



Universiteit  
Leiden  
The Netherlands

## **Bilingualism is more than just the sum of two parts : the family context of language development in ethnic minority children**

Prevoo, M.J.L.

### **Citation**

Prevoo, M. J. L. (2014, November 19). *Bilingualism is more than just the sum of two parts : the family context of language development in ethnic minority children*. Mostert & Van Onderen. Retrieved from <https://hdl.handle.net/1887/29753>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/29753>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/29753> holds various files of this Leiden University dissertation

**Author:** Prevoo, M.J.L.

**Title:** Bilingualism is more than just the sum of two parts : the family context of language development in ethnic minority children

**Issue Date:** 2015-11-19



# Chapter

# 5

**A context-dependent view on the linguistic  
interdependence hypothesis:  
SES and language use as potential moderators**

Mariëlle J.L. Prevo, Maïke Malda, Judi Mesman, Nihal Yeniad,  
Rosanneke A.G. Emmen

*An adapted version of this chapter is in press in Language Learning*

## ABSTRACT

The *linguistic interdependence hypothesis* (Cummins, 1979) states that the development of skills in a second language (L2) partly depends on the skill level in the first language (L1). It has been suggested that the theory lacked attention for differential interdependence. In this study we test the hypothesis of *context-dependent linguistic interdependence* by examining child language use and SES as moderators in the relation between L1 vocabulary and L2 vocabulary growth, in a sample of 104 five- and six-year old bilingual children with a Turkish background in the Netherlands. Relative child language use moderated the relation between L1 vocabulary and L2 vocabulary growth. Positive transfer was only present for children who used L1 more than L2. The findings provide support for context-dependent linguistic interdependence.

**Keywords:** bilingualism, linguistic interdependence, SES, language use

## INTRODUCTION

An important theory in research on bilingualism is the *linguistic interdependence hypothesis* (Cummins, 1979), which states that for bilingual children the development of skills in their second language (L2) partly depends on their skill level in the first language (L1). Since the classic paper in which this hypothesis was explained, it has been suggested that the theory lacked attention for differential interdependence varying for different types of language skills, different levels of resemblance between languages, and different levels of contextual factors, such as language exposure (Proctor, August, Snow, & Barr, 2010; Verhoeven, 1994). Initial evidence for differences in interdependence between different types of language skills and levels of resemblance between languages has been found in previous research (Proctor et al., 2010), but studies looking into the role of contextual factors in linguistic interdependence are lacking. On the level of the individual child, the child's language use indicates language exposure in which more profound language processing is involved than in exposure by hearing only (Bohman, Bedore, Peña, Mendez-Perez, & Gillam, 2010). On the family level, socioeconomic status (SES) is an important contextual factor in language development. Relative child language use—the child's use of one language relative to the other—and SES are both related to circumstances in which children can develop their language proficiency (Hoff, 2003; Pearson, 2007). In this study we test the hypothesis of *context-dependent linguistic interdependence* by examining these two contextual factors as moderators in the relation between L1 vocabulary and growth in L2 vocabulary, in a sample of five- and six-year old bilingual children with a Turkish background in the Netherlands.

Evidence for linguistic interdependence or cross-linguistic transfer has been found for various types of language skills, such as general language proficiency, vocabulary, narrative skills, and reading (Genesee & Geva, 2006; Ordóñez, Carlo, Snow, & McLaughlin, 2002; Proctor, August, Carlo, & Snow, 2006; Ramirez, 1987; Uccelli & Páez, 2007). The idea of linguistic interdependence has also been confirmed by neuroimaging studies, in which the same neural structures (particularly the left inferior frontal gyrus and superior temporal gyrus) were found to be responsible for both L1 and L2 processing (Abutalebi, 2008; Buchweitz & Prat, 2013). However, over the years some suggestions for revision or specification of the interdependence hypothesis have been proposed.

