



Input Dominance and Development of Home Language in Russian-German Bilinguals

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Bilingual children experience a rapid shift in language preference and input dominance from L1 to L2 upon entering kindergarten when regular contact with L2 starts. Though this change in dominance affects further L1 development, little is known about how various factors shape this. The present study examines the combined influence of different background factors including not only chronological age, age of onset of L2 (L2 AoO), and gender, but also various L1 input measures on L1 receptive and expressive lexical and morphological (case and verb inflections) development in Russian-German bilingual children. For lexical skills, we found a general strong impact of chronological age, gender, and input factors but a differential impact of L2 AoO. Only expressive lexical skills were influenced by language dominance. Morphological development was influenced in the following way: chronological age and gender were most relevant for the acquisition of verb inflection, whereas age, L1 use in the nuclear family and L2 AoO affected the acquisition of case on nouns. This pattern explains the findings of the second series of analyses of longitudinal data, which showed that case is more vulnerable than verb inflection to language attrition—or, taking another perspective—to heritage Russian grammar restructuring.

Keywords: input, dominance, home/heritage-language, lexicon, morphology, verbs, nouns, Russian-German

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INTRODUCTION

In migrant families where two parents speak the same home language (henceforth, L1), toddlers and pre-kindergarten children experience dominance in this L1 as opposed to the environment language, i.e., language of the country in which they live (henceforth, L2). Upon entering the regular educational unit, be it nursery school or kindergarten, the input situation changes critically. L2 input begins to dominate and L1 input as well as continued L1 language use radically decreases (Rothman, 2009). According to recent studies (Kohnert and Bates, 2002; Oller and Eilers, 2002; Oller et al., 2011 among others), a shift to L2 preference as a result of this strongly increasing language input takes place within 2–3 years of L2 exposure. This shift in language preference is shaped by various factors and strongly impacts the development of dual languages of bilingual children. While a shift to L2 (input) dominance does not mean achievement of high language proficiency in this language, it might, together with other background factors, substantially impact L1 development. Development in this language may slow down compared with monolingual children's pace of language acquisition (e.g., Flores et al., 2017) or certain grammatical phenomena

may be acquired differently or undergo attrition in certain morphological domains (e.g., Gagarina, 2017). However, the described developmental patterns of home (alternately called heritage, s. below) languages are highly specific for individual language phenomena, shaped by language-specific properties and various acquisition contexts. In other words, this home/heritage language, i.e., a minority language acquired in a migration context, is defined as becoming a non-dominant language once regular contact with the L2 starts (Rothman, 2009; Kupisch and Rothman, 2016). Generally, heritage languages are defined as “languages spoken by the children of immigrants or those who immigrated to a country when young” (Cho et al., 2004, p. 23) and also include—according to Wiley (2005)—languages of the indigenous population, e.g., the Chukchi language in northeastern Russia, as well as earlier colonial languages, e.g., Dutch in South Africa (languages of the indigenous population are not dealt with in our study). Essential components for the definition of heritage languages is the order and degree of their acquisition, being “first in the order of acquisition but not yet acquired because of the individual’s switch to another dominant language” (Polinsky and Kagan, 2007, 369f). Due to switching to the language of the environment, heritage speakers experience various changes in their L1 grammars. These changes follow certain patterns and/or rules, which results in a similarity in heritage grammars, like loss of the pro-drop parameter (Polinsky, 2016) or reluctance to reject ungrammatical or infelicitous material (Bayram et al., 2017), etc. In our study, we examine various patterns in the acquisition of lexicon and of some morphological categories in heritage Russian spoken by second-generation migrant children in Germany within the context of the input dominance shift.

Impact of L1 Input and Background Factors on L1 Development

Despite changes in input dominance, children continue to receive L1 input to varying degrees at home and during after-school activities. The degree of input as well as the quality of the input is shaped by various factors, such as socio-economic background or presence of bilingual educational institutions among other things. L1 input is usually reduced and significantly determines the development of this language. This has been shown by several studies exploring the influence of input parameters on L1 development in ratings of general language skills (De Houwer, 2007) and lexical (Pearson et al., 1997; Klassert and Gagarina, 2010; Armon-Lotem et al., 2011; Hoff et al., 2012) or grammatical skills (Gutiérrez-Clellen and Kreiter, 2003; Gathercole and Thomas, 2009; Klassert and Gagarina, 2010; Armon-Lotem et al., 2011; Hoff et al., 2012; Thomas et al., 2014; Flores and García, 2017; Rodina and Westergaard, 2017).

The studies use a variety of L1 input measures, such as proportion of language use at home as estimated by the parents (Pearson et al., 1997; Gutiérrez-Clellen and Kreiter, 2003; Hoff et al., 2012), home language situation, i.e., whether one or both parents are L1 speakers (Thomas et al., 2014) or whether the parents are 1st or 2nd generation immigrants (Flores et al., 2017), language policy at home, i.e., whether the parents use

one or both languages at home (De Houwer, 2007; Gathercole and Thomas, 2009; Klassert and Gagarina, 2010; Armon-Lotem et al., 2011; Rodina and Westergaard, 2017 with specification of the proportion, if both languages are used). All these L1 input measures, assessed via questionnaires, revealed significant effects on the different language skills assessed in a variety of L1s and age ranges, even though there is evidence, that the reliability of these parental ratings is low (Carroll, 2017; Marchman et al., 2017).

Some of the studies included additional input measures, in order to account not only for L1 input at home but also for the overall language situation of the children (e.g., Gutiérrez-Clellen and Kreiter, 2003; Rodina and Westergaard, 2017). Gutiérrez-Clellen and Kreiter (2003) assessed the proportion of language input at home (estimated by the parents) in addition to the proportion of language input at school (estimated by the teachers), as well as the number of hours spent reading and doing literacy activities in the target languages of 57 school-children (aged 7;3–8;8) from Latin American migrant families in the United States. An influence on the score of grammatical utterances in an L1 Spanish story-telling task was only found for language input at home. The authors cannot clearly conclude, that L1 in school significantly impacts language development. They suggest, however, that the teachers may have had no objective and independent information about the amount of Spanish input in school and therefore teachers’ ratings may have been less reliable. The same holds for reading activities: these parental ratings could have been guided by social desirability and therefore not be reliable. Rodina and Westergaard (2017) collected detailed cumulative data on language use inside and outside the home with the *Bilingual Language Exposure Calculator* (BiLEC, Unsworth, 2013), which calculates the child’s exposure to the target language in the current year (present exposure) and the total lifetime exposure (cumulative length of exposure) based on parent’s ratings on a Likert scale. Only for the latter measure did a regression analysis reveal an influence on gender marking skills in L1 Russian of Russian-Norwegian children, aged 4;1–7;11. As described above, in another step of their analyses, they included the more global variable of language situation at home (both parents are L1 speakers, or one parent is L1 speaker), which also revealed significantly better L1 gender marking skills for children with two L1-speaking parents. In sum, these studies suggest that input measures from outside the home do not lead to such consistent effects as do parental input measures (see also Gagarina et al., 2014 for combined measure of inside and outside home; Lein et al., 2017). It remains open for discussion whether this is a matter of information reliability or whether the impact of present language use outside the family is not that important for L1 language skills.

