The effects of internal and external factors and cognates on the vocabulary scores of Dutch-English bilingual children

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Chapter 1: Vocabulary Development in Bilingual Children

Bilingual children have long been a source of interest in the acquisition literature. The term 'bilingual' has been used to refer to children acquiring two languages from birth (also called simultaneous bilinguals, but here referred to as 2L1 children) or to children who begin acquiring a second language sometime after birth (also called early/late sequential bilinguals, referred to here as L2 children). Here the term 'bilingual' will be used to refer to 2L1 and L2 children. Much research has been done on the acquisition processes of these children, focusing primarily on the acquisition of morpho-syntax. However, the focus here is on the slightly less-studied area of vocabulary acquisition in both 2L1 and L2 children: namely, how vocabulary development differs in these two populations and which factors play a role in the overall vocabulary development of both 2L1 and L2 children. This chapter provides a general overview of previous literature on the vocabulary development of 2L1 and L2 children, as well as a brief look at the models of lexical representation proposed for each group.

1.1. Vocabulary development in L2 children

The definition of child L2 is problematic in its own right. Previous studies on L2 acquisition in children have had varying definitions of an L2 child (versus a 2L1 child or an L2 adult). Schwartz (2003), for example, claims that an L2 child is one whose first exposure to the nonnative language was approximately between ages 4 and 7. Her reasoning for this is that it has been previously established that most of the L1 grammar has been acquired by age 4. Thus, an additional language at this point does not entail acquiring two grammars at once, but rather acquiring a new grammar after the first is (mostly) complete (Schwartz, 2003; see also Unsworth, 2005). Additionally, results of previous studies (DeKeyser, 2000; Johnson & Newport, 1989) show that children with an age of onset of no later than age 7 may make use of the same acquisition process as in L1 acquisition (Schwartz, 2003). Other researchers have claimed that child L2 is defined by age of first exposure being sometime after birth but before age 9 (Penfield & Roberts, 1959) or before puberty (Lenneberg, 1967).

What appears to have been largely ignored in the L2 literature is the group of children first exposed to the L2 between age 1 and 3. These children have often been considered early sequential bilinguals (cf. Unsworth & Hulk, 2010, among others) or lumped in with 2L1 children (cf. Guttierrez-Clellen, et al., 2008; Padilla and Lindholm, 1976). While it seems to be logical in some regards - these children are, in fact, still in the process of L1 acquisition when the L2 is introduced - , they have missed out on a rather large amount of exposure to one of their languages when compared to 2L1 children and, thus, can hardly be considered as having the same development as 2L1 children, given the large role input has been shown to play in recent literature (see Chapter 2). Genesee (2010) discusses L2 learners under the age of 5, although does not specify the lower limit, or the cut off age for 2L1 versus L2 children. He defines young L2 children as those "who begin to learn a second language after first language learning has begun and is established" (Genesee, 2010: 18). One study that has made the differentiation between younger and older L2 learners is Tabors (2008). While no measurements of the development of specific language areas were made, she noted that the children, aged 2;9 to 5;0, passed through the same stages as monolinguals, with the exception of the first stage: (1) home language use, (2) nonverbal period, (3) telegraphic and formulaic use, and (4) productive language use (Tabors, 2008; cited in Genesee, 2010).

Vocabulary development is absolutely crucial for communication for L2 children, particularly for those with a minority L1 (Goldberg, et al., 2008). This can be somewhat challenging for these children since they are trying to hit a moving target (Cummins, 2000) – that is, they are trying to catch up in vocabulary size to their peers, whose vocabularies are also increasing. This is in contrast to other domains – inflectional morphology, for example – where monolingual 6-year-olds have already hit ceiling with past tense morphology (Rice & Wexler, 2001); hence in morphological development L2 children are trying to hit a more stable target (Goldberg, et al., 2008). In fact, L2 English children have been found to be quite slow in reaching monolingual vocabulary norms – even fifth-grade L2 children aged 9-10 years (that is, those having started school in English around age 5) did not perform as monolinguals (Cobo-Lewis, et al., 2002).

The general learning environment of the L2 child, particularly the older L2 child, also deserves some consideration. It seems quite conceivable that children acquiring the L2 in a naturalistic environment may develop in a different way than children learning the L2 in a more formal classroom (or tutored) environment where they are explicitly instructed on the language. This may have bearing on their lexical development in that, the naturalistic L2 child's vocabulary development mainly consists of acquiring words as they become useful while the tutored L2 child's vocabulary development mainly consists of being taught words and their meanings and encouraged to memorize them. It has been shown that late immersion children generally outperform age-matched early French immersion children in Canadian school immersion programs (cf. Harley, 1986). However, while the late immersion children have generally done better on tasks involving reading comprehension or grammaticality judgement, the early immersion children have generally been found to outperform the late immersion children on tests of listening comprehension and speaking (cf. Turnbull et al., 1998; Swain, 1981a).

1.2. Vocabulary development in 2L1 children

There has been much debate over the years as to whether learning two languages simultaneously challenges the ability of 2L1 children to learn one or both languages. These children have the potential to differ from their monolingual counterparts in three major ways: rate of acquisition, pattern of acquisition and ultimate attainment (Genesee, 2010).

Several recent studies seem to suggest that overall language development in bilingual children is essentially the same as that of monolingual children (cf. David & Li, 2008; De Houwer, 1990), at least for morphosyntax. However, vocabulary development in 2L1 children has been dealt with extensively in the literature with differing opinions. 2L1 children have often been claimed to lag behind monolinguals. It has been claimed that they reach language milestones, such as babbling or first words, later (cf. Genesee, 2003; Maneva & Genesee, 2002) and that their vocabulary size is smaller than that of their monolingual peers (cf. Doyle, et al., 1978). In young children,

between 2;0 and 4;0, some results have shown that bilingual children do not perform as well as their monolingual peers in one or both of their languages (cf. Pearson, et al., 1993).

However, the results are not so clear for older children. Some studies have shown bilinguals to have fallen behind their monolingual peers in one or both languages (cf. Pearson, et al., 1997) while others have shown that bilingual children score within monolingual norms in both their languages (cf. Cromdal, 1999). Recently, multiple studies on the lexical development of 2L1 children have shown that when these children's vocabularies are assessed for one of their languages, they tend to score below monolingual norms (cf. Pearson, et al., 1993; Junker & Stockman, 2002). However, when both languages are taken into account, this no longer seems to be the case. Pearson, et al. (1993) found that Spanish-English bilingual preschoolers scored within monolingual norms when their combined vocabulary knowledge of both languages was considered. This was done by including all words produced, regardless of language but counting translational equivalents only once. In other words, they took into account the children's "total conceptual vocabulary" - the total number of concepts the child had named in either language (Pearson, et al., 1993). They also found that the English vocabularies of English dominant 2L1 children were equal to the English monolingual norm[1] (Pearson, et al., 1993). More recent results from Junker and Stockman (2002) show a similar pattern, with the additional finding that many children scored within monolingual norms when tested only in their stronger language. This leads to the conclusion that bilingual lexical development is characterized by considerable variability (Thordardottir, et al., 2005). This variability is likely to stem from multiple factors (see Chapter 2). Similar results have also been found for the attainment of classic language milestones, such as first words, first two-word combinations, and the first 50 words, in that 2L1 children are comparable to their monolingual counterparts when both languages are taken into account (Holowka, et al., 2002; see also Nicoladis & Genesee, 1997; Pearson, et al., 1995).

2L1 children may not differ from monolinguals only in the rate of acquisition, but also in the pattern. The unitary language system hypothesis claims that young 2L1 children pass through a

[1] This was also found for Spanish dominant Spanish-English 2L1 children (Pearson, et al., 1993).

stage in which "their languages are not differentiated, but constitute a single underlying language system" (Genesee, 2010: 3).[2] In other words, this view suggests that young 2L1 children may be confused and unable to differentiate the two languages during the first few years of life. Alternatively, it is possible that young 2L1 children are aware that they are acquiring two different languages – termed the differentiated language system hypothesis (Genesee, 1989; see also Genesee, et al., 1995; Petitto, et al., 2001; Holowka, et al., 2002).

In fact, recent research appears to support the latter of these views. Holowka, et al., (2002), for example, argue that the presence of translational equivalents in young 2L1 children's vocabularies is evidence for the view that children have differentiated their two language systems and are not "semantically and conceptually confused" (Holowka, et al., 2002: 212; see also Pearson, et al., 1995; Petitto, et al., 2001). Pearson, et al. (1995) found that approximately 30% of their Spanish-English 2L1 children's individual vocabularies consisted of semantic translational equivalents.[3] These results were somewhat of a contradiction to Clark's (1988) "principle of contrast" which argues that because of children's bias towards having a single label for each item in their world, they reject the acquisition of synonyms in their early years. Pearson, et al. (1995) argue that although this likely still holds *within* languages, their results show that it does not hold *across* languages, thus allowing translational equivalents. The above studies suggest that 2L1 children are, in fact, aware that they are acquiring two languages from the start (Holowka, et al., 2002).

To summarise, the age cut off between 2L1 children and L2 children is still a question under debate. While it has, for the most part, been agreed that children with an age of onset of 4 years or older are considered L2 children, there is still some debate surrounding children with an age of onset between 1 and 3 years. Among 2L1 children, there appears to be little challenge to the idea that young children lag behind their monolingual peers in vocabulary development.

[2] Although it should be noted that Genesee himself did not advance this view (Holowka, et al., 2002) but see also Redlinger and Park (1980), Vihman, (1985).
[3] These results have also been found for cross-modal 2L1 children, that is, those acquiring a spoken and a signed language from birth (Petitto, et al., 2001).

However, this is not the case for older children as studies have had conflicting results, with the most recent studies providing evidence that 2L1 children are on par with monolinguals when their vocabulary in both languages is considered. There has also been some debate as to whether 2L1 children differentiate their two language systems, however recent research has offered support for the differentiated language system hypothesis over the unitary language system hypothesis. The following section further discusses the idea of differentiation of language systems by examining research into the lexical representation in 2L1 and L2.

1.3. Lexical representation in bilinguals

While not the main focus of this study, it is worth considering the research on lexical representation for both L2 and 2L1 children. This may shed further light on the idea of the separation of a bilingual's two languages. Cognate representations are also considered here, as they are an important aspect of the study that follows. Cognates are translational equivalents that are identical or similar in sound and appearance across more than one language. They are mainly found in related languages (such as English and Dutch) but can also appear across unrelated languages (such as English and Hebrew or Japanese) through borrowing (Friel and Kennison, 2001).

1.3.1. Lexical representation in L2

There are two major models of L2 representation worth considering here: on the one hand, the word association and concept mediation models (considered together) and on the other, the distributed feature model.

The word association model (Potter, et al., 1984) supposes that the bilingual makes connections between the concept and the corresponding lexical representation in their L1. The L2 lexical equivalent of this concept becomes connected to the lexical representation of the L1 rather than directly to the concept. In other words, during L1 acquisition, *conceptual links* are created

between the L1 lexical representation and the concept. During L2 acquisition, *lexical links* are drawn between corresponding lexical representations in the L1 and the L2 as they are learned in the L2. Thus, the L2 lexical representation does not map directly to the concept. The learner must rely on the L1, creating an additional step in processing which is not present when using the L1 (Potter, et al., 1984). It should be mentioned that this model assumes the universality of concepts – that is, that concepts do not vary across languages and that an L2 lexical representation maps directly to an L1 equivalent.

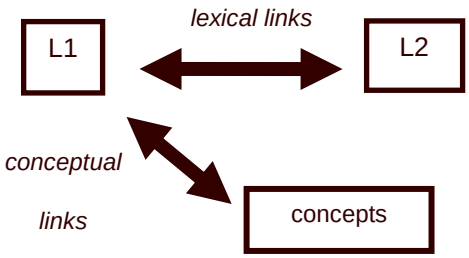

Figure 2- Word Association Model

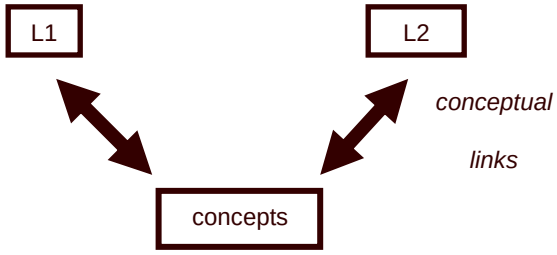

Figure 1- Concept Mediation Model

(Potter, et al., 1984)

While the word association model is thought to characterize the early stages of L2 acquisition, the concept mediation model is, ideally, where the L2 learner arrives after significant experience with the L2. In the concept mediation model, the L2 forms conceptual links with the concept as in the L1. There are no lexical links between L1 and L2 since they are linked through the concepts. Thus, the learner has no need to rely on the L1 in order to communicate in the L2. L1 and L2 become independent of each other, in a sense (Potter et al. 1984).

In light of these two models, Kroll and Stewart (1994) sought to integrate the two resulting in the Revised Hierarchical Model. This model posits a very strong conceptual link between the L1 and concepts and a weaker link between the L2 and concepts. This model predicts a one-way lexical link between the L1 and the L2 in that only translations from L1 into L2 are conceptually mediated.

While the models described above rely on the idea of universal concepts, the Distributed Feature Model (De Groot, 1992b) assumes the idea of universal conceptual features. In this model, a concept is made up of a set of features and lexical items are associated with specific features. While two concepts may be very similar in two different languages, they may differ in only one or two features, accounting for words that do not appear to have exact translations into another language (De Groot, 1992b). Support for this model comes from evidence from reaction time tasks, in which concrete words are generally found to be translated faster by bilinguals than abstract words (Kroll et al., 1998). Concrete words, such as *table* and *tafel*, for example, are likely to share the same conceptual features. Dutch speakers and English speakers do not have different ideas of what a table is. More abstract concepts, however, are not so straightforward.

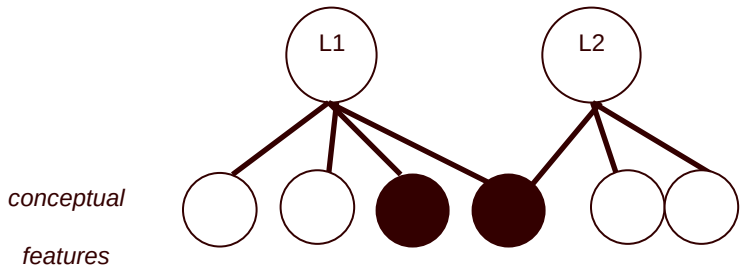

Figure 3- Distributed Feature Model (De Groot 1992b)

For example, the Dutch *gezellig* is often translated into English as *cozy*. While both lexical items share conceptual features such as "warm" and "positive", *gezellig* implies multiple people while *cozy* does not. Conversely, *cozy* implies "small" while *gezellig* does not. Thus, the two words are similar, in that they share some conceptual features, but they are not exact translations of each other because they each possess conceptual features that the other lacks. The Distributed Feature Model can account for word pairs such as this, while the models presented above cannot. However, these models do little to account for commonalities across languages, such as cognates.

The cognate facilitation effect is also something to be considered for the study at hand. This effect occurs when two languages have words similar in form for the same concept, thus offering help to the learner. Instead of acquiring two words for a single concept, one in each language, the child acquires the word in one language. When the child comes across the word in the other language, it is already known to them, albeit perhaps in a slightly different form. Thus the child does not need to spend resources to acquire this word in the other language; they can logically deduce the meaning of this word in one language once it is known in the other. In light of recent research proposing this cognate facilitation effect in adult L2 learners (cf. Dijkstra, et al., 2010), several models of bilingual representation have been proposed. Friel and Kennison (2001) distinguish three general models. The first is that cognate translations share a common conceptual representation, while non-cognates rely on their own, language-specific representation, as evidenced by the existence of cross-language semantic priming for cognates and the lack thereof for non-cognates (De Groot and Nas, 1991). Alternatively, it is possible that cognate translations share a representation at the lexical level only, while non-cognates necessarily have separate lexical representations for each language (Sanchez-Casas, et al., 1992). Evidence for this model comes from experiments that show that the cross-language priming effects for cognates were equivalent to repetition priming effects (cf. Sanchez-Cases, et al., 1992). However, some have also suggested that words with common root morphemes may be stored together in clusters, regardless of language (Kirsner, Lalor and Hird, 1993). Thus, words such as the French *marier, mariage* would be stored in the same cluster as the English *marry, marriage, married.* Non-cognates have different root morphemes and, hence, are stored in different clusters (Friel and Kennison, 2001).