For instance, it has been suggested that the type of language skills needs to be taken into account, because the degree of interdependence differs for different types of language skills (Verhoeven, 1994). More recently, an interdependence continuum was proposed (Proctor et al., 2010). On this continuum, the interdependence between languages is hypothesized to be stronger for language skills that involve a small learning challenge, such as word-level skills, and weaker for language skills that require a broader range of knowledge, such as oral language, and stronger for languages that are more alike than for languages with a smaller resemblance. One of the shortcomings of Cummins' (1979) hypothesis is that it neglects the role of contextual factors (Verhoeven, 1994). In line with findings that experiences supporting vocabulary development are not equally available at all levels of child language use or in all SES groups (Hoff, 2003; Pearson, 2007), it is possible that linguistic interdependence varies for different levels of these contextual variables. Therefore, we hypothesize *context-dependent linguistic interdependence*, in which the extent of linguistic transfer varies depending on relative child language use and family SES. We suggest that a child is more likely to draw on its L1 skills in L2 development when SES-based or language usage-based sources of language experience or stimulation are lacking.

Regarding the potential moderating role of children's relative language use, previous studies have often emphasized the role of language exposure in explaining children's language development, but the actual language use is at least as important (Hammer et al., 2012). For bilingual children, the use of a certain language, L1 or L2, is positively related to their proficiency in that language (Bohman et al., 2010; Hammer et al., 2012). However, when looking at the profile of home language use, children who use both languages at home are more at risk for low proficiency than children who use only one language at home (L. Q. Dixon, Wu, & Daraghme, 2012). The relation between language use and language skills is bidirectional, with a better proficiency enabling people to use the language more, and more usage providing opportunities to improve proficiency (Pearson, 2007; Van Tubergen & Kalmijn, 2009). In addition, children invite certain language input via their language use, not only in terms of which language others use when talking to them, but also in terms of which words others use (Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Pearson, 2007). It is suggested that bilingual children process a language differently when they use it themselves as compared to when they are exposed to others who use the

language to them (Bohman et al., 2010). Thus, given the intricate role of language use in the development of language proficiency, the extent of language usage as a resource to build L2 development upon might vary depending on children's language use patterns. If L2 usage-based resources are lacking, children might be more likely to use their L1 skills as a resource.

Another important contextual factor and possible moderator in the relation between L1 vocabulary and L2 vocabulary development is SES. A positive relation between SES and early vocabulary development has been shown for monolinguals (Hoff, 2003). Also, in several studies with bilingual samples, SES was positively related to L2 skills, but SES was not or negatively related to L1 skills (Hammer et al., 2012; Phinney, Romero, Nava, & Huang, 2001). Several studies have suggested that SES exerts its influence on language skills via maternal speech (Hoff, 2003; Huttenlocher et al., 2010), and stimulation in the home environment (Hindman & Morrison, 2012; Kalia & Reese, 2009; Prevo et al., 2014). In high-SES families L1 is generally used less and L2 is used more (Arriagada, 2005; Pearson, 2007; Van Tubergen & Kalmijn, 2009). However, the effect of SES on use of L1 relative to L2 is less strong than its effect on L2 proficiency, because language learning might be easier and economic incentives of L2 proficiency higher for people with a higher SES (Van Tubergen & Kalmijn, 2009). Based on the difference in relations of SES with L1 versus L2 proficiency, L1 proficiency might play a different role in L2 development for different SES groups. For example, a child growing up in a high-SES family with a very stimulating home environment will experience enough resources at home to develop L2 proficiency and might thus be less likely to also use its L1 skills as a base for L2 development than a child from a low-SES family in which these resources are lacking.

In sum, relative child language use and SES are interrelated and both are related to bilingual children's language skills, and interdependence between L1 and L2 might thus vary depending on child language use and SES, suggesting *context-dependent linguistic interdependence*. In this study we examine whether relative child language use and SES play a moderating role in the relation between L1 vocabulary and L2 vocabulary growth (linguistic interdependence) in a sample of five- and six-year old bilingual children with a Turkish background in the Netherlands. We hypothesize that: 1) the relation between L1 vocabulary and L2 vocabulary growth will be stronger for children who use their L1 more and

their L2 less; 2) the relation between L1 vocabulary and L2 vocabulary growth will be stronger for children from lower-SES families; 3) the relation between L1 vocabulary and L2 vocabulary growth will be stronger for children from lower-SES families who use their L1 more and their L2 less. The testing of this specification of the *linguistic interdependence hypothesis* (Cummins, 1979) will add to the ongoing discussion on circumstances under which the hypothesis is or is not valid. Furthermore, the results can provide important information for policies and education aiming at the support of bilingual language development. Depending on the strength and direction of linguistic interdependence at different levels of child language use and SES, advice on a possible differential focus of this language support can be made.

