GEOLINGUISTICS OF LANGUAGE COMPETENCE: A CASE OF FRANKFURT AM MAIN, GERMANY

GEOLINGUISTIK DER SPRACHKENNTNISSE, AM BEISPIEL VON FRANKFURT AM MAIN

(Zusammenfassung)

Hintergrund. Sprachkenntnisse der Vorschulkinder werden nicht nur durch ihre medizinischen Auffälligkeiten und soziolinguistischen Eigenschaften beeinflusst, sondern auch durch ihre Umgebung, u.a. durch Sprachkenntnisse ihrer Peers und Verwandten. Da sowohl soziolinguistische als auch demographische Merkmale geographisch gehäuft vorkommen, wäre anzunehmen, dass auch Merkmale der Stadtteile mit den Sprachkenntnissen ihrer Einwohner assoziiert sind. In der vorliegenden Studie wurde geprüft, ob solche Assoziationen in einer Stichprobe der Vorschulkinder aus Frankfurt/Main vorliegen.

Methoden. Eine Stichprobe von 802 Kindern (422 männlich, 380 weiblich; 284 monolingual Deutsch, 507 zwei/mehrsprachig, 11 unbekannt; Altersspanne 60-99 Monate, Median 71) wurde mit Sprachtests AWST-R (Wortschatz), ETS 4-8 (Grammatik, Sprachverständnis) und S-ENS (Aussprache, phonologisches Kurzzeitgedächtnis: Wiederholung der Wörter und Sätze) untersucht. Testergebnisse wurden mit den Merkmalen von 45 Frankfurter Stadtteilen korreliert.

Ergebnisse. Höhere Sprachtestscores waren mit einem niedrigen Prozentsatz von Arbeitslosen, Empfängern von diversen Leistungen seitens des Staats sowie von Mini-Jobbern im entsprechenden Stadtteil assoziiert, darüber hinaus mit einem höheren Durchschnittsalter, niedrigerem Prozentsatz von Familien mit mehreren Kindern, von Migranten, mit einem höheren Bruttoeinkommen und größerer Wohnfläche pro Einwohner.

Fazit. Kinder, die in den Stadtteilen mit einem hohen Anteil von Arbeitslosen, Geringverdienern und Migranten wohnten, demonstrierten in den Sprachtests schlechtere Leistungen im Vergleich mit den Kindern aus wohlhabenden Stadtvierteln, in denen überwiegend Deutsche ohne Migrationshintergrund wohnten.

Schlüsselwörter: Geolinguistik, Deutsche Sprache, Soziolinguistik, Spracherwerb.

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1. Introduction

Language skills and even linguistic error patterns of children at the preschool age are associated with the demographic and sociolinguistic characteristics of districts or regions they live in. For instance, as was shown for the German city of Frankfurt am Main by Zaretsky (2015), children from districts with many low-income inhabitants, unemployed, immigrants, and lone parents tend to produce relatively simple error patterns in the vocabulary tasks: repetition of the question, very broad and vague descriptions of the situation (without target item), semantically irrelevant answers or generic terms. Children who acquired German in the districts with comparatively favorable sociolinguistic and demographic conditions, on the contrary, tended to produce relatively advanced error patterns: descriptions of form and function of the target item, comparisons with other objects, personal attitude to the object or situation, and subconcepts.

Unfavorable sociolinguistic and demographic characteristics tend to cluster and correlate, as was shown for Frankfurt/Main by Zaretsky and Lange (2015). Statistically significant correlations were found between the percentage of immigrants in the districts and a number of other factors associated with limited German skills: high percentage of unemployed inhabitants (including native Germans), of people with low-income and those receiving various kinds of financial assistance from the state, of families with three and more children, of households with very limited living space, of the so-called mini-jobbers (those earning only 450 EUR/month) etc. Such intercorrelations create a vicious circle of numerous extralinguistic factors negatively effecting the quality and quantity of the preschoolers' language input.

The present study focused not only on the vocabulary skills (as it was done in Zaretsky (2015)), but on all important linguistic domains: grammar, speech comprehension, articulation, vocabulary, and phonological short-term memory. Also, whereas in Zaretsky (2015) the target sample comprised four-year-old Frankfurt children, the present study analyzed language skills of preschoolers who were invited to the school enrolment examination, that is, predominantly five- and six-year-old children. Total scores of their correct answers in various language tests were correlated with sociolinguistic and demographic characteristics of the districts they lived in. Under consideration of the results of Zaretsky (2015), it was expected that limited German skills would be statistically associated with various unfavorable language acquisition conditions such as high percentage of unemployed, immigrant, and low-income inhabitants in the respective district.

