Geography of German Daycare Centers and its Association with the Preschoolers' Sociolinguistic Characteristics

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Abstract

Purpose. Language acquisition is associated with or influenced by a number of factors which can be called sociolinguistic, social/sociological or demographic. Among other things, children cannot avoid being influenced linguistically by their peers and other contact persons from their neighborhood. Also, neighborhood might be a correlate of several factors influencing language acquisition. This study aimed at analysis of associations between German preschoolers' sociolinguistic characteristics and demographic characteristics of the districts where they attend daycare centers.

Methods. A sample of 1212 children (661 boys, 551 girls, 472 monolingual Germans, 658 bi/multilingual, 82 unknown; median 51 months) was tested with validated language tests (MSSb and AWST-R) with tasks on vocabulary, grammar, speech comprehension, articulation, and phonological short-term memory. The test results were correlated with the characteristics of 45 Frankfurt/Main districts. Demographic statistics for the districts were taken from the official page www.frankfurt.de.

Results. Higher total scores of language tests were associated with a low percentage of unemployed citizens in the district, of citizens receiving various kinds of financial aid from the state, of inhabitants who earn only up to 450 EUR/month, with a higher average age, with a low number of immigrants, with higher salaries, a larger living space per inhabitant, etc. The distribution of numerous sociolinguistic characteristics in the Frankfurt districts including medical issues such as stuttering was above chance.

Conclusions. Children attending daycare centers in the districts with a high percentage of unemployed and poor inhabitants as well as immigrants score lower than children from comparatively well-off districts.

Keywords: sociolinguistics, geolinguistics, language acquisition, German language, preschoolers

Introduction

The language development process and its outcome (that is, the actual language competence) are influenced by or correlated with a whole slew of factors. Apart from biological variables influencing language competence (e.g., Jenkins, 2000), there are numerous environmental ones too (e.g., Tager-Flusberg, 2005). Those factors can be referred to as social, sociological or sociolinguistic. One special facet within this palette of social variables can be termed demographic. Gender, for instance, is substantially linked to language-related variables (Lange, Euler, & Zaretsky, in press).

Also, characteristics of the districts children grow up in might be correlated (though not necessarily in the sense of causality) with their verbal skills (Rydland, Grøver, & Lawrence, 2014; Sellström & Bremberg, 2006). As this observation refers to a link between linguistics and geography, we can term this kind of research as geolinguistics. The current paper adheres to this field. However, we are not concerned with an influence of any kind of space on language, which would also apply to, for instance, dialectology (e.g., Auer, 2013), but more with the geographic correlates of verbal skills. We thus enter an interdisciplinary field of linguistic, medical, and psychological research.

Children, for instance, are undoubtedly influenced linguistically by their peers and other contact persons from their neighborhoods, which would speak for a causal relation between the social characteristics of the respective neighborhoods and the children's language development. Apart from that, district might be (merely) a correlate of several factors influencing language acquisition, with these factors causing more or less advanced verbal proficiency. Before talking about a potentially causal relation between the characteristics of certain city districts and children's language development, first one needs to show that there are correlations between those characteristics and language development. This is especially important as geolinguistic research as presented here is rather scarce. Indeed, most linguistic research taking geographical information into consideration is more aiming at investigating dialects or minority languages. Here, however, we are concerned with verbal proficiency as it might be correlated with neighborhood characteristics.

Hence, the current study aimed at the identification of demographic characteristics of Frankfurt/Main districts associated with advanced and limited German skills of German preschoolers. Whereas characteristics of districts where preschoolers lived were analyzed in our previous studies (Zaretsky, 2015; Zaretsky & Lange, 2015a-c), the current study focused on the districts where the same sample of children attended daycare centers. However, we did not expect qualitatively different results and, therefore, hypothesized that preschoolers' advanced German skills would be associated with such district characteristics as high income, high employment rates, low percentage of immigrants, small families with no or very few children, and high average age of the district inhabitants (which is characteristic of districts inhabited by native Germans). These variables contribute potentially, be it directly or indirectly, to the high quality and quantity of the language input and thus are probably linked both to high total scores of correct answers in the language tests and to relatively advanced error patterns in the test items.

Methods

The data were analyzed retrospectively and originate from studies on the construction of a language test. No exclusion criteria except inappropriate age were applied in the original studies, which means that the sample presented here can be considered quite representative and unselected.