## METHOD

### Participants and procedure

Data for the current study were collected from 104 ethnic Turkish mothers in the Netherlands with their five- or six-year-old children, who were visited at home before, during and after the transition to formal reading education. These mothers were recruited from the municipal registers of several cities and towns in the western and middle region of the Netherlands. We selected second-generation Turkish immigrant mothers who were born in the Netherlands (with at least one of their parents born in Turkey), or first-generation Turkish immigrant mothers who moved to the Netherlands before the age of 11, and who had children who were in the 2<sup>nd</sup> year of Dutch primary school—which corresponds to the kindergarten year in the U.S.—at the time of the home visit (age 5.40 - 6.69 years). Families were only selected if the child's father was a first- or second-generation Turkish immigrant.

In total, 639 families were reached of whom 113 (18%) agreed to participate. Two respondents had to be excluded from this study because Kurdish was spoken at home, and seven others because the mothers did not provide questionnaire data at any of the home visits. A subgroup of mothers who did not want to participate ( $N = 152$ ) provided some general information about their families by filling out a form. These families did not differ significantly from the participating families in age of father ( $p = .36$ ), mother ( $p = .09$ ), and child ( $p = .26$ ), child's gender ( $p = .08$ ), total number of children in the family ( $p = .90$ ),



birth rank of the participating child ( $p = .20$ ), maternal education level ( $p = .19$ ), country of birth of mother ( $p = .60$ ) and father ( $p = .60$ ), mother's marital status ( $p = .41$ ), and child's family status ( $p = .69$ ).

In three consecutive years the participating parents completed questionnaires and each year mother and child participated in yearly two-hour home visits including an interview with the mother, computer tests for the child, and video observation. The children had a mean age of 6.08 years ( $SD = 0.30$ ) at the time of the first home visit. Thirty-nine percent of the sample consisted of boys. The mothers had a mean age of 33.17 years ( $SD = 4.15$ ). Thirty-one percent of the mothers and 88% of the fathers were born in Turkey. The mothers who were born in Turkey migrated to the Netherlands at a mean age of 5.82 years ( $SD = 3.83$ ), whereas fathers who were born in Turkey migrated to the Netherlands at a mean age of 20.04 years ( $SD = 8.64$ ). Most children lived in two-parent families with both biological parents (92%). The majority of the children had one sibling (58%), 10% had no siblings, and 32% had two or more siblings. Fifty-five percent of the children were the first-born child in their family. On average parents had completed intermediate vocational education, and the average gross annual family income was between €20,000 and €40,000.

Almost half of the mothers (49%) reported speaking an equal amount of Dutch and Turkish with their child, 41% mostly or only Dutch, and 10% reported speaking mostly or only Turkish with their child. Of the 65 fathers who filled out the father questionnaire, 35% reported speaking an equal amount of Dutch and Turkish with their child, 19% mostly Dutch, and 46% reported speaking mostly or only Turkish to their child. In the families where both fathers and mothers filled out the questionnaires, fathers reported speaking significantly more Turkish to their child than mothers did ( $t(63) = 6.95, p < .001$ ). Most mothers reported that they could speak and read Dutch (88% speaking; 94% reading) and Turkish (75% speaking; 77% reading) very well. Most fathers who filled out the father questionnaire also reported that they could speak (86%) and read (83%) Turkish very well. Almost half of the fathers reported that they could speak (42%) and read (49%) Dutch very well.

## Measures

Questionnaires were available in the Dutch and the Turkish language. All questionnaires in this study were translated from English into Dutch and Turkish

and back-translated in order to ensure correct wording in both languages. Most mothers (91%) chose to complete the Dutch version of the questionnaire. This may be explained by the fact that all second-generation Turkish mothers have attended school in the Netherlands, and are thus more used to written communication in Dutch, even though they may prefer Turkish for spoken communication (Yaman, Mesman, Van IJzendoorn, & Bakermans-Kranenburg, 2010b).

