Linguistic Approaches to Bilingualism

Acquisition of adjectival gender agreement in monolinguals and bilinguals: evidence from Latvian and Russian

--Manuscript Draft--

Manuscript Number:	
Full Title:	Acquisition of adjectival gender agreement in monolinguals and bilinguals: evidence from Latvian and Russian
Short Title:	Gender agreement in monolinguals and bilinguals
Article Type:	Article
First Author:	Olga Urek, Ph.D.
Other Authors:	Marit Westergaard, PhD
	Agrita Tauriņa, Dr. paed.
Corresponding Author:	Olga Urek, Ph.D. UiT Norges arktiske universitet Tromsø, NORWAY
Funding Information:	Norwegian Financial Mechanism 2009-2014 (NFI/R/2014/053) — Not applicable
Section/Category:	Basic Science Section
Keywords:	gender agreement; Latvian; input frequency.
Manuscript Classifications:	10.250: Typical child simultaneous bilingualism; 20.100: Morphology
Abstract:	This article presents the results of an experimental study investigating the acquisition of Russian and Latvian adjectival gender agreement by monolingual and bilingual preschool children. Although we find quantitative differences between bilinguals and older monolingual children, we conclude that acquisition paths are qualitatively very similar across participant groups. We also find that the cumulative amount of exposure to the target language and noun frequency in the input plays a significant role in the bilingual acquisition of grammatical gender.
Author Comments:	
Suggested Reviewers:	
Opposed Reviewers:	
Order of Authors Secondary Information:	

Acquisition of adjectival gender agreement in monolinguals and bilinguals: evidence from Latvian and Russian

Abstract

This article presents the results of an experimental study investigating the acquisition of Russian and Latvian adjectival gender agreement by monolingual and bilingual preschool children. Although we find quantitative differences between bilinguals and older monolingual children, we conclude that acquisition paths are qualitatively very similar across participant groups. We also find that the cumulative amount of exposure to the target language and noun frequency in the input plays a significant role in the bilingual acquisition of grammatical gender.

1 Introduction

This study focuses on the acquisition of adjectival gender agreement in Russian and Latvian by monolingual and bilingual preschool children. To the best of our knowledge, this study is the first work expressly addressing the acquisition of grammatical gender by Latvian monolinguals and Latvian-Russian bilinguals. In order to investigate whether bilingual acquisition of grammatical gender follows a qualitatively different path, bilingual children (aged 4;0-5;0) are compared to younger monolingual children (aged 3;0-4;0) as well as monolingual children closer to them in age, in both languages. Unlike previous studies investigating the acquisition of grammatical gender in Russian, our study investigates bilingual children and monolingual Russian controls living in Latvia, growing up in a community characterized by a high degree of both societal and individual

bilingualism. Although the monolinguals come from one-language households and attend kindergartens with Russian curricula, they are passively exposed to a certain amount of the Latvian language outside of their immediate circle. Furthermore, the bilinguals in Latvia can be expected to be generally more balanced than bilinguals who have been investigated in previous studies, who grow up in communities where Russian has no official status (e.g. The United States or Norway, see Schwartz et al. 2015, Rodina & Westergaard 2015). This also means that children growing up in Latvia are exposed to a considerable amount of language input (including child-directed speech) that is generated by non-native speakers of Latvian and Russian at various levels of proficiency. We also address the influence of noun frequency and cumulative amount of language exposure on the acquisition of grammatical gender and analyze the non-target-consistent agreement patterns produced by both monolingual and bilingual children.

This article is structured as follows. Section 2 provides some background on gender assignment and agreement in Russian and Latvian; Section 3 describes the bilingual situation in Latvia; Section 4 summarizes the most relevant findings of previous studies; in Section 5, we lay out our research questions and predictions; in Section 6, we describe the methodology used in the present study; in Section 7, we present quantitative and qualitative analyses of the results, while Section 8 contains discussion and Section 9 concludes.

2 Bilingualism in Latvia

Latvia is a sovereign republic located in the Baltic Region of Northern Europe, with a population of approximately 2.07 million people. It was part of the former USSR from 1944 and until it regained independence in 1991. In 2004, Latvia joined the European Union. Although the only state language of Latvia is Latvian, it has traditionally been a multinational country, with ethnic Russians constituting the most numerous minority group. As of 2013, the ethnic composition of the Latvian population was as follows: 61% Latvian, 26% Russian, 4% Belorussian, 2% Ukrainian, 2% Polish, 1% Lithuanian, and 4% other ethnic groups (data from Central Statistical Bureau). According to the data presented in Filej (2014), the proportion of ethnic Russians was at 11% in 1930, growing steadily over the years until it peaked at 34% in 1989, and it has been slowly declining since. The proportion of the inhabitants mainly using Russian at home follows a similar dynamic. Thus, according to the results of the 1930 Population Census, 73% of the respondents reported that they mainly used Latvian, while only 13% said they mainly used Russian at home. In the Population Census of 2011, on the other hand, 56% identified Latvian as the language mainly used in the household, while 34% of the respondents said they mainly used Russian (data from Central Statistical Bureau). The distribution also varies considerably by geographical region. For instance, in Riga (where the data for the present study was collected) 39% of the respondents reported mainly using Latvian at home, while approximately 50% said they mainly use Russian.

Until 1999, schools with Latvian and Russian curricula existed in parallel. In 1999, four bilingual education models were offered for obligatory basic schools (grades

1-9); those models were gradually adopted by 2007 (Kļava et al. 2010, Zepa et al. 2008). Out of 811 public schools operating in Latvia in the 2015/2016 school year, 94 had Russian-taught and bilingual curricula, and 60, 000 pupils (or 26% of all school children) attended schools offering curricula in minority languages (data from the Ministry of Foreign Affairs of Latvia). Unlike the schools, kindergartens still have Latvian and Russian curricula existing in parallel. Out of 93, 000 children attending kindergartens in 2012/2013 school year, around 71, 000 thousand (or 76%) were enrolled in kindergartens with Latvian as the language of instruction, while 21.9 thousand (or 23%) attended kindergartens were the language of instruction was Russian (*Children in Latvia*, the report by the Central Statistical Bureau, 2013:47). Bilingualism is maintained in the mass media as well: printed periodicals, electronic news resources, radio and TV shows, etc. are available in both Latvian and Russian.

According to the results of the 2000 Population Census, approximately 75% of Latvian native speakers reported at least some knowledge of Russian, while about 56% Russian native speakers reported at least some knowledge of Latvian. This indicates that a very large proportion of the inhabitants of Latvia are bilingual to varying extents. In other words, Latvia is characterized by a high degree of both societal and individual bilingualism.

3 Gender assignment and agreement in Russian and Latvian

3.1 The gender system of Russian

Russian distinguishes between three grammatical genders – masculine, feminine and neuter. Gender agreement is expressed as a suffix on singular adjectives, demonstratives, possessives, past tense verbs, etc., as illustrated in (1) (here and further, transliteration from Cyrillic follows Corbett 1991).

1) Gender agreement marking in Russian

a.	Moj**a**	golub**aja**	kurtka
	My.FEM	blue.FEM	jacket (FEM)
	'My blue jacket'		
b.	Moj	golub**oj**	stol
	My.MASC	blue.MASC	table (MASC)
	'My blue table'		
c.	Moj**o**	golub**oje**	vedro
	My.NEUT	blue.NEUT	bucket (NEUT)
	'My blue bucket'		

Nouns of different genders are unequally distributed in the lexicon, with masculines accounting for 46% of all nouns, feminines 41%, and neuters 13% (Corbett 1991, Polinsky 2008). Masculine is usually seen as the default, because it has the largest number of nouns, attracts most borrowings and is associated with the default declension class (Corbett 2007:267). In addition, masculine agreement is typically used when the biological gender of the referent is unknown or unclear (Corbett 2007:271-2), as illustrated in (2). Masculine is also used when referring to mixed-gender groups (e.g. representatives of some profession, nationality, etc.), also in cases where the corresponding feminine form is available. For instance, *nemci* 'Germans.MASC', and not *nemki* 'Germans.FEM' is used to refer to Germans in general (see Corbett ibid).

2)

a. Tot, kto eto sdelal, budet nakazan
That.MASC who this did.MASC be.fut punished.MASC
'Whoever did this, will be punished'

b. Ego znal kazhdyj
He.ACC knew.MASC everyone.MASC
'Everyone knew him'

In Russian, grammatical gender of a noun is largely predictable from its phonological shape in nominative singular. Nouns ending in non-palatal consonants are masculine (e.g. *dom* 'house'), while nouns ending in a stressed [a] are feminine (e.g. *ruka* 'hand') and those ending in a stressed [o] are neuter (e.g. *pero* 'feather'). However, in a number of instances nominative singular nouns are ambiguous with respect to gender. For instance, nouns ending in palatal and postalveolar consonants can be either feminine or masculine (e.g. *konj* 'horse (m.)' vs. *tenj* 'shadow (f.)'), while nouns ending in an unstressed (and hence phonologically reduced) vowel can be either feminine or neuter (e.g. *part[ʌ]* 'desk (m.)' vs. *sit[ʌ]* 'sieve (f.)')[1] (see Iosad 2012 on vowel reduction in Russian). Here and further, we will refer to these two groups of nouns as 'transparent' and 'opaque' respectively.