The sample comprised 1212 German preschoolers: 661 boys (55%), 551 girls (45%); 472 monolingual Germans (39%), 658 bi- and multilingual children (54%), 82 with no data on languages spoken at home (7%); age range 42-72 months, median age 51 months. Most children were classified by a group of university language experts (researchers in clinical linguistics, speech and language pathologists) as (a) needing (ED) or not needing (NED) additional educational support and (b) as needing (CLIN) or not needing (NCLIN) additional medical help in acquiring/learning German. ED children were defined as those who could profit from language courses, whereas CLIN children were those who needed, first and foremost, some kind of language(-related) therapy and would not be able to profit from the language courses alone. CLIN children were those suffering from disorders, illnesses or impairments influencing negatively the language acquisition process: frequent otitis media, autism spectrum disorders, Down syndrome, etc. In this sample, 372 children were classified as ED (31%), 655 as NED (54%), 185 without classification (15%); 139 were classified as CLIN (12%), 888 as NCLIN (73%), 185 without classification (15%). Although all children were tested linguistically, sample sizes in the calculations below mostly did not reach $N = 1212$ because not all children were able to complete the tests or subtests, which is common for preschool children.

It should be noted that some children attended daycare centers outside of the districts where they lived. For a subsample of $N = 973$ children, information both on the location of their daycare centers and on the Frankfurt districts where they lived was available. In 70% of cases ($N = 682$) parents chose daycare centers within the district where the family lived, in 30% of cases ($N = 291$) they chose a facility in another Frankfurt district. Further 25 children lived in villages and towns adjacent to Frankfurt and probably belonged to the families of commuters.

All children were tested with a validated short version of the *Marburger Sprachscreening* (MSSb), with subtests on speech comprehension, vocabulary, articulation, phonological short-term memory (repetition of sentences and nonce words), and grammar (Euler et al., 2010; Neumann et al., 2011). The test also included questionnaires for parents and daycare center teachers with various sociolinguistic and demographic variables. These questionnaires documented, among other things, information on the location of daycare centers. A subgroup of 355 children was tested with a well-known, validated vocabulary test *Aktiver Wortschatztest für 3- bis 5-jährige Kinder* (Kiese-Himmel, 2005), also known as AWST-R. Results of this test were utilized here to assess the stability of correlations identified for MSSb, that is, to check whether one can arrive at comparable results using two different validated tests that assess the same linguistic domain (vocabulary).

Statistics on the demographic characteristics of 45 districts of Frankfurt were taken from its official page www.frankfurt.de. Demographic variables had to be accepted as they were, even if their definitions seemed not quite rational to the authors. For

instance, the official statistics on Frankfurt differentiate neither between Australians and Asians nor between South and North Americans (although one can assume that North Americans can be encountered more frequently in Frankfurt than South Americans due to extensive business relationships between German and North American banks). Frankfurt districts were ranked according to the intensity of their demographic characteristics, for example, from the highest rates of unemployment (rank 45) to the lowest rates (rank 1). Consequently, a negative correlation between total scores of correct answers in the MSSb subtest vocabulary and the ranking of Frankfurt districts on unemployment would mean that lower unemployment rates among adults were associated with better vocabulary skills.

The statistical analyses can be summarized as follows. First, total scores of children's correct answers in MSSb and AWST-R were correlated (Spearman correlations, ρ) with the rankings of Frankfurt districts in respect to such demographic variables as percentage of unemployed persons. Total numbers of significant correlations were not supposed to be compared for different subtests because scales with different ranges of possible values were used, for example, 0-3 in the MSSb subtest on speech comprehension vs. 0-15 in the MSSb subtest on the repetition of sentences. Larger value ranges usually result in higher correlations. Also, the sample sizes were not identical, which also makes correlation coefficients not directly comparable. Therefore, in case of MSSb-AWST-R comparison, only general tendencies should be looked at.

Two subgroups of immigrant children with very different language test results, Italians (advanced German skills, cf. Zaretsky and Lange (2015d)) and Turks (limited German skills, cf. Zaretsky, Neumann, Euler, and Lange (2013)), were compared to monolingual Germans in respect to the characteristics of districts where they attended daycare centers and where they lived. This was done by a non-parametric test for two independent groups: Mann-Whitney *U* test. Generally, non-parametric tests were used because the data were either ordinal or not normally distributed according to the Kolmogorov-Smirnov test (ps < .05).

Next, the distribution of MSSb total scores was compared for Frankfurt districts with at least 20 tested children by means of the Kruskal-Wallis *H* test. Subgroups of Frankfurt districts with comparatively limited or advanced German skills were identified by a classification tree (growing method: Exhaustive Chi-Square Automatic Interaction Detectors). Sociolinguistic and demographic characteristics of children from the group of districts where the most advanced German skills were identified were compared to those in other districts. These characteristics were mostly documented in the MSSb questionnaires. In case of metrical data such as age of the child or length of the daycare center attendance, the Mann-Whitney *U* test was used. In other cases, characteristics of children from two groups of districts ("most advanced" vs. "less advanced") were cross-tabled. Chi-square (χ^2, nominal data) or linear-by-linear associations (*lbl*, ordinal data) were calculated for cross-tables.

