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Sociolinguistic factors associated with the subjectively and objectively measured language development in German preschoolers in three follow-up studies

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Abstract: The study aimed at an analysis of sociolinguistic variables associated with the language acquisition progress between the first and the second test sessions in three follow-up studies with German preschool children. In all three samples, children acquiring German, both Germans and immigrants, were tested twice with validated language tests within a time span of several months. Furthermore, language skills of children were judged by daycare center teachers. The language competence of normally developed test subjects did not change much between two test sessions, whereas children acquiring German under more challenging circumstances were still in the process of active development, mostly due to the daycare center attendance, language courses, and medical therapies. Therefore, contra-intuitively at first sight, the following factors were associated with the quick progress in language development (floor effect): bad school marks for the language competence at the beginning of the daycare attendance, low age at the first test session, not regular attendance of the daycare centers, late contact to the German language, foreign language(s) spoken at home, medical issues, and some other unfavorable language acquisition conditions.

Keywords: language acquisition, bilingualism, German language, sociolinguistics

1 Introduction

Language acquisition requires consistent and quantitatively as well as qualitatively sufficient linguistic input embedded in a proper social environment

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(e. g., Carrier 1999; Cartmill et al. 2013; Hoff 2006; Huttenlocher et al. 2002; Kuhl 2004; Pancsofar and Vernon-Feagans 2006; Schmid and Dusseldorp 2010; Tarone 2007) and, if necessary in case of delayed language development, early interventions (Kaiser and Roberts 2011; McLaughlin 2011).

Previous research indeed suggests the existence of a broad palette of sociolinguistic and extralinguistic as well as medically relevant factors influencing language acquisition (Tager-Flusberg 2005). For instance, Luoma et al. (1998) found that preterm children performed significantly lower than controls in speech and language comprehension and production at the age of five. In accordance, low birth weight is predictive of poor receptive vocabulary at the age of four and might even be predictive of other problems (e. g., reading) at a later age (Taylor et al. 2013). Also socioeconomic status and maternal education are correlated with children's language development (Letts et al. 2013; Hoff 2006; Niklas et al. 2011; Pancsofar and Vernon-Feagans 2006; Taylor et al. 2013; Thomas et al. 2013) because these two measures are confounded with the quality and quantity of the linguistic input the child receives (Hoff 2006; Pancsofar and Vernon-Feagans 2006). Another study indicates that not only socioeconomic status but also child's emotionality and parenting stress might influence language acquisition (Noel et al. 2008).

Taylor and colleagues (2013) identified several risk factors for vocabulary delay at the age of four. If the mother, for instance, is not proficient in the language the child is tested in (in the Taylor study it was English), the child's vocabulary might be underdeveloped. Other risk factors were: child not read to at home (cf. Westerlund and Lagerberg 2008); four or more siblings; low family income (in accordance with the Letts et al. 2013 study); maternal mental health distress; low maternal parenting consistency; high child temperament reactivity. Also low maternal education was, as in the study by Letts and colleagues, predictive of language problems, in this case vocabulary delay (Taylor et al. 2013). In general accordance with these findings, quality of child care is also correlated with language development (Pancsofar and Vernon-Feagans 2006). The quality of child care was defined in terms of the group size and child/staff ratio limits in the nursery schools, education of the staff, (categorized) sensitivity, harshness, and detachment of the staff in interaction with children.

Also language-related problems in the family are a risk factor for proper language development (Lyytinen et al. 2004; Tager-Flusberg 2005). Indeed, language impairments and pathologies cluster in families, which does not necessarily mean that the children's language development suffers from their parents' insufficient verbal input, as many language impairments are most likely caused by genetic factors (Aitchison 2008; Jenkins 2000; Smith et al. 1996).

Still, language development is surely a process driven both by genetic and environmental factors (Tager-Flusberg 2005). Also hearing disorders are known to influence language acquisition (Cho Lieu 2004; McGuckian and Henry 2007).

Children generally seem to benefit from attending daycare centers and preschool classes in regard to their language development (Dickinson and Porche 2011). Burchinal et al. (2008) showed that in a pre-kindergarten program, the quality of the daycare center teachers' instructions towards the children and generally the quality of their interaction with the children predicted the children's language development. Especially for children with immigration background, attending kindergarten is an important factor for the development of the target language. Becker (2006) and Niklas et al. (2011) demonstrated for immigrant children living in Germany that the longer they attended kindergarten, the lower their deficits in German were. However, Caniato et al. (2010) did not find evidence for a clear association between time spent in kindergarten and speech development (see also Hoff 2006). Overall, findings on the effect of kindergarten attendance on language development are not consistent (Niklas et al. 2011). Also under some circumstances, kindergarten attendance might have some undesired effects. Becker (2006) showed that having many children of the same (linguistic) origin in the kindergarten might result in a separation of these children, which negatively affects their acquisition of the German language.

As for second language acquisition, specifically, many factors have been proposed that might be responsible for the child's verbal proficiency (Hoff 2006). Apart from the quantity and quality of the linguistic input, an early onset of second language acquisition might be crucial. Possibly, also the other language (s) spoken might play their part (Cornips and Hulk 2008).

Most of the studies named above were carried out cross-sectionally and, consequently, identified sociolinguistic factors associated with the language competence of children at a certain time point, and not those associated with changes in this competence in the course of time. Despite the knowledge of some correlates of language development, it might be more important to assess several potential predictors for language growth longitudinally. The present study aimed at an analysis of sociolinguistic (including extralinguistic, demographic) variables associated with the language acquisition progress between two test sessions in three follow-up studies with preschool children acquiring German as their first or second language. The term "sociolinguistic" is used here in a broad sense as including any factors directly or indirectly related to the language use (including age, language therapies, educational level of parents, personal characteristics of language speakers) except intralinguistic ones (such

as language complexity and typology). We hypothesized that normally developed children, that is, children without language-related medical issues and acquiring German under usual or favorable circumstances, developed their language skills slowly between two test sessions in comparison with disadvantaged children because the former had already acquired German to a considerable extent before the first test session (Neumann et al. 2009). The impetus for the quick development of the disadvantaged groups is to be sought for in the factors associated with the daycare center attendance including educational courses and medical therapies initiated due to indications either from daycare center teachers or from our research team's letters with the results of the first test session.

2 Methods

2.1 Test subjects and tests

In all three samples, children acquiring German were tested twice with validated language tests within a time span of several months. For an overview of the sample sizes, time spans between test sessions, tests used, and location of all three samples, see Table 1.

All children were classified by language experts (speech and language pathologists and researchers in clinical linguistics) as (1) those needing additional educational support in acquiring German (PAED); (2) those needing medical help in acquiring German (CLIN), or (3) normally developed with respect to the acquisition of the German language (ND). Children classified as PAED scored low in the language tests, that is, usually below the 17th percentile of the reference population, which corresponds to at least one standard deviation below the norm mean. The definition of PAED presupposed that PAED children can profit by language courses irrespective of known medical issues, if there were any. CLIN children had some language-associated comorbidities (hearing disorders, Down syndrome, autism spectrum disorders, frequent otitis media, etc.) and needed medical assistance in language acquisition. Their language skills were usually in at least one domain (speech comprehension, grammar, articulation, vocabulary, phonological short-term memory) below the 6th percentile of the reference population (two standard deviations below the norm). Some children were classified as both PAED and CLIN. The classification as PAED, CLIN or ND was carried out on the basis of audio records of the tests, test

Table 1: Sample sizes, tests, time, and location of all three samples.

