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Production of pronoun gender by children acquiring Russian as a minority language: comparison with the effects of developmental language disorder

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Samenvatting

Dit artikel beschrijft een onderzoek naar de verwerving van het voornaamwoordelijk geslacht door Russisch-Nederlandse simultaan tweetalige kinderen, die in Nederland opgroeien. De prestaties van de tweetalige groep worden vergeleken met die van eentalige Russische kinderen met en zonder taalontwikkelingsstoornis (TOS). De groepen zijn gematcht op leeftijd. De hypothese was dat de tweetalige kinderen, die opgroeien in een context waarin het Russisch een minderheidstaal is (minder input), problemen hebben die vergelijkbaar zijn met die van kinderen met een TOS. In het laatste geval zijn de problemen een gevolg van een verminderd vermogen om taal op te nemen (minder intake). De kinderen moesten verhaaltjes vertellen aan de hand van plaatjes. De resultaten lieten zien dat beide groepen eentalige kinderen al vanaf 4 jaar nauwelijks fouten maakten in het gebruik van het geslacht van pronomina. De eentalige kinderen met een TOS waren daarbij niet te onderscheiden van hun eentalige leeftijdsgenoten zonder TOS. Dit biedt ondersteuning aan theorieën over TOS die rekening houden met de invloed van de morfologische rijkdom van een taal. In tegenstelling tot de eentalige kinderen, presteerden 4-jarige tweetalige kinderen nog op kansniveau. De prestaties bij deze groep waren beter voor oudere dan voor jongere kinderen, maar pas op 7-jarige leeftijd waren de prestaties op hetzelfde niveau als die van de eentalige kinderen. De resultaten suggereren dat in een morfologisch rijke taal een gebrek aan input meer invloed heeft op de verwerving van grammaticaal geslacht dan een gebrek aan intake. De mogelijke effecten van taalontwikkelingsstoornissen zijn na het derde levensjaar niet meer zichtbaar.

*The first author was privileged to collaborate with Steven Gillis in several projects. His cross-linguistic work on the role of morphological richness in first language acquisition has played an important role in the conceptualization of the research reported in this paper.

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Abstract

This paper studies the acquisition of Russian pronominal gender by Dutch-Russian simultaneous bilinguals (4;3-7;11) growing up in the Netherlands. The performance of the bilingual group is compared to that of age-matched monolinguals with and without developmental language disorder (DLD). We hypothesize that reduced exposure to Russian in the minority-language context may lead to delays in language development, comparable to problems attested in DLD (in this case due to reduced intake). The results of a narrative elicitation task demonstrate that both monolingual groups performed at ceiling from age 4 onwards. Monolingual children with DLD were as accurate at using pronominal gender as their unimpaired peers from the earliest ages studied, which supports the processing accounts of DLD taking morphological richness of the target language into account. In contrast, 4-year-old bilinguals performed around chance level. The performance of the bilingual group improved with age and reached the monolingual level only by age 7. The results suggest that reduced input has more impact on the acquisition of gender in a morphologically rich language, whereas the possible effects of DLD are no longer visible after age 3.

Introduction

Bilingual children grow up with two languages and therefore do not hear and speak each of their languages as often as their monolingual peers do. This particularly holds for the non-dominant (minority) language that bilinguals only hear and use at home and in which they receive no, or very little, schooling (Janssen, 2016; Ringblom, 2014; Tribushinina et al., 2017). Within the usage-based framework, input frequency is one of the strongest predictors of the acquisition rate (Behrens, 2009; Tomasello, 2003). Higher token frequencies leave a deeper trace in the processing system and lead to entrenchment of words and grammatical structures. Higher type frequencies bolster analogy and generalization, i.e. processes that play a paramount role in the acquisition of grammar rules (Bybee 2007; Goldberg 2006). Bilingual children usually have reduced exposure to one or both languages, which entails lower input frequencies. Not surprisingly, early bilinguals have been shown to have a slower pace in the acquisition of frequency-sensitive grammatical constructions, such as grammatical gender (Nicoladis & Marchak, 2011).

Due to the lack of reliable assessment tools for bilinguals, these children are sometimes overdiagnosed (or underdiagnosed) for developmental language disorder (DLD, formerly known as SLI) (Grimm & Schulz, 2014). Children with DLD have language deficits in the absence of any hearing, intellectual and emotional impairments or frank neurological damage (Leonard, 2014). Although there is no theoretical conformity regarding the nature of DLD (e.g. Leonard, 2014; Meir & Armon-Lotem, 2017; Rice, 2004; Ullman & Pierpont, 2005), there is a growing body of evidence suggesting that the disorder is associated with impaired procedural learning (Ullman & Pierpont, 2005) and with processing deficits, including deficits in working memory (Ellis Weismer et al., 1999) and processing speed (Windsor, 2002). In this

paper, we adopt the processing approach to DLD (Ellis Weismer & Evans, 2002; Leonard, 2014), which posits that processing difficulties are cause, rather than consequence of language deficits in DLD (contra Rice, 2004). In line with this view, there is evidence that individuals with DLD need at least twice as much input to learn patterns based on statistical information in the input, compared to typically developing (TD) peers (Evans et al., 2009; Tomblin et al., 2007). Hence, in the case of monolinguals with DLD the problem is not the amount of input they receive, but the capacity to efficiently use input for acquisition (reduced intake).

Research trying to tease apart language profiles of TD bilingual children and children with DLD is clearly warranted (e.g. Armon-Lotem, 2014; Bedore & Peña, 2008; Crago & Paradis, 2003; Genesee et al., 2004; Kohnert et al., 2009; Paradis, 2010; Paradis & Crago, 2000). The present paper contributes to this literature by comparing the production of Russian pronominal gender in three groups of children: TD monolinguals, monolingual children with DLD and TD Dutch-Russian bilinguals (2L1) raised in the Netherlands. Across languages, both bilingual children (e.g. Blom et al., 2008; Blom & Vasić, 2011; Gathercole, 2002; Janssen, 2016; Kupisch et al., 2002; Nicoladis & Marchak, 2011; Rodina & Westergaard, 2017; Unsworth, 2008; 2013) and monolingual children with DLD (e.g. Anderson & Lockowitz, 2009; Bedore & Leonard, 2001; 2005; Leonard et al., 2001; Orgassa, 2009; Roulet-Amiot & Jacubowicz, 2006; Silveira, 2011) have been shown to experience difficulty in the acquisition of grammatical gender.

