

Crosslinguistic evidence for the diminutive advantage: gender agreement in Russian and Serbian children*

NADA ŠEVA

*University of Stirling, and Laboratory of Experimental Psychology,
University of Belgrade*

VERA KEMPE

University of Stirling

PATRICIA J. BROOKS

*College of Staten Island and the Graduate Center of the City University of
New York*

NATALIJA MIRONOVA

Moscow State University

ANGELINA PERSHUKOVA

Moscow State University

AND

OLGA FEDOROVA

Moscow State University

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ABSTRACT

Our previous research showed that Russian children commit fewer gender-agreement errors with diminutive nouns than with their simplex counterparts. Experiment 1 replicates this finding with Russian children ($N=24$, mean 3;7, range 2;10–4;6). Gender agreement was recorded from adjective usage as children described animal pictures

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given just their names, varying in derivational status (diminutive/simplex), novelty, and gender. Experiment 2 extends the gender-agreement elicitation methodology developed for Russian to Serbian, a language with similar morphosyntactic structure but considerably fewer diminutives in child-directed speech. Serbian children ($N=22$, mean age 3;8, range 3;0–4;1), exhibited an advantage for diminutive nouns of almost the same magnitude as the Russian children. The fact that the diminutive advantage was found in a language with a low frequency of diminutives in the input suggests that morpho-phonological homogeneity of word clusters and membership in dense neighbourhoods are important factors that contribute to the reduction of inflectional errors during language development.

INTRODUCTION

A sizeable body of research has demonstrated that child-directed speech (CDS) simplifies, regularizes, and highlights relevant linguistic structures and, thereby, facilitates language acquisition (e.g. Golinkoff & Alioto, 1995; Morgan & Demuth, 1996; Kuhl *et al.*, 1997; Tamis-LeMonda & Bornstein, 2002; but see also Fernald & McRoberts, 1996, for a note of caution). One feature shown to be pervasive in the CDS of many languages is the frequent use of diminutives. Diminutives are morphological derivations (e.g. English *doggy*, *footie*, *Stevie*) that indicate smallness, and connote endearment and affection. Quite obviously it makes semantic and pragmatic sense to use diminutives in CDS as they are well suited to adjust the meanings of words to the smaller world of the child. Indeed, an analysis of the semantics of diminutives in over 80 languages has identified child-relatedness as the core meaning of the diminutive derivation (Jurafsky, 1996). Unlike English, in which diminutive derivations typically apply to only a limited number of proper names, animate nouns, body-parts, and child-related objects, many languages have a much wider range of diminutive productivity. In languages as diverse as Dutch, Finnish, German, Greek, Italian, Lithuanian, and Polish, diminutives can be derived from almost any concrete noun and in some languages (e.g. Spanish, Russian and Serbian) from adjectives and adverbs as well. In many languages, diminutives are very common in child language (cf. Dressler, 1997; Gills, 1998) and often it is the first morphological derivation acquired and productively used by children (Voeykova, 1997; Haman, 2003; Savickiene, 2003).

Previous studies found that the presence of diminutives in the input facilitates gender acquisition in Russian (Kempe & Brooks, 2001): adult English speakers exposed to a limited set of Russian phrases over four language-learning sessions showed faster acquisition of grammatical gender and fewer agreement errors if the input consisted of diminutive nouns

rather than their simplex counterparts. Using a gender agreement elicitation paradigm, Kempe, Brooks, Mironova & Fedorova (2003) presented three- and four-year-old Russian children with familiar and novel, simplex and diminutive nouns, and demonstrated that children produced fewer gender-agreement errors with diminutive nouns compared to their simplex counterparts (also committing fewer errors with familiar nouns than novel ones, and with masculine nouns than feminine ones). While no one has examined whether the advantage for diminutive nouns in gender agreement occurs with learners of other Slavic languages, Polish children have been observed to commit fewer case-marking errors with diminutives as compared to simplex nouns (Dabrowska, 2006). An interesting question addressed in this paper is whether a diminutive advantage for gender agreement will be observed in Serbian, which is a language with a much lower frequency of diminutive usage in CDS in comparison to Russian. If the diminutive advantage observed in Russian and Polish is due to the high frequency of diminutive use in CDS, the potential benefit of diminutives should be attenuated in Serbian.

A brief description of the Russian and Serbian gender systems

In the Slavic languages, noun gender determines agreement with pronouns, modifiers and verbs, as well as the case-marking paradigm. Obviously, in these highly inflected languages, acquiring the underlying gender system is a crucial prerequisite for learning morphology. Across the world's languages, gender categories are rarely, if ever, entirely transparently associated with semantic and morpho-phonological properties of nouns (Corbett, 1991). Some languages (e.g. German), display very weak associations between grammatical gender and noun properties, whereas others (e.g. the Slavic languages) exhibit a much stronger degree of transparency. Both Russian and Serbian distinguish three major gender categories: masculine nouns usually end in a consonant in both languages. Feminine nouns end in /-a¹/, and neuter nouns in /-o/ and /-e/. Both languages have sets of nouns that are non-transparent with respect to the relationship between word ending and gender. First, Russian and Serbian have a small group of masculine nouns ending in /-a/. These are nouns, like the Serbian /*sudija*/ [judge], or the Russian /*sud'ja*/, as well as hypocoristic forms of proper male names which exist in both languages like /*aleksandar*/[simplex] – /*safa*/ [hypocoristic], and, in Serbian, hypocoristic forms for some animal and kinship terms like /*medved*/[bearSIM] vs. /*meda*/[bearHYP] or /*deda*/ [grandfatherSIM] vs. /*deka*/ [grandfatherHYP]. Secondly, Serbian has also a few masculine nouns ending in /-o/ or /-e/. Thirdly, Russian