As shown in (3), grammatical gender in Russian correlates with declension class. Declension I nouns are masculine, nouns in declensions II and III are feminine (with a handful of notable exceptions like *papa* 'dad (m.)', which trigger masculine agreement, but follow the paradigm of declension III), while nouns of declension IV are neuter (Corbett 1991). Notice that the declension paradigm of neuter nouns

[1] Please see Corbett (1991:34-43) and Rodina & Westergaard (2015) for a more detailed discussion of gender assignment in Russian.

largely overlaps with that of masculines (except in nominative and accusative case) – this property will be relevant for our discussion of gender agreement errors in the current study.

3) Nominal inflection in Russian

	I		*II*	*III*	*IV*
	M		**F**	**F**	**N**
	'house'	'horse'	'hand'	'lynx'	'feather'
Nom	dom-Ø	konj-Ø	ruk-a	tenj-Ø	per-o
Acc	dom-Ø	konj-a	ruk-u	tenj-Ø	per-o
Gen	dom-a	konj-a	ruk-i	tenj-i	per-a
Dat	dom-u	konj-u	ruk-e	tenj-i	per-u
Inst	dom-om	konj-om	ruk-oy	tenj-ju	per-om
Loc	dom-e	konj-e	ruk-e	tenj-i	per-e

Morphophonologically opaque nouns can be disambiguated based on the inflectional paradigm that they follow. For instance, while both *kon'* ('stallion (m.)') and *ten'* ('shadow (f.)') end in a palatal consonant in nominative singular, they take different inflections in the remaining cases.

3.2 Latvian

Latvian distinguishes two grammatical genders – masculine and feminine. Just like in Russian, gender agreement is expressed as a suffix and appears on adjectives (both singular and plural), pronouns, demonstratives, numerals and certain participles. Unlike in Russian, there is no gender agreement on verbs in Latvian. Gender agreement on adjectives and possessives is illustrated in (4).

4) Gender agreement marking in Latvian

a. Mana zilā soma
My.FEM blue.FEM bag (FEM)
'My blue bag'

b. Mans zilais spainis
My.MASC blue.MASC bucket (MASC)
'My blue bucket'

The default-gender criteria used for Russian by Corbett (2007:271-2) can also be applied to Latvian – with the same results. In other words, Latvian also defaults to masculine in cases where the biological gender of the referent is unknown or unclear (as in (5)). The same is true when one refers to mixed-gender groups: e.g. people of Germany in general will be referred to by the plural masculine form (*vācieši*) and not the plural feminine (*vācietes*).

5)

a. Vai kāds var palīdzēt?
If somebody.MASC can help
'Can anybody help?'

b. To jāzin katram
That know.deb everyone.MASC
'Everyone should know that'

Just like in Russian, the grammatical gender of a Latvian noun can largely be predicted from its ending in the nominative singular. Thus, most nouns ending in [a] (e.g., *māsa* 'sister') or [e] (e.g., *pele* 'mouse') are feminine, while most nouns ending in [s] (e.g., *rags* 'horn') or [ʃ] (e.g., *vējš* 'wind') are masculine. There are three main groups of exceptions to this general rule. First, there is a number of stems ending in [s] triggering feminine agreement (e.g. *asins* 'blood'). These belong to a separate closed declension class (see below) and are not very numerous - a search in the tagged text corpus of Modern Latvian returns 55 stems (Levāne-Petrova 2012). Second, there is a handful of nouns with male human referents ending in [a] that trigger masculine agreement, e.g., the noun *puika* 'boy' and

certain hypocoristics derived from masculine proper names, such as *Janka* (from *Jānis*) (Sokols et al. 1959:379, Nau 2011). Third, there is also a group of nouns with (mostly) human referents that end in [e] or [a] that trigger either masculine or feminine agreement depending on the biological gender of the referent. These belong to so-called common gender nouns - or *kopdzimte* in Latvian (see Sokols et al. 1959:381, Nau 2011). This is an extremely restricted class that includes some family names as well as names of animate referents mostly bearing a negative connotation: *badmira* 'starving person', *pļapa* 'chatterer', *slepkava* 'murderer', *bende* 'butcher' etc.

As noted in Halle (1992:37), grammatical gender and declension class are highly correlated in Latvian. Most masculine nouns belong to declensions I-III , while declensions IV-VI contain all feminine as well as some exceptional masculine nouns. Halle (1992) refers to these as Class A and Class B declensions respectively. Declensions I, II, IV and V are open declensions: these contain both simple and derived stems and accept new borrowings, while declensions III and VI are closed (Nau 2011:150). Inflectional paradigms corresponding to the six declensions are illustrated in (6) (for segmentation and further discussion, see Halle & Zeps 1966, Steinbergs 1977, Halle 1987, Halle 1992, Urek 2016; for a traditional account, see Sokols et al. 1959).[2]

6) Nominal inflection in Latvian

a. Class A: masculine declensions

[2] Here we follow the traditional labeling of declensions (see e.g. Sokols et al. 1959).

	I	II	III
	‘horn’	‘salmon’	‘ice’
Nom	rag-s	las-i-s	led-u-s
Gen	rag-a	laš-a	led-u-s
Dat	rag-a-m	las-i-m	led-u-m
Acc	rag-u	las-i	led-u
Loc	rag-ā	las-ī	led-ū

b. Class B: feminine declensions

	IV	V	VI
	‘sister’	‘mouse’	‘blood’
Nom	mās-a	pel-e	asin-s
Gen	mās-a-s	pel-e-s	asin-s
Dat	mās-a-i	pel-e-i	asin-i-j
Acc	mās-u	pel-i	asin-i
Loc	mās-ā	pel-ē	asin-ī

However, this correlation between declension class and gender does not always hold (Halle 1992). While most Latvian masculine nouns (i.e. nouns that trigger masculine agreement) belong to Class A declensions, *puika*-type nouns and common gender nouns with male referents follow the paradigms of Class B declensions for all singular cases except in the dative. In the dative, all masculine nouns take the suffix [-m] following the theme vowel, while all feminine nouns take the suffix [-j]. In fact, the dative is the only case that disambiguates nouns ending in [s] in the nominative singular with respect to gender (e.g. *rags* vs. *ledus* vs. *lasis* vs. *asins*).[3] Thus, in the nominative singular, [asin-s] (Declension VI) takes the same inflection as [rag-s] (masculine, Declension I); in the genitive singular, [asin-s] has the same suffix as [akmen-s] ‘stone’ (masculine, subgroup of Declension II); and in the accusative and locative singular ([asin-i] and [asin-i:]

[3] Note *in passim* that, unlike Russian, in Latvian it is the dative singular, and not the nominative singular form that is the most informative with respect to gender assignment: all masculine nouns take the suffix [-m] and all feminine nouns take the suffix [-j] in the dative singular. In addition, the dative singular is the only form where an underlying theme vowel surfaces faithfully in all declensions.

respectively) it takes the same case-number inflections as the masculines of Declension II (e.g. [las-i] and [las-i:]).

To sum up the discussion so far, both Russian and Latvian are languages where grammatical gender can be assigned based on the phonological shape of nominative singular forms in most instances. Nevertheless, both languages have a certain number of morphophonologically opaque nouns, where gender can only be assigned when the rest of the paradigm is taken into account. In addition, both languages have nouns whose grammatical gender is determined by the biological gender of their referents.

4 Previous studies: acquisition of grammatical gender in Russian and Latvian

In this section, we briefly summarize what is known to date about monolingual and bilingual acquisition of grammatical gender in Russian. To the best of our knowledge, information about the acquisition of grammatical gender in Latvian is rather scarce. The two available longitudinal diary studies (Rūķe-Draviņa 1992, Rūķe-Draviņa 1993) do not discuss the emergence of grammatical gender specifically. However, Rūķe-Draviņa (1993:29) mentions that target-appropriate adjectival inflections start to emerge in the final quarter of the third year of life. At the same time, the examples given in Rūķe-Draviņa (1992:382, 384) show that gender agreement was used target-appropriately with masculine and feminine transparent nouns already at the age of 2;4-2;10, although there is no indication as to whether this occurred consistently. However, considering the high degree of

similarity between gender systems in Russian and Latvian, the regularities observed for Russian should, to a large extent, be generalizable to Latvian as well.