Little research has focused on cognate representations in child L2. Comaseña, et al. (2010) claim that, according to the Revised Hierarchical Model (Kroll & Stewart, 1994) discussed above, cognates should be easier to learn during the early stages of L2 acquisition as it is during this time that learners rely more on lexical links as opposed to conceptual links (Comaseña, et al., 2010). They found this to be the case for older children in the early stages of L2 acquisition, providing evidence for the claim that semantic processing in early learners is affected by L1 lexical representations (Comaseña, et al., 2010).

It has, for the most part, been agreed that the presence of cognates has a positive influence on L2 vocabulary development (cf. Hancin-Bhatt & Nagy, 1994; Treville, 1993). Multiple researchers have claimed that "a common cognitive system underlies both languages in bilinguals and that levels of native-language proficiency…have an important impact on L2 development" (Cunningham & Graham, 2000; p. 38; cf. Cummins, 1979, 1981; Verhoeven, 1991). Recent literature has focused on adult L2 vocabulary development rather than child L2 or 2L1; however, it suggests that cognate transfer presents an advantage for the L2 learner (Friel and Kennison, 2001). That is, L2 learners acquire vocabulary items faster which are similar in form to the translational equivalent in their L1. When presented with a lexical decision task, sequential bilinguals appear to access L2 cognates faster than L2 non-cognates (Dijkstra, Van Jaarsveld and Ten Brinke, 1998). Translation tasks have shown that L1 to L2 translation of cognates is faster and more accurate than translation of non-cognates (De Groot and Poot, 1997; Kroll and Stewart, 1994). Furthermore, there have also been many studies showing stronger translation-priming effects for cognates than for non-cognates (e.g. Larsen, Fritsch and Grava, 1994).

Studies on cognate transfer in L2 to date have focused primarily on L1 to L2 transfer in adults, however when L2 children are considered, another issue arises – that of L2 to L1 transfer[4]. There has been some basis to the suggestion that transfer in children may work in the opposite directions as well. Genesee, et al. (1985) found evidence of this not only in vocabulary but also in the reading and writing skills of children after the first three years of a language immersion program. Likewise, Lambert and Tucker (1972) examined the receptive vocabulary skills of children in the first French immersion program in Canada and found that the second-grade immersion group scored slightly higher than the English only group. Taking a closer look, it was discovered that the majority of the words that led to these higher scores (that is, those that the immersion group understood proportionally better) had French cognates, leading them to the conclusion that vocabulary gains in English may have been the result of learning French (Lambert & Tucker, 1972). However, much of the more recent research on L2 to L1 transfer has been largely limited to L1 attrition in adults (cf. Major, 1992; Seliger & Vago, 1991).

[4] L2 to L1 transfer may also be a relevant issue when dealing with adults attriting in their L1, though not our focus here.

Cunningham and Graham (2000) investigated the issue of L2 to L1 transfer in native English children attending a Spanish immersion program. They set out to test whether L2 Spanish had an effect on the vocabulary of L1 English children. Taking the assumption that the two lexicons of a bilingual share a single underlying representation[5] as a starting point, they hypothesized that the immersion students would score as well or better than their English only counterparts on general vocabulary tests and would score better than the English only group on a cognate-based receptive vocabulary test.

To test these hypotheses, the authors tested 30 fifth- and sixth-grade Spanish immersion children (age 10-12 years) with L1 English and compared them to a control group of 30 monolingual English children. Data from both the Peabody Picture Vocabulary Test-Revised (PPVT-R) and the General Vocabulary Measure (GVM)[6] confirm findings of previous studies that immersion students do not lag behind their monolingual peers in terms of L1 receptive vocabulary development – at least when their two languages are cognate languages. In fact, the immersion students were found to perform better than the controls on the cognate items of the GVM, providing evidence that their L2 may have had an influence on their L1 performance. Data from the Spanish-English Cognate Test (SECT) brought to light strong evidence of positive crosslinguistic influence on the children's L1 vocabulary recognition. The authors argue that this is the only plausible explanation for the fact that the immersion students performed more strongly on the cognate items than the controls, as the test was designed specifically so that the English cognates were not likely to be known by native English speakers of the target age group while the Spanish cognates were common enough to have been learned by most immersion students of the target age group. This would imply that the children transferred their knowledge of the Spanish words in order to recognize the English cognates.[7]

[5] See section 1.3

[6] Within the PPVT-R, a General Vocabulary Measure (GVM) was also taken. This involved all participants completing the same 60 consecutive items, in the style of Lambert and Tucker (1972), regardless of ceiling item.

[7] It is worth noting here that not all cognates appeared to transfer equally, in that some were recognized by nearly all the children while others were hardly ever recognized. The authors cite reading studies carried out by Hancin-Bhatt and Nagy (1994) that claim that only a small subset of cognates are actually recognized by bilingual readers. They hypothesize that it may be that "if an English suffixed item is inflectional rather than derivational, it is more likely to

As can be seen from the studies cited above, cognate transfer effects appear to be well-attested in L2 children and adults, both from L1 to L2 and L2 to L1. However, little research appears to have taken cognates into account when looking at the vocabulary development of 2L1 children. If cognate effects can appear in both directions in L2 acquisition, it seems plausible that this happens in 2L1 acquisition as well. The question of cognitive maturity, although largely ignored in cognate studies, also comes into play here. It seems possible that older children will have access to a wider inventory of cognates based on orthography. There are cognates which may sound quite different in each language, but have identical or very similar orthography – particularly in very closely related languages such as Dutch and English (e.g. Dutch *primaat* vs. English *primate*). Older children, being able to read and write, may notice more cognates than younger children due to their knowledge of orthography, thus causing a stronger cognate facilitation effect in older children.

1.3.2. Lexical representation in 2L1

While recent research has mainly been in support of a differentiated language system hypothesis (see preceding section), this does not imply that the language systems are completely independent of each other. In fact, evidence that a 2L1 speaker's two language systems are interrelated is growing. Many recent studies have found evidence of convergence in the domains of phonology, morpho-syntax and semantics (cf. Bullock & Gerfen, 2004; Sanchez, 2004; Ameel, et al., 2005). Convergence, as defined by Pavlenko (1999), is "a kind of language change whereby a new, intermediate system is created by a bilingual from elements of both languages" (Ameel, et al., 2009: 271). Likewise, it can also be seen as "the enhancement of inherent structural similarities in the two linguistic systems" (Bullock & Gerfen, 2004; in Ameel, et al., 2009: 271). In other words, a bilingual's two language systems interact in such a way that

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be recognized by Spanish bilinguals" (Cunningham & Graham, 2000; p. 46). However, this did not appear to hold for Cunningham and Graham's own data.

differentiates them from monolinguals in both languages without leaving them any less proficient (Ameel, et al., 2009). Evidence for this idea comes from language processing studies. Several priming studies have shown that in a lexical decision task, a target item is primed by a semantically-related word, even if it is in the participant's other language (cf. De Groot & Nas, 1991; Kirsner, et al., 1984). Likewise, it has also been found that in picture-word interference tasks, an incongruent word presented simultaneously with the target picture slowed picture naming, even if the task and the incongruent word were in different languages (Costa, et al., 1999).

It has also been argued that 2L1 speakers have a more fragile lexical convergence than monolinguals or even L2 speakers (Ameel, et al., 2009). This is based on findings that 2L1 adults name pictures more slowly and with more errors than monolinguals, even when performing the task in their dominant language (Gollan, et al., 2005). Gollan et al. point out that, because of reduced input in each language, 2L1 speakers have weaker mappings between semantic and lexical representations than do monolinguals. However, the bilingual participants in their study appeared to benefit more from repetition than the monolinguals. After four presentations, the bilinguals named pictures as quickly as the monolinguals (Gollan, et al., 2005). They also argue that monolinguals have more low-frequency words in their lexicon than do bilinguals, suggesting that bilinguals have weaker memory traces which, in turn, make them more vulnerable to change in one language from exposure to the other (Ameel, et al., 2009). In fact, Ameel, et al. (2009) suggest that "the two languages reactivate each other continuously in simultaneous bilinguals, resulting in representations in both that are vulnerable to mutual influence" (Ameel, et al., 2009: 285). They claim that the distributed feature model (see a simplified version in Figure 1), developed for L2 acquisition by Van Hell and De Groot (1998) also holds, albeit slightly differently, for 2L1 speakers. They argue that the simplified representations found in bilinguals can be represented by the "dropping" of specific features, represented by the disconnected circles in the figure. However, they do point out that which features are dropped is highly variable and that features may not be dropped in both languages (Ameel, et al., 2009).

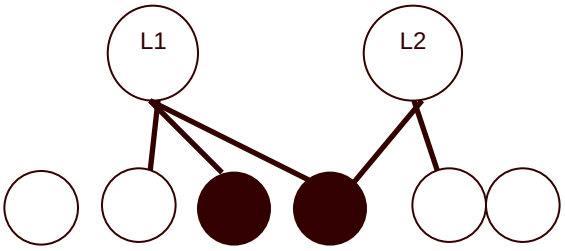


Figure 3- Distributed Feature Model
(adapted for 2L1 speakers)

(Ameel, et al., 2009)

It is still unclear whether these findings do, in fact, hold for 2L1 children. Ameel, et al. (2009) speculate on two potential situations here. Since children have received less input, convergence may be greater early in life. However, over time the two languages reactivate each other continuously and this may cause the representations to become more similar over time, in which case, convergence would be greater later in life (Ameel, et al., 2009).

While it has been rather widely investigated in the L2 literature, little research has focused on the effect of cognates in 2L1 adults and, to my knowledge, no research has focused on the effect cognates in 2L1 children. Duñabeita, et al. (2009) found significant masked priming effects in the visual modality for both noncognates and cognates among balanced 2L1 adults. However, these effects were substantially higher for cognates than for noncognates, providing more evidence of a link between lexical representations in the two languages (Duñabeita, et al., 2010). It has also been argued that cognates may not, in fact, have "a privileged role in a bilingual's lexicon" (Duñabeita, et al., 2010: 105) but merely an additional priming component on the basis of the similar form (Voga & Grainger, 2007). It is important at this stage to examine the effect of cognates in the auditory modality to resolve this debate.

To summarise, the preceding section has outlined the proposed models for lexical representation in both L2 and 2L1 children and adults. This is most important to consider when considering the effect of cognates on the vocabulary scores of 2L1 and L2 children. If the two lexical systems are, in fact, interrelated, as recent research suggests, cognates should have an effect. This will be discussed further in Chapter 3.

1.4. Summary

This chapter has offered a general overview of previous research on 2L1 and L2 vocabulary development in children, as well as some theories of the lexical representation of the L2 and 2L1 child's lexicon. Based on the preceding discussion, it seems likely that 2L1 and L2 children should be considered separately in terms of vocabulary development and that both groups need to be considered separately from monolinguals. However, there are also other factors to consider beyond what has been discussed here. The following chapter examines these factors.

Chapter 2: Internal and External Factors in Bilingual Acquisition of Vocabulary

Vocabulary development in bilingual children has been dealt with extensively in the literature with differing opinions, as discussed in the previous chapter. More recent studies on vocabulary development in L2 and 2L1 children have begun dealing with the role of external and internal factors on acquisition. These factors could each potentially play a role in the acquisition processes of bilingual children. What follows is a brief review of recent studies dealing with the internal and external factors in both L2 and 2L1 vocabulary development.

2.1 Internal Factors

Internal factors are those factors which are within the child, that is, factors which cannot be influenced by the outside world. These include chronological age and age of onset, knowledge of another language, aptitude, and motivation, among others. Our discussion will focus largely on the factors to be considered in the present study, namely the factors of age and transfer; however, aptitude and motivation will also be considered briefly in the final part of this section.

2.1.1 Chronological age and age of onset

The issue of age has long been present in the field of acquisition, particularly in L2 research. While chronological age, or age at time of testing, has been addressed, it is age of onset that seems to have received the most attention. The following section is divided into two parts: the first offers a brief, general summary of the age debate in L2, while the second focuses on more recent research in this domain.

2.1.1.1 The age debate

The effect of age on the acquisition of an L2 has been the source of much debate and, to some extent, has dominated the research into language acquisition in the L2 sphere (see Johnson & Newport, 1989; Singleton & Ryan, 2004). To date, a large majority of the studies done have focused on the end-state of the L2 learners as opposed to the acquisition process. The idea that child and adult L2 learners might acquire language in a different manner has been discounted by many researchers – "Results of research into various dimensions of the way in which L2 learning proceeds suggest that age differences between adults and children are of little significance as far as the L2 acquisition process is concerned" (Singleton & Ryan, 2004: 115). However, more recently there have been studies showing that children and adult L2 learners go through a different process of acquisition (cf. Dimroth, 2008). This research has focused mainly on the acquisition of grammar – studies on the lexical acquisition of L2 adults and children have been fewer. These have been focused mainly on age of onset, but there is also the factor of chronological age to consider. Unfortunately, it is often difficult to disentangle these two factors when looking at L2 children. It has been widely assumed, particularly by educators that "the younger the better" when it comes to age of onset in naturalistic language learning. There have been many studies and experiments done to attempt to prove that this conclusion is true. However, some studies have shown the opposite – that older learners, either older children or adults, outperform younger children in L2 learning.

The "younger equals better" approach is taken by many to be a steadfast rule of L2 acquisition. However, there is much variation in terms of the details of this approach. At its most extreme, it is argued that "L2 learners whose exposure begins in childhood are globally more efficient and successful than older learners" (Singleton & Ryan, 2004: 61) or even, as claimed by Lenneberg's Critical Period Hypothesis (CPH) (1967): "native competence cannot be attained by mere exposure if the onset of acquisition happens after a certain age" (Meisel, 2004: 104). The CPH has been supported by numerous studies of minority language children, such as that of Johnson and Newport (1989), who looked at Korean and Chinese immigrants in the United States. Their results showed that individuals who had arrived in the United States before the age of 7

performed within native speaker range on grammaticality judgement tasks. After this age, however, the results of the subjects declined linearly with age of arrival until about 15 years. Those subjects who had arrived after age 17 showed no linear decline. This was disputed by Bialystok (1997) who reanalyzed the data and claimed that "the tendency for proficiency to decline with age projects well into adulthood and does not mark some defined change in learning potential at around puberty" (Bialystok, 1997: 122).

There is some debate even within this position. Some argue that younger is only better in some respects – particularly phonological acquisition (cf. Scovel, 1988). Others maintain that younger is better only in the long run, that adults and older children initially outperform younger children in the early stages of morphosyntax, but that L2 learners exposed in younger childhood generally reach a higher level of proficiency than those exposed later in childhood or adulthood (cf. Krashen et al., 1979).

Although the "older equals better" position has traditionally not been as widely supported, there is still some compelling evidence to imply that older children and adults are better at L2 acquisition than younger children – at least in a formal instructional setting. Most evidence of this comes from studies of children in school immersion programs. One such study involved L1 English children in French immersion programs in Canada. It was found that the students from the late immersion group – beginning in grade 8, age 12 – outperformed their early immersion counterparts – beginning in kindergarten, age 5 (Harley, 1986).[8] It should be noted that while older learners in immersion programs have been found to do better than younger learners on reading comprehension and grammaticality judgement tasks, younger learners are generally found to do better on listening comprehension and speaking tasks (cf. Turnbull et al., 1998). There has also been some positive evidence for the "older equals better" position from studies of minority language children. Ekstrand (1976) investigated school-age immigrant children in Sweden for their proficiency in various aspects of Swedish. With the exception of free speech[9],

[8] Both groups had had roughly the same amount of exposure: about 1000 hours (Harley, 1986).
[9] It should be noted that this is a rather significant exception.

all the tests correlated significantly with age but not with length of residence. From these results, Ekstrand concluded that L2 learning "improves with age" (Ekstrand, 1976: 130).