While input is a very important factor in language development, it is not the only one. Among the other factors influencing L1 acquisition in bilingual children, the impact of age of onset of L2 (L2 AoO) and length of exposure to L2 (LoE) has been addressed. It is undeniable that these factors are crucial for L2 acquisition, since L2 AoO shape developmental rate and outcomes (although L2 AoO effects on L2 acquisition are mixed) and LoE is the most crucial factor in long-term

input quantity of L2 (e.g., Chondrogianni and Marinis, 2011; Paradis, 2011; Unsworth et al., 2014). In the context of heritage L1 acquisition, L2 AoO can be treated as a measure of input language dominance. This is because it has been shown, that soon after L2 contact begins, a shift toward dominance to L2 also begins (Oller et al., 2011). Moreover, L1 has more time to develop independently if the L2 AoO is later, therefore making the LoE of L2 shorter (Kupisch and Rothman, 2016). Studies examining the influence of L2 AoO/LoE on L1 acquisition have not yield consistent results. Whereas Armon-Lotem et al. (2011) and Gagarina et al. (2014) found no correlation between L2 AoO/LoE and L1 lexical and grammatical skills in two relatively large cohorts of Russian-German and Russian-Hebrew children (Armon-Lotem et al., 2011; $n = 143$, age 4–6 years; Gagarina et al., 2014; $n = 196$, age 4–7 years), correlations were reported by Lein et al. (2017) in a sample of 14 bilingual children (L1 Portuguese, age 4;9–8;7) in Germany. Receptive and productive lexical tasks and a productive morphosyntactic task (sentence repetition) showed significant correlation with L2 AoO and LoE, but not with a receptive morphosyntactic task (sentence comprehension). Furthermore, Schwartz and Minkov (2014), based on a descriptive comparison of successive and sequential Russian-Hebrew bilingual children ($n = 9$; age 3–4), reported that a low L2 AoO is associated with higher error rates in case marking in spontaneous speech data. Janssen et al. (2015) found that L2 AoO (under consideration of LoE and language spoken at home in a regression analysis) was the only significant predictor for correctness in the case processing task in L1 Russian ($n = 36$, age 59–77 months). Since L2 AoO and LoE should be inter-correlated with the cumulative exposure to a language and to the language situation at home, in order to obtain a more detailed picture it is crucial to explore its influence on L1 language skills together with other input factors in regression analyses.

Another ever-present factor in language acquisition is chronological age. The increase of language skills with chronological age in monolingual language acquisition is a common fact. With increasing chronological age, the total amount of experience with a certain language, present since birth, grows. Cognitive skills mature and language develops. This is not self-evident for the acquisition of the L1 as a minority language in bilingual children. Studies exploring age effects in combination with input factors yield a mixed picture. In two studies on L1 Welsh, increasing L1 abilities with age were reported (analyses with ANOVAs): Thomas et al. (2014) found increasing skills with age in plural marking in a sample of 88 children (age 7–11 years). Interactions with input were not reported. Gathercole and Thomas (2009) reported an effect of age and an interaction with home language as an input measure in a lexical task ($n = 610$, age 7–11) and also in a grammatical comprehension task without interaction with input measures ($n = 248$, three age groups: 5, 7, 9). For L1 Portuguese in Germany, Flores et al. (2017) also found an influence of age under consideration of the parental input variable (1st or 2nd generation immigrants) and the presence of older siblings, in a sample of 50 subjects (age 6–16). Contrary to this, Lein et al. (2017) found no correlation of age with a variety of language skills for the same population in a younger sample (4;9–8;7).

Finally, we briefly summarize the results of the influence of age in L1 Russian (further details for Russian will be given in the next section). In the studies of Armon-Lotem et al. (2011) and Gagarina et al. (2014), L1 skills correlated with age only for the children living in Germany, but not for the children living in Israel. In Rodina and Westergaard (2017) study on L1 Russian in Norway, age was not a significant predictor for gender-marking skills. It was only the cumulative input measure. It appears that the influence of age on L1 development strongly depends on a conglomerate of various factors, such as the acquisition context and input, and L1 and L2 language-specific properties. The status of a minority language in the society, the institutional support in kindergarten or school, the presence of the language in the environment of a child and, last but not least, the language use patterns at home, and the family language policy in general appeared to determine the speed and success of L1 acquisition more obviously than age.

The influence of gender on L1 skills has so far received much less attention in comparison to various other background factors. In monolingual language acquisition, this influence has been found to occur from the earliest stages of the life span. In early monolingual acquisition, girls exhibit larger vocabularies and produce longer and more complex sentences than boys of the same age (for an overview see Bornstein et al., 2004; Eriksson et al., 2012). Later in L2 acquisition, female learners also outperform male learners in speaking skills (Van Der Slik et al., 2015). Additionally, bilingual girls at age three to eight were shown to be better in the development of their narrative skills in L1 Turkish as compared to the age matched boys (Mavi et al., 2016). Explanations for these findings involve biological, psychological and social explanations (Maccoby, 1966; Bornstein et al., 2004; Eriksson et al., 2012). Recent results of a cross-linguistic and cross-cultural stable gender effect (Eriksson et al., 2012; Van Der Slik et al., 2015) are in favor of a strong biological influence.

All in all, there is still little research on the combined influence of background factors on bilingual L1 acquisition, which is fragile as compared to monolingual acquisition and is more dependent on these background factors. Out of all factors influencing L1 development, L1 input was shown to be the most crucial. But it's differential influence on lexical and grammatical development in interaction with chronological age, L2 AoO, and gender is far from being clear and has, to the best of our knowledge, never been analyzed in combination with other factors (Armon-Lotem et al., 2011; Gagarina et al., 2014; Lein et al., 2017 the studies with the highest number of background factors report only correlations). Moreover, only a few studies examined the influence of input in- and outside the home (e.g., Gutiérrez-Clellen and Kreiter, 2003; Rodina and Westergaard, 2017). Most of the studies on input used either only measures of parental input (e.g., Pearson et al., 1997; De Houwer, 2007; Klassert and Gagarina, 2010; Armon-Lotem et al., 2011) or combined measures for all L1 speakers in the environment of the child (e.g., Gagarina et al., 2014; Lein et al., 2017). Therefore, it is still an open question of whose input most contributes to the heritage language skills of bilingual children. Finally, evidence on the influence of the combination of various background factors on concrete grammatical phenomena

in Russian is sparse. The studies considered either just a limited range of variables (Schwartz and Minkov, 2014; Janssen et al., 2015; Rodina and Westergaard, 2017) or used only combined grammatical measures (Armon-Lotem et al., 2011; Gagarina et al., 2014). A detailed examination might be crucial for understanding patterns of L1 development, because, as shown in the following section, various grammatical phenomena are differentially influenced by the bilingual acquisition context.

Bilingual Acquisition of Russian as a Heritage Language

The Russian-speaking population is widely spread across the world, with about 30 million people living outside of Russia and the republics of the former Soviet Union (according to the Ministry of Foreign Affairs of the Russian Federation). Depending on the country of residence, history of emigration and various environmental factors, these people have different resources and motivation for maintaining the Russian language and for transferring it to their children—thus, the diversity (the various levels of Russian proficiency and Russian “grammars”) is large. Furthermore, research on the acquisition of Russian as a heritage/home language differs strongly between countries. Here, we will concentrate only on studies dealing with Russian-German bilingualism. This is due to several factors: first, apart from the perceptive and productive lexicon, we are interested in productive morphology. German, as a societal language with poor and non-transparent morphology, impacts the acquisition of heritage Russian in a specific way (Brehmer, 2007; Anstatt, 2008; Dieser, 2009 among others). The second reason has to do with the peculiarities of Russian-speaking diaspora to Germany and its broad network, own print media, local radio- and TV broadcasts, educational offers, doctors, and shops (Soultanian et al., 2008). Russian of the speakers, who emigrated to Germany as adults, but also heritage Russian, which was acquired by children born in Germany, is in fact spoken throughout the country, allowing for its active use in every-day life as well as its stable transfer to further generations [more on Russian(-speaking diaspora) in Germany, see Brehmer, 2007; Anstatt, 2008; Gagarina et al., 2014; Gagarina, 2017].