[1] All Russian and Serbian examples are written using the International Phonetic Alphabet.

contains words ending mainly in a palatalised consonant which can be either masculine (e.g. /*gostʲ*/ [guestMAS] or feminine (e.g. /*kostʲ*/ [boneFEM]). Additionally, there are some feminine nouns ending in hard consonants, like /*mif*/ [mouse]. Serbian, similarly, has a small set of feminine nouns ending with a consonant, which, unlike Russian, comprises mainly abstract nouns like /*ľubav*/ [loveFEM], /*smrt*/ [deathFEM] or /*noć*/ [nightFEM], and only very few concrete nouns, like /*kost*/ [boneFEM]. In both languages, many of the feminine non-transparently gender-marked nouns are derived using the productive suffix /-ost/ (Russian: /-ostʲ/), which is commonly used for the nominalization of adjectives (for example /*gord*/ adj. [proud] – /*gordost*/ (Russian: /*gordostʲ*/) n. [pride]). This quasi-regularity, which seems to be present in all natural gender systems (Corbett, 1991), makes acquiring grammatical gender challenging for the learner.

Morphological characteristics of Russian and Serbian nouns and diminutives

Both Russian, an East Slavic language, and Serbian, a South Slavic language, have rich noun morphology. Russian has six, and Serbian has seven cases (the same six cases as Russian and a vocative case). Both languages have two numbers and three genders.

In both languages, diminutivisation is a productive process, i.e. diminutives can be derived from almost all concrete nouns and even from some abstract ones (e.g. Serbian: /*želja*/ [wish] – /*željitsa*/ [wishDIM], as well as from some adjectives and adverbs. Several suffixes are used in the process of diminutive derivation. In Russian, the most frequent ones are /-ik/ or /-ik/ for masculine, /-ka/ or /-čka/ for feminine, and /-ko/, /-čko/, or /-tse/ for neuter nouns. In Serbian, the most frequent diminutive suffixes are /-itč/ for masculine, /-itsa/ for feminine, and /-tse/ for neuter nouns. In addition, there is a set of complex derivatives of masculine and neuter suffixes: /-tfitč/, /-antse/, /-entse/, /-aftse/, /-eftse/, as well as more archaic and regional forms like /-tfe/ and /-ak/.

Note that in both languages, diminutive suffixes retain the grammatical gender of the simplex form of the noun. Moreover, for the non-transparently gender-marked nouns described earlier, diminutives provide an ending which is transparently gender marked. Also, both Russian and Serbian have lexicalised or frozen diminutives, i.e. nouns ending in a diminutive suffix which have taken on a meaning quite differently from the corresponding simplex noun. For example, the Russian simplex /*lampa*/ means lamp but the diminutive /*lampotʲka*/ does not mean *small lamp* but *lightbulb*. Similarly, the Serbian /*tjetka*/ means *brush* but the diminutive /*tjetkitsa*/, apart from *small brush*, is usually used to denote *tooth brush*.

Despite the apparent similarities between Serbian and Russian diminutives, there is one major difference: suffixes used for diminutivisation in

Serbian are polyfunctional (Stevanović, 1964; Klajn, 2003). Apart from denoting smallness, endearment and affection, they can be used in some other derivational processes like nominalisation of adjectives and adverbs or derivation of compound nouns. For example, the Serbian suffix */-itsa/*, which is considered to be the most productive suffix in Serbian (Stevanović, 1964; Klajn, 2003), can be used not only for the derivation of diminutives, but also as a suffix which changes the gender of simplex nouns from masculine to feminine (e.g. */lav/* [lionMAS] *-/lavitsa/* [lionessFEM] or as a suffix for simple noun derivations, where the new noun is semantically related to the stem (e.g. */sto/*-*/stolica/* [table-chair]). For example, in the *Frequency Dictionary of Contemporary Serbian Language* (Kostić, 1999), only 9% of nouns ending in */-itsa/* are diminutives. In the first 100 nouns of CDS produced by four mothers in *The Serbian Corpus of Early Child Language* (Anđelković, Ševa, Moskovljević, 2001), this percentage was considerably higher, 50%, reflecting the more frequent use of diminutives in CDS. Still, unlike in Russian, these Serbian morphemes are not exclusively used for diminutivisation.

Distribution of diminutives in Serbian and Russian CDS

Diminutives are formed by adding one or several suffixes to the noun. For example, the Russian and Serbian masculine simplex noun */slon/* [elephant] become */slonik/* [Russian: elephantDIM] and */slonitε/* [Serbian: elephantDIM], and the Russian feminine simplex */riba/* and the Serbian */riba/* [fish] become */ribotʃka/* [Russian: fishDIM] and */ribitsa/* [Serbian: fishDIM]. Given the morphological similarities between Serbian and Russian diminutives, it might be reasonable to expect a similar frequency of diminutives in the CDS registers of the two languages, particularly since in many languages diminutives are used to express endearment and affection. Given that CDS is considered an affective speech register (Fernald, 1992; Burnham, Kitamura & Vollmer-Conna, 2002), one would expect an increased frequency of diminutives in CDS in languages where diminutive derivations are highly productive. Indeed, languages with productive diminutive derivations like Lithuanian, Russian or Spanish exhibit a fairly high frequency of diminutives in CDS (Savickiene, 1998; Kempe *et al.*, 2001; Melzi & King, 2003). Because diminutives are as productive in Serbian as in Russian, one might expect them to be as frequent in Serbian CDS.