2.1.2 Recent research

More recently, the claim that L2 children progress faster in their lexical development when the age of onset is higher has emerged. This was investigated in Goldberg, Paradis & Crago (2008) on the basis that older children "have more cognitive and literacy-based resources for language learning that can enhance their L2 development" (Goldberg et al. 2008: 44) in line with Cummins (1991, 2000) and that older children have been shown to have stronger lexical-processing skills than younger children (Windsor & Kohnert, 2004). Goldberg, et al. (2008) compared the lexical development over time of children who began learning English prior to starting school and those who began after starting school, while keeping the length and amount of English exposure constant. The children were tested five times – approximately once every six months. They participated in a full battery of language tasks, but conclusions drawn on lexical development were made based on results of the Peabody Picture Vocabulary Task – Third Edition (PPVT-III) (Dunn & Dunn, 1997) and analysis of spontaneous speech samples. PPVT scores showed a continuous growth from one testing session to the next, while the number of different word types in a sample of spontaneous speech showed a plateau effect. However, the authors argue that this could well be due to a flaw in the method and not likely to be indicative of expressive vocabulary development in general.

After less than three years of exposure to English, the children in this study very nearly reached the monolingual norm for age-appropriate receptive vocabulary size. The mean score for the final round of testing was 97; well within the monolingual range and just three points shy of the monolingual mean of 100. This contrasts with a similar study by Cobo-Lewis, et al. (2002) on L1 Spanish L2 English children in Miami in that the mean from the children in this study was significantly lower than that of the children in the Canada study. However, Goldberg, et al. (2008) put this down to community context. In the Miami study, all children had the same L1,

Spanish, and likely had very extensive exposure to their L1 both in and out of school with family and friends. In contrast, in the Canada study, the children had different L1s and it can be assumed that they had less contact with their L1 outside of school and little to none in school because their respective L1 communities would be significantly smaller than the Spanish-speaking community in Miami. Thus, the children in the Canada study were likely required to use their L2 more often outside of school in order to communicate, while the children in the Miami study were likely able to rely more on their L1, due to the considerably larger size of the L1 community. As a result, the children in the Canada study likely had more exposure to the L2 in a shorter time than the children in the Miami study.

Through Goldberg, et al.'s analysis, age of onset of English acquisition was found to be a significant predictor of individual differences for receptive vocabulary. Children with a higher age of onset – that is, later than 5 years of age – had higher PPVT raw scores across all five rounds of testing than did the children with a lower age of onset – that is, before 5 years of age. This is not entirely in line with previous studies showing a middle-childhood onset advantage (cf. Collier, 1987, 1989) in that the mean age of the older L2 onset children was only 5;6, which is rather too young to be considered middle-childhood. Middle-childhood has been defined as the period between ages 8 and 12, while ages 4 to 7 are considered younger-childhood (Collier, 1988). The authors also point out that, because the children in the younger age of onset group were also chronologically younger than the older age of onset group at the time of testing, these age-based effects may be due to age of onset, chronological age or a combination of the two. One cannot be disentangled from the other for this data. The authors suggest a study in which the participating children have differential ages of onset but are somewhat matched on chronological age and amount of exposure to English.

Further evidence for the position that a higher age of onset predicts faster acquisition of vocabulary comes from Chondrogianni and Marinis (2011). They investigated vocabulary development and morpho-syntax in L1 Turkish L2 English children. The main aim of the study was to compare the development of vocabulary and morpho-syntax in L2 children; however, the

results also shed important light on the issue of vocabulary development. Using the claim of previous studies of a positive association between age of onset and rate of acquisition as a starting point, the authors investigated differences in standardized assessments between L1 and L2 children, profile effects and the relation between internal and external factors by testing L1 Turkish L2 English children.

When compared to age-matched, monolingual peers, the L2 children performed significantly less accurately on the British Picture Vocabulary Scale II (BPVSII; Dunn, et al., 1997). In fact, this task was deemed one of the most problematic tasks for the L2 children, with only one-third scoring reaching age-appropriate monolingual norms (Chondrogianni & Marinis, 2011). In terms of predictors of the children's performance, age of onset and length of exposure were prevalent. Children with an older age of onset scored higher on the BPVSII, offering evidence for the idea that cognitive maturity may well facilitate faster acquisition of vocabulary in beginner L2 children. However, the authors are quick to point out that length of exposure and age of onset do not necessarily correlate with the ability to reach age-appropriate monolingual norms. The main predictor of children's inability to reach these norms was an external factor – the mother's low proficiency in English[10], although this accounted for only 10% of the variation. In contrast, performance on the grammar-based tests was predicted by external factors, such as amount of exposure and the mother's proficiency[11]. This leads to profile effects favouring morpho-syntax over vocabulary for L2 children. Oller, et al. (2007) claim that this can be primarily explained because of the strong effect of what they call the "distributed characteristic" – vocabulary is distributed across languages in that some concepts are encoded in the L2 but not the L1 dependent on context (see Chapter 1), while the effect of this characteristic has been found to be minimal for many syntactic features of language (Gathercole, 2002). Another contributing factor to these effects is likely to be the nature of lexical acquisition in itself. Lexical items are generally learned one by one and rule generalization is only possible at the level of derivational morphology (Chondrogianni & Marinis, 2011). In the same vein, lexical items are learned for each language independently, regardless of whether the concept has been acquired. Thus, it

[10] See section 2.2.4.
[11] The exception here is tense-marking morphology, success in which was not at all predicted by external factors (Chondrogianni & Marinis, 2011).

appears that, for the most part, the effects of "bilingual bootstrapping" (Gawlitzek-Maiwald & Tracy, 1996) are rather limited (Singleton, 1999). The main exception here is overlap between the two languages in the form of cognates (Chondrogianni & Marinis, 2011; see section 1.3.2).

The studies cited here have all been concerned more with age of onset of L2 than with chronological age; however, as already noted, it is difficult to disentangle these two factors. In such studies, children with an older age of onset also tend to be chronologically older than children with a younger age of onset. It is necessary to eliminate one factor – either age of onset or chronological age – by comparing different ages of onset within a group of chronologically age-matched L2 children. Using data from 2L1 children may also enable us to determine whether chronological age is a factor without having to take age of onset into account. If chronological age is indeed a factor, older children should either be within or closer to monolingual norms in both their languages than younger children.

There also seems to be a small group of children that are not taken into consideration in any of the above studies – those that are exposed to one language from birth and the other sometime within the first three or four years of life. All the L2 studies cited here have considered L2 children as those with first exposure to the L2 around three or four years, while the 2L1 studies have considered 2L1 children to be those with exposure to two languages immediately from birth. However, children with first exposure to a second language between birth and age 3 have yet to be considered. More specifically, what about children who begin producing words in their L1, only to be exposed to an L2 a very short time later, that is, between ages 1-3? These children can hardly be considered strictly 2L1, but neither do they have an L1 grammatical system mostly in place, so they do not fit with the traditional definition of L2 children either (see Chapter 1). Perhaps it is time to broaden the definition of an L2 child. It is important to take these children into consideration in L2 research in order to truly define them as L2.

2.1.3 Other internal factors

Although we do not consider any further internal factors in this study, there are two worth considering for future research, namely aptitude and motivation. Language aptitude has also been considered as an internal factor in L2 acquisition studies, although often neglected. Language aptitude can be defined as "a kind of intelligence that is inherent to the individual" (Paradis, 2011: 2). While it is related to general intelligence, it consists mainly of two components: verbal memory skills and analytic reasoning or pattern recognition. In fact, it has been found to be the most consistent predictor of successful adult L2 acquisition after motivation (cf. Dörnyei & Skehan, 2003; Sawyer & Ranta, 2002). The research on the influence of language aptitude on acquisition has been thinner in the domain of child L2; however there is evidence that aptitude may also be a reliable predictor for children, particularly for older children and adolescents (cf. Harley & Hart, 1997; Ranta, 2002) and, more recently, clear evidence that language aptitude is a source of individual differences in young L1 minority children in an L2 majority context (Paradis, 2011).

While the effect of motivation on the adult acquisition of L2, in particular, has been quite widely studied, little has been done on children (but see MacIntyre, et al., 2002 for the role of motivation in L2 adolescents). Classically, motivation in L2 learning has been attributed to one of two orientations: an integrative orientation, involving an interest in interacting with a particular language group, and an instrumental orientation, encompassing more practical reasons for L2 learning, such as career advancement (Gardner, 1985). It is safe to assume here that child L2 learners likely fall under the integrative orientation – their interest in the L2 generally lies in being able to express themselves to and engage in play or activities with children from that language group.

2. 2 External Factors

Child-external factors are those "that determine the quantity and quality of the input the child receives in the target language" (Paradis, 2011: 3), such as amount of exposure, home language and socio-economic status (SES), richness of the input, proficiency of the parents of other speakers in each language, and language status, among others.

2.2.1 Amount of Exposure

Amount of exposure has long been thought to be the main predictor of proficiency in all language acquisition. One of the first claims along these lines came from L1 acquisition research by Huttenlocher, et al. (1991), who claimed that the amount that individual mothers spoke to their children directly affected the size of their child's vocabulary. It has also been claimed that L1 vocabulary size in toddlers may be directly correlated with the number of words the children hear from people around them (Hart & Risley, 1995).

However, 2L1 children are problematic for the idea that more input equals a bigger vocabulary. Being exposed to two languages means that these children are unlikely to have equivalent input in either language to a monolingual child. This leads to the question of whether the two languages in 2L1 and L2 children need to "compete" for scarce time resources (Scheele, et al., 2010). There has been some conflicting research along these lines. Some studies bring to light a situation of *positive bilingualism* – in that bilingual children may have cognitive advantages, such as better metalinguistic awareness and executive control (cf. Bialystok, 2007). This in turn supports L2 learning on the basis that the conceptual knowledge learned during the acquisition of L1 may facilitate the learning of L2 (cf. Cummins, 1991; Genesee, et al. 2004) and that this advantage is also found among young minority language bilingual children (Verhoeven, 2007). It is also supported by the fact that 2L1 children somehow acquire, and become proficient in two languages, despite reduced input in both. However, there is also the danger of *negative* or

subtractive bilingualism (Cummins, 1991; Butler & Hakuta, 2004) – the idea that the learning of a second language takes away time and resources from the first, potentially resulting in lower proficiency in both languages when compared to monolingual peers in each language, particularly for bilingual immigrant children (cf. Leseman & van den Boom, 1999).

Pearson, et al. (1997) found "a substantial relation between the quantity of input in a given language and the amount of vocabulary learning in that language" (Pearson, et al., 1997: 51) for 2L1 two-year-olds. They claim that the amount of words learned by the child in each language is somewhat proportional to the amount of time spent with speakers of that language. In fact, children who heard one of their languages less than 20% of the time appeared to tune out that language, and appeared unwilling to use it during testing (Pearson, et al., 1997).

Amount of exposure has more recently been expanded to account for varying language environments and situations. Place and Hoff (2011) set out to characterize the language environments of a group of 2-year-old Spanish-English bilinguals on the basis of their parents' native language and the variability in the children's dual language exposure. While previous research has shown amount of exposure in each language to be a strong predictor of language development rates (cf. Gathercole & Thomas, 2009; De Houwer, 2009), very little has been done on the more specific properties of children's exposure to two languages and the effect this has on the development of these two languages.

Using the Language Diary Method (De Houwer & Bornstein, 2003), the authors calculated various measures of the children's bilingual exposure that may potentially influence their development. This method involved the child's "caregivers keep[ing] a log of the children's language exposure over the course of seven days, providing a more detailed description of children's bilingual experience than can a retrospective caregiver report" (Place & Hoff, 2011: 6). Exposure was measured in thirty minute blocks throughout each day in which the child heard only Spanish, only English or both Spanish and English. The function of language use in each

block was considered separately for each context (e.g. mealtime, bedtime, etc.) and for the speaker. The caregiver was asked to fill in all four columns of the Language Diary for each 30-minute time period: the person/people who interacted with the child, the language used, the activity, and extra comments. During analysis, data was categorized based on language used, then by type of speaker (native or non-native) and context (activity).

The difference in percentage of language exposure in English and Spanish was insignificant, as was the number of single-language contexts and conversational partners in each language. However, there was a significant difference in the amount of input that came from native speakers; the children were exposed to significantly more nonnative input in English than in Spanish. The data also revealed that the children's two languages often co-occurred in the environment – in more than one-third of the 30-minute blocks. In line with previous research, differences in the relative amount of exposure were related to the children's levels of development in both languages. For English, amount of exposure was found to be a significant predictor of the development of both vocabulary and grammar, accounting for 39% of the variance in English vocabulary scores. For Spanish this was only found to be significant for vocabulary.

These results are consistent with usage-based theories that claim language acquisition is a process drawing on experience and input – vocabulary development in the children from the above study clearly showed effects of amount of input. It seems that this idea should also hold somewhat for L2 children as well, however, some studies have found amount of exposure to be overruled by other factors, such as age of onset and SES (cf. Goldberg, et al., 2008). In addition, just how 2L1 children differ from L2 children in this respect remains unknown.

2.2.2 Richness of L2 input

Richness is a fairly new consideration in the field of second language research. It considers qualitative elements of the language environment. The amount of native-speaker input and rich L2 input are measured through aspects such as native-speaking friends, books and media (cf. Paradis, 2011; following Jia and Aaronson, 2003; and other work by Jia and colleagues).

As discussed above, previous studies have found age of arrival or age of onset to be a solid predictor of long-term L2 attainment; that is, as age of arrival increases, long term L2 proficiency decreases. More recent research has begun to examine L2 attainment in comparison to L1 attainment. This has shown quite consistently that although L2 attainment decreases with a higher age of arrival, L1 attainment increases (cf. McElree, Jia & Litvak, 2000). More recently, studies have also begun to deal with language environment and many researchers have found that more external factors such as L2 media input, motivation to learn the L2, years of education in the L2 and the L2 proficiency of family members may also play a role in L2 acquisition (cf. Jia & Aaronson, 2003).

Jia and Aaronson (2003) examine the richness of the environment in great detail in their longitudinal study on the L2 proficiency over time of L1 Mandarin immigrant children to the United States. They tracked the children's proficiency in English and Mandarin, language environment and language preference over their first three years in the United States. Ten Chinese children with an arrival age between 5 and 16 years were included in this study. Over the course of three years, home visits were conducted, including interviews with the children and their parents, parental questionnaires to evaluate language preference, proficiency and environment, an L2 (English) grammaticality judgment task, and an L1 to L2 translation task. In order to evaluate the richness of the language environment for each child, the parents filled out a written questionnaire at the end of each year, documenting the number of hours every week spent watching TV or movies in each language, the number of books read in each language, the number of friends speaking mainly one language, and the percentage of time each language was

spoken at home. These were turned into percentages, and then averaged to yield an overall L2 environment score. A higher score indicates a richer L2 environment and, thus, a poorer L1 environment. More detailed information on language environment was obtained through interviews with the parents and the children on what TV shows they watched, which books they read and what types of activities they did with friends, in conjunction with direct observation by the interviewer and field trips.

Using the L2 environment composite scores, age of arrival was found to be a significant predictor of richness of the L2 environment, in that a younger age of arrival was found to predict a significantly richer L2 environment. This also held for language preference. The younger children (8;0 and older) had all, with the exception of the youngest child, switched their language preference from L1 to L2 by the end of the first year of the study. In contrast, the older children (12;0 and older) all maintained L1 as their language of preference. These results are in line with previous studies suggesting that children with a younger age of onset have better L2 attainment than children with an older age of onset (see section 2.1.1.2). However, these results have shown that this may not be due purely to age, but also to the richness of the L2 environment. It is impossible to tease apart these two factors in this study, as age of arrival was the main predictor of a richer L2 environment (Jia & Aaronson, 2003). However, more recent research has found an older age of onset to be positively correlated with faster vocabulary acquisition in L2 (cf. Goldberg, et al., 2008), thus suggesting that the results of this study may say more about richness of the L2 environment than about age.