We now present the results relevant to our study on the acquisition of Russian as a heritage language in the German context, with a focus on lexical skills and morphological categories—verb inflection and case. In bilingual L1 lexicon acquisition, an increase in L1 with chronological age in expressive lexicon was found in cross-sectional studies (Armon-Lotem et al., 2011; Klassert, 2011; Gagarina et al., 2014; Klassert et al., 2014). For productive lexicon, picture-naming of objects and actions, Klassert et al. (2014) showed a bilingual disadvantage (i.e., smaller lexicons in comparison with monolingual peers) that increased with age in comparison to monolingual children. They also found that verb learning was more stable in heritage Russian than noun learning and that the dominance of L2 noun production appeared 3 years after L2 AoO.

Noun and verb morphology was shown to follow various acquisitional patterns in baseline child Russian and in heritage Russian. Noun and verb morphology in Russian is characterized

by richness of inflection, but differs in respect to its syncretism and transparency. Inflection on verbs in Russian is rather homogenous: the majority of verbs build aspectual pairs, both members of which are marked in the past by number—plural and singular, and in singular by the genders—feminine, masculine, and neuter. Imperfective verbs in the present and perfective verbs in the future exhibit synthetic person-number inflection, which is characterized by the one *form-one function* relation (cf. Slobin, 2001). This relation facilitates acquisition of this inflection and leads to low overgeneralization rates. Case is generally considered to be “one of the most heterogeneous nominal morphological categories” (Eisenbeiss et al., 2009, p. 369) in the languages of the world, and Russian is not an exception. Nouns in the three declension classes exhibit six cases (in singular and plural) with the same marking for various cases within one declension class and across singular and plural number, e.g., *myši* “mouse-GEN.SG or -DAT.SG or -NOM.PL.” Additionally, Russian exhibits differential object marking, with animate objects having similar inflections to the genitive case and inanimate objects to the nominative case, e.g., *myšej* “mouse-GEN or ACC singular” and *stul* “chair-NOM.SG or -ACC.SG.” The flexibility of stress on nouns and vowel reduction in the unstressed final inflections increases syncretism and opacity of the case system. This difference in the target noun and verb morphology leads to differences in timing and path of acquisition.

Studies on the acquisition of verb inflection showed its early and stable development, especially for person marking [however, past tense marking of verbs, which includes agreement with the subject in number and gender was found to be vulnerable in eight Russian-Hebrew bilingual children aged 3;6–5;0 (Gagarina et al., 2007)]. Early acquisition of person-marking on verbs in heritage Russian was shown to be similar to that of monolinguals in one case study: Gagarina (2008) used a longitudinal corpus to establish the stages in L1 bilingual development of verb categories; she found similarities in timing and acquisition path of verb inflection between a simultaneous bilingual child and four monolingual children (cf. Kiebzak-Mandera, 2000). Generally, bilingual children were shown to master person marking on verbs in L1 similarly to monolingual children, with high acquisition speed (Xanthos et al., 2011) and low error rate, as opposite to past tense marking.

Acquisition of case-marking follows another pattern. For monolingual acquisition of Russian, Gagarina and Voeikova (2009) performed a multiple-case longitudinal study with four children and reported a very early emergence of all case oppositions (in singular), but not its productive use, which was shown to fully develop by age three, i.e., later than tense-person inflection on verbs. They suggested that the acquisition of case inflection corresponds to inflectional classes of nouns and is driven by transparency and iconicity of form-function meaning. Furthermore, they distinguished between several degrees of productiveness dealing with the variability in use of a given case form with various inflectional classes and with its frequency. They concluded that “various types of morphophonemic markings and the contrastive forms construct a system of cases that approaches the target Russian” (Gagarina and Voeikova, 2009, p. 212). Thus, they explained the acquisition

of the case marking system via the transparency, non-syncretism and frequency of its single elements. For example, both in monolingual and bilingual acquisition of accusative marking in the first declension inflectional class of *-a*-nouns, class is the first of the six cases in Russian to be acquired. Whereas in monolingual children it usually remains stable and does not undergo any changes, bilingual children might modify their use of this inflection. In a longitudinal study, Gagarina (2011) documented the productive use of accusative inflection *-u* (the first inflectional class of *-a*-nouns) in a simultaneous bilingual child at age three: *klouna* “clown-ACC,” but the loss of this inflection, i.e., **kloun* at age six. This was despite L1 language input remaining stable and the child receiving school education in both languages. Such a loss of already acquired categories or constructions affects only those areas of the grammatical system that are less transparent and characterized by high syncretism, low frequency and later age of acquisition (cf. Gagarina and Reichel, 2013). This pattern is a clear example of attrition of an inflectional category, or of marking of accusative case within one declension class; this process of attrition is traceable only if longitudinal observations are made and the correct productive use in the earlier acquisition phase has been observed.

While these studies suggest that language-specific morphological properties and children’s own preferences may lead to case errors, recent research shows that (i) the percentage of overgeneralisations in children’s speech is comparatively low, and (ii) case errors mostly occur during a limited period of time. In particular, children acquiring Slavic and Baltic languages, such as Croatian, Lithuanian, Russian, generally exhibit low overgeneralisation rates (Voeikova and Gagarina, 2002; Katičić, 2003, p. 110–112; Savickiene, 2002, p. 131–133). The authors view these findings as evidence for a strong reliance on rote-learned forms and transparent analogies in early grammatical development.

Generally, Gagarina (2017) specified that for the acquisition of heritage Russian in Russian-German bilingual children, as language acquisition progresses, some already acquired elements, which are non-transparent, not the first to be acquired, and “stabilized” in their productive use, undergo attrition. As a result of this process, the restructuring of (the elements of) the grammatical system takes place.

THE STUDY: GOALS AND RESEARCH QUESTIONS

All in all, bilingual L1 acquisition was shown to be fragile as compared to monolingual acquisition and more dependent on various background factors, contributing to the non-dominance of L1 in daily life (Oller et al., 2011). Our study aims to close several gaps in research on heritage L1 Russian acquisition in bilingual children. We address not only productive and perceptive lexicon, but analyze productive L1 morphology, in particular the production of person-number inflection on verbs in present tense and case on nouns.

In the first series of analyses we inspect the impact of various background factors on L1 skills in a more differentiated way than

previous studies, which used either combined input measures for family and friends (Gutiérrez-Clellen and Kreiter, 2003; Armon-Lotem et al., 2011; Gagarina et al., 2014) or only parental input measures (De Houwer, 2007; Pearson, 2007). We distinguish between L1 use with nuclear family members, i.e., parents and siblings, and L1 use with other people, i.e., other members of the family or friends, and investigate its influence as combined with chronological age, L2 AoO and gender on L1 performance in the selected domains. This differentiated view allows for a more fine-grained examination of the effects of L1 input on language performance in specific language domains. Furthermore, these analyses will show which of the child’s communication partners’ L1 use mostly impacts L1 development in contexts in which L1 input loses its dominance.

