

**The development of morphological error patterns of monolingual Dutch and bilingual
Turkish-Dutch children with and without a Developmental Language Disorder**

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Abstract

Background: Morphology is often seen as a clinical marker (i.e. a characteristic point of difficulty) of Development Language Disorder (DLD) in monolingual children. Previous studies have reported overlap in the difficulties bilingual TD (Typical Development) children and monolingual children with DLD have with morphology. As a result, it is uncertain whether morphology can be used to help identify DLD in bilingual children.

Aim: The aim of this thesis is to identify the effects of DLD and bilingualism on the development of the morphological error patterns of monolingual Dutch and bilingual Turkish-Dutch children with and without a Developmental Language Disorder.

Method: Longitudinal data of Dutch monolingual and bilingual Turkish-Dutch children with and without DLD (n = 10 per group) between the ages of 5 to 7 years was collected during three yearly sessions. At each session, children's spontaneous language was recorded during a semi-structured interview and narrative task. For each child, the morphological errors in verb inflection, determiners, adjectives, plural nouns and prepositions were coded based on error types (i.e. substitution, omission or other errors).

Results: The absolute error numbers showed that the children with DLD were more likely than TD children to make omission errors rather than substitution errors in each session in the verb inflection and the noun phrase feature categories. However, this difference between TD and DLD were only consistently significant in the verb inflection category. The omissions to total errors proportions showed a number of longitudinal effects. There was a significant effect of bilingualism in children with DLD and a significant effect of DLD in bilingual children. The bilingual children with DLD had a larger decrease in omission proportions than the monolingual children with DLD over the course of the experiment. However, the bilingual group with DLD had consistently higher omission proportions than the bilingual TD group and the monolingual group with DLD.

Conclusion: There is evidence that longitudinal error patterns involving verb inflection, noun phrase features and prepositions could help distinguish DLD from TD in bilingual children.

Keywords: Developmental Language Disorder, bilingualism, morphology, development

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Chapter 1 Introduction

Children with Development Language Disorder (DLD) commonly struggle with morphology (e.g. Bishop, 2004). They typically acquire morphological rules at a slower rate and make more errors than monolingual peers with typical development (TD). Because of this, morphology is often seen as a clinical marker (i.e. a characteristic point of difficulty) that can help identify DLD in children (e.g. Rice & Wexler, 1996). However, several studies have reported that bilingual children with typical development (TD) make similar morphological errors (e.g. Paradis, 2005; Paradis, Rice, Crago & Marquis, 2008). As a consequence, it remains unclear which linguistic difficulties can be expected in a typical second language acquisition and which difficulties are a hallmark of DLD. This raises the question whether morphology can be used as a clinical marker for DLD in bilingual children. Considering that bilingual children are at risk of being under- or overdiagnosed due to over- and underestimation of their linguistic difficulties (e.g. Botting, Conti-Ramsden & Crutchley, 1997; Grimm & Schulz, 2014; Paradis, 2005), more research is needed to distinguish between the effects of bilingualism and DLD on morphology acquisition.

This thesis examines Turkish-Dutch children, who form a considerably large bilingual population in the Netherlands. As part of the CoDEmBI-project¹, Moroccan-Dutch and Turkish-Dutch bilingual children were followed over the course of three years and completed a set of cognitive and linguistic tasks each year. Such longitudinal research is valuable as the current amount of longitudinal studies with children with DLD and bilingual children is still small. Longitudinal, developmental data provides a different perspective on how bilingual TD children and children with DLD differ in their acquisition of morphology than cross-sectional studies. That is, changes in the morphological error patterns over time may offer a point of distinction between bilingual TD children and bilingual children with DLD. For example, most of the morphological errors a certain child makes involve the omissions of bound and unbound morphemes (e.g. *she run, two tree*) at a certain point in time. A year later, the child may both omit and substitute (e.g. *she runned, two childs*) morphemes at a similar frequency. The next year, most of the child's morphological errors are substitution errors, while omission errors have become infrequent. In comparison, another child's error patterns may undergo different changes. For example, the second child also mostly makes omission

¹ See the website for more information on this project (<https://www.uu.nl/onderzoek/education-for-learning-societies/projecten-resultaten/codembi>)

errors in the first year (e.g. 90%) similar to the first child. In the second and third year, omission errors decrease in frequency, but at a slower pace than the first child (e.g. to 80% of total morphological errors in the second year, and 75% in the second year). In a similar fashion, it is possible that bilingual TD children and children with DLD differ from each other from a developmental perspective.

Therefore, this thesis has taken a developmental approach by comparing the error type patterns of Dutch monolingual and Turkish-Dutch bilingual children over the course of three years. The errors in verb inflection, determiners, adjectives, plural nouns and prepositions were tracked in their spontaneous speech production. The aim of this thesis was to identify the effects of DLD and bilingualism on the development of the morphology of monolingual Dutch and bilingual Turkish-Dutch children with and without a Developmental Language Disorder. To be more precise, the focus was on the distributions of different types of morphological errors the children made throughout three years and how time, and bilingualism and DLD affected these distributions.

Chapter 2 of thesis provides a description of DLD and bilingualism and a summary of non-Dutch studies that have examined the morphological skills of monolingual and bilingual children with and without DLD. Subsequently, previous Dutch studies that have looked at verb inflection, noun phrase features and preposition acquisition are discussed in separate sections in chapters 3 through 5. Each of these chapter starts with a short and basic description of how that particular lexical category functions in Dutch and what the typical monolingual acquisition of each category looks like. In addition, an overview is also given with previous findings on monolingual and bilingual children with and without DLD and the type of errors they make. In chapter 6, the research questions and an overview the predictions are presented. Chapter 7 contains a description of the methodology of how the data for this thesis was gathered and analysed. The results are presented in chapter 8 and discussed in chapter 9. In chapter 10, the conclusion to this thesis is presented.

Chapter 2 DLD and bilingualism

2.1 DLD

2.1.1 What is DLD?

DLD, formerly also known as SLI (Specific Language Impairment) or LI (Language Impairment), is a developmental disorder that primarily affects the language comprehension and/or production of children (e.g. Wetherell, Botting & Conti-Ramsden, 2007). It has a prevalence of approximately 7% (Bishop, 2010; Tomblin et al. 1997). A few years ago, researchers and professionals discussed the terminology of language disorders and, in particular, DLD (e.g., see Bishop, 2017; Bishop et al., 2017; Bishop, Snowling, Thompson & Greenhalgh, 2016). According to Bishop (2017), a child should be diagnosed with DLD if the child has 'difficulty producing or understanding language that affects everyday functioning'. On top of that, these language problems need to have a 'poor prognosis', meaning that they are expected to be persistent over time. The language problems should also not be associated with a known biomedical condition, meaning that the child must have a normal IQ, no hearing impairments, nor any neurological, sensory or cognitive impairments. If the child is bilingual and not familiar with the local language, it should be confirmed whether the child is competent in another language or whether the language difficulties are present in both languages.

The domains of language that are affected in DLD can include semantics, pragmatics, phonology, morphology and syntax (e.g. Bishop, 2004). The current study will only focus on morphology. This is the most commonly found affected area in DLD (see Bishop, 2004 for a summary of DLD/SLI types). Studies have found that children with DLD have a tendency to only optionally produce (i.e. occasionally omit) free and bound morphemes (e.g. *she walk* instead of *she walks*) involved in verb inflection (e.g. Armon Lotem, 2014; Conti-Ramsden, 2003; Leonard, Miller & Rauf, 2003; Rice & Oetting, 1993; Rice and Wexler, 1996; Rice, Wexler & Cleave, 1995), noun phrase features (e.g. gender and number) (e.g. Conti-Ramsden, 2003; Leonard, Salameh & Hansson, 2001; Rice and Wexler, 1996) and prepositions (e.g. Armon Lotem, 2014; Grela, Rashiti & Soares, 2004). To a lesser extent, they also substitute free and bound morphemes in these domains (e.g. *they is* instead of *they are*). As was mentioned in the introduction, these morphological errors have led

researchers to conclude that morphology can be seen as a clinical marker for DLD (e.g. Rice & Wexler, 1996).

2.1.2 Accounts of DLD

Different researchers have attempted to map and explain the effects of DLD on language development. However, until now, there is no account that covers all areas of language ability that are affected in DLD. The accounts discussed in this section are mainly relevant to the morphology of children with DLD and error types, namely the Extended Optional Infinitive Account and the Missing Agreement Account/Agreement Deficit Account.

2.1.2.1 Extended Optional Infinitive Account

The Extended Optional Infinitive (EOI) Account was proposed by Rice et al. (1995). Rice and Oetting (1993), Rice and Wexler (1996) and Rice et al. (1995) reported that children with DLD omitted the finite markers third person singular (3S) -s and past tense -ed and DO and BE auxiliaries more often than TD children. In short, Rice and Wexler (1996) and Rice et al. concluded that the children with DLD are still in the Optional Infinitive Stage (OIS) in which they optionally add or omit tense markers. During this stage in typical language development, young children produce sentences with Root Infinitives (RI) such as in (1a-d) alongside sentences containing tense. While monolingual TD children acquire inflection rules at the age of 3 to 4 years (e.g. Polišenská, 2010; Wilsenach, 2006) depending on their native language, children with DLD may have an Extended OIS in which tense remains optional for a longer time than in TD (Rice et al. 1995; Rice and Wexler, 1996). Children with DLD may also never leave this stage in more severe cases.

(1) a. Papa want apple.

Papa want.INF apple

(English, Brown, 1973)

b. Die niet lezen.

that not read.INF

(Dutch, Haegeman, 1995)

c. Thorstn das haben.

Thorstn that have.INF

(German, Poeppel & Wexler, 1993)

d. Michel dormir.

Michel sleep.INF

(French, Pierce, 1992)

This account predicts that children with DLD omit tense markers, while it also predicts that when inflection is applied, it is done so correctly. This account thus entails that these children do have the appropriate knowledge for inflection, but tense remains optional until a later age than in TD children. Rice et al. (1995) described this as the grammar of children with DLD staying ‘young’.

Findings from Leonard et al. (2003) and Rice, Wexler and Hershberger (1998) have corroborated this model. Conversely, not every study has reported omission errors to be predominant. For instance, substitution errors appear to be more prevalent than omission errors in pro-drop languages such as Hebrew and Italian (Bortolini, Caselli & Leonard, 1997; Dromi, Leonard, Adam & Zadunaisky-Ehrlich, 1999). Studies on children with DLD learning Germanic languages have also reported both omissions and substitutions, although omission errors were made more often than substitution errors in German (e.g. Kauschke, Renner & Domahs, 2017) and Dutch (e.g. Boerma et al., 2017; Blom, Vasić & De Jong, 2014; De Jong, Orgassa & Çavuş, 2007).

These error differences may be caused by differences in the verbal morphology of the languages involved as the EOI account is primarily based on English studies. English tense morphology is relatively less rich than German, Hebrew, Italian or Dutch, for example. Possible substitution errors in English would be the substitution of the 3SG -s where -∅ would be appropriate (e.g. *they run-s*), or the overregularisation of affixes (e.g. *he can-s*, *he runned*). On the contrary, morphologically richer languages such as Hebrew have higher varieties in affixes, which allows for more kinds of substitution errors. Therefore, the EOI account may be less accurate for languages with higher variety in verb affixes (e.g. pro-drop languages), than ones that have less variety (e.g. English).

Another limitation to the EOI account is the nature of the account, which describes only a phase in language development. Monolingual children with DLD have been found to improve on their verb inflection at a rate parallel to monolingual TD peers (Rice et al., 1998), or even faster than their TD peers if the TD peers had already hit a ceiling² (e.g. Boerma et al., 2017; Zwitserlood, Van Weerdenburg, Verhoeven & Wijnen, 2015). In these studies, regardless of

² That is, a ceiling, or limit, in how much a child can continue to improve. At a certain point, a child's morphological proficiency has become (almost) mature. In an accuracy test, for example, the child will score high (e.g. 98% correct) at the first session, and similarly high in a follow-up session (e.g. 99%). Because the child's accuracy was already adult-like during the first session, there is little to no improvement measured over time.

how fast the children with DLD improved, their error patterns and development looked similar to those of younger TD children. That is, they gradually made fewer omission errors over time and started to make more substitution errors instead. Thus, it seems that children with DLD may still reach the same milestone (i.e. leaving the (extended) OIS) as TD peers did a few years before them, or they may hit a ceiling in how much they can improve (i.e. their verb inflection does not fully become 100% adult-like). Consequently, the EOI account may not correctly predict verb inflection error patterns accurately for the entire childhood of a monolingual child with DLD if the child does not stagnate in their language development, but continues to improve.

2.1.2.2 Missing Agreement Account/Agreement Deficit Account

The Missing Agreement (MA) account by Clahsen (1989) was based on research with German monolingual children with DLD. This account claims that children with DLD lack an understanding of agreement relations, and, as a result, omit agreement markings. This applies to subject-verb agreement, determiner-noun agreement, adjective-noun agreement, antecedent-anaphora agreement, and other grammatical relations. Unlike the EOI account, the MA account predicts that children with DLD have trouble with any kind of agreement relation, not just verb-related agreement.

A revised version of the MA account, the Agreement Deficit (AD) account, was later developed by Clahsen and other researchers (Clahsen, 2008; Clahsen, Bartke & Göllner, 1997). One of the changes from the MA account was that an understanding of grammatical relations is not missing in children with DLD, but is just not fully acquired yet. Children with DLD can leave grammatical features (e.g. tense, gender, number) unspecified, while TD peers have already mastered these grammatical features. Another change is that the AD account focusses only on verb inflection rather than any kind of grammatical agreement like the MA account did. Children with DLD are expected to make both omission and substitution errors in their verb inflection.

The AD account is supported by the aforementioned studies in 2.1.2.1 which reported that children with DLD appear to omit or incorrectly substitute grammatical features (e.g. gender, tense, and number, and person). This could imply that they have not yet acquired the knowledge of subject-verb agreement and that children with DLD need more input than TD children. On the contrary, there is also evidence in favour of the MA account as studies

have found that these children also have difficulty with other grammatical relations. For instance, monolingual children with DLD have been found to mostly omit prepositions, but they sometimes also substitute them with the wrong preposition (Armon-Lotem, 2014; Grela et al., 2004; Roeper, Ramos, Seymour & Abdul-Karim, 2001). Determiners are frequently substituted, overgeneralized and omitted (Bottari, Cipriana, Chilosì & Pfanner 1998; Hansson, Nettelbladt & Leonard, 2003; Keij, Cornips, van Hout, Hulk & van Emmerik, 2012; Leonard et al., 2001; Rice & Wexler, 1996; Tsimpli, & Stavrakaki, 1999). Findings on noun plural affixes are mixed. In Rice and Oetting (1993), Clahsen, Rothweiler, Woest and Marcus (1992) and Leonard et al. (2001), children with DLD did not appear to struggle with plural noun formation in elicitation tasks and spontaneous speech tasks. Contrarily, in Leonard, Caselli, Bortolini, McGregor and Sabbadini (1992) and Leonard, Eyer, Bedore and Grela (1997), the children with DLD seemed to have difficulty with the noun plural -s, but these problems were not as evident as verb inflection-related problems. Studies looking at gender production found that children with DLD substitute the gender of adjectives and omit adjectival affixes more often than the LA-matched TD children (Leonard et al., 2001; Roulet-Amiot & Jakubowicz 2006; Tribushinina & Dubinkina, 2012).

In short, children with DLD appear to struggle with more types of grammatical relations than just verb inflection, which is in line with the MA account. However, the MA account implies that children with DLD miss any understanding of grammatical relations, which does not seem to be the case as children with DLD also produce correct morphology. The AD account improves on this aspect (i.e. incomplete instead of missing knowledge), but it is also narrowed down to just verb inflection. More research is needed to find out whether the AD account could also include other grammatical relations like the MA account, as most of the research on DLD has involved verb inflection.

2.1.3 General conclusions on DLD

In conclusion, the accounts discussed above have attempted to predict the difficulties children with DLD may have with language. However, none of these accounts currently appear to cover all observations found in studies involving children with DLD with several different first languages. That is, some accounts predict difficulties with verb inflection, some of which predict omission errors (EOI, MA), while another account predicts both substitutions and omissions (AD). The MA account also predicts difficulties with other

grammatical relations aside from verb inflection, but only predicts omission errors. In short, these accounts differ from each other based on three points: 1) The cause of the language problems in DLD; 2) the affected domains (i.e. only verb inflection, or any grammatical relation); and 3) the type of errors. On top of this, the language problems appear to differ based on the language of the child with DLD. For example, as was discussed earlier, omission errors appear to be more frequent in English studies than in Spanish or Hebrew studies. Therefore, these accounts on DLD may not unanimously predict language difficulties for children with any native language. That is, one account may fit the language problems in DLD found in one language, but not in another language. These accounts need to be tested in more languages to see how these accounts hold up for a specific language. If more is known about the language difficulties of children with DLD across different languages and how each account holds up for each language, more about the nature of DLD will also be uncovered (i.e. whether there is a universal source or cause of all language problems found in DLD). Because of this, this thesis discusses expected difficulties in Dutch children with DLD for all domains separate from non-Dutch studies in chapters 3 to 5. The thesis focusses on the third point of difference between the accounts, namely the error types.

2.2 Bilingualism and DLD

2.2.1 What is bilingualism?

A person can learn two languages from birth (i.e. simultaneous bilingualism), or learn an second language (L2) later on in their childhood or adulthood (i.e. successive bilingualism). There is ongoing debate about the age at which simultaneous bilingualism exactly ends and successive bilingualism begins (e.g. Meisel, 2010). The type of bilingualism that the current study focusses on cannot be described as successive or simultaneous specifically. The bilingual Turkish-Dutch children who participated in this study received Turkish input from their parents from birth and most of them received both native and non-native Dutch input from people in their environment before the age of 4 when they started attending school (e.g., through daycare). Thus, they did not acquire both languages at a similar rate simultaneously, nor did they only start receiving input of the L2 at a later age. However, the Turkish-Dutch children have received less native Dutch input compared to monolingual Dutch children. This puts the bilingual children at an expected risk of lagging behind the monolingual children in terms of reaching language development milestones since input

quantity and richness positively correlate with accuracy for certain aspects of the morphosyntax and morphology (e.g. Jia & Aaronson, 2003; Unsworth, 2013).