Jia and Aaronson's (2003) study has provided some evidence that the richness of the language environment, in addition to amount of exposure affects the language development of L2 children. However, more research with a larger group of L2 children is needed to solidify this evidence and there is no evidence (to my knowledge) specific to vocabulary acquisition. While it seems likely that the richness of the environment affects the rate of vocabulary acquisition in L2 children just as it appears to affect overall proficiency, evidence for this claim has yet to be found. 2L1 children also appear to have been somewhat neglected in this sphere (however, see

Place & Hoff, 2011, next section), although one could speculate that a richer language environment leads to higher and/or faster acquisition of one language over the other with these children as well.

2.2.3 SES and home language use

SES and home language use have been found to be closely linked in terms of vocabulary development in children (cf. Oller, et al., 2007). Differences in language use in the home have also widely been found to affect children's early language skills in both L1 and L2 research. Results of previous studies have shown that children from lower SES families tend to score lower on vocabulary tests than children from higher SES families (cf. Oller, et al., 2007; Goldberg, et al., 2008). Lower SES appears to suggest less verbal input, both quantitatively and qualitatively (Chondrogianni & Marinis, 2011; but cf. Scheele et al., 2010).

Returning to Chondrogianni and Marinis (2011) on L1 Turkish L2 English children, while age of onset and length of exposure were the main predictors of vocabulary scores, the children's inability to reach monolingual norms was mainly predicted by the mother's low proficiency (self-rated). In this study, L2 proficiency and level of education of the mother were highly correlated. The majority of the mothers had less than 12 years formal education and a low proficiency in the L2, indicative of lower SES, thus suggesting that inability to reach monolingual norms may be influenced more by low SES than by lack of input due to bilingualism.

The research on the impact of home language on L2 vocabulary development, however, is very limited. The few studies along these lines involving L2 children have yielded similar, albeit less clear-cut, results, in that home language development activities, such as shared book reading and storytelling, had a positive impact on the children's language comprehension and vocabulary in *that* language (Leseman, et al., 2009). This tends to be the case more often for the L1, seeing as

with L2 children, the main home language is in many cases the L1 rather than the L2, although this may be dependent on a variety of factors, such as L1 status and access to formal and literate use of the L1 (cf. Pearson, 2007). A notable exception here seems to be Moroccan-Dutch children, where the L2 appears to have a large presence in the home (cf. Leseman, et al., 2009; Scheele, et al., 2010).

Progressing from previous research and the question of whether languages need to "compete" for resources in bilingual children, Scheele, et al. (2010) examined the relationship between home language learning activities and vocabulary in monolingual Dutch, Moroccan-Dutch and Turkish-Dutch 3-year-old children in The Netherlands. The aim of the study was to investigate whether the task of acquiring a L2 vocabulary while at the same time maintaining and expanding the L1 are complementary or competitive. Ethnic/cultural background, SES, home language, and literacy practices and the effect on children's L1 and L2 vocabularies were investigated. Data was collected during home visits and involved the following measures: SES, computed as a mean of parents educational level and job status; nonverbal intelligence, measured using Raven's Coloured Progressive Matrices (Raven, 1995); home language environment, consisting of scales involving reading, storytelling, conversations, singing and educational television watching in both L1 and L2; and receptive vocabulary in L1 and L2, using the Diagnostic Test of Bilingualism of the national educational testing service (Verhoeven, et al., 1995).

Results showed a large difference in SES, with Moroccan-Dutch families having the lowest, on average. In fact, the patterns of home language use for each group appear to account for the differences in the children's L1 and L2 proficiency. The overall language input (literate and oral interactions in the home) differed between groups, even before taking L1 or L2 into account. Dutch parents were found to read more to their children overall than Turkish-Dutch parents who, in turn, read more to their children than the Moroccan-Dutch parents. Other oral home language activities were found to be equally frequent among the Dutch and Turkish-Dutch parents, but significantly less frequent among the Moroccan-Dutch parents. Moroccan-Dutch families also used their L1 less frequently than the other groups, due to the stronger influence of Dutch in

these families[12]. In line with previous work, SES was found to have a significant positive effect on the amount of input for the monolingual Dutch group, and a significant positive effect on L2 input for the Moroccan-Dutch group. It is interesting to note that while more L1 input for the Turkish-Dutch children did not lead to a L1 vocabulary advantage over the Moroccan-Dutch children, more L2 input among the Moroccan-Dutch children did lead to a L2 vocabulary advantage over the Turkish-Dutch children. These results provide support for both aforementioned hypotheses, suggesting that both competition for resources and positive L1 transfer are mechanisms present in bilingual acquisition. Statistical analysis revealed similar effect sizes for these two mechanisms, suggesting the existence of both positive and negative effects of bilingualism.

While the effect of SES on vocabulary acquisition has been attested in the studies cited above for monolingual and L2 children, there seems to be little research on the effect of SES on the vocabulary of 2L1 children. It is quite likely that there is an effect here, given that both monolinguals and L2 children are affected by SES. Examining language use in the home also becomes much more complicated with 2L1 children, however, in that they are generally regularly exposed to two languages in the home. This is an issue to be considered in the study at hand.

2.2.4 Proficiency and number of other speakers

Variability in the input, that is number of speakers, and the proficiency of the input are also factors worth considering here, albeit less attested than the external factors discussed above. Returning now to Place and Hoff (2011), while amount of exposure was the main predictor here, more specific properties of the language environment were also found to be predictors in this area. For English the following properties were found to be positive predictors of vocabulary

[12] The authors speculate that this is likely due to a lack of resources in the L1, Tarifit-Berber. Since this is a nonscripted and unofficial language in Morocco, access to television, printed materials, etc. is essentially non-existent in The Netherlands. In fact, L1 loss is stronger among higher-educated Moroccan-Dutch immigrants than among other minority language immigrant groups (Backus, 2005).

skills: the number of people with whom the child spoke only English, the number of people from whom the child heard only English, and the percentage of input provided by native speakers. These properties, combined with amount of exposure, account for 68% of the variance in vocabulary (Place & Hoff, 2011). Specific properties of the language environment were not found to be predictors of Spanish language skills, however. The authors attribute this finding to the fact that the majority of the native Spanish-speaking parents spoke English fluently, while very few of the native English-speaking parents spoke Spanish fluently leading to fewer sources of Spanish than of English.

The constellation of the family also had an effect on the children's vocabulary (Place & Hoff, 2011). This was partially due to the amount of English heard by the children, but also to the number of different sources from which the children were exposed to English. On average the children had larger English vocabularies than Spanish vocabularies[13]. Children with a native English-speaking mother were more advanced in English than in Spanish on vocabulary measures, while children with a native Spanish-speaking mother showed no significant difference between their levels of English and Spanish. The family constellation also affected how much English input the children received from native speakers. Children with a native English mother had the most native speaker input in English, followed by children with a native Spanish mother and children with two native Spanish parents. These results suggest that the number of different sources of English have a positive effect on English vocabulary development, thus adding evidence to previous claims that language development is affected not only by the amount of exposure but also by more specific properties of the input and is in line with claims that variability in input is necessary "in order to extract the categories that will support later recognition and production" (Place & Hoff, 2011: 25), particularly for phonological and lexical learning (cf. Richtsmeier, et al., 2009; Singh, 2008, cited in Place & Hoff, 2011). The proportion of input from native speakers was also found to affect vocabulary development implying that nonnative speech may not be as supportive to language acquisition as native speech.

[13] Although it should be noted that children with two native Spanish-speaking parents had smaller vocabularies averaged across both languages than children with only one native Spanish-speaking parent (Place & Hoff, 2011).

While it has been attested in the above study that 2L1 children benefit from more native exposure and exposure to more speakers, this has not yet been examined in L2 children. It becomes more complicated with L2 children, in that they rarely have much native L2 input in the home, although school language could be considered here.

2.2.5 Other external factors

Another external factor to be taken into account, although not considered in the study at hand, is language status. There has been research to suggest that language status may play a role in bilingual or L2 acquisition. Gathercole and Thomas (2009) conducted research on the proficiency of Welsh-English bilinguals and L2 children in both languages in relation to home language and school language. The results suggest that all the children in the stable bilingual community in Wales seem to acquire the dominant language (English) to equivalent levels, yet this is not necessarily the case for the minority language (Welsh). They speculate that this may depend on the reason for the dominant language being dominant – in this case, English is the language of opportunity outside the Welsh-speaking community in addition to the fact that not everyone in Wales actually speaks Welsh. This leads the authors to conclude that dominant versus minority languages is not a subtle enough distinction and that there is, indeed, a difference in status between a minority language within a stable bilingual community and a minority language in an immigrant or indigenous community, the latter potentially even more susceptible to imperfect learning or even language loss than the former.

Scheele, et al. (2010), have also suggested that within minority languages, some have higher status than others. Looking at Tarifit-Berber among Moroccan-Dutch and Turkish among Turkish-Dutch, this contrast is apparent. They claim that, due to a general absence of Tarifit-Berber in education, public administration and media, L1 loss is stronger among Moroccan-Dutch immigrants than among Turkish-Dutch immigrants. This leads to a lack of resources in Tarifit-Berber when compared to the number of available resources in Turkish in The Netherlands. Additionally, language maintenance is considered to be of particular importance among Turkish immigrants (Backus, 2005). However, in the study at hand, this is not likely to be

an issue, as the minority language, English, is a rather unique status in The Netherlands. It is widely spoken as a second language and has a rather high social status. Hence, we do not consider language status in more detail.

2. 3 Summary

This chapter has provided a brief overview of the previous literature examining the effect of both internal and external factors on bilingual vocabulary acquisition (both L2 and 2L1). The main internal factors to be considered in this study, age and transfer, both appear to have strong effects on L2 acquisition, although this evidence is lacking for 2L1 acquisition. The main external factors to be considered, richness, amount of exposure, SES and home language use, and proficiency and number of other speakers, have a less clear-cut effect. There has been evidence that all play a role in acquisition, yet this has not been attested in both L2 and 2L1 acquisition for any of these factors.

Chapter 3: Present Study

3. 1 Research Questions

Based on the literature review and discussion in the first two chapters, the following research questions have emerged:

- If L2 children with a later age of onset are found to have stronger vocabulary scores than children with a younger age of onset, as has been claimed by Goldberg, Paradis & Crago (2008), is this advantage due to help from cognates? Does this advantage remain if cognates are factored out of the vocabulary scores?
- If the 2L1 children are found to score within monolingual norms in either language, is this due to help from cognates? Are their scores likely to remain within monolingual norms for that language if cognates are factored out?
- Which internal and external factors play a role in the vocabulary development of 2L1 and L2 Dutch children? Do the same factors affect 2L1 children and L2 children?

It is predicted that, for the most part, the 2L1 participants will score within the acceptable range for monolinguals in both their languages. The scores of the L2 children are predicted to be lower than the monolingual norm for Dutch, but within this norm for English. It is also predicted that cognates will have a negative effect on the vocabulary scores of both groups of children. That is, the percentage of errors excluding cognates is predicted to be higher than the percentage of errors including cognates. This would provide evidence for the idea that cognates facilitate dual language learning. It also seems likely that there will be a larger cognate effect among the older children than the younger children for both 2L1 and L2.

It is also predicted that 2L1 and L2 children will have multiple similar predicting factors and that these factors will likely be mainly external. However, L2 children with different ages of onset are predicted to differ slightly– particularly the youngest age of onset group as this group is still very much in the stages of L1 development when the L2 is introduced.

2. 4 Participants

The participants were all part of a larger project – the Early Child Bilingualism Project (see www.childbilingualism.org, principal investigator: Sharon Unsworth). The participants were either Dutch-English 2L1 or L2 Dutch children. The analysis included 163 2L1 and 112 L2 children. All children completed the Peabody Picture Vocabulary Test-III-NL(PPVT-NL, Dunn, Dunn & Schlichting, 2004) and either the British Picture Vocabulary Scale (BPVS, Dunn et al., 1997) or the Peabody Picture Vocabulary Test (PPVT, Dunn & Dunn, 2007) depending on the variety of English to which they had been exposed.

3. 1 2L1

This group consisted of 164 children, all of whom were included in the cognate analysis and 154 of whom were included in the regression analyses.[14] The age at the time of testing of the 2L1 participants ranged from 41 months (3;5) to 203 months (16;11) with a mean age of 98 months (8;2). All 2L1 participants had been exposed to Dutch and English since birth and all resided in The Netherlands at the time of testing. Thirty-two of these children were born outside the Netherlands, in various countries.

[14] 10 children were excluded from the regression analysis because some or all of the data from parental questionnaires was incomplete.

For the cognate analysis, 2L1 participants were also divided into two groups based on age at time of testing. The *young* group consisted of all participants under 96 months (8;0), while the *old* group consisted of participants 97 months (8;1) and older[15]. The young group consisted of 84 participants and had a mean age of 70 months (6;10). The proficiency of the child in each language was rated by the parents using the five-point proficiency scale in Appendix A. The mean proficiency for English was 2.97 and for Dutch, 4.49. The old group consisted of 70 participants and had a mean age of 131 months (10;11). The mean proficiency of this group was 3.65 for English and 4.75 for Dutch. This is detailed in Table 1.

Table 1- 2L1: Mean age, LoE and proficiency levels by age group

	n	**Mean age (months)**	**Mean length of exposure to Dutch (cumulative, in years)**	**Mean English proficiency**	**Mean Dutch proficiency**
Young	84	70	3.2210 (SD=1.13700)	2.97	4.49
Old	70	131	5.5089 (SD=1.44775)	3.65	4.75

3. 2 L2

This group consisted of 107 L2 children, all of whom were included in both the cognate analysis and the regression analyses. These children ranged in age from 40 months (3;4) to 204 months (17;0) and had a mean age of 101 months (8;5). The age of onset for these children fell between 12 and 131 months (1;0 and 12;11) with a mean of 55 months (4;7). Eleven children with age of onset between 3 and 11 months were excluded[16]. The proficiency of the child in each language

[15] This age cut-off is in line with evidence from Nicoladis and Paradis's study that a vocabulary "tipping point" occurs around age 8 or 9 in bilingual and L2 children (Nicoladis & Paradis, 2008)

[16] Only children with AO of 0 months were considered bilinguals. Children with AO between 1 and 11 months were excluded to ensure a distinction in exposure between 2L1 and L2 children.

was rated by the parents using the five-point proficiency scale in Appendix A. The mean proficiency for these children in English was 4.7 and in Dutch, 2.5.

These children were further divided into three groups based on age of onset (AO): young from 12 (1;0) to 47 months (3;11), middle from 48 (4;0) to 95 months (7;11), and old from 96 months (8;0) and older. The young AO group consisted of 45 children with a mean AO of 28 months (2;4). The middle AO group was the largest, consisting of 53 children with a mean AO of 64 months (5;4). The old AO group consisted only of 14 children with a mean AO of 110 months (9;2). The young AO group had a mean English proficiency of 4.46 and a mean Dutch proficiency of 2.79. The middle AO group had a mean English proficiency of 4.85 and a mean Dutch proficiency of 2.48. The old AO group had a mean English proficiency of 4.85 and a mean Dutch proficiency of 1.5. This is summarised in Table 2.

Table 2- L2: Mean age, AO, LoE and proficiency levels by AO group

	n	**Mean AO (months)**	**Mean age at testing (months)**	**Mean length of exposure to Dutch (cumulative, in years)**	**Mean English proficiency**	**Mean Dutch proficiency**
Young AO	45	28	87 (SD=37.433)	1.3534 (SD=1.28335)	4.46	2.79
Middle AO	53	64	105 (SD=25.759)	.6585 (SD=.98276)	4.85	2.48
Old AO	14	110	134 (SD=23.313)	.2120 (SD=.30716)	4.85	1.5

For the cognate analysis, L2 participants were also divided into two groups based on age at time of testing. The *young* group consisted of all participants under 96 months (8;0), while the *old* group consisted of participants 97 months (8;1) and older. The young group consisted of 53 children and had a mean age of 74 months (6;2). The mean proficiency for this group was 4.58 for English and 2.17 for Dutch. The old group consisted of 54 children and had a mean age of

128 months (10;8). The mean proficiency for this group was 4.80 in English and 2.82 in Dutch. This is summarised in Table 3.