In the second series of analyses, we trace the longitudinal development of L1 lexicon and morphology (person-number inflection on verbs and case on nouns) in two cohorts of preschool children. We thereby extend the results of the first series of analyses by exploring the age factor in more detail. This will allow us to provide a deeper insight into the developmental patterns of these particular domains in a non-dominant context of L1 acquisition. Previous studies suggest, that the acquisition of noun and verb morphology in L1 Russian, in particular case and person-number inflection, is affected differently by this acquisition context (Gagarina, 2008; Gagarina and Reichel, 2013) and that lexical abilities increase with age in Germany but not in other countries (Armon-Lotem et al., 2011 for Israel). However, no studies so far have investigated the longitudinal L1 development of Russian in a larger sample in these different domains.

Our study explores selected language domains of Russian-German bilingual children and addresses the following research questions: (1) How do the background factors chronological age, gender, L2 AoO and L1 input (differentiated across the nuclear family and other people) impact L1 acquisition of receptive and productive lexicon and of two domains of morphology—accusative and dative case on nouns, 1st and 2nd person on present tense verbs? (2) Which developmental changes in L1 lexicon and morphology (case on nouns and person on verbs) are observed between the 3rd and 4th and between the 4th and 5th years of age in these children?

METHOD

Participants

The data come from a large sample of Russian-German bilingual children. Most of the data were gathered at Leibniz-ZAS Berlin from 2008 to 2017 for *Russian language proficiency test for multilingual children* (Gagarina et al., 2010, 2015) and in the context of the Berliner Interdisciplinary Association for Multilingualism (BIVEM) Project. Another small set of the data comes from the lab of Prof. Cornelia Hamann in northern Germany (Bremen/ Oldenburg). All participants showed, according to the parental questionnaires and teachers, no motoric, cognitive, socio-psychological or any other disorders. For our analyses, we used different subsets of the data, which are described in the respective sections in the results.

The results of *Analysis 1, exploring the impact of background factors on L1 development*, are based on a subsample of 213 Russian-German bilingual children between 26 and 98 months ($M = 52.76$, $SD = 17.41$), 44.6 female. 91.5% of the data were gathered in Berlin. The data of 18 children come from Bremen/Oldenburg. For all children, one or more parts of the language measures were assessed, and the questionnaire was filled out by the parents. Due to data collection problems, there are missing data for all measures (see **Table 1**). The evaluation of the questionnaire (described in section Background Measures) concerning L2 AoO, revealed that 14.6% ($n = 31$) of the sample came in regular contact with L2 German below 18 months of age, 42.3% ($n = 90$) between 18 months and 3;05 years and 11.7% ($n = 25$) between 3;06 and 5;05 years. For 31.5% ($n = 67$) the parents did not indicate L2 AoO for their child. The descriptive statistics for input and language measures are presented in **Table 1**.

Table 2 depicts the number of people specified in the questionnaire for L1 use with the child. In 95.8% of the cases, both parents' L1 use was specified, and in 62.9% that of one or more siblings. As described in section Background Measures, these data were combined for L1 use in the nuclear family. The L1 use of other people was specified for 85.9% of the children in the sample. The first two persons were always grandparents. Additional other people were also grandparents but also other relatives (cousins, aunts and uncles), and further persons close to the child (friends and neighbors).

Analysis 2, exploring the longitudinal development of L1 lexicon and morphology, are based on a subsample of 116 three- and four-year-old Russian-German bilingual children living in Berlin. The L1 language skills of these children were tested twice with an interval of ~1-year (interval between testing 1 (T1) and testing 2 (T2) $M = 11.65$ months, $SD = 0.71$, $range = 10$ –14 months). The 3-year-old sample (AG3) comprised 58 children (48.3% female). Their mean age at T1 was 42.02 months ($SD = 3.40$, $range =$

36–47 months) and at T2 53.55 months ($SD = 3.78$, $range = 47$ –61). The 4-year-old sample (AG4) consisted of 58 children (39.7% female; age T1 $M = 52.05$ months, $SD = 3.17$, $range = 48$ –59; age T2 $M = 63.81$ months, $SD = 3.18$, $range = 59$ –71). As presented in **Table 5**, not all children completed all language subtests. For case and verb inflection especially, the samples are smaller.

Linguistic Measures: Productive and Receptive Lexicon

For the present study, several subtests from the *Russian Language Proficiency Test* (SRUK, Gagarina et al., 2010, 2015) were used, namely, receptive and productive lexicon and productive morphology: case on nouns and person-number on verbs. The productive lexicon was tested by means of a picture-naming task, consisting of nouns and verbs (for each word category there were two training items and 26 test items). The children were shown individual pictures and asked, "What is this?" or "What is s/he doing?" The test items were chosen based on unambiguous identifiability of the pictures, frequency of the item and semantic field (for verbs, the category of aspect was considered as well). For some items, several responses were accepted as correct. The comprehension of individual words was tested by means of a picture-selection task for nouns and verbs (for each word category there were one training item and 10 test items). The tester presented the word auditorily and the child had to choose the correct picture from a group of four pictures by pointing to it. The three distractors were composed of a semantically-related, a phonologically-related, and an unrelated item of the same part of speech. Again, the test items belonged to different frequency ranges and were controlled for unambiguous identifiability with monolingual adults and children.

Linguistic Measures: Productive Morphology

Two linguistic subtests testing case on nouns and person-number on verbs were used in order to examine productive morphology. The case subtest consisted of two training questions and six elicitation questions. Three of the questions elicit the accusative and three the dative case. These two cases were chosen because they both oblique cases and are central for the Russian case system, show stable use in monolingual children by age three (Gagarina and Voeikova, 2009) and exhibit, in some context, direct correspondences to accusative and dative cases in German, e.g., *Papa darit devočke-DAT cvety-AKK* (Russian), *Der Vater schenkt dem Mädchen-DAT die Blumen-AKK* (German) "The father presents the flowers to the girl." The case subtest has two parts: in the introduction, the child is familiarized with the circus picture, accompanied by a story of a circus where various characters, which are presented as pairs of two puzzle pieces, are friends. The tester names all items in the nominative case: *Here is a lion, an elephant, a monkey, a snake*, etc. Then the child answers the elicitation question and puts pieces of two-part puzzles together. The elicitation question for dative is *Komu nraivitsja X? (Who (-DAT) does the lion like?)*, and for accusative *Kogo iščet X? (Whom (-ACC) X is looking for?)*.

TABLE 1 | Descriptive statistics for input measures and language measures.

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
L1 use nuclear family	213	0.50	4.00	2.64	0.88
L1 use other	183	0.00	4.00	2.68	1.13
Receptive lexicon	206	2	20	14.52	4.11
Productive lexicon	204	0	51	22.23	13.22
Case	153	0	6	2.29	2.22
Verb inflection	118	0	12	9.65	3.49

TABLE 2 | Number of people [*N* (%)] specified in the questionnaire for language use with the child.

	0	1	2	3	4	5	6
Parents		9 (4.2)	204 (95.8)				
Siblings	79 (37.1)	96 (45.1)	28 (13.1)	8 (3.8)	2 (0.9)		
Other	30 (14.1)	45 (21.1)	61 (28.6)	43 (20.2)	29 (13.6)	3 (1.4)	2 (0.9)

Verb inflection is tested for the first and second-person singular imperfective present. Although the first and second-person singular imperfective present is acquired after the third person, all tense-person inflections occur early and are used in a target-like fashion prior to age three (Gvozdev, 1949; Gagarina, 2008). The test consists of 2 training items and 6 test items. The child and tester perform certain actions and the child is asked *Who is doing what? S/he has to name the action, e.g., Ja igraju* “I’m playing” or *Ty čitaješ* “You’re reading.”

The number of correct responses (according to Gagarina et al., 2015) for each subtest was used as the child’s final score in the data analysis.