One notion that is relevant for bilingualism and this thesis is L1 transfer, also known as language transfer or crosslinguistic influence. It refers to the influence the first language can have on the acquisition of the second language. For example, the L1 does not feature inflection on adjectives, while the L2 features specific gender and number inflections for adjectives. As a consequence, the acquisition of adjectives in the L2 will be relatively more difficult than if the L1 featured a similar adjectival inflectional paradigm as the L2 (e.g. Hulk, & Müller, 2000). How L1 transfer may affect the Turkish-Dutch bilingual children who participated in the present study is discussed in chapters 3 to 5.

2.2.2 Bilingualism and morphological error patterns

Just like children with DLD and younger monolingual TD children, bilingual TD children have been found to make substitution and omission errors in the domains of verb inflection, prepositions, and noun phrase gender and plurality in several studies (e.g. Armon-Lotem, 2014; Granfeldt, 2000; Paradis, 2005; Paradis et al., 2008; Montrul & Potowski 2007; Schwartz, Kozminsky & Leikin, 2009; Thomas, Williams, Jones, Davies & Binks 2014; Zaretsky, Lange, Euler & Neumann 2013). Bilingual children omit and substitute verb affixes (Blom & Paradis, 2013; Paradis, 2005; Paradis et al., 2008;) and prepositions (Armon-Lotem, 2014), with substitution errors being the most frequent in older children. Bilingual TD children have been found to omit determiners at an early age (e.g. around 2 years in Granfeldt, 2000), but studies including older children have reported both substitution and omission errors (e.g. around 6 years in Keij et al., 2012; Vasić & Blom, 2011). However, differences between children with DLD and bilingual TD children have also been reported regarding error types. For instance, in Armon-Lotem (2014), although both the Hebrew monolingual children with DLD and the Russian-Hebrew bilingual TD children both made substitution errors in two verb inflection production tasks, only the monolingual group with DLD also made omission errors. In Paradis (2005), the bilingual children who spoke English as their L2 did not differ from English monolingual children with DLD based on their verb inflection error types in both spontaneous and elicited speech. That is, the bilingual TD children made more omission errors than commission errors (additions of excess affixes plus substitution errors) similar to monolingual children with DLD. Instead, the bilingual TD children had an overall higher

accuracy than monolingual children with DLD. Thus, these cross-sectional studies have shown mixed results on whether bilingual TD children and monolingual children with DLD differ in their error types.

A non-Dutch longitudinal study ran by Zdorenko and Paradis (2008) followed children from varying linguistic backgrounds who were acquiring English as their L2 from the age of 4 to 7 years. The L1 appeared to affect the determiner production in the L2 of bilingual children, mostly when the children were 5 to 6 years old. Children whose L1 did not feature determiners, dropped determiners in their L2 more often than children whose L1 did feature determiners. It has to be noted, however, that the bilingual children had only been exposed to their L2, English, for 9 months at the time of the first session, so they were still at relatively early stages of their L2 acquisition, which could explain the high omission rates at the ages of 5 to 6.

In short, monolingual children with DLD and bilingual TD children have a lot of similarities in their morphological error types (e.g. Paradis, 2005). Both groups have shown delays in their acquisition of morphology to some extent compared to monolingual TD peers. In addition, both groups have been reported to make both omission and substitution errors in their morphology. Some studies have reported that bilingual TD children make more omission errors than substitution errors (e.g. Paradis, 2005), while other studies have reported that omission errors are not as prevalent in bilingual TD children as substitution errors (e.g. Armon-Lotem, 2014; Thomas et al., 2014).

2.2.3 Bilingual DLD and morphological error patterns

A few non-Dutch studies have compared the morphological error types of bilingual children with and without DLD. For instance, Blom and Paradis (2013) looked at past tense affix use of bilingual children with and without DLD. Both groups made omission errors, although the bilingual TD group produced more tensed verbs and made more overregularisation errors than the bilingual group with DLD.

A longitudinal study by Paradis (2008) compared the tense marking of English bilingual TD children and two impaired English bilingual children over a period of time. Paradis concluded that the two impaired children not only showed similarities with bilingual TD children, but also with the EOI stage patterns found in monolingual children with DLD. In the first session, at around the age of 5 years, about 90% of the errors made by the impaired bilingual

children were omission errors, while the bilingual TD group had an average of 65% omission errors. During the second session a year later, one of the impaired bilingual children had a 50/50 distribution in omission versus commission errors, while the other impaired child had a rate of 75% omission errors. The bilingual TD children had a rate of 53% omission errors.

Similarly, Salameh, Håkansson and Nettelbladt (2004) reported on their longitudinal study with Swedish-Arabic bilingual children with and without DLD that bilingual children with and without DLD followed the same developmental language pathway that had also been found in younger monolingual TD children. However, the bilingual children with DLD took a longer time to reach a certain developmental level than the bilingual TD children.

In short, bilingual children with and without DLD appear to make both omission and substitution errors. It can be expected of bilingual children with DLD that they produce more omission errors than bilingual TD children as a result of DLD. Over time, the proportion of omission errors relative to total errors should become smaller in both groups. What may distinguish between bilingual TD children and bilingual children with DLD is that bilingual TD children reach lower omissions to substitutions rates earlier than their bilingual peers with DLD.

A few other studies have compared monolingual DLD and bilingual DLD. A study by Gutiérrez-Clellen, Simon-Cereijido and Wagner (2008) concluded that regardless of their English monolingual or Hispanic-English bilingual background, children with DLD mostly made omission errors rather than substitution errors in their verb inflection. Paradis (2007) reviewed two French-English studies and concluded that the bilingual children with DLD did not differ from the monolingual children with DLD in their accuracy in the production of a wide range of grammatical morphemes.

In conclusion, monolingual children with DLD and bilingual children with and without DLD all appear to make both omission and substitution errors. As was mentioned earlier omission errors are associated with early stages of morphology acquisition, while substitution errors are a sign of following stages of development. Although there are only a few longitudinal studies involving DLD and bilingualism, there are some signs that between-group differences may become more apparent over time. That is, bilingual TD children may improve faster than monolingual and bilingual children with DLD, which should be expressed in lower rates of omission errors than the children with DLD.

Chapter 3 Verb Inflection

3.1 Dutch verb inflection

According to Koster (1975), the unmarked word order of Dutch is Subject-Verb-Object (SVO). Although this thesis will not be looking at the word-order proficiency of children, word-order features is important for Dutch subject-verb agreement in certain cases. Either the finite verb is put in the second position of main clauses, or the subject and the verb are inverted in certain illocutionary acts (e.g. imperatives and questions). Finite verbs also appear in the final position in embedded clauses³. Generally, the infinitive verb is put in the final position of the sentence. Dutch finite verbs are marked with tense, person and number. This chapter contains a basic description of Dutch verb inflection. For a more detailed account on Dutch grammar, see the *Algemene Nederlandse Spraakkunst* (ANS; Haeseryn, Romijn, Geerts, De Rooij & Van Den Toorn, 1997).

3.1.1 Present tense

The Dutch infinite verbs are marked with the suffix -(e)n. Together with an affix, the stem of an infinitival verb form (minus the infinite marker) is used to express person and number in the present tense. In regular verbs, three affixes can be added to the stem: -∅, -t and -en (see 2). The -∅ affix expresses first person singular (1SG), the -t second and third person singular (2SG and 3SG), and the -en expresses plural forms. The 2SG form is the same as the 1SG form in cases of subject-verb inversion (see 3-4).

(2) Present tense regular - rennen ('to run')

Person & Number	Pronoun	Forms	Translation	Rules
1SG	ik	ren	I run	stem+∅
2SG	jij/je	rent	you run	stem+t
3SG	hij/ie, zij/ze, het	rent	he/she/it runs	stem+t
1PL	wij/we	rennen	we run	stem+en
2PL	jullie	rennen	you run	stem+en
3PL	zij/ze	rennen	they run	stem+en

³ See Koster (1975) for more on the Subject-Object-Verb, or SOV order in Dutch.

(3) Ga jij weg?

Go you away

'Are you going away?'

(4) Gaat hij weg?

Goes he away?

'Is he going away?'

Some stems end on the graphemes -t or -d, which are both pronounced as /t/. In cases where the stem ends with the grapheme 't', no -t affix is added. In cases where the stem ends with the grapheme 'd', the -t affix is still added to the stem for 2SG and 3SG (5-6) (Booij, 2002). Dutch also contains a few verbs that are formed irregularly in the present tense (e.g. 7-9). These irregular verbs have no systematic morphological rules like the regular present tense verbs. For instance, unlike the present tense, the 3SG form of *willen* (7) is not formed by adding -t to the stem. In other irregular verbs, there are no consistent stems or affixes across each person and number (e.g. 8-9).

(5) Hij weet-Ø

He knows

'He knows.'

(6) Hij word-t.

He becomes

'He is becoming.'

(7) Present tense irregular - *willen* ('to want')

1SG	ik	wil	I want
2SG	jij/je	wilt	you want
3SG	hij/ie, zij/ze, het	wil	he/she/it wants
1PL	wij/we	willen	we want
2PL	jullie	willen	you want
3PL	zij/ze	willen	they want

(8) Present tense irregular - hebben ('to have')

1SG	ik	heb	I have
2SG	jij/je	hebt	you have
3SG	hij/ie, zij/ze, het	heeft	he/she/it has
1PL	wij/we	hebben	we have
2PL	jullie	hebben	you have
3PL	zij/ze	hebben	they have

(9) Present tense irregular - zijn ('to be')

1SG	ik	ben	I am
2SG	jij/je	bent	you are
3SG	hij/ie, zij/ze, het	is	he/she/it is
1PL	wij/we	zijn	we are
2PL	jullie	zijn	you are
3PL	zij/ze	zijn	they are

3.1.2 Past tense

Past tense verbs in Dutch are also divided into regular and irregular verbs. Over 80% of Dutch past tense verbs are regular (Tabak, Schreuder, & Baayen, 2005). The regular verb forms are formed by adding the past tense affixes to the same stem that was used for the present tense. The selected affix depends on the stem ending. If the final phoneme of the stem is an underlyingly⁴ voiceless obstruent, the selected affixes are -te for singular and -ten for plural (Ernestus & Baayen, 2001) (10). The affixes for verb stems ending on any other phoneme are respectively -de and -den for singular and plural forms (11). A complicating factor for auditory recognition of number differences in Dutch regular past tense is the frequent n-deletion in the pronunciation of the plural forms. Consequently, there are often no audible differences between -te and -ten, or -de and -den. The irregular past tense is either formed by using the stem with a vowel change and only adding the affix -en for plural

⁴ Dutch has final-obstruent devoicing (e.g. see Zonneveld, 2007). In short, although certain verb stems end on grapheme that represent a voiced obstruent (e.g. *melden* - *meld*, 'to report'), the voiced obstruent (e.g. /d/) is devoiced during pronunciation (e.g. /mɛldən/ - /mɛlt/). The -te/-ten affix is only selected if the obstruent is underlyingly voiceless (e.g. *heffen* / hɛfən/ - *hef-te*, /hɛftə/, 'to lift', as opposed to *meld-de*). That is, the obstruent must be originally voiceless in the non-finite verb form, regardless of final-obstruent devoicing.

forms (12), or a form that differs greatly or entirely from the stem (13) (Haeseryn et al., 1997). The verbs that undergo a vowel change are also referred to as strong or ablauting verbs (e.g. Verhoeven & Vermeer, 2001).

(10) Past tense regular -de(n) - rennen ('to run')

1SG	ik	rende	I ran	stem+de
2SG	jij/je	rende	you ran	stem+de
3SG	hij/ie, zij/ze, het	rende	he/she/it ran	stem+de
1PL	wij/we	renden	we ran	stem+den
2PL	jullie	renden	you ran	stem+den
3PL	zij/ze	renden	they ran	stem+den

(11) Past tense regular -te(n) - praten ('to talk')

1SG	ik	praatte	I talked	stem+te
2SG	jij/je	praatte	you talked	stem+te
3SG	hij/ie, zij/ze, het	praatte	he/she/it talked	stem+te
1PL	wij/we	praatten	we talked	stem+ten
2PL	jullie	praatten	you talked	stem+ten
3PL	zij/ze	praatten	they talked	stem+ten

(12) Past tense irregular - lopen ('to walk')

1SG	ik	liep	I walked
2SG	jij/je	liep	you walked
3SG	hij/ie, zij/ze, het	liep	he/she/it walked
1PL	wij/we	liepen	we walked
2PL	jullie	liepen	you walked
3PL	zij/ze	liepen	they walked

(13) Past tense irregular - zijn ('to be')

1SG	ik	was	I was
2SG	jij/je	was	you were
3SG	hij/ie, zij/ze, het	was	he/she/it was
1PL	wij/we	waren	we were
2PL	jullie	waren	you were
3PL	zij/ze	waren	they were

3.1.3 Past participle

The regular past participle is formed by adding the prefix *ge-* and the suffixes *-d* or *-t* to the stem (14). Similar to regular past tense affixes, the *-t* suffix is selected when the last phoneme of the stem is an underlyingly voiceless obstruent, and the *-d* suffix is selected in all other cases. Irregular past participles are formed in a number of different ways. The stem can remain the same or undergo a vowel change after which the prefix *ge-* and suffix *-(e)n* are added (15 and 16, respectively). The stem can also undergo a bigger change than just a vowel change and receive the *ge-* prefix and either the *-t/-d* or *-(e)n* suffix (17). A rule for all participles is that the prefix *ge-* is not applied to the stem if the stem has an unstressed prefix such as *be-*, *er-*, *ge-*, *her-*, *ont-* or *ver* (*bevelen* - *bevolen*, 'to recommend, recommended'), or if the verb is made up from separable parts (e.g., *aanbevelen* - *ik beveel aan* - *aanbevolen*, 'to recommend - I recommended - recommended') (Haeseryn et al., 1997). The past participle is always accompanied by an auxiliary, which can be either *be* or *to have* (14-17).

(14) Past participle regular - rennen ('to run')

ik heb gerend	I have run	ge+stem+d
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(15) Past participle irregular - kijken ('to look')

ik heb gekeken	I have looked	ge+ ablauted stem +en
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(16) Past participle irregular - vallen ('to fall')

ik ben gevallen	I have fallen	ge+stem+en
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(17) Past participle irregular - kopen ('to buy)

ik heb gekocht

I have bought

ge+ special stem +t

3.1.4 Error types in Dutch verb inflections

As was mentioned earlier, this thesis focuses on the distributions of omission versus substitution errors. Table 1 contains an overview of what is understood by omission and substitution errors in Dutch verb inflection, as this is not always as straightforward as a missing affix versus an incorrect affix.

Table 1.

A short description of the error types in Dutch verb inflection as used in this thesis.

Omission	a. Affix omission/bare verb: missing affixes, only a stem where there should be stem plus affix	a. <i>Wij ren-Ø</i> instead of <i>wij renn-en</i> ('we run')
	b. Root Infinitives: non-finite form where a finite form should be used	b. <i>Ik boekje lezen</i> instead of <i>ik lees een boek</i> ('I am reading a book')
Substitution	a. Incorrect agreement: an incorrect affix was applied (includes any overregularisations, and past tense -te versus -de)	a. <i>Ik lez-en een boekje</i> instead of <i>ik lees een boekje</i>
	b. Wrong tense was applied (e.g. present tense instead of present tense)	b. <i>Gisteren lees ik</i> instead of <i>gisteren las ik</i> ('Yesterday, I read')

3.2 Similarities and differences between Dutch and Turkish verb inflection

While Dutch is mainly a SVO language (Koster 1975), Turkish has a neutral, unmarked SOV that can be freely shifted depending on the pragmatics and semantics of the sentence according to Kornfilt (1997). Turkish is also a pro-drop language, meaning that personal pronoun subjects such as *you* and *I* can be omitted. Instead, the subject's number and person is expressed through the inflection on the verb (Kornfilt, 1997). The verb inflection is

non-syncretic (Lewis, 1967). This means that each number and person has a different affix, while Dutch only has three different affixes that can be used for multiple person subjects (e.g. the -en affix is used for 1PL, 2PL and 3PL and the infinitival verb form). In Turkish, a tense affix (e.g. present, past or future) is applied to the stem. After the tense affix, the number and person affix are added as well. In Dutch, future tense is not expressed through affixes, but through either context and present tense or auxiliary verbs such as *zullen* ('will') and *gaan* ('to go'). Because the Dutch verbal affixes have a lower variety (i.e. certain affixes can refer to multiple different persons) than Turkish verbal affixes the Turkish-Dutch children are expected to struggle Dutch subject-verb agreement. In addition they may also have trouble with tense as Dutch tense is not always expressed by adding an affix to the stem, while tense always has an affix in Turkish.

3.3 Acquisition of Dutch verb inflection

3.3.1 Present tense

Three main stages in the typical acquisition of Dutch present tense verb inflection have been described by Wijnen (2000) (18). Some of these stages have been (partially) mentioned in the previous chapter. Generally, Dutch monolingual TD children have acquired the knowledge for verb inflection around the age of 3 and can correctly apply verb affixes at that age (e.g. Polišenská, 2010).

- | | |
|--------------|---------------------------|
| (18) Stage 1 | Infinitival stage |
| Stage 2 | Lexical-finite stage |
| Stage 3 | Optional infinitive stage |

In the first stage, a Dutch monolingual TD child uses RIs in small and simple two- or three-word clauses around the age of 2 (e.g. (19a), from Blom, 2003: i). The Dutch RI is characterised by a non-finite verb in the final position of a sentence marked by the infinitival affix -en. The adult version of (19a) can be (19b) or (19c) in which the main verb is made finite or a finite auxiliary is added (also from Blom, 2003: ii). The duration of this stage differs per child, ranging from weeks to months (Wijnen, 2000).