Studies directly comparing the performance of bilingual children and children with DLD in the gender domain report controversial results. For instance, Keij et al. (2012) have found that Dutch-speaking children with DLD lag behind TD L2 learners, which points at a greater impact of the disorder. As against this, Orgassa and Weerman (2008) have demonstrated that monolingual Dutch-speaking children with DLD perform better than TD L2 children, suggesting that reduced input in L2 children has a stronger impact than the processing deficits associated with DLD (Orgassa & Weerman, 2008). A more recent study by Marinis and colleagues (2017) compared the acquisition of gender in L2 Dutch (opaque system) and L2 Greek (transparent system). The results revealed that in Dutch both L2 children and L1 children with DLD performed worse than age-matched TD controls, whereas in Greek only TD L2 participants showed poorer performance. In contrast, L1 Greek children with DLD performed on a par with TD monolinguals. The authors conclude that problems with grammatical gender are not ubiquitous: Children with DLD acquiring morphologically rich languages have less difficulty with the acquisition of morphosyntax compared to learners of morphologically sparse languages. This is because morphological richness facilitates the acquisition of inflectional morphology by making it more salient (due to more evidence available in the input) and more transparent (due to one-to-one form-meaning mappings) (Dressler, 2005; Laaha & Gillis, 2007; Xanthos et al., 2011).

The present paper will build on this line of research and extend it to the acquisition of pronominal gender in the minority language of simultaneous bilinguals. Existing research

on the effects of bilingualism and DLD tends to focus on the majority languages widely spoken in the community. In the present study, we focus on the heritage/minority/home language in which bilingual children receive much less input. We study gender production in Russian, a morphologically rich language with multiple and salient gender cues (cf. Marinis et al., 2017). Most, if not all, studies investigating the acquisition of grammatical gender by bilingual children and/or children with DLD deal exclusively with determiner and adjective agreement. An important aspect of grammatical gender that remains largely underinvestigated, also in research on typical first language acquisition, is pronominal gender, i.e., a gender agreement relation between a pronoun and its antecedent (Corbett, 1991). This study will fill this gap and focus on the acquisition of gender agreement between personal pronouns and their antecedents. By way of illustration, consider the following example from Russian:

(1) Александр подарил Марии кота. Он очень пушистый.

Alexander gave Maria cat-MASC. he very fluffy

'Alexander gave Maria a cat. It is very fluffy.'

The noun кот is masculine, hence the pronoun referring to it should also have the masculine form он 'he'. In Corbett's (1979) agreement hierarchy, pronouns involve the largest possible agreement domain because they are separated from their antecedent by large stretches of discourse. In (1) the pronoun refers to an antecedent in the preceding clause, but the referential distance between a pronoun and its antecedent can also include several clauses.

There are reasons to assume that pronominal gender might be more complex than adjective or determiner agreement because it involves not only lexical (gender assignment) and morphological (gender agreement) processes but also establishing and maintaining discourse coherence. Both bilingual children and monolingual children with DLD have been shown to exhibit problems in the domain of referential coherence (Tribushinina et al., 2017), albeit for different reasons (Mak et al., 2017). Hence, the acquisition of pronominal gender can provide useful insights into the similarities and differences between bilingual children and children with DLD. To this end, we will compare the accuracy of pronominal gender agreement in narratives produced by Dutch-Russian bilinguals and Russian monolingual children with and without DLD. A narrative task appears particularly suitable for our purposes, since it requires both maintaining complex coherence relations (i.e. the discourse dimension of pronoun use) and selecting pronouns based on the grammatical gender of their antecedent (i.e. the morphological dimension of pronoun use).

Before describing the methodology and the results of the study, we briefly review the literature on the acquisition of grammatical gender across languages and populations, with a focus on Russian.

The acquisition of grammatical gender

The acquisition of grammatical gender by typically developing (TD) monolingual children

There are large typological differences between languages as far as transparency and salience of gender systems is concerned, and these typological properties affect the rate of acquisition. Besides semantic cues (e.g. biological gender), children can rely on noun-internal (morphophonological) cues and noun-external (agreement) cues. Noun-internal cues involve predictability of gender based on the noun ending. Noun-external cues involve agreement with other elements in the sentence, such as determiners and adjectives that adjust their form according to the gender of the noun they modify. Rodina and colleagues (2020) distinguish between three types of gender systems: (i) languages with transparent gender systems (e.g. Spanish, Italian, Greek); (ii) languages with semi-transparent systems (e.g. Hebrew, Latvian, Russian); and (iii) languages with opaque systems (e.g. Dutch, Norwegian, Irish). In transparent gender systems, noun endings are unambiguously associated with specific genders (e.g. –a is strongly associated with the feminine gender in Italian). Such systems are acquired early, by age 3 or 4 (Belacchi & Cubelli, 2012; Lew-Williams & Fernald, 2007).

The acquisition of opaque gender systems is known to be a notoriously difficult and protracted process. In these languages children still make errors at age 9 (De Houwer & Gillis, 1998; Hulk & Cornips, 2006; Rodina & Westergaard, 2013; 2017; Schaerlakens & Gillis, 1987; Thomas & Gathercole, 2007). In Netherlandic Dutch, the dominant language of the bilingual participants in this study, there are very few noun-internal cues to gender assignment. Adjective agreement with the noun is informative about the noun gender only in one specific case: singular indefinite neuter nouns are modified by the bare form of an adjective (e.g. *een groot huis* 'a big house'), whereas in all other cases attributive adjectives end in –e (e.g. *het grote huis* 'the big house', *de grote tafel* 'the big table', d*e grote tafels/huizen* 'the big tables/houses', *een grote tafel* 'a big table'). The acquisition of Dutch gender mainly boils down to learning specific determiner-noun combinations (Durieux et al., 1999).

The Russian gender system can be characterized as semi-transparent: Some of the cues are highly transparent, while other cues are more ambiguous and take longer to acquire (Rodina et al., 2020). Russian has a three-way gender system of masculine, feminine and neuter. The masculine form is considered the default (Corbett & Fraser, 2000). According to Corbett (1991), about 46% of Russian nouns are masculine, 41% feminine and 13% neuter. Nouns display gender agreement with adjectives (both attributive and predicative), demonstrative pronouns, possessive pronouns and past-tense verb forms. Grammatical gender is also manifested in agreement between singular pronouns and their antecedents. Masculine nouns (e.g. стол 'table') require the pronoun он 'he', feminine nouns (e.g. картина 'painting') agree with the pronoun она 'she' and neuter nouns (e.g. окно 'window') with оно 'it' (or their oblique case forms).