All data were collected in monolingual modus in a separate room in the kindergartens or schools by a native speaker after the parental consent forms were signed. The parents and teachers were informed about the goals, content and procedure of the studies.

Background Measures

A questionnaire was administered for the gathering of detailed information on each child’s individual language acquisition context and input situation. The entire questionnaire is published in Gagarina et al. (2010). For the present study, the following two parts were used: In the questionnaire, the parents had to indicate how old the child was when it came into regular contact with German, i.e., L2 AoO as one of three categories: 1. below 18 months, 2. between 18 months and 3;05 years, 3. between 3;06 and 5;05 years. In another part of the questionnaire, the parents were asked to rate the child’s language use with his/her mother, father, siblings and other people who were in frequent contact with the child: person X speaks (1) only German, (2) little Russian, much German, (3) Russian and German equally, (4) much Russian, little German, (5) only Russian. For the data analysis, this was converted into a 5-step scale according to the numbers given before [from 0 (only German) to 4 (only Russian)]. For each child, the mean language use of L1 Russian was calculated separately for the nuclear family (*L1 use nuclear family* = mean of language use for parents and siblings) and for other persons specified by the parents (*L1 use other*).

The parents filled out the questionnaire at home, without the guidance of an instructor.

Data Analysis

The data were analyzed using SPSS statistics 24.

To evaluate the impact of background factors on L1 development (Analysis 1), in the first step we calculated the correlations between language measures and background factors, using pairwise deletion of missing cases. Correlations were assessed by calculating r with Pearson correlation between metrical variables (language measures and input measures) and with Spearman’s rank correlation between metrical and the ordinal variable *L2 AoO* (interpretation according to Cohen, 1988: $r = 0.10$ – 0.29 small, $r = 0.30$ – 0.49 medium, $r = 0.50$ – 1.0 large). Correlations between the nominal variable *age* and the metrical/ ordinal variables were assessed with the eta correlation ratio (interpretation according to Cohen, 1988: $\eta = 0.01$ – 0.03 small; $\eta = 0.04$ – 0.15 medium; $\eta > 0.16$ high). In the second step, we performed multiple regression models for each language

competence measure as a dependent variable (sum for individual child) with listwise deletion of missing cases. All factors were chosen on the basis of the results of the initially performed correlations, and were entered simultaneously as predictors.

To explore the longitudinal development of L1 lexicon and morphology (Analysis 2), repeated measures ANOVAs were performed to explore the influence of testing time and age on the different language skills. *Age* (with the two age groups AG3 and AG4) served as between-subject factors, and *sum correct* of the certain language measure as a within-subject factor (with testing time T1 and T2 as levels). *Post-hoc t*-tests were performed in case of significant between-subject effects and significant interactions. Additionally, effect sizes are reported, partial η^2 for ANOVAs and d for *t*-tests. In the classification of effect sizes, we follow Cohen (1988) with $d = 0.2$ small, $d = 0.5$ medium, $d = 0.8$ large, and Döring and Bortz (2006) with *partial* $\eta^2 = 0.001$ small, *partial* $\eta^2 = 0.10$ medium, *partial* $\eta^2 = 0.25$ large.

The sum of included cases is reported as n for correlations and as df for regressions and ANOVAs.

RESULTS

Analyses 1: The Impact of Background Factors on L1 Development

Correlations Between Language Measures and Background Factors

First, we assessed correlations between the different language measures and the background factors. **Table 3** shows the correlations between the language measures and all background factors except gender (the correlations between this binary variable and the other variables are presented afterward).

All language measures are significantly correlated between each other. The correlations between *receptive lexicon* and *expressive lexicon* [$r_{(200)} = 0.715, p < 0.001$], *receptive lexicon* and *verbal inflection* [$r_{(111)} = 0.542, p < 0.001$] and between *expressive lexicon* and *case* [$r_{(143)} = 0.734, p < 0.001$] are high. Correlations between *receptive lexicon* and *case* [$r_{(146)} = 0.461, p < 0.001$], *expressive lexicon* and *verbal inflection* [$r_{(110)} = 0.494, p < 0.001$] and between *case* and *verbal inflection* [$r_{(116)} = 0.374, p < 0.001$] are moderate.

The language measures are significantly correlated with the background factors *age* [*receptive lexicon* $r_{(204)} = 0.599, p < 0.001$, *expressive lexicon* $r_{(202)} = 0.607, p < 0.001$, *case* $r_{(152)} = 0.328, p < 0.001$, *verbal inflection* $r_{(117)} = 0.231, p = 0.011$] and *L1 use in the nuclear family* [*receptive lexicon* $r_{(204)} = 0.191, p = 0.006$, *expressive lexicon* $r_{(202)} = 0.385, p < 0.001$, *case* $r_{(152)} = 0.316, p < 0.001$, *verbal inflection* $r_{(117)} = 0.182, p = 0.048$] to different degrees ranging from small to large. *L2 AoO* is significantly correlated with all language measures [small to moderate correlations, *receptive lexicon* $r_{S(138)} = 0.324, p < 0.001$, *expressive lexicon* $r_{S(140)} = 0.449, p < 0.001$, *case* $r_{S(99)} = 0.280, p = 0.005$] except *verbal inflection* [$r_{S(75)} = 0.181, p = 0.114$]. *L1 use other* shows no significant correlations to the language measures. Furthermore, there are intercorrelations between the background factors: *L1 use in the nuclear family* and *L1 use other* correlate moderately [$r_{(181)} = 0.407, p < 0.001$]. Correlations with small effect sizes appear between *age* and *L1 use other* [$r_{(181)} =$

TABLE 3 | Correlations between language measures and background factors with Pearson correlation, ^aSpearman's rank correlation, * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

	2.	3.	4.	5.	6.	7.	8. ^a
1. Receptive lexicon	0.715***	0.461***	0.542***	0.599***	0.191**	-0.018	0.324***
2. Expressive lexicon	1	0.734***	0.494***	0.607***	0.385***	0.036	0.449***
3. Case		1	0.374***	0.328***	0.316***	-0.050	0.280**
4. Verbal inflection			1	0.231*	0.182*	0.001	0.181
5. Age				1	-0.064	-0.267***	0.226*
6. L1 use nuclear family					1	0.407***	0.229***
7. L1 use other						1	0.159
8. L2 AoO							1

N's range from 77 to 206 due to missing data (for details see text).

-0.267, $p < 0.001$], *age* and *L2 AoO* [$r_{S(144)} = 0.226$, $p < 0.001$] and *L2 AoO* and *L1 use nuclear family* [$r_{S(144)} = 0.229$, $p < 0.001$]. *Age* and *L1 use nuclear family* [$r_{(211)} = -0.064$, $p = 0.353$] as well as *L1 use other* and *L2 AoO* [$r_{S(132)} = 0.159$, $p = 0.066$] are not significantly correlated.

The correlations of *gender* with the other variables were assessed with eta correlation ratio because *gender* is a binary variable. The analysis revealed that, concerning the language measures, *gender* is moderately correlated with *receptive lexicon* ($\eta = 0.149$, $n = 198$) and *verbal inflection* ($\eta = 0.134$, $n = 110$), highly correlated with *expressive lexicon* ($\eta = 0.250$, $n = 197$) and weakly correlated with *case* ($\eta = 0.010$, $n = 145$), all in favor for the girls. Calculating eta correlation ratio of *gender* with the other background factors showed no correlation with *age* ($\eta = 0.007$, $n = 204$), a small correlation with *L2 AoO* ($\eta = 0.017$, $n = 146$, being a girl is associated with a later L2 AoO) and medium correlations with *L1 use nuclear family* ($\eta = 0.137$, $n = 204$) and *L1 use other* ($\eta = 0.050$, $n = 182$), both indicating that the L1 use with girls is higher than with boys.