- (19) a. jij de walvis maken
 you the whale make.INF
- b. jij maakt de walvis
 you make.FIN the whale
 'You are making the whale'
- c. jij moet de walvis maken
 you must-aux the whale make.INF
 'You have to make the whale'

In the second stage, the child has a subset of verbs that he or she marks with finiteness, although RIs remain dominant. The subset of inflected verbs mainly include modal auxiliaries (e.g. *kan*, 'can'), the copula *is* and a few lexical verbs that are stative (e.g. *past*, 'fits') or non-dynamic (e.g. *zit*, 'sit(s)') that are correctly placed in the second or fronted position of the sentence (20ab, Wijnen, 2000: 66). One notable feature of this subset is that none of these verbs are used as RI's or vice versa during this stage (for more on the no-overlap phenomenon, see Poeppel & Wexler, 1993).

- (20) a. rode kan niet in
 red one can.FIN not in
 'The red one cannot go inside.'
- b. mag niet
 may.FIN not
 'That is not allowed.'

The third and final stage starts around three months after the child has reached the first stage. As was mentioned earlier, the child uses tense optionally during this stage. RIs, finite verb forms and auxiliary plus infinitives all appear. Two notable uses of auxiliaries are the aspectual auxiliary *gaan* ('to go') or *doen* ('to do') as dummy auxiliaries (21, from Wijnen & Verrips, 1998). Dummy auxiliaries do not contribute to the meaning of the utterance (i.e. the auxiliary can be omitted without a change in meaning) nor do they convey any contextually relevant aspectual feature (i.e., about an act someone is *going to do* or something that is

going to happen in the near future) (e.g., Wijnen, 2000; Wijnen & Verrips, 1998). Rather, dummy auxiliaries can be seen as a way to circumvent having to use more difficult inflection.

(21) a. *hij doe huilen*

he do.FIN cry

'He is crying.'

b. *poesje gaat hier blijven staan*

kitty goes here remain stand

'Kitty is staying here.'

In addition to the omission of finiteness or tense markers, Dutch monolingual TD children also make substitution errors (e.g., overregularisations). Previous studies have reported that these children incorrectly apply the -t and the - \emptyset suffixes to inappropriate contexts (e.g. *zij rent* instead of *zij rennen*, 'they run'), although they only sporadically appear to incorrectly apply the finite plural -en affix to singular contexts (Blom & Poliřensk, 2006; Poliřensk, 2010).

3.3.2 Past tense

Past tense verb inflection remains more problematic than present tense inflection after the age of 3. Dutch monolingual TD children make overregularisation errors (e.g., *loop-te* instead of *liep*), they apply the -te affix in contexts where the -de affix is appropriate and vice versa (occasionally in combination with an overregularisation error), and they use present tense forms where the past tense form should be used (van Kampen & Wijnen, 2000; Rispen & de Bree, 2014, 2015). Different kinds of frequencies (i.e. type and token frequency) are argued to affect acquisition of irregular and regular forms. Since this thesis will not focus on frequency of verb forms, type and token frequency will not be discussed here. For information on Dutch verb forms and frequency effects, see Tabak et al. (2005).

3.3.3 Participles

Dutch monolingual TD children start using participles in the second stage of their verb inflection development (e.g. Bol & Kuiken 1988; Wijnen & Verrips, 1998). In this stage, the children tend to omit participial affixes, of which most are unstressed prefixes (e.g. (22), Van Kampen & Wijnen, 2000; Wijnen, Krikhaar & Den Os, 1994; Wijnen & Verrips, 1998).

- (22) Peter emmer (ge-)daan (Wijnen & Verrips, 1998: 6)
Peter bucket done
'Peter put (it) (in) (the) bucket.'

Like the present tense verb inflection, children typically have acquired the rules for Dutch participles around the age of 3 years (Wilsenach, 2006). After age of 3, Dutch monolingual TD children have been reported to make more substitution and addition with participial affixes errors (e.g. overregularisations) than omission errors (e.g. Van Kampen & Wijnen, 2000).

Dutch children may acquire participles at a relatively young age, because the frequency of participles is high in Dutch (De Houwer, 1990). The high frequency is due to the contexts in which participles are used in Dutch. For instance, while English speakers would use simple past tense to express an action or event from the past in a nonnarrative setting (e.g. *Yesterday, I saw you at the museum*), Dutch speakers are more inclined to use present perfect participles (e.g. *Gisteren heb ik je in het museum gezien*), although using the simple past form would also be a grammatical option (e.g. *Gisteren zag ik je in het museum*) (see Boogaart, 1999).

3.4 Dutch verb inflection and the effects of DLD and bilingualism

3.4.1 Monolingual children with DLD and Dutch verb inflection acquisition

De Jong (1999) reported three types of errors with present tense verb inflection of Dutch monolingual children with DLD (23). These errors overlap with the type of errors Dutch monolingual TD children make in their early stages of inflection acquisition (see 3.3.1).

- (23) Type 1 The use of bare verbs
Type 2 The substitution of the -t affix in plural contexts
Type 3 The use of RI's

Other studies have reported that monolingual Dutch children with DLD predominantly omit verb affixes and produce RIs in both present and past tense contexts (e.g. Boerma et al., 2017; Blom et al., 2014; De Jong et al., 2007; Verhoeven et al., 2011; Steenge, 2006; Rispens & De Bree, 2014). Past tense was frequently substituted by children with DLD for present

tense in a study by Rispen and De Bree (2014). Overall, the least frequent errors appear to be substitution errors. In the production of participles, children with DLD omit affixes, predominantly the prefix (Boerma et al., 2017; Wilsenach, 2006). These findings are in accordance with the developmental patterns of younger TD children who are in the early stages of their verb inflection acquisition (see 3.3.3). In contrast, TD children of the same age as the children with DLD have been reported to make more substitution or addition errors in the verbal domain, while only a relatively low amount of omission errors are observed (e.g. Blom, De Jong, Orgassa, Baker & Weerman, 2013; De Jong et al., 2007).

As of yet, only a few studies have looked at the error patterns of Dutch children with DLD over time. In Boerma et al. (2017), the children with DLD omitted affixes more often than the TD children during the first session, when they were 5 or 6 years old. When the children were tested again a year later, the children with DLD did not omit the participial affixes more frequently than their TD peers did. This suggests that the children with DLD improved over time.

Another longitudinal study came to a similar conclusion. Zwitterlood et al. (2015) saw a similar decline in the quantity of verb inflection errors of Dutch monolingual children with DLD aged 6.5 years during three sessions spread out over the course of two years. The children with DLD scored worse than the chronological age-matched (CA) and the language age-matched (LA) TD children during all three sessions. However, the children with DLD improved more rapidly than the other two groups (who already made few errors), especially between the first and second sessions, and they seemed to be catching up with them. In particular, the DLD group produced fewer RIs over the course of the two years, although there were still some observations during the final session when children were 8 years old. The CA-matched children did not use any RIs during any of the sessions and the LA-matched children (around 4 years old at the first session) only used some RIs in the first two sessions, which fits the timeframe of typical language development. Zwitterlood et al. (2015) did not distinguish between bare verbs and substituted agreement affixes, so no conclusion can be drawn from this study about the proportions of these two error types.

In conclusion, it can be expected that Dutch monolingual children with DLD do improve over time in terms of their verb inflection development. However, the speed at which this takes place is still unsure. As mentioned in the previous chapter, an English study by Rice et al. (1998) concluded that the DLD group did not improve at a rate in which they would catch

up with their TD peers. Instead, the DLD group improved at a rate parallel to that of the TD peers, although they still performed worse. However, at a certain point in time the TD children will hit a ceiling in their development as they have become (almost) adult-like. At that time, it can be expected that children with DLD will continue to improve their morphological ability until they have reached a ceiling or a plateau where they cannot progress any further.

3.4.2 Bilingualism and Dutch verb inflection acquisition

On the one hand, bilingual TD children who are acquiring Dutch as their L2 have been reported to make both omission and substitution errors with verb inflection, although substitution errors appear to be more prominent (e.g. Verhoeven et al., 2011; Rispens & De Bree, 2014). On the other hand, bilingual children with DLD seem to make more omission errors than their bilingual CA- or LA-matched TD peers (Boerma et al., 2017; De Jong et al., 2007; Steenge, 2006).

3.4.2.1 Bilingual children with and without DLD and Dutch present tense

The Dutch-Turkish bilingual TD children around the age of 6;7 years in De Jong et al. (2007) scored nearly as well as the monolingual TD children around the age of 4;8 years on present tense agreement marking (respectively 92% and 100% correct). The Dutch-Turkish bilingual and Dutch monolingual groups with DLD around the ages of 7;3 and 7;4 years scored worse (respectively 74% and 79% correct). Both DLD groups hardly substituted the plural -en affix in singular contexts, which is comparable to younger monolingual TD children (see 3.3.1). The bilingual group with DLD struggled more with plural contexts than the monolingual groups with DLD, while the latter struggled more with singular contexts. In 3PL contexts, the bilingual children with DLD mostly tended to substitute the plural -en affix with the singular -t affix (46%) and sometimes produced a bare verb (12%), while the monolingual group with DLD produced both errors in about equal proportions (10% and 11%). De Jong et al. argue that the bilingual children with DLD struggled more with plural forms because of a lexical error. That is, the bilingual children with DLD stored the plural items that were used in the study (e.g. *de kinderen*, 'the children' and *de ouders*, 'the parents') as a referent to one singular individual (e.g. one child, or a father or a mother). Nevertheless, it is still unsure whether this is indeed the cause of the higher 3PL inaccuracies in this group.

Unlike the participants in the study by De Jong et al. (2007), the Dutch-Moroccan and Dutch-Turkish bilingual TD group did not score as well as the Dutch monolingual TD group with present tense marking in Verhoeven et al. (2011). In addition, Verhoeven et al. (2011) compared bilingual TD children and the bilingual children with DLD. Both bilingual groups substituted singular forms in plural contexts more often than monolingual children with and without DLD, which is in line with the error patterns found by De Jong et al. (2007) for bilingual children with DLD. Both monolingual and bilingual children with DLD omitted the agreement marker in the 3SG contexts more frequently than monolingual and bilingual children with TD.

Blom et al. (2013) also studied Turkish-Dutch bilingual children with and without DLD. In terms of error frequency, the bilingual DLD group made more errors than the CA-matched bilingual TD group. In terms of error type, the bilingual children with and without DLD both made substitution errors, although the bilingual DLD group had a higher amount of substitution errors than the bilingual TD group. On the contrary, omission errors (i.e. bare verbs) were made by the monolingual DLD group more often than by either bilingual group. However, Blom et al. (2013) argue that the children had individual error-type patterns irrespective of their group, which makes it hard to find a type of error that can distinguish between the effects of DLD and bilingualism.

3.4.2.2 Bilingual children with and without DLD and Dutch past tense

As of yet, there are no studies involving bilingual children with DLD and Dutch past tense. There is one study by Rispens & De Bree (2014) that only involved bilingual TD children. In Rispens & De Bree (2014), the production of Dutch past tense verbs of 7-year-old Dutch-Hebrew bilingual TD children was compared with LA- and CA-matched groups of Dutch monolingual TD children using both novel and existing verbs. The Dutch-Hebrew bilingual TD children did not differ from the CA-matched Dutch monolingual TD children based on the regular past tense verb production. Both groups had overall high accuracy scores for regular verbs, although both groups scored relatively lower on regular low-frequency verbs that require the -de affix in comparison with other regular verbs. Irregular verbs were difficult for all three groups. The bilingual group scored better on irregular verbs (15% correct on average) than the LA-matched group (10% correct on average), but worse than the CA-matched group (29% correct on average). The overregularisation of the -te/-de affix (e.g.

loopte instead of *liep*) was the most common error for all three groups. Notably, the bilingual TD group also overregularised the wrong affix (e.g. *loopde* instead of *liep*), whereas the other two groups hardly made such errors.

3.4.2.3 Bilingual children with and without DLD and Dutch participles

As was mentioned earlier, Wilsenach (2006) and Boerma et al. (2017) concluded that Dutch monolingual children with DLD predominately omit the participial affixes and namely the prefixes. The longitudinal study of Boerma et al. also included Dutch-Turkish bilingual children with and without DLD. Both the bilingual and monolingual TD groups hardly omitted the participial affixes, while both the bilingual and monolingual groups with DLD omitted affixes during the first session. The bilingual TD group made more substitution and addition errors than the monolingual TD group instead. A year later, both DLD groups did not differ much from the TD groups anymore with respect to the proportions of omission errors which became infrequent for all groups.

3.5 Summary

In short, there is large support that the omission of affixes are a sign of DLD (at least at an early age) in both Dutch (e.g. Boerma et al., 2017; Blom et al., 2007) and non-Dutch studies (e.g. Armon Lotem, 2014; Conti-Ramsden, 2003; Leonard et al., 2003). The omission of verb affixes is associated with early monolingual TD verb inflection acquisition as mentioned in 3.3. Error patterns that could help distinguish the effects of DLD and bilingualism on error patterns appear to change over time. That is, younger children with DLD have a higher rate of omission to substitution errors, and as they get older, this rate will become lower, although omission errors are expected to be persistent. Bilingual TD children are expected to make both omission and substitution errors, but they are expected to gradually have a lower omission to substitution error ratio. Compared to monolingual children with DLD, the bilingual TD children make relatively more substitution errors than omission errors. (e.g. Verhoeven et al., 2011). For instance, bilingual TD children have been found to substitute agreement markers and overregularize past tense (sometimes with the wrong regular affix) (e.g. Rispens & De Bree, 2014). They do not differ much from the monolingual TD children in respect to participial affix error types, although they did have a higher frequency of errors than the monolingual TD children (Boerma et al., 2017). There is only little Dutch research on bilingual children with DLD. But the few studies that were discussed earlier have reported

that they make more omission errors than substitution errors, similarly to monolingual children with DLD.

In conclusion, it appears that monolingual and bilingual children with and without DLD go through the same developmental stages of verb inflection, but at a different pace and at different ages. On the one hand, the predominance of substitution errors is associated with later stages of verb inflection acquisition in monolingual TD children as mentioned in 3.3. On the other hand, omission the predominance of omission errors is linked to earlier stages in verb inflection acquisition.

It can be expected that both monolingual and bilingual children with DLD will predominately make verb inflection omission errors. While bilingual TD children only have a developmental delay caused by reduced native input, children with DLD have a persistent disorder that makes verb inflection difficult for them to acquire. Therefore, the ratios of omission to substitution errors in monolingual and bilingual children with DLD are expected to go down over time, although omission errors will remain a frequent error for this group. But since bilingual children with DLD also receive less native input than monolingual children with DLD, they are expected to have a slower decrease in these ratios than monolingual children with DLD. Bilingual TD children will make both substitution and omission errors, but their omission to substitution ratios are expected to go down faster than those of the monolingual and bilingual DLD groups.

Chapter 4 Noun phrase features

4.1 Dutch noun phrase features

In Dutch, the grammatical gender of a noun can either be common or neuter. However, the gender is generally not marked on the noun itself apart from a select set of words that express gender inherently (e.g. *juf*, ‘female teacher’, *meester* ‘male teacher’). Noun gender can be expressed through determiners and, very limitedly, through adjectives. For a more in-depth description of Dutch gender, see Van Berkum (1996).

The Dutch definite determiners are *de* (pronounced /də/) for common and plural nouns and *het* (/hɛt/) for singular neuter nouns. The indefinite, singular determiner, *een* (/ən/), can be applied to both common and neuter, singular nouns. Indefinite, plural nouns are not accompanied by a determiner. The indefinite determiner should not be confused with the cardinal number *een*, (/:en/, ‘one’). Common nouns have a higher frequency than neuter nouns based on both type frequency (ration of 2:1) and token frequency (ration of 3:1) (Van Berkum, 1996).

Attributive adjectives receive an schwa affix -e (-/ə/), except if the noun is indefinite, singular and neuter (see table 2) and in a number of special cases, e.g., when the adjective already ends on a schwa like the adjective *oranje* (‘orange’) (see Haeseryn et al., 1997 for a broader description). Predicative adjectives never receive a suffix (*de hond/het paard is groot*, ‘the dog/the horse is large’). Because common nouns are more frequent than neuter nouns and the suffix -e is also added to the adjective in plural contexts, adjectives with the suffix -e are more frequent and have higher syncretism than bare adjectives.

Table 2.

Dutch determiners, adjectives and plurals.

	Common	Neuter
Definite, singular	De grote hond (‘The large dog’)	Het grote paard (‘The large horse’)
Indefinite, singular	Een grote hond (‘A large dog’)	Een groot paard (‘A large horse’)
Definite, plural	De grote honden (‘The large dog’)	De grote paarden (‘The large horses’)
Indefinite, plural	Grote honden (‘Large dog’)	Grote paarden (‘Large horses’)

Regular plurality in nouns is expressed through the plural suffixes -en (-/ən/, although the /n/ is often dropped in spoken language) or -s depending on sonority and stress, and some exceptions (see Haeseryn et al., 1997). A select number of nouns can receive either plural suffix (e.g. *zonen* or *zoons*, ‘sons’). Only 31% of Dutch nouns take the suffix -s (Baayen, McQueen, Dijkstra & Schreuder, 2003), making the suffix -en the most frequent of the two. There is also a small amount of nouns that have irregular plural forms that are not formed by simply adding -s or -en to the singular noun form. These forms have to be acquired separately from the regular plural forms as there are little to no clues which plural form is regular and which is not. For example, the minimal pair *bak* - *dak* (/bak/ - /dak/, ‘container’ - ‘roof’) have different plural forms. Although the vowel in *bak* remains short (*bakken*, /bəkən/, ‘containers’), the vowel in *dak* (/dak/, ‘roof’) is lengthened: *daken* (/d:əkən/, ‘roofs’). In addition, some nouns receive irregular suffixes, such as -eren (e.g. *kinderen*, ‘children’) (see Wijk, 2007 for a more detailed description of Dutch plurals).

4.2 Similarities and differences between Dutch and Turkish noun phrase features

While Dutch has a distinction between neuter and common gender, Turkish does not have grammatical gender. Most Turkish nouns are not specifically masculine, feminine or neuter (Braun, 2001). Only a few types of nouns have gender distinctions, such as kinship terms (e.g. *abla*, ‘older sister’ - *abi* ‘older brother’) and terms of address (e.g. *bayan*, ‘lady’- *bay*, ‘sir’). In addition, Turkish has no definite determiners, and adjectives are never inflected. In relation to the existence of a Turkish indefinite determiner, it could be argued that the cardinal number *bir* (‘one’) functions as such (24) (Braun, 2001; Kornfilt, 1997). Similarly to Dutch, Turkish has two plural suffixes (-lar and -ler) that are selected based on vowel harmony (25) (Görgülü, 2011).