Table 1: Declensional classes of Russian nouns

	I (M)			II (F)	III (F)	IV (N)
	стол 'table' (inanimate)	кот 'cat' (animate)	конь 'horse'	корова 'cow'	моль 'moth'	окно 'window'
NOM	стол-ø	скот-ø	конь-ø	коров-а	моль-ø	окн-о
GEN	стол-а	кот-а	кон-я	коров-у	мол-и	окн-а
DAT	стол-у	кот-у	кон-ю	коров-е	мол-и	окн-у
ACC	стол-ø	кот-а	кон-я	коров-у	моль-ø	окн-о
INS	стол-ом	кот-ом	кон-ём	коров-ой	моль-ю	окн-ом
LOC	стол-е	кот-е	кон-е	коров-е	мол-и	окн-е

In most cases the gender can be easily predicted from the morphophonological form of the noun (see Table 1). Masculine nouns usually end in a consonant, either hard (e.g. телефон 'telephone') or soft (e.g. медведь 'bear'). Most feminine nouns end in –a (e.g. обезьяна 'monkey'), and neuter nouns end in –o/–e (e.g. молоко 'milk', сердце 'heart'). Monolingual Russian children with typical language development acquire these major morphophonological regularities in the gender domain by age 4 (Gvozdev, 1961; Rodina, 2008).

However, some less transparent cases take longer to acquire (Rodina, 2014; Rodina & Westergaard, 2012). For example, feminine nouns of declension III end in a palatalized consonant (e.g. лошадь 'horse') and are therefore ambiguous between feminine and masculine, because there are also masculine nouns of declension I ending in a palatalized consonant (e.g. огонь 'fire'). In these cases, children have to rely on noun-external cues and noun endings in oblique cases.

Another relatively difficult aspect of the Russian gender system are nouns with a mismatch between semantic and morphological gender. Some of these nouns refer to males (semantic cue), but have a feminine form (morphological cue). For example, the noun папа 'daddy' is a feminine noun of declension II (thus having the case and number morphology of feminine nouns). However, it agrees exclusively with masculine forms of modifiers, verbs and pronouns. Similarly, female names taking the diminutive suffix –ок/ик (e.g. Светик from Света) are morphologically masculine, but should agree with feminine modifiers, verbs and pronouns.

Cases that take longest to acquire involve homophony between feminine forms and stem-

stressed words. Endings of stem-stressed neuter nouns (e.g. сен-о[ə]) 'hay') are virtually indistinguishable from those of feminine nouns (e.g. машин-а[ə] 'car') because unstressed endings are always phonologically reduced in Russian. The same indistinguishability applies to stem-stressed adjectives (e.g. красн-ое[əjə] vs. красн-ая[əjə])) and stem-stressed past-tense verbs (e.g. упал-а[ə] vs. упал-о[ə])). In this case, learners have to rely on end-stressed modifiers and verbs, and also on endings in oblique cases. Six-year-olds with typical language development still make errors with stem-stressed neuter nouns, as in большая -FEM солнце-NEUT 'big sun'(Janssen, 2016; Rodina & Westergaard, 2017; Tribushinina et al., 2018).

The acquisition of pronominal gender by TD monolingual children

The vast majority of studies on the acquisition of grammatical gender deal with gender agreement marked on determiners and adjectives. Relatively little is known about the acquisition of pronominal gender. Mills (1986) reports that English-speaking preschoolers aged 3-4 correctly apply *it* to inanimate referents, but tend to over-generalize *he* to all animate referents. Similar observations were made for children acquiring Dutch (Schaerlaekens & Gillis, 1987). There is some evidence that children exposed to Netherlandic Dutch acquire basic principles of pronominal gender by age 5 (Hulk & Cornips, 2010), but gender errors persist at least until age 7 (Tribushinina & Mak, 2022).

Netherlandic Dutch is a partial pronominal language with a two-way gender system (common and neuter) in the attributive domain and a three-way gender system (masculine, feminine and neuter) in the pronominal domain. Feminine pronouns are used for human (and sometimes animal) females, masculine pronouns are used with reference to human males and animals, but also inanimate referents that are bounded and countable, and neuter pronouns are used for unbounded and uncountable inanimates (Audring, 2009a; 2009b). So an adult speaker of Netherlandic Dutch would usually refer to a fish with *hij* 'he', unless it is a cartoon fish which is conspicuously female, such as Dory in *Finding Nemo* (in this case the feminine pronoun *zij* 'she' will be used). Finally, if fish is a dish (unbounded and uncountable), the neuter pronoun *het* 'it' would be the preferred option. Dutch children as old as 7 years of age have been shown to overuse masculine pronouns, even with reference to female humans (e.g., *Hij is een prinses* 'He is a princess') and conspicuously female animals (e.g., a mother-bird) (Tribushinina & Mak, 2022).

Whereas pronominal gender in English and Netherlandic Dutch is semantic in nature (inanimate vs. animate; male vs. female), languages such as German and Belgian Dutch (also) pronominalize based on the grammatical gender of the antecedent. This form of gender agreement between the noun and the pronoun is more complex than semantic agreement and presumably takes longer to acquire. The scarce evidence available in the literature supports this assumption. For example, Mills (1986) has found that German-speaking children only learn to pronominalize correctly by age 6. Similarly, De Vogelaer (2006) reports that children speaking Belgian Dutch acquire semantic aspects of pronominal gender

(based on biological sex) by age 5, but the acquisition of grammatical gender is not completed by age 7.

To the best of our knowledge, there are no studies investigating the acquisition of pronominal gender in Russian. The bilingual participants in this study acquire Russian and Netherlandic Dutch simultaneously. This language combination is interesting, since Russian has a three-way system of grammatical gender determining pronoun use, whereas in present-day Netherlandic Dutch pronoun selection is primarily based on semantic cues, as explained above.

The acquisition of grammatical gender by bilingual children

A general finding in the literature is that it takes bilingual children longer to acquire grammatical gender compared to monolingual children. Child L2 learners are almost always outperformed by their monolingual peers (e.g. Blom et al., 2008; Blom & Vasić, 2011; Brouwer et al., 2008; Hulk & Cornips, 2006; Keij et al., 2012; Orgassa & Weerman, 2008; Unsworth, 2008; Unsworth et al., 2014). For simultaneous bilinguals the findings in the literature are more mixed. Some studies report that simultaneous bilinguals make more errors with gender markers than their monolingual peers either in the majority language (Unsworth, 2008; 2013) or in the minority language (Janssen, 2016), or in both (Kupisch et al., 2002; Rodina & Westergaard, 2017). However, there are also investigations that find no differences between monolinguals and simultaneous bilinguals (Rodina & Westergaard, 2013; Unsworth et al., 2014). There is even evidence that bilinguals may outperform their monolingual peers in the acquisition of an opaque gender system if their other language has a more transparent and salient gender system (Cornips & Hulk, 2006; Tribushinina & Mak, 2022).