Table 3- L2: Mean age, AO, LoE and proficiency levels by age group

	n	Mean age (months)	Mean AO (months)	Mean length of exposure to Dutch (cumulative, in years)	Mean English proficiency	Mean Dutch proficiency
Young	53	74	43 (SD=18.438)	.5970 (SD=.63383)	4.58	2.17
Old	54	128	68 (SD=33.814)	1.1396 (SD=1.41752)	4.80	2.82

3. 3 Method

3.3.1 Analysis of Vocabulary Scores and the Role of Cognates

This portion of the study consisted of two steps. The first was to determine exactly which of the nearly 500 words contained in the vocabulary tests could actually be considered cognates. This was achieved through a similarity judgment task. Once cognates had been identified, the next step was to factor them out of the scores of the bilingual and L2 children. This was done by calculating the percentage of errors including and excluding cognates.

3.3.1.1 Identifying cognates

The British Picture Vocabulary Scale II (BPVS), the Peabody Picture Vocabulary Test (PPVT) and the Dutch-language equivalent of the PPVT-III (PPVT-NL) each contain approximately 200 words in total (BPVS – 168, PPVT – 228, PPVT-NL – 204). However, there is some

significant overlap in the words used between the tests. Thus, the total number of different words is approximately 500. Translational equivalents were determined for each word that appeared in any of the tests. It should be noted here that the translational equivalents chosen were not always exact translations. In the cases of words whose exact translation was not a cognate, but there exists a word that is quite similar in sound and could be interpreted in the same way during the test, the more similar word was used. This was the case for the English word *bloom*, presented in the PPVT (set 8, item 93). While the Dutch *bloem (flower)* is clearly not an exact translation (this would be *bloei*), a child presented with four pictures, one of which is a flower (to represent *bloom*), is likely to assume that this is a cognate if they do not know the word *bloom* in English. Thus, English *bloom* and Dutch *bloem* are similar enough in meaning to be considered cognates for our purposes.[17]

Firstly, every word along with its translational equivalent was categorized in one of three ways: cognate (n=151), non-cognate (n=264) or potential cognate (n=83). Words considered to be cognates at this stage were extremely similar or identical in sound (ex. *hand-hand, oval-ovaal*). Words were considered potential cognates if there was some degree of similarity in the appearance or the sound of the translational equivalents. For example, pairs such as *dripping-druppelen* were included since the two words are not completely different in appearance or sound. A similarity judgment task was then created with the words considered to be potential cognates. Some words from the non-cognate category were included as control items.

The similarity judgment was divided into two tasks, consisting of approximately 150 words each, 300 words total. There were twelve participants in this task – 6 for each version of the task. Participants were asked to rate themselves as having one of four levels of fluency in both Dutch and English: (i) native, (ii) near-native or very fluent, (iii) fluent, or (iv) not fluent. All participants were either native English or native Dutch speakers and rated themselves either as fluent or near-native in their non-native language. Participants were presented with one of the

[17] Note that this is possible because of the participants being children. It is likely that young bilingual children are not aware of the difference in meaning between *bloom* and *bloem.* Note that this may not be possible with adult participants.

two tasks and asked to rate the similarity of appearance and sound on a five-point scale, with 1 being ‘completely different’ and 5 ‘identical’. Words were presented in written form on a computer (see Figure 1).

neck – nek

	1 - completely different	2	3	4	5 - identical
look	○	○	○	◉	○
sound	○	○	○	○	◉

Figure 1- Example of the similarity judgment task

The appearance rating was not taken into consideration for the following section because the BPVS, PPVT and PPVT-NL are based on oral presentation of the words. Children being tested do not see the words written. The appearance rating was included in the similarity judgment task as a control against participants rating words based on orthography rather than sound.

The average sound similarity rating was calculated for each pair of words. Words with an average of 3.0 and higher were taken to be cognates. In total, 97 words on the English PPVT, 96 words on the Dutch PPVT and 70 words on the BPVS were deemed cognates.

3.4.1.2 Procedure

All participants completed the PPVT-NL and the BPVS or PPVT as part of larger testing sessions. Each child participated in two testing sessions – one in English and one in Dutch. The testing sessions were held on different days with different testers. The participants were presented with a page of four pictures and asked to choose the picture corresponding to the word given by the tester. The tests consist of several sets, each set consisting of 12 words. The first set given was based on the child's age. In the case of the BPVS or PPVT, if one or zero errors were made, this was considered the basal set. In the case of the PPVT-NL, this was considered the basal set if four or fewer errors were made. If more errors were made, the previous set was presented. This continued until a basal set was established. The BPVS and PPVT continued until eight or more errors were made in a single set. For the PPVT-NL, the test continued until nine or more errors were made in a single set. This set was considered the ceiling set. Based on the number of items and the number of errors, a standard score was calculated. The standard score is calculated by taking into account the number of items, number of errors and the age (in months) of the child. "The standardized score indicates the degree to which an individual's score deviates from the average for people of the same age[18]. The scale is based on the 'normal' distribution of scores that would be expected within the population, and is calculated on the basis that the overall mean (average) standardized score is 100 and the standard deviation is 15, so that about 68 per cent of people will score between 85 and 115." (Dunn, et al., 1997: 14).

3.4.1.3 Factoring out cognates

In order to determine the effect of cognates on the standard score, the percentage of errors including and excluding cognates was calculated for each participant in each language. The percentage of errors including cognates was calculated by dividing the number of completed items by the number of errors. The number of cognates among the completed sets for each

[18] Note that this refers to monolinguals.

participant in each language was then determined. The number of cognates was subtracted from the total number of items. This was then divided by the number of errors excluding errors made on cognate items to obtain the percentage of errors excluding cognates. The difference between these two scores was then calculated.

3.3.2 Analysis of the Role of Internal and External Factors

Data concerning internal and external factors was gathered from parents via a questionnaire. The internal factors included were age at testing and age of onset (for the L2 children). The external factors were more numerous and included both parents' level of education, whether the mother stayed home with the children, the language of schooling and/or after school care (buitenschoolse opvang), richness of the language environment outside of school, the language spoken to the child by various people in the home, the proficiency in English and Dutch of these people and *cumulative* length of exposure (Unsworth et al., 2010).

Age at testing is the age of the child in months on the date of their first testing session. Age of onset is the age in months at which the child first received consistent and significant exposure to Dutch, as reported by the parents. Cumulative length of exposure was calculated based on parental reports of the child's past exposure Dutch (Unsworth, et al., 2010). This included language spoken to the child by parents, siblings and other people, as well as amount of time spent with each person. Exposure outside the home, such as school and after-school care, was also taken into consideration. For children age 4 or younger at the time of testing, parents were asked to provide this information in one-year periods (i.e. from birth to age 1, age 1 to age 2, etc.). For children age 5 and older at the time of testing, parents were asked to provide this information in two-year periods (from birth to age 2, aged 2 to age 4, etc.).

Parents were also asked about their highest level of education as a measure of socio-economic status (SES). They were given the following options: primary education, secondary education,

university or college education, post-graduate education, and other. This was coded in the following way: 1=secondary, 2=university or college, 3=post-graduate, 4=other. As no parents chose primary education as their highest level of education, it was not included in this scale. Guardian 1 (G1) was, in most cases, the mother and guardian 2 (G2), the father. While the occupations of the parents were not considered for this analysis, whether G1 worked or stayed home with the child was. All primary guardians who listed stay-at-home mother, homemaker, housewife, or unemployed as their occupation were assigned a value of 1. All other occupations were assigned a value of 0. If G1 stays home, this guardian will almost certainly have more contact with the child than a working guardian. It seems likely that, particularly for young children, this extra exposure to G1's language may have an effect on their vocabulary scores.

Parents were also asked about the language at the child's school (primary, secondary or preschool) and/or after-school care (buitenschoolse opvang). This was evaluated using the frequency scale in Appendix A. The richness of the language environment outside of school was calculated based on parent questionnaire data regarding time the child spends in extracurricular activities, with friends, reading, and on the computer in each language. This was rated by the parents using the frequency scale in Appendix A. The scores for each of the four previously mentioned activities were then averaged to create a Dutch language richness score. The English richness score was then calculated by subtracting the Dutch richness score from 1.

Using the frequency scale in Appendix A, parents rated their use of English and Dutch for each parent and each sibling. Siblings under 3 years of age were not included. These scores were averaged to determine the home language score. This score reflects the percentage of Dutch use in the home. Proficiency scores for each language were self- or parent-rated on the five-point proficiency scale in Appendix A. The results are presented in the following chapter.

Chapter 4: Results

This chapter presents the results of the study. Section 4.1 presents the standard scores as well as the results of the cognate analysis. Section 4.2 presents the results of the regression analysis examining the effects of internal and external factors on the vocabulary scores of the children.

4.1 Vocabulary scores

4.1.1 Standard Scores

The mean standard score for monolingual children on the PPVT, BPVS and PPVT-NL is 100; however any score within one standard deviation of the mean is considered to be within monolingual norms (Dunn, et al., 1997). Thus, children scoring between 85 and 115 are considered to have reached age-appropriate monolingual norms. The mean results for both the 2L1 and the L2 children are presented in Figure 1.

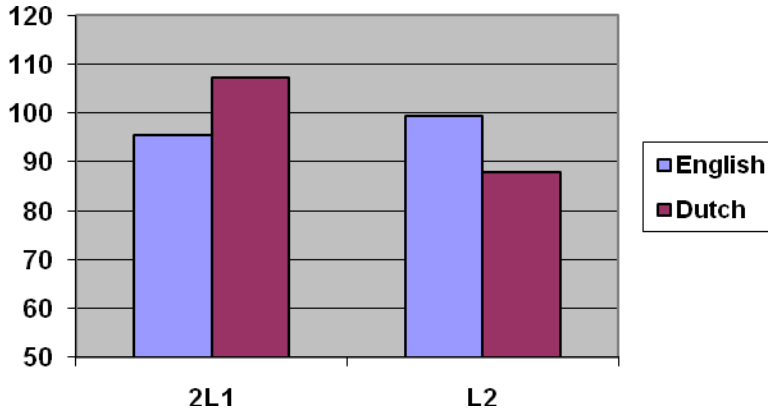


Figure 4-Mean PPVT scores

4.1.1.1 2L1 children

The 2L1 children had a mean standard score on the Dutch test of 107.3 (SD=14.5). The English test had a lower mean score of 95.4 (SD=15.1). It should be noted that only one child on the Dutch test and five children (3%) on the English test were more than one standard deviation below the norm.

Grouped by age at testing

In this analysis, the children were grouped by age at time of testing with children below 96 months (8;0) being considered young and children 96 months and older considered old. This age cut-off is in line with evidence from Nicoladis and Paradis's study that a vocabulary "tipping point" occurs around age 8 or 9 in 2L1 and L2 children (Nicoladis & Paradis, 2008). The mean scores are presented in Figure 2.

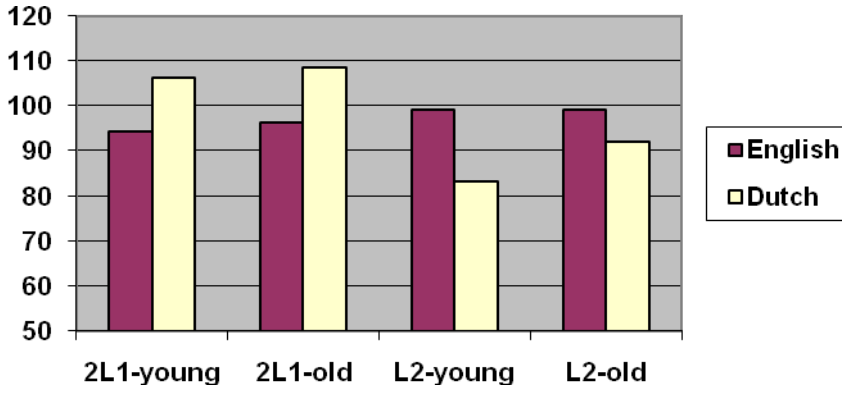
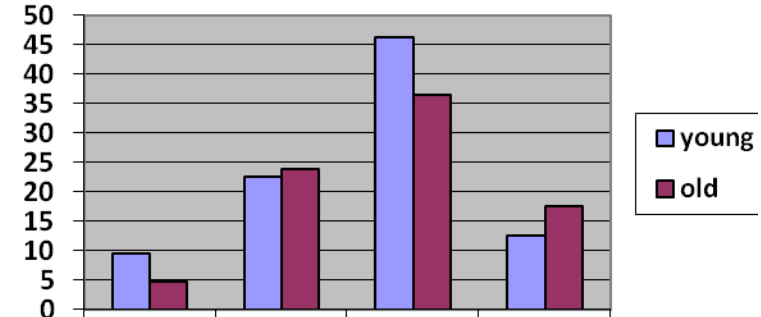


Figure 2-Mean PPVT scores, grouped by age at testing

On the Dutch test, the young group had a mean score of 106.2 (SD=15.1). The old group had a mean score of 108.7 (SD=13.9). The percentage of children from each group who scored below

monolingual norms is presented in Figure 3. It should be noted that, in each group, all but one child scored within one standard deviation of the norm. The difference in mean scores for the two age groups was not found to be significant (t(164)=-1.11149, p=0.268).



	2L1 Dutch	2L1 English	L2 Dutch	L2 English
young	9.6	22.5	46.2	12.5
old	4.8	23.8	36.4	17.5

Figure 3- Percentage of children scoring below monolingual norms

On the English test, the young group had a mean score of 94.4 (SD=14.1). The old group had a mean score of 96.4 (SD=16.1). It should be noted that only one child on the English test and two on the Dutch test scored more than one standard deviation below the norm. Again, the difference in scores for the two age groups was not found to be significant (t(162)=-0.88688, p=0.377).

4.1.1.2 L2 children

The L2 children also had a mean score within the monolingual norm on both tests; however, the mean standard score for the Dutch test is close to the lower limit at 87.8 (SD=21.7). The mean score on the English test is higher at 99.3 (SD=14.6). On the Dutch test, 28 children (26.2%) scored more than one standard deviation below the norm. In fact, 12 of these children scored so low that their scores could not be registered and thus were counted as the lowest possible score

for their age. However, only two of the children (1.9%) scored lower than one standard deviation below monolingual norms on the English test.

Grouped by age at testing

On the Dutch test, the young group had a mean score just below the lower limit of monolingual norms – 83.2 (SD=20.0). However, this is not the case with the old group. This group had a mean score of 92.2 (SD=22.5), well within monolingual norms. The percentage of children from each group who scored below monolingual norms is presented in Figure 3. It should be noted here that 15 children (28.9%) in the young group and 13 children (23.6%) in the old group scored more than one standard deviation below the norm. The difference between the two age groups was found to be significant (t(105)= -2.20228, p=0.03).

On the English test, the young group had a mean score of 99.3 (SD=13.4). The old group had a mean score of 99.2 (SD=15.6). It should be noted that no children in the young group and two children in the old group scored more than one standard deviation below this norm. This difference was not found to be significant (t(103)=0.036061, p=0.971). Mean scores are presented in Figure 2.

Grouped by age of onset

The data was then further divided by age of onset. Mean scores are presented in Figure 4. The young AO group had a mean score of 96.1 (SD=12.9) on the English test and 88.95 *(*SD=19.9) on the Dutch test. It should be noted here that while no children scored more than one standard deviation below monolingual norms on the English test, nine children (20%) did so on the Dutch test. The percentage of children from each group who scored below monolingual norms is presented in Figure 5.