In Kempe, Brooks, Mironova, Pershukova & Fedorova (in press) we provided an estimate of the diminutive frequency in Russian CDS. Here, we use this estimate as a basis for the comparison with Serbian. The detailed method of frequency estimation is described in Kempe *et al.* (in press). In Russian, the frequency of diminutives in CDS was estimated based on the first 100 nouns produced by four mothers in spontaneous

TABLE 1. *Percentage of diminutives and diminutive-like word endings in CDS as a function of child age (standard deviations are given in parentheses)*

	Percentage of diminutives in CDS	
	20 months	34 months
		Russian
Noun types	58.6 (11.3)	41.4 (9.2)
Noun tokens	54.7 (19.3)	35.0 (6.9)
		Serbian
Noun types	9.8 (4.8)	9.8 (3.6)
Noun tokens	7.8 (5.4)	7.0 (3.4)
		Serbian (all diminutive-like word endings)
Noun types	13.2 (14.7)	16.8 (5.2)
Noun tokens	9.8 (5.1)	11.3 (5.6)

conversations with their children, two boys and two girls, at 20 and 34 months of age of the children. In order to compare Russian CDS with Serbian CDS, we applied the same methodology using *The Serbian Corpus of Early Child Language* (Anđelković, Ševa, Moskovljević, 2001). From this corpus, we extracted the first 100 nouns produced by four mothers in conversations with their children, two boys and two girls, at the same ages (20 and 34 months of age). The results, depicted in Table 1, indicate that despite the relatively similar noun and diminutive morphology in Serbian and Russian, the frequency of diminutives in CDS differs by a magnitude (an average of 45% noun tokens and 50% of noun types in Russian and 7% noun tokens and 10% of noun types in Serbian). Given that the suffixes used for diminutivisation in Serbian can also carry a different function, we counted the occurrence of these suffixes in the corpus, and obtained a frequency of 10.5% of noun tokens and 15% of noun types, which is still markedly below the frequency of Russian diminutives.

If the frequency of diminutives in the input to the language learning child is indeed responsible for the diminutive advantage in production of gender agreement, we should not expect to find a similar effect in Serbian, or, at best, a very attenuated one. This issue will be explored in two experiments. Experiment 1 attempts to provide a replication of the diminutive advantage for Russian using a more constrained elicitation procedure than in Kempe *et al.* (2003), and Experiment 2 applies the same procedure to Serbian.

EXPERIMENT 1

This experiment introduces a more constrained gender elicitation procedure to replicate the diminutive advantage reported earlier. The Kempe *et al.*

(2003) experiment used a relatively unconstrained procedure allowing children to use different agreement forms such as adjective agreement and pronominal agreement. The main goal of Experiment I was to replicate the diminutive advantage in Russian gender agreement reported in Kempe *et al.* (2003), but with less variability in agreement forms, and with materials that would allow us to retain a maximum of phonological similarity when adapting them for Serbian. In addition, we were interested in obtaining some preliminary data on Russian children's knowledge of the gender of non-transparently marked nouns.

METHOD

Participants

Twenty-four children (mean age 3;9 years, range 2;10–4;6 years) participated in this experiment. Children were recruited from various day-care centres in the Moscow region, and acquired the variety of Russian spoken in Moscow.

Materials

Sixteen colour photographs of familiar animals and 16 colour photographs of unfamiliar animals were selected from *Faszination Tier & Natur* published continuously by Meister Verlag GmbH, München, IMP B.V. The unfamiliar animals were selected for their unusual appearance making sure that their real habitat was distant from Europe. Eight of the nouns denoting the familiar animals were masculine, and eight were feminine. In addition, we created 16 Russian pseudo-word labels for the unfamiliar animals. Eight of the novel names for the unfamiliar animals ended in a non-palatalised consonant thus resembling the dominant word form of Russian masculine nouns, and eight ended in the suffix /-a/, resembling the dominant form of Russian feminine nouns. Thus, all 32 nouns were transparently marked for gender. All nouns were diminutivised for presentation in the diminutive condition. No neuter nouns were included as it is impossible to find a matching number of Russian neuter nouns denoting animals. Furthermore, we selected four familiar animal names that ended in palatalised consonants, which renders them non-transparently marked for gender, to test children's knowledge of gender for such nouns. Two of the non-transparent nouns, /miʃ/ [mouse] and /risʲ/ [lynx] were feminine, and the other two, /golubʲ/ [pigeon] and /olenʲ/ [deer] were masculine. Since the non-transparent nouns comprise only a small proportion of Russian nouns, there was not much choice with respect to animal names, and, thus, no possibility to match these nouns for word frequency and age of acquisition. Still, given the relatively high frequency of /miʃ/ (36 per million based on Zazorina, 1977)

we would expect that the children knew at least this word. Thus, comparing /*mif*/ with its lower frequency counterpart /*ris*/ (13 per million) would give us the opportunity to see whether word frequency affects gender access of non-transparent nouns. Similarly, the two masculine nouns also differed in frequency with /*golub*/ (14 per million) being more frequent than /*olen*/ (6 per million). In addition, we selected four familiar animals for practice, and six more to provide examples of the adjective production template (see Procedure for details). All nouns and their diminutive derivations are listed in Appendix 1.

Derivational status of noun (simplex vs. diminutive) and noun gender (masculine vs. feminine) were varied as within-subject factors. The 16 familiar and 16 unfamiliar nouns were distributed across two lists in such a way that each noun appeared as simplex in one list, and as diminutive in the other. Each list contained an equal number of simplex and diminutive, familiar and unfamiliar nouns. Half of the children were presented with list 1, and the other half with list 2. In addition to these 32 nouns, both lists contained the same 4 non-transparently gender-marked nouns presented in simplex form. The lists were split up into two equal parts to be presented in consecutive sessions. Order of presentation of the two parts was counter-balanced resulting in a total of four presentation conditions. Children were quasi-randomly assigned to the two lists of 36 items, matching for sex and age. Items from each list were randomly assigned to six blocks of 6 trials.