(24) Bir arkadaş ara-dı. (Braun, 2001: 285)

INDEF friend call-PAST

‘A friend called.’

(25) a. çocuk-lar (Görgülü, 2011: 71)

kid-PL

‘children’

- b. Teyze-ler-im (Görgülü, 2011: 72)
aunt-PL-1SG
'My aunts'

The plural suffix is not applied to plural contexts if the noun is accompanied by a quantifier (e.g. *one*, *two* or *many*). In this case, the noun is left singular (Göksel & Kerslake, 2011). This may negatively affect the acquisition of the Dutch plural suffixes through L1 transfer (Boerma et al., 2017). L1 transfer interference is also expected for Dutch determiners. Because there are no definite determiners, gender and adjective inflections in Turkish, Turkish-Dutch children may have trouble with the definite determiners and adjectives (Orgassa, 2009).

4.3 Acquisition of Dutch noun phrase features

4.3.1 Typical acquisition of determiners

Dutch monolingual TD children acquire determiners slower than their French and English peers, who typically reach the 90% accuracy criterion before the age of 3;3 years (Rozendaal, & Baker, 2008). Studies such as Bol and Kuiken (1988), Wijnen et al. (1994) and Rozendaal and Baker (2008) have attempted to map the stages of Dutch determiner acquisition. Initially, Dutch monolingual TD children omit determiners and only produce the nouns. Then, at around 18 months, children start using the indefinite determiner *een* which they occasionally pronounce as only a schwa. When the children are about 2 to 3 years old, definite determiners start to appear, although they do not always assign the right gender to nouns. The monolingual TD children tend to overgeneralise the common determiner *de* into contexts where a neuter determiner is required (e.g. *de paard* instead of *het paard*, 'the horse') (Hulk & Cornips, 2010). In contrast, the determiner *het* appears later and is not mastered before the age of 7 (Blom et al., 2008; Rozendaal & Baker 2008).

4.3.2 Typical acquisition of adjectives

Between 12 and 18 months, the first adjectives appear in one-word utterances (Schaerlaekens & Gillis, 1987). At around the age of 2, Dutch monolingual TD children start to use adjectives in combination with nouns (Bol & Kuiken, 1987; Schaerlaekens & Gillis, 1987). Around the age of 3, the first determiner-adjective-noun combinations appear as well

(Bol & Kuiken, 1988; De Houwer 1990). Although the adjectival suffix -e is rarely omitted, it is frequently overgeneralised into indefinite, singular, neutral contexts (e.g. see (26) from Polišenská, 2010: 71; Weerman, Bischof & Punt, 2006).

- (26) a. een blauwe stuk
a blue piece.NEUTER
'a blue piece'
- b. een kleine huisje
a little house.NEUTER
'a little house'

Weerman et al. (2006) reported that this overgeneralisation was the most recurrent in children aged 3 to 5 in their data, while the 6-years-olds made this error only rarely. Similarly to the case of determiners, adjectives in neuter contexts appear to be more problematic for Dutch monolingual TD children than adjectives in common contexts. This may be explained by the higher frequency and syncretism of common gender and common gender affixes. That is, the determiner *de* and the adjectival suffix -e are more salient (i.e. they have a bigger prominence) than the determiner *het* and the bare adjective.

4.3.3 Typical acquisition of plural suffixes

Schaerlaekens (1980) and Schaerlaekens and Gillis (1987) identified four stages in the acquisition of the Dutch plural. In the first stage, Dutch monolingual TD children produce only singular nouns and omit the plural suffixes in plural contexts. In the second stage that starts around the age of 2, children start using a restricted set of correct plurals that often already appear in their input as plurals (e.g. *schoenen*, 'shoes'). In the third stage, the children produce plural affixes in all appropriate contexts, although substitutions of either only the suffixes -en or -s appear as well (e.g. *viss-es* instead of *viss-en*, 'fish' (PL), *auto-en* instead of *auto-s*, 'cars'). While Dutch children can produce the correct regular plural suffixes in the correct contexts a few months after the third stage, the irregular plural forms remain difficult until stage four when the children are about 6-7 years old. Until then, irregular plural forms are very frequently overregularised (e.g. Boerma et al., 2017).

4.4 Dutch noun phrase features and the effects of DLD and bilingualism

4.4.1. Dutch determiners and the effects of DLD and bilingualism

Several studies have reported that Dutch monolingual and bilingual children with DLD between the ages of 4 to 12 years omit definite determiners more frequently than monolingual and bilingual TD peers (Bol & Kuiken, 1988; De Jong, 1999; Orgassa, 2009; Orgassa & Weerman, 2008). Both groups with DLD appear to perform more like younger monolingual TD children, although the bilingual children with DLD score worse than monolingual peers with DLD (e.g. Orgassa, 2009).

Another frequent error type is the overgeneralisation of the common determiner *de* into neuter contexts. Overgeneralisations were more often made by monolingual and bilingual children with DLD and bilingual TD children between the ages of 6 to 8 years than by their monolingual TD peers (Orgassa, 2009: 133). The bilingual group with DLD made more overgeneralisations in the neuter contexts than the bilingual TD group and monolingual group with DLD. Similar results were found by Orgassa and Weerman (2008: 355) and Keij et al. (2012) for the same groups.

How these error patterns develop over time is still unknown because of a lack of longitudinal studies involving bilingual children and children with DLD. One study that could still help formulate expectations is Keij et al. (2012). In this study, older and younger groups of children with DLD and bilingual children were compared with each other. The older monolingual children with DLD (10;2-12;0) did not perform better on the production of neuter, definite determiners than their younger counterparts (8;4-11;3). In contrast, the older bilingual TD group showed higher accuracy with neuter nouns than their younger counterparts. However, the older bilingual TD group scored worse on common nouns (77%) than the younger group (97%), because the older group started to use and overgeneralise *het* into common contexts. Although Keij et al. is not a longitudinal study, these results indicate that children with DLD may show no improvements with determiner production accuracy in a certain timeframe, while the bilingual TD children progress into their next developmental stage in the same time (i.e. applying *het* determiners).

4.4.2. Dutch adjectives and the effects of DLD and bilingualism

Orgassa (2009) and Orgassa and Weerman (2008) reported that monolingual and bilingual children with and without DLD tend to overgeneralize the adjectival suffix *-e* into singular,

indefinite, neuter contexts. In Orgassa and Weerman (2008), the 4- to 8-year old bilingual group with DLD most frequently made this error (84%), followed by the bilingual TD group (77%), the monolingual group with DLD (69%) and the monolingual TD group (55%). Contrarily, errors with bare adjectives in contexts where the suffix -e is required, appeared to be infrequent in all four groups (Orgassa, 2009; Orgassa & Weerman, 2008; Weerman et al., 2006), although the bilingual group with DLD in Orgassa and Weerman (2008) produced relatively more bare adjectives than the bilingual TD group and the monolingual DLD group.

In short, the bilingual children with and without DLD and the monolingual children with DLD do not seem to differ much from each other in the type of errors they make when producing adjectives. That is, they all overgeneralize the -e. Nonetheless, because there are no Dutch longitudinal studies on adjectival inflection as of yet, it is difficult to formulate predictions for the (possibly different) rates of development of the four groups. Despite this, there is some indication that bilingual children will continue to overgeneralise the suffix -e even when they have had over 10 years of exposure to native Dutch (Laloi, Spanjaard & Styczynska, 2005, as cited in Orgassa, 2009).

4.4.3. Dutch plural suffixes and the effects of DLD and bilingualism

Several studies have reported that Dutch monolingual children with DLD make more errors with plural suffixes and omit the plural suffixes more frequently than monolingual TD peers (Boerma et al., 2017; De Bree & Kerkhoff, 2010; Van Alpen et al., 2004). In Bol and Kuiken (1988), the monolingual children with DLD had an error pattern similar to monolingual TD children who were 2 years younger. Bilingual TD children have been reported to make more errors with plural suffixation than their monolingual TD peers (Verhoeven & Vermeer, 1985; Lalleman, 1986), and, to make more mission errors as well (Lalleman, 1986).

In the longitudinal study by Boerma et al. (2017), monolingual 5-year-old children with DLD omitted the plural suffixes more often than substituting them when they made errors during the first session. This did not appear to improve in the second session, a year later. Contrarily, the monolingual TD children also made more omission errors than substitution errors during the first session, but in the second session, they hardly made omission errors anymore. Rather, most of the errors made by the monolingual TD children were not lengthening the vowel of irregular plural forms even though the correct suffix was provided. The monolingual children with DLD had a lot of trouble with this type as well.

The bilingual group with DLD made more errors than the bilingual TD group on the regular plural suffixes in the first session, but they caught up with the latter group in the second session. Other than that, their error type patterns were similar to the bilingual TD group in both sessions. In the first session, both bilingual groups made more omission errors than in the second session. Just like the two monolingual groups (mentioned in 4.4.1.3), the bilingual groups with and without DLD all struggled with the lengthening of the vowel in irregular plural forms. Boerma et al. mention that all of the items in the elicitation task that was used, involved quantifiers, which may have affected the results of the Turkish-Dutch children from the bilingual groups due to L1 transfer (see 4.2). It has to be noted, however, that an elicitation task such as the one used in Boerma et al. could give different results than a task involving spontaneous speech. This is because elicitation tasks force children to use certain sentence constructions or words that they would not spontaneously choose to use. In spontaneous speech, children are free to use any words or constructions they want, which allows them to use a (limited) pool of plural nouns they are comfortable with, or to even use no plural forms at all. This effect of task counts for verb inflection, determiners and adjectives as well.

Chapter 5 Prepositions

5.1 Dutch prepositions

Prepositions contribute to the meaning of a sentence in a number of ways. This can be locative, directional or temporal for example (27abc). Dutch prepositions can also occur as postpositions (36d) or circumpositions (27e).⁵ In addition, some Dutch verbs require prepositions to convey a certain grammatical meaning (e.g. an argument being a *receiver*, 28a), while other verbs already contain a preposition in their infinitive form (e.g. *uitlachen*, 'to laugh at', 28b) that is separated from the stem once the verb is made finite. In this last case, the preposition is also separated from the stem if the verb is accompanied by the infinitival (*om*) *te*, which is similar to the English infinitival *to* (28c).

(27) a. De kat zit op de tafel.

The cat sits on the table

'The cat is sitting in the table.'

b. De kat loopt naar de deur.

The cat walks to the door

'The cat walks to the door.'

c. De kat maakt een wandeling na het avondeten.

The cat makes a walk after the dinner

'The cat takes a walk after dinner.'

d. De kat loopt de straat op.

The cat walks the street on

'The cat walks unto the street.'

e. De kat loopt naar de deur toe.

The cat walks to the door to

'The cat walks to the door.'

(28) a. Het meisje geeft een speeltje aan de kat.

The girl gives a toy to the cat

'The girl gives a toy to the cat.'

⁵ Postpositions and circumpositions will be referred to as prepositions, unless more specificity is required.

b. De kat lacht de muis uit.

The cat laughs the mouse out.

‘The cat laughs at the mouse.’

c. De kat vindt het leuk om de muis uit te lachen.

The cat finds it fun COMP the mouse out to laugh-INF

The cat likes to laugh at the mouse.

5.2 Turkish prepositions

As opposed to Dutch, Turkish prepositions only appear as postpositions and the noun it accompanies is marked with case (CM or case marker) (29, Jansen, Lalleman & Muysken, 1981: 318). In certain cases, only a case suffix is applied to the noun without a separate postposition (e.g. -den/dan , ‘from’) (Extra & Van Hout, 1993). Instead, relations are expressed through the case affix attached to the noun. Because of this difference, it can be expected that a Turkish L2 speaker of Dutch will make mistakes with prepositions by omitting them or by placing them after nouns when they should precede the nouns instead.

(29) a. antikacıdan içeri

antique inside

‘inside the antique dealer’s’

b. ağustostan beri

August since

‘since August’

5.3 Typical acquisition of Dutch prepositions

Because this thesis is only examining omission versus substitution error patterns, word order patterns involving prepositions will not be covered in as much detail. Instead, the focus is on the selection of an inappropriate preposition or the omission of a required preposition. Not much research has been done on preposition production in Dutch monolingual children with the focus on omission and substitution errors. One corpus study by Schaerlaekens (2009) describes how Dutch monolingual children around the age of 2 to 3 start to use a limited set of prepositions. In this stage, prepositions are omitted, overgeneralised and substituted. For instance, one child started using the preposition *bij* (‘at’) as his first locative preposition, but applied it to any locative context, even when the contexts required a

different locative preposition (30). In (31), the child wanted to go downstairs, but used the wrong preposition/adverb.

(30) de soep is *bij/in de kelder (Schaerlaekens, 2009: 135)
the soup is *at/in the cellar'
'The soup is in the cellar.'

(31) Mag ik naar boven gaan? (Schaerlaekens, 2009: 135)
May I to up go?
'May I go upstairs?'

5.4 Dutch prepositions and the effects of DLD and bilingualism

As of yet, there are no Dutch studies that have looked at the production of prepositions in monolingual and bilingual children with and without DLD. However, two case studies by Klein and Perdue (1992) and Extra and Van Hout (1993) examined preposition use in Turkish and Moroccan adult L2 speakers of Dutch and reported occasional omissions and substitutions of prepositions. This is in accordance with the expectations for an L1-transfer effect mentioned in 5.2.

In combination with the findings of the non-Dutch studies mentioned in chapter 2 (e.g. Armon-Lotem, 2014; Grela et al., 2004; Roeper et al., 2001), it can be expected that bilingual TD children and monolingual children with DLD make more errors with prepositions than monolingual CA- or LA-matched TD children. In these studies, both groups more frequently omitted and substituted prepositions in comparison with TD peers, although the monolingual DLD children appeared to more frequently omit prepositions than the bilingual TD children. No prediction can be made for the Turkish-Dutch bilingual children with DLD, as there is no literature on bilingual DLD involving substitution or omissions of prepositions. On top of that, there is also a gap in the knowledge of the acquisition of prepositions in these four groups.

Chapter 6 Current study

Henceforth, L1TD will refer to monolingual TD children; L2TD will refer to bilingual TD children; L1DLD will refer to monolingual children with DLD; and L2DLD will refer to bilingual children with DLD. The main research question of this thesis is what the effects of DLD and bilingualism are on the of morphological error patterns of monolingual and bilingual children with and without DLD. This question is divided into two parts:

- 1) What are the effects of DLD and bilingualism on the type of errors these children make during each session?
- 2) What are the effects of the four groups on the speed at which the children improve over time? That is, how fast do their omission to total error ratios decrease?

The morphological categories include verb inflection, determiners, adjectives, plural noun affixes and prepositions. The expectations based on the studies discussed previously are described in (32-33).

(32) Question 1

- a. Effects of DLD: For all categories (verb inflection, noun phrase features and prepositions), it is expected that the children with DLD, regardless of their monolingual or bilingual background, make more omission errors than substitution errors. The TD groups are expected to make more substitution errors than omission errors.
- b. Effects of bilingualism: For all categories, it is expected that there will be no significant differences between the monolingual and bilingual groups, as DLD and TD each already have different effects on error types (see 32a).

(33) Question 2

- a. Effect of bilingualism in TD children (L1TD versus L2TD): L1TD children are not expected to improve much as they already are at or near a ceiling in their language development. The L2TD children are expected to improve as they may have been still developing their morphology ability at the time of session 1.
- b. Effect of bilingualism in children with DLD (L1DLD - L2DLD): Both the L1DLD children and the L2DLD children are expected to improve, although the L1DLD children are expected to improve at a faster rate as they do not also have an extra delay due to bilingualism.

- c. Effect of DLD in monolingual children (L1TD - L1DLD): Contrary to the L1TD children, the L1DLD children are expected to improve over the course of the three sessions.
- d. Effect of DLD in bilingual children (L2TD - L2DLD): Both the L2TD and L2DLD children are expected to improve, although the L2TD group is expected to improve at a faster rate as they do not have an extra delay due to DLD.

Chapter 7 Method

7.1 Participants

40 children were assigned to four groups ($N=10$ per group): Dutch monolingual TD (L1TD), Turkish-Dutch bilingual TD (L2TD), Dutch monolingual DLD (L1DLD); and Turkish-Dutch bilingual DLD (L2DLD). At the time of the first session, the children were around 5 to 6 years old. The children were assigned as monolingual if both parents only spoke Dutch to them or bilingual if one or both parents spoke Turkish to them. The bilinguals have received their largest amount of native Dutch input from a school where Dutch is language of instruction. To gain insight into the children's varying Socio-Economic Status (SES), and quality and quantity of Dutch and Turkish input and output, parents had to fill in the Questionnaire for Parents of Bilingual Children (PaBiQ) (Tuller, 2015).

The TD children were recruited through regular Dutch elementary schools. Two national organizations in the Netherlands (Royal Dutch Kentalis and Royal Auris Group) were used to recruit the children with DLD. These organisations are specialists in the area of diagnostics, care and education for people who have language difficulties. The presence of DLD was determined using a Dutch standardized language assessment test battery, most commonly consisting of the Dutch version of the Clinical Evaluation of Language Fundamentals (CELF-4-NL; Kort, Schittekatte, & Compaan, 2008) and/or the Schlichting Test for Language Production and Comprehension (Schlichting & Lutje Spelberg, 2010ab).

Table 3 shows the average ages of the children during the three sessions, their SES, non-verbal intelligence, their amount of exposure to Dutch before the age of 4 and their current exposure to Dutch at home at the time of session 1. The children were matched based on age in months, nonverbal intelligence and their SES. Bilingual children with DLD were matched with bilingual TD children based on exposure to Dutch before the age of 4 inside and outside the home and current exposure to Dutch at home (table 3). There are no significant differences between the bilingual groups in their exposure to Dutch before the age of 4 ($F(1,17) = .50, p = .49$). The bilingual TD group had significantly more current exposure to Dutch at home than the bilingual children with DLD ($F(1,17) = 5.55, p = .03$). Nonverbal intelligence was measured using the short version of the Wechsler Nonverbal-NL (Wechsler & Naglieri, 2008) and SES was based on the parents' education level ranging from 1 'no education' to 9 'university degree' (table 3). The children from the four different

Table 3.