In monolingual Russian-speaking children, target-like adjectival gender agreement emerges very early with morphophonologically transparent masculine and feminine nouns – that is, masculines ending in a plain consonant and feminines ending in *-a* in the nominative singular. For instance, Ceitlin (2005, 2009) reports (based on observational data) that in some children adjectival gender agreement in these cases is virtually error-free even before two-word utterances appear: that is, adjectives uttered in isolation agree in gender with nouns omitted in speech but present in the context. In contrast, target-appropriate classification of opaque feminines (i.e. feminines ending in a palatalized consonant) is accomplished relatively late – around the age of 7;0, while younger children tend to overgeneralize masculine agreement with such nouns (Ceitlin 2005, 2009, Schwartz et al. 2015, see also Gvozdev 1961). Target-like agreement with neuters is acquired later, which can be linked to their relatively low frequency in the input (Ceitlin 2005, 2009). In addition, as Ceitlin points out, the singular declension paradigm of neuters (Declension IV) overlaps with that of masculines (Declension I) in all cases but the nominative and the accusative. Gender assignment in transparent (end-stressed) neuters is completed between 3;0 and 4;0 years of age, while gender assignment in opaque (stem-stressed) neuters is not accomplished until approximately the age of 6;0 (Ceitlin 2009, Schwartz et al. 2015, also Gvozdev 1961). The added difficulty in the case of stem-stressed neuters is their confusability with feminines in the nominative singular (see Section 3.1). As a

result, neuters might appear with either feminine or masculine agreement in the speech of young children (Ceitlin 2005, 2009, Rodina & Westergaard 2012).

The evidence from observational studies summarized above finds experimental confirmation. For example, Rodina & Westergaard (2015) demonstrate that monolingual Russian-speaking children aged 4;2-6;0 show complete mastery (i.e. 100% accuracy) of adjectival gender agreement with transparent masculine, feminine and neuter nouns, while erring with opaque feminines and neuters in 15% and 10% of cases respectively. Similarly, Schwartz et al. (2015) find that transparent neuters are produced with target-appropriate agreement in 10% of cases by monolingual 3-year-olds, but in 90% of cases by monolingual 4-year-olds, while opaque neuters elicit target-like agreement in 15 % and 70% of cases respectively. Schwartz et al. (2015) also show that opaque feminines elicit agreement errors in 85% of cases in 3-year-olds, and only in 25% of cases in 4-year-olds.

Acquisition of gender agreement by bilingual Russian-speaking children appears to be qualitatively similar to monolingual acquisition, which is confirmed by both observational (e.g. Dieser 2007) and experimental data (Schwartz et al. 2015, to some extent also Rodina & Westergaard 2015). For instance, Schwartz et al. (2015) conducted an elicitation study investigating adjectival gender agreement with transparent and opaque Russian nouns in two groups of Russian monolinguals (aged 3;0-4;0 and 4;0-5;0) and four groups of bilingual children aged between 4;0 and 5;0, who had English, Hebrew, German or Finnish as their majority language.

While quantitative differences in accuracy between the monolinguals and bilinguals were found, Schwarz et al. (2015) concluded that error patterns were the same across all participant groups. In addition, they found that children who had German or Hebrew as their L2 scored higher than participants speaking Finnish and English and concluded that the presence of grammatical gender in the L2 has a facilitating effect on the acquisition of gender agreement in the L1. The results are to a certain extent confirmed by the experimental study in Rodina & Westergaard (2015), who investigated adjectival gender agreement in Russian-Norwegian bilingual pre-schoolers living in Norway. The bilingual children in their study fell into three groups depending on the home language situation: children in families were only Russian was used at home, children who were exposed to one parent/one language scenario (Norwegian and Russian), and children in households were one parent used only Norwegian, and the other parent used both Norwegian and Russian with the children. They found that bilingual children in the first group were both quantitatively and qualitatively similar to age-matched monolinguals, while children who used both languages at home were significantly less accurate with respect to gender agreement. Crucially, they also found qualitative differences between monolinguals and the third group of bilingual children, who overgeneralized masculine agreement across the board (with most feminine and neuter targets), i.e. they seemed to be developing a variety of Russian completely without gender. Quantitative and qualitative differences between monolinguals and bilinguals have been linked primarily to the differences in the amount of exposure (Rodina & Westergaard 2015, 2013, 2012, Schwartz et al. 2015). Unsurprisingly, the effect of lower exposure in bilinguals is especially

evident with low-frequency forms (i.e. Russian neuters) and the forms where gender assignment cannot be done based on the phonological shape of the base form (i.e. Russian opaque nouns). In addition, low-frequency nouns belonging to these groups can be expected to elicit more errors than high-frequency items (Dieser 2007).

5 Research questions and predictions

In this study, we investigate the acquisition of adjectival gender agreement in monolingual and bilingual children acquiring Latvian and Russian. In doing so, we aim to answer the five main researched questions listed in (7).

7) Research questions

1. Will differences between mono- and bilingual children be mainly quantitative?
2. Do we find changes/reductions in the gender system of bilinguals?
3. Does the amount of cumulative exposure affect the acquisition of grammatical gender in bilinguals?
4. Does the frequency of lexical items affect the acquisition of grammatical gender?
5. Does morphophonological transparency affect the acquisition of grammatical gender?
6. Are monolingual children growing up in Latvia qualitatively and quantitatively different from their peers growing up in Russia?

Based on the previous studies summarized above, our predictions are as summarized in (8). Since the youngest of our monolingual participants are around 3;0 years of age, we expect that adjectival gender agreement with transparent masculine and feminine nouns will be essentially target-like for both monolingual groups (Latvian and Russian). At the same time, we expect transparent neuter nouns (in Russian) to still be somewhat problematic for younger monolingual participants, but not for the monolingual 4-year-olds. Since masculine has been

argued to be a default gender both in Russian and in Latvian, we expect that accuracy on masculine items will be the highest across conditions. We also expect the opaque items to elicit more agreement errors compared to transparent items across all participant groups in both languages. Furthermore, bilingual children are expected to score lower than monolinguals across conditions. At the same time, we predict that lemma frequency will have a positive effect on accuracy in all conditions across participant groups in both languages. Accuracy in bilinguals is also expected to positively correlate with the cumulative amount of exposure to the target language. Although some previous studies have found qualitative differences between monolinguals and bilinguals with respect to the acquisition of adjectival gender agreement (Rodina and Westergaard 2015), we expect to find no such differences here. This is because the bilingual children included in our study live in a community with a very high degree of societal bilingualism (see Section 2) and therefore receive input in both languages also outside of the home and the immediate social circle. At the same time, it also means that children growing up in Latvia are exposed to a considerable amount of language input (including, supposedly, child-directed speech) that is generated by non-native speakers of Latvian and Russian at various levels of proficiency, and, therefore, to a certain amount of what we might refer to as "erroneous" forms. While it is reasonable to expect that this can affect the acquisition of adjectival gender agreement, at this point we remain agnostic about the potential effects of societal bilingualism on monolingual and bilingual acquisition. With respect to non-target-like agreement patterns, we predict that masculine agreement might be used with opaque feminine forms, while opaque neuters (in Russian) might be overgeneralized as

either masculine or feminine. Also, given that opaque feminines in Russian follow a separate paradigm while opaque feminines in Latvian overlap with masculine paradigms in all cases but the dative, we expect that opaque feminines in Latvian will elicit more errors than opaque feminines in Russian.

8) Predictions

a. At-ceiling performance with transparent masculine and feminine forms in both groups of monolinguals;

b. At-ceiling performance with transparent neuters in the older monolingual group, but not in younger monolingual group (for Russian);

c. Higher accuracy on masculine items across conditions for all participant groups;

d. Lower accuracy on opaque compared to transparent nouns across all participant groups;

e. Lower accuracy in bilinguals compared to monolinguals across conditions;

f. Positive effect of lemma frequency on gender agreement accuracy across all participant groups;

g. Positive effect of cumulative amount of exposure on accuracy in bilinguals;

h. Qualitatively similar acquisition of gender agreement in all participant groups;

i. Masculine agreement overused with feminine opaque nouns, and feminine agreement overused with masculine opaque nouns;

j. Both feminine and masculine agreement overused with opaque neuters (for Russian).

k. Lower agreement accuracy with Latvian opaque feminines than with Russian opaque feminines

6 Methodology

6.1 Participants

For this study, we recruited 19 bilingual Latvian-Russian children aged from 4;0 to 6;10 (mean age = 62.2 months, SD = 10.4). As Latvian controls, we recruited 13 monolingual three-year-olds (mean age = 43.9 months, SD = 2.58) and 16 monolingual four-year-olds (mean age = 52.2, SD = 3.1). As Russian controls, we recruited 24 monolingual three-year-olds (mean age = 43.6, SD = 2.9) and 18 monolingual four-year-olds (mean age = 54.4, SD = 3.5). All children were recruited in kindergartens in Riga, Latvia.