There are also controversial findings concerning qualitative differences between acquisition trajectories in monolingual and bilingual development. De Houwer (1990), for instance, argues that simultaneous bilinguals generally make the same errors as monolinguals. Similar findings have been reported by Blom et al. (2008) and Orgassa and Weerman (2008). In contrast, Rodina and Westergaard (2017) demonstrate that Russian-Norwegian bilinguals with very little exposure to the minority language (Russian) often make errors that monolingual Russian children do not make, such as errors with transparent nouns or across-the-board use of the default masculine forms (cf. Janssen, 2016).

Like in monolingual development, the transparency of the target gender system predicts the ease with which gender is acquired. For instance, Unsworth et al. (2014) report that Greek-English bilinguals have less difficulty acquiring gender in Greek than Dutch-English bilinguals in Dutch, since grammatical gender in Greek is much more transparent and salient than in Dutch. The amount of input in each of the child's languages is another important predictor for the ease with which gender is acquired. For example, Rodina and Westergaard (2017) report that Russian-Norwegian bilinguals (growing up in Norway) acquire the Russian gender system almost as fast as monolingual Russian children, if both their

parents speak Russian at home. In contrast, children from mixed families who speak both Russian and Norwegian at home perform significantly worse with the Russian gender. Interestingly, for the acquisition of gender in the majority language (Norwegian) it apparently does not matter whether bilinguals have one or two Russian-speaking parents. In Norwegian both bilingual groups performed slightly worse than monolinguals, but did not differ from each other.

There are only two studies that looked specifically at production of gender markings by Dutch-Russian bilinguals (Janssen, 2016; Tribushinina & Mak, 2022). Janssen (2016) focused on gender production in Russian (minority language) and studied agreement between nouns and the possessive pronoun мой 'my' (in the attributive domain). Monolingual Russian-speaking children (aged 3 to 6) revealed ceiling performance across all genders. In contrast, the accuracy rates of bilingual children ranged between 55% for neuter and 67% for masculine.

Tribushinina and Mak (2022) looked at the majority language (Dutch) and compared production of pronoun gender in the narratives of Dutch-Russian bilinguals and Dutch-speaking monolinguals. The results revealed that simultaneous bilinguals outperformed Dutch monolinguals. Monolingual Dutch 7-year-olds still used masculine pronouns across the board, even with reference to female characters, such as a mother-bird. In contrast, Dutch-Russian simultaneous bilinguals appropriately used both masculine and feminine pronouns and performed like Dutch-speaking adults. This result has been taken as evidence of positive transfer from a morphologically rich minority language with a semi-transparent gender system (Russian) to a morphologically sparse majority language with an opaque gender system (Dutch). However, this study also found evidence of negative transfer from Russian: Child L2 learners of Dutch overused feminine pronouns, for instance, with reference to a fox, which is feminine in Russian and masculine in Dutch. These results show that the two gender systems do not have to be fully parallel for cross-linguistic transfer to take place: Pronoun gender is grammatical in Russian and semantic in Netherlandic Dutch. Furthermore, Russian, unlike Dutch, has no gender-marked determiners.

The present study continues this line of research and addresses production of pronoun gender in the minority language of Dutch-Russian bilinguals residing in the Netherlands. Based on the results reported in Janssen (2016), we expect that monolingual Russian-speaking children will be target-like in the production of pronoun gender by age 4, whereas Dutch-Russian bilinguals will perform significantly worse than monolinguals.

The acquisition of grammatical gender by children with DLD

As in typical language development, morphological richness of the language and transparency of its gender system have direct implications for the course of gender acquisition by individuals with DLD. Although children with DLD acquiring languages with (semi-)transparent gender systems are often outperformed by their peers with typical language development

(Anderson & Lockowitz, 2009; Bedore & Leonard, 2001; 2005; Bortolini et al., 1997; Dromi et al., 1993; Tribushinina & Dubinkina, 2012; Tribushinina et al., 2018), they still perform much better than children with DLD acquiring opaque gender systems (Keij et al., 2012; Leonard et al., 2001; Marinis et al., 2017; Orgassa & Weerman, 2008). These findings are consistent with the processing accounts of DLD that take morphological richness of the target language into account (Dromi et al., 1993; Leonard, 2000; Leonard et al., 1987). By this view, children with DLD have to devote their limited processing resources to the aspects of grammar that are most informative for interpreting sentences. For languages with sparse morphology word order is a more reliable cue, whereas for morphologically rich languages inflectional morphology is more informative. Inflections are not only more reliable but also more salient in languages with rich morphological paradigms and they offer their learners a lot of evidence of the relevant gender distinctions, thereby facilitating acquisition (Laaha & Gillis, 2007).

The only study that has addressed the acquisition of gender by Russian-speaking children with DLD is Rakhlin et al. (2014). In this study, the children (aged 7-15) were asked to assign real nouns and pseudo-nouns to either masculine or feminine gender. In addition to the morphophonological form of the noun, there were also conditions in which the children could use gender agreement with an adjective or past-tense verb as a cue to noun gender. The results revealed that children with DLD performed rather well with real nouns, but their performance with pseudo-words was below chance. These results seem to support the view that children with DLD acquire gender primarily via a lexical route, in line with the procedural deficit hypothesis (Ullman & Pierpont, 2005). By this view, individuals with DLD have impaired procedural memory (underlying the acquisition of rule-based aspects of language) but intact declarative memory (responsible for learning words and other idiosyncratic elements).

Two other studies on DLD in Russian that might be (indirectly) relevant for our present purposes are Tribushinina and Dubinkina (2012) and Tribushinina et al. (2018). These studies were not concerned with gender agreement per se, but investigated production of antonymous adjectives and adjectival degree markers by children with DLD and aged-matched TD controls. Remarkably, the children in these studies were provided with a model adjective in the correct gender form (agreeing with the target noun). They only had to provide an antonym or a degree-modified adjective in the same gender form. But even in this case, children with DLD made errors with stem-stressed neuter forms, even at the age of 10 years. These results suggest that despite the transparency of the Russian gender system, its acquisition may still be demanding for children with DLD. It remains to be seen whether this problem is specific to adjective agreement or can be generalized to other manifestations of grammatical gender. The present study will shed more light on this issue by focusing on gender agreement in the pronominal domain.