Descriptives of the participants.

	Gender		Age (months) Session 1		Age (months) Session 2		Age (months) Session 3		Socio-Economic Status		Nonverbal Intelligence		% Exposure to Dutch before the age of 4		% Current exposure to Dutch at home at session 1	
	N	F/M	M (SD)	Range	M (SD)	Range	M (SD)	Range	M (SD)	Range	M (SD)	Range	M (SD)	Range	M (SD)	Range
L1TD	10	3/7	70.9 (6.5)	60-84	82.5 (6.0)	71-84	92.0 (8.4)	79-106	6.0 (2.3)	2-9	93.6 (9.0)	81-104	n/a	n/a	n/a	n/a
L2TD	10	5/5	71.1 (6.6)	58-83	83.0 (7.1)	69-96	94.8 (6.9)	81-107	4.0 (2.1)	2-7	93.9 (6.9)	81-104	38.0 (5.8)	33.3-50.0	44.5 (7.3)	29.4-57.1
L1DLD	10	3/7	70.3 (6.3)	59-80	81.7 (6.3)	70-80	93.4 (6.6)	81-103	5.2 (1.5)	3-8	91.4 (10.3)	74-104	n/a	n/a	n/a	n/a
L2DLD	10	2/8	69.7 (7.9)	58-84	80.3 (8.1)	68-94	94.1 (6.3)	81-105	4.5 (1.9)	2-7	88.9 (10.6)	75-101	35.0 (11.1)	20.0-50.0	35.2 (8.8)	14.3-47.1

Note. Dutch monolingual TD = L1TD , Turkish-Dutch bilingual TD = L2TD , Dutch monolingual DLD = L1DLD, and Turkish-Dutch bilingual DLD = (L2DLD). One child from the bilingual TD group that had missing data on SES, exposure to Dutch before the age of 4 and current exposure to Dutch at home. Means (M), Standard deviations (SD) and ranges of the ages of the children in months during each session, in addition to their Socio-Economic Status, nonverbal intelligence, and exposure to Dutch. The data of one bilingual TD child on the current exposure to Dutch and the exposure to Dutch before the age of 4 was missing.

groups did not differ significantly between groups in age during session 1 ($F(3,36) = 0.07, p = .97$), session 2 ($F(3,36) = 0.26, p = .85$), nor session 3 ($F(3,36) = 0.25, p = 0.86$). There were no significant differences based on SES ($H(3) = 3.96, p = .27$), or nonverbal intelligence ($F(3,36) = .56, p = .65$).

7.2 Instruments and procedure

During each session, the children were seated together with the experimenter in an empty (class)room. The goal of each session was to gather spontaneous language from the children using a semi-structured interview and the Dutch version of the Multilingual Assessment Instrument for Narratives (MAIN, Gagarina et al., 2012). First, to get the children more comfortable with talking with the experimenter, the experimenter asked them some general questions in the form of a semi-structured interview (e.g. 'What did you do during the weekend?' or 'What television-series or movie did you watch recently?').

Second, the experimenter led the children through the MAIN task⁶. This tool contains four stories consisting of six wordless pictures each, named Cat, Dog, Baby Birds and Baby Goats. The stories were designed in such a way that the researcher could ask comprehension questions about the narratives in relation to the events or the characters. Each picture set depicts a goal, an attempt, an outcome and the internal states of the characters in the stories. In the Baby Birds story for example, a cat attempts to climb up a tree with the goal to grab a baby bird from its nest. In the outcome of the story, the cat is stopped by a dog, who pulls the cat's tail, and the cat runs off. As for internal states, the mother bird is shocked when the cat grabs one of her babies, the dog angrily chases away the cat, and the cat is afraid of the dog who is chasing her.

In the first half of the MAIN task, the experimenter told a model story (either Cat or Dog) to get the children adjusted to the set-up of MAIN. Afterwards, the experimenter asked the children ten questions about the events and the characters (e.g. 'How does the baby goat feel?' or 'Why does the dog leap forward?') to elicit answers in spontaneous language from the children. In the second half of the task, the children had to tell a story on their own (either Baby Birds or Baby Goats) and they had to answer ten more questions about this story. The versions of the stories were counterbalanced to control for possible varying

⁶ See Boerma Leseman, Timmermeister, Wijnen and Blom (2006) for more in-depth information of the MAIN procedure that was used in the CoDEmBI-project.

degrees of difficulty. The audio of each session was recorded using a Samson Go Mic microphone. Each session was about ten to twenty minutes long.

7.3 Analyses

7.3.1 Transcriptions and error codes

The recordings were transcribed according to the CHAT format in CLAN (MacWhinney, 2000). The children's utterances were then coded for errors with verb inflection, noun phrase features and prepositions. Tables (4-6) contain overviews of the different error types in their respective error categories and examples. This coding scheme was based on several studies that were mentioned in the previous chapters. The verb inflection codes were based on the De Jong et al. (2007), Rispen and De Bree (2014) and Boerma et al. (2017). The noun phrase codes were based on Keij et al. (2012), Orgassa (2008) and Boerma et al. (2017). The preposition codes were not based on previous research, but were formed in a way that captures omissions and substitutions of prepositions.

7.3.2 Analyses for first research question

The first research question of this thesis is what the effects of DLD and bilingualism are on the type of errors children make during each session. To answer this question, the absolute amounts of each error type (substitution and omission) in each domain (verb inflection, noun phrase features and prepositions) from each participant were taken as dependent variables. Because of the low amount of error observations in some of the groups, the observations of certain groups were taken together for further analysis. That is, the monolingual groups (L1TD and L1DLD), the bilingual groups (L2TD and L2DLD), the TD groups (L1TD and L2TD) and the DLD groups (L1DLD and L2DLD) were added together to form four groups. The TD groups were compared to the DLD groups to find an effect of DLD on error types in each domain. In the same fashion, the monolingual groups were compared to the bilingual groups to find an effect of bilingualism. Schematically, these comparisons were as the following for each morphological category:

(34)	Bilingual groups versus Monolingual groups	Effect of bilingualism
	DLD groups versus TD groups	Effect of DLD

Table 4.

Overview of the different verb inflection error types.

Omission error types	Error example	Target example	Substitution error types	Error example	Target example
Bare verb	Jan lees-Ø een boek. 'Jan read a book.'	Jan lees-t een boek. 'Jan reads a book'	Incorrect agreement ⁷	Jan lez-en een boek. 'Jan read a book.' Wij lees-t een boek. 'We reads a book.' Hij wil-t. 'Hij wants'.	Jan lees-t een boek. 'Jan reads a book' Wij lez-en een boek. 'We read a book.' Hij wil-Ø He wants'.
Root Infinitive	Jan boek lez-en. 'Jan book read.' Jan lez-en. ⁸ 'Jan read.' Boek lez-en. 'Book read.'	Jan lees-t een boek. 'Jan reads a book.' Jan lees-t. 'Jan reads.' Jan lees-t een boek. 'Jan reads a book.'	Incorrect tense ⁹	Toen leest Jan. 'Then Jan reads.' Jan maak-de. 'Jan made.' houd-de hield-de 'kept'	Toen las Jan. 'Then Jan read-PAST.' Jan maak-te. 'Jan made.' hield hield 'kept'
Missing participle affix	Ø-maakt gemaak-Ø Ø-maak-Ø 'made'	gemaakt gemaakt gemaakt 'made'	Incorrect participle affix or root	ge-loop-t 'walked' ge-koop-t 'buy-ed' ge-schuif-t 'shifted'	ge-lop-en 'walked' ge-koch-t 'bought' ge-schov-en 'shifted'

⁷ Incorrect agreement includes overregularisations such as *hij wil-t* as *wilt* agrees with 2SG and not 3SG.

⁸ It could be argued that *lezen* here is actually an instance of incorrect agreement (a substitution error) involving the plural -en in a 3SG context. But since the verb is in a sentence-final position where non-finite verbs belong, cases like this have still been coded as Root Infinitives. As shown in the incorrect agreement category below, *lezen* is considered *finite* if it does not appear in a sentence-final position (*Jan lezen een boek*).

⁹ Incorrect tense includes present tense in past tense context, -de/-te substitutions, and overregularisations.

Table 5.

Overview of the different noun phrase feature error types.

Error type	Specific errors	Error	Target
Omission	Determiner	Jan leest boek.	Jan leest een boek.
		'Jan read book'.	'Jan reads a book'.
	Plural affix	Jan pakt twee boek.	Jan pakt twee boeken.
		'Jan picks up two book'.	'Jan picks up two books'.
	Bare adjective	Jan gooit een rood bal.	Jan gooit een rood-e bal.
		'Jan throws a red bal'.	'Jan throws a red bal'.
Substitution	Determiner ¹⁰	Jan ziet de geitje.	Jan ziet het geitje.
		'Jan sees the little goat'.	'Jan sees the little goat'.
		Jan ziet een geitje. Een geitje springt.	Jan ziet een geitje. Het geitje springt.
		'Jan sees a little goat. A little goat jumps.'	'Jan sees a little goat. The little goat jumps.'
	Plural suffix	Twee boek-s.	Twee boek-en.
		'Two books.'	'Two books'.
		Twee kind-en.	Twee kind-eren.
		'Two childs'.	'Two children'.
	Adjective	Een klein-e geitje.	Een klein-Ø geitje.
		'A little goat'.	'A little goat'.
Addition	Plural affix	Twee kind-eren-s	Twee kind-eren.
		'Two children'.	'Two children'.
		Die snoep-en.	Dat snoep-Ø.
		'Those candies'.	'That candy'.

Table 6.

Overview of the different preposition error types.

Error type	Specific errors	Error	Target
Omission	Preposition	Jan zit school	Jan zit op school.
		'Jan is school.'	'Jan is at school'.
Substitution	Preposition	Jan zit bij school	Jan zit op school.
		'Jan is by school.'	'Jan is at school'.

¹⁰ Determiner errors include incorrect gender and definiteness.

First, the total observations of each error type (omission and substitution) in each domain (verb inflection, noun phrase features and prepositions) were compared between groups using Pearson's Chi-squared tests with Yates' continuity correction. This showed whether there were significant differences between the TD and the DLD groups, and between the L1 and the L2 groups in which types of errors they were more likely to make during each session.

7.3.3 Analyses for second research question

The second research question this thesis addresses is what the effects of DLD and bilingualism are on the speed at which the children improve. As was mentioned earlier, it is assumed that omission errors are a sign of earlier stages in morphological development, whereas substitution errors are a sign of later stages. Therefore, the second research question was answered by checking whether the L1TD, L2TD, L1DLD and L2DLD groups differ in how their distributions of omission errors relative to total errors change over the course of the three sessions. This was done by comparing these distributions of the groups pairwise using repeated measures ANOVAs. These pairs and the effects they show were as the following:

(35) L1TD versus L2TD	Effect of bilingualism in TD children
L1DLD versus L2DLD	Effect of bilingualism in children with DLD
L1TD versus L1DLD	Effect of DLD in monolingual children
L2TD versus L2DLD	Effect of DLD in bilingual children

Chapter 8 Results

8.1 Verb inflection

8.1.1 Descriptives

Table 7 contains an overview of all absolute errors involving verb inflection. Table 8 shows the absolute error numbers of only the omission and substitution errors for the L1, L2, TD and DLD groups. Table 9 shows the mean proportions of verb inflection omission errors relative to total verb inflection errors per group per session. Based on the absolute error numbers, L1TD and the L2TD mostly made substitution errors during all three sessions. The L1DLD groups made more substitutions than omissions in session 1, fewer substitutions than omissions in session 2 and more substitutions than omissions in session 3. The L2DLD group made more omissions than substitutions in session 1 and 2, but more substitutions in session 3.

However, the within-group variation is rather high, and in certain instances, most of the group totals of a certain error type were made by only one or two participants. In particular, about 56% of the omission errors in the L2DLD group in session 1 were made by two children ($N = 14$ and 15). In the same group, about 45 % of the omission errors in session 2 were made by two other children ($N = 12$ and 12). Similarly in session 2, around 49% of the omission errors in the L1DLD group were made by two children ($N = 11$ and 11). In session 3, around 65% of the substitution errors in the L2DLD group were made by two children ($N = 28$ and 15). If these two participants are ignored in session 3, the L2DLD group appears to predominately make omission errors consistently throughout all three sessions. In addition, not all children with DLD or bilingual children produced omission errors. In a lot of cases, children had only one or two verb inflection omission errors. As a consequence of this variation, group error totals are not always representative for every individual in that group.

8.1.2 Effects of DLD and bilingualism on verb inflection errors

When the L1 and the L2 groups were compared, no significant interactions between group (monolingual or bilingual) and error type were found in all three sessions (session 1, $\chi^2(1) = 3.44$, $p = .06$; session 2, $\chi^2(1) = 0.11$, $p = .74$; session 3, $\chi^2(1) = 1.12$, $p = .29$). That is, the types of error children made were not dependent on whether the children were monolingual or bilingual. Contrarily, the type of error children was found to be dependent

Table 7.

Absolute error types and standard deviations (SD) for verb inflections per group per session.

Session	Group	N	Total		Omissions		Substitutions		Other	
			N	Range	N	Range	N	Range	N	Range
1	L1TD	10	28 (1.78)	1-6	7 (0.46)	0-1	18 (1.89)	0-5	3 (0.65)	0-3
	L2TD	10	61 (4.35)	2-13	11 (1.64)	0-5	49 (3.67)	1-13	1 (0.22)	0-1
	L1DLD	10	76 (4.84)	2-19	29 (1.92)	0-7	45 (4.78)	1-17	2 (0.30)	0-1
	L2DLD	10	69 (5.94)	1-18	52 (5.15)	0-15	15 (1.80)	0-5	2 (0.44)	0-2
	Total		234 (4.86)	1-19	99 (3.38)	0-15	127 (3.63)	0-13	6 (0.44)	0-3
2	L1TD	10	31 (2.66)	0-8	6 (0.66)	0-2	24 (2.01)	0-6	1 (0.68)	0-1
	L2TD	10	60 (2.32)	2-10	16 (1.36)	0-4	42 (1.66)	2-7	2 (0.30)	0-0
	L1DLD	10	76 (4.94)	1-17	45 (3.98)	1-11	30 (2.28)	0-7	1 (0.22)	0-1
	L2DLD	10	96 (5.57)	2-18	53 (4.43)	0-12	40 (3.19)	1-12	3 (0.48)	0-2
	Total		266 (4.69)	0-18	120 (3.64)	0-12	136 (2.47)	0-12	7 (0.46)	0-2
3	L1TD	10	9 (0.54)	0-2	2 (0.40)	0-1	7 (0.64)	0-2	0 (0.00)	0-0
	L2TD	10	57 (2.28)	2-9	9 (0.70)	0-2	47 (2.37)	1-9	1 (0.22)	0-1
	L1DLD	10	40 (2.61)	1-9	15 (1.80)	0-6	24 (1.11)	1-4	1 (0.00)	0-1
	L2DLD	10	99 (8.28)	2-31	31 (2.77)	0-9	66 (8.19)	0-28	2 (0.22)	0-1
	Total		203 (5.52)	0-31	57 (2.01)	0-9	144 (4.86)	0-28	4 (0.16)	0-1

Note. Other errors include verb inflection errors that could not be coded as an omission or substitution errors.

Table 8.

The absolute error numbers with only the omissions and substitutions (SD) for verb inflections per session for the L1, L2, TD and DLD groups.

Group	Session 1			Session 2			Session 3		
	Omissions	Substitutions	Total	Omissions	Substitutions	Total	Omissions	Substitutions	Total
L1	36 (1.78)	63 (3.88)	99 (4.41)	51 (3.46)	54 (2.17)	105 (4.53)	17 (1.46)	31 (1.24)	48 (2.35)
L2	63 (4.34)	64 (3.36)	127 (5.21)	69 (3.76)	82 (2.55)	151 (4.33)	40 (2.30)	113 (6.10)	153 (6.47)
TD	18 (1.22)	67 (3.31)	85 (3.81)	22 (1.18)	66 (2.05)	88 (2.67)	11 (0.67)	54 (2.65)	65 (2.90)
DLD	81 (4.06)	60 (3.91)	141 (5.40)	98 (4.23)	70 (2.82)	168 (5.17)	46 (2.47)	90 (6.21)	136 (6.82)

Table 9.

Mean proportions of verb inflection omission errors relative to total verb inflection errors.

Group	Session 1	Session 2	Session 3
L1TD	0.41 (0.41)	0.14 (0.16)	0.20 (0.40)
L2TD	0.16 (0.22)	0.25 (0.20)	0.19 (0.17)
L1DLD	0.42 (0.25)	0.57 (0.28)	0.28 (0.26)
L2DLD	0.72 (0.34)	0.45 (0.33)	0.38 (0.32)
Total	0.43 (0.37)	0.35 (0.30)	0.26 (0.31)

on whether the children had TD or DLD (session 1, $\chi^2(1) = 26.89, p < .001$; session 2, $\chi^2(1) = 24.45, p < .001$; session 3, $\chi^2(1) = 5.38, p = .02$). It was calculated using odds ratios how much more likely the DLD group, in comparison with the TD group, was to make an omission error rather than a substitution error. For session 1, the odds ratio = 5.03 with a 95% confidence interval of 2.71, 9.32. For session 2, this odds ratio = 4.2 with a 95% confidence interval of 2.37, 7.44. For session 3, this odds ratio = 2.51 with a 95% confidence interval of 1.2, 5.26. Children with DLD were about five times more likely than the TD children to make an omission error rather than a substitution error in the first session, and 4.2 and 2.5 times in the second and third sessions respectively.