	Sample 1	Sample 2	Sample 3
N	190	119	132
N boys	104 (55 %)	72 (61 %)	79 (60 %)
N girls	86 (45 %)	47 (39 %)	53 (40 %)
N MO	132 (70 %)	0 (0 %)	47 (36 %)
N BM	58 (30 %)	119 (100 %)	85 (64 %)
N CLIN	45 (24 %)	22 (19 %)	14 (11 %)
N PAED	57 (30 %)	63 (53 %)	45 (34 %)
Age range, 1st session (months)	48–55	48–53	37–55
Mean age, 1st session (months)	51	50	50
Age range, 2nd session (months)	60–78	54–60	63–81
Mean age, 2nd session (months)	65	56	67
Tests	MSS b > MSS b	MSS b > MSS b	MSS b > S-ENS b
Months between test and retest (range)	11–16	4–7	8–33
Months between test and retest (mean)	13	6	17
Questionnaires: 1st session	For parents and daycare center teachers	For parents and daycare center teachers	For parents and daycare center teachers
Questionnaires: 2nd session	For daycare center teachers	For daycare center teachers, short version	For parents
Years	2007–2008	2010	2008–2011
Test location	Hessian daycare centers	Hessian daycare centers	Hessian public health departments and daycare centers

Notes: ND, normally developed; CLIN, needing clinical assistance in acquiring German; PAED, needing educational assistance in acquiring German; MO, monolingual Germans; BM, bi-/multilingual children.

batteries, and questionnaires both after the first and after the second test session in all three samples.

Both monolingual Germans (MO) and bi-/multilingual children (BM) were included in the study sample. German children who spoke not only German but also (an)other language(s) at home were classified as BM. BM children spoke mostly Turkish, Italian, Russian, Serbian, Croatian, Polish, and Arabic. Most of

them did not have any or had very little contact to German till their third or fourth year of life. Children from one test sample did not re-appear in the other two ones.

All parents had signed informed consent before the first test session and received information on the test results after both sessions. Consequently, parents were informed about the need of educational and/or medical assistance for their children and usually had an opportunity to apply for language courses and therapies.

Language tests used were a modified, validated version of the Marburger Sprachscreening (MSS b; cf. Euler et al. 2010; Neumann et al. 2011) and the validated test S-ENS (Döpfner et al. 2005) with some additional validated tasks (this extended version of S-ENS is called S-ENS b here). The language test S-ENS b, with its norms for five- and six-year-old children, was used only in the second test session of the Sample 3 because children were too old for MSS b. Both tests include subtests on grammar, vocabulary, articulation, speech comprehension, and phonological short-term memory. In both tests, study participants had to answer questions on the basis of colorful pictures depicting playing children and well-known objects like a ball or an apple. In the tasks on speech comprehension, children were asked to show certain objects on the pictures (e. g., "Show me a boy wearing blue trousers"), that is, no verbal reaction was required. In the grammar tasks, children had to fill out gaps in the sentences like "Here is one apple and there one can see several . . .", with items related to the plural forms of nouns, word order in subordinate clauses, comparative forms of adjectives, past participle and 2nd person Sg. present forms of verbs as well as items related to a correct use of prepositions and articles in respect to case and gender. In the vocabulary tasks, children answered questions like "What is it?" (for nouns), "What does it feel like?" (for adjectives), and "What does he do?" (for verbs). In case of articulation tasks, children either also named objects on the pictures or, if they were unable to, repeated words pronounced by the tester. Tasks on the phonological short-term memory comprised repetition of German-like nonce words such as *Nabolira* and of grammatically and semantically correct sentences such as 'A brown pony is running over a meadow'. The tests were audio-recorded and analyzed by university language experts for the identification of PAED and CLIN children. In case of low compliance or illness, children were re-tested several days or weeks later. The testers were linguistics students and researchers.

The analysis of sociolinguistic factors associated with language competence was carried out retrospectively on the basis of the data gathered for the studies on validation of various language tests. No exclusion criteria except inappropriate age were applied in the original studies. In Sample 2, however, the original

study design aimed at testing of BM children only. This explains why no MO children were included. Also no special criteria were utilized for the choice of children to be retested, that is, all children recruited for the first test session were invited to participate in the second one.

The study did not aim to analyze three qualitatively or quantitatively different samples. Rather, three samples were utilized which were available from previous studies. These samples differed in respect to time spans between test sessions, age of children in the second test session, tests used, and time of the study conduction. However, all children were originally tested by the same research team with the same purpose (language test development), so that no qualitative difference between the samples can be assumed.

2.2 Statistical analyses

The structure of the statistical analysis can be summarized as follows. First, language advances of children between two test sessions are demonstrated. Reliability of estimations of the children's language competence by daycare center teachers is examined. Next, various factors associated with the language development of children are analyzed and visualized in several ways. Both subjective and objective estimations of the language competence were utilized.

Non-parametric tests were used because the metric data were not normally distributed according to the Kolmogorov-Smirnov test ($ps < 0.05$).

Sociolinguistic variables of interest were immigration background (BM vs. MO), sex, age in months at the first and second test session, time span between test sessions in months, language(s) spoken at home, length of daycare center attendance in months, whether the child attended a nursery school in the first two years of life, whether the child attended the daycare center regularly, for half a day or a whole day, possible comorbidities (hearing disorders, otitis media), difficult birth and low birth weight, languages spoken by parents, length of contact of the child and parents to the German language, language disorders in the family, whether the child played with German speaking children during and after the daycare center time and spoke out when playing, whether he or she underwent a language therapy or participated in language courses, whether the child was a member of some study group or association, educational level of parents, etc. These data were collected by means of questionnaires for parents and daycare center teachers.

Subjective level of the language development was measured by school marks (grades) given by daycare center teachers for the time points when the child began to attend daycare center and was tested for the first and for the

second time. German school marks range between 1 "very good" and 6 "unsatisfactory". The worst mark, 6, is, however, used very rarely. The objective level of language development was measured by total scores of correct answers in the language tests MSS b and S-ENS b. Test subjects were ranked according to their total scores, with 1 as the lowest rank which corresponded to the lowest total score. The changes in the language competence between two test sessions were measured in all three samples. Some analyses aimed at an examination of sociolinguistic factors associated with these changes.

First, changes in the language competence between the two test sessions were demonstrated by a calculation of the sign test for the school marks, a chi-square test for the classification of children as PAED, CLIN or ND, and a Wilcoxon test for the total scores of correct answers. Language development progress was visualized both for the total scores of language tests and for the school marks in two samples where this was feasible. In Sample 3, total scores were not directly comparable (different tests were used) and no school marks were collected. It was to be expected that children would score significantly higher in the second test session compared to the first one according to the language test results (raw scores of correct answers without any data transformation), but it was unclear whether the school marks given to the children's German skills by daycare center teachers would reflect these changes or rather would reflect the first (or old) impressions from the children's German skills.