Hypotheses

This study investigates agreement between antecedent nouns and gender-marked pronouns in the Russian narratives produced by bilingual Dutch-Russian children and their monolingual peers with and without DLD (age range 4-7). Based on the literature review above, we expect that TD monolingual Russian-speaking children will be at ceiling with pronominal gender from the earliest ages studied (Gvozdev, 1961; Janssen, 2016; Rodina, 2008; Rodina & Westergaard, 2012). Both monolingual children with DLD (cf. Rakhlin et al., 2014; Tribushinina & Dubinkina, 2012; Tribushinina et al., 2018) and TD Dutch-Russian simultaneous bilinguals (cf. Janssen, 2016; Tribushinina et al., 2018) are expected to perform worse than TD Russian-speaking monolinguals. As far as the relative impact of reduced intake (DLD) vs. reduced input (2L1) is concerned, it is difficult to make specific predictions because earlier attempts to compare gender production by children with DLD and bilingual children (Keij et al., 2012; Orgassa & Weerman, 2008) only included L2 children (rather than simultaneous bilinguals), and neither of the studies looked at the acquisition of a minority language. Theoretically, three scenarios are possible.

One possibility is that there will be no difference in performance between Dutch-Russian TD bilinguals and monolinguals with DLD. For instance, a study on the production of discourse connectives by Russian-speaking children with DLD and Dutch-Russian bilinguals acquiring Russian as a heritage language (Tribushinina et al., 2017) has found that both groups made significantly more errors in connective use compared to TD monolingual peers. Furthermore, bilinguals could not be distinguished from monolinguals with DLD based on error rates and error types. A similar pattern might also emerge in the present study.

Another possibility is that 2L1 children will outperform children with DLD. This scenario is plausible because pronominal gender involves not only morphological processes (gender agreement) as such, but also discourse processes of maintaining reference across clause boundaries. There is ample evidence that that children with DLD have difficulty producing coherent discourse (e.g. Norbury et al., 2014; Tsai & Chang, 2008). If production of a coherent narrative is particularly demanding for children with DLD, their performance with pronominal gender can also be affected. An eye-tracking study testing comprehension of Russian discourse connectives (Mak et al., 2017) revealed that bilingual preschoolers were as sensitive to the semantic-pragmatic properties of these connectives as their monolingual TD peers, whereas monolingual children with DLD did not reveal any sensitivity to the discourse-organizational constraints associated with the connectives under study. These results suggest that bilingual children may have an advantage over children with DLD in the acquisition of discourse coherence phenomena, including pronominal gender.

Finally, it is possible that reduced input in simultaneous bilingualism may have greater consequences for the course of acquisition than reduced intake in DLD. In this case, monolingual children with DLD will outperform the bilingual group. Evidence in favour of this possibility comes from studies suggesting that children with DLD acquiring morphologi-

Table 2: The participants

Age group	TD monolinguals		Monolinguals with DLD		Bilinguals (2L1)	
	N	Mean age (range)	N	Mean age (range)	N	Mean age (range)
4-year-olds	24	4;3 (4;1-4;5)	20	4;6 (4;1-4;11)	25	4;4 (4;1-4;10)
5-year-olds	20	5;6 (5;4-5;10)	18	5;5 (5;2-5;11)	25	5;6 (5;0-5;11)
6-year-olds	28	6;5 (6;0-6;11)	26	6;5 (6;0-6;11)	19	6;3 (6;0-6;6)
7-year-olds	21	7;4 (7;0-7;10)	19	7;5 (7;0-7;11)	24	7;4 (7;0-7;11)

cally rich languages with transparent gender systems perform relatively well, albeit less well than TD monolinguals (Anderson & Lockowitz, 2009; Bedore & Leonard, 2001; 2005; Bortolini et al., 1997; Dromi et al., 1993). Marinis et al. (2017) found no differences between monolinguals with and without DLD in the production of gender in Greek; both monolingual groups outperformed child L2 learners. Janssen (2016) reports that Dutch-Russian preschoolers perform around chance level with gender in the attributive domain in Russian. If these accuracy rates are indicative of performance with pronominal gender, we may expect poor performance of 2L1 children below age 7 with the gender of pronouns. For this reason, we will include age groups ranging from 4 to 7 years in the present study.

Notice that the performance of the bilingual group can also be affected by cross-linguistic influence from their dominant language (Dutch). There is evidence that gender properties of one language are also activated when bilinguals use their other language (Ganushchak et al., 2011). Furthermore, young 2L1 children sometimes make gender errors that are compatible with the gender of the counterpart noun in their other language (Cantone & Müller, 2008). If the bilingual participants in our study are influenced by pronominal gender in Dutch, we may expect an overuse of masculine pronouns in their Russian narratives, since in Dutch masculine pronouns are in principle used for all non-human countable referents (Audring, 2009b).

Method

Participants

Informed consent was obtained from the parents of all participating children. Two hundred sixty-nine children participated in this study: 93 TD monolingual children, 83 monolingual children with DLD and 93 TD bilingual children. The children were divided over four age groups: 4- to 7-year-olds (see Table 2).

The bilingual Dutch-Russian participants were recruited from the Russian weekend schools in Amsterdam, Amersfoort, The Hague and Hilversum (The Netherlands). These children were born in the Netherlands and raised bilingually from birth by a Russian-speaking mother and a Dutch- or Russian-speaking father. All children attended a regular Dutch primary

school on weekdays and a Russian language school/kindergarten during the weekend (half a day). In order to estimate the amount of their overall exposure to Dutch and Russian, a detailed questionnaire was administered to the parents. The analysis of the parental questionnaires reveals that all bilingual participants had less than 45% exposure to Russian (range 12–44%). The children had more exposure to Russian at the weekend (M = 12.2 hours a day) than on weekdays (M = 5.5 hours a day). On average, the children spent 2.5 weeks a year visiting relatives in Russia. The bilingual participants had no hearing problems and no history of DLD, as established by the parental questionnaire. However, eight parents reported a slow start in both Dutch and Russian. Additionally, seven parents mentioned in their comments that the Russian of their children was influenced by Dutch, as evidenced by frequent code-switches and non-Russian syntactic constructions.

The participants with DLD were recruited through specialist schools and kindergarten groups for children with DLD in a large city in West-Siberia. All children were monolingual speakers of Russian and had been independently diagnosed for DLD (in Russian – общее недоразвитие речи, уровень речевого развития III) by a multidisciplinary committee consisting of a speech pathologist, a psychiatrist, a neurologist, a paediatrician and a clinical psychologist. For privacy reasons we were not granted access to the diagnostic results. Therefore, the teachers were asked to select participants based on the following set of criteria: medium- to high performance on a series of non-verbal IQ tests conducted by a school/kindergarten psychologist; no evidence of neurological impairment; no severe visual or auditory problems (based on the yearly medical checks at kindergarten/school); absence of any other known disorder, such as autism; no severe phonological disorder.