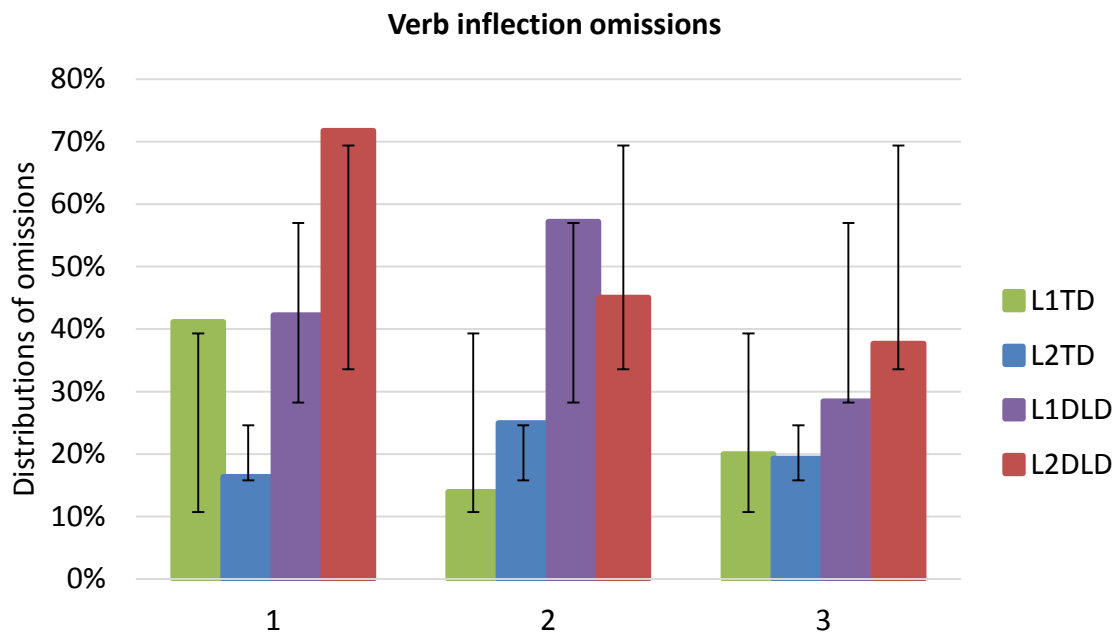


Figure 1. Bar graphs with the proportions of verb inflection omission errors relative to total verb inflection errors and the standard deviations per group per session.

8.1.3 Longitudinal effects on verb inflection errors

Figure 1 shows the bar graphs with the proportions of verb inflection omission errors relative to total verb inflection errors and the standard deviations per group per session. Using repeated measures ANOVAs, the effects of group (L1TD, L2TD, L1DLD and L2DLD) and session (session 1, 2 and 3) on the proportions of verb inflection omission errors relative to total errors in the verb inflection domain were analysed in pairs. Mauchly's test did not indicate any violation of sphericity ($\chi^2(2) = 0.851, p = .654$).

When the L1TD and the L2TD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.773, p = .469, \eta p^2 = .041$) nor a significant within-groups interaction effect between session and group ($F(2,36) = 2.283, p = .117, \eta p^2 = .113$). There was also no between-groups effect of group ($F(1,18) = 0.299, p = .591, \eta p^2 = .016$). This indicates that the omission proportions of the L1TD and the L2TD groups did not significantly differ from each other, nor did they significantly decrease over the course of the three sessions. Based on these omission proportions, there is no evidence of an effect of bilingualism in TD children on their omission proportions.

When the L1DLD and the L2DLD groups were compared, there was a significant within-groups effect of session ($F(2,36) = 6.716, p = .003, \eta p^2 = .272$) and a significant within-groups interaction effect of session and group ($F(2,36) = 4.692, p = .015, \eta p^2 = .207$). There was no significant between-groups effect of group ($F(1,18) = 0.573, p = 0.459, \eta p^2 = .031$). This indicates that the both groups had significantly lower omission proportions over the course of the three sessions, although the L2DLD group had a larger decrease in these proportions (from an estimated marginal mean of 0.717 in session 1, to 0.450 in session 2 and 0.377 in session 3) than the L1DLD group (0.422 in session 1, 0.572 in session 2 and 0.285 in session 3). That is, the estimated marginal mean omission proportion of the L1DLD group is 0.137 lower in session 3 than in session 1, while the estimated marginal mean omission proportion of the L2DLD group is 0.340 lower in session 3 than in session 1. Based on these omission proportions, there is evidence of an effect of bilingualism in children with DLD on the types of verb inflection errors they make. The L2DLD consistently have higher mean omission proportions than the L1DLD, although the L2DLD had a larger decrease in omission proportions over the course of the three sessions.

When the L1TD and the L1DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 1.795, p = .181, \eta p^2 = .091$). There was a trend for a within-groups interaction effect between session and group ($F(2,36) = 2.905, p = .068, \eta p^2 = .139$) and a trend for a between-groups effect of group ($F(1,18) = 3.368, p = 0.083, \eta p^2 = .158$). There is no indication that the L1TD and L1DLD group significantly differ from each other in their omission proportions nor did they have significantly lower omission proportions over the course of the three sessions. Based on these omission proportions, there is no significant evidence of an effect of DLD in monolingual children on their omission proportions.

When the L2TD and the L2DLD groups were compared, there was a significant within-groups effect of session ($F(2,36) = 3.812, p = .032, \eta p^2 = .175$) and a significant within-groups interaction effect of session and group ($F(2,36) = 6.808, p = .003, \eta p^2 = .274$). There was also a significant between-effect of group ($F(1,18) = 7.910, p = .012, \eta p^2 = 0.305$). This indicates that the L2TD and the L2DLD groups each had significantly different proportions of omission error over the course of the three sessions, but the way these proportions changed over time differed per group. That is, the proportions of the L2TD group did not decrease, but increased from session 1 to session 3 with 0.030 (estimated marginal means were 0.163 in session 1, 0.250 in session 2 and 0.193 in session 3), while the proportions of the L2DLD group decreased from session 1 to session 3 with 0.340 (see analysis between the L1DLD and the L2DLD groups for exact numbers). Based on these omission proportions, there is evidence of an effect of DLD in bilingual children on the types of verb inflection errors they make. The L2DLD group had lower omission proportions over time, while the L1TD group had an increase of proportions. However, the L2TD group had overall lower mean omission proportions than the L2DLD group.

8.2 Noun phrase features

8.2.1 Descriptives

Table 10 contains an overview of all absolute errors involving noun phrase features. Table 12 shows the mean proportions of noun phrase feature omission errors relative to total noun phrase feature errors per group per session. The L1TD group made omission and substitution errors at relatively similar rates at each session (i.e. between 45% to 56% omissions). The L2TD group made relatively more omissions than substitutions during each session, although the omission distribution did decline from session 1 to session 2. The L1DLD and L2DLD groups did not seem to improve as most of their errors consisted of omission errors in all three sessions.

Similar to the verb inflection category, the within-group variation is rather high and not every child made omission or substitution errors with noun phrase features. In session 1, around 81% of the omission errors in the L2TD group were made by two children ($N = 21$ and $N = 29$). In session 2, around 37% of the omission errors of this group are made by one child ($N = 25$). Around 98% of these errors were determiner omissions in session 1, 88% in session 2, and about 87% in session 3. However, most errors were determiner omissions in all

Table 10.

Absolute error types and standard deviations (SD) and error ranges for noun phrase features per group per session.

Session	Group	N	Total		Omissions		Substitutions		Additions	
			N	Range	N	Range	N	Range	N	Range
1	L1TD	10	18 (1.60)	0-6	9 (0.83)	0-2	9 (1.22)	0-4	0 (0.00)	0-0
	L2TD	10	108 (9.84)	1-32	62 (9.64)	0-29	46 (3.98)	0-12	0 (0.00)	0-0
	L1DLD	10	50 (3.52)	1-13	31 (2.81)	0-9	19 (1.30)	0-4	0 (0.00)	0-0
	L2DLD	10	50 (3.58)	1-13	42 (2.71)	1-10	8 (0.98)	0-3	0 (0.00)	0-0
	Total		226 (6.46)	0-32	144 (5.56)	0-29	82 (2.71)	0-12	0 (0.00)	0-0
2	L1TD	10	38 (3.43)	0-10	16 (1.28)	0-4	22 (2.52)	0-7	0 (0.00)	0-0
	L2TD	10	134 (8.69)	4-34	68 (6.58)	0-25	63 (3.47)	1-13	3 (0.64)	0-2
	L1DLD	10	73 (3.98)	3-16	43 (1.85)	1-8	30 (3.32)	0-11	0 (0.00)	0-0
	L2DLD	10	75 (3.41)	3-15	43 (3.29)	0-12	27 (1.73)	0-6	5 (0.67)	0-2
	Total		320 (6.37)	0-34	170 (4.26)	0-25	142 (3.27)	0-13	8 (0.51)	0-2
3	L1TD	10	25 (1.75)	0-6	15 (1.20)	0-4	9 (1.58)	0-1	1 (0.30)	0-1
	L2TD	10	68 (5.40)	1-20	30 (2.05)	1-7	37 (4.10)	0-2	1 (0.30)	0-1
	L1DLD	10	79 (3.91)	4-15	45 (2.29)	2-10	32 (3.06)	0-1	2 (0.40)	0-1
	L2DLD	10	100 (5.27)	3-18	66 (4.08)	1-12	34 (3.61)	0-1	0 (0.00)	0-0
	Total		272 (5.13)	0-18	156 (3.23)	0-12	112 (3.41)	0-2	4 (0.30)	0-1

Table 11.

The absolute error numbers with only the omissions and substitutions (SD) for noun phrase features per session for the L1, L2, TD and DLD groups.

Group	Session 1			Session 2			Session 3		
	Omissions	Substitutions	Total	Omissions	Substitutions	Total	Omissions	Substitutions	Total
L1	40 (2.35)	28 (1.36)	68 (3.17)	59 (2.09)	52 (2.97)	111 (4.10)	60 (2.37)	41 (2.69)	104 (4.06)
L2	104 (7.15)	54 (3.47)	158 (7.95)	111 (5.35)	90 (3.28)	209 (7.23)	96 (3.70)	71 (3.87)	168 (5.57)
TD	71 (7.34)	55 (3.48)	126 (8.36)	84 (5.41)	85 (3.66)	172 (8.16)	45 (1.84)	46 (3.41)	93 (4.55)
DLD	73 (2.82)	27 (1.28)	100 (3.55)	86 (2.67)	57 (2.65)	148 (3.71)	111 (3.47)	66 (3.35)	179 (4.76)

Table 12.

Mean proportions of noun phrase feature omission errors relative to total noun phrase feature errors.

Group	Session 1	Session 2	Session 3
L1TD	0.53 (0.39)	0.45 (0.24)	0.56 (0.30)
L2TD	0.89 (0.11)	0.56 (0.27)	0.64 (0.29)
L1DLD	0.50 (0.45)	0.54 (0.40)	0.65 (0.40)
L2DLD	0.53 (0.29)	0.66 (0.23)	0.65 (0.31)
Total	0.61 (0.37)	0.55 (0.30)	0.63 (0.33)

four groups in general, as the children hardly produced adjectives or plural nouns (only e.g. *geiten*, 'goats'; *vrienden*, 'friends').

8.2.2 Effects of DLD and bilingualism on noun phrase feature errors

Table 11 shows the absolute error numbers of only the omission and substitution errors for the L1, L2, TD and DLD groups. When L1 and L2 groups were compared, no significant interactions between group (monolingual or bilingual) and error type were found in all three sessions (session 1, $\chi^2(1) = 0.73$, $p = .40$; session 2, $\chi^2(1) = 0.05$, $p = .82$; session 3, $\chi^2(1) = 0.03$, $p = .86$). That is, the types of error children made in the noun phrase domain were not dependent on whether the children were monolingual or bilingual.

Contrarily, when the TD and DLD groups were compared, there was a significant interaction between group (TD or DLD) and error type in the first session ($\chi^2(1) = 5.99$, $p = .01$). It was calculated using odds ratios how much more likely the DLD group, in comparison with the TD group, is to make an omission error rather than a substitution error. For session 1, the odds ratio = 2.09 with a 95% confidence interval of 1.19, 3.68. The children with DLD were about two times more likely than the TD children to make an omission error rather than a substitution error in the noun phrase domain during session 1. In session 2 and 3, there were no significant interactions between TD/DLD and error type, although there were almost significant trends in both sessions (session 2, $\chi^2(1) = 2.99$; $p = .08$; session 3, $\chi^2(1) = 3.82$, $p = .05$). The odds ratio for session 2 is 1.53 with a 95% confidence interval of 0.97, 2.4. The odds ratio for session 3 is 2.09 with a 95% confidence interval of 1.27, 3.44. Although children with DLD were 1.53 and 2.09 times more likely than the TD children to make an omission error rather than a substitution errors, these differences between TD and DLD were not significant during session 2 and 3.

8.2.3 Longitudinal effects on noun phrase feature errors

Figure 2 shows the bar graphs with the proportions of noun phrase feature omission errors relative to total noun phrase feature errors per group per session. Using repeated measures ANOVAs, the effects of group (L1TD, L2TD, L1DLD and L2DLD) and session (session 1, 2 and 3) on the proportions of noun phrase feature omission errors relative to total errors in the noun phrase feature domain were analysed in pairs. Mauchly's test did not indicate any violation of sphericity ($\chi^2(2) = 1.035$, $p = .596$).

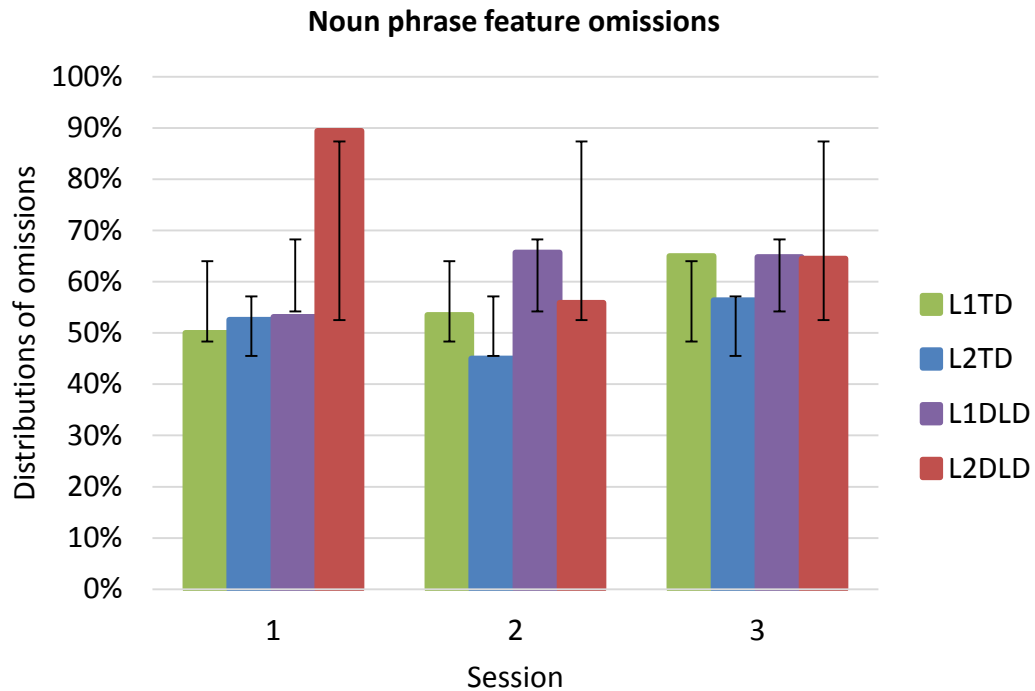


Figure 2. Bar graphs with the proportions of noun phrase feature omission errors relative to total noun phrase feature errors and the standard deviations per group per session.

When the L1TD and the L2TD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.658, p = .524, \eta p^2 = .035$), no within-groups interaction between session and group ($F(2,36) = 0.181, p = .835, \eta p^2 = .010$) nor a between-groups effect of group ($F(1,18) = 0.153, p = .700, \eta p^2 = .008$). This indicates that the omission proportions of the L1TD and the L2TD groups did not significantly differ from each other nor did they significantly decrease over the course of the three sessions. Based on these omission proportions, there is no evidence of an effect of bilingualism in TD children on the types of preposition errors they make longitudinally.

When the L1DLD and the L2DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.992, p = .381, \eta p^2 = .052$). There was a significant within-groups interaction effect of session and group ($F(2,36) = 5.241, p = .010, \eta p^2 = .226$). There was no significant between-groups effect of group ($F(2,18) = 1.059, p = .317, \eta p^2 = .056$). This indicated that the L1DLD and the L2DLD group changed differently over time, although they did not significantly differ from each other in their omission proportions nor did they significantly improve each session. That is, the L2DLD group started with a high estimated marginal means in session 1 (0.894), but their estimated marginal means were lower in

session 2 (0.559) and session 3 (0.648). Contrarily, the L1DLD group started with a relatively lower estimated marginal mean in session 1 (0.531), but this number was higher in session 2 (0.657) and session 3 (0.648). Based on these omission proportions, there is evidence of an effect of bilingualism in children with DLD. The L2DLD children started out with a higher omission to total error ratio than the L1DLD children in the first session. However, in the session thereafter, the L2DLD groups had relatively fewer noun phrase feature omission errors than the L1DLD group. In the last session, the groups had similar omission proportions.

When the L1TD and the L1DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.847, p = .437, \eta p^2 = .045$), no significant within-groups interaction between session and group ($F(2,36) = 0.193, p = .825, \eta p^2 = .011$) nor a significant between-groups effect of group ($F(1,18) = 0.184, p = .673, \eta p^2 = .010$). This indicates that the omission proportions of the L1TD and the L2DLD groups did not significantly differ from each other nor did they significantly decrease over the course of the three sessions. Based on these omission proportions, there is no evidence of an effect of DLD in monolingual children on the types of preposition errors they make longitudinally.