We also selected two antonymous adjective pairs that were used to prompt the children to talk about the animals. These pairs were /*dobrij-zloj*/ (mas.) vs. /*dobraja-zlaja*/ (fem.) [benevolent-malevolent] and /*xorofij-ploxoj*/ (mas.) vs. /*xorofaja-ploxaja*/ (fem.) [good-bad]. The adjective endings serve as indicators for correct or erroneous gender agreement.

Procedure

Each child was tested individually by a female native speaker of Russian in a room adjacent to the main activity room of the day care centre. The entire procedure took about 20 minutes to complete.

The experiment comprised three phases: (1) a Practice phase, to engage the child in labelling and describing the animals; (2) a Template phase, to introduce a specific pair of adjectives to be used to describe the subsequently presented 6 test items; (3) a Test phase, to elicit use of gender-marked adjectives as descriptions of animals (i.e., adjective or adjective-noun production).

The children were first shown the four practice pictures depicting familiar animals, labelled by the experimenter. The children were instructed to repeat the labels. Then the experimenter provided a simple statement about the animal like /*Medved' bol'oj. Povtori.*/ [BearNOM is big. Repeat.].

GENDER AGREEMENT IN RUSSIAN AND SERBIAN

TABLE 2. *Gender agreement error percentages and standard deviations (in parentheses) as a function of noun familiarity, derivational status, and gender for Russian (Experiment 1) and Serbian (Experiment 2)*

	Simplex nouns		Diminutive nouns	
	Feminine	Masculine	Feminine	Masculine
	Russian (Experiment 1)			
Familiar nouns	8.3 (20.4)	5.2 (12.7)	4.2 (15.9)	1.0 (5.1)
Novel nouns	19.8 (25.5)	4.2 (9.5)	14.6 (24.3)	1.0 (5.1)
	Serbian (Experiment 2)			
Familiar nouns	4.6 (12.5)	0.0 (0.0)	2.6 (8.7)	0.0 (0.0)
Novel nouns	30.3 (28.5)	7.2 (12.1)	12.5 (24.1)	1.1 (5.3)

The practice pictures were used to introduce children to the activity, and to encourage them to produce whole sentences.

Next, the children were shown one template picture, for example the spider, and told: */Eto pauk. Pauk – xorofij ili ploxož?/* [This is spiderNOM. Is spiderNOM goodMAS or badMAS?] After the children had given their response, the experimenter presented the first test picture, for example, the elephant, accompanied by the utterance: */Eto slon. Pauk xorofij. A slon?/* [This is elephantNOM. SpiderNOM is goodMAS. And what about elephantNOM?]. This elicitation form avoided the experimenter's use of gender agreement, and gave the children the opportunity to pick one of the members of the adjective pair. The same adjective pair was used for six consecutive test nouns, after which the experimenter introduced a new template noun, along with the other antonymous adjective pair. This procedure of introducing a template picture (with one of the two adjective pairs) followed by six test trials was repeated six times for a total of 36 test trials. Alternation of adjective pairs and order of template gender were counterbalanced across participants. Instances of erroneous gender agreement as reflected in the adjective endings were recorded as the dependent variable.

RESULTS AND DISCUSSION

We transcribed all first instances of adjective–noun gender agreement produced by the child. Three items were coded as missing values because the children failed to produce an answer, or the experimenter accidentally revealed the noun gender. Agreement errors per child averaged 7.3%, and ranged from 0 to 34.4% (*s.d.* = 8.9%). Table 2 shows the mean errors percentages, corrected for missing values, as a function of noun familiarity, derivational status and gender.

We performed a (2) noun familiarity: familiar vs. unfamiliar \times (2) derivational status: simplex vs. diminutive \times (2) gender: feminine vs. masculine within-subjects ANOVA on agreement errors, computed as proportions of completed trials, corrected for the number of lost trials per subject and condition. There was a main effect of noun familiarity, $F(1, 23) = 5.4$, $p < 0.05$, $\eta^2 = 0.03$, which indicated that children made more errors with unfamiliar than with familiar nouns. There was also a significant effect of derivational status, $F(1, 23) = 7.4$, $p < 0.05$, $\eta^2 = 0.08$, due to fewer errors with diminutive nouns than with simplex nouns. Finally, the main effect of noun gender, $F(1, 23) = 5.1$, $p < 0.05$, $\eta^2 = 0.02$, indicated that children made fewer errors with masculine than with feminine nouns. There was also a significant two-way interaction between noun familiarity and gender, $F(1, 23) = 7.3$, $p < 0.05$, $\eta^2 = 0.04$, indicating that the familiarity effect was predominantly carried by the feminine nouns.²

This experiment fully replicates the findings reported in Kempe *et al.* (2003) where we observed exactly the same main effects as well as the interaction between noun familiarity and gender. We confirmed that Russian children commit fewer agreement errors with diminutive as compared to simplex nouns. They also perform better with familiar compared to novel nouns, and with masculine compared to feminine nouns. The superior performance with masculine nouns is in line with findings on Russian adults, who exhibit effects of gender priming in feminine and neuter but not masculine nouns (Akhutina, Kurganskij, Kurganskaya, Polinsky, Polonskaya, Larina, Bates & Appelbaum, 2001).