All monolingual children in our study come from families where both primary caregivers speak the target language natively, and they attend kindergartens where the target language is either the only language of instruction (in the case of Latvian), or the primary language of instruction (in the case of Russian). However, due to Latvia being *de facto* a bilingual society, a certain amount of exposure to the non-target language has to be assumed for all monolingual participants.

All bilingual children in our sample come from families where one primary caregiver is a native speaker of Latvian and the other a native speaker of Russian. All of these children were born in Latvia, and most of them (N = 17) have Latvian as the only language of instruction in the kindergarten. Two children attend

kindergartens where Russian is also used. In order to estimate the amount of exposure to Latvian and Russian in the bilinguals, we requested their parents to fill out a detailed questionnaire and specify the amount of time that a given language is used/heard by the child in different situations from birth (UBiLEC; Unsworth 2013). Parents could choose to fill in the questionnaire in Latvian or in Russian. For the bilingual children in our sample, the cumulative length of exposure (CLoE) to Latvian ranges between 0.68 and 4.29 (mean = 2.4, SD = 0.92), while the Russian CLoE ranges from 1.19 to 4.28 (mean = 2.39, SD = 0.8). As evident from the CLoE values, our bilingual participants – as a group – are fairly balanced in their two languages.

6.2 Stimuli and procedure

The procedure used in this study is an adapted version of the elicited production task used in Rodina & Westergaard (2013, 2015). The elicitation materials consisted of a set of colored pictures depicting the target nouns, and these were presented on a laptop screen. The Latvian and Russian stimuli were translation equivalents, which was done in order to control for familiarity and frequency across the two languages. The nouns were selected in such a way as to avoid a gender match across the languages (e.g. Rus. *grib* (m.) vs. Lat. *sēne* (f.) 'mushroom'). This was achieved for all items but two frequent Russian opaque feminines, *tenj* 'shadow' and *myshj* 'mouse', which have feminine counterparts in Latvian (*ēna* and *pele* respectively). For each stimulus, lemma frequency (measured as number of instances per one million words, ipm) was registered. Frequency information for the Russian items comes from the New Frequency

Dictionary of Russian, based on the National Text Corpus (Ljashevskaja & Sharov 2009). The frequency of the Latvian items in ipm was calculated based on the text corpus of Modern Latvian (Levāne-Petrova 2012).

The Russian stimuli consisted of 31 nouns distributed across the three genders. In addition, nouns of each gender varied with respect to transparency, resulting in six conditions. There were five nouns in each condition except feminine transparent, where an extra item was added to achieve balance in Latvian. The Latvian stimuli were distributed across two genders and five declension classes (2 masculine and 3 feminine declensions). The feminine items varied with respect to transparency. All transparent items came from open declension classes (I and II for masculines and IV and V for feminines), while the opaque feminine items belonged to the closed Declension VI. Six nouns of each declension class were used (except Declension IV that had seven). The full list of stimuli is given in the Appendix.

In order to elicit attributive adjectives, participants were presented with a set of two identical objects of different colors in each trial. The experimenter named the object for the child and then asked the child to identify each of the objects along with its color. After that, the experimenter pressed a button causing one of the objects to disappear. The child was then asked to name the object that disappeared along with its color. Thus, we expected three responses per item for each child. Lead-in sentences were selected so as to not provide any cues to the grammatical gender of the target item, which meant that all gender-agreeing forms had to be avoided. For Russian, we used the lead-in sentences given in Rodina &

Westergaard (2015) (e.g. “This is what we call ‘mushroom’. What color are they?”). The plural pronoun was chosen because Russian plural forms do not agree in gender. The lead-in sentences used in Latvian are given in (9). Each session was preceded by two practice trials, where the children were familiarized with the procedure. During the test trials, plural forms were used to avoid priming.

9) Elicitation procedure

Exp: To mēs saucam ‘sēne’. Salīdzini pēc krāsas!
‘This, we call ‘mushroom’. Compare (them) by color!

Child: Zila$_F$ sēne un sarkana$_F$ sēne.
‘A blue mushroom and a red mushroom’

Exp: Kas tagad pazuda?
‘What has disappeared now?’

Child: Sarkanā$_F$ sēne!
‘The red mushroom!’

Both in Latvian and in Russian, the questions prompting the child to produce attributive adjectives contained the word ‘color’, as illustrated in (10). In Latvian, *krāsa* ‘color’ is a transparent feminine noun, while *tsvet* ‘color’ in Russian is a transparent masculine. As exemplified below, this has occasionally resulted in children using attributive adjectives agreeing in gender with the word *color*, and not with the target noun. Needless to say, it is only possible to identify cases like this where the noun is produced along with the attributive adjective (while noun omission in this context is perfectly grammatical in both Latvian and Russian). If the child omitted the target noun at the first attempt, the examiner asked a follow-up question “What is it here?”, to encourage the child to name both the adjective

and the noun. Responses where the child did not produce the complete utterance were coded as unavailable, and not included in the final analysis.

10) Lead-in questions in Russian and Latvian

a. Russian

Exp:

Kakie	oni	po	tsvetu?
What	they	by	color-ACC.MASC

'What color are they?'

Child:

Eto	krasnyj	tsvet,	a	eto	zeljonyj	tsvet.
This	red.MASC	color$_M$	and	this	green.MASC	color$_M$.

'This is a red color, and this is a green color'

b. Latvian

Exp:

Salīdzini	pēc	krāsas!
Compare.imp	by	color-GEN.FEM

'Compare them by color!'

Child:

Šeit	zila	krāsa,	un	šeit	sarkana	krāsa!
Here	blue.FEM	color$_F$	and	here	red.FEM	color$_F$

'Here is a blue color, and here is a red color'

As a rule, children were not corrected if they misnamed the color (e.g. said 'green' for 'red'), and such responses were coded as "correct" if gender agreement was target-like. There were, however, a number of exceptions. The Russian adjective *goluboj* 'light-blue' is the only end-stressed color term, and this was therefore crucial in order to unambiguously determine the kind of agreement used with the neuters. Although the children were trained to use the term during practice trials, they occasionally misnamed the color as *sinij* 'dark blue'. When that happened, the experimenter said "Are you sure this is *sinij tstvet*? I think this is *goluboj tsvet*", and prompted the child to name the colors of the objects again. In the neuter, only the

responses with the end-stressed adjective *goluboj* were included in the analysis. In Latvian, the terms *rozā* 'pink' and *zelta* 'golden' do not agree in gender with the noun that they modify. Although our materials did not include pink or golden objects, children ocassionally used these terms. In such cases, the same procedure as in the case of *goluboj* was used. Responses where a child used a noun other than the target noun were discarded. Diminutives were discarded in cases where they either disambiguated the target gender (e.g. *kljuch* vs. *kljuchik* 'key', *zivs* vs. *zivtiņa* 'fish') or made the target gender opaque (e.g. vedro vs. vedjorkʌ). Diminutives of feminine and masculine transparent forms were tolerated (e.g. *glaz* vs. *glazik* 'eye', *putns* vs. *putniņš* 'bird'), since these belonged to the same declension class as the target noun in both languages. All responses included in the analysis were coded as correct/incorrect. In addition, the type of agreement produced (M, F, N) was indicated.

7 Results

7.1 Effect of bilingualism, age, cumulative exposure and frequency

In this section, we consider the overall differences between the monolingual and bilingual children in Latvian and Russian. Figure 1 illustrates the mean proportion of target-appropriate responses given by children in each group. As evident from Figure 1, none of the groups is at ceiling in either language. The overall mean accuracy of older monolinguals reaches 94% in Russian and 88% in Latvian, while the younger monolinguals produce target-appropriate agreement patterns in 85% of cases in Russian and in 82% of cases in Latvian. Bilinguals score slightly lower than older monolinguals in both languages, as they are accurate 86% of the time in

Russian and 81% of the time in Latvian. Error bars on Figure 1 indicate that accuracy scores of both monolinguals and bilinguals are characterized by a high degree of individual variation. While this is not surprising, given that individual variation is one of the hallmarks of typical language development, it might potentially obscure the effect of factors such as bilingualism in cases where sample size is limited.