In sum, the correlations show that the language measures are more strongly correlated between each other than with the background variables. Nevertheless, nearly all background variables are correlated to different degrees with at least most of the language measures. The exception is *L1 use other*, which is not significantly correlated to the assessed language skills. Moreover, it is intercorrelated with the other input measure *L1 use nuclear family*. Therefore, to reduce the model complexity and to avoid multicollinearity in the regression, the background variable *L1 use other* will be excluded from the following regression models.

Regression Analysis

To evaluate the influence of background factors on L1 language competence, we ran multiple regression models for each language competence measure as dependent variable and chronological *age* in months, *gender*, *L1 use nuclear family* and *L2 AoO* as predictors, all entered simultaneously. *L1 use other* was not included as predictor because of the missing correlation to the language measures and the intercorrelation to *L1 use nuclear family*. Detailed results for the predictors of all regressions described in this part are presented in **Table 4**.

For the *receptive lexicon* the regression model with *age*, *gender*, *L1 use nuclear family*, and *L2 AoO* as simultaneous predictors was significant [$F_{(4,135)} = 35.67$, $p < 0.001$, *mean VIF* = 1.13].

Age, *gender* and *L1 nuclear family* were significant predictors and explained 50% of the variance in the test scores (*adj. R*² = 0.50). The strongest standardized beta coefficient was found for *age* ($\beta = 0.592$). For *L1 use nuclear family* ($\beta = 0.194$) the standardized beta coefficient was slightly higher than for *gender* ($\beta = -0.176$). *L2 AoO* was not a significant predictor for receptive lexical skills. In sum, a higher age, an increased amount of Russian language use at home and being a girl lead to better receptive lexicons.

For the *expressive lexicon* the predictors explained 67% of variance in the data [*adj. R*² = 0.67; $F_{(4,137)} = 70.96$, $p < 0.001$, *mean VIF* = 1.1]. In this model all predictors had significant coefficients (for details see **Table 4**), with the largest standardized beta for *age* ($\beta = 0.601$), followed by *L1 use nuclear family* ($\beta = 0.281$), *L2 AoO* ($\beta = 0.196$), and *gender* ($\beta = -0.172$), in favor of girls. So, the older the children, the more the nuclear family uses Russian, the later their L2 AoO of German and if the children are female, the better the expressive lexicon of the children in our sample.

For *case* marking skills the multiple regression model with the selected predictors described above was again significant [$F_{(4,96)} = 7.60$, $p < 0.001$, *mean VIF* = 1.0]. Significant predictors (ordered by impact according to standardized coefficients) were *L1 use nuclear family* ($\beta = 0.283$), *age* ($\beta = 0.278$), and *L2 AoO* ($\beta = 0.179$). They explained 21% of variance in the data (*adj. R*² = 0.21). *Gender* was clearly no significant predictor for case marking skills.

Also for *verb inflection* the multiple regression with *age*, *gender*, *L1 use nuclear family* and *L2 AoO* was significant [$F_{(4,72)} = 4.30$, $p = 0.004$, *mean VIF* = 1.0]. Only *age* (with the highest standardized $\beta = 0.388$) and *gender* ($\beta = -0.200$, again in favor of the girls) were significant predictors and explained 15% of variance in the test scores (*adj. R*² = 0.15). *L1 use nuclear family* and *L2 AoO* were clearly not significant.

In sum, the regression analysis revealed an influence of chronological age on all tested areas of L1 Russian in the sample of Russian-German bilingual children. However, the age range in our sample was large (26–98 months), so this pattern was to be expected. Nevertheless, it was very important to control for age, in order to obtain a comprehensive picture of the influence of the other factors of interest. This turned out to be different for each assessed language skill. Moreover, the amount of explained variance for the lexical tasks was clearly larger than for the

TABLE 4 | Multiple regression models for each language competence measure.

Receptive lexicon					
Factors	B	SE B	β	t	p
(constant)	4.989	1.482		3.366	0.001
Age	0.151	0.016	0.592	9.376	<0.001
Gender	-1.468	0.509	-0.176	-2.887	0.005
L1 use nuclear family	0.971	0.324	0.194	2.999	0.003
L2 AoO	0.638	0.454	0.093	1.405	0.162
$R = 0.712$, $adj. R^2 = 0.499$, $F_{(4,135)} = 35.67$, $p < 0.001$					
Expressive lexicon					
(constant)	-14.356	3.733		-3.846	<0.001
Age	0.461	0.039	0.601	11.848	<0.001
Gender	-4.429	1.277	-0.172	-3.467	0.001
L1 use nuclear family	4.357	0.812	0.281	5.364	<0.001
L2 AoO	4.100	1.103	0.196	3.717	<0.001
$R = 0.821$, $adj. R^2 = 0.665$; $F_{(4,137)} = 70.96$, $p < 0.001$					
Case					
(constant)	-4.189	1.306		-3.207	0.002
Age	0.042	0.014	0.278	3.075	0.003
Gender	0.278	0.407	0.061	0.683	0.496
L1 use nuclear family	0.810	0.260	0.283	3.116	0.002
L2 AoO	0.685	0.346	0.179	1.982	0.050
$R = 0.490$, $adj. R^2 = 0.209$, $F_{(4,96)} = 7.60$, $p < 0.001$					
Verb inflection					
(constant)	5.950	2.199		2.706	0.008
Age	0.073	0.020	0.388	3.647	<0.001
Gender	-1.105	0.590	-0.200	-1.873	0.049
L1 use nuclear family	0.267	0.420	0.067	0.635	0.527
L2 AoO	0.265	0.525	0.054	0.504	0.615
$R = 0.439$, $adj. R^2 = 0.148$, $F_{(4,72)} = 4.30$, $p = 0.004$					

morphological tasks, where power was lower because of the moderately smaller sample size due to missing data.

Analyses 2: Longitudinal Development of L1 Lexicon and Morphology

The following analyses explore the longitudinal development of L1 lexicon and morphology in 3- and 4-year-old children over the course of 1 year. For all language measures, means from T1 to T2 increase for the total sample as well as for the single age groups numerically, as presented in **Table 5**. First, we will take a closer look at the morphological tests. For *case*, which was tested with 6 items, the younger children (AG3) performed correctly for an average of 34% at T1 and correctly for 35.5% at T2, and the older children (AG4) 31.8% at T1 and 45.3% at T2. For *verb inflection*, which was tested with 12 items, the means of correct responses in percent were higher (AG 3: T1 $M = 45.8\%$, T2 $M = 67.6\%$; AG 4: T1 $M = 66.3\%$, T2 $M = 82\%$).

The ANOVAs revealed a significant main effect of *testing time* for all language measures (for a report of these ANOVAs see **Table 5**). The children therefore improved significantly from T1 to T2 in all language skills assessed. For *case*, the effect size was

only small (partial $\eta^2 = 0.057$), for all other language measures there was a medium effect (partial $\eta^2 > 0.14$).