In addition, we presented children with the four nouns /golubi/ [pigeonMAS], /oleni/ [elkMAS], /mif/ [mouseFEM], and /risi/ [lynxFEM], to test acquisition of non-transparently gender-marked nouns. The mean error percentages for these nouns were 12.5%, 4.2%, 54.2%, and 62.5%, respectively. Clearly, performance was better in the two masculine nouns than in the two feminine nouns, $t(23) = 5.9$, $p < 0.001$. As expected, children tended to treat nouns ending in palatalised consonants as masculine. However, had the children treated the non-transparent feminine nouns just as two more examples of novel masculine nouns, the error rates should have been close to the rate for correct responses in novel masculine nouns, which was 96%. Apparently, the error rates are determined by whether the children were familiar with these nouns or not. We performed a (2) non-transparent noun gender \times (2) median split age mixed-type ANOVA to determine whether the older children indeed tended to commit fewer errors in these nouns. This analysis confirmed the main effect of noun

[2] Both in Experiments 1 and 2, we also included median-split age group as a factor in the ANOVA. However, since age group did not yield any significant effects or interactions, we omitted it from the reported statistical analyses.

gender, $F(1, 22) = 33.9$, $p < 0.001$. The effect of age fell short of significance, $F(1, 22) = 2.6$, $p = 0.11$, suggesting that there was a trend in the expected direction. It seems, then, that acquisition of the gender for non-transparently gender-marked nouns occurs on an item-by-item basis, and depends on the familiarity with each specific non-transparent noun. However, the fact that we also observed a familiarity effect for transparently gender-marked nouns suggests that grammatical category learning in general is to a large extent exemplar-driven.

EXPERIMENT 2

Experiment 2 was designed to apply the gender-agreement elicitation methodology developed for Russian to Serbian in order to examine whether a diminutive advantage can be observed in this language as well, and if so, whether the advantage is similar in magnitude.

METHOD

Participants

22 children (mean age 3;7, range from 3;0 to 4;1) were tested in various day care centres in the Belgrade region. All children were acquiring the Belgrade variety of Serbian. An additional 3 children were tested but excluded because they did not complete the task.

Materials

Children were presented with 16 pictures of familiar animals and the same set of 16 pictures of unfamiliar animals. Thirteen pictures were identical to the pictures used with Russian children in Experiment 1. Of the identical pictures, ten Serbian nouns had the same gender as their Russian translations. Eight of the nouns denoting the familiar animals were masculine, and eight were feminine. In addition, we created 16 Serbian pseudo-word labels for the unfamiliar animals. The Serbian pseudo-words were identical to the Russian pseudo-words or as similar to their Russian counterparts as Serbian phonotactics permits (e.g. /farzjak/ (Russian) vs. /farzak/ (Serbian)). Half of the novel nouns ended in consonants, which is the dominant ending for Serbian masculine nouns. The other half ended in the suffix /-a/, which is the dominant suffix for Serbian feminine nouns. Thus, all 32 nouns were transparently marked for gender. All nouns were diminutivised for presentation in the diminutive condition. Distribution of nouns across lists, and the presentation sequence were identical to the Russian materials. In contrast to Experiment 1, we did not include any nontransparently gender-marked simplex nouns in the stimulus materials because there are no animals in this category in Serbian.

As in Experiment 1, we used two antonymous adjective pairs to elicit children's statements about the animals. These pairs were /*dobar-lof*/ vs. /*dobra-lofa*/ [good-bad] and /*lep-ružan*/ vs. /*lepa-ružna*/ [beautiful-ugly].

Procedure

Each child was tested individually by a female native speaker of Serbian in a room adjacent to the main activity room of the day care centre.

The children were first shown the four practice pictures depicting familiar animals that were labelled by the experimenter. The children were instructed to repeat the labels. As in Experiment 1, the experimenter then provided a simple statement about the animal like /*Medved je velik. Ponovi.*/ [BearNOM is big. Can you repeat this?]. The children were then shown one template picture and told /*Ovo je pauk. Je li pauk dobar ili lof?*/ [This is spiderNOM. Is spiderNOM goodMAS or badMAS?]. After the child answered the question, the experimenter presented the first target picture, accompanied by the utterance: /*Ovo je slon. Pauk je dobar. A slon?*/ [This is elephantNOM. SpiderNOM is goodMAS. And what about elephant NOM?]. In contrast to Experiment 1, only 4 template pictures were used, with 8 test trials per template. In every other respect, the procedure was identical to Experiment 1.

RESULTS AND DISCUSSION

Twenty-four items (3.4%) were coded as missing values because the children failed to produce an answer, or the experimenter accidentally revealed the noun gender. Agreement errors per child averaged 7.4%, and ranged from 0 to 25% (*S.D.* = 6.6%).

The agreement error percentages, corrected for the number of missing values per subject and condition, are presented in Table 2. A (2) noun familiarity: familiar vs. unfamiliar \times (2) derivational status: simplex vs. diminutive \times (2) gender: feminine vs. masculine within-subjects ANOVA revealed a main effect of familiarity, $F(1, 21) = 20.3$, $p < 0.001$, $\eta^2 = 0.11$, which indicated that children made more errors with unfamiliar than with familiar nouns, a main effect of derivational status, $F(1, 21) = 11.8$, $p < 0.05$, $\eta^2 = 0.03$, due to fewer errors with diminutive nouns than with their simplex counterparts, and a main effect of noun gender, $F(1, 21) = 12.4$, $p < 0.05$, $\eta^2 = 0.10$, due to fewer errors with masculine than with feminine nouns.

The analysis also yielded an interaction between noun familiarity and gender $F(1, 21) = 8.3$, $p < 0.05$, $\eta^2 = 0.04$, suggesting that, like in Russian, the familiarity effect was predominantly carried by feminine nouns and an interaction between familiarity and derivational status, $F(1, 21) = 6.8$,

$p < 0.05$, $\eta^2 = 0.02$, suggesting that in Serbian children, the familiarity effect was somewhat more pronounced in novel simplex nouns.