When the L2TD and the L2DLD groups were compared, there was a significant within-groups effect of session ($F(2,36) = 3.334, p = .047, \eta p^2 = .156$), but no significant within-groups interaction effect of session and group ($F(2,36) = 1.988, p = .152, \eta p^2 = .099$). There was a trend for a between-groups effect of group ($F(2,18) = 3.945, p = .062, \eta p^2 = .180$). This indicated that the two groups had significantly lower omission proportions over the course of the sessions, and that they did not significantly differed in how these proportions changed over time. In addition, the two groups also significantly differed in how high their proportions. That is, as mentioned earlier in the previous comparison, the L2DLD group started with a high estimated marginal mean of omission proportions, but they had lower proportions in the sessions thereafter. The L2TD group started out estimated marginal mean of 0.523 in session 1, which went down to 0.450 in session 2, and then up again to 0.564. Both groups had lower omission proportions in the first session, then had relatively lower proportions in the second session, and then had an increase in their proportions in the final session. Based on these omission proportions, there is evidence of an effect of DLD. The L2DLD children consistently made more omissions relative to total errors than L1TD, while the two groups do not differ in how their proportions change over time.

8.3 Prepositions

8.3.1 Descriptives

Table 13 contains an overview of all absolute errors involving prepositions. Table 14 shows the mean proportions of preposition omission errors relative to total preposition errors per group per session. Table 15 shows the mean proportions of preposition omission errors relative to total preposition feature errors per group per session.

Table 13.

Absolute error types and standard deviations (SD) and error ranges for prepositions per group per session.

Session	Group	N	Total		Omissions		Substitutions	
			N	Range	N	Range	N	Range
1	L1TD	10	12 (0.98)	0-3	6 (0.80)	0-2	6 (0.49)	0-1
	L2TD	10	34 (2.46)	0-8	11 (1.45)	0-4	23 (2.00)	0-6
	L1DLD	10	17 (1.95)	0-4	5 (0.67)	0-2	12 (1.99)	0-6
	L2DLD	10	16 (1.56)	0-6	10 (1.10)	0-3	6 (0.66)	0-6
	Total		79 (2.01)	0-8	32 (1.08)	0-4	47 (1.63)	0-6
2	L1TD	10	17 (2.00)	0-7	7 (1.19)	0-4	10 (1.26)	0-3
	L2TD	10	48 (2.14)	2-9	14 (1.11)	0-4	34 (2.06)	0-8
	L1DLD	10	22 (2.09)	0-8	9 (1.14)	0-3	13 (1.19)	0-4
	L2DLD	10	26 (2.76)	0-7	12 (1.08)	0-4	14 (2.42)	1-8
	Total		113 (2.56)	0-9	42 (1.16)	0-4	71 (2.04)	0-8
3	L1TD	10	7 (0.64)	0-2	5 (0.67)	0-2	2 (0.40)	0-1
	L2TD	10	18 (1.17)	0-4	4 (0.66)	0-4	14 (1.20)	0-4
	L1DLD	10	6 (0.92)	0-7	1 (0.30)	0-1	5 (0.92)	0-3
	L2DLD	10	24 (2.24)	0-3	16 (1.74)	0-5	8 (0.87)	2-4
	Total		55 (1.58)	0-7	26 (1.15)	0-5	29 (1.00)	0-4

Table 14.

The absolute error numbers with only the omissions and substitutions (SD) for prepositions per session for the L1, L2, TD and DLD groups.

Group	Session 1			Session 2			Session 3		
	Omissions	Substitutions	Total	Omissions	Substitutions	Total	Omissions	Substitutions	Total
L1	11 (0,74)	18 (1,48)	29 (1,56)	16 (1,17)	23 (1,24)	39 (2,06)	6 (0,56)	7 (0,73)	13 (0,79)
L2	21 (1,28)	29 (1,72)	50 (2,25)	26 (1,10)	48 (2,46)	74 (2,70)	20 (1,45)	22 (1,09)	42 (1,81)
TD	17 (1,19)	29 (1,69)	46 (2,17)	21 (1,20)	44 (2,09)	65 (2,59)	9 (0,67)	16 (1,08)	25 (1,09)
DLD	15 (0,94)	18 (1,51)	33 (1,77)	21 (1,12)	27 (1,90)	48 (2,46)	17 (1,46)	13 (0,91)	30 (1,94)

Table 15.

Mean proportions of preposition omission errors relative to total preposition errors (SD).

Group	Session 1	Session 2	Session 3
L1TD	0.27 (0.35)	0.36 (0.45)	0.40 (0.49)
L2TD	0.26 (0.36)	0.30 (0.24)	0.18 (0.32)
L1DLD	0.33 (0.45)	0.23 (0.26)	0.10 (0.30)
L2DLD	0.38 (0.36)	0.60 (0.44)	0.49 (0.43)

Similar to the other categories, the within-group variation is high and not every child made omission or substitution errors with prepositions. In all three sessions, both the L2TD and the L1DLD groups made more substitution errors than omission errors. The L2DLD group made more absolute omission errors than substitution errors in session 1 and 3, but slightly more substitution errors than omission errors in session 2.

8.3.2 Effects of DLD and bilingualism on preposition errors

When L1 and L2 groups were compared, no significant interactions between group (monolingual or bilingual) and error type were found in any of the three sessions (session 1, $\chi^2(1) = 0.01$, $p = .91$; session 2, $\chi^2(1) = 0.17$, $p = .68$; session 3, $\chi^2(1) > 0.001$, $p = 1$). In addition, no interaction between TD/DLD and error type was found in any of the three sessions (session 1, $\chi^2(1) = 0.28$, $p = .60$; session 2, $\chi^2(1) = 1.10$, $p = .30$; session 3, $\chi^2(1) = 1.58$, $p = .21$). The types of error children made in the preposition domain were not dependent on whether the children were bilingual or monolingual, or had TD or DLD.

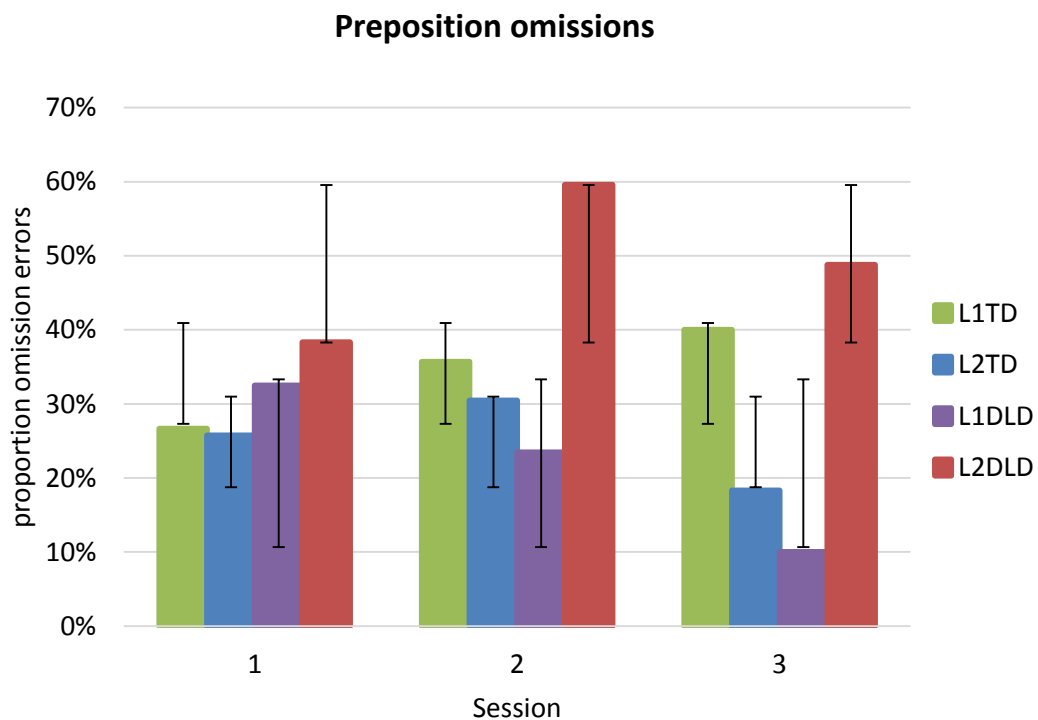


Figure 3. Bar graphs with the mean proportions of preposition omission errors relative to total preposition errors and the standard deviations per group per session.

8.3.3 Longitudinal effects on prepositions errors

Figure 3 shows the bar graphs with the proportions of preposition omission errors relative to total preposition errors per group per session. Using repeated measures ANOVAs, the effects of group (L1TD, L2TD, L1DLD and L2DLD) and session (session 1, 2 and 3) on the proportions of preposition omission errors relative to total errors in the preposition domain were analysed in pairs. Mauchly's test did not indicate any violation of sphericity ($\chi^2(2) = 0.431, p = .806$)

When the L1TD and the L2TD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.152, p = .860, \eta p^2 = .008$) nor a within-groups interaction between session and group ($F(2,36) = 0.381, p = .686, \eta p^2 = .021$). There was also no between-groups effect of group ($F(1,18) = 0.806, p = .381, \eta p^2 = .043$). This indicates that the omission proportions of the L1TD and the L2TD groups did not significantly differ from each other nor did they significantly decrease over the course of the three sessions. Based on these omission proportions, there is no evidence of an effect of bilingualism in TD children on the types of preposition errors they make.

When the L1DLD and L2DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.459, p = .636, \eta p^2 = .025$) nor a within-groups interaction between session and group ($F(2,36) = 1.049, p = .361, \eta p^2 = .055$). There was a significant between-groups effect of group ($F(1,18) = 6.878, p = .017, \eta p^2 = .276$). This indicates that the L1DLD group differed from the L2DLD group in how high their omission proportions were. That is, the L2DLD made on average relatively more omissions than the L1DLD group. The L2DLD group had higher omission proportions in session 2 and 3 (the estimated marginal means respectively 0.596 and 0.488) than in session 1 (estimated marginal mean was 0.383), while the L1DLD group had a lower mean omission proportion with each session (estimated marginal means were 0.325 in session 1, 0.235 in session 2 and 0.100 in session 3). However, neither groups significantly improved over the course of the three sessions. Based on these omission proportions, there is evidence of an effect of DLD in bilingualism in children with DLD. The L1DLD children have consistently lower omission proportions than L2DLD children.

When the L1TD and the L1DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.076, p = .927, \eta p^2 = .004$) and no within-groups interaction between session and group ($F(2,36) = 0.874, p = .426, \eta p^2 = .046$). There was also no between-groups effect of group ($F(1,18) = 1.505, p = .236, \eta p^2 = .077$). Based on these

omission proportions, there is no evidence of an effect of DLD in monolingual children on the types of preposition errors they make.

When the L2TD and the L2DLD groups were compared, there was no significant within-groups effect of session ($F(2,36) = 0.755$, $p = .477$, $\eta p^2 = .040$) and no within-groups interaction between session and group ($F(2,36) = 0.372$, $p = .692$, $\eta p^2 = .020$). There was a significant between-groups effect of group ($F(1,18) = 5.067$, $p = .037$, $\eta p^2 = .220$). This indicates that the L2TD and the L2DLD groups differed in their omission proportions. That is, the L2TD group had lower estimated means in each session (0.258 in session 1, 0.305 in session 2 and 0.183 in session 3) than the L2DLD group (0.383 in session 1, 0.596 in session 2 and 0.488 in session 3). However, neither group significantly improved over time. The L2TD children had consistently lower omission proportions than L2DLD children. Based on these omission proportions, there is evidence of an effect of DLD in bilingual children.

Chapter 9 Discussion

Morphology is often seen as a clinical marker of DLD in monolingual children. However, previous studies have reported overlap in the difficulties bilingual TD children and monolingual children with DLD have with morphology. As a consequence, it is unsure whether morphology can also be a reliable marker for DLD in bilingual children. There is currently only a small amount of longitudinal studies that have looked at this clinical marker using bilingual children with DLD. Longitudinal data does not only show how monolingual and bilingual children with and without DLD differ from each other based on error types, but also based on how these error type patterns change over time. Therefore, the goal of this thesis was to gather and analyse longitudinal data on Dutch monolingual and Turkish-Dutch bilingual children with and without DLD.

The main research question of this thesis was about the effects of DLD and bilingualism on the morphological error patterns of monolingual and bilingual children with and without DLD. This question was divided into two parts: 1) What are the effects of DLD and bilingualism on the type of errors these children make during each session?; and 2) What are the effects of the four groups on the speed at which the children improve over time? That is, how fast do their omission to total error ratios decrease? The expectations were as mentioned in (32-33).

(32) Question 1

- a. Effects of DLD: For all categories (verb inflection, noun phrase features and prepositions), it is expected that the children with DLD, regardless of their monolingual or bilingual background, make more omission errors than substitution errors. The TD groups are expected to make more substitution errors than omission errors.
- b. Effects of bilingualism: For all categories, it is expected that there will be no significant differences between the monolingual and bilingual groups, as DLD and TD each already have different effects on error types (see 32a).

(33) Question 2

- a. Effect of bilingualism in TD children (L1TD versus L2TD): L1TD children are not expected to improve much as they already are at or near a ceiling in their language development. The L2TD children are expected to improve as they may have been still developing their morphology ability at the time of session 1.
- b. Effect of bilingualism in children with DLD (L1DLD - L2DLD): Both the L1DLD children and the L2DLD children are expected to improve, although the L1DLD children are expected to improve at a faster rate as they do not also have an extra delay due to bilingualism.
- c. Effect of DLD in monolingual children (L1TD - L1DLD): Contrary to the L1TD children, the L1DLD children are expected to improve over the course of the three sessions.
- d. Effect of DLD in bilingual children (L2TD - L2DLD): Both the L2TD and L2DLD children are expected to improve, although the L2TD group is expected to improve at a faster rate as they do not have an extra delay due to DLD.

9.1 First research question

The four groups were divided in four different groups, the monolingual group, the bilingual group, the TD group and the DLD group. Then, the monolingual and bilingual groups, and the TD and DLD groups were compared with each other using χ^2 tests and the absolute error totals for omissions and substitutions.

9.1.1 Verb inflection

Based on the results in the verb inflection domain, the bilingual children did not differ from the monolingual children in how likely they were to make omission errors rather than substitution errors. Contrarily, the children with DLD significantly differed from the TD children. That is, children with DLD were about five times more likely than the TD children to make an omission error rather than a substitution error in the first session, and 4.2 and 2.5 times in the second and third sessions respectively.

In short, in the verb inflection domain, there was a significant effect of DLD and no significant effect of bilingualism. In accordance with the expectations, the children with DLD are more likely than TD children to make omissions rather than substitution errors. The findings that monolingual and bilingual children with DLD make more omission errors than substitution errors are in line with previous studies such as Boerma et al. (2017), Blom et al. (2014), De Jong et al. (2007), Verhoeven et al. (2011), Steenge (2006), Rispens and De Bree,

(2014). The findings that monolingual and bilingual TD children are more likely to make substitution than omission errors are in line with Verhoeven et al. (2011).

9.1.2 Noun phrase features

Based on the results in the noun phrase feature domain, the bilingual children did not differ significantly from the monolingual children in how likely they are to make omission errors rather than substitution errors. Contrarily, the DLD children differed significantly from the TD children in session 1. The children with DLD were about two times more likely than the children with DLD to make an omission error rather than a substitution error in the noun phrase domain during session 1. However, in session 2 and 3, the DLD group and the TD group did not differ significantly, although the children with DLD were, respectively, 1.53 and 2.09 times more likely than the TD children to make an omission error rather than a substitution errors.

In short, in the noun phrase feature domain, there was significant effect of DLD in session 1 and trends in session 2 and 3, while there was no significant effect of bilingualism. The found effects of DLD were in line with the expectations as the children with DLD made relatively more omission errors than substitution errors, while the TD children made relatively more substitution errors than omission errors. These findings are in accordance Bol and Kuiken (1988), De Jong (1999), Orgassa (2009) and Orgassa and Weerman (2008).

9.1.3 Prepositions

Based on the results in the preposition domain, the bilingual children did not differ significantly from the monolingual children in how likely they were to make omission errors rather than substitution errors. In addition, the DLD children did not differ from the TD children either. These results do not match the expectations, since it was expected that DLD children would be more likely than the TD children to omit prepositions rather than substituting them. There are no previous studies with bilingual children with DLD involving prepositions, but according to non-Dutch studies (e.g. Armon-Lotem, 2014; Grela et al., 2004; Roeper et al., 2001), monolingual DLD children appear to more frequently omit prepositions than the bilingual TD children. This particular difference between the L2TD and the L2DLD groups was only found in the analysis for the second research question.

9.2 Second research question

The second research question was divided into four parts: i) an effect of bilingualism in TD children (L1TD versus L2TD); ii) an effect of bilingualism in children with DLD (L1DLD versus L2DLD); iii) an effect of DLD in monolingual children (L1TD versus L1DLD); and iv) an effect of DLD in bilingual children (L2TD - L2DLD).

9.2.1 Verb inflection

There was no indication that the omission proportions of the L1TD and the L2TD groups significantly differed each other. In addition, there was no indication that either group significantly improved over time. There appears to be no effect of bilingualism on the verb inflection errors in monolingual and bilingual TD children. An effect of DLD on verb inflection error types in monolingual children with and without DLD was also not found.

Contrarily, there was an effect of bilingualism in monolingual and bilingual children with DLD. That is, the L2DLD group had a larger decrease in omissions relative to total verb inflection errors over the course of the three sessions than the L1DLD group. However, the L2DLD group had higher mean omission proportions than the L1DLD group in each session. Lastly, there was also an effect of DLD in bilingual children. The L2TD group did not make relatively fewer omissions errors over the course of the sessions, but actually made relatively more omission errors, while the L2DLD group had a steep decrease in their omission proportions.

Compared to the expectations, there was no evidence supporting the expectations for an effect of bilingualism in TD children and for an effect of DLD in monolingual children. The expectations for an effect of bilingualism in children with DLD and an effect of DLD in bilingual children were partly confirmed. In short, based on the omission proportions, there was only a significant effect of bilingualism in monolingual and bilingual children with DLD and a significant effect of DLD in bilingual children. Together, these two last effects show that the L2DLD group improved more than the L1DLD group and the L2TD group. The L1DLD group still improved, while the L1TD and the L2TD groups did not improve over time. No comparable longitudinal research has been done on Dutch verb inflection featuring bilingual children with DLD, except for the study by Boerma et al. (2017). Boerma et al. did not look at general verb inflection, however. In their study, the bilingual children with DLD tended to omit participial affixes more often than bilingual TD children in both sessions. Which is

somewhat similar to how the L2DLD children omitted verb inflection more often than they substituted verb inflection, compared to L2TD children. In this thesis, all kinds of verb inflection errors (tense error, agreement error, participle error) were added together. Thus, this thesis' findings cannot be directly compared with Boerma et al.'s findings on participles.