An effect of *age* was found in the ANOVAs only for *receptive lexicon*, $F_{(1,114)} = 6.01$, $p = 0.016$, partial $\eta^2 = 0.050$, and *verb inflection*, $F_{(1,63)} = 5.43$, $p = 0.023$, partial $\eta^2 = 0.079$. This indicates, that in these two measures there are differences between the age groups. *Post-hoc* tests with independent *t*-test revealed a better performance of the older age group (AG4) for *receptive lexicon* than the younger age group (AG3) at both testing times [T1: $t_{(114)} = -2.53$, $p = 0.013$, $d = 0.24$; T2: $t_{(114)} = -2.14$, $p = 0.035$, $d = 0.20$], for *verb inflection* only at T1 [$t_{(63)} = -2.17$, $p = 0.033$, $d = 0.27$] but not at T2 [$t_{(63)} = -1.75$, $p = 0.086$, $d = 0.22$]. As mentioned before, there was no significant main effect of *age* for *expressive lexicon* [$F_{(1,113)} = 3.72$, $p = 0.056$, partial $\eta^2 = 0.032$] and *case* [$F_{(1,73)} = 0.23$, $p = 0.634$, partial $\eta^2 = 0.003$]. This suggests, that older and younger children perform equally well at individual testing times.

None of the ANOVA found an interaction between *testing time* and *age*, indicating that younger children improved similarly in the different language measures to older children [*receptive lexicon*: $F_{(1,114)} = 0.251$, $p = 0.617$, partial $\eta^2 = 0.002$; *expressive lexicon*: $F_{(1,113)} = 0.784$, $p = 0.378$, partial $\eta^2 = 0.007$; *case*:

TABLE 5 | Descriptive statistics for the total sample (all) as well for the single age groups (AG3, AG4) and report of main effects of ANOVAs for testing time (T1-T2).

Language measure	Group	N	T1 [M (SD)]	T2 [M (SD)]	F (df)	P	Partial eta ²
Receptive lexicon	All	116	13.14 (3.90)	14.11 (4.01)	18.97 (1,114)	<0.001	0.143
	AG3	58	12.24 (3.94)	13.33 (4.12)			
	AG4	58	14.03 (3.69)	14.9 (3.77)			
Expressive lexicon	All	115	17.37 (12.79)	21.22 (13.91)	34.92 (1,113)	<0.001	0.236
	AG3	57	15.35 (11.79)	18.61 (13.71)			
	AG4	58	19.36 (13.51)	23.78 (13.74)			
Case	All	75	1.97 (2.08)	2.47 (2.24)	4.39 (1,73)	0.040	0.057
	AG3	32	2.06 (2.08)	2.13 (2.27)			
	AG4	43	1.91 (2.10)	2.72 (2.22)			
Verb inflection	All	65	6.89 (4.62)	9.09 (4.02)	15.73 (1,63)	<0.001	0.200
	AG3	28	5.5 (4.73)	8.11 (4.42)			
	AG4	37	7.95 (4.30)	9.84 (3.58)			

$F_{(1,73)} = 3.23$, $p = 0.077$, partial $\eta^2 = 0.042$; *verb inflection*: $F_{(1,63)} = 0.40$, $p = 0.531$, partial $\eta^2 = 0.006$].

This longitudinal analysis clearly show that L1 Russian language skills of 3 and 4-year-old children develop within 1 year. For case, this effect is smaller than for verb inflections and lexicon. Although there is an increase, even the oldest children (AG4 at T2) perform at a very low level in the case test and are, as a group, far from the full acquisition of the case target system.

DISCUSSION

This study aimed at examining the role of various background factors in L1 acquisition in Russian-German bilingual children when L1 input shifts from dominant to non-dominant upon entering an educational unit in Germany. In particular, we aimed at establishing a scrutinized picture of the impact of the background factors chronological age, gender, individual L1 input, and L2 AoO on the development of heritage Russian. We furthermore aimed at tracing the development of lexicon and two morphological categories—case on nouns, and tense-person on verbs—longitudinally in the home language, to explore in detail the impact of the age factor on these domains.

The multiple linear regression analysis of the influence of background factors on different language skills reveal a differentiated picture for individual language domains. At first, chronological age has a strong impact on all tested areas of language acquisition, even under consideration of other background factors in the same statistical model. For all tested domains except case, age was the predictor with the highest coefficient. This shows that receptive and expressive lexical skills as well as case marking and verb inflection increase with chronological age in heritage Russian for children living in Germany. This finding confirms and extends the results of previous studies, which consider age as an isolated factor (e.g., Armon-Lotem et al., 2011; Gagarina et al., 2014; Klassert et al., 2014) and displays the vivid language situation of the Russian diaspora in Germany as the background for L1 development (cf. Soultanian et al., 2008). On the one hand, one could claim that

this strong influence of age is caused by the large age range in our sample (26–98 months). One must keep in mind though, that increasing L1 language abilities are not self-evident, due to the important role of input factors (e.g., Lein et al., 2017; Rodina and Westergaard, 2017). Our longitudinal analyses confirmed the influence of age by revealing significant increases over 1 year in abilities in the respective language domains in 3 to 4-year-old children.

Secondly, we found significant effects of children's gender on all language measures except case, as manifested in an advantage for girls. This is the first study that confirms the gender gap for L1 bilingual acquisition, which was also reported for monolingual (e.g., Bornstein et al., 2004; Eriksson et al., 2012) and L2 acquisition (Van Der Slik et al., 2015). Interestingly, gender was also correlated with the input situation in our data: being a girl is correlated with a later L2 AoO and a higher L1 use with the family and other people. These findings point out the importance to control for gender if the influence of the acquisition context is of interest. This was considered in our study, and the significant contribution of gender to expressive and receptive lexical skills, as well as to verbal inflection skills, demonstrate that its L1 acquisition is driven by this biological feature.

Concerning L1 use in the child's environment, this study differentiated between L1 use in the nuclear family (parents and siblings) and L1 use with other people. This was done with the aim of scrutinizing to what extent the L1 input situation of a child must be assessed to most comprehensively evaluate its influence on his/her L1 language skills. Our data suggest, that it is obviously more reliable to assess L1 use in the nuclear family, since the L1 use with other people was not correlated with any of our language measures. Parents' answers varied very much concerning the number of people outside the nuclear family whom they reported to have language use with their child (this factor could have been reduced by conducting the questionnaire in the presence of an instructor). Additionally, communication with these partners might be of various frequency and intensity. In any case, the estimate of the language use of other people with their child might be difficult for the parents, since it has been shown, that they are not even fully reliable in estimating

their own language use (Carroll, 2017; Marchman et al., 2017). Despite these problems with the self-ratings of language use, we found that the L1 use in the nuclear family is the second most important predictor for lexical skills, after age. This confirms and extends the results of numerous previous studies on lexical skills, which found correlations between family/parental input and lexical skills (e.g., Pearson et al., 1997; Klassert and Gagarina, 2010; Armon-Lotem et al., 2011; Hoff et al., 2012). For morphological skills in L1 Russian, our results revealed an interesting dissociation: L1 use in the nuclear family was the most important predictor for case marking skills but did not influence verbal inflection skills, suggesting that verbal inflection is robust to input effects, whereas case is especially sensitive to it (we turn to this point later on in the discussion). In sum, one cannot conclude from our results that L1 use outside the family is not important for L1 language development. Rather, it is very hard to assess, and L1 use within the family (and presumably L1 use in general) differentially impacts different morphological phenomena.