The monolingual TD Russian group was recruited from a number of kindergartens and primary schools in the same city as the DLD group. The teachers were asked to select the children based on the following criteria: normal IQ (within one standard deviation of the mean on IQ tests conducted for school enrolment), average academic performance, normal motor, social-emotional and cognitive development, as well as age-appropriate language skills.

Materials and procedure

Two picture stories were used to elicit children's narratives - the Fox Story (Gülzow & Gagarina, 2007) and the Cat Story (Hickmann, 2003). The stories consisted of six pictures each. The pictures were black-and-white drawings, 12x12 cm (Fox Story) and 10x13 cm (Cat Story) in size. In the Cat Story, there are three main protagonists – a mother-bird, a cat and a dog. The mother-bird flies away from the nest in order to search for food for her nestlings. The cat notices this and climbs the tree to catch the baby birds. Then a dog comes into the picture and just before the cat reaches the nest, the dog grabs his tail and pulls the cat from the tree. The mother-bird comes back with a worm and the dog chases the cat away from the tree with the nest. In the Fox Story there are also three main characters – a bird, a fox and a fish (fishbone). The bird finds the fish and proudly sits on a tree. A hungry fox appears and

wants to have the fish. The fox reaches for the fish and the bird drops it. The fox catches the fish and runs away, but the bird follows the fox and takes the fish back.

As narrative collection was part of a larger study (see the Discourse BiSLI corpus in the CHILDES archive), the bilingual participants produced one narrative in Russian and one in Dutch (either Cat or Fox). Only Russian narratives are relevant to the present study. The monolingual participants were randomly assigned to one of the narratives (Cat or Fox) so that their corpus size would be comparable to that of the bilingual participants.

The children were interviewed individually in a quiet room. The monolingual children were tested in their regular school/kindergarten. Most bilingual participants were tested at their weekend (Russian) school, and some were tested at home. After a short warming-up talk, the investigator asked the child to tell the story in pictures. All six pictures were then placed on the table and the child was asked to look through them and confirm that they have understood the story. After that the experimenter took all the pictures away and started placing them on the table one by one. When the child finished describing picture 1, the investigator placed picture 2 next to picture 1 so that the child could see two pictures at the same time. When the child was finished with picture 2, the investigator placed it on top of picture 1 and put picture 3 next to picture 2 on the table, etc. The narratives were audio-recorded and later transcribed in a CHAT format (MacWhinney, 2000).

Coding

First, we selected all sentences containing personal pronouns, either in the nominative case (e.g. он 'he') or in one of the oblique cases (e.g. ей-DAT 'her' его-ACC 'him'). Only singular pronouns were selected because gender is not marked in plural. Demonstrative and relative pronouns were not included in this study because they have adjectival forms of gender agreement and this investigation only focussed on pronominalization. Repetitions and reformulations were left out of the analyses. Finally, only cases with clear antecedents were included in the study; we excluded all ambiguous pronouns (i.e. pronouns that could not be unambiguously related to one specific referent). For example, there are two possible antecedents of она in (2), and it is not clear from the context whether the child refers to the bird or to the cat.

(2) А потом кис&, а потом птичка говорит... А ! Заметила кошечка. А потом она, а потом она куда-то ушла и снова увидела птичек. (r_dld4_119_cat)

'And then the cat, and then the bird says.... Ah! Noticed the cat (or: the cat noticed). And then she, and she left somewhere and saw the little birds again.'

All remaining (relevant) personal pronouns (N=886) were coded for grammatical gender. There was only one instance of a neuter pronoun in the whole corpus, hence only masculine and feminine forms were included in further analyses. Table 3 summarizes the number of coded pronoun instances by group and age.

Table 3: Number of cases of relevant personal pronouns, split by group and age

	4 years	5 years	6 years	7 years
Monolingual (TD)	55	84	213	93
Monolingual (DLD)	29	28	62	51
Bilingual	60	72	75	47

Additionally, each pronoun was coded as either correct gender or incorrect gender. The target gender was determined for each individual case separately, depending on the antecedent of the personal pronoun. For instance, if the child referred to the bird in the Fox Story as птица-FEM 'bird' or ворона-FEM 'crow', the feminine pronouns would be coded as correct. However, if the same protagonist was called ворон-MASC 'raven' or орёл-MASC 'eagle', the masculine pronouns would be considered the target form.

Data analysis

The dependent variable in the analysis was whether or not a child used the correct gender of the pronoun when referring to its antecedent. We analysed the data with a logistic regression using the *glmer* function in the lme4 package in R (Bates et al., 2015). Participant and Story were included as random factors. Group (TD monolingual children vs. bilingual children vs. monolingual children with DLD), Age, and the interaction of Group and Age were included in the fixed part of the model. Age was treated as a continuous variable. The TD monolingual children were taken as the reference level, as we expected this group to show the best performance and wanted to compare the performance of the other groups to this reference group. This analysis tests whether the probability that a child uses the correct pronoun is lower for the bilingual children and the monolingual children with DLD than for the TD monolingual children. Also, the interaction tests whether the difference, if any, decreases with age.

Results

The results are presented in Figure 1.

The results of the logistic regression are presented in Table 4. There was no difference between the children with DLD and the TD monolingual children. There was no effect of Age for the monolingual groups: Both groups were at ceiling with the production of pronominal gender across all ages studied. The bilingual children performed significantly worse than the monolingual children. At age 4, when the monolingual groups were already target-like in the production of pronominal gender, the bilingual children performed just above chance. In contrast, the performance of the bilingual children increased with age. As is ev-