Spearman correlations were utilized to control the reliability of daycare center teachers' estimations of the language competence by comparing school marks (ranging from 1 to 6) with the total number of correct answers in MSS b. Because German daycare center teachers are trained to identify language deficits, significant correlations were expected. Statistical significance does not preclude, however, moderate or low correlation coefficients caused by a short training time, time span between training and time point of the study, subjective impressions, personal attitudes, personal characteristics of the daycare center staff such as motivation and medical issues (e. g., hearing disorders).

Spearman correlations between total scores of correct answers in the language tests MSS b and S-ENS b at the first and second test sessions and changes in ranks of children were calculated in order to examine whether children with high or low language scores in the first test session demonstrated a higher language progress. For instance, a negative correlation in the first test session and a positive in the second one mean that children with low scores in the first test session and high scores in the second one were ranked

higher (and not children with average or high scores in both sessions). No correlations were feasible for the differences in school marks because they mostly ranged within 0 and +1. Because monolingual German children usually acquire all domains of German before their fourth birthday (Neumann et al. 2009), one could expect that a considerable progress in the language development between two test sessions would be rather a result of a floor effect of children with a very limited access to and command of German, first and foremost immigrants (in this paper, the term "floor effect" refers to children with low language test scores in the first test session, that is, children whose linguistic development between two test sessions can be effectively quantified by the language tests, whereas "ceiling effect" refers to children who had already reached high or even highest possible language test scores in the first test session and whose further linguistic development cannot be effectively quantified by the tests used in this study). Consequently, negative correlations between language test results in the first test session and changes in the ranks between two test sessions were expected (positive values of changes in the ranks mean a considerable progress in the language development). The lower the test result in the first test session was, the more children in the ranking could be caught up with or left behind in case of a sufficient language input between two test sessions. Changes in the ranks of children were chosen as the indicator of language development instead of, for instance, changes in the total scores of language tests because in Sample 3 two different language tests were used in the first and second test session. Furthermore, total scores of children inevitably grow between two test sessions, but they do not clearly reflect changes in the "hierarchies" of children in respect to their German skills: A child with a minimal or no growth of the language test total score might have the highest (best) ranking in both test sessions because he/she had already reached the highest possible level in the first test session.

Next, various sociolinguistic factors associated with the language progress were analyzed. Most relevant factors from the questionnaires for parents and daycare center teachers were identified for the ordinal regressions. This was done by point-biserial correlations (for dichotomous variables) and Spearman correlations (for ordinal and metric variables) with differences in the ranks between the first and second test sessions. Again, positive values of changes in the ranks indicated language progress. Only factors with significant correlations entered the ordinal regressions with the same differences in the ranks as dependent variable. The analysis aimed at an identification of the most important sociolinguistic variables associated with the language progress. It

was hypothesized that the most relevant variables related to the language progress pre-determined the quality and/or quantity of the German language input directly or indirectly. Because only validated questionnaires were used (these were part of MSS b and S-ENS b), all the chosen factors can be considered relevant for the language acquisition, but the questionnaire items had not been analyzed so far in respect to the language progress between two test sessions.

Additionally, a hierarchical cluster analysis was utilized for the largest sample (Sample 1) with the same differences in ranks between test sessions and the most relevant sociolinguistic variables identified in the correlations. The cluster analysis aimed at the identification of children with outstanding language progress and was of exploratory nature, that is, without a formulated hypothesis. However, it was expected that a certain subgroup of children might have profited considerably more or less from sociolinguistic factors associated with the language progress (such as language courses) than all other children.

After the analysis of changes in ranks, sociolinguistic factors associated with differences in the school marks between two test sessions were assessed by cross-tables for categorical and ordinal values and by Mann-Whitney *U*-tests for metric values. Factors significantly associated with differences in the school marks entered a discriminant analysis which aimed at the identification of sociolinguistic variables associated with the subjectively measured language progress. The quality of the discriminant analysis was assessed by the percentage of correctly predicted results, canonical correlation between the discriminant functions and group classification, and the Wilks-Lambda value which tests whether the mean values of the discriminant function yield significantly different results. The discriminant analysis was also of exploratory nature because all the utilized questionnaire items are known to be associated with the language development and only the most relevant ones had to be identified.

Some of the most important factors associated with the language progress in Sample 1 were visualized by a homogeneity analysis by means of alternating least squares (HOMALS). The language progress was exemplified in this case by a progress in grammar between two test sessions and by a plural item *Apfel* > *Äpfel* 'apple'. HOMALS was utilized only as the illustration of some sociolinguistic factors associated with the language progress.

All data were processed using SPSS 20 (International Business Machines Corp., New York, USA). $P < 0.05$ was considered to indicate a statistically significant difference. All results are reported as two-tailed if not stated otherwise.

3 Results

Changes in the language competence of the test subjects between the first and the second test sessions were assessed in three ways: (a) comparison of the school marks given by daycare center teachers, (b) comparison of classifications of children by language experts, (c) comparison of total scores of correct answers in the language tests, see Table 2.

Table 2: Changes in the language competence measured by school marks given by daycare center teachers, classification of children by language experts, and total numbers of correct answers.

	Test	Sample 1	Sample 2	Sample 3
Questionnaire for daycare teachers: school marks	Sign test: Z	−5.92***	n. s.	–
Classification of children: CLIN and/or PAED vs. ND	Chi-square: $\chi^2_{(1)}$	2.62#, 37 % > 36 %	57.31***, 59 % > 45 %	35.52***, 37 % > 32 %
Total number of correct answers	Wilcoxon-Test: Z	−10.70***	−9.12***	–

Notes: $^{\#}p \leq 0.08$, $^{***}p < 0.001$, n. s. = not significant.
ND, normally developed; CLIN, needing clinical assistance in acquiring German; PAED, needing educational assistance in acquiring German.

According to Table 2, percentage of ND children increased in all three samples between the first and second test sessions. In Sample 1 this difference was only marginally significant, in other two samples highly significant. Also test subjects' German skills measured subjectively, by daycare center teachers' school marks, became significantly better in Sample 1 and not significantly better in Sample 2 (no school marks were utilized in Sample 3). German skills measured objectively, by total scores of language tests, grew significantly in Samples 1 and 2. In Sample 3, two different tests were used, which made a direct comparison impossible.

Advances in the language development are visualized in Figure 1 for two samples where the same test (MSS b) was used in both test sessions and also school marks were utilized. In case of the school mark "6", there were not enough cases for a visualization.