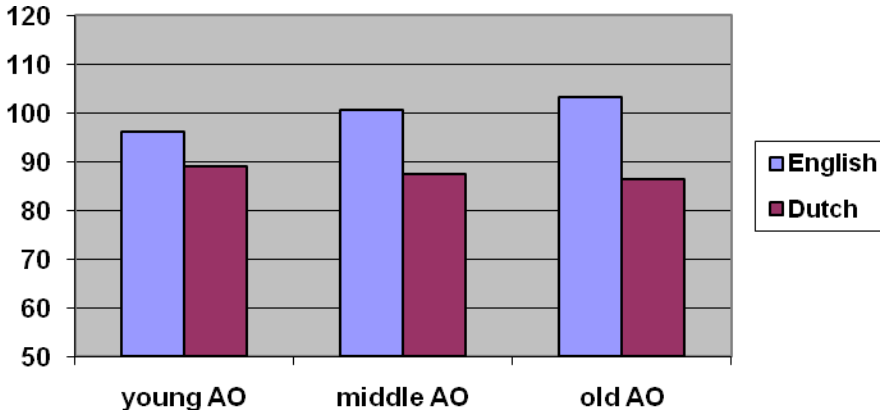
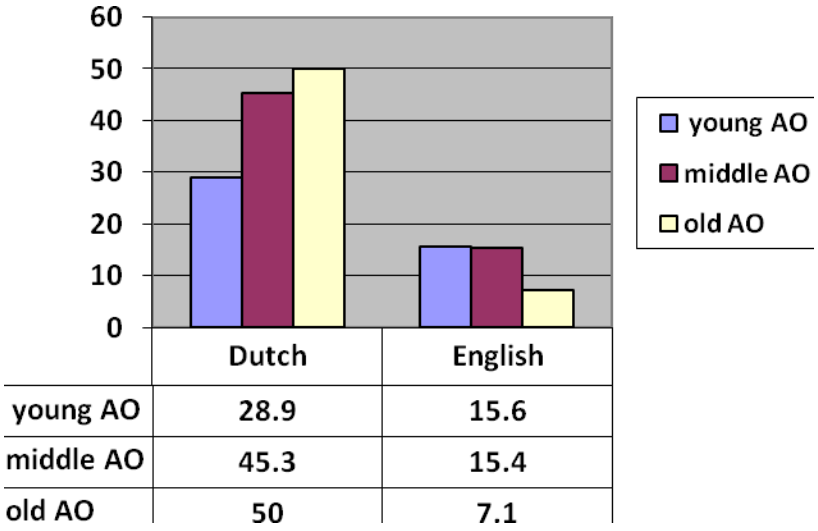


Figure 4 – Mean PPVT scores grouped by age of onset

The middle AO group had a mean score of 100.5 (SD=16.4) on the English test. Of these, two (3.9%) scored more than one standard deviation below the norm. The mean score for this group was 87.4 (SD=23.5) on the Dutch test. While two children scored more than one standard deviation below the norm on the English test, 15 (28.3%) did so on the Dutch test.

The old AO group had a mean score of 103.3 (SD=10.4) on the English test and only one child scored below monolingual norms. The mean score on the Dutch test for this group was 86.4 (SD=20.5). While no children scored more than one standard deviation below the norm on the English test, four (28.6%) did so on the Dutch test.



	Dutch	English
young AO	28.9	15.6
middle AO	45.3	15.4
old AO	50	7.1

Figure 5- Percentage of L2 children scoring below monolingual norms, by AO group

For the Dutch test, the differences between AO groups were not significant, as is to be expected as all three groups have very similar mean scores (young-old: $t(22)=-0.410$ $p=0.686$; young-middle: $t(90)=-0.344$, $p=0.731$; middle-old: $t(23)=-0.163$, $p=0.872$). For the English scores however, there is a significant difference between the standard scores of the young AO group and the old AO group ($t(28)=2.071$, $p<0.05$), with the older AO group scoring significantly higher than the young AO group, although the other between-group comparisons were not found to be significant (young-middle: $t(89)=1.432$, $p=0.156$; middle-old: $t(33)=0.772$, $p=0.446$).

To summarise, the 2L1 children consistently scored higher on the Dutch test than the English, while the reverse is true for the L2 true. Mean scores for all groups in English and Dutch were within monolingual norms, with the exception of the young L2 group. This group's mean score was slightly below the lower limit. While the old AO group had a mean score significantly higher than the younger group, there was also a higher percentage of this group which scored below monolingual norms. This will be discussed further in the following chapter.

4.1.2 Role of Cognates

In order to determine whether cognates do, in fact, have a facilitation effect on the vocabulary scores of these children, error rates were calculated for 2L1 and L2 children separately, first including cognates and then excluding cognates.

4.1.2.1 2L1 children

While these children have a higher mean score than the L2 children on the Dutch test, they also have a higher mean error rate including cognates is 46.7% (range: 8.3% – 70.8%). This mean increases to 50.8% (range: 8.3% – 89.3%) when cognates are factored out. Using a paired two sample t-test, this difference was found to be highly significant ($t(166)=-7.59565$, one-tailed $p<0.001$). While the mean error rates on the English test were lower – a mean of 33.6% (range: 13.9% – 83.3%) including cognates and a mean of 39.1% (range: 15.9% – 87.5%) excluding cognates – his difference was also found to be highly significant ($t(165)=-11.7874$, one-tailed $p<0.001$). Mean error rates are summarised in Table 1.

Table 1- Mean error rates including and excluding cognates for 2L1 and L2 children

	Dutch		**English**	
	Mean error rate incl. cognates	*Mean error rate excl. cognates*	*Mean error rate incl. cognates*	*Mean error rate excl. cognates*
2L1 (n=166)	46.7%	50.8%	33.6%	39.1%
L2 (n=105)	52.1%	59.4%	27.5%	29.5%

Grouped by age at testing

When grouped by age, there is little difference in results for either the young or the old group. The difference in error rate for both groups on both the Dutch and the English tests were highly significant (NL young: $t(82)=-5.416$, one-tailed $p<0.001$; NL old: $t(83)=-5.150$, one-tailed

p<0.001; ENG young: t(79)=-8.677, one-tailed p<0.001; ENG old: t(84)=-8.014, one-tailed p<0.001). These results are summarised in Table 2.

Table 2- Mean error rates for groups divided by age at time of testing

	Dutch		**English**	
	Mean error rate incl. cognates	*Mean error rate not incl. cognates*	*Mean error rate incl. cognates*	*Mean error rate not incl. cognates*
2L1-young (n=82)	46.8%	51.2%	34.6%	40.4%
2L1-old (n=84)	47.0%	51.3%	32.7%	37.7%
L2-young (n=50)	53.4%	60.5%	29.7%	32.4%
L2-old (n=55)	51.4%	59.7%	26.1%	28.1%

4.1.2.2 L2 children

On the Dutch test, the mean error rate including cognates is 52.1% (range: 14.2% – 70.8%) and excluding cognates the mean error rate is 59.4% (range: 28.6% – 92.9%). Again, this difference was found to be highly significant (t (106)= -8.87883, one-tailed p<0.001). On the English test, the error rates were understandably quite low compared to the error rates on the Dutch test. The mean error rate including cognates is 27.5% (range: 7.6% – 47.2%) and excluding cognates, 29.5% (range: 4.0% – 55.8%). This difference, reached significance, although was less significant than the differences discussed above (t (105)=-3.47386, one-tailed p<0.01). The results are summarised in Table 1.

Grouped by age at testing

When grouped by age, the difference in error rates on the Dutch test were highly significant for both groups (young: $t(51)=-8.13625$, one-tailed $p<0.001$; old: $t(54)=-7.17449$, one-tailed $p<0.001$). This was also the case for the English test – the difference in error rates reached significance for the older group ($t(51)=-2.95291$, one-tailed $p<0.01$) and for the younger group ($t(53)=-2.51251$, one-tailed $p<0.01$). These results are summarised in Table 2.

Grouped by age of onset

When grouped by age of onset, the difference in error rates on the Dutch test for all three AO groups was found to be highly significant (young: $t(70)=-3.58138$, one-tailed $p<0.001$; middle: $t(81)=-4.50043$, one-tailed $p<0.001$; old: $t(19)=-4.48754$, one-tailed $p=0.0001$). On the English test, none of the differences were found to be significant, although results approached significance for the all three AO groups (young: $t(91)=-1.44285$, one-tailed $p=0.076$; middle: $t(89)=-1.44891$, one-tailed $p=0.075$; old: $t(89)=-1.40063$, one-tailed $p=0.088$). These results are summarised in Table 3.

Table 3 - Mean error rates for L2 group divided by age of onset (AO)

	Dutch		**English**	
	Mean error rate incl. cognates	*Mean error rate not incl. cognates*	*Mean error rate incl. cognates*	*Mean error rate not incl. cognates*
Young AO	51.3%	57.1%	31.0%	34.0%
Middle AO	52.5%	61.2%	28.0%	30.9%
Old AO	55.0%	66.8%	25.6%	30.8%

To summarise, mean error rates for all groups of 2L1 and L2 children were higher when cognates were excluded from the analysis. Error rates were consistently lower for the English tests for both L2 and 2L1 children. This will be discussed further in the following chapter.

4.2 Role of Internal and External Factors

In order to determine which factors were to be included in the regression analysis, correlations between predictor variables and both the English and the Dutch PPVT scores were calculated. This is detailed in section 4.2.1 Based on the correlations, the data was then analyzed using multiple linear regression, presented in sections 4.2.2 through 4.2.4. A backward regression model was used in all cases.

4.2.1 Correlations

All potential factors described in Chapter 3 were analyzed for significant correlations with either Dutch or English vocabulary scores. These correlations are detailed in Appendix 2. Among the L2 children, the old AO group, correlations could not be calculated for BSO language, OtherNLprof and OtherENprof because of these factors applied to too few children in this group. In other words, not enough of these children attended after school care or had significant contact with speakers outside school and home. All factors significant at the .05 level with vocabulary scores in Dutch or English were included in the regression analysis for that language (following Jia et al 2002?). The results of the regression analysis are presented in the following sections.

4.2.2 2L1

All factors with a significant correlation were entered into the model. These factors are summarised in Table 3. For Dutch vocabulary this included only three factors: language at

school (SchoolLg), cumulative length of exposure (LoE) and the number of other speakers (OtherNr). A backward regression analysis was conducted. Together, these three factors accounted for 12.4% of the variation in Dutch vocabulary scores (F (13.037)= 6.819, p=0.000, R^2=.124). Note that the strongest standardized beta coefficient was for LoE (β=.225).

Table 4- Significantly Correlated Factors for 2L1 Children

	Factor	Mean[19]	SD	Range	Correlation with PPVT scores
English	HomeLg	.5482	.17521	0.0 – 1.0	-.186 (p=.024)*
	SibENprof	3.2887	1.25262	0.0 – 5.0	.233 (p=.016)*
	ENrich	.3630	.19375	0.0 - .94	.278 (p=.001)***
	OtherNr	.5325	.98465	0.0 – 4.0	-.254 (p=.002)**
	SibNLprof	4.6276	.72333	2.0 – 5.0	-.248 (p=.01)**
Dutch	SchoolLg	.76	.410	0.0 – 1.0	.207 (p=.011)*
	LoE	4.5123	2.05427	.12 – 11.4	.208 (p=.01)**
	OtherNr	.5325	.98465	0.0 – 4.0	-.206 (p=.01)**

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed).

For English vocabulary, five factors were included in the model: home language (HomeLg), English richness (ENrich), proficiency of the sibling(s) in both English (SibENprof) and Dutch (SibNLprof) and the number of other speakers (OtherNr). All factors together accounted for 21.9% of the variation in English vocabulary scores (F(13.511)=5.542, p=.000, R^2=.219). Note that the strongest standardized beta coefficient was for OtherNr, i.e., the number of other speakers with whom the child spends a significant amount of time (β=-.328). All standardized β coefficients and R^2 are reported in Appendix 3.

[19] See Chapter 3 for descriptions of the scales for each factor.

4.2.3 L2

All factors with a significant correlation with vocabulary scores were entered into the regression model. These factors are summarised in Table 6. The model including all factors accounted for 44.2% of the variation in Dutch PPVT scores (F (17.818)=6.540, p=0.000, R^2=0.442). However, the model which included only four of these factors, namely G2Edu, SibNLprof, AGE and SchoolLg, accounted for 42.5% of the variation in the PPVT scores (F (17.570)=12.920, p=0.000, R^2=0.425). Note that the strongest standardized beta coefficient was for SibNLprof (β=.356), i.e. the Dutch proficiency of the child's siblings. The statistics are presented in Appendix 3.

For English vocabulary, the model including all factors accounted for 39.5% of the variation in the English PPVT scores (F (11.458)=4.250, p=0.000, R^2=0.395). However, G1Edu and ENrich alone predicted 35% of this variation (F (11.208)=19.679, p=0.000, R^2=0.350). Note that the strongest standardized beta coefficient was for ENrich (β=.680). Standardized β coefficients and R^2 are reported in Appendix C.

Table 5-Significantly Correlated Factors for L2 Children

	Factor	Mean	SD	Range	Correlation with PPVT scores
English	LoE	.8857	1.13606	0.0–5.33	-.355 (p=.000)***
	G1Edu	2.0	.727	0.0 – 3.0	.227 (p=.021)*
	G2Edu	2.18	.787	0.0 – 3.0	.290 (p=.003)**
	NLrich	.3821	.29402	0.0 – 1.0	-.520 (p=.000)***
	SchoolLg	.44	.469	0.0 – 1.0	-.422 (p=.000)***
	SibENprof	4.6296	.81309	2.5 – 5.0	.323 (p=.004)**
	SibNLprof	2.3125	1.76152	0.0 – 5.0	-.354 (p=.001)**
	ParentsENprof	4.7783	.43139	2.5 – 5.0	.255 (p=.009)**
	HomeLg	.1503	.19331	0.0 - .83	-.269 (p=.006)**
	AO	55.21	29.754	12 – 131	.254 (p=.009)**
Dutch	LoE	.8857	1.13606	0.0– 5.33	.361 (p=.000)***
	G2Edu	2.18	.787	0.0 – 3.0	.213 (p=.03)*
	NLrich	.3821	.29402	0.0 – 1.0	.434 (p=.000)***
	SchoolLg	.44	.469	0.0 – 1.0	.441 (p=.000)***
	ParentsNLprof	1.8131	1.45939	0.0 – 5.0	.330 (p=.001)***
	SibNLprof	2.3125	1.76152	0.0 – 5.0	.581 (p=.000)***
	HomeLg	.1503	.19331	0.0 - .83	.349 (p=.000)***
	AGE	101.27	34.023	40 - 204	.219 (p=.025)*

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed)

4.2.4 L2 divided by age of onset

The L2 children were further divided into groups by age of onset, as described in the preceding section, and the regression analyses run accordingly. All factors with a significant correlation to

vocabulary scores were included in the regression analysis. Standardized β coefficients and R^2 are reported in Appendix C.

Table 6-Significantly Correlated Factors for Young AO Group

	Factor	Mean	SD	Range	Correlation with PPVT scores
English	ENrich	.4882	.25913	0.00 – 1.00	-.393 (p=.009)**
	AGE	87.11	37.433	40 - 204	-.402 (p=.008)**
Dutch	LoE	1.3534	1.28335	0.00 – 5.33	.447 (p=.004)**
	NLrich	.4882	.25913	0.00 – 1.00	.517 (p=.001)***
	SchoolLg	.65	.447	0.00 – 1.00	.528 (p=.000)***
	SibNLprof	3.0893	1.53390	0.00 – 5.00	.595 (p=.001)***
	SibENprof	4.6071	.49735	4.00 – 5.00	-.483 (p=.012)*
	HomeLg	.2022	.22517	0.00 - 0.83	.434 (p=.005)**

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed)

Young AO

For Dutch vocabulary, when taken together, these factors accounted for 54% of the variation in Dutch vocabulary scores ($F(15.777)=3.347$, $p=.023$, $R^2=.542$). However, 50% of this variation can be accounted for by only two factors: SchoolLg and LoE ($F(14.722)=10.793$, $p=.001$, $R^2=.507$). Note that the strongest standardized beta coefficient was for LoE (β=.535).

For English vocabulary, only two factors were significantly correlated with vocabulary scores: English richness (ENrich) and age at time of testing (AGE). These factors accounted for

approximately 25% of the variation in PPVT scores (F(12.252)=6.902, p=.003, R^2=.257). Note that the strongest standardized coefficient was for AGE (β=-.329).

Middle AO

For Dutch vocabulary, all factors together accounted for nearly 40% of the variation in PPVT scores (F(20.199)=5.523, p=.001, R^2=.387). However, SibNLprof alone accounted for 36% of this variation (F(19.709)=21.965, p=.000, R^2=.366). The strongest standardized beta coefficient was for SibNLprof (β=.704).