A link between sociolinguistic characteristics of children from the sample used in the current study and their error patterns in the grammar has already been demonstrated in the previous research (Zaretsky et al., 2013; Zaretsky & Lange, 2014), however, without consideration of the geolinguistic aspects. Here, it was hypothesized that children's error patterns were also associated with the demographic characteristics of

the districts where they attended daycare centers. A statistical analysis of this issue was carried out for one of the MSSb items on the past participles: (*rein*)*gekrabbelt* ‘crawled (inside)’ (other semantically comparable verbs such as (*rein*)*gekrochen* ‘crept (inside)’, (*rein*)*gelaufen* ‘rushed (inside)’ were also considered correct). Children’s error patterns were classified as comparatively simple or advanced ones. Simple errors were (a) unspecific description of the situation without verb, (b) subject (agent) without verb, (c) repetition of the question, (d) child points at something, (e) non-relevant answer, (f) infinitive. Following errors were classified as comparatively advanced: (a) correct or wrong verb form in a wrong tense, (b) overgeneralization of strong verbs in participles (*gemachen* ‘done’), (c) overgeneralization of weak verbs in participles (*gelauft* ‘run’), (d) other errors in past participle forms. 260 simple and 86 advanced error patterns were identified. Mann-Whitney *U* tests were utilized to examine which error patterns were linked to which characteristics of Frankfurt districts.

Distribution of further sociolinguistic characteristics in the Frankfurt districts was exemplified by stuttering. Severity of stuttering (“the child stutters never – seldom – sometimes – often – always”) according to the daycare center teachers was correlated with the demographic characteristics of Frankfurt districts (with Ns ≥ 20). Again, an overview of associations between sociolinguistic variables and stuttering, calculated on the basis of the same database, can be found in one of the previous studies, but without consideration of geolinguistic aspects (Zaretsky, 2014).

For a small subgroup of immigrant children, namely 22 Russian speaking and 30 Turkish speaking study participants, data on their command of mother tongues was available. These children were tested with the validated language screening SCREEMIK 2 (Wagner, 2008), with subtests on articulation, grammar, and vocabulary. The test result was dichotomized as pass/fail and analyzed with the Mann-Whitney *U* test in respect to the demographic characteristics of Frankfurt districts where the study participants attended daycare centers. Due to a small sample size, the sample of 52 children was not subdivided according to nationality.

All calculations were carried out in SPSS 20 (IBM). Values with $p < .05$ were considered significant, values with p between .05 and .08 marginally significant. Language test scores and other data were not transformed (e.g., *z*-transformed) in any way.

Results

Table 1 gives an overview of correlations between total scores of correct answers in the language tests and Frankfurt district characteristics.

Table 1. Spearman correlations between language test scores (MSSb, AWST-R) and rankings of 45 Frankfurt districts according to the intensity of their demographic characteristics

Characteristics of Frankfurt districts	**MSSb vocabulary** (N = 1197)	**MSSb grammar** (N = 1100)	**MSSb speech comprehension** (N =	**MSSb repetition of nonce words** (N = 1102)	**MSSb repetition of sentences** (N = 1084)	**MSSb articulation** (N = 1203)	**MSSb total score** (N = 975)	**AWST-R total score** (N = 355)
% of employed persons	.15[1]	.22[1]	.08[2]	.09[2]	.18[1]	.07[3]	.22[1]	.12[3]
% of unemployed persons	-.21[1]	-.25[1]	-.12[1]	-.08[2]	-.21[1]	-.09[2]	-.25[1]	-.19[1]
% of unemployed (SGB III)	-.09[2]	-.12[1]	-.04	-.05	-.13[1]	-.08[2]	-.14[1]	-.17[2]
% of unemployed (SGB II)	-.21[1]	-.25[1]	-.12[1]	-.08[2]	-.20[1]	-.09[2]	-.25[1]	-.18[2]
% of unemployed men	-.18[1]	-.22[1]	-.11[1]	-.06[3]	-.18[1]	-.09[2]	-.22[1]	-.17[2]
% of unemployed women	-.24[1]	-.27[1]	-.13[1]	-.11[1]	-.24[1]	-.10[1]	-.28[1]	-.22[1]
% of unemployed Germans	-.22[1]	-.26[1]	-.13[1]	-.10[2]	-.22[1]	-.09[2]	-.27[1]	-.19[1]
% of unemployed foreigners	-.16[1]	-.19[1]	-.09[2]	-.05	-.15[1]	-.08[2]	-.19[1]	-.14[2]
% of recipients of basic social help for unemployed persons	-.24[1]	-.28[1]	-.14[1]	-.11[1]	-.23[1]	-.11[1]	-.28[1]	-.19[1]
% of recipients of basic social help for poor senior citizens	-.16[1]	-.16[1]	-.12[1]	-.06[3]	-.14[1]	-.07[3]	-.16[1]	-.13[3]
% of recipients of subsistence grants	-.18[1]	-.18[1]	-.12[1]	-.08[2]	-.16[1]	-.07[3]	-.19[1]	-.13[3]
% of mini-jobbers	-.21[1]	-.25[1]	-.13[1]	-.12[1]	-.22[1]	-.10[1]	-.26[1]	-.16[2]
% of recipients of subsistence grants for senior and disabled citizens	-.16[1]	-.15[1]	-.12[1]	-.07[3]	-.15[1]	-.07[3]	-.16[1]	-.13[3]
living area per person (m^2)	.25[1]	.29[1]	.14[1]	.11[1]	.24[1]	.11[1]	.30[1]	.19[1]