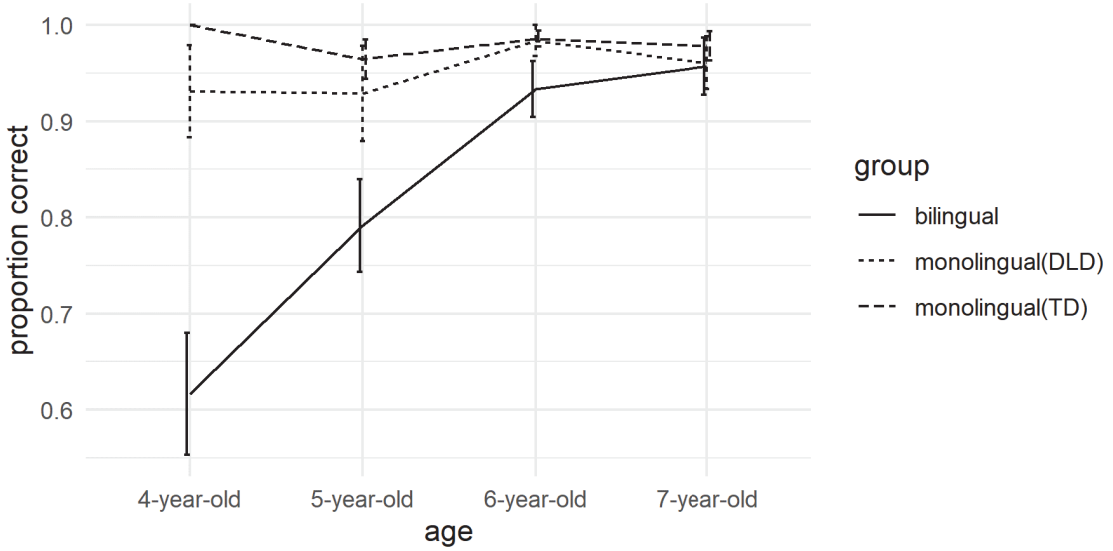

Figure 1: Proportion correct pronouns, by group and age

Table 4: Fixed effects in the logistic regression

	B	Std. Error	*z*-value	*p*
Intercept	7.33	3.84	1.91	.06
Age (L1)	-0.23	0.63	-0.36	.71
L1-DLD vs. L1-TD	-3.80	4.94	-0.77	.44
2L1 vs. L1-TD	-11.47	4.51	-2.54	.01
Age (L1-DLD vs. L1-TD)	0.50	0.85	0.59	.56
Age (2L1 vs. L1-TD)	1.57	0.78	2.02	.04

ident from Table 3, the youngest (4-year-old) bilinguals performed significantly worse than TD monolinguals. Posthoc pairwise comparisons in the other age groups revealed that at age 5 ($p = .02$) and 6 ($p = .03$) the performance of the bilingual group still differed from that of TD monolinguals. Only at age 7 there was no difference between the bilinguals and the TD monolinguals ($p = .78$).

A qualitative error analysis revealed that bilinguals made only one type of error – using the masculine pronouns instead of the feminine ones, as in examples (3) and (4). Errors in the opposite direction (feminine instead of masculine) were not attested, whereas feminine pronouns were more frequent in the narratives (69% feminine pronouns, 31% masculine pronouns).

(3) Лиса. Он хочет съесть. (br4_098_fox)
fox-FEM. he-MASC&ERR wants eat
'Fox. He wants to eat.'

The masculine pronoun он in (3) is used to refer back to the feminine noun лиса 'fox'. Similarly, the masculine accusative form его 'him' is used in (4) with reference to the cat for which the child uses the feminine noun кошка throughout the narrative.

Analysis of individual performance reveals that some of the bilinguals used both correct feminine and incorrect masculine pronouns. In total, there were 12 children in the bilingual group who showed such inconsistent performance (3 four-year-olds, 5 five-year-olds, 3 six-year-olds and 1 seven-year-old). Nine of these children used feminine and masculine pronouns interchangeably with reference to the same protagonists. For example, the pronouns он and она in (5a) and (5b) respectively were used with reference to the same character – bird. The feminine noun is appropriate in this case because the noun птица 'bird' used by this child is feminine.

(5 a.) И потом он, что-то надо делать. (br6_021_cat)
and then he-MASC&ERR something needs do
'And then he needs to do something.'

(5 b.) Она кушать взяла им. (br6_021_cat)
she-FEM eat took them
'She took some food for them.'

Interestingly, in most cases where the children switch between two gender forms for the same referent, they adequately adjust the gender form of the verb or attributive phrase; see for example (6):

(6 a.) Сначала птица нашла рыбу такую. (br4_194_fox)
first bird-FEM found- FEM fish- FEM such- FEM
'First the bird found such a fish.'
(6 b.) А потом он уронил.
and then he dropped-MASC
'And then he dropped (it).'
(6 c.) Лиса тогда его взяла и убежала.
fox- FEM then him took- FEM and ran.away- FEM
'The fox then grabbed it and ran away.'

The sentences in (6) were produced within the same narrative. Notice that in (6a) there is correct agreement between the feminine noun птица 'bird' and the verb, whereas the masculine pronoun он is erroneously used to refer to the bird in (6b). At the same time, the masculine pronoun он in (6b) correctly agrees with the verb уронил 'dropped-MASC'.

In (6a) the feminine noun рыба 'fish' correctly agrees with the demonstrative determiner, but in (6c) the fish is referred to by means of the masculine pronoun его 'him'. A similar pattern was observed in other narratives with inconsistent use of masculine and feminine forms with reference to the same protagonists.

Discussion and conclusion

This study compared production of gender agreement in the pronominal domain across three groups of children: simultaneous Dutch-Russian bilinguals with limited exposure to Russian and Russian-speaking monolinguals with and without DLD. We predicted that both 2L1 children acquiring language in the minority situation (the lower-input group) and monolingual Russian children with DLD (the lower-intake group) would have more difficulty acquiring gender agreement in the pronominal domain compared to unimpaired monolingual children. Concerning the relative impact of simultaneous bilingualism (in the minority language) and processing deficits in DLD, three possibilities were considered: no difference, greater impact of bilingualism and greater impact of the disorder.

The first prediction was only partly borne out by the data in this study. Only bilingual children lagged behind their monolingual TD peers in the acquisition of pronominal gender. Monolingual children with DLD had a ceiling performance and were indistinguishable from their unimpaired peers from the earliest ages studied. These findings are consistent with prior research demonstrating that the acquisition of gender agreement in the adjectival and verbal domain by TD Russian-speaking children is by and large completed by age 4 (Gvozdev, 1961; Janssen, 2016; Rodina, 2008). This study extends these findings to pronominal gender and to language development of children with DLD. One might assume that pronominal gender is more demanding than gender agreement with attributes and verbs because pronominal agreement extends beyond clause boundaries and requires maintaining referential coherence. However, we have seen no evidence of this in our research. Both monolingual groups showed target-like performance from age 4 onwards. Notice, however, that based on these data we cannot rule out the possibility that children with DLD have a delay in the acquisition of (pronominal) gender before age 4. It appears difficult to test this possibility because the youngest age at which children are diagnosed with DLD is 4 years.