### ***Relative child language use***

Mothers reported on a 5-point scale (1 = only Turkish; 2 = more Turkish than Dutch; 3 = equal amount of Dutch and Turkish; 4 = more Dutch than Turkish; 5 = only Dutch) how often their child used the host relative to the ethnic language when speaking with them, with father, with siblings, and with Turkish friends. Relative child language use was computed as the mean score of these four items.

### ***Socioeconomic status (SES)***

Family SES was based on the family's annual gross income and the highest completed educational level of both parents at the first assessment. The annual gross income was measured on a 7-point scale (1 = no income; 2 = less than €10,000; 3 = €10,000-20,000; 4 = €20,000-30,000; 5 = €30,000-40,000; 6 = €40,000-50,000; 7 = more than €50,000). Parents' highest completed education was also measured on a 7-point scale (1 = no qualification; 2 = primary education; 3 = lower vocational education; 4 = intermediate vocational education; 5 = secondary education; 6 = higher vocational education; 7 = university level degree). Because factor analysis showed that maternal and paternal educational levels and annual family gross income loaded on a single factor (loadings of .87, .79, and .85 respectively), SES was computed as the mean of the standardized values of the income and education variables. If one of the SES variables was missing, the values of the missing variables were computed based on a regression equation that included the available values as predictors of the missing value, before computing the SES variable. For three families father's education was missing, and for 22 families annual income was missing while education levels were available, in most cases because mothers found their family income too confidential to report.

***Dutch vocabulary***

To measure Dutch expressive vocabulary, the Expressive One Word Picture Vocabulary Test (EOWPVT; Brownell, 2000) was translated into Dutch. In this test, a picture is shown and after a prompting question from the researcher the child has to name the picture in one word. All test administrations were audio-recorded to be able to decide on the scoring afterwards in case of ambiguous answers. Based on pilot assessments of the Dutch translation of this test, the decision was made to replace the map of the United States with a map of the Netherlands and to delete items 118 (*reel*), 146 (*prescription*) and 160 (*monocular*) for which no appropriate Dutch translation was available. Item-response analyses showed that this Dutch version of the test captured basically the same increase in difficulty level that is present in the original English version. The split-half (odd/even) sample reliability was  $> .99$ . The growth in Dutch vocabulary was computed by subtracting the Time 1 score from the Time 3 score.

***Turkish vocabulary***

Because bilingual children have been shown to have difficulties accessing their productive vocabulary in their ethnic language in the circumstance of immersion in the host language (Gibson, Oller, Jarmulowicz, & Ethington, 2012), a receptive vocabulary measure was most appropriate for the Turkish language. To measure Turkish receptive vocabulary, the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 2007) was translated into Turkish (Glück, 2009). In this test, four pictures are shown and the child is asked to select the picture that matches a spoken word. Because not all research assistants administering the child tests spoke the Turkish language, the Turkish pronunciation was recorded beforehand and children heard the Turkish word as soon as the four pictures that they could choose from were shown on the computer screen. If necessary, the child could ask the assistant to play the recorded word one more time. Item-response analyses showed that despite some variance in difference levels within sets, the increasing difficulty level from one set to the other that is present in the original English version was captured in this translation. The split-half (odd/even) sample reliability was .98.

Table 1. Descriptives and correlations of family SES, relative child language use and Dutch and Turkish vocabulary

	Range	M (SD)	1.	2.	3.	4.	5.	6.	7.	8.
1. Relative child language use	1.00- 5.00	3.35 (0.74)	-							
2. Family SES	-2.09- 1.76	0.02 (0.83)	.36**	-						
3. Turkish vocabulary T1	11.00- 125.00	55.83 (25.63)	-.42**	.03	-					
4. Turkish vocabulary T2	15.00- 162.00	72.14 (33.62)	-.31**	-.01	.72**	-				
5. Turkish vocabulary T3	20.00- 173.00	82.29 (35.48)	-.43**	.00	.64**	.79**	-			
6. Dutch vocabulary T1	21.00- 81.00	45.28 (11.89)	.41**	.36**	-.14	-.01	-.11	-		
7. Dutch vocabulary T2	30.00- 92.00	57.28 (12.21)	.33**	.41**	-.07	.04	-.04	.74**	-	
8. Dutch vocabulary T3	40.00- 100.00	65.44 (12.68)	.33**	.46**	-.04	.05	-.05	.74**	.89**	-
9. Growth Dutch voc. T1-T3	-4.00- 45.00	20.16 (8.84)	-.08	.17	.13	.07	.08	-.28**	.28**	.44**

Note. Child language use ranges from 1 = only Turkish, to 5 = only Dutch.