For the analysis of the reliability of the school marks, Spearman correlations were calculated. In Sample 1, school marks given by daycare center teachers yielded the following correlations with the total number of correct answers in MSS b: $r_s = -0.565$, $N = 84$ for the first test session and $r_s = -0.573$, $N = 107$ for the

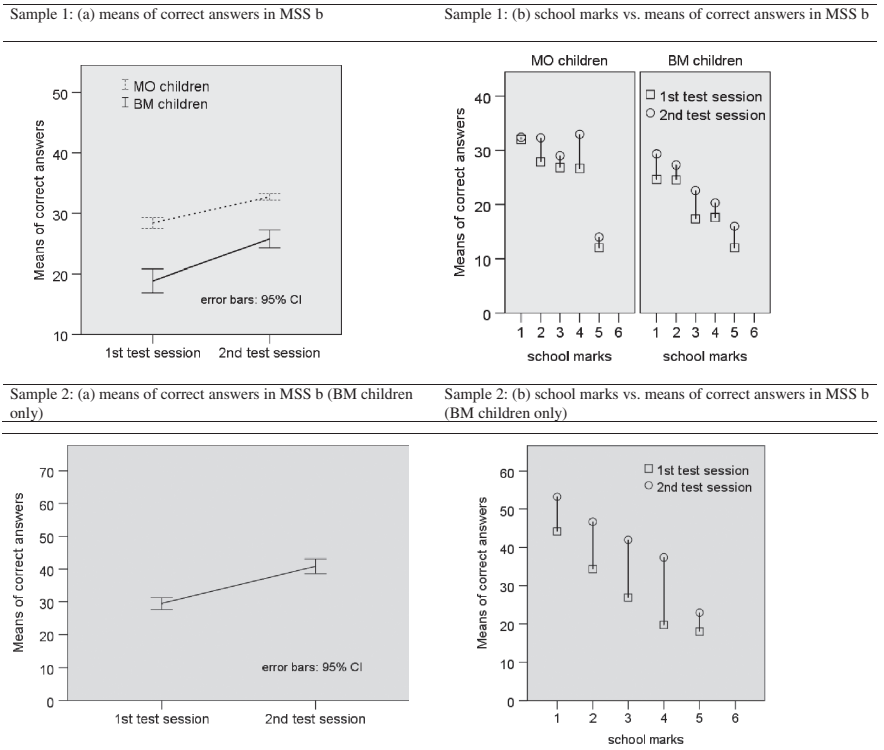

Figure 1: Language development between the two test sessions, measured by total scores of correct answers in the language test MSS b and by school marks.

second test session, $ps < 0.001$. For Sample 2, the corresponding values were $r_s = -0.675$, $N = 81$ and $r_s = -0.771$, $N = 50$, $ps < 0.001$.

Next, all children were ranked according to their language test results in the first and second test sessions. Rank numbers of the first test session were subtracted from the rank numbers in the second one, thus resulting in a positive value (quick language development in comparison with other children) or a negative one (slower language development). If a child, for instance, had a rank 20 in the first test session and 25 in the second one, then the difference between these two values was 5, which means that the child's German skills not only improved in comparison with the first test session, but also got better than those of five other children who had been linguistically more advanced in the previous test session. Correlations between differences in the ranks of children on the one hand and total scores

in the subtests of MSS b and S-ENS b on the other hand were calculated for both test sessions, see Table 3. There were no repetition tasks in Sample 1.

In spite of numerous not statistically significant results, a tendency of negative correlations in the first test session and positive correlations in the second one can be recognized for all linguistic domains. This means that children who went up in the ranking of all test subjects according to their German language skills, that is, whose German skills got better, were those who scored very low in the first test session.

An association of the sociolinguistic factors from questionnaires for parents and daycare center teachers with differences in the ranks of test subjects between the first and second test sessions was calculated by means of correlations, see Tables 4 and 5. Only the most relevant factors entered the ordinal regression in order not to overload it with too many independent variables. The dependent variable in the regression was, again, differences in the ranks of children. Only significant results are presented.

The goodness of fit of the regression in Sample 1 was $\chi^2_{(2,234)} = 2{,}639.78$, $p < 0.001$, Nagelkerke pseudo $R^2 = 0.20$, $N = 96$. The goodness of fit in Sample 3 was $\chi^2_{(5,770)} = 6{,}051.23$, $p = 0.005$, Nagelkerke pseudo $R^2 = 0.47$, $N = 86$. In Table 5, two factors were excluded from the ordinal regression because they referred to the BM children only and reduced the sample size considerably. Ordinal regressions yielded significant results for the participation in the language therapy (Sample 1), absence of language disorders in the family, and a shorter daycare center attendance in months (Sample 3). No ordinal regression was calculated for Sample 2 because only one factor correlated significantly with the difference in the ranks: length of daycare center attendance in months, $r_s = 0.266$, $p = 0.013$, $N = 86$.

An exploratory hierarchical cluster analysis was carried out only for the largest sample (# 1). The analysis aimed at identification of some subgroups of test subjects with exceptionally good or bad progress in the language development and of sociolinguistic factors associated with this progress or delay. Because of a considerable number of gaps in the questionnaires for both parents and daycare center teachers, the sample size reduced from $N = 190$ to $N = 96$. The variables chosen for the cluster analysis were, again, the most relevant sociolinguistic factors identified in Table 4 and differences between the ranks of children in the two test sessions. The cluster analysis detected two groups of children, with a significant difference between the groups: $U = 145.5$, $Z = -2.34$, $p = 0.019$, $N = 96$. The group with the higher rankings in both test sessions was characterized by a marginally significantly higher number of language-associated impairments / illnesses ($\chi^2_{(1)} = 3.57$, $p = 0.059$, $N = 94$), by a significantly more frequent participation in therapies ($\chi^2_{(1)} = 6.06$, $p = 0.014$,

Table 3: Spearman correlations between total scores of correct answers in the language tests MSS b and S-ENS b and changes in the ranks of test subjects.

Sample	Speech comprehension		Articulation		Vocabulary		Grammar		Repetition of words		Repetition of sentences		Total score	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
	Test session		Test session		Test session		Test session		Test session		Test session		Test session	
1	−0.134#	n. s.	−0.302***	0.182*	−0.272***	0.268***	−0.191**	0.413***	–	–	–	–	−0.342***	0.203**
2	n. s.	0.224*	n. s.	n. s.	n. s.	0.322***	n. s.	0.354***	n. s.	0.327***	n. s.	0.395***	−0.191*	0.184*
3	n. s.	0.291**	−0.194*	n. s.	−0.176*	0.268**	n. s.	0.255**	−0.231**	0.239**	−0.212*	0.306***	−0.220*	0.359***

Notes: n. s. = not significant, # $p \leq 0.08$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4: Sample 1: Factors associated with the language development measured by changes in ranks in MSS b total scores between two test sessions.

Source	Factor	Correlations			Ordinal regression	
		r_{pb} or r_s	p	N	Wald	p
Parents	Language therapy	$r_{pb} = 0.155$	0.042	185	4.11	0.043
Teachers	Language courses	$r_{pb} = 0.210$	0.006	169	–	n. s.
Teachers	The child does not hear well (1st test session)	$r_s = 0.151$	0.040	185	–	n. s.
Teachers	A school mark for the language competence of the child when he/she began to attend the daycare center	$r_s = 0.176$	0.076	103	–	n. s.

Notes: n. s., not significant; r_{pb}, point-biserial correlation; r_s, Spearman correlation.

Table 5: Sample 3: Factors associated with the language development measured by changes in ranks in MSS b total scores between two test sessions.