An influence of age of onset of L2 appeared in our multiple regression analyses only for expressive lexicon and case. The later the children came into contact with the L2, the better they performed in these L1 domains. Concerning lexical abilities, our results replicated the findings of Lein et al. (2017), who found for Portuguese L1 acquisition, that lexical abilities are correlated with L2 AoO. A new result is, that under consideration of other background factors in the regression model, L2 AoO is a significant predictor only for expressive lexicon. L2 AoO in the context of L1 acquisition reflects language dominance (Oller et al., 2011), in the sense that with increasing duration of L2 contact, the amount and relevance of input as well as the amount of L2 language use increases and becomes prevalent for the child, so that L1 use and relevance decreases. Oller et al. (2011) summarize several studies which have documented a large receptive-expressive gap in L1 lexical abilities, concluding that lexical retrieval is very much affected by the change of dominance (for similar results and argumentation see Yan and Nicoladis, 2009). This is mirrored in our data, in the differential influence of L2 AoO and also on morphological categories. L2 AoO differentially impacts our data. Case inflection in heritage Russian is very sensitive to L2 AoO (a confirmation of the previous results of Schwartz and Minkov, 2014; Janssen et al., 2015) whereas verbal inflection is not. This finding can be explained from the usage-based perspective on language acquisition: case on nouns in Russian is one of the least transparent morphological categories; it is characterized by high syncretism and multiplicity of manifestations and thus it is more challenging for language acquisition as compared to the iconic and transparent tense-person verb inflection. Children need more input and more time in order to uptake the case forms and acquire their *form-function* meanings. For example, while the inflection *-es'* in *igraes'* “play-2SG.PRES” unambiguously marks the 2nd person present singular, the ending *-i* in *teni* “shadows-NOM/-ACC or shadow-GEN/-DAT/-LOC” can mark plural—nominative or accusative or singular—genitive, dative or locative. These features of the case forms impede their uptake from the input and the establishment of the form-function mapping—thus, children

need more instances of a given category in different contexts in order to be able to identify its meaning and generate a rule. Additionally, the so-called child-directed speech has—in contrast to the language addressed to adult speakers—its specific peculiarities, e.g., a reduced morphological richness, i.e., not all forms of a paradigm are present in child-directed speech, and vocabulary (Hoff-Ginsberg, 1985; Aksu-Koç, 1998; Hoff, 2006 among others). Thus, this positive influence of paradigmatic morphological richness on the speed of case acquisition is weakened by the low degree of morphological richness for nouns (Xanthos et al., 2011) and by syncretism of case inflection. The acquisition process of case inflection on nouns is therefore slowed down and—given the switch to L2 input dominance in bilinguals—cannot progress any more in a sufficient way, i.e. because the L1 input and the frequency of use are not enough for the attainment of the target morphological system.

Another strong pattern in our multiple regression analyses was the notably lower amount of explained variance of morphological skills as compared to lexical skills. This might partially be traced back to the smaller sample size for the morphological data, which causes a moderately lower power in these models. However, another important factor, which was not taken into account, is the interdependence of lexical and grammatical skills. Both domains were highly correlated and based on extensive previous research, allowing a sure conclusion that lexical development is a very important prerequisite for morphological development also in bilinguals (for bilingual children e.g., Simon-Cerejido and Gutiérrez-Clellen, 2009; Kohnert et al., 2010; Blom et al., 2012). Our design did not allow us to include the lexical abilities together with the background factors in a regression model to explain the variance in morphological abilities: due to the wide age range, age and lexical abilities were also highly correlated. Including both together in the regression model would cause multicollinearity. This would therefore be an interesting issue for future studies.

Contrasting the morphological paradigms of case and verb inflections, we found diverging patterns of influencing factors for these morphological categories in L1 acquisition of Russian: case, in our sample, was influenced more by input factors (L2 AoO and L1 use, but also age), and verb inflection more by biological factors (only age and gender). This picture was completed in our longitudinal analyses, which, in general, showed that children showed development in heritage Russian within 1 year in all tested domains. However, this effect was small only for case, in contrast to medium effects for verb inflection as well as the lexical tasks. Although there was an increase, even the oldest children around 5 years of age (AG4 at T2), performed at a very low level in the case test and were as a group far from the full acquisition of this paradigm, showing a fossilization of case and/or, taking another perspective on the heritage grammar—indicating the restructuring of the case system under the conditions of reduced input in bilingual acquisition. This confirms the findings of Gagarina and Reichel (2013), describing case as a vulnerable area in heritage Russian of two Russian-German bilingual children and as an area that more readily undergoes restructuring (the reduction of cases) in the context of input insufficiency and non-sustainability. For verb inflections,

the oldest children in our study performed at a high, close to target, level, which indicates the full or near-full mastery of this paradigm. This difference in the attainment of the target system of verb and noun inflections and in the speed of their acquisition goes back to “a grammatical verb bias (as opposed to a lexical noun bias) in early language development” (Xanthos et al., 2011, p. 472): morphological richness of verbs in child-directed speech is higher as compared to nouns and since it is positively associated with the speed of development in child speech, verb inflections are acquired within a shorter time interval and are more robust to the background factors. The acquisition of case, on the other hand, is more sensitive to input factors—L2 AoO and L1 use—than verb inflection. Generally, bilingual children in our study acquired both morphological domains notably slower than monolingual children, who master the case inflection at age three without errors (Gagarina and Voikova, 2009, but Janssen et al., 2015 on case processing) and show consistently errorless use of verb tense-person inflection prior to age three (Gvozdev, 1949; Kiebzak-Mandera, 2000; Gagarina, 2003, 2008). “The younger the better” rule of Singleton and Ryan (2004), despite this slower acquisition of verb inflection, appeared to define its robustness against the unfortunate environmental factors impeding attainment of the target L1 morphological system.

CONCLUSION

This study reported on the differentiated impact of various background factors on L1 acquisition of lexicon and morphology in Russian-German bilinguals in the situation of the change of input dominance from heritage language to L2 upon entering kindergarten. Additionally, it provided new evidence of heritage development of lexicon and morphology—accusative and dative case on nouns and 1st and 2nd person singular present tense inflection on verbs—obtained from the 1-year longitudinal observations of 3- and 4-year-old bilinguals. The background factors were shown to play diverse roles in heritage acquisition of lexicon and morphology. Chronological age was found to impact all investigated domains. Gender impacted all domains except case, and L2 AoO influenced not only case, but also expressive lexicon. The results obtained from the differentiated treatment of input—nuclear family vs. other people—suggested that the evaluation of the nuclear family input is a significant predictor for the acquisition of lexical and case abilities in a heritage language. This does not hold for verbal inflection, which was robust to input effects. Finally, the acquisition of L1 noun and verb morphology showed different patterns of interaction with the background factors—inflection on verbs appeared to be more robust to these factors than case on nouns. The peculiarities of child-directed speech were used to explain this finding:

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the morphological richness of the verb paradigm in Russian “stimulated” children to learn it early and fast and with lower input quantity and one form-one meaning relationship made this task easier, so that the shift in the input dominance did not impede the acquisition of verb inflection, which appeared to be rather robust. The acquisition of case in heritage Russian, on the contrary, was found to be less stable and more vulnerable to the background factors. The syncretic nature and non-transparency of case inflections aggravated children’s task of uptaking the noun form, establishing associations between the form and its grammatical function and acquiring the correct contexts of use. In the context of reduced and non-dominant input acquisition of such a category as case becomes a challenging task, which is not fully accomplished and remains unstable till puberty. All in all, this study deepens our knowledge of the development of heritage/home language in Russian-German bilingual children in the context of the shift in input dominance, provides evidence for the differentiated influence of biological and other factors on the acquisition of lexicon and some morphological categories and, finally, enriches our understanding of the multi-faceted process of acquisition of heritage Russian and underlines the decisive role of input in the acquisition of L1.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of German Linguistic Association, Ethics Committee. The protocol was approved by the Ethics Committee, head Prof. Dr. P. Schumacher. All subjects gave written informed consent in accordance with the Declaration of Helsinki.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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