\* $p < .05$ , \*\* $p < .01$

## Analyses

For all respondents included in this study we had data on the relevant variables from at least one time of assessment. Missing values for a particular variable were estimated based on a regression equation that included the available values of this variable at other assessment time points as predictors of the missing value. One outlier on Time 1 Turkish vocabulary was winsorized to be equal to the next highest value of the particular variable (W. J. Dixon, 1960).

Correlations were computed to explore the relations between SES, relative child language use, children's Turkish and Dutch vocabulary scores at each assessment time point, and children's growth in Dutch vocabulary across assessments. The potential moderator effects of the contextual variables in the cross-language relation between Turkish vocabulary and Dutch vocabulary growth were tested by means of regression analysis. Before computing interaction variables, the two potential moderator variables and the predictor variable Turkish vocabulary were centered by subtracting the mean from each participant's score. Interaction variables were based on multiplication of the centered potential moderator variable(s) with the centered Turkish vocabulary score. In this regression analysis Dutch vocabulary growth from Time 1 to Time 3 was the outcome variable to be predicted. Age, and Dutch vocabulary at Time 1 were entered into the regression in the first step, then relative child language use, SES, and Turkish vocabulary (all Time 1) were entered. The two-way interaction terms were entered in the third step and the three-way interaction in the last step.

## RESULTS

Descriptive statistics of the main variables after winsorizing and imputation of missing values are reported in Table 1. Given that the mean for language use is above the scale midpoint, children on average used more Dutch than Turkish when speaking with others. The correlations between all contextual variables of interest at Time 1 and Dutch and Turkish vocabulary scores at the three assessments are shown in Table 1. Relative child language use showed strong correlations with Dutch and Turkish vocabulary scores at all assessment time points in that a child's vocabulary score in a certain language was generally higher if that language was used more. Children from families with a high SES generally use more Dutch than Turkish, and have higher Dutch vocabulary scores. Family

SES was not related to the children's Turkish vocabulary scores or to Dutch vocabulary growth. Vocabulary scores showed strong stability over time, which makes difference scores more reliable (D. R. Thomas & Zumbo, 2012). The correlations did not show evidence for linguistic interdependence, because no significant correlations between Dutch and Turkish vocabulary scores were found. The negative correlation between Time 1 Dutch vocabulary and vocabulary growth indicates that there is less growth in vocabulary for children who start off with a higher Dutch vocabulary score.

To examine potential moderator effects of relative child language use and SES in L1-L2 linguistic transfer across time, a regression analysis was conducted. The results of this regression analysis are presented in Table 2. Child language use was a significant moderator in the relation between Time 1 Turkish vocabulary and Dutch vocabulary growth, and is illustrated in Figure 1. Positive transfer from