Source	Factor	Correlations			Ordinal regression	
		r_{pb} or r_s	p	N	Wald	p
Parents	Language disorders in the family	$r_{pb} = -0.209$	0.019	126	9.33	0.002
Teachers	There is one more child in the daycare center group who speaks the same non-German foreign language	$r_{pb} = -0.325$	0.016	55	–	–
Teachers	Language spoken at home (only German, German and other language (s), only other language(s))	$r_s = -0.183$	0.052	114	–	n.s.
Teachers	Length of attendance of daycare center in months	$r_s = -0.259$	0.010	98	4.00	0.045
–	Age of the child at the first test session	$r_s = -0.339$	<0.001	132	–	n.s.
–	Age of the child at the second test session	$r_s = 0.293$	<0.001	132	–	n.s.
–	Time span between two test sessions	$r_s = 0.516$	<0.001	132	–	n.s.
Parents	Whether the mother can read and write German not so well, well, very well	$r_s = 0.259$	0.037	65	–	–

Notes: r_{pb}, point-biserial correlation; r_s, Spearman correlation.

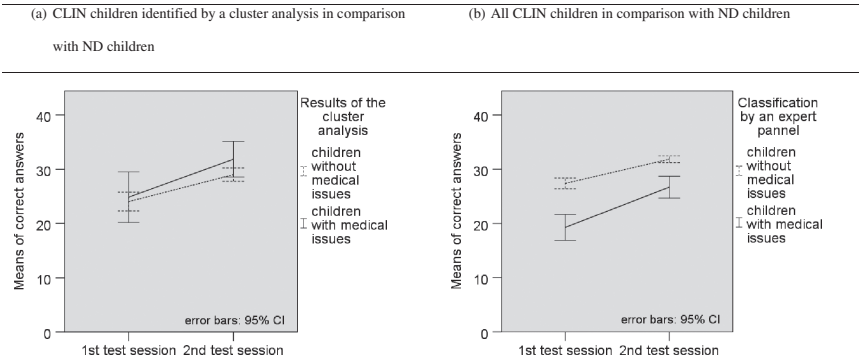

Figure 2: Language development of children with and without medical issues in Sample 1: means of correct answers in the language test MSS b.

$N = 93$) and in language courses ($\chi^2_{(1)} = 12.39$, $p < 0.001$, $N = 96$). Language development of this group in comparison with all other children is visualized in Figure 2(a). Figure 2(b) visualizes, for a comparison, the language development of all CLIN and ND children in the same sample. The difference between the classification of children as CLIN vs. ND by language experts and the classification of children by the cluster analysis was not significant according to a Chi-square test ($p = 1.0$, $N = 77$). Therefore, the latter are also referred to as CLIN and ND in the Figure 2.

To sum up the results of Figure 2, a subgroup of children categorized as CLIN due to diagnosed, but obviously minor language-related issues, was ranked higher than all other children in both test sessions, which can be related to their long-lasting participation in the language courses and therapies (Figure 2(a)). In general, however, CLIN children were ranked lower than ND children in both test sessions (Figure 2(b)).

The differences between the school marks ranged predominantly between 0 and +1 and hence could hardly be considered metrical or even ordinal. Therefore, for the examination of associations between sociolinguistic variables and changes in ranks, cross-tables and Mann-Whitney *U*-tests were used instead of correlations and a discriminant analysis was used instead of the ordinal regression (cf. Table 4). In Sample 1, due to a low number of children in the group with +2 points ($N = 6$), differences in the school marks between two test sessions were dichotomized: “the same level” vs. “better”. Results are given in Table 6, along with the discriminant analysis. The model used in the discriminant analysis classified correctly 81% of original group cases.

Table 6: Factors associated with the language development measured by school marks given by daycare center teachers in Sample 1.

Source	Factor	$\chi^2_{(\text{degrees of freedom})}$ or Mann-Whitney *U*-test (*U*, *Z*)			Discriminant analysis: *N* = 80. Test of equality of group means		
		χ^2 or *U*/*Z*	*p*	*N*	Wilks' Lambda	*p*	Structure matrix*
Teachers	The child attends the daycare center regularly	$\chi^2_{(1)} = 3.88$	0.049	90	0.947	0.040	−0.337
Teachers	Participation in the language courses	$\chi^2_{(1)} = 5.36$	0.021	90	0.931	0.018	−0.390
Teachers	Age when the child had enough contact to the German language to learn it (in years)	$\chi^2_{(3)} = 15.43$	0.001	83	0.824	<0.001	0.659
Teachers	A school mark for the language competence of the child when he/she began to attend the daycare center	$\chi^2_{(3)} = 32.73$	<0.001	88	0.716	<0.001	0.899
Teachers	Language spoken at home (German, German and other language(s), only other language(s))	$\chi^2_{(2)} = 8.25$	0.016	88	0.887	0.002	0.509
Teachers	There is one more child in the daycare center group who speaks the same non-German foreign language	$\chi^2_{(1)} = 4.21$	0.040	76	–	–	–
Language experts	Language-related medical issues (e. g., hearing disorders)	$\chi^2_{(1)} = 5.40$	0.020	90	0.914	0.008	0.437
–	Age of the child at the first test session	$U = 783.5$, $Z = -1.78$	0.075	90	–	n. s.	–

Notes: *Pooled within-group correlations between discriminating variables and standardized canonical discriminant functions.n. s. = not significant.

The canonical correlation between the discriminant functions and group classification was 0.574. The Wilks-Lambda was also significant ($p < 0.001$) with the value 0.671. One of the factors was excluded from the analysis because it referred to the BM children only and reduced the sample size considerably. No discriminant analysis was carried out for Sample 2 because the school marks

did not differentiate significantly between two test sessions according to Table 2. In Sample 3, no school marks were used and, therefore, no discriminant analysis was possible.

In Table 6, most of the factors with significant results in cross-tables and Mann-Whitney *U*-tests yielded significant results in the discriminant analysis as well. The most significant associations with the objectively measured language progress between two test sessions (result "better") were found for high age when the child had enough contact to the German language to acquire/learn it and for the high (that is, bad) school marks given by daycare center teachers to the child's language competence when he or she began to attend the daycare center.

Some factors associated with the progress in language development were exemplified by the HOMALS method for Sample 1, see Figure 3. A short distance between two points on the figure means a close association between these points, e. g., school marks for the language competence at the beginning of the daycare center attendance and at the first test session (left upper corner of

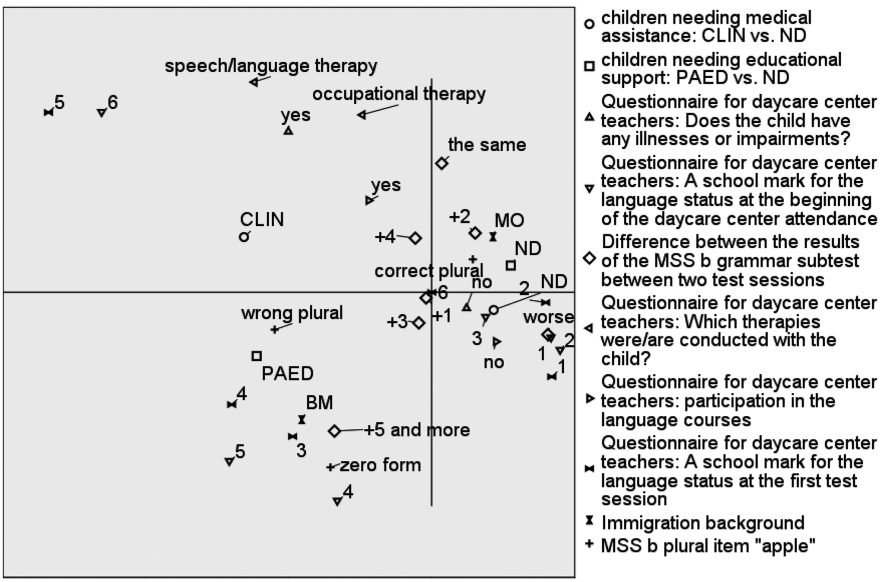

Figure 3: Some sociolinguistic factors and error patterns associated with the language development in Sample 1, visualized by a Homogeneity analysis by means of alternating least squares (HOMALS).