Our results are compatible with the processing accounts of DLD (Dromi et al., 1993; Leonard, 2000; Leonard et al., 1987), which claim that children with DLD have limited processing resources and devote them to the aspects of grammar that are most informative in a given language. Inflectional morphology is a reliable cue in morphologically rich languages, such as Russian. The current results have revealed that 4-year-old Russian-speaking children with DLD are target-like in the production of pronominal gender, whereas German-speaking children with typical language development only reach this milestone by age 6 (Mills, 1986) and children acquiring Belgian Dutch still struggle with grammatical pronoun gender at age 7 (De Vogelaer, 2006). The current study adds to the body of research show-

ing that children with DLD acquiring morphologically rich languages have an advantage over their peers speaking languages with sparse morphology (Dromi et al,. 1993; Leonard, 2000; Leonard et al., 1987; Marinis et al., 2017), even though in morphologically rich languages, such as Turkish, children with DLD may still perform worse than their TD counterparts (Güven & Leonard, 2020, 2021).

Concerning the question whether language learning in a minority context or language deficits associated with DLD would have more impact on the development of pronominal gender in Russian, the results unambiguously show that the former is the case. The performance of Russian-speaking monolinguals with DLD is not different from that of TD monolinguals. In contrast, bilingual children having limited exposure to Russian in the dominant Dutch environment significantly lag behind their monolingual peers in the acquisition of pronominal gender. At age 4, the performance of monolinguals is at ceiling, whereas bilinguals of this age still perform around chance. With age, their production of pronominal gender becomes more target-like, and at age 7 bilinguals reach the monolingual standard in the production of pronominal gender. These findings are consistent with the results reported by Marinis et al. (2017): In their study Greek-speaking monolinguals with DLD performed like TD monolinguals, whereas child L2 learners made significantly more errors than both monolingual groups.

A clinical implication of these findings is that pronoun gender, unlike gender agreement between adjectives and nouns (Tribushinina & Dubinkina, 2012; Tribushinina et al., 2018), is not vulnerable in Russian-speaking children with DLD. So poor performance on pronominal gender by pre-school children is likely to be indicative of negative effects of reduced input in the target language rather than language disorder. Given the vulnerability of pronoun gender in the minority language context, Russian weekend schools may need to include more practice with anaphoric pronouns and noun gender in their curricula. This being said, the transparency of the Russian gender system makes it possible for bilinguals with limited input in Russian to acquire the system completely by age 7, whereas bilinguals acquiring opaque gender systems may fossilize in their non-target-like performance, even in the majority language (Hulk & Cornips, 2006; Unsworth, 2008), but even more so in the minority language (Nic Fhlannchadha & Hickey, 2017; Thomas & Gathercole, 2007).

The question arises whether the poor performance of the bilingual children below age 7 is only due to limited exposure to the minority language or also due to cross-linguistic influence from their dominant language (Dutch). We cannot tease these two possibilities apart based on the production data in this study. On the one hand, given the earlier findings that Dutch-Russian bilinguals aged 3-6 perform slightly above chance in the production of gender markings on possessive pronouns (Janssen, 2016) we may assume that the errors attested in this study are, at least, partly due to a delayed acquisition of grammatical gender in the minority-language context. This explanation is in line with the earlier findings that Russian monolingual children with typical language development (Ceitlin, 2000) and with DLD (Rakhlin et al., 2014) also over-use the default masculine form.

On the other hand, it is also possible that production of pronominal gender by Dutch-Russian bilinguals might be aggravated by transfer errors. Importantly, all the errors in the bilingual group were overgeneralizations of the masculine pronouns. The bilinguals overused masculine forms for feminine antecedents, but never the other way around. It is plausible to assume that this performance might be a manifestation of cross-linguistic influence from Dutch. All the protagonists in the narratives under study (except the mother-bird) would be referred to by means of masculine pronouns in Dutch, since all bounded countable entities including animals fall within the scope of the pronoun *hij* 'he' in Netherlandic Dutch.

Based on the production of pronouns, we cannot say for sure whether the children fall back on the masculine forms due to a delayed acquisition (i.e. incomplete grammar) or overrely on masculine pronouns due to performance problems such as inhibiting the dominant Dutch system (cf. White, 2011). It is possible that both factors converge and thereby create a combined difficulty effect. Online processing experiments might be helpful for teasing these two possibilities apart. Several investigations of bilingual acquisition of Dutch grammatical gender have shown that bilingual children who are still at chance in the production of the Dutch neuter determiner reveal sensitivity to ungrammaticality in online tasks, as evidenced in longer reaction times after ungrammatical determiner-noun combinations (Blom & Vasić, 2011; Brouwer et al., 2008) and appropriate forced-choice (offline) grammaticality judgments (Unsworth, 2013). These studies conclude that frequent errors in the production of grammatical gender may reflect "a production-specific performance problem rather than a failure to acquire those grammatical features and rules and/or to specify certain nouns with the target gender features" (Unsworth, 2013, p. 105). These findings make it plausible to assume that the problems in the production of pronominal gender by bilinguals under age 7 are at least partly due to difficulty with inhibiting the dominant Dutch system in a language production task. If this is the case, online experiments with children aged 4-5 (i.e. the age when they still perform around chance level in gender production) may reveal early sensitivity to gender cues in language processing. Such patterns would be compatible with theories of bilingual development assuming that comprehension-production asymmetries are common in bilinguals and that transfer errors are an epiphenomenon of speech production rather than indications of deviant representation (Nicoladis, 2006).

This study has a number of limitations. First, the narratives contained only a limited number of referents and the participants were free to choose any noun to refer to the protagonists. We cannot exclude the possibility that the performance of children with DLD could have been less target-like if a wider range of nouns, including more ambiguous cases, such as stem-stressed neuter nouns, were included (cf. Tribushinina & Dubinkina, 2012). Future studies should test this possibility using elicited production experiments including different noun classes. Second, we were not given access to the diagnostic results in the DLD group, so we did not have much insight into the language profiles of the participants with DLD,

which is important given the heterogeneity of this population. It would also be useful to have more information on the cognitive skills (e.g. working memory, procedural memory) of participants with (and without) DLD. In this paper, we assumed that DLD involves reduced intake, but we have not directly tested this possibility. Future work in this area should empirically test the contribution of input quantity and processing skills on the acquisition of gender distinctions. Finally, as discussed above, based on production data alone, we cannot determine the source(s) of errors that bilingual children make. Online experiments (e.g. in the Visual World Paradigm) will be crucial to resolving these issues in future research.

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