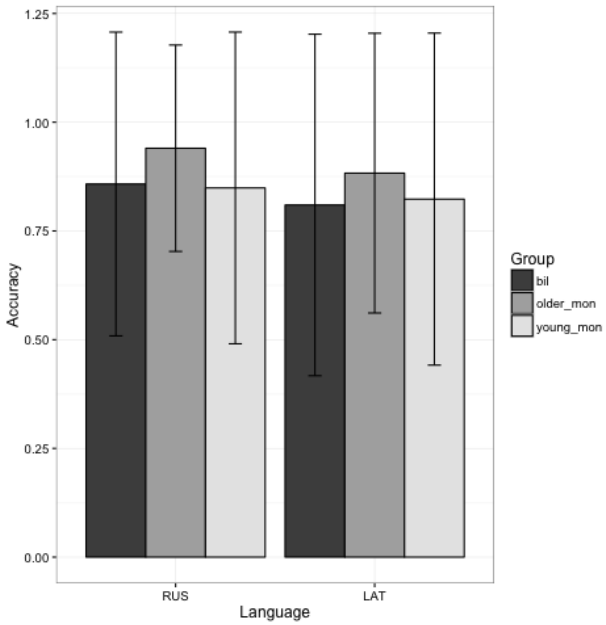

Figure 1. Adjectival gender agreement accuracy by participant group in Russian and Latvian

In order to establish whether differences in accuracy revealed in Figure 1 are significant, a generalized linear mixed model was constructed for each language (using lme4 package in R, Bates, Maechler, Bolker & Walker 2014). The models predicted response accuracy based on participant group (older monolinguals vs. younger monolinguals vs. bilinguals), while allowing intercepts to vary across participants and items. The results of the models are summarized in Tables 1 and 2. For Russian, the model shows that the older monolingual children are

significantly more accurate than the bilinguals and younger monolingual children together (β = -1.42 (SE = 0.53), z = -2.7, p = 0.008); at the same time, there is no difference in performance between bilinguals and younger monolinguals (p = 0.16). For Latvian, the pattern is essentially the same: older monolinguals outperform younger monolinguals and bilinguals (β = -0.97 (SE = 0.41), z = -2.4, p = 0.018), while the bilinguals and younger monolinguals show the same level of accuracy (p = 0.977).

Table 1. Effect of bilingualism on performance in Russian

	Estimate	**Std. Error**	**z value**	**p value**
(Intercept)	3.4066	0.4182	8.146	3.78e-16
older 1L1 vs. 2L1 & younger 1L1	-1.4248	0.5340	-2.668	0.00762
2L1 vs. younger 1L1	-0.8921	0.6403	-1.393	0.16353

Table 2. Effect of bilingualism on performance in Latvian

	Estimate	**Std. Error**	**z value**	**p value**
(Intercept)	3.1676	0.4904	6.459	1.05e-10
older 1L1 vs. 2L1 & younger 1L1	-0.9703	0.4101	-2.366	0.018
2L1 vs. younger 1L1	-0.0134	0.4705	-0.028	0.977

In order to investigate the effect of age and cumulative exposure to Russian or Latvian on accuracy in bilinguals, a separate model was fit for each language, with "Participant" and "Item" as random effects. The results of the models are summarized in Tables 3 and 4. For Russian, the analysis revealed that, controlling for age, cumulative length of exposure has a significant positive effect on accuracy (β = 1.36 (SE = 0.64), z = 2.13, p = 0.03). In addition, age – independently - also has a significant positive effect, such that older participants are more target-consistent (β = 0.16 (SE = 0.04), z = 3.5, p = 0.0005). For Latvian, the analysis also uncovered a significant positive effect of cumulative language exposure (β = 1.3 (SE = 0.45), z

=2.88 , p = 0.004), but no relationship between age and performance was found (p = 0.63).

Table 3. Effect of age and cumulative exposure on accuracy in Russian

	Estimate	**Std. Error**	**z value**	**p value**
(Intercept)	2.64477	0.68776	3.845	0.000120
AgeMonths	0.15591	0.04494	3.469	0.000522
CumExpRus	1.36057	0.63807	2.132	0.032980

Table 4. Effect of age and cumulative exposure on accuracy in Latvian

	Estimate	**Std. Error**	**z value**	**p value**
(Intercept)	3.19837	0.70904	4.511	6.46e-06
AgeMonths	-0.01680	0.03529	-0.476	0.63397
CumExpLat	1.29635	0.44948	2.884	0.00393

Finally, let us consider the effect of lemma frequency on the accuracy of adjectival gender agreement in each language. In order to do that, we ran generalized linear mixed models with accuracy as a dependent variable and transparency and frequency as predictors, allowing intercepts to vary by participant. Separate models were fit for monolinguals (as a group) and bilinguals in each language. The model revealed that, controlling for the effect of transparency (see Section 7.2 for discussion), the bilingual children are significantly more accurate on adjectival gender agreement with more frequent nouns, both in Russian ($\beta = 0.27$ (SE = 0.1), $z = 2.62$, $p = 0.009$) and in Latvian ($\beta = 0.16$ (SE = 0.08), $z = 2.08$, $p = 0.038$). However, no effect of item frequency was found for the monolinguals in either language ($p = 0.198$ for Russian, $p = 0.192$ for Latvian).

7.2 Effect of gender and transparency in Russian

In this section, we consider the effects of gender and transparency on adjectival agreement in the three groups of participants tested in Russian. In order to do so,

generalized mixed effects models with varying intercepts for participants and items were run on the relevant data subsets. Table 5 shows the proportion of target-appropriate responses given by the bilinguals and the two groups of monolingual participants in each condition. As evident from Table 5, all three groups of participants are at ceiling with respect to transparent masculines. At the same time, they still err on transparent feminines, and especially on transparent neuters, where bilinguals show 71% accuracy and older monolinguals produce target-appropriate responses only 88% of the time. Performance on opaque masculine and feminine items is lower than on transparent items of the same gender for all three groups. However, unexpectedly, bilinguals score somewhat higher on opaque than on transparent neuters. Overall, opaque feminines appear to elicit the most errors across all three participant groups.

Table 5. Accuracy by condition and group in Russian

	Transparent			**Opaque**		
	M	**F**	**N**	**M**	**F**	**N**
younger 1L1	99% (10.7)	90% (30.0)	77% (42.3)	95% (22.6)	65% (47.8)	73% (44.8)
older 1L1	100% (0)	98% (13.9)	88% (32.8)	96% (19.8)	84% (36.4)	93.4% (24.9)
2L1	99.2% (8.9)	94% (22.9)	71% (45.4)	89% (31.3)	75% (43.5)	78% (41.7)

Figures 2 and 3 illustrate the distribution of target-appropriate responses by noun status (opaque vs. transparent) and by grammatical gender respectively for the three groups of participants. As the visual inspection of Figure 2 indicates, participants tend to score somewhat higher on transparent items compared to the opaque ones. The positive effect of transparency turns out to be statistically significant overall ($\beta = 1.37$ (SE = 0.40), $z = 3.4$, $p = 0.0007$), while differences in

performance between participant groups are insignificant in both conditions. With respect to the effect of gender, the statistical analysis reveals that overall both feminines (β = -2.53 (SE = 0.53), z = -4.8, p = 1.67e-06) and neuters (β = -3.19 (SE = 0.54), z = -5.9, p = 2.68e-09) elicit significantly more errors than masculines across participant groups. However, due to large individual variability, differences between participant groups are less significant than Figure 3 might suggest. Thus, bilinguals score only marginally lower than the older monolinguals in the neuter (β = 1.34 (SE = 0.74), z = 1.805, p = 0.071), and there is no statistical difference between bilinguals and older monolinguals in the feminine (p = 0.486) or the masculine (p = 0.817).

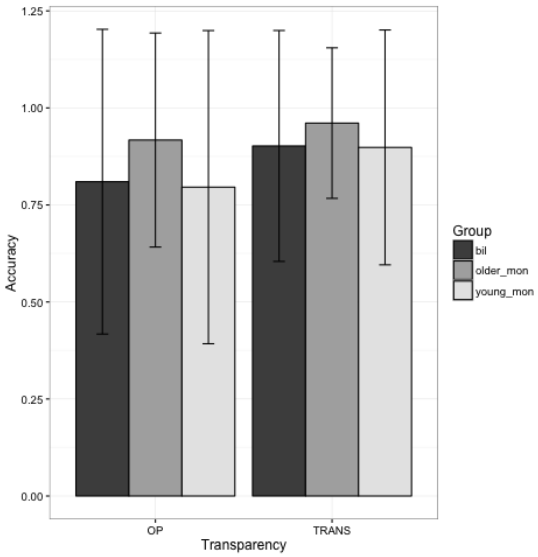

Figure 2. Proportion of accurate responses on opaque and transparent items by participant group in Russian