9.2.2 Noun phrase features

There was no indication of significantly different omission proportions between the L1TD and the L2TD groups and between the L1TD and L1DLD groups in the noun phrase feature category. In addition, none of the groups appeared to improve significantly over the course of the three sessions. As a result, there were no significant effects of bilingualism in TD children and DLD in monolingual children on how their omission proportions differ between groups or how the proportions change over time.

In contrast, there appeared to be an effect of bilingualism in children with DLD. This effect seemed to be that the L2DLD children had more omissions relative to total errors than the L1DLD group in the first session. Then, the L2DLD had a decrease in omission proportions, while the L1DLD group made relatively more omission errors relative to total errors than the L2DLD in the second session. In the final session, the L1DLD and the L2DLD had similar amounts of omission errors relative to total errors.

In addition, there was also an effect of DLD in bilingual children on the noun phrase feature omission proportions. That is, the L2DLD children consistently made more omissions relative to total errors than the L2TD group. These two groups did not differ significantly in how their pattern changed over time. First, both groups showed a decrease in proportion from session 1 to session 2, and then showed increase from session 2 to session 3.

Compared to the predictions, there was no evidence supporting the expectations for an effect of bilingualism in TD children and an effect of DLD in monolingual children. The expectations for an effect of bilingualism in children with DLD and an effect of DLD in bilingual children were partly supported by the results. The L2TD groups made fewer omission errors relative to total errors compared to the L2DLD group. The L1DLD only made fewer omissions than the L2DLD group in session 1. There is barely any previous longitudinal research to support these findings as of yet.

9.2.3 Prepositions

There was no indication that the preposition omission proportions of significantly differed between the L1TD and the L2TD groups, nor between the L1TD and the L1DLD group. In addition, there was no indication that any of the groups significantly improved over time. There appears to be no significant effect of bilingualism on the preposition error types in monolingual and bilingual TD children, nor a significant effect of DLD in monolingual children.

There were only significant differences between groups found in the comparisons between L1DLD and L2DLD, and between L2TD and L2DLD. These differences were that the L2DLD group had consistently higher omission proportions than the L1DLD and the L2TD groups. Thus, the effect of bilingualism in children with DLD appear to be that bilingual children with DLD made relatively more omission errors compared to total preposition errors than monolingual children with DLD. In addition, the effect of DLD in bilingual children appears to be that bilingual children with DLD made relatively more omission errors compared to total preposition errors than bilingual TD children.

Compared to the predictions, there was no evidence supporting the first two expectations for an effect of bilingualism in TD children or an effect of DLD in monolingual children. The expectations for the effects of bilingualism in children with DLD and of DLD in bilingual children were only partly supported by the results. In short, the L2DLD group tended to make more omission errors relative to total errors than the L2TD group and the L1DLD group during all sessions. There are no previous longitudinal studies involving prepositions as of yet, thus, the current results cannot be compared with previous research.

9.3 General discussion

9.3.1 Effect of bilingualism and DLD on error types

9.3.1.1 Effect of DLD

The children with DLD appeared to have a higher tendency than TD children to make omission error rather than substitution errors in the verb inflection and noun phrase feature categories. This tendency only appeared to be consistently significant in verb inflection category. These findings are supported by the aforementioned studies mentioned in 9.1 The absence of significant differences between TD and DLD in the preposition category could be

explained by the possibility that Dutch TD children still struggle with prepositions between the ages of 5 to 8 years, similarly to the other three groups. As was also mentioned in that section, the accounts on DLD discussed in this thesis do not entirely explain why the children with DLD make more omission errors than substitution errors.

Firstly, the EOI account does not cover noun phrase features nor prepositions, but only verb inflection. The EOI account predicts that children with DLD omit verb inflection more than TD peers because they are still in an earlier stage of verb inflection development. This stage the children with DLD are still in is called the optional infinitive stage. However, according to the results of this thesis, the children with DLD (both Dutch monolingual and Turkish-Dutch bilingual) did not only make omission errors. They also made substitution errors, which are not accounted for by the EOI account. This discrepancy can be explained by language differences. As was explained in 2.1.2.1, studies in Germanic languages have reported similar results (e.g. Boerma et al., 2017; Blom et al. 2014; De Jong et al., 2007; Kauschke et al., 2017).

Secondly, the MA account predicts that children with DLD have no understanding of grammatical relations at all, and thus, it predicts that children with DLD cannot produce correct grammatical relations. As a result, children with DLD make morphological omission and substitution errors involving grammatical relations. It was not the focus of the current thesis to look at what the children were capable of producing. Based on the data and previous research, there is no evidence that children with DLD are incapable of producing correct verb inflection, noun phrase features and prepositions.

Thirdly, in contrast with the MA account, the AD account predicts that children with DLD have some understanding of grammatical relations (but it is incomplete), and that they can, in fact, produce correct morphology. However, the AD account only focuses on verb inflection, and therefore, does not explain errors in the noun phrase feature and preposition domain. The AD account would be a better fit for the data of the current thesis, if the account would be expanded to include other grammatical relations as well.

9.3.1.2 Effect of bilingualism

The bilingual children (both with and without DLD) did not differ significantly from the monolingual children (both with and without DLD) based in their error type. This can be explained by the effect of DLD. Because of the effect of DLD (TD children are more likely to

make substitution errors, while DLD children are more likely to make omission errors), the bilingual children and the monolingual children each did not have a tendency to make a specific error type more than another error type. One observation from the bilingual group in the noun phrase feature domain can be explained by L1-transfer. That is, the largest part of noun phrase feature omissions in bilingual group were determiner omissions. This could be attributed to L1-transfer as Turkish does not have definite determiners, while Dutch has two definite determiners. However, another explanation of the relatively high amount of determiner omissions is the methodology. Most of the noun phrase feature errors in the monolingual group were also determiner omissions. There appears to be a tendency to drop determiners in front of the names of animal characters in all groups. This methodological explanation will be discussed more deeply in the section about limitations.

9.3.2 Longitudinal effects on error types

9.3.2.1 Longitudinal effects of bilingualism

The longitudinal effects of bilingualism differed for children with and without DLD. There appeared to be no significant difference between the L1TD and the L2TD groups in how much of their errors were omission errors in the verb inflection, noun phrase feature and preposition categories. In addition, they also did not improve over the course of the three sessions in any of the categories. On the contrary, there were significant differences between the L1DLD and the L2DLD groups in all domains. The effect of bilingualism in children with DLD appeared to be that bilingual children with DLD tended to make more omission errors relative to total errors than monolingual children with DLD in the verb inflection, noun phrase feature and preposition categories. However, the bilingual children with DLD improved at a higher rate than monolingual children with DLD in the verb inflection and the noun phrase feature domains. In session 3, the L2DLD children consistently had higher omission proportions than the L1DLD children, except for in the noun phrase feature category. In this category, differences between the L1DLD and the L2DLD groups in omission proportions disappeared over time.

9.3.2.2 Longitudinal effects of DLD

The longitudinal effects of DLD also differed for monolingual and bilingual children. There appeared to be no significant difference between the L1TD and the L1DLD groups in any of

the categories. In contrast, there were significant differences between the L2TD and the L2DLD groups in all categories. That is, the L2TD did not improve over time, while the L2DLD group improved significantly. The L2TD group had consistently lower omission proportions than the L2DLD group.

In short, the L1TD and the L2TD groups did not have lower omission proportions over the course of the three sessions, while the L1DLD and the L2DLD groups each had lower proportions of omissions in the third session than in the first session. However, a notable difference between the L2TD and the L2DLD groups is that the L2DLD group had overall higher omission proportions than the L2TD group.

9.3.2.3 Explanations for different effects

Possible explanations for these findings are as follows. First, the L1TD and the L2TD groups may not have improved over the course of the study, because they may have already hit a ceiling in their morphological development around the time of session 1. Both groups already had lower mean omission proportions than the two DLD groups, which may have left little room for the TD groups to improve.

Second, the lack of significant differences between the L1TD group and the L1DLD and the L2TD groups may be explained by the low amount of total errors observed in the L1TD group. This caused some L1TD children to have high omission proportions. For instance, three children from the L1TD group only made one verb inflection error each during session 1. Nevertheless, because their verb inflection error totals were also only one error for that session, their distributions of verb inflection omissions were at the maximum of 1.00. As a consequence, it appeared as if these three L1TD children only made verb inflection omission errors. It can be argued that these three proportions of the L1TD group are less meaningful than, for example, the proportions of another child from the L2DLD group who made 15 verb inflection omission errors out of 15 total verb inflection errors in session 1. This explanation could also account for the lack of differences between the L1TD and the L2TD group in the same way. Perhaps, if there were more total error observations in the L1TD group, than the L1TD group could have had (significantly) lower proportions than the L2TD group and the L1DLD group.

Third, the L2DLD group may have improved more than the L1DLD group because the L2DLD group started out with a relatively high omission rate. As a result, the L2DLD group

had more room to improve during the run of the experiment. In contrast, the L1DLD group started out with a relatively lower omission rate, which left them relatively less room to improve before their development reached a plateau or a ceiling.

Fourth, the higher omission rates in the L2DLD group in comparison with the L1DLD group can be explained the combined effect of DLD and bilingualism. Because of their bilingual background, the Turkish-Dutch L2DLD children from this study have generally had relatively less exposure than the Dutch L1DLD at the time of the first session. Coupled with the ‘normally’ expected language difficulties that come with DLD, the L2DLD may have had a larger delay than the L1DLD group. However, as was mentioned earlier, the L2DLD group appeared to be improving faster than the L1DLD group. In fact, in the noun phrase feature and verb inflection categories, the difference in omission rates between the L1DLD and the L2DLD group had become smaller over time. This indicates that these two groups may catch up over time. Contrarily, in the preposition category, the difference between the L1DLD and L2DLD group became bigger over time. Why these two groups diverge only in the preposition category is unclear.

9.3 Limitations

A number of limitations to this thesis are discussed in this section. First, as was mentioned earlier, the number of error observations was quite low at times and there were large in-group variances in how many errors children made. Consequently, the numbers used in the analyses may not be wholly representative of each group. In addition, as was mentioned in the general discussion of the longitudinal effects of DLD and bilingualism, some children in the L1TD group had high omission rates during a certain session, although they each only made one error in total in that session. It was also discussed that this could explain why the L1TD group did not differ significantly from the L1DLD and the L2TD groups.

This first limitation is a result of the methodology that was chosen for this thesis, namely spontaneous speech. The children were allowed to say whatever they wanted, how much they wanted and how they formed utterances. The children were not forced to make a certain number of constructions containing difficult verbs, particles, past tense, prepositions, adjectives, specific genders or plurals for example. As a result, the amount of observations containing errors in these kind of constructions is rather low (e.g. only 11 to 28 for plural affix and adjective errors in total per session). Because of the big variation in error

observations, the outcomes to a spontaneous task such as the one analysed in this thesis would be more reliable if the amount of observed errors would be larger for each group. For future research, it would be an improvement to somehow gather larger amounts of errors from all groups in all categories.

Second, each group had a relatively small sample size of only ten children. It can be argued that the groups do not reliably represent each population (i.e. Dutch monolingual and Turkish-Dutch monolingual children with and without DLD). Because of the small sample sizes in combination with the first limitation discussed above, the statistical power of the current results are debatable.

Third, because of the small amount of error observations per group (L1TD, L2TD, L1DLD and L2DLD), the groups had to be compared in groups of twenty children each (e.g. all monolinguals in one group, all bilinguals in one group) to answer the first research question. As a consequence, it could not be analysed whether any of the original groups differed from each other in how likely they were to make a certain error type. Thus, the analysis for the first research question did not show whether there was a difference in the effect of bilingualism in children with or without DLD, and whether there was a difference in the effect of DLD in monolingual and bilingual children. The analysis for the second question showed that such differences can be expected, as was discussed earlier.

Fourth, another limitation is that most of the observed errors involving noun phrases were determiner omissions in each group. The relative overrepresentation of this specific error type could be explained by the fact that determiners appear in more situations than constructions involving adjectives or prepositions. Another explanation is that, in a story setting, determiners are sometimes dropped when referring to animal characters (e.g. *Dan springt hond naar voren*, 'Then, dog jumps forward'). But because children would add determiners in front of the animal names more often than not, these cases were still considered omission errors. Because of this, it is unsure whether determiner omissions in the bilingual groups are due to L1 transfer or due to the reason above.

9.4 Future directions

A number of directions for future research can be taken from this thesis. First, future research should aim to gather more error observations per child and use larger sample sizes than this thesis has used. This would improve the reliability of the findings and give more

meaningful conclusions on how the effects of bilingualism may differ for children with and without DLD, and how the effects of DLD may differ for monolingual and bilingual children.

Second, the low amount of error observations in the noun phrase features (besides determiners) and prepositions categories could be remedied in future research by testing these categories using elicitation tasks. A drawback of elicitation tasks is the loss of the spontaneity of the children's output. Elicitation tasks could condition children to only pay attention to single elicited sentences or sentence parts instead of the bigger 'picture' of communicating thoughts and ideas. Another option for future research is to include narrative tasks comprised around different prepositions and adjectives. That is, if the child wants to tell the story correctly, they will have to use adjectives, plural nouns and prepositions to distinguish between two objects or characters in the story (e.g. The boy went to get the blue ball on the table).

Third, looking back at the accounts on DLD discussed in this thesis, a number of points have already been discussed in 9.3.1. In short, the EOI account would only predict omission errors for (monolingual) children with DLD, while this thesis has found that (monolingual and bilingual) children with DLD make both omission and substitution errors. It was discussed earlier how previous studies have shown that error types in DLD can be dependent on the language. That is, children with DLD mainly make omission errors and relatively fewer substitution errors in Germanic languages (e.g. Boerma et al., 2017; Blom et al. 2014; De Jong et al., 2007; Kauschke et al., 2017), while substitution errors appear to be more prevalent than omission in pro-drop languages such as Italian and Hebrew (Bortolini, et al. 1997; Dromi et al., 1999). The findings of this thesis support the idea that children with DLD make both omission and substitution errors in Germanic languages. For future research, it would be interesting to test the same for more languages, both with and without pro-drop, to gather more insight in how language affects DLD and vice versa.

Regarding the MA and AD accounts, it was discussed earlier that the MA account is not supported nor disproven by the findings of this thesis as the focus was not to look at whether the children with DLD are capable of producing correct grammatical relations. Rather, the goal was to look at what type of error they made if they a grammatical error. The AD account is supported as the children with DLD had trouble with verb inflection. However, the AD account does not encompass noun phrase features or prepositions as a point of

difficulty in DLD, unlike the MA account. Thus, the AD account could be expanded to include other grammatical relations as well.

9.5 Clinical implications

Quite some research on Dutch verb inflection has already shown evidence in favour of verb inflection as a clinical marker of DLD in Dutch-speaking bilingual children (e.g. Boerma et al., 2017; De Jong et al., 2007). However, more research on Dutch determiners, adjectives, plural nouns and prepositions is necessary to find out whether these morphemes can be used as clinical markers for DLD in Dutch-speaking bilingual children. The current study has provided support for verb inflection, noun phrase features and prepositions as clinical markers for DLD in bilingual children. That is, based on the results, bilingual children with DLD tended to make more omission errors relative to total errors than bilingual TD children in all three categories. However, the L2DLD group appeared to improve in the verb inflection and noun phrase feature categories, while the L2TD group did not improve. As a result, the difference between these two groups was the largest in the first sessions for both categories. Thus, verb inflection and noun phrase feature as clinical markers may be more reliable around the ages of 5 to 6 years, rather than around the ages of 7 and 8 years. Still, as was discussed in the limitations section, the reliability of the results of this thesis are debatable. More research is needed before the any of these morphological categories can be used as clinical markers of DLD in bilingual children.

Chapter 10 Conclusion

The aim of this study was to find out what the effects of DLD and bilingualism are on the morphological error types made by Dutch monolingual and Turkish-Dutch monolingual children with and without DLD and how they affect morphological development. Based on the analyses with the absolute error numbers, children with DLD were more likely than TD children to make omission errors rather than substitution errors in each session in the verb inflection and noun phrase feature categories. The preposition category did not give different error tendencies to the children based on DLD or TD. There were also no differences found between the bilingual and monolingual groups in any of the sessions nor in any of the categories. This last observation may be caused by different effects of TD and DLD on error types in monolingual and bilingual children, which became apparent in the longitudinal analysis.

The four groups (Dutch monolingual and Turkish-Dutch monolingual children with and without DLD) were compared using the omissions to total error ratios in order to find longitudinal effects of DLD and bilingualism. There was no evidence for longitudinal effects of bilingualism in TD children or effects of DLD in monolingual children on their error types. The L1TD group did not differ significantly from the L2TD and the L1DLD group.

In contrast, there was an effect of bilingualism in children with DLD and an effect of DLD in bilingual children. The L2DLD group made more omissions relative to total errors than the L2TD group in all three sessions. In comparison with the L1DLD group, the L2DLD group tended to have higher omission proportions as well, except for in the noun phrase feature category. In this category, any differences between the L1DLD and L2DLD group that were noticeable in session 1 disappeared over the course of the experiment.

When the changes in error type patterns were compared over time, the L1TD and the L2TD groups did not have lower omission to total errors proportions over the course of the experiment. In contrast, the omission proportions of the L2DLD and the L1DLD groups were lower in session 3 than in session 1. The L2DLD group had a larger overall decrease than the L1DLD group. The explanations and limitations to these findings were discussed in the previous chapter.

The end goal that this thesis contributed to is to improve the available knowledge on bilingualism and DLD. This was done by providing evidence in favour of or against the three morphological domains (that were tested in this thesis) as clinical markers of DLD in bilingual

children. The findings of this thesis positively point towards these three categories as possible clinical markers in bilingual children. However, the differences between L2TD and L2DLD appeared to be more distinct at the time of session 1 than in the later sessions. More research is needed before these categories can be reliably used as clinical markers.

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