Notes: ND, normally developed; CLIN, needing clinical assistance in acquiring German; PAED, needing educational support in acquiring German; MO, monolingual Germans; BM, bi-/multilingual children. School marks range from 1 "very good" to 6 "unsatisfactory".

the Figure 3). This sample was chosen for the analysis as the largest one. The language progress was quantified by the progress in the MSS b grammar subtest. This subtest was chosen because of the highest Spearman correlation between the differences in the total number of correct answers and the differences in the ranks of children between two test sessions: (a) speech comprehension: $p > 0.05$, (b) vocabulary: $r_s = 0.268$, $p < 0.001$, (c) articulation: $r_s = 0.182$, $p = 0.012$, (d) grammar: $r_s = 0.413$, $p < 0.001$. Additionally, characteristic error patterns were exemplified by the plural item 'apple': zero plural forms (repetition of the singular form *Apfel*), any wrong plural form (*Apfels*, *Apfeln*, *Äpfeln* etc.), and correct plural form (*Äpfel*).

According to Figure 3, the best progress in grammar (+4 and +5) was associated with the participation in language courses, speech/language and occupational therapies, with bad school marks given to the children's language competence when they began to attend the daycare center and during the first test session (floor effects), with immigration background, with classification as CLIN or PAED, and language-related medical issues according to daycare center teachers. Children with the most prominent progress in grammar between two test sessions produced zero or wrong plural forms of the plural item 'apple' in the first test session, whereas children with a very limited progress in grammar between two test sessions had already been good in this linguistic domain in the first test session and tended to produce correct plural forms (ceiling effect).

4 Discussion

The study aimed at an identification of sociolinguistic factors associated with subjectively and objectively measured advances in the language development of preschool children acquiring German. To sum up the test results with one sentence, the language competence of normally developed test subjects did not change much between two test sessions, often due to ceiling effect, whereas children acquiring German under more challenging circumstances were still in the process of the active development, mostly due to the daycare center attendance, language courses, and medical therapies.

In the following, the results will be discussed in more detail. Several sociolinguistic factors from the questionnaires for parents and daycare center teachers were associated with the language development measured by differences in ranks of children between the first and second test sessions. There was a positive association between rapid language advances and participation in

language courses or language therapy, with an absence of language disorders in the family, absence of other immigrant children who spoke the same non-German language as the test subjects, language spoken at home (the more German, the better the advances), long time span between test sessions, very good German reading and writing skills of the mothers, higher age at the second test session.

Contra-intuitively at first sight, the following factors were associated with the same variable (language development measured by differences in ranks of children between the first and second test sessions): low school marks for the language competence at the beginning of the daycare attendance, low age at the first test session, and non-regular attendance of the daycare centers. These tendencies, however, find their reflection in the analysis of factors associated with the subjective language development measured by school marks. The school marks were given by daycare center teachers to judge the language competence of the test subjects for the time when they began to attend daycare center and for the time of both test sessions. According to this analysis, the following sociolinguistic (extralinguistic, demographic) variables were associated with a positive linguistic development between two test sessions: non-regular attendance of the daycare center, late contact to the German language, high (that is, bad) school marks for the language competence at the beginning of the daycare center attendance, foreign language(s) spoken at home, and even language-related medical issues. Also, according to the correlations between differences in the ranks of children on the one hand and subtests of MSS b and S-ENS b on the other hand, children with the higher ranks in their samples were those with low scores at the first test session and high scores at the second one (Table 3). The explanation of this phenomenon is reflected in Figures 1 and 2(b) where children with lower values at the first test session (children with medical issues and immigrant children) were in the process of catching up with better developed children without medical issues. The latter had already acquired German before the first test session to a considerable degree, which resulted in comparatively low gains in the subjective and objective estimations of the language development between two test sessions.

The same tendency is reflected in a more drastic form in Figure 2(a) and in the cluster analysis where a subgroup of children was identified which suffered from various language-associated diseases but had already reached the normal level of language development before the first test session. Possibly due to the therapies and language courses, this subgroup outscored even normally developed children in the second test session. Excessive, long-lasting, hardly motivated therapies have already been demonstrated for German preschoolers by Zaretsky and Lange (2015a) and obviously can be traced back to a certain

inertness of the healthcare system in combination with the clear preference of some therapists for patients with minimal deviations from the norm, that is, patients with the highest chances of therapy success even in case of a minimal input of time and other resources. Also one cannot exclude that in some cases children received language-related therapies due to wrong diagnoses at the early pre-school age. Whatever the reason may be, Zaretsky and Lange (2015a) have shown that out of 100 German preschoolers receiving some kind of speech or language therapy, 73 children did not need this therapy according to a panel of university language experts (therapists, researchers in the clinical linguistics including professors) and 53 children even did not need an educational help in acquiring German. Thus, the latter would be classified as ND in the present study. Obviously, these children had some minor language issues at the age of two or three, and some of them might have been so-called late bloomers (Zorowka 2005), but there was no obvious motivation for the participation in the language therapy at the age of five or six.

Of special interest are the results of the homogeneity analysis by means of alternating least squares (Figure 3). These results also visualize the tendency described above: considerable language progress in the disadvantaged groups which are located on the left side of the figure (children needing educational and medical assistance in acquiring/learning German, immigrant children, children with illnesses and impairments, children with bad school marks for the language competence at the beginning of the daycare center attendance) and minimal language advances in the groups on the right side of the figure (monolingual Germans, healthy and normally developed children). The former produced wrong plural forms or no plural forms at all, the latter produced correct plural forms. Thus, the former group was in the process of catching up with the latter one.

The fact that only one sociolinguistic factor (length of daycare center attendance in months) was associated with language development in Sample 2 can be traced back to the short time span between two test sessions: about 6 months in Sample 2 vs. about a year in Samples 1 and 3. Obviously, even the strongest factors such as language therapy cannot influence the language competence considerably within such a short period of time. This is also reflected in the fact that the subjective estimation of the language competence by daycare center teachers did not change significantly in Sample 2 either. However, the total number of correct answers did increase highly significantly in this sample. A short time span between two test sessions might also explain the discrepancy in the results on the length of the daycare center attendance. According to Sample 2, the longer the daycare center attendance, the higher the language advances. According to Sample 3, however, attendance of a

daycare center for a short period of time (in months) before the first test session was associated with the considerable language progress between the first and the second test sessions. Obviously, the short time span between test sessions resulted in case of Sample 2 in the association characteristic of cross-sectional studies (cf. Bettge et al. 2007).