average gross salary	.20[1]	.25[1]	.10[2]	.11[1]	.20[1]	.09[2]	.25[1]	.18[2]
% of employed in the service sector	.05	.04	.00	.03	.03	.03	.04	.10
private cars per inhabitant	.11[1]	.10[2]	.09[2]	.03	.09[2]	.04	.10[2]	.06
% of inhabitants under the age of 18	-.09[2]	-.13[1]	-.02	-.08[2]	-.12[1]	-.06[3]	.15[1]	-.09
average age	.16[2]	.20[1]	.10[2]	.07[3]	.19[1]	.04	.22[1]	.15[2]
% of people living alone	.06	.09[2]	.02	.08[3]	.09[2]	.04	.10[2]	.06
% of lone parents	-.12[1]	-.15[1]	-.06[3]	-.07[3]	-.13[1]	-.08[2]	-.16[1]	-.07
population density per hectare	.04	.07[3]	.00	.11[1]	.10[2]	.04	.10[2]	.07
number of people per household	-.09[2]	-.13[1]	-.04	-.08[2]	-.12[1]	-.06[3]	-.15[1]	-.10
% of families with children	-.09[2]	-.12[1]	-.03	-.08[2]	-.12[1]	-.05	-.14[1]	-.08
% of families with 3+ children	-.17[1]	-.21[1]	-.08[2]	-.10[2]	-.18[1]	-.09[2]	-.23[1]	-.15[2]
% of children who stay in daycare centers for 7+ hours/day	.10[2]	.10[2]	.04	.04	.08[2]	.07[3]	.11[1]	.10
% of children who spoke German age-appropriately in the school enrolment test	.08[2]	.04	.02	.01	.02	.04	.04	.04
% of children who attended grammar schools	.15[1]	.18[1]	.09[2]	.06	.15[1]	.06[3]	.19[1]	.17[2]
% of foreigners	-.21[1]	-.26[1]	-.14[1]	-.07[3]	-.22[1]	-.08[2]	-.26[1]	-.21[1]
% of Germans with immigration background	-.22[1]	-.26[1]	-.14[1]	-.12[1]	-.22[1]	-.10[1]	-.27[1]	-.17[2]
% of daycare center children with immigration background of at least one parent	-.24[1]	-.28[1]	-.15[1]	-.10[2]	-.23[1]	-.09[2]	-.28[1]	-.19[1]
% of daycare center children who speak predominantly (a) foreign language(s)	-.21[1]	-.28[1]	-.15[1]	-.08[2]	-.22[1]	-.08[2]	-.28[1]	-.19[1]
% of native Germans from all children under the age of five	.22[1]	.27[1]	.14[1]	.09[2]	.20[1]	.09[2]	.27[1]	.21[1]
% of native Germans among primary pupils	.21[1]	.25[1]	.13[1]	.07[3]	.18[1]	.08[2]	.24[1]	.16[2]
% of Greeks among immigrants	-.01	-.06	-.04	.01	-.05	.00	-.04	-.05
% of Turks among immigrants	-.17[1]	-.24[1]	-.11[1]	-.10[2]	-.20[1]	-.10[2]	-.25[1]	-.17[2]
% of inhabitants from	-	-.14[1]	-.06[3]	-.08[3]	-.13[1]	-.06[3]	-.15[1]	-.12[3]