With the exception of the interaction between familiarity and derivational status, the results were almost identical to Russian. Children performed better with familiar nouns compared to novel nouns, and with diminutive nouns compared to simplex nouns. As in Russian, performance in masculine nouns was near ceiling resulting in a more pronounced familiarity effect for feminine nouns. Note that noun familiarity accounted for 3% of variance in Russian and for 11% in Serbian, derivational status accounted for 8% of variance in Russian and 3% in Serbian, and gender accounted for 2% of variance in Russian and 10% in Serbian. Given that the corresponding effect sizes for Russian in Kempe *et al.* (2003) were 6% for familiarity, 2% for derivational status, and 12% for gender³, respectively, it seems that the differences between Russian and Serbian do not exceed normal fluctuations found across different studies within a language. In short, the results of Experiment 2 support the existence of a diminutive advantage in Serbian, which is similar to Russian. The only difference to Russian was that the familiarity effect was more pronounced in the simplex nouns.

JOINT ANALYSIS AND DISCUSSION OF EXPERIMENTS 1 AND 2

In order to obtain a more accurate estimate of cross-linguistic differences, we performed a 4-way ANOVA with noun familiarity, derivational status and gender as within-subjects factors and language as a between-subjects factor. This analysis confirmed all the effects found in the Russian and Serbian experiments. We found a main effect of familiarity, $F(1, 44) = 24.2$, $p < 0.001$, $\eta^2 = 0.07$, a main effect of gender, $F(1, 44) = 15.2$, $p < 0.001$, $\eta^2 = 0.09$, a main effect of derivational status, $F(1, 44) = 19.3$, $p < 0.001$, $\eta^2 = 0.03$, as well as a significant interaction between familiarity and gender, $F(1, 44) = 15.7$, $p < 0.001$, $\eta^2 = 0.04$, and a significant interaction between familiarity and derivational status, $F(1, 44) = 4.4$, $p < 0.05$, $\eta^2 = 0.01$, which is depicted in Figure 1. The only effect involving the factor of language was the interaction between familiarity, gender and language, $F(1, 44) = 4.4$, $p < 0.05$, $\eta^2 = 0.01$. This interaction is depicted in Figure 2. It indicates that the Serbian children had more difficulties with novel feminine nouns.

The two experiments reported so far provide a very stringent cross-linguistic comparison of gender-agreement performance in Russian and

[3] The effect sizes from Kempe *et al.* (2003) are taken from the second analysis of the data from which we excluded the children who produced predominantly pronominal agreement. Pronominal agreement is less error prone, and the excluded children did not make any errors. The analysis of the entire sample shows very similar, albeit somewhat smaller, effect sizes.

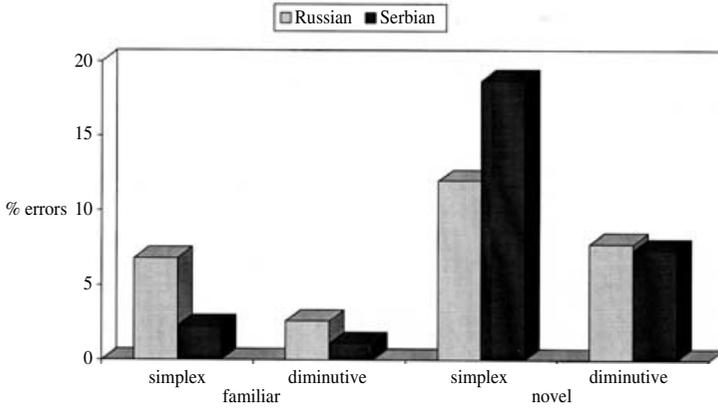


Fig. 1. Percent gender-agreement errors in Russian and Serbian children as a function of noun familiarity and derivational status.

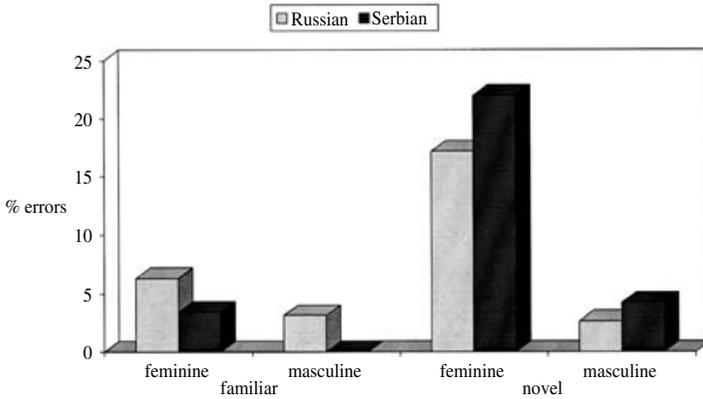


Fig. 2. Percent gender-agreement errors in Russian and Serbian children as a function of noun familiarity and noun gender.

Serbian children. In both languages, children perform better with familiar nouns than with novel nouns, and with masculine nouns than with feminine nouns. Most importantly, children in both languages show superior gender-agreement performance with diminutive compared to simplex nouns. The only subtle difference between languages concerned the feminine novel nouns which proved to be slightly more difficult for Serbian children than for Russian children. There are two possible explanations for this effect. One would be that the relatively high percentage of hypocoristic forms of Serbian masculine animal nouns and kinship terms ending with /-a/

(e.g. /*medved*/ [SIMbear] vs. /*meda*/ [HYPbear]) additionally obscures the gender distribution, which can then mislead children in the gender-agreement task. Although hypocoristics like /*mifa*/ [HYPbear] or /*ʒajka*/ [HYPrabbit] exist in Russian too, in Serbian these forms tend to be more productive and hence, more frequent. In fact, a comparison of the corpora of CDS described above yielded a token frequency of hypocoristics of 20.3% in Serbian and 2.9% in Russian.

On the other side, it is possible that the gender effect is just a consequence of the selection of the novel nouns for Serbian, which had been modelled after the Russian novel nouns. A comparison of the individual feminine novel nouns revealed that especially the pseudo-words /*timza*/ and /*mompa*/ elicited more errors in Serbian than in Russian. It is possible that these two items constitute slightly less acceptable non-words in Serbian than in Russian. Still, this minor difference between the languages does not affect the main finding, namely that there is a diminutive advantage for gender-agreement production of comparable magnitude in Russian and in Serbian, despite the fact that the frequency of diminutives in Serbian CDS is markedly lower.