There was a considerable negative correlation between total scores of correct answers and school marks given to the language competence of children by daycare center teachers for the first and second test sessions (range $r_s = -0.565$ to -0.771): the higher the total scores, the better the school marks. Obviously, estimations of the language competence by the daycare center teachers matched the results of the language tests to a considerable degree. It should be noted that the sample sizes in these calculations were quite low and ranged between 50 and 107. One could assume that higher sample sizes would result in much higher correlations. However, as was shown in one of the previous studies on German preschoolers and their daycare center teachers, this is not the case even with the sample sizes of $N > 1{,}000$ (Zaretsky et al. 2015b). Obviously, factors such as personal attitude, motivation, first impression, and medical issues do influence the subjective estimation of daycare center teachers, which results in significant, but not very high correlations with the total scores of the validated language tests.

The same factors might influence the results of university language testers as well. For instance, one of the language testers in the present study believed to have identified sigmatism in all tested 120 four-year-old children. The explanation for this unusual clustering of sigmatism in one region was found in the previously undiagnosed minimal hearing disorder of the tester, namely her inability to hear certain frequencies. All the results had to be re-evaluated on the basis of audio records in this case.

Most of children who demonstrated a significant progress in the language development between two test sessions were BM children, which requires a special explanation. All children in the study sample were recruited and tested in the daycare centers. Prior to the attendance of these facilities, most immigrant children had hardly any contact to the German language, as could be expected having former studies on immigrant children's acquisition of German in mind (Niklas et al. 2011). Irrespective of their L1 skills and their cognitive development – both might be even above the average (cf. Hoff et al. 2012) and are not directly reflected in their command of German – bi/multilingual children had no or limited access to a high-quality German language input in their first years of life. It is to be assumed that three factors made possible or facilitated language advances of these children: (a) contact to German speaking children in the daycare centers (Becker 2006; Burchinal et al. 2008; Dickinson

and Porche 2011; Niklas et al. 2011; but see also Caniato et al. 2010), (b) language courses in the daycare centers, (c) therapies instigated by the personnel of the daycare centers (Fricke et al. 2013). Also, some children might have received assistance due to our research team's letters with the results of the first test session containing recommendations to conduct a medical examination (children classified as CLIN) or to participate in language courses (children classified as PAED). All these factors might have improved both the quantity and the quality of the German language input, which resulted in a considerable improvement of the German skills between two test sessions.

Some of the chosen sociolinguistic factors did not yield significant results in any of the statistical analyses: sex of the child, whether the child attended a nursery school in the first two years of life, whether the child attended the daycare center for half a day or a whole day, frequent otitis media, difficult birth and/or low birth weight, languages spoken by parents at home as well as first languages of parents, age when parents began to acquire/learn the German language (only for immigrants), educational level of parents, whether child's relatives had "problems with reading and writing", whether the child played with German speaking children during and after the daycare center time, whether the child spoke out when playing, whether the child liked to play with other children, whether the child was a member of some study group or association. Because both questionnaires were validated as parts of MSS b and S-ENS b and, consequently, showed a significant association with the language competence of children, analyzed cross-sectionally, the lack of the statistical link to the changes in this competence might have other explanations such as insufficient sample size. Also in case of correlations with the total scores of correct answers, opposed to the correlations with changes in the ranks of children, a range of possible values is more extensive, and a probability of a statistically significant result is thus somewhat higher.

Although officially the German healthcare services are equally available to all citizens irrespective of income and nationality, immigrants do experience certain problems which might result in a higher proportion of language-related impairments, illnesses, and diseases. These problems are linked less to the discrimination, if at all, and more to the immigrants' inability to explain to the medical staff and daycare center teachers deviations from the norm observed by parents in their children. Also, some medical and psychological tests such as hearing and intelligence ones rely heavily on at least a minimal command of German. Thus, due to limited German skills both in immigrant parents and their children, some language-related medical issues might remain undiagnosed till they are noticed by the daycare center teachers. Medical issues of those immigrant preschoolers who are raised at home might remain unnoticed till the

school enrolment examination or even later. Indirectly a higher proportion of undiagnosed language-related medical issues in immigrants is supported by the fact that according to questionnaires for parents, immigrant parents in Germany believe significantly more often, compared to native Germans, that their children of preschool age do not suffer from hearing disorders and, marginally significantly, from language-related illnesses and diseases (Zaretsky et al. 2015a). Also, immigrant parents believe more often that their relatives do not suffer from language disorders such as specific language impairment. In both cases it is rather to be assumed that language-related medical issues of immigrant children and adults remained unnoticed, which is also reflected in the fact that in the same study immigrant children were classified by university language experts as needing a language-related medical therapy significantly more often than native Germans.

To sum up, children who needed medical assistance and/or educational support in acquiring/learning German at the first test session developed their language skills more quickly between two test sessions than children with a normal language competence (floor effect vs. ceiling effect). This resulted in a positive association of the advances in the language acquisition with such sociolinguistic factors as language courses and therapy, high (that is, bad) school marks for the language competence at the first test session, late contact to the German language, language-related medical issues, and not regular attendance of the daycare center. Rapid advances of children who acquired German under comparatively disadvantageous circumstances are linked to the attendance of the daycare centers, language courses (which are normally offered in the daycare centers), and medical therapies. The results demonstrate that, although poor language skills of pre-school children are a cause of concern and should be taken care of by means of interventions, such children are able to catch up with normally developed children.

References

Aitchison, Jean. 2008. *The articulate mammal: An introduction to psycholinguistics*, 5th edn. London: Routledge.

Becker, Birgit. 2006. Der Einfluss des Kindergartens als Kontext zum Erwerb der deutschen Sprache bei Migrantenkindern. *Zeitschrift für Soziologie* 35(6). 449–464.

Bettge, Susanne, Sylke Oberwöhrmann, Sabine Hermann & Gerhard Meinlschmidt. 2007. Kita-Besuch als förderlicher Einflussfaktor auf die vorschulische kindliche Entwicklung. Paper presented at Fachtagung Entwicklungspsychologie. Heidelberg, Germany, 24–27 September.

Burchinal, Margaret, Carolee Howes, Robert Pianta, Donna Bryant, Diane Early, Richard Clifford & Oscar Barbarin. 2008. Predicting child outcomes at the end of kindergarten from the quality of pre-kindergarten teacher-child interactions and instruction. *Applied Developmental Science* 12(3). 140–153.

Caniato, Riccardo N., Marlies E. Alvarenga, Heribert L. Stich, Holger Jansen & Berhard T. Baune. 2010. Kindergarten attendance may reduce developmental impairments in children: Results from the Bavarian Pre-School Morbidity Survey. *Scandinavian Journal of Public Health* 38. 580–586.

Carrier, Karen. 1999. The social environment of second language listening: Does status play a role in comprehension? *The Modern Language Journal* 83. 65–79.

Cartmill, Erica A., Benjamin F. III Armstrong, Lila R. Gleitman, Susan Goldin-Meadow, Tamara N. Medina & John C. Trueswell. 2013. Quality of early parent input predicts child vocabulary 3 years later. *Proceedings of the National Academy of Sciences* 110(28). 11278–11283.