Turkey among foreigners	.10[1]							
% of Turkish citizens among foreigners	-.16[1]	-.22[1]	-.10[2]	-.09[2]	-.19[1]	-.09[2]	-.23[1]	-.16[2]
% of inhabitants from Russia among foreigners	.03	.04	-.01	-.03	.04	-.02	.04	.04
% of EU-foreigners among all foreigners	.10[1]	.11[2]	.09[2]	.03	.08[2]	.07[3]	.11[2]	.07
% of Europeans among foreigners	-.01	.00	.03	-.01	-.02	.02	.00	.00
% of Italians among immigrants	.15[1]	.16[1]	.13[1]	.08[3]	.14[1]	.07[3]	.17[1]	.06
% of Africans among foreigners	-.19[1]	-.23[1]	-.11[1]	-.07[3]	-.18[1]	-.12[1]	-.24[1]	-.17[2]
% of Asians and Australians among foreigners	.05	.06	-.02	.03	.06	.03	.06	.08
% of Americans among foreigners	.21[1]	.25[1]	.11[1]	.11[1]	.22[1]	.10[2]	.26[1]	.16[2]
number of foreign citizenships	-.01	.01	-.04	.02	-.01	.01	.00	-.02

Notes. [1] $p < .001$, [2] $p < .01$, [3] $p < .05$. MSSb = *Marburger Sprachscreening* (short version), AWST-R = *Aktiver Wortschatztest für 3- bis 5-jährige Kinder*

According to Table 1, living area per person yielded the highest correlation with the MSSb total score. In case of AWST-R, the highest correlation was identified for the percentage of unemployed women in the district, a factor that was also among the most important ones for MSSb.

Among other findings, Table 1 demonstrated that a high percentage of Italians in a district was associated with comparatively advanced German skills of preschoolers who attended daycare centers there, whereas high percentage of Turks was associated with limited German skills. We assumed that this finding can be explained by geographical separation of Turks from Germans and Italians. Indeed, Turkish children from the sample used here both lived ($U = 14495$, $Z = -5.36$, $p < .001$, $N = 541$) and attended daycare centers ($U = 17320$, $Z = -5.12$, $p < .001$, $N = 589$) more often in the districts with a high percentage of immigrants compared to monolingual German children. There were no statistically significant differences between Italians and Germans in this respect (ps > .05), which means that they usually both lived and attended daycare centers in the same or in demographically comparable districts.

Differences in the distribution of total scores of correct answers in the Frankfurt districts with at least 20 tested children turned out to be significant for all MSSb subtests according to seven Kruskal-Wallis H tests: speech comprehension ($\chi^2_{(24)} = 70.38$, $p < .001$, $N = 1045$), vocabulary ($\chi^2_{(24)} = 121.72$, $p < .001$, $N = 1031$), articulation ($\chi^2_{(24)} = 41.43$, $p = .015$, $N = 1038$), grammar ($\chi^2_{(24)} = 161.75$, $p < .001$, $N = 952$), repetition of nonce words ($\chi^2_{(24)} = 59.25$, $p < .001$, $N = 948$), repetition of sentences ($\chi^2_{(24)} = 143.08$, $p < .001$, $N = 932$), total score ($\chi^2_{(24)} = 161.51$, $p < .001$, $N = 840$).

A classification tree identified four groups of districts (*N*s ≥ 20) with significantly different mean total scores of MSSb ($F_{(1, 836)} = 61.44$, $p < .001$, $N = 840$). The highest total scores of correct answers were found in the group with the following nine districts: Praunheim ($\bar{x} = 44.00$), Nordend-West ($\bar{x} = 43.22$), Dornbusch ($\bar{x} = 42.08$), Bornheim ($\bar{x} = 41.80$), Bergen-Enkheim ($\bar{x} = 40.25$), Sachsenhausen-Süd ($\bar{x} = 40.18$), Eschersheim ($\bar{x} = 39.89$), Westend-Süd ($\bar{x} = 39.66$), and Heddernheim ($\bar{x} = 38.52$). The remaining sixteen districts were merged to one group of comparatively weak districts for further calculations. An average MSSb total score in the "best" group was $\bar{x} = 40.76$, in the remaining three groups taken together $\bar{x} = 30.59$. Seven out of nine "best" districts have common boundaries, thus forming a large area in the Western and central parts of the city.

Children who attended daycare centers in the nine "best" districts were significantly different from children from the other sixteen districts (with *N*s ≥ 20) in respect to the sociolinguistic and demographic characteristics described in Table 2.