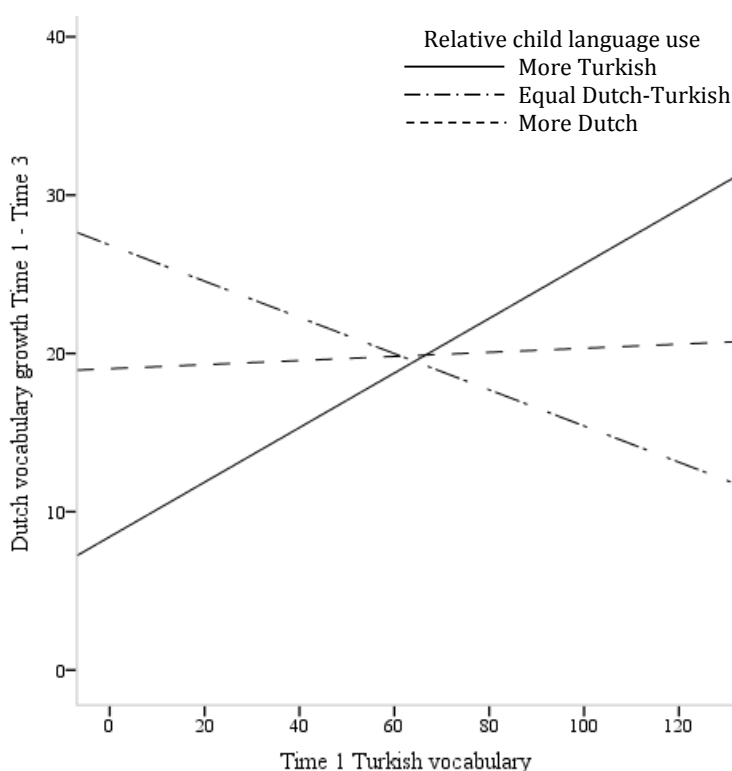


Figure 1. Moderation of relative child language use in the relation between Turkish vocabulary and Dutch vocabulary growth

Turkish to Dutch vocabulary was only present in the group of children who spoke more Turkish than Dutch ( $R^2 = .34, p = .002$ ), but not in the group of children who spoke more Dutch than Turkish ( $R^2 < .01, p = .96$ ). For the children who speak an equal amount of Dutch and Turkish, there was a trend towards negative transfer of Turkish vocabulary on Dutch vocabulary growth ( $R^2 = .08, p = .09$ ). SES was found to be a significant predictor of Dutch vocabulary growth, but no significant interaction effect of SES and Time 1 Turkish vocabulary was found.

The differences between the child language use groups in Time 1 vocabulary scores were tested in one-way analyses of variance (ANOVAs). These ANOVAs showed that children who spoke more Dutch than Turkish had significantly lower Time 1 Turkish vocabulary scores,  $F(2, 101) = 8.19, p = .001$ , and higher Time 1 Dutch vocabulary scores,  $F(2, 101) = 9.71, p < .001$ , than children who spoke more Turkish, while the mean vocabulary scores of children who spoke an equal amount of Dutch and Turkish were in between the scores of the other two groups and did not significantly differ from them. However, children in the different groups of language use did not differ significantly in their Dutch vocabulary growth,  $F(2, 101) = 0.12, p = .89$ , as is illustrated in Figure 2.

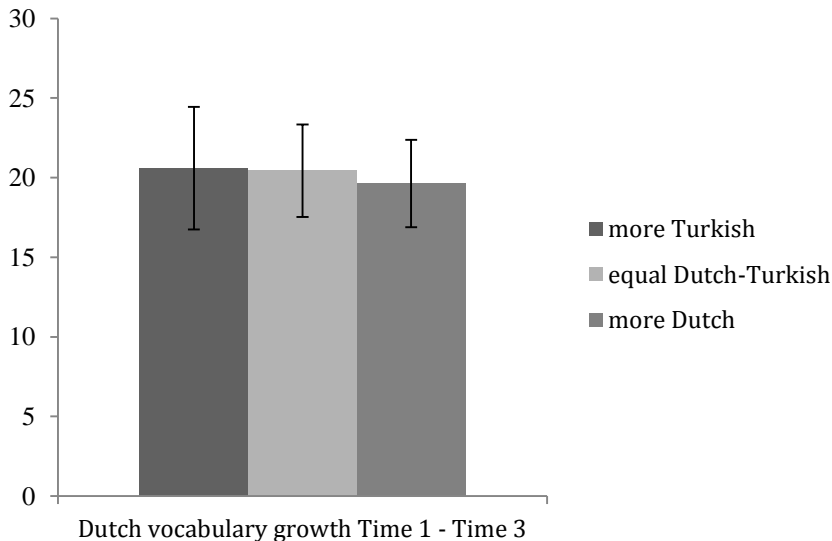


Figure 2. Dutch vocabulary growth in different groups of relative child language use