Cho Lieu, Judith E. 2004. Speech-language and educational consequences of unilateral hearing loss in children. *Archives of Otolaryngology – Head & Neck Surgery* 130. 524–530.

Cornips, Leonie & Aafke Hulk. 2008. Factors of success and failure in the acquisition of grammatical gender in Dutch. *Second Language Research* 24(3). 267–295.

Dickinson, David K. & Michelle V. Porche. 2011. Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development* 82(3). 870–886.

Döpfner, Manfred, Iris Dietmair, Heiner Mersmann, Klaus Simon & Gabriele Trost-Brinkhues. 2005. *S-ENS. Screening des Entwicklungsstandes bei Einschulungsuntersuchungen*. Göttingen: Hogrefe.

Euler, Harald A., Inge Holler-Zittlau, Susanne van Minnen, Ulrike Sick, Winfred Dux, Yevgen Zaretsky & Katrin Neumann. 2010. Psychometrische Gütekriterien eines Kurztests zur Erfassung des Sprachstandes vierjähriger Kinder. *HNO* 58. 1116–1123.

Fricke, Silke, Claudine Bowyer-Crane, Allyson J. Haley, Charles Hulme & Margaret J. Snowling. 2013. Efficacy of language intervention in the early years. *Journal of Child Psychology and Psychiatry* 54(3). 280–290.

Hoff, Erika. 2006. How social contexts support and shape language development. *Developmental Review* 26. 55–88.

Hoff, Erika, Cynthia Core, Silvia Place, Rosario Rumiche, Melissa Señor & Marisol Parra. 2012. Dual language exposure and early bilingual development. *Journal of Child Language* 39. 1–27.

Huttenlocher, Janellen, Marina Vasilyeva, Elina Cymerman & Susan Levine. 2002. Language input and child syntax. *Cognitive Psychology* 45. 337–374.

Jenkins, Lyle. 2000. *Biolinguistics: Exploring the biology of language*. Cambridge: Cambridge University Press.

Kaiser, Ann P. & Megan Y. Roberts . 2011. Advances in early communication and language intervention. *Journal of Early Intervention* 33(4). 298–309.

Kuhl, Patricia K. 2004. Early language acquisition: Cracking the speech code. *Nature Reviews Neuroscience* 5. 831–843.

Letts, Carolyn, Susan Edwards, Indra Sinka, Blanca Schaefer & Wendy Gibbons. 2013. Socio-economic status and language acquisition: Children's performance on the new Reynell Developmental Language Scales. *International Journal of Language & Communication Disorders* 48(2). 131–143.

Luoma, Laila, Eila Herrgard, Anneli Martikainen & Timo Ahonen. 1998. Speech and language development of children born at ≤ 32 weeks' gestation: A 5-year prospective follow-up study. *Developmental Medicine & Child Neurology* 40. 380–387.

Lyytinen, Heikki, Timo Ahonen, Kenneth Eklund, Tomi Guttorm, Pirjo Kulju, Marija-Leena Laakso, Matti Leiwo, Paavo H. T. Leppänen, Paula Lyytinen, Anna-Maija Poikkeus, Ulla Richardson, Minna Torppa & Helena Viholainen. 2004. Early development of children at familial risk for dyslexia – Follow-up from birth to school age. *Dyslexia* 10. 146–178.

McGuckian, Maria & Alison Henry. 2007. The grammatical morpheme deficit in moderate hearing impairment. *International Journal of Language and Communication Disorders* 42. 17–36.

McLaughlin, Maura R. 2011. Speech and language delay in children. *American Family Physician* 83(10). 1183–1188.

Neumann, Katrin, Inge Holler-Zittlau, Susanne van Minnen, Ulrike Sick, Yevgen Zaretsky & Harald A. Euler. 2011. Katzengoldstandards in der Sprachstandserfassung. Sensitivität und Spezifität des Kindersprachscreenings (KiSS). *HNO* 59. 97–109.

Neumann, Katrin, Annerose Keilmann, Jochen Rosenfeld, Rainer Schönweiler, Yevgen Zaretsky & Christiane Kiese-Himmel. 2009. Sprachentwicklungsstörungen bei Kindern. Leitlinien der Deutschen Gesellschaft für Phoniatrie und Pädaudiologie (gekürzte Fassung). *Kindheit und Entwicklung* 18(4). 222–231.

Niklas, Frank, Sandra Schmiedeler, Nina Pröstler & Wolfgang Schneider. 2011. Die Bedeutung des Migrationshintergrunds, des Kindergartenbesuchs sowie der Zusammensetzung der Kindergartengruppe für sprachliche Leistungen von Vorschulkindern. *Zeitschrift für Pädagogische Psychologie* 25(2). 115–130.

Noel, Melanie, Carole Peterson & Beulah Jesso. 2008. The relationship of parenting stress and child temperament to language development among economically disadvantaged preschoolers. *Journal of Child Language* 35. 823–843.

Pancsofar, Nadya & Lynne Vernon-Feagans. 2006. Mother and father language input to young children: Contributions to later language development. *Journal of Applied Developmental Psychology* 27(6). 571–587.

Schmid, Monika S. & Elise Dusseldorp. 2010. Quantitative analyses in a multivariate study of language attrition: The impact of extralinguistic factors. *Second Language Research* 26(1). 125–160.

Smith, Shelley D., Bruce F. Pennington & John DeFries. 1996. Linkage analysis with complex behavioral traits. In Mabel L. Rice (ed.), *Toward a genetics of language*, 29–44. Mahwah, NJ: Erlbaum.

Tager-Flusberg, Helen. 2005. Designing studies to investigate the relationships between genes, environments, and developmental language disorders. *Applied Psycholinguistics* 26. 29–39.

Tarone, Elaine. 2007. Sociolinguistic approaches to second language acquisition research – 1997–2007. *The Modern Language Journal* 91. 837–848.

Taylor, Catherine L., Daniel Christensen, David Lawrence, Francis Mitrou & Stephen R. Zubrick. 2013. Risk factors for children's receptive vocabulary development from four to eight years in the longitudinal study of Australian children. *Plos One* 8(9). e73046.

Thomas, Michel S. C., Neil A. Forrester & Angelica Ronald. 2013. Modeling socioeconomic status effects on language development. *Developmental Psychology* 49(12). 2325–2343.

Westerlund, Monica & Dagmar Lagerberg. 2008. Expressive vocabulary in 18-month-old children in relation to demographic factors, mother and child characteristics, communication style and shared reading. *Child: Care, Health and Development* 34(2). 257–266.

Zaretsky, Eugen & Benjamin P. Lange. 2015a. A sociolinguistic portrait of preschool immigrant children in German daycare centers. Paper presented at the 11th International Conference on Bilingual Studies, Manila, Philippines, 12–15 February.

Zaretsky, Eugen & Benjamin P. Lange. 2015b. Both parents and kindergarten teachers estimate the language competence of German preschoolers correctly in most cases. Paper presented at the Second International Conference on Language, Literature and Community, Bhubaneshwar, India, 21–22 February.

Zorowka, Patrick G. 2005. Disorders of speech development: Diagnostic and treatment aspects. *Journal of Neural Transmission-Supplement* 69. 37–49.