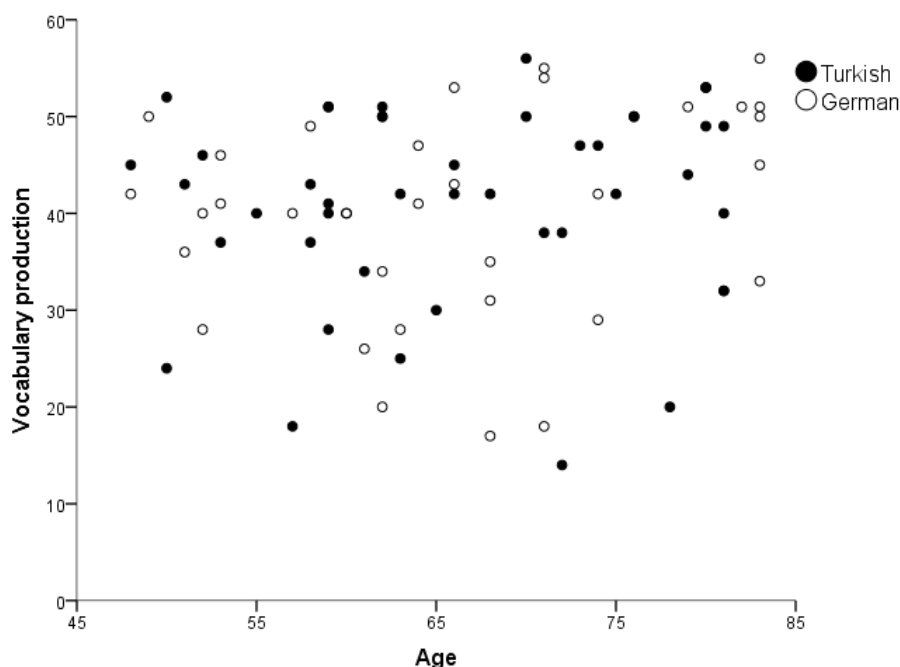


Figure 1: Vocabulary production scores and age in months. Max score=60.

Socio-economic status (SES)

Within the German-Swedish group, there was very little variation in SES (as defined via level of parental education); all children except two had two parents with tertiary education and all were therefore placed in the high-SES group.

The Turkish-Swedish bilinguals were evenly spread over the two SES groups (Table 4). Three families did not provide any information on parental education. The children from lower SES families performed slightly better on Turkish vocabulary than high-SES children, although this difference proved not statistically significant. Interestingly, the variation in scores within the high-SES group was larger.

Table 4: Vocabulary production scores and SES for the Turkish-Swedish group. Max score=60.

	Low SES	High SES
Mean score	43.6	37.6
SD	7.10	12.30
n	19	18

Mother-tongue instruction (MTI)

Slightly less than half of the children received MTI on a regular basis, 15/40 in Turkish, 22/38 in German. No significant difference in vocabulary scores was found between those who received MTI (Turkish: $M=42.3$, $SD=9.69$, $n=15$, German: $M=39.3$, $SD=11.23$, $n=22$) and those who did not (Turkish: $M=39.6$, $SD=10.45$, $n=25$, German: $M=42.8$, $SD=10.06$, $n=16$).

Language use between parents

Language use between parents had a significant effect on child vocabulary production (Turkish: $t=-3.507$, $df=38$, $p=.001$, German: $t=-2.883$, $df=36$, $p=.007$). Children whose parents communicated with each other exclusively in the home language (Turkish: $n=31$, German: $n=16$) scored significantly higher than those whose parents spoke something else (i.e. both Swedish and home language, or only Swedish, or another language), see Figure 2. The variation in scores was smaller for the *only home language between parents* groups (Turkish $SD=8.09$, German $SD=9.23$) than for the *other* groups (Turkish $SD=11.51$, German $SD=10.23$).