Table 2. *Regression analysis of moderator effects of contextual variables in the relation between Time 1 Turkish vocabulary and Dutch vocabulary growth*

	$\Delta R^2$	$\beta$	$p$
Step 1	.12 **		
Age		-.21	.04
Time 1 Dutch		-.20	.05
Step 2	.07 *		
Relative child language use		-.01	.90
SES		.28	.01
Time 1 Turkish		.08	.47
Step 3	.06 *		
T1 Turkish-by-Child language use		-.25	.01
T1 Turkish-by-SES		.17	.08
Step 4	.00		
Three-way interaction		-.08	.52
Total $R^2$	.25 **		

\* $p < .05$ , \*\* $p < .01$

## DISCUSSION

In a sample of five- and six-year old bilingual children with a Turkish background in the Netherlands, we found that relative child language use moderated the relation between Turkish vocabulary and Dutch vocabulary growth. Positive transfer from L1 to L2 was only present in the group of children who spoke more Turkish than Dutch with their parents, siblings and Turkish friends. SES was not a moderator of linguistic interdependence, but it was a significant predictor of Dutch vocabulary growth. The increase in vocabulary scores over time was larger for children from families with a higher SES. The findings provide support for context-dependent linguistic interdependence.

Relative child language use moderated the relation between Turkish vocabulary and Dutch vocabulary growth. In line with our hypothesis, children who use more Turkish deploy their Turkish vocabulary skills in the development of their Dutch vocabulary. This might be explained by the more profound processing of a language when actively using it as compared to only being exposed to it receptively (Bohman et al., 2010). Given the previous research finding that transfer effects are generally stronger for higher levels of L1 proficiency (Ordóñez et al., 2002), and the findings from neuroimaging studies



that the similarity in brain activation between L1 and L2 is higher for more proficient bilinguals (Buchweitz & Prat, 2013), a possible role of proficiency in the moderator effect of language use should be taken into account. Although we did find differences in vocabulary scores between children who use Dutch more and children who use Turkish more, the vocabulary scores of the children who used both language equally did not differ significantly from the scores of the other two groups. This means that the moderator effect that we found cannot be explained by proficiency differences, and reflects some added advantage of frequency of L2 use above and beyond proficiency in facilitating L1-L2 transfer. Furthermore, the language use groups did not differ in their scores on the outcome variable Dutch vocabulary growth. The three-way-interaction of Turkish vocabulary, child language use, and SES was not significant. This implies that the moderating effect of child language use is present for children across all SES levels.

The family-level contextual factor SES was a significant predictor of Dutch vocabulary growth in the regression model, after controlling for age, Time 1 Dutch vocabulary score and relative child language use, but SES did not moderate the relation between Time 1 Turkish vocabulary and Dutch vocabulary growth. Our second hypothesis was not supported. Apparently, linguistic interdependence effects from L1 vocabulary to L2 vocabulary development are similar across SES groups. Correlational analyses showed that SES was not related to L1 vocabulary scores, which is in line with previous research (Quiroz, Snow, & Zhao, 2010). A possible explanation for this absence of a relation between SES and L1 vocabulary is that high-SES parents stimulate their children's L1 development because they value bilingualism more, while low-SES parents use L1 more because that is the language they feel most comfortable with (Arriagada, 2005), thereby possibly stimulating their children's L1 use as well. This might also explain why we did not find a moderating effect of SES in the relation between Turkish vocabulary and Dutch vocabulary growth. The Turkish language is equally important across SES-groups, albeit for different reasons, and Turkish language skills are thus equally available as a possible resource for Dutch vocabulary development.

For children who use both languages equally, a trend towards competition between the languages was found. In previous research lower proficiency scores were found for children who spoke both languages at home compared to children who spoke only L1 or only L2 at home (L. Q. Dixon et al., 2012). Also, it has been

suggested that competition between the languages could lead to *semilingualism* – limited skills in both languages (Cummins, 1979). However, the average vocabulary scores of the children who use both languages equally did not differ from the scores of children who spoke only Dutch or only Turkish, so in our study the equal-use group is not the group that is worst of in terms of language proficiency. It could be that the equal use of two languages involves language mixing, and that more mixing takes place when a child is more proficient in L1. More language mixing is related to lower vocabulary scores (Byers-Heinlein, 2013), so the negative trend of Turkish vocabulary on Dutch vocabulary growth in the equal-use group might be mediated by language mixing. The equal-use group was a heterogeneous group, consisting of children who spoke a mix of Dutch and Turkish with their parents, siblings and Turkish friends and children who spoke mostly Dutch with some people and mostly Turkish with others. Differences in linguistic interdependence between these subgroups could not be tested in this study, because group sizes were too small. Future research could look into the differences in linguistic interdependence between these two subgroups of equal language use.