For English vocabulary, when all factors were taken together, nearly 45% of the variation was accounted for (F(12.010)=3.431, p=.008, R^2=.437). However, G2Edu and ENrich alone were able to account for nearly 40% of this variation (F(11.567)=11.656, p=.000, R^2=.393). The strongest standardized beta coefficient was for ENrich (β=-.298).

Table 7-Significantly Correlated Factors for Middle AO Group

	Factor	Mean	SD	Range	Correlation with PPVT scores
English	HomeLg	.1337	.17139	0.00 – 0.67	-.370 (p=.009)**
	SibENprof	4.5854	1.02410	2.50 – 5.00	.338 (p=.033)*
	SchoolLg	.32	.440	0.00 – 1.00	-.491 (p=.000)***
	ENrich	.3448	.30480	0.00 – 0.95	.502(p=.000)***
	G1Edu	2.04	.781	0.00 – 3.00	.294(p=.041)*
	G2Edu	2.24	.847	0.00 – 3.00	.422 (p=.003)**
	LoE	.6585	.98276	0.00 – 4.38	-.352 (p=.013)*
Dutch	AGE	105.26	25.759	60 - 162	.347 (p=.013)*
	NLrich	.3448	.30480	0.00 – 0.95	.407 (p=.003)**
	SchoolLg	.32	.440	0.00 – 1.00	.436 (p=.002)**
	SibNLprof	2.1789	1.77771	0.00 – 5.00	.605 (p=.000)***
	HomeLg	.1337	.17139	0.00 – 0.67	.327 (p=.02)*
	LoE	.6585	.98276	0.00 – 4.38	.341 (p=.015)*

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed)

Old AO

For English vocabulary, the model reached significance only when two factors – SibNLprof and LoE – were removed. This model accounted for approximately 74% of the variation in PPVT scores ($F(9.254)=6.672$, $p=.018$, $R^2=.741$). In fact, ENrich alone accounted for nearly 67% of this variation ($F(9.219)=18.221$, $p=.002$, $R^2=.430$). Note that the standardized beta coefficient was for ENrich ($\beta=-.459$) in the first significant model.

In the old AO group, none of the factors were positively correlated with the Dutch PPVT scores. This is likely due to the small number of children that were included in this group.

Table 8-Significantly Correlated Factors for Old AO Group

	Factor	Mean	SD	Range	Correlation with PPVT scores
English	AO	110.77	12.091	104 – 194	-.624 (p=.03)*
	SibNLprof	.8333	1.16190	0.00 – 4.00	-.636 (p=.036)*
	SchoolLg	.23	.401	0.00 – 1.00	-.771 (p=.003)**
	ENrich	.1663	.21490	0.00 – 0.60	.818 (p=.001)***
	LoE	.2120	.30716	0.00 – 0.88	-.618 (p=.032)*

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed)

To summarise, 2L1 and L2 children have different main predictors of vocabulary scores. Likewise, the main predictors are different for Dutch and English vocabulary scores. However, ENrich is a recurring factor among the L2 children. This will be discussed further in the following chapter.

Chapter 5: General Discussion

The main aim of this study was to compare the vocabulary development of 2L1 and L2 children, particularly in the domain of age and age of onset. In particular, the effect of cognates and other internal and external factors on vocabulary score in Dutch and English were the focus. To recap, the research questions for this study were as follows:

- If the 2L1 children are found to score within monolingual norms in either language, is this due to help from cognates? Are their scores likely to remain within monolingual norms for that language if cognates are factored out?
- If L2 children with a later age of onset are found to have stronger vocabulary scores than children with a younger age of onset, as has been claimed by Goldberg, Paradis & Crago (2008), is this advantage due to help from cognates? Does this advantage remain if cognates are factored out of the vocabulary scores?
- Which internal and external factors play a role in the vocabulary development of 2L1 and L2 Dutch children? Do the same factors affect 2L1 children and L2 children?

This chapter is divided into several sections. Section 5.1 discusses the first two research questions, dealing with vocabulary scores and the effect of cognates. The third research question is addressed in Section 5.2. Sections 5.3 and 5.4 discuss the limitations of this study and the implications and considerations for future research, respectively.

5.1 Vocabulary scores

5.1.1 2L1

The majority of the 2L1 children were within monolingual norms on both tests. In fact, the mean score of these children was above the monolingual mean of 100 in Dutch and just below this mean in English. This remained true when children were grouped by age at time of testing. It is interesting to note that the proportion of children who scored below monolingual norms on the English test was nearly a quarter (22%) while the proportion of children who scored below these norms on the Dutch test is much lower (7%). This, along with the higher vocabulary scores in Dutch, is likely explained by the fact that all participating children were resident in The Netherlands at the time of testing and, thus, were likely to have more limited exposure to English than to Dutch. However, the fact that the majority of the 2L1 children scored within or even above monolingual norms in both languages offers evidence against the claim made by Pearson, et al. (1993), among others, that 2L1 children's vocabularies are not on par with their monolingual counterparts – at least when it comes to young children.

The difference in percentage of errors including and excluding cognates was found to be significant for all groups, with error rates excluding cognates found to be significantly higher than those including cognates, offering evidence that cognates do, in fact, have an effect on the vocabulary scores of these children. Furthermore, this effect may provide evidence that cognates provide a "helping hand" to 2L1 children in their overall vocabulary development, at least when their two languages are closely related. Based on this data, it also seems safe to speculate on the direction of the cognate effect. For these children, the difference in error rates was similar for both the Dutch and the English tests (approximately 4% in Dutch and 5% in English). This suggests that the cognate effect may work in both directions – that is, from Dutch to English and English to Dutch. This also holds when the participants are divided by age. It should be noted here, however, that results were not considered for individual children. This is a point for future research.

While cognates do seem to have a strong effect on vocabulary scores, it seems likely that these children would score within monolingual norms, even with cognates removed from the test. This is particularly true of the Dutch scores. Both the old and young groups had a mean Dutch standardized score well above the monolingual mean – 108 and 106, respectively. Even with 4% more errors, these means are unlikely to drop below 85, the lower limit of monolingual norms. While the English scores are somewhat lower, the mean for both the old and young groups is still well within monolingual norms (93 and 94, respectively) and even approaching the monolingual mean of 100. Even with a slightly higher difference in error rates on the English test (5%), it remains unlikely that such a small percentage of errors would drop the scores below 85.

5.1.2 L2

While the majority of these children also scored within monolingual norms, 26% did not reach these norms on the Dutch test. The mean scores for the L2 children were also within monolingual norms on both tests when all children were grouped together. These children performed just shy of the monolingual mean in English and lower, although also still within the norm, in Dutch. However, once separated by age, a different picture emerges. While English scores remain near the monolingual mean across both groups, with 12% and 17% scoring below monolingual norms for young and old groups, respectively, this is not true of the Dutch scores. On the Dutch test, the younger children have a mean score below monolingual norms (83) while the older children's mean score was well within this norm (92). In fact, 46% of the young children scored below monolingual norms, while only 36% of the old children did so. This significant difference may add support to the emerging idea that older children are faster in L2 vocabulary development than younger children (cf. Goldberg, et al., 2008). This claim is further supported by the fact that, in our data, the old AO group had a shorter LoE, on average, than the younger AO groups. As discussed in Chapter 2, a major issue in the Goldberg, et al. (2008) study was disentangling chronological age from age of onset. This is also an issue here, as the older group do, in fact, have a higher mean AO (68 months) than the younger group (43 months). However, as no significant differences were found in the Dutch scores based on age of onset, this

may be evidence that chronological age may be the deciding factor here. Although chronological age was indeed a factor for the young and middle AO groups, it was only the main predictor for the English scores of the young AO children.

What does appear however, once children are grouped by age of onset, is the effect of the L2 on the L1. Children with an old age of onset (age 8-12) performed significantly better in English than children with a young age of onset (age 1-4). This suggests the possibility that the acquisition of an L2 at a younger age has more of a negative effect on the vocabulary of the L1 than acquisition later in childhood. However, the middle AO group was not found to perform significantly better or worse than either the young or old AO groups. This is an issue for further research.

The difference in error rates is somewhat more imbalanced for the L2 children (approximately 7% in Dutch and 2% in English) than for the 2L1 children (approximately 6% in English and Dutch for the young group and 4% in English and Dutch for the old group), which is to be expected given the L2 children's higher vocabulary scores in English. This would imply that the cognate effect here only occurs in one direction – from English to Dutch. This also holds when the participants are divided by age. This is further supported by the fact that, when divided by age of onset, the difference in error rates did not reach significance in English for any of the groups, although this difference was highly significant for all groups in Dutch.

The difference in Dutch error rates stands out for the old AO group. This difference was extremely significant ($p=0.0001$), implying that this group may have relied more on the help of cognates in their L2 than the two younger groups. In fact, the difference in error rates for this group is higher (11%, as opposed to 6% for the young AO group and 8% for the middle AO group). With the mean standard score of this group so close to the lower limit of the monolingual norm (86), it seems very unlikely that the scores of the old AO children would remain above monolingual norms without the help of cognates. It is possible that orthography is playing a role

here, as this is the only group in which all children were able to read and write before beginning to acquire the L2. Once children can read and write, they acquire vocabulary not only by hearing it but by reading it, thus having a visual representation of the word. If they know the orthography of the word, they are more likely to identify cognates that are perhaps less similar in sound than other on the basis of orthographical rules. Returning to Goldberg, et al.'s (2008) claim that older children perform better on vocabulary tests, these results suggest that this advantage may, in fact, be due to cognates. It seems quite possible that increased cognitive maturity may increase the number of cognates recognized. The more cognates recognized by the child, the more of an advantage the child may have. However, this was also the smallest AO group, with only 14 participants. Additionally, it is impossible to separate AO from chronological age here, as the old AO group necessarily has more chronologically older children than the younger AO groups. Thus, further research into this difference is needed to confirm our findings.

To summarise, it is clear that cognates do have a positive effect on the vocabulary scores of Dutch-English bilingual children, particularly for L2 children. Thus, it seems likely that this claim would hold for other closely-related language pairs. There is some evidence here to suggest that older children are more aided by cognates than younger children, although whether this is an effect of chronological age or age of onset is unclear. In terms of vocabulary scores, the majority of 2L1 children scored within monolingual norms, as did the L2 children for English. A much larger percentage of the L2 children scored below these norms in Dutch.

5.2 Role of Internal and External Factors

The results of the regression analyses described in the preceding chapter are further discussed in this section, divided into internal and external factors.

5.2.1 Internal factors

The only group in which internal factors appear to play a large role is the young AO group. Here, AGE (at testing) was the strongest predictor for English scores, although Dutch scores were

mainly predicted by an external factor – LoE. In fact, no internal factors were even significantly correlated with Dutch scores for this group. This may be an indication that this group differs from older AO groups, however these results are not definitive enough to make such a claim. Further research into the role of internal factors is needed – in particular, more detailed analyses of internal factors as well as a wider range of internal factors beyond the age-based factors considered here such as motivation and language aptitude.

5.2.2 External factors

Many more external factors were included in the present study than internal. Thus it is not a surprise that the main predictors are more often external than internal factors. The most consistent factor which seems to play a role in vocabulary development among both 2L1 and L2 children is LoE. However, this factor is conspicuously absent from the list of significantly correlated factors for the English test among 2L1 children; particularly since LoE was the strongest predictor of high vocabulary scores in Dutch among these children, in line with Place & Hoff (2011). Among the L2 children, LoE was found to highly correlate with vocabulary scores in both languages, although it was not the main predictor for either language. This also holds across AO groups. In each AO group, LoE is highly correlated with vocabulary scores in at least one language. In fact, in the old AO group, LoE is also a major factor, alone predicting 43% of the variation in scores for English. Again, however, it is difficult to draw any solid conclusions from this group, as it consisted of only 14 children. Thus, further research on children with an older age of onset is needed.

Among the 2L1 children, the number of other speakers (people outside of the home and school with whom the child spends a significant amount of time) seems to be particularly strong. In fact, it is the strongest predictor of English vocabulary scores. It seems that the number of other speakers in either language with which the child comes into contact has a negative effect on both English and Dutch vocabulary scores. In other words, the more people that regularly speak to the child in either language (other than parents and siblings), the lower the child's vocabulary scores

– particularly in English. This is in contrast to Place & Hoff (2011), who found that children exposed to more English speakers scored higher on English vocabulary tests. While the language spoken by these other speakers was not taken into account here, it is likely that the majority of these other speakers are Dutch given that all children were resident in the Netherlands. This could explain the contrast with Place & Hoff (2010) in terms of the English scores, yet a negative, albeit weaker, correlation was also found for Dutch scores. Further research is needed here as it seems unlikely that the number of other speakers alone is a factor. Rather, it is likely the case that this factor is highly correlated with another, such as amount of time spent with different people in each language, which has not been examined here.

Another prominent factor, particularly in L2 children is the proficiency of the child's sibling(s). SibNLprof was the strongest predictor of Dutch vocabulary scores among L2 children in general. SibNLProf was also a strong predictor of Dutch vocabulary scores among the middle AO children. However, it should be noted here in that siblings are very likely to have rather similar LoE and language environments. Thus, it is not clear whether a sibling's high proficiency is actually aiding the child's vocabulary development or whether the child and sibling merely have similar proficiency levels. This is an issue for further research, but if proficiency of siblings is, in fact, found to aid in a child's vocabulary development, it would provide evidence that the quality of the input is a major consideration.

Another external factor that appears to play a sizeable role in vocabulary development is the richness. As described in Chapter 3, richness was determined as a proportion of activities outside of school and/or after-school care in each language. This included extra-curricular activities, friends, reading, computer use and television. ENrich was found to be the strongest predictor of English vocabulary scores among the L2 children. Thus, the higher the proportion of English activities, the higher the English vocabulary score. ENrich was the strongest predictor of English vocabulary scores in the middle AO group, although it was significantly correlated with at least one of the vocabulary tests in all three AO groups (only in the old AO Dutch scores, was ENrich not found to significantly correlate). These findings for vocabulary support the results of Jia and

Aaronson (2003) linking higher L2 attainment to the richness of the L2 environment. Yet in Jia and Aaronson's study, age of onset and richness were highly correlated and thus, could not be disentangled. Our findings offer evidence that this attainment (at least as it concerns vocabulary) is due to the richness of the L2 environment rather than age of onset, as richness was found to be significant predictor across all three AO groups.

The home language (that is, the percentage of time at home spent in Dutch), although not the strongest predictor for any group, is also worth considering as it was significantly correlated with English vocabulary scores for 2L1 children and both Dutch and English scores for L2 children. This supports previous research suggesting that more use of a language in the home affects vocabulary in that language (cf. Scheele, et al., 2010). The L2 findings are particularly in line with the Scheele, et al. (2010) study, which found that Moroccan-Dutch children have more L2 exposure in the home and, potentially as a result, outperform Turkish-Dutch children in their L2. When divided by age of onset, home language only appears to play a sizeable role in the Dutch vocabulary scores of the young AO group and in Dutch and English scores of the middle AO group. It seems likely that children with a younger age of onset have more L2 exposure in the home than older age of onset children. Children who acquire the L2 at a later age already have their L1 very solidly established and are likely in the habit of speaking to their family members in the L1, while younger children, who begin their L2 before the L1 is fully established, may be more likely to speak the L2 to parents and siblings. This may lead to a stronger influence on vocabulary scores, however further and more detailed research is needed in this area.

In line with previous work, SES was also found to have an effect on vocabulary scores, particularly among L2 children. The education levels of G1 and G2 were significantly positively correlated with English vocabulary scores. Similarly, G2 education level was also found to positively correlate with Dutch vocabulary scores. These findings support the results of previous studies suggesting that higher SES leads to higher L1 vocabulary scores (cf. Oller, et al., 2007; Goldberg, et al., 2008) and higher L2 vocabulary scores (cf. Chondrogianni & Marinis, 2011).

To summarise, while many factors play a role in the vocabulary scores of both the 2L1 and the L2 children, the main predictors are different. The 2L1 children's vocabulary scores were predicted by cumulative length of exposure, school language and the number of other speakers for Dutch, home language, English and Dutch proficiency of the siblings, English richness and the number of other speakers for English. For L2 children, these factors were far more and were able to predict a higher percentage of the vocabulary scores. The main predictors were mostly external factors, however there were far fewer internal factors than external included in this analysis. There is evidence that the young AO group behaves differently than the old AO group, although where the middle AO group fits in is yet to be determined. Overall, many of the factors which were significantly correlated with vocabulary scores are in line with previous research.