Table 2. Sociolinguistic and demographic characteristics of children attending daycare centers in the districts with the highest MSSb total scores: results of cross-tables

Children's characteristics according to questionnaires for parents and daycare center teachers	$\chi^2_{(1)}$ **or** ***lbl***	***N***
More often German as the only language spoken at home	$lbl = 40.75$[1]	748
Children's better compliance in the test situation	$lbl = 4.13$[3]	964
More often attendance of nursery schools in the first two years of life	$\chi^2_{(1)} = 25.82$[1]	346
More often attendance of daycare centers for a full day, and not for half a day	$\chi^2_{(1)} = 4.24$[3]	300
More frequent playing with other children	$lbl = 4.74$[3]	380
More frequent playing with German speaking children	$lbl = 6.77$[2]	219
More frequent speaking out during the group activities	$lbl = 13.91$[1]	378
German skills more often classified as age-appropriate by daycare center teachers	$lbl = 17.87$[1]	666
German skills more often classified as age-appropriate by parents	$\chi^2_{(1)} = 5.02$[3]	157
Lower (= better) school marks given by daycare center teachers for the time point when children began to attend the daycare center	$lbl = 11.71$[2]	153
Lower school marks given by daycare center teachers for the time point when children were tested for the current study	$lbl = 5.45$[3]	155
If immigrants, more often age-appropriate mother tongue skills according to parents	$\chi^2_{(1)} = 5.67$[3]	407
If immigrants, earlier contact to the German language sufficient to learn/acquire it	$lbl = 38.66$[1]	410
More frequent attendance of associations or study groups	$\chi^2_{(1)} = 18.47$[1]	519
Higher educational level of mothers	$lbl = 7.72$[2]	142
Higher educational level of fathers	$lbl = 10.43$[2]	135
Less often bi/multilingualism	$\chi^2_{(1)} = 52.07$[1]	990
Less often classification as ED according to university language experts	$\chi^2_{(1)} = 66.69$[1]	883

Notes. [1] $p < .001$, [2] $p < .01$, [3] $p < .05$. MSSb = *Marburger Sprachscreening* (short version), *lbl* = linear-by-linear association

Also, such children scored higher in all linguistic domains according to both MSSb (speech comprehension, vocabulary, grammar, articulation, repetition of words and sentences: *U*s = 47844-113464, *Z*s ≤ -4.63, *p*s < .001, *N*s ≥ 840) and AWST-R (vocabulary: $U = 9185$, $Z = -4.63$, $p < .001$, $N = 328$) in Mann-Whitney *U* tests.

For a number of variables no statistically significant differences were found, but in most cases it could be attributed to low sample sizes: age when parents began to acquire/learn German (for immigrants), whether the child attends the daycare center regularly, …has mental, hearing, sight, motor, fluency, voice disorders, frequent otitis media, language-related illnesses/disorders/impairments, how often the (immigrant) child plays with other immigrant children speaking the same non-German language, whether the child likes to attend the daycare center, …participates in a language therapy, …participates in a language course, …had a difficult or early birth, whether the child's parents suffer from language, fluency or voice disorders, whether they had "problems with reading and writing", sex and age of the child (in months), length of his or her daycare center attendance (in months), classification as CLIN.

Associations between demographic characteristics of Frankfurt districts and children's error patterns were exemplified by the MSSb item "Here is one boy in a pipe. He has… (crept, crawled, etc.) into it". According to a Mann-Whitney *U* test, children who produced comparatively simple errors in this item, attended daycare centers in the districts with characteristics described in Table 3.

Table 3. Demographic characteristics of districts where children produced comparatively simple error patterns in the MSSb item "Here is one boy in a pipe. He has… (crept, crawled, etc.) into it" (past participle); *N*s = 346

Characteristics of Frankfurt districts	***U***	***Z***
A high percentage of unemployed persons (SGB II)	9559	-2.02[1]
A high percentage of unemployed women	9341	-2.29[1]
A high percentage of unemployed Germans	9600	-1.97[1]
A low average age of the inhabitants	9482	-2.11[1]
A high percentage of foreigners	8627	-3.18[2]
A low percentage of Italians	9498	-2.09[1]
A limited living area per person	9323	-2.32[1]
A low gross salary	9521	-2.07[1]

Notes. [1] $p < .05$, [2] $p < .01$. MSSb = *Marburger Sprachscreening* (short version)

For a full list of variables analyzed for Table 3, see Table 1. Also, children with comparatively simple errors in this MSSb item scored marginally significantly lower both in MSSb ($U = 5946$, $Z = -1.75$, $p = .080$, $N = 264$) and AWST-R ($U = 703$, $Z = -1.95$, $p = .051$, $N = 101$) in comparison with children who produced relatively advanced error patterns.