The current study has some limitations. First, the response rate was low, despite all the effort that was put into the recruitment of families for this study. Letters and brochures were sent in both Dutch and Turkish and contained culturally adapted pictures. Furthermore, we tried to personally contact the families. These are all important aspects in the recruitment of ethnic minority respondents (Yancey, Ortega, & Kumanyika, 2006). It should be noted that, paradoxically, more effort to reach possible participants could lead to a lower response rate. The response rate is negatively affected when eligible participants who are difficult to reach refuse participation, whereas these potential participants would have remained unreached with less recruitment effort. Second, child language use was assessed with a scale on which the use of one language relative to the other language was reported by mother. This measure does not provide information on the absolute amount of language use in each of the languages. However, relations between language use and language proficiency have been found in studies that used the same kind of measure as well as studies that used a more detailed measure of language use (Bohman et al., 2010; Hammer et al., 2012). Third, vocabulary was the only measure of language proficiency in this study and it was measured receptively in Turkish and expressively in Dutch.

Results might have been different if the same language modality had been used for both languages. However, a receptive measure is a better indicator of the children's L1 vocabulary, because the receptive-expressive gap that is often present in bilingual children's vocabulary has been shown to be larger for the ethnic language (Gibson et al., 2012), and because children may suffer from word retrieval problems in L1 (Hakuta & D'Andrea, 1992).

The trend towards competition between the languages for children who use both languages equally, and the role that language mixing plays in this relation, should be investigated further in future research. Also, future research could test context-dependent linguistic interdependence with samples of other ages and other immigrant generations. The children in this study were in the transition to formal education in Dutch and had quite some environmental exposure to L2 at the time of the study. According to the Revised Hierarchical Model (RHM) (Kroll & Stewart, 1994), at higher levels of L2 proficiency the cognitive link to the concept of a word becomes more important and the link to the translation of the word in L1 becomes less important. The distribution of the child language-use groups might also be different at younger ages, because the language use changes when children start preschool or childcare (Prevo, Mesman, Van IJzendoorn, & Pieper, 2011). The mothers of the children in this study were second-generation immigrants or first-generation immigrants who moved to the Netherlands as children. Children of these mothers can be expected to be less proficient in their L1 than children with two first-generation parents (Hakuta & D'Andrea, 1992). Context-dependent linguistic interdependence might also be different for children from different immigrant generations. Furthermore, previous research has shown that cross-language effects are less strong when the skills that are being studied involve a smaller learning challenge and when the two languages show fewer resemblance (Genesee & Geva, 2006; Proctor et al., 2010), and our hypothesis should thus also be tested with skills other than vocabulary (e.g., syntactic skills) and in samples who speak two languages that are more similar than Turkish and Dutch (e.g., Spanish and English).

Our findings confirm the existence of context-dependent linguistic interdependence, which is moderated by relative child language use. There is positive transfer of L1 vocabulary to L2 vocabulary growth for children who use L1 more, but not for children who use L2 more. Also, SES predicts L2 vocabulary growth, but linguistic interdependence does not vary for different SES levels.

Interventions or education programs focusing on support of the L1 can have a positive effect on L2 development for children who use L1 more, without doing any harm to the L2 development of the children who use L2 more. For this last group of children, the more frequent use of L2 can be an important resource for L2 development, whereas for the others L1 proficiency is a more important resource. For children who use both languages equally, more research is needed into the role of language mixing in linguistic interdependence. Our findings show that the *linguistic interdependence hypothesis* (Cummins, 1979) is context-dependent and only valid under circumstances of more L1 use relative to L2.