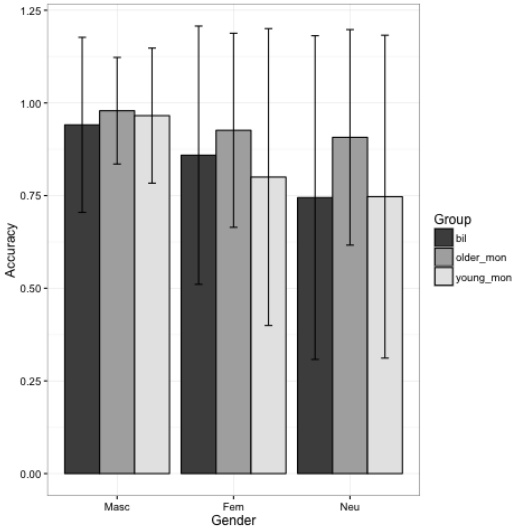

Figure 3. Proportion of accurate responses on masculine, feminine and neuter items by participant group in Russian

Let us now have a closer look at the non-target-appropriate agreement patterns that the participants produce. Figures 4 and 5 illustrate the distribution of masculine, feminine and neuter attributive adjectives with transparent and opaque target nouns of the three genders. While all three groups of participants are at ceiling on masculine transparent nouns, Figure 4 reveals that masculine agreement is overused with transparent feminines. The proportion of masculine adjectives produced with feminine nouns is the highest in the younger monolingual group (10%), followed by the bilingual participants at 6%. The differences between the participant groups are especially apparent in the neuter. Here, both younger monolingual children and bilingual children tend to overuse masculine agreement (20% and 25% respectively), while older monolingual participants overgeneralize masculine and feminine in equal proportions (6%).

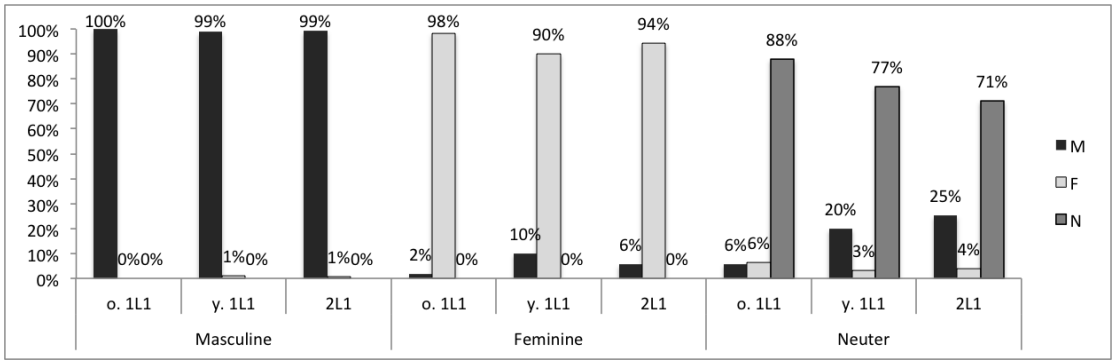

Figure 4. Agreement patterns with transparent items by gender and participant group

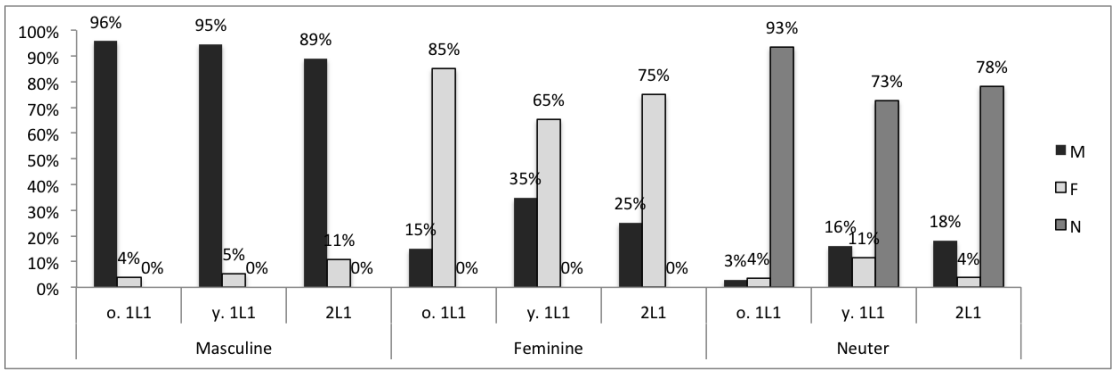

Figure 5. Agreement patterns with opaque items by gender and participant group

As expected, the proportion of non-target-like agreement patterns is higher with the opaque nouns (Figure 5) for all groups of participants. In line with our predictions, opaque masculines occasionally trigger feminine agreement, while masculine agreement is overgeneralized with opaque feminines, as exemplified in (11).

11) Non-target agreement with opaque feminines and masculines

a. Belyj mysh
White.MASC mouse(FEM)
'White mouse'

b. Zheltaja kljuch
Yellow.FEM key(MASC)
'Yellow key'

This latter pattern is especially pronounced in the younger monolingual group (35%), followed by the bilinguals (25%). Just as with transparent targets, differences between the three groups of participants are especially evident in the neuter. Recall that stem-stressed neuter items are potentially confusable with the feminines, so we expected feminine agreement to be overused in the opaque neuter condition.

12) Non-target-like agreement with opaque neuters

a. Golubaja platje
Blue.FEM dress(NEUT)
'blue dress'

b. Goluboj jabloko
Blue.MASC apple(NEUT)
'blue apple'

This prediction, however, appears not to be borne out. While older monolinguals are almost target-consistent, younger monolinguals use non-target-consistent feminine and masculine agreement with opaque neuter targets in approximately equal proportions, while the bilingual children overuse masculine agreement more frequently than feminine (18% vs. 4%).

7.3 Effect of gender and transparency in Latvian

In this section, we address the effects of gender and transparency on adjectival agreement accuracy in Latvian. Recall that, unlike Russian, Latvian distinguishes between two grammatical genders. In addition, gender assignment in Latvian is largely transparent: singular nominative nouns can be readily identified as masculine or feminine based on the final sound in the vast majority of cases. The only exception to this general rule that is relevant for this study is the set of 55

feminine nouns in Declension VI. These nouns end in [-s] in the nominative singular, and therefore they are potentially confusable with masculines.

Table 6 shows the mean proportion of target-appropriate agreement patterns produced with the nouns of each declension class by the three groups of participants. As expected, transparent nouns seem unproblematic for both monolingual and bilingual children. All three groups of participants are at or nearly at ceiling with transparent feminines and show high accuracy with masculine agreement as well. In contrast, opaque feminines tend to elicit non-target-appropriate masculine agreement in monolinguals and bilinguals alike. Even in the older monolingual children, the mean accuracy only reaches 45% (cf. Russian, where older monolinguals produced target-appropriate agreement with opaque feminines in 84% of cases). Note, however, that unlike in Russian, where opaque nouns can be disambiguated based on several case forms, in Latvian it is only the dative singular that distinguishes the opaque feminines from all masculine classes. This, and the fact that feminine nouns of this class are not very numerous, makes it reasonable to expect that Latvian opaque feminines will elicit non-target-like agreement patterns in a considerably larger proportion of cases than opaque feminines in Russian.

Table 6. Accuracy by gender and declension class in Latvian

	Masculine		Feminine		
	I	II	IV	V	VI
younger 1L1	93% (26.1)	83% (37.9)	97% (15.8)	100% (0)	35% (47.7)
older 1L1	98% (13.7)	94% (24)	98% (12.4)	100% (0)	45% (49.8)

2L1	85% (35.7)	85% (35.4)	96% (19.1)	99% (11)	38% (48.6)

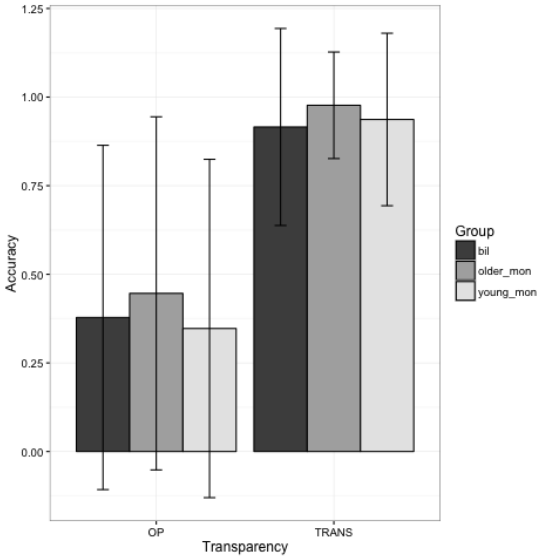

Figure 6. Proportion of accurate responses on opaque and transparent items by participant group in Latvian

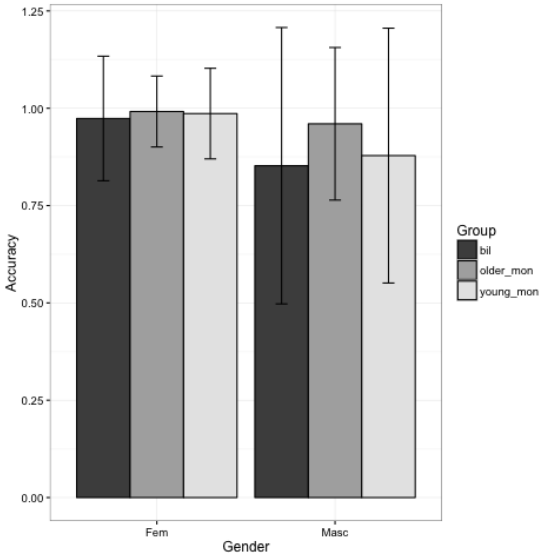

Figure 7. Proportion of accurate responses on feminine and masculine items by participant group in Latvian

Figures 6 and 7 illustrate the mean proportion of target-like agreement patterns used with opaque vs. transparent and masculine vs. feminine (transparent only) items by participant group. Unsurprisingly, the model reveals a highly significant effect of transparency (β = 4.53 (SE = 0.59), z = 7.61, p = 2.66e-14). In addition,

transparent masculines elicit more errors than transparent feminines across participant groups (β = -2.93 (SE = 0.41), z = -7.03, p = 1.94e-12).