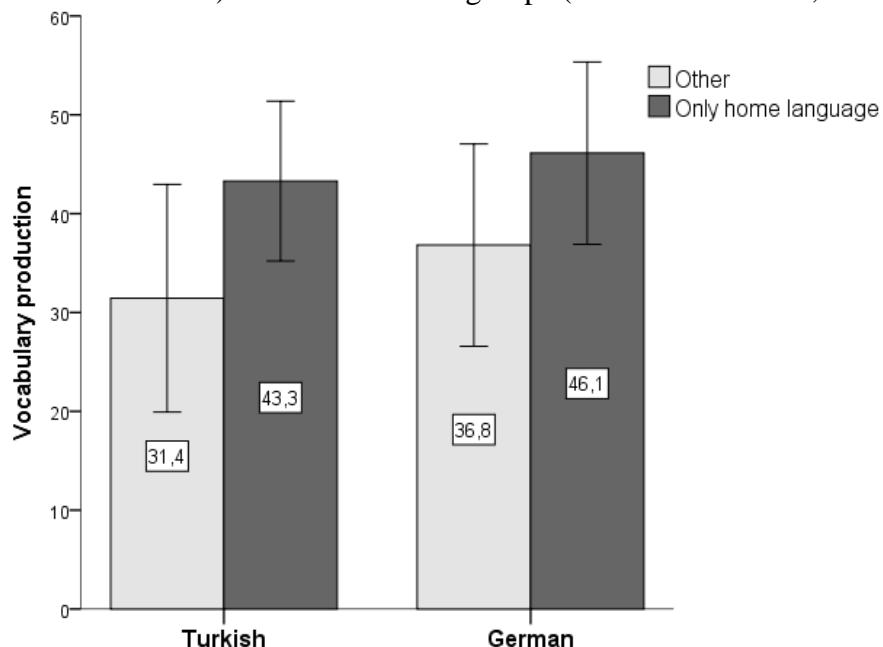


Figure 2: Vocabulary production scores and the language used between the parents. Max score=60. Error bars show $\pm 1SD$.

Language use: parents to child

There were clear effects of the parents' language use to the child for both Turkish and German. Figure 3 shows the mean vocabulary production scores for children whose parents both speak mainly the home language to the child compared to those whose parents do not. When both parents spoke mainly the home language to the child, mean vocabulary production scores were significantly higher (Turkish: $t=-3.990$, $df=21.793$, $p=.001$, German: $t=-5.122$, $df=35.666$, $p<.001$). Scores were not only higher, but also more uniform (SDs for the *mainly home language* groups are 5.52 and 5.13 for Turkish ($n=23$) and German ($n=12$) respectively, compared with 11.15 and 10.28 for the *other* groups).

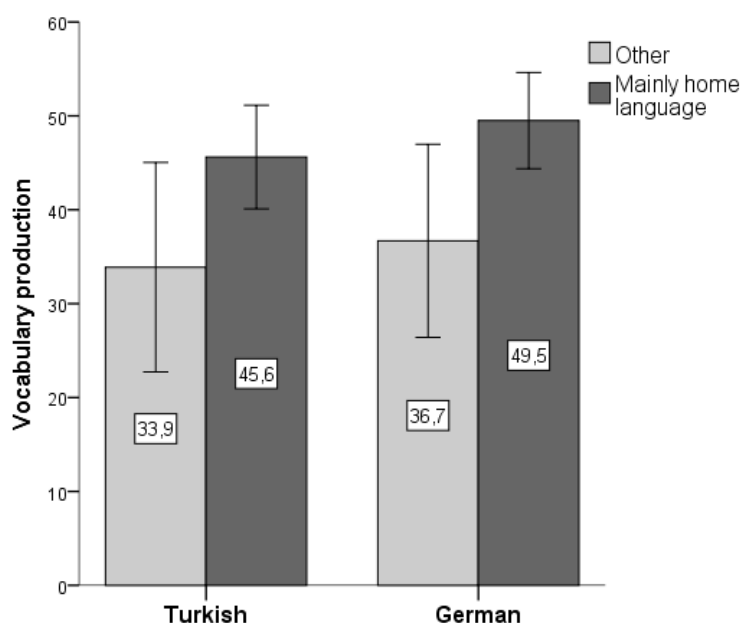


Figure 3: Vocabulary production scores and the language used by parents to the child. Max score=60. Error bars show $\pm 1SD$.