Apart from the distribution of total scores of correct answers in MSSb, almost all children's sociolinguistic and demographic characteristics documented in the MSSb questionnaires were distributed unequally in the Frankfurt districts with *N*s ≥ 20 (*p*s <

.05), for example, stuttering ($\chi^2_{(24)}$ = 39.01, p = .027, N = 444), hearing disorders ($\chi^2_{(24)}$ = 38.18, p = .033, N = 749), and the CLIN/NCLIN classification ($\chi^2_{(24)}$ = 44.50, p = .007, N = 883). For instance, more intensive stuttering (codified ordinally from 1 = "never" to 5 = "always") was identified in the districts with a low percentage of the employed population (ρ = -.11, p = .012), with more inhabitants below the age of 18 (ρ = .12, p = .016), more Germans with immigration background (ρ = .15, p = .001), a higher percentage of families with children (ρ = .15, p = 001), a higher number of people in the households (ρ = .15, p = .001), with more lone parents (ρ = .10, p = .032), more mini-jobbers, that is, people earning only 450 EUR/month (ρ = .13, p = 003), with less children spending 7 or more hours in the daycare centers (ρ = -.10, p = .025), more senior or disabled people receiving financial aid (ρ = .13, p = .005), more citizens from Turkey (ρ = .13, p = .033) and less from Europe (ρ = -.13, p = .005), Ns = 495 (for a full list of analyzed variables, see Table 1).

In the last step, language skills of 52 Turkish and Russian speaking children were analyzed in respect to the characteristics of the districts where they attended daycare centers. Results of some children could not be accounted for in the calculations due to the missing data. The subtest on grammar had to be excluded from the analysis because of a too low sample size. The findings are summarized in Table 4.

Table 4. Demographic characteristics of districts where immigrant children tested with SCREEMIK 2 (N = 52) yielded significantly better results in the articulation and vocabulary

Characteristics of Frankfurt districts	***U***	***Z***
Articulation (N = 43)		
More unemployed (SGB III)	76	-2.62[2]
More unemployed (SGB II)	93	-2.12[1]
More unemployed men	94	-2.09[1]
More unemployed Germans	98	-1.97[1]
Smaller average gross salary	98	-1.97[1]
More Turks among immigrants	97	-2.00[1]
Less monolingual Germans among children under the age of five	90	-2.21[1]
Less Americans among foreigners	95	-2.06[1]
Vocabulary (N = 42)		
Lower average age	121	-2.55[1]
Less inhabitants below the age of 18	139	-2.09[1]
More foreigners	111	-2.81[2]
More people living alone	131	-2.30[1]
Less families with children	129	-2.35[1]
Less people per household	140	-2.06[1]
More children who attend daycare centers for a full day, and not for half a day	118	-2.63[2]
More foreign citizenships	120	-2.58[1]
Less citizens from Russia	123	-2.50[1]

Notes. [1] $p < .05$, [2] $p < .01$. SCREEMIK = Screening der Erstsprachfähigkeit bei Migrantenkindern

Discussion

To sum up the study results with one sentence, German preschoolers with comparatively advanced German skills attended daycare centers in the Frankfurt/Main districts with a high average income, low percentage of immigrants (except Americans and EU-Europeans), and a low percentage of unemployed persons. Most of the sociolinguistic and demographic variables available for the districts (see Table 1) can be categorized into these three groups, even if it is not always evident at first sight. For instance, an association between better German skills and a higher average age in the district, high percentage of people living alone, low percentage of inhabitants aged below 18, small households as well as a small family size with no or almost no children can be traced back to very low birth rates in the families of native Germans opposed to somewhat higher birth rates in the immigrant families. Even if all children born in Germany are taken into account, including Turkish and Arab families with traditionally three and more children, Germany occupies 190th position out of 191 in the country rating of births per 1000 inhabitants (8.4 annually) (Berié, Gwardys, Löchel, & Bogumil, 2015).

The correlation results for children's German language skills and demographic characteristics of 45 Frankfurt districts demonstrated stability over two language tests: MSSb and AWST-R. Among other things, unemployment rates of females (probably including some mothers of children tested in this study) correlated higher with children's German skills than those of males. Higher importance of mothers' sociolinguistic and demographic characteristics in comparison with those of fathers for preschoolers' linguistic development was shown for children from the same database in another study (Zaretsky & Lange, 2015e) and thus confirms previous results. In respect to the income, living area per person (in m^2) demonstrated the highest correlations with children's German skills in the study and, interestingly, higher correlations than gross salaries, probably because (a) the wealth of the families depends not only on their income but also on their savings, (b) not all families report their real income, with tax evasion being a sort of national sport in Germany. The financial resources of the family might be associated with further variables related directly or indirectly to the language development: quality of the language courses, access to a high-quality language input from the circle of friends and relatives, educational level of parents, immigration background, language-related medical problems among relatives, etc. Because even comparatively poor families in Germany can afford a car, private cars per 1000 inhabitants yielded only very weak correlations with the German skills. All correlations presented in Table 1 can be considered low, which means that the identified tendencies were weak.