8 Discussion

In this section, we discuss the results of this study in light of our research questions and predictions. For ease of reference, these are repeated below:

13) Research questions

1. Will differences between mono- and bilingual children be mainly quantitative?
2. Do we find changes/reductions in the gender system of bilinguals?
3. Does the amount of cumulative exposure affect the acquisition of grammatical gender in bilinguals?
4. Does the frequency of lexical items affect the acquisition of grammatical gender?
5. Does morphophonological transparency affect the acquisition of grammatical gender?
6. Are monolingual children growing up in Latvia qualitatively and quantitatively different from their peers growing up in Russia?

14) Predictions

a. At-ceiling performance with transparent masculine and feminine forms in both groups of monolinguals;

b. At-ceiling performance with transparent neuters in the older monolingual group, but not in younger monolingual group (for Russian);

c. Higher accuracy on masculine items across conditions for all participant groups;

d. Lower accuracy on opaque compared to transparent nouns across all participant groups;

e. Lower accuracy in bilinguals compared to monolinguals across conditions;

f. Positive effect of lemma frequency on gender agreement accuracy across all participant groups;

g. Positive effect of cumulative amount of exposure on accuracy in bilinguals;

h. Qualitatively similar acquisition of gender agreement in all participant groups;

i. Masculine agreement overused with feminine opaque nouns, and feminine agreement overused with masculine opaque nouns;

j. Both feminine and masculine agreement overused with opaque neuters (for Russian).

k. Lower agreement accuracy with Latvian opaque feminines than with Russian opaque feminines

With respect to RQ1, we found that the differences between monolinguals and bilinguals in our study are quantitative in nature, such that bilingual children score slightly lower than the older group of monolinguals, but not differently from the younger monolinguals, both in Latvian and in Russian (prediction 14e). At the same time, as expected, the bilingual children are qualitatively the same as

monolinguals, i.e. they showed adjectival agreement errors characteristic of monolingual learners (RQ2, prediction 14h). Thus, we can conclude that no changes or reductions are evident in the developing grammatical gender system of the bilinguals included in our study. While reductions in the gender system of some groups of Russian-speaking bilingual children have been found in previous studies (e.g. Rodina & Westergaard 2015), expressed as across-the-board overgeneralization of masculine agreement, these have been linked to a very limited amount of exposure to the target language and were observed in children growing up in a completely non-Russian language community. In contrast, the bilingual children included in our study receive a considerable amount of exposure to both of their languages also outside their home environments and immediate family circles. In answering RQ3, we did find a statistically significant correlation between the cumulative amount of exposure and adjectival gender agreement accuracy in both languages in the bilingual group (prediction 14g). Related to this is the finding that the bilingual children are significantly less likely to produce non-target-like agreement patterns with more frequent nouns (RQ4, prediction 14f). However, contrary to our expectations, no significant frequency effect was found for the monolingual children in either language. If we assume that there exists a certain input frequency threshold that is required for the assignment of target-appropriate grammatical gender to a morphophonologically opaque noun, we might speculate that the apparent insensitivity of monolingual children to noun frequency is due to that threshold being exceeded in their input. In other words, even the nouns that are infrequent in the corpus appear with sufficient frequency in the (larger) input to the monolingual children, while some of these infrequent

nouns do not reach this frequency threshold in the bilinguals. This being said, it is important to keep in mind that the frequency information that we based our calculations on are taken from balanced text corpora and may therefore only be considered approximations of the frequencies of these nouns in child-directed speech. With respect to RQ5, we found a statistically significant effect of transparency, such that transparent nouns were less likely to elicit agreement errors than morphophonologically opaque nouns in both languages. As for Q6, we may conclude that monolingual Russian-speaking children growing up in Latvia are qualitatively similar to their peers growing up in Russia in that the agreement errors that they make are of the same type that have been reported for the latter population in observational and experimental studies (see Section 4 for an overview). As for the quantitative comparison, the younger Russian-speaking monolinguals included in our study seem to outperform their age-matched peers described in Schwartz et al. (2015) on all conditions, while older monolinguals show agreement accuracy comparable to that of their peers tested by Schwartz et al. (2015). However, in order to draw definite conclusions pertaining to quantitative similarity/difference of these groups, it would be necessary to a) make sure that all children follow exactly the same experimental procedure and respond to the same set of stimuli; and b) conduct a statistical analysis that takes individual variation into account.

Let us now turn to the discussion of the observed agreement patterns. As predicted, all monolingual participants performed at or nearly at ceiling with respect to gender agreement with transparent masculine and feminine nouns in

both languages (14a). The only exception to this general pattern is the performance of younger monolinguals in Latvian with the masculine nouns of Declension II, where they showed only 83% accuracy. While no statistically significant difference in accuracy was found between the declension classes, we might speculate that a slightly higher proportion of feminine agreement overgeneralization with the masculine nouns of this class is due to some overlap between inflectional paradigms of Declension II and feminine Declension VI (see (6)). With respect to transparent neuters in Russian, we found that even the older monolinguals are not yet at ceiling (88% accuracy), although they do outperform the younger monolinguals, as expected (14b) As predicted, we found that masculine nouns elicited significantly fewer agreement errors across conditions and participant groups in Russian, which might be seen as a reflection of the masculine default (14c). In Latvian, however, transparent feminines triggered significantly more accurate responses than transparent masculines. This result is unexpected, since, as we argued above, Latvian also defaults to the masculine grammatical gender. The reasons for this effect might be sought in the frequency distribution of feminine and masculine nouns in Latvian, but, unfortunately, at present these data are not available to us.

As expected, opacity was more detrimental in the case of Declension VI feminines in Latvian: recall that these can be disambiguated from the masculines only based

on the singular dative form (14k)[4]. With respect to the opaque nouns in Russian, we found (as expected) that feminine agreement is overused with opaque masculines, while masculine agreement is overused with opaque feminines ending in a palatal consonant (14i). Neuters – both transparent and opaque – occasionally triggered either feminine or masculine agreement (14j). With the transparent neuters, the latter pattern prevailed in younger monolinguals and bilinguals (20% and 25% of all agreement patterns produced, vs. 3% and 4% of erroneous feminine agreement). With the opaque neuters, bilingual children showed a clear preference for the masculine agreement over feminine (18% vs. 4%), while younger monolinguals used both non-target-like agreement patterns equally frequently (16% vs. 11%). Recall that overgeneralization of neuters to masculine, frequently observed in young monolingual children, has been attributed to a significant overlap between the inflectional paradigms of the two classes (Ceitlin 2005, 2009), while overgeneralization of (opaque) neuters to the feminine is explained by the phonological similarity between feminine and opaque neuter nouns in the nominative singular. Interestingly, our results suggest that younger monolinguals are sensitive to the phonological similarity between opaque neuters and feminines (as suggested by 11% non-target-like feminine agreement), while bilingual children are not. These findings contrast with previous studies involving age-matched monolingual and bilingual Russian-speaking children (e.g. Schwartz et al. 2015), which found a clear preference for non-target feminine agreement with both transparent and opaque neuters across monolingual and bilingual

[4] While we did not check the knowledge of dative case suffixes in our participants, it is reasonable to expect that nominal inflection accuracy will positively correlate with agreement accuracy, because it also requires target-like gender assignment.

participant groups. Notably, however, the degree of the feminine agreement preference (i.e. the percentage of cases where it was used non-target-appropriately) appeared to vary in the bilingual participants depending on their majority language. This might suggest that the grammatical and/or morphophonological properties of one of the languages of a bilingual learner to a certain extent influence the sensitivity to different types of gender cues in the other language. Since our Russian monolingual controls were recruited in Latvia, it remains a possibility that their divergent agreement patterns are due to exposure to the Latvian language. In order to investigate the effects of societal bilingualism on the acquisition of grammatical gender, it would be interesting to conduct a study that directly compares the performance of age-matched monolinguals living in Russia and Latvia.