Hearing home language from siblings

Around half of the children in our study heard the home language from their sibling(s); the rest did not, according to parental report. Their mean scores are shown in Table 5. The children who heard Turkish from their siblings had significantly higher mean vocabulary production scores ($t=-2.367$, $df=30.819$, $p=.024$), and their scores were also more uniform (lower SD, see Table 5). For the German-Swedish bilinguals, there was no significant difference. Still, the patterns for German and Turkish are similar, with (somewhat) lower mean scores for those who did not receive home-language input from siblings.

Table 5: Vocabulary production scores and hearing the home language (HL) from siblings. Max score=60.

		Turkish	German
HL from siblings	Mean	44.1	43.5
	SD	7.56	10.49
	n	21	17
No HL from siblings	Mean	36.8	38.5
	SD	11.38	10.67
	n	19	21

Hearing home language from friends

This variable concerns whether or not the child has friends or playmates who are speakers of the home language. Mean scores are shown in Table 6.

Table 6: Vocabulary production scores and hearing the home language (HL) from friends. Max score=60.

		Turkish	German
HL from friends	Mean	44.1	44.9
	SD	7.73	8.57
	n	22	14
No HL from friends	Mean	36.4	38.3
	SD	11.27	11.32
	n	18	24

In the Turkish-Swedish group, children with home-language friends scored significantly higher than those without ($t=-2.463$, $df=29.117$, $p=.02$). For the German-Swedish children, the difference approaches significance ($t=-2.005$, $df=33.368$, $p=.053$), indicating a trend for higher vocabulary scores for children with home-language friends. In both groups, children without any home-language input from friends exhibited larger variation in scores.

Hearing home language from extended family and friends of the family

Table 7 contrasts the scores of the children who received home language input from extended family and friends of the family with those who did not. On the face of it, the vocabulary scores between the groups differ. Yet due to the small size of the groups without home-language extended family input providers (five Turkish-Swedish and four German-Swedish children), we could not test these results statistically.

Table 7: Vocabulary production scores and hearing the home language (HL) from extended family and friends of the family. Max score=60.

		Turkish	German
HL from extended family	Mean	41.1	42.7
	SD	9.77	9.39
	n	35	34
No HL from extended family	Mean	37.6	24.5
	SD	13.30	7.94
	n	5	4

The five children’s Turkish scores are spread out (SD=13.3), but only one of them scored low (18/60), whereas another child scored among the highest (50/60). In contrast, the German scores of the four children who did not receive home language input from extended family and friends of the family are very low, with three scoring among the lowest (scores of 17/60, 20/60, and 26/60), and even the fourth child (35/60) scoring well below the mean for the total German-Swedish group. There are thus substantial differences between the language groups for this variable.

Multifactorial analysis

Only variables that were found to be significant in the analysis above were included in the linear regression analysis. The variable *hearing home language from siblings* was first added but then removed, since it proved not significant and keeping it in the model did not improve the fit of the model. This means that the final model contains the following predictors: *language use between parents*, *language used by parents to child*, and *hearing home language from friends*. The interaction between *parents’ language to child* and *hearing home language from friends* was also added to the model.

The variables *Language use: parents to child* and *Hearing HL from friends* were recoded so that the values were centered around the mean, as is done in regression analysis for those variables for which there is also an interaction in the model. The final model is shown in Table 8. We found main effects of *language use: parents to child* ($p<.001$) and *hearing home language from friends* ($p=.018$), as well as an interaction effect between these two variables ($p<.001$). *Language use between parents* was not significant ($p=.302$) but contributed to the model.