According to a classification tree, Frankfurt districts can be subdivided into four groups in respect to linguistic skills of children attending daycare centers in these districts. Children from the nine districts with the most advanced language skills acquired German under very favorable sociolinguistic conditions: more intensive and longer language contact, higher educational level of parents, etc. On the contrary, stuttering children attended daycare centers in the surrounding unfavorable for proper language acquisition, namely in the districts inhabited by low-income families or lone parents, often with immigration background, unemployed or mini-jobbers. Comparable results were shown by Zaretsky and Lange (2015c) for voice disorders: children with a frequently or permanently hoarse voice attended daycare centers in the

districts with more immigrants, more lone parents etc., that is, again, with lower quality and quantity of the language input. Although, of course, these factors cannot be interpreted in terms of causal relationships to stuttering or language deficits, an access to high-quality speech and language therapies might be indeed limited in case of inhabitants of these districts as well as of those who choose or have no other choice than to send their children to daycare centers in the districts with comparatively unfavorable conditions for their language acquisition. Some other empirical evidence presented by Zaretsky and Lange (2015f) also indicates that certain subgroups of Frankfurt children, first and foremost immigrants, might have a limited access both to the medical and educational help in acquiring/learning German, which results in a later identification of language-related illnesses, disorders or impairments. For instance, parents of immigrant children believed more often than Germans that their children did not need any medical help related to the language acquisition although immigrant children were more often classified as CLIN by the university language experts.

As was demonstrated by Zaretsky and Lange (2015g), the distribution of error patterns in the past participle forms in the answers of children from the database used in the current study was associated with sociolinguistic and demographic characteristics of these children. Comparatively simple error patterns were found in the answers of children from bi/multilingual families, children who attended daycare centers for half a day, and not a full day, who began comparatively late to acquire/learn German, who did not speak much when playing with other children and had either no opportunity or no wish to play with monolingual Germans, children with hearing disorders and frequent otitis media. In the current study, some associations between error patterns in the past participle form ʻcrawled' and demographic characteristics of districts were found. Children who produced comparatively simple error patterns (such as infinitives or vague descriptions of the situation without verbs) attended daycare centers in the districts with the same characteristics as children with a limited command of German (see Table 1), that is, district characteristics resulting in limited quality and quantity of the language input. Zaretsky and Lange (2015f) demonstrated, again on the basis of the database used here, including some MSSb grammar items such as ʻcrawled', ʻinto the sandpit', ʻthrough the pipe' (past participles, prepositions, case and gender forms), that the error patterns of the linguistically weak children were universal irrespective of the compared subsamples: bi/multilingual children vs. monolingual Germans, younger vs. older monolingual Germans, ED vs. NED, CLIN vs. NCLIN. These were the same errors patterns that were produced by children acquiring German under unfavorable sociolinguistic and demographic conditions according to the current study, exemplified by the MSSb item ʻcrawled'.

According to Zaretsky and Lange (2015b) as well as Zaretsky et al. (2013), Turkish children acquired German under most unfavorable sociolinguistic and demographic conditions among all immigrant children. However, Turkish children spoke their mother tongue better than all other immigrant groups according to parents. The current study delivered more differentiated results on the acquisition of the immigrants' mother tongues. Children from the districts with very unfavorable conditions of the German language acquisition (e.g., districts with high unemployment rates, low income) acquired pronunciation of their mother tongues better than children from other districts. However, vocabulary of the mother tongues was acquired better in comparatively well-off districts with a low unemployment and

high income, but also with a high percentage of immigrants, except Russians. It does not mean, however, that the presence of Russian speaking inhabitants correlated with limited mother tongue skills. Rather, as was shown in Zaretsky and Lange (2015b), Russians lived in the districts with a low percentage of immigrants, together with German, Italian (compare the finding in Table 3 on a low percentage of Italians in the districts where children produce simple error patterns in the past participles), and English speaking citizens. No data on associations between mother tongue skills and characteristics of the districts where the children lived were presented in the previous studies with the same database because the sample size was too limited.

Demographic characteristics of Frankfurt districts where preschoolers with limited German skills lived were demonstrated by Zaretsky and Lange (2015a-c). These characteristics corresponded exactly to those identified in the current study for the districts where daycare centers with linguistically weak children are located: high percentage of immigrants and unemployed persons, low average age and large families, low income and limited living space. This can be explained, for the most part, by the fact that most children lived and attended daycare centers in the same districts, but, furthermore, even if they did not, their parents probably could hardly afford to finance enrolment of their children in the daycare facilities of comparatively well-off (and, consequently, expensive) districts, and thus sent their children from one district with unfavorable language acquisition conditions to another one which was not qualitatively different. Also, the strength of correlations between demographic characteristics of districts and children's language skills was almost identical for the districts where the children attended daycare centers (presented here, e.g., average ρ = |.167| in AWST-R) and for the districts where they lived (presented in Zaretsky (2015), average ρ = |.166| in AWST-R).

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