5.3 Limitations of the present study

Several limitations of the present study are worth mentioning. Firstly, the old AO group of L2 children, with only 14 children, is significantly smaller than the other AO groups. Thus, it is unlikely that this is a representative sample of the population. In addition, the children included in this study were not matched for chronological age or length of exposure. This is an issue when looking at the effect of age of onset. As described in Chapter 3, the mean length of exposure for the old AO group is much lower than that of the young AO group. Likewise, mean chronological age is much higher for the old AO group. Thus, any conclusions drawn about age of onset could potentially be an effect of length of exposure or chronological age.

5.4 Implications and future research

In sum, these results support the evidence from recent studies that 2L1 children do not, in fact, lag behind their monolingual peers, as claimed in earlier literature. Our results also suggest that, in L2 children, onset of the L2 between ages 1 and 4 may have a more negative effect on the L1 vocabulary than a much later onset (between ages 8 and 12), suggesting that children with such a

young age of onset may need to be considered apart from older age of onset children. What remains unclear here is where children with an age of onset between 4 and 8 fit in. These results found no significant difference between the vocabulary scores of this group and those of the other two groups, yet the younger group was found to perform significantly worse than the older. Further research should compare the effect of the L2 on the L1 among middle age of onset children with both younger and older age of onset children.

The results here also provide evidence that cognates may have a facilitation effect on the vocabulary scores of both 2L1 and L2 children. This effect appears to occur in both directions (from Dutch to English and vice versa) in 2L1 children, but only from the L1 to the L2 (English to Dutch) in L2 children. These results also provide evidence that children with an age of onset between 8 and 12 may rely on the help of cognates more in their L2 than those with a younger age of onset, suggesting that cognitive maturity plays a role in L2 vocabulary development. Future research should focus on this older age of onset group. A larger sample than that used in this study is needed before any solid conclusions may be drawn.

This study has also provided further evidence that length of exposure is an important and somewhat consistent internal factor in the vocabulary development of both 2L1 and L2 children. It has also emerged that the proficiency of a child's sibling(s) is also highly correlated with their success on vocabulary tests – particularly in Dutch. However, it remains unclear whether this factor is actually the cause of higher vocabulary scores. Future research should examine and compare the environments of both the child and the sibling(s) in order to determine how much effect a sibling's proficiency can have on a child's vocabulary in the L2.

What has emerged across both parts of this study is that L2 children with a young age of onset (between 1 and 4 years) appear to behave differently than other L2 children. The main predictor of vocabulary scores in English was an internal factor: age at time of testing. This contrasts with children with an age of onset between 4 and 8 years, who rely more on external factors. This

group also performed significantly worse than the oldest age of onset children on the English vocabulary test, implying that a younger age of onset has a bigger effect on L1 vocabulary. Future research should compare children with a very young age of onset (1 to 4) and those with a slightly higher age of onset (4 to 8) using, perhaps, a more detailed set of internal and external factors.

In sum, while we are able to draw some tentative conclusions from our results here, there still remain more questions than answers. A study which is age- and length of exposure-matched appears to be much-needed if we are to determine how, exactly 2L1 and L2 children's vocabulary development differs.

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Chapter 3

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Appendix 1: Scales used in parent questionnaires

Proficiency scale

0 = Almost no understanding

1 = Limited understanding, i.e. only understand basic words and expressions

2 = Some understanding, i.e. can understand simple conversations

3 = Good understanding, i.e. can follow extended conversations

4 = Excellent understanding, i.e. can understand almost everything in almost every situation

5 = Native

Frequency of English/Dutch scale

1 = Dutch almost always, English hardly ever

.75 = Dutch usually, English seldom

.50 = Dutch 50%, English 50%

.25 = English usually, Dutch seldom

0 = English almost always, Dutch hardly ever

Appendix 2: Correlations of internal and external factors with vocabulary scores

Table 0-1: L2 children

L2	**Dutch**	**English**
G1Edu	.060 (p=.546)	.227 (p=.021)*
G1Job	-.085 (p=.388)	.125 (p=.206)
G2Edu	213 (p=.03)*	.290 (p=.003)**
ENrich	-.434 (p.000)*	.520 (p=.000)***
NLrich	.434 (p=.000)***	-.520 (p=.000)***
BSOLg	-.400 (p=.326)	.236 (p=.573)
SchoolLg	.441 (p=.000)***	-.422 (p=.000)***
OtherNr	.126 (p=.203)	-.089 (p=.367)
ParentsNLprof	.330 (p=.001)***	-.066 (p=.507)
SibNLprof	.581 (p=.000)***	-.354 (p=.001)**
OtherNLprof	.380 (p=.181)	.179 (p=.539)
ParentsENprof	-.071 (p=.473)	.255 (p=.009)**
SibENprof	-.174 (p=.126)	.323 (p=.004)**
OtherENprof	-.270 (p=.294)	-.273 (p=.290)
HomeLg	.349 (p=.000)***	-.269 (p=.006)**
AO	-.105 (p=.287)	.254 (p=.009)**
AGE	.219 (p=.025)*	-.108 (p=.276)
LoE	.361 (p=.000)***	-.355 (p=.000)***

Table 0-2: 2L1 children

2L1	**Dutch**	**English**
G1Edu	-.026 (p=.760)	.009 (p=.912)
G1Job	-.124 (p=.135)	-.027 (p=.751)
G2Edu	.055 (p=.517)	.151 (p=.079)
ENrich	-.146 (p=.073)	.278 (p=001)***
NLrich	.146 (p=.073)	-.278 (p=.001)***
BSOLg	.157 (p=.327)	.-241 (p=.134)
SchoolLg	.207 (p=.011)*	-.124 (p=.141)
SibNr	-.125 (p=.123)	-.129 (p=.120)
OtherNr	-.206 (p=.01)**	-.254 (p=.002)**
ParentsNLprof	-.078 (p=.346)	-.067 (p=.430)
SibNLprof	.082 (p=.394)	-.248 (p=.01)**
OtherNLprof	-.013 (p=.942)	-.147 (p=.399)
ParentsENprof	-.013 (p=.872)	-.026 (p=.757)
SibENprof	-.163 (p=.087)	.233 (p=.016)*
OtherENprof	-.090 (p=.586)	-.168 (p=.314)
HomeLg	.148 (p=.068)	-.186 (p=.024)*
AGE	.156 (p=.055)	.106 (p=.200)
LoE	.208 (p=.01)**	-.028 (p=.739)

Table 0-3: L2 children – Young AO

L2 Y	**Dutch**	**English**
G1Edu	.078 (p=.626)	.134 (p=.390)
G1Job	-.203 (p=.202)	.252 (p=.103)
G2Edu	.166 (p=.298)	.192 (p=.217)
NLrich	.517 (p=.001)***	-.393 (p=.009)**
BSOLg	-.889 (p=.302)	.914 (p=.266)
SchoolLg	.528 (p=.000)***	-.154 (p=.330)
OtherNr	.322 (p=.04)*	.037 (p=.812)
ParentsNLprof	.517 (p=.001)**	-.027 (p=.865)
SibNLprof	.595 (p=.001)**	-.063 (p=.751)
OtherNLprof	.842 (p=.074)	.343 (p=.506)
ParentsENprof	-.098 (p=.541)	.261 (p=.091)
SibENprof	-.483 (p=.012)*	.297 (p=.125)
OtherENprof	-.179 (p=.735)	-.621 (p=.136)
HomeLg	.434 (p=.005)**	-.094 (p=.549)
AGE	.209 (p=.191)	-.402 (p=.008)**
AO	-.212 (p=.184)	.186 (p=.232)
LoE	.447 (p=.004)**	-.266 (p=.088)

Table 0-4: L2 children - Middle AO

L2 M	**Dutch**	**English**
G1Edu	.000 (p=.999)	.294 (p=.041)*
G1Job	.005 (p=.973)	.104 (p=.477)
G2Edu	.187 (p=.193)	.422 (p=.003)**
NLrich	.407 (p=.003)**	-.502 (p=.000)***
BSOLg	.159 (p=.798)	-.654 (p=231)
SchoolLg	.436 (p=.002)**	-.491 (p=.000)***
OtherNr	-.004 (p=.979)	-.184 (p=.206)
ParentsNLprof	.273 (p=.055)	.033 (p=.820)
SibNLprof	.605 (p=.000)***	-.295 (p=.064)
OtherNLprof	.321 (p=.438)	-.365 (p=.421)
ParentsENprof	-.066 (p=.651)	.207 (p=.159)
SibENprof	-.170 (p=.289)	.338 (p=.033)*
OtherENprof	-.388 (p=.267)	.027 (p=.945)
HomeLg	.327 (p=.02)*	-.370 (p=.009)**
AGE	.347 (p=.013)*	.003 (p=.984)
LoE	.341 (p=.015)*	-.352 (p=.013)*
AO	-.015 (p=.919)	.190 (p=.192)

Table 0-5: L2 children - Old AO

L2 O	**Dutch**	**English**
G1Edu	.491 (p=.088)	.079 (p=.807)
G1Job	-.114 (p=710)	-.239 (p=.454)
G2Edu	.509 (p=.075)	.152 (p=.636)
NLrich	.310 (p=.302)	-.818 (p=.001)***
BSOLg	.	.
SchoolLg	.194 (p=.525)	-.771 (p=.003)**
OtherNr	-.185 (p=.545)	.011 (p=.973)
ParentsNLprof	-.267 (p=.378)	.190 (p=.554)
SibNLprof	.382 (p=.246)	-.636 (p=.036)*
OtherNLprof	.	.
ParentsENprof	.413 (p=.161)	.249 (p=.249)
SibENprof	.411 (p=.184)	.249 (p=.435)
OtherENprof	.	.
HomeLg	-.116 (p=.706)	-.165 (p=609)
AGE	.402 (p=.173)	-.531 (p=.076)
LoE	.219 (p=.472)	-.618 (p=.032)*
AO	-.173 (p=.572)	-.624 (p=.030)*

Appendix 3: Regression Analyses

* significant at the 0.05 level (two-tailed)

** significant at the 0.01 level (two-tailed)

*** significant at the 0.001 level (two-tailed)

Table 6-Regression Analysis of Dutch Vocabulary scores of 2L1 children

	R^2	Standardized β
Model 1	.124***	
OtherNr		-.194*
SchoolLg		.202*
LoE		.225**

Table 7-Regression Analysis of English Vocabulary scores of 2L1 children

	R^2	Standardized β
Model 1	.219***	
Home Lg		-.137
SibENprof		.219*
SibNLprof		-.160
OtherNr		-.328***
ENrich		-.063
Model 2	.216***	
HomeLg		-.121
SibENprof		.199*
SibNLprof		-.148
OtherNr		-.325***
Model 3	.205***	
SibENprof		.237**
SibNLprof		-.188*
OtherNr		-.310***

Table 8-Regression Analysis of Dutch Vocabulary Scores of L2 Children

	R^2	Standardized β
Model 1	.442***	
LoE		.031
G2Edu		.280**
NLrich		.078
SchoolLg		.217
ParentsNLprof		-.189
SibNLprof		.356
HomeLg		.107
AGE		.202
Model 2	.442***	
G2Edu		.282**
NLrich		.075
SchoolLg		.219
ParentsNLprof		-.186
SibNLprof		.362*
HomeLg		.127
AGE		.208*
Model 3	.441***	
G2Edu		.277**
SchoolLg		.247
ParentsNLprof		-.186
SibNLprof		.396**
HomeLg		.139
AGE		.205*
Model 4	.433***	
G2Edu		.249*
SchoolLg		.258
ParentsNLprof		-.117

SibNLprof		.431**
AGE		.211*
Model 5	.425***	
G2Edu		.238*
SchoolLg		.230
SibNLprof		.377**
AGE		.207*

Table 9- Regression Analysis of English Vocabulary Scores for L2 Children

	R^2	**Standardized β**
Model 1	.395***	
LoE		-.266
G1Edu		.178
G2Edu		.106
NLrich		-.680**
SchoolLg		-.010
SibENprof		.058
SibNLprof		.239
ParentsENprof		.010
HomeLg		.254
AO		.034
Model 2	.395***	
LoE		-.266
G1Edu		.179
G2Edu		.106
NLrich		-.686***
SibENprof		.058
SibNLprof		.237
ParentsENprof		.011
HomeLg		.255

AO		.035
Model 3	.395***	
LoE		-.261
G1Edu		.180
G2Edu		.105
NLrich		-.684***
SibENprof		.066
SibNLprof		.234
HomeLg		.253
AO		.036
Model 4	.394***	
LoE		-.269
G1Edu		.187
G2Edu		.099
NLrich		-.689***
SibENprof		.062
SibNLprof		.227
HomeLg		.249
Model 5	.392***	
LoE		-.277
G1Edu		.196
G2Edu		.101
NLrich		-.715***
SibNLprof		.252
HomeLg		.230
Model 6	.386***	
LoE		-.254
G1Edu		.258**
NLrich		-.748***
SibNLprof		.289

HomeLg		.196
Model 7	.375***	
LoE		-.125
G1Edu		.254**
NLrich		-.680***
SibNLprof		.274
Model 8	.366***	
G1Edu		.261**
NLrich		-.703***
SibNLprof		.213
Model 9	.350***	
G1Edu		.263**
NLrich		-.532***

Table 10- Regression Analysis for Dutch Vocabulary of Young AO L2 Children

	R^2	**Standardized β**
Model 1	.542	
LoE		.529
NLrich		.241
SchoolLg		.336
SibNLprof		.025
SibENprof		-.019
HomeLg		-.282
Model 2	.541	
LoE		.532
NLrich		.238
SchoolLg		.342
SibNLprof		.023
HomeLg		-.271
Model 3	.541	

LoE		.541
NLrich		.245
SchoolLg		.354
HomeLg		-.277
Model 4	.521	
LoE		.365
NLrich		.176
SchoolLg		.325
Model 5	.507	
LoE		.407*
SchoolLg		.432*

Table 11- Regression Analysis for English Vocabulary Scores of Young AO L2 Children

	R^2	**Standardized β**
Model 1	.257**	
NLrich		-.317*
AGE		-.329*

Table 12- Regression Analysis of Dutch Vocabulary Scores of Middle AO L2 Children

	R^2	**Standardized β**
Model 1	.387***	
NLrich		-.240
SchoolLg		.229
SibNLprof		.666*
AGE		-.019
Model 2	.387***	
NLrich		-.234
SchoolLg		.230
SibNLprof		.649**

Model 3	.375***	
SchoolLg		.119
SibNLprof		.531**
Model 4	.366***	
SibNLprof		.605***

Table 13- Regression Analysis for English Vocabulary Scores of Middle AO L2 Children

	R^2	**Standardized β**
Model 1	.437	
NLrich		-.298
HomeLg		.012
SibENprof		.046
SchoolLg		-.103
G1Edu		.144
G2Edu		.212
LoE		-.156
Model 2	.437	
NLrich		-.293
SibENprof		.044
SchoolLg		-.105
G1Edu		.144
G2Edu		.212
LoE		-.149
Model 3	.435	
NLrich		-.295
SchoolLg		-.117
G1Edu		.151
G2Edu		.212
LoE		-.160
Model 4	.430	

NLrich		-.383*
G1Edu		.159
G2Edu		.221
LoE		-.161
Model 5	.415	
NLrich		-.377*
G2Edu		.320*
LoE		-.177
Model 6	.393	
NLrich		-.473***
G2Edu		.322**

Table 14- Regression Analysis for English Vocabulary Scores of Old AO L2 Children

	R^2	**Standardized β**
Model 1	.750	
NLrich		-.285
SchoolLg		-.293
LoE		-.050
SibNLprof		-.148
AO		-.259
Model 2	.749	
NLrich		-.344
SchoolLg		-.282
SibNLprof		-.139
AO		-.254
Model 3	.741*	
NLrich		-.459
SchoolLg		-.287
AO		-.227
Model 4	.715**	

NLrich		-.681*
AO		-.254
Model 5	.669**	
NLrich		-.818**