Table 8: Linear regression model for vocabulary production scores.

Predictor	B	SE B	t	p
Constant	39.56	1.944	20.36	p < .001 **
Language use: parents to child (centered)	9.25	2.257	4.10	p < .001 **
Hearing HL from friends (centered)	4.75	1.967	2.42	.018 *
Language use between parents	2.66	2.562	1.04	.302
Language use: parents to child x Hearing HL from friends	-9.88	3.684	-2.68	p < .001 **
Model evaluation				
r^2	.43			

Overall, the model explains 43% of the variation in vocabulary production scores in our bilingual children ($r^2=.43$). The main effects we found simply mean that receiving a large amount of home-language input from parents, as well as input from friends, measurably and positively influence the child's vocabulary production score. The interaction effect between the language used by parents to child and hearing home language from friends needs to be explained further, as it is more complex, see Figure 4.

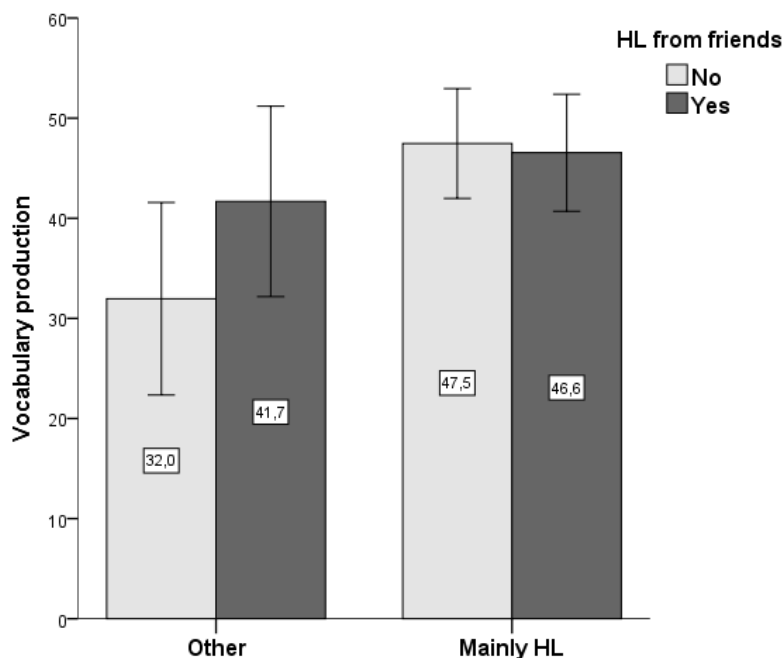


Figure 4: Interaction between language use of parents to child and hearing home language (HL) from friends. Error bars show $\pm 1SD$. Max score=60.

Figure 4 shows that when the child hears mainly the home language from both parents, there is no additional effect of hearing the home language from friends. However, when the child's parents do not speak mainly the home language to the child (or when only one parent does so), there is a clear effect: In this case, the additional input provider(s), such as friends, make a measurable difference to the child's productive home language vocabulary.

Discussion and conclusion

The 40 Turkish-Swedish and 38 German-Swedish bilinguals performed equally well on an equivalent expressive vocabulary test in their home languages, Turkish and German. Variation was relatively large; there were no floor or ceiling effects. Neither age, SES, nor mother-tongue instruction measurably affected the child's vocabulary score. Why might this be so?

As for age, the range 4;0–6;11 should be large enough to detect lexical growth with age, yet we could not find any for the home language, at least not at group level. It remains to be seen whether larger group sizes or a yet larger age range would yield different results. As this is a cross-sectional study, we do not know how the home-language lexical proficiency develops in individual children over time. However, our results clearly echo findings from the literature (Boeschoten & Verhoeven, 1986; Gagarina et al., 2014; Hoff et al., 2014; Sheng et al., 2011), namely that there is no (or no clear) correlation between age and expressive vocabulary in the minority home language of bilinguals. Other factors, notably exposure, affect vocabulary development more than age in this regard.