9 Summary and conclusions

In this article we have presented the results of an experimental study investigating the acquisition of adjectival gender agreement in monolingual and bilingual pre-school children speaking Latvian and Russian. We found that the bilingual children, while being qualitatively very similar to monolinguals, show overall lower gender agreement accuracy than monolinguals close to them in age. At the same time, the error rates in bilingual children are the same as those found in younger monolinguals. However, it has to be kept in mind that the bilinguals in our study are part of a language community characterized by a very high degree of societal and individual bilingualism, which means that they are exposed to extensive and varied input in both languages in multiple social contexts. In other words, the input

that these children receive is both quantitatively and qualitatively different from the input that children growing up in situations where one of their two languages is not the language of the community are exposed to. The language situation in Latvia can also be expected to influence language acquisition by monolingual Russian-speaking children – primarily because they are exposed to a considerable amount of Russian input generated by non-native-speakers, and, therefore, to a certain amount of non-target-like forms. While the performance of monolingual Russian children in this study is comparable – both quantitatively and qualitatively – to what has been previously reported for the age-matched Russian children growing up in Russia, a more detailed investigation including a direct comparison of both groups would be of interest.

Our results show that the amount of cumulative exposure to the target language positively correlates with gender agreement accuracy in bilingual children, even when age is controlled for. In addition, we have shown that bilingual children are sensitive to the relative frequency of nouns in their input, such that more frequent items elicit fewer errors than less frequent ones, while no effect of frequency was found in the monolinguals. Crucially, the effect of item frequency in bilinguals holds when the morphophonological transparency of the items is controlled for. While this might be attributable to the fact that the monolinguals in our study are simply too advanced for the effects of frequency to be apparent, this might also suggest that bilinguals rely more on contextual cues (e.g. agreement) than monolinguals do when assigning grammatical gender. It would, therefore, be interesting to conduct a follow-up study that compares the performance of

monolinguals and bilinguals on nonce stimuli and assesses the effects of both contextual and noun-internal information on gender assignment.

References

Bates, D., Maechler, M, Bolker, B., & Walker, S. 2014. lme4: Linear mixed-effects models using Eigen and S4. ArXiv e-print; submitted to Journal of Statistical Software, http://arxiv.org/abs/1406.5823

Ceitlin, S. N. 2005. Kategorija roda v detskoj rechi [The category of gender in child language]. In A. V. Bondarenko, & S. A. Shubik. (Eds.), *Problemy funkcionalnoj grammatiki* [Issues in functional grammar]. St Petersburg, Russia: Rossijskaja Akademija Nauk. pp. 346–375

Ceitlin, S. N. 2009 *Ocherki po slovoobrazovaniju i formoobrazovaniju v detskoj rechi*. [On inflection and derivation in child language] Moscow, Russia: Znak.

Latvijas Republikas Centrālā statistikas pārvalde [Central Statistical Bureau of the Republic of Latvia]. 2013. *Bērni Latvijā* [Children in Latvia]. Riga: Latvijas Statistika.

Corbett, G. G. 1991. *Gender*. Cambridge University Press.

Corbett, G. G. 2007. Gender and noun classes. In Timothy Shopen (ed.), *Language typology and syntactic description*, 2nd edn, vol. III, Cambridge: Cambridge University Press. pp. 241-279.

Dieser, E. 2007. Osvojenije kategorii roda v ramkakh detskogo dvu – trekhjazychija. [Acquisition of the category of gender in bi- and trilingual children] In S. N. Ceytlin (Ed.), *Semantičeskije kategorii v detskoj reči* [Semantic categories in child language]. St Petersburg, Russia: Nestor-Istorija. pp. 244–263

Filej, A. V. 2014. Problemy bilingvizma i obzor sociolingvisticheskoj situacii v Latvii [Bilingualism and the overview of sociolinguistic situation in Latvia]. *Socio- i psiholingvisticheskie issledovanija*, 2. pp. 69-83.

Gvozdev, A. N. 1961. Formirovanie u rebenka grammaticheskogo stroja russkogo jazyka. [Grammar development in a Russian child] Moscow: APN RSFSR.

Halle, Morris and V. J. Zeps. 1966. Survey of Latvian Morphophonemics. *MIT RLE Quarterly Progress Report*, 83, pp. 105-113.

Halle, Morris. 1987. The Morphophonemics of Latvian Declension. In R. Channon and L. Shockey (eds.), *In Honor of Ilse Lehiste*. Dordrecht:Foris Publications, pp. 375-379.

Halle, Morris. 1992. The Latvian declension. In Geert Booij and Jaap van Marle, *Yearbook of Morphology 1992*, pp. 33-47.

Iosad, P. 2012. Vowel reduction in Russian: No phonetics in phonology. Journal of Linguistics, 48. pp. 521–571.

Kļava, G., Kļave, K., Motivāne, K. 2010. *Latviešu valodas prasme un lietojums augstākās izglītības iestādēs: mazākumtautību izglītības satura reformas rezultāti* [Latvian language proficiency and use in higher education institutions: the results of the ethnic minority education content reform]. Riga: Latviešu valodas aģentūra.

Levāne-Petrova K. 2012. Līdzsvarots mūsdienu latviešu valodas tekstu korpuss un tā tekstu atlases kritēriji [Balanced text corpus of Modern Latvian and its text selection criteria]. *Baltistica VIII*, pp. 89-98

Ljashevskaja, O. N. & S. A. Sharov. 2009. Chastotnyj slovarj sovremennogo russkogo jazyka (na materialah Nacionaljnogo korpusa russkogo jazyka) [Frequency dictionary of Modern Russian (based on the National Corpus of Russian)]. Moscow: Azbukovnik.

Nau, Nicole. 2011. Declension classes in Latvian and Latgalian: Morphomics vs. morphophonology. *Baltic Linguistics 2*, pp. 141-177.

Polinsky, M. 2008. Gender under incomplete acquisition: Heritage speakers' knowledge of noun categorization. Heritage Language Journal, 6, 40–71.

Rodina, Y., & Westergaard, M. 2012. A cue-based approach to the acquisition of grammatical gender in Russian. Journal of Child Language, 39, 1077–1106

Rodina, Y., & Westergaard, M. 2013. Two gender systems in one mind: The acquisition of grammatical gender in Norwegian–Russian bilinguals. In P. Siemund, I. Gogolin, M.E. Schulz & J. Davydova (eds.), *Multilingualism and Language Diversity in Urban Areas: Acquisition, identities, space, education*. Amsterdam: John Benjamins. pp. 95–126

Rodina, Y., & Westergaard, M. 2015. Grammatical gender in bilingual Norwegian–Russian acquisition: The role of input and transparency. Bilingualism: Language and Cognition, Available on CJO 2015 doi:10.1017/S1366728915000668

Rūķe-Draviņa, V. 1992. *No 5 mēnešiem līdz 5 gadiem*. [From 5 months to 5 years] 2. edn. Rīga: Zvaigzne.

Rūķe-Draviņa, V. 1993. *Latviešu meitene apgūst savu pirmo valodu.* [Latvian girl acquiring her first language] Rīga: Dio Noordik.

Schwartz, M., Minkov, M., Dieser, E., Protassova, E., Moin, V., & Polinsky, M. (2014). Acquisition of Russian gender agreement by monolingual and bilingual children. International Journal of Bilingualism, doi: 10.1177/1367006914544989

Sokols, E., A. Bergmane, R. Grabis, and M. Lepika (eds.). 1959. *Mūsdienu latviešu literārās valodas gramatika, I: Fonētika un morfoloģija*. [Grammar of Modern Literary Latvian. Volume I: Phonetics and Morphology] Rīga: LPSR Zinātņu akadēmijas izdevniecība.

Steinbergs, Aleksandra. 1977. *The Phonology of Latvian*. PhD dissertation. University of Illinois at Urbana-Champaign.

Unsworth, S. 2013. Assessing the role of current and cumulative exposure in simultaneous bilingual acquisition: The case of Dutch gender. Bilingualism: Language and Cognition, 16, 86–110

Urek, Olga. 2016. Palatalization in Latvian. Doctoral dissertation. UiT The Arctic University of Norway.

Zepa, B., O. Žabko & L. Vaivode. 2008. *Language*. A report for Latvian Language Learning State Agency (LVAVA). Riga: Baltic Institute of Social Sciences.