GENERAL DISCUSSION

From the estimation of diminutive frequencies in Russian and Serbian CDS, and from the two experiments reported above the following picture emerges: Russian and Serbian are two languages with very similar inflectional systems but a marked difference in the frequency of diminutives in CDS. Despite this difference, Russian and Serbian children acquire noun morphology faster with diminutive than with simplex nouns, as evidenced by superior gender-agreement performance with diminutive nouns. In fact, the Russian and Serbian results were remarkably similar demonstrating the merits of careful crosslinguistic comparisons.

The diminutive advantage in Russian and Serbian may be the result of several factors: first, given that both languages have a subset of non-transparently gender-marked nouns, and diminutivisation renders such nouns transparently gender marked, pervasive diminutivisation should result in an overall decrease of the frequency of non-transparent nouns. In other words, frequent diminutivisation minimizes the instances of non-transparently gender-marked nouns thereby increasing the overall degree of gender-marking regularity in the input. Gender learning is easier if the input contains less non-transparently gender-marked nouns (Kempe & Brooks, 2001). Secondly, adding a diminutive morpheme to a noun inserts a phonologically invariant segment right before the inflectional suffix at the end of the word. It is possible that this 'island of invariance' may serve to mark and highlight the upcoming inflectional changes thereby drawing the

learners attention to morpho-phonological information such as the association between noun ending and noun gender or case. Thirdly, diminutive morphemes increase the phonological similarity within genders. For example, while Russian masculine simplex nouns can end in any consonant, Russian masculine diminutives all end in */-k/*. Similarly, Serbian masculine simplex nouns also end in various consonants, but Serbian masculine diminutives all end in */-tɛ/*. This renders masculine diminutive nouns much more similar to each other than masculine simplex nouns. The same is true for feminine and neuter nouns. Increased phonological similarity should make it easier to discover grammatical gender categories. Finally, diminutive morphemes result in a substantial degree of phonological similarity amongst the class of diminutives in general. Since these morphemes can sometimes encompass up to three syllables of a noun (e.g. Russian: */rutʃonotʃka/* [handDIM-DIM-DIM]), diminutives constitute a noun cluster with high neighbourhood density, thereby facilitating the emergence of low-level schemata (Dabrowska, 2006). If children rely on such low-level schemata in the acquisition of inflectional morphology, then productive use of inflections should be more likely with novel nouns resembling these schemata in overall phonological shape. This latter account is in line with item-based views on language learning according to which children move from learning morphological patterns for single words, to learning morphological patterns applying to narrow clusters of fairly similar words, and eventually to wider generalizations (Lieven, Pine & Baldwin, 1997; Tomasello, 1992, 2003), encompassing groups of words commonly labelled as grammatical categories. The findings on gender agreement with Russian non-transparent nouns reported in Experiment 1 support this notion as well: recall that there was a trend for older children to make fewer gender-agreement errors with feminine non-transparent nouns, presumably due to the higher familiarity of the older children with these nouns.

In contrast, due to the existence of non-transparently gender-marked nouns, it may be tempting to view the Russian and Serbian system of morpho-phonological gender marking in terms of a large class of regulars and a small class of exceptions. According to a dual-mechanism framework, regular items would be treated by a rule system whereas exceptions like the non-transparently gender-marked nouns should be memorized (Pinker, 1999). Such an abstract rule of gender agreement, if it exists, should apply equally to diminutives as well as regularly gender marked simplex nouns. The finding that gender-agreement performance in diminutives is superior to regular simplex nouns is not in line with this framework, but more compatible with a view according to which the acquisition of gender follows a continuous trajectory from individual items to increasingly larger clusters of words. Moreover, complex inflectional systems such as those found in the Slavic languages cast doubt on the validity of a dual-mechanism account not

the least because there are many complex inflectional phenomena, such as the existence of various declension paradigms that do not lend themselves to a straightforward ‘rules vs. exceptions’ dichotomy (Dabrowska, 2004). It may be possible for narrow and wide generalizations, once acquired, to coexist in the adult system. Thus, while the system seems to favour low-level schemata characterised by morpho-phonological homogeneity at a certain stage of learning, later generalisations (e.g. the generalisation of feminine agreement to all nouns ending in *-a*) need not completely override earlier generalisations. Recent studies presenting familiar and unfamiliar words to adults have demonstrated that morphological processing is co-determined by paradigmatic analogies between lexical items (see Hay & Baayen, 2005 for general overview), and that even within the class of ‘regulars’ language users perform more consistently for items that fall within ‘islands of reliability’ (Albright & Hayes, 2003) or morpho-phonologically densely populated neighbourhoods (Dabrowska, submitted). In this context, it would be interesting to see whether sensitive online processing measures can reveal a similar advantage for novel diminutive words in adult native speakers of Russian and Serbian.

Why is there a sizeable advantage for morpho-syntactic processing of diminutives even if their frequency in the input is low? In other words, why is the low-level schema extracted as successfully in Serbian as it is in Russian or Polish given the difference in frequency in the input that children encounter? In each of these languages, diminutives are distinguished from simplex nouns by their salient word endings, and they are the earliest acquired derivation in child speech, and the most common derivation in both child speech and in CDS. Thus, it seems that phonological homogeneity among word clusters and morphophonological distinctiveness from other words might be factors as important for schema extraction as the frequency of derived forms in the language. Indeed, our most recent work (Ševa, Kempe & Brooks, 2006) suggests that low-level schemata may indeed not take very long to extract. Over four sessions, Serbian-speaking children ($N=24$, mean age 4;4) were introduced to pictures of unfamiliar objects and animals that were labelled using novel nouns, varying in grammatical gender and derivational status, with half of the nouns introduced in simplex form and the other half in pseudo-diminutive form. Pseudo-diminutives were artificial derivations that mimic the regular morphological gender marking of Serbian diminutives, using unfamiliar artificial suffixes (*-upa* for feminine, *-uf* for masculine). Results indicated a pseudo-diminutive advantage for gender agreement already by Session 2, suggesting that low-level schema extraction is a relatively fast process which relies mainly on morpho-phonological homogeneity of word clusters.