As for SES, we found no effects on home language vocabulary in our children. This could be due to the fact that differences in SES were not as pronounced as in some other countries, since educational levels in Sweden are generally high, which also held for the families in our study. SES effects may also be levelled out by child day-care, which is affordable even for low-income (low-SES) families. Again, our findings mesh well with international studies, where SES tends to affect the vocabulary skills of bilingual children in the majority language, but not in the minority home language (Buac et al., 2014; Cobo-Lewis et al., 2002b; Leseman, 2000; Prevoo et al., 2014).

Mother-tongue instruction did not correlate with our children's Turkish or German vocabulary. Mother-tongue lessons in Sweden nowadays only last an average 40-60 min/week and, in the great scheme of things, this may be a negligible input amount for 4-6-year-old MTI attendees. At higher ages, MTI may well have measurable effects on home language vocabulary, as lessons add up year after year and also involve literacy activities (Ganuza & Hedman, 2015, for Somali vocabulary skills in Somali-Swedish 6-12-year-olds).

In contrast, several measures of parental language use did strongly affect the children's expressive vocabulary. Children had significantly higher Turkish or German scores when parents spoke only the home language to each other and/or when both parents mainly spoke the home language to the child (cf. Buac et al., 2014; Cobo-Lewis et al., 2002b; de Houwer, 2007; Dijkstra et al., 2016; Klassert & Gagarina, 2010; Thordardóttir, 2011). The finding that language exposure predicts vocabulary development in bilinguals may not strike the reader as

revolutionary, but it is documented here for the first time in a Swedish context. Apart from parents, we also investigated other home-language input providers. Hearing Turkish or German from siblings and from friends also contributed positively to the child’s expressive vocabulary score, though sometimes the contribution was only approaching significance.

Our multivariate model included the factors that had proved significant in the first part of our analysis. Here, the decisive predictor was the language spoken by the parents to the child. Language use between parents was less decisive, though both factors tend to be interrelated. Interestingly, when the parents did not mainly speak the home language to the child or when only one parent did so, additional input provider(s), such as friends, measurably boosted the child’s home-language vocabulary.

Expressive vocabulary skills varied substantially across children. Our model with several input factors could explain 43% of the variance in the vocabulary scores, but of course not all. Each child is a sum of many factors, some of which tend to correlate. We illustrate this with brief descriptions of four individuals.

Table 9 describes two of the youngest children but who had some of the highest Turkish or German vocabulary scores in our study. Both grew up in families who almost exclusively spoke the home language. Not surprisingly, the children scored high.

Table 9: Two young children with very high vocabulary production scores. (HL=Home language)

BiGer4-10	BiTur4-04
Age: 4;1	Age: 4;2
CLT production score: 50/60	CLT production score: 52/60
Born in Germany, 3.5 years in Sweden	Born in Sweden
Both parents’ L1=HL, born in Germany	Both parents’ L1=HL, born in Turkey
Parents speak HL together	Parents speak HL together
Parents speak almost only HL to child	Parents speak almost only HL to child

Table 10 showcases two rather different stories. BiGer6-06 is one of the oldest (6;11) in our study, but only scored ca 50% correct (33/60). The child’s mother grew up with German and Italian. The father is native Swedish but speaks some German. The parents used Swedish with each other. The mother reports speaking German to the child during early years, but using more Swedish as the child grew older, and almost only Swedish at the time of testing. A likely explanation for the child’s low vocabulary result in German is fossilisation due to the family’s shift from two active languages towards only one, Swedish.

BiTur6-03 had the lowest home-language vocabulary production score out of all the children in our study, less than 25% correct (14/60). Her family situation differed from BiGer6-06 on a number of points. Both parents stated that they were native Turkish speakers. Both were born in Sweden and grew up as Turkish-Swedish bilinguals themselves. They reported that they

spoke Swedish and Turkish to each other and to the child, who could be classified as a heritage speaker of Turkish. The low Turkish vocabulary score can be linked to family language shift from Turkish-dominant towards Swedish-dominant.

In our data, children with very high Turkish/German vocabulary scores at a young age received extensive home language input. For children whose home-language vocabulary scores were low however, the situations varied considerably (cf. Tables 9 and 10).

Table 10: Two older children with very low vocabulary production scores. (HL=Home language)

BiGer6-06	BiTur6-03
Age: 6;11	Age: 6;0
CLT production score: 33/60	CLT production score: 14/60
Born in Sweden	Born in Sweden
Parent1: German-Italian bilingual, Parent2: Swedish L1	Both parents' L1=HL, born in Sweden
Parents speak Swedish together	Parents speak Swedish and HL together
Parent1 used almost only German until child was age 2;6–3;0, but now speaks mostly Swedish to child.	Parents speak both HL and Swedish (50%) to the child

We were surprised not to find any differences with regard to CLT production scores for Turkish vs. German, even though the family characteristics of the two populations differed; it was far more common for both parents to be native speakers of the minority language in Turkish-Swedish families than in German-Swedish ones. Thus, there should have been more parental minority-language input in the Turkish group. Why then were the Turkish-speaking children not outstripping the German-speaking children?

Our answer has to remain speculative, but language closeness and the availability of shared forms spring to mind. Turkish and Swedish are distant languages with virtually no lexical overlap. Only one item on the Turkish CLT (*helikopter* [helicopter]) is homophonous with the Swedish word, and another item is similar (*balon/ballong* [balloon]). In all other cases, knowing the Swedish word would not help the child on the Turkish test. In contrast, German and Swedish are closely related. 7 items on the German CLT are homophonous with the Swedish word (e.g. *Vogel/fågel* [bird]), so producing the Swedish word would in fact help the child on the German test. Moreover, more than 1/3 of the German test items are easily recognizable as cognates with Swedish, even though they are not phonologically identical (e.g. *Lampe/lampa* [lamp]). Here, producing the Swedish item on the German test would not be scored as correct, but knowing the Swedish cognate might still help the child. Cognates may lessen the burden of vocabulary learning. Whilst a Turkish-Swedish child has to acquire entirely different lexical roots for the same concept in her two languages, a German-Swedish

child can build on their knowledge of one language, as many words and lexical roots are cognates. To acquire these, a lesser amount of input might be necessary, and even Swedish input may indirectly boost the child's German lexicon. We know that far fewer of our German-Swedish children hear German from both parents; nevertheless they perform as well as the Turkish-Swedish children. In order to answer whether cognates are indeed responsible for the relatively good vocabulary results of our German group, another study would be necessary. An items analysis could reveal whether some German-Swedish children only (or mainly) respond correctly on German test items that are cognate with Swedish. In addition to cognates, another factor might have driven up the mean home-language vocabulary score for German. Recall that seven of the 38 German-Swedish children, but none of the Turkish-Swedish children, attended a bilingual preschool where they were exposed to both languages. A perusal of individual results however does not suggest that all bilingual preschool attendees performed well.

This paper has been a first attempt at investigating the minority-language vocabulary skills of bilingual children in Sweden in relation to exposure and other factors. Much remains to be done. Turkish and German, the two minority languages in our study, do not receive much support outside the home setting, which easily leads to home-language vocabulary stagnating at an early age, especially in the expressive modality. We could show however that parents who used Turkish or German to the child and to each other measurably boosted the children's expressive home-language vocabulary, and that additional input provider(s) such as friends could also make a clear difference. In a country that officially endorses multilingualism, society should encourage and support families in their home-language use.

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