What remains open is the question as to what accounts for the difference in diminutive frequency between Russian and Serbian CDS. One possible

explanation might be related to the fact that Serbian has other derivational forms suitable for connoting affection and endearment, like the hypocoristics. Although not as productive as diminutives, since they can be formed only for proper nouns, some animals and kinship terms, hypocoristics still provide a clear marker of endearment that is frequent in CDS, especially because animals and kinship terms are part of typical child-directed conversational domains. The low frequency of diminutives in Serbian CDS might also be related to the polyfunctionality of Serbian diminutive morphemes as described above. It is possible that this feature makes Serbian diminutives less prominent candidates for the expression of affection and endearment, given that suffixes like the feminine diminutive suffix /-itsa/ may also be used for the derivation of other meanings.

We also cannot exclude the possibility that there may be discrepancies in the representativeness of the corpora underlying our estimates. These estimates stem from a limited number of mothers speaking in slightly different situations. For example, the Russian mothers auto-recorded their interactions in the absence of a third person (Kempe *et al.*, in press) whereas the Serbian mother-child interactions were video-taped (Anđelković, Ševa, Moskovljević, 2001), which made the presence of another adult necessary. This may have slightly discouraged the Serbian mothers from full use of CDS and, thus, inflated the cross-linguistic differences in diminutive frequency. These methodological difficulties underscore the importance to control for potential confounds in frequency estimations through the use of experimental methods. Preliminary studies conducted in our laboratory suggest that elicitation of speech to an imaginary child under controlled laboratory conditions in a large number of speakers may provide more representative estimates of diminutive frequency in CDS. Nonetheless, the finding that the magnitude of the diminutive advantage in children's productive gender agreement is comparable between Russian and Serbian suggests that the frequency of a particular form in CDS plays less of a role in facilitating acquisition of morpho-syntax than its morpho-phonological properties in the context of the entire lexicon.

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APPENDIX I.

MATERIALS FOR EXPERIMENT I (RUSSIAN) AND EXPERIMENT 2 (SERBIAN).

Masculine		Feminine	
Russian	Serbian	Russian	Serbian
Training nouns			
medved ¹ [bear]	medved [bear]	sova [owl]	mat[ka] [cat]
zajt[ik] [rabbitDIM]	zet[ite] [rabbitDIM]	sobat[ka] [dogDIM]	zebritsa [zebraDIM]
Template nouns			
pauk [spider]	Pauk [spider]	belka [squirrel]	žaba [frog]
pailint[ik] [peacockDIM]	golubitc [pigeonDIM]	Babot[ka] [butterflyDIM]	sovitsa [owlDIM]

APPENDIX I. (Cont.)

Masculine		Feminine	
Russian	Serbian	Russian	Serbian
begemot [hippopotamus]		zebra [zebra]	
Familiar nouns			
pingvin/pingvintʃik [penguin]	pingvin/pingvintʃitɕ [penguin]	ptitsa/ptitʃka [bird]	ptitsa/ptitʃitsa [bird]
slon/slonik [elephant]	slon/slonitɕ [elephant]	zmeja/zmejka [snake]	zmija/zmijitsa [snake]
krokodil/kroko dilʹtʃik [crocodile]	krokodil/ krokodiltʃitɕ [crocodile]	ptʃela/ptʃiolka [bee]	ptʃela/ptʃelitsa [bee]
popugaj/popugajtʃik [parrot]	papagaj/papagajtʃitɕ [parrot]	tʃerepaxa/tʃerepaʃka [turtle]	korʃatʃa/korʃatʃitsa [turtle]
osiol/oslik [donkey]	lav/lavite [lion]	muxa/muʃka [fly]	muva/muvitsa [fly]
joʒ/joʒik [porcupine]	majmun/ majmuntʃitɕ [monkey]	riba/ribotʃka [fish]	riba/ribitsa [fish]
ʒuk/ʒutʃok [beetle]	leptir/leptiritɕ [butterfly]	obesʹ jana/obesʹ janka [monkey]	buba/bubitsa [beetle]
ʒiraf/ʒirafik [giraffe]	koʃ/koʃitɕ [horse]	lisa/lisitʃka [fox]	ʒirafa/ʒirafitsa [giraffe]
Unfamiliar nouns			
ʒabul/ʒabulʹtʃik pusot/pusotik rabon/rabontʃik farziak/farziatʃik zurun/zuruntʃik narap/naraptʃik cokor/cokorik batus/batusik	ʒabul/ʒabulitɕ pʊsot/pʊsotitɕ rabon/rabonitɕ farzak/farzatʃitɕ zurun/zurunitɕ narap/narapitɕ cokor/cokoritɕ batus/batusitɕ	mirva/mirvotʃka sura/surotʃka briʊlia/briʊiletʃka timza/timzotʃka vigla/viglotʃka gljuʃa/gljuʃetʃka krjofa/krjofotʃka mompa/mompotʃka	lirva/lirvitsa sʊra/sʊritsa brʊla/brʊlitsa tmza/tmzitsa vigla/viglitsa gʌʊʃa/gʌʊʃaitsa krufa/krufitsa mompa/mompitsa
Non-transparent familiar nouns			
golubʹ olenʹ		miʃ risʹ	