2. Methods

In the years 2009–2012, a large sample of German preschoolers ($N = 802$) was tested in the city of Frankfurt/Main in the German state of Hesse. Boys made out 53% of the sample ($N = 422$), girls 47% ($N = 380$). Because no

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exclusion criteria were applied, both healthy and severely handicapped/ill children were included, both monolingual Germans (N = 287, 36% of the sample) and bi-/multilingual children (N = 507, 64%, plus N = 11 with unclear immigration background). Age of the test subjects ranged between 60 and 99 months (median 71).

All children were tested linguistically in the local public health department during the school enrolment examination. The tests were performed by students (including PhD students) and researchers in linguistics and medicine. Parents were asked to sign an informed consent and to fill out a questionnaire on the sociolinguistic and demographic background of the family (Neumann et al. 2011).

The data were analyzed retrospectively and were originally collected in the course of a study dedicated to the validation of a new language test. All important linguistic domains were assessed with three well-known, validated language tests:

- AWST-R: a test on vocabulary (Kiese-Himmel 2005);
- ETS 4-8: a test on grammar and speech comprehension (Angermaier 2007);
- S-ENS: a screening on articulation and phonological short-term memory: repetition of words and sentences (Döpfner et al. 2005).

Most children were classified by university language experts (researchers and professors) as needing or not needing additional educational support (language courses) in acquiring/learning German and as needing or not needing medical help in acquiring/learning German (that is, as having or not having some language-related illness, disease or impairment). The classification was carried out on the basis of audio records and language test batteries. All in all, 174 out of 555 (31%) children needed educational support and 51 out of 555 (9%) needed medical help according to these judgements.

Demographic characteristics of 45 Frankfurt districts were taken from its official page www.frankfurt.de where they were freely available for download. Districts were ranked for correlations with children's total scores of language tests according to the intensity of these characteristics, e.g. percentage of the unemployed, of immigrants, of lone parents, etc.

Due to the not normal distribution of data, non-parametric tests were used in the statistical analysis. Total scores of correct answers in the language tests were correlated with the rankings of the Frankfurt districts (Spearman correlations, ρ) to find out which demographic characteristics of districts were concomitant with advanced or limited German skills. Kruskal-Wallis H test was utilized to answer the question whether the differences in the distribution of German skills, measured by total scores of language tests, in the Frankfurt districts were a matter of chance. Since in some districts very few children were tested, only those districts were included in these calculations where Ns ≥ 20 were achieved.

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In the next step, all Frankfurt districts with *N*s ≥ 20 were subdivided into (a) those five districts where the highest total scores of language tests were identified and (b) all other districts. This dichotomous classification of districts was cross-tabled with sociolinguistic and demographic characteristics of children who lived there to identify variables associated with good or limited German skills. These characteristics were taken from questionnaires for parents and other legal guardians. All calculations were carried out in SPSS 20 (IBM). Sample sizes in calculations varied depending on the willingness of parents to reveal information on their sociological/demographic background and also on the difficulty level of the language test or subtest (children with incomplete test results were excluded from calculations).

3. Results

In Table 1, Spearman correlations between total scores of correct answers in the language tests and sociolinguistic/demographic characteristics of districts children lived in are given. The total numbers of significant results cannot be directly compared between different linguistic domains (grammar, articulation, etc.) because the ranges of possible total scores varied depending on the respective test. Larger ranges (e.g., in AWST-R), that is, higher maximum total scores usually result in somewhat higher correlations than limited ranges (e.g., in S-ENS subtest on articulation).

Table 2 gives an overview of the distribution of the total scores of correct answers in the language tests in Frankfurt districts with *N*s ≥ 20. All in all, 16 such districts were identified. According to the Kruskal-Wallis *H* test, the distribution of total scores was uneven in all domains except repetition of words (phonological short-term memory). Children with best German skills lived in the districts Sachsenhausen Süd, Ostend, Nordend-West, Bergen-Enkheim, and Eschersheim.

In the next step, sociolinguistic and demographic characteristics of inhabitants of these five districts were compared with those of other eleven districts, where the German skills were comparatively limited. For these calculations, two groups of Frankfurt districts (the "best" five vs. eleven other districts with *N*s ≥ 20) were cross-tabled with the children's characteristics documented in the questionnaires for parents (Table 3). In case of dichotomous or nominal data, Chi-square was calculated. In case of ordinal data, linear-by-linear associations were utilized. For the numerical data, namely age when the father began to learn German, Mann-Whitney *U* test was calculated: In the "best" five districts, fathers began earlier to learn/acquire German ($U = 3516$, $Z = -2.66$, $p = .008$, $N = 250$). Some other variables yielded no significant result (*p*s > .05), e.g., child's participation in a language therapy or age when the mother began to learn/acquire German. For a full list of questionnaire items, see Neumann et al. (2011).

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A subgroup of 218 children was tested twice: first, at the age of four in daycare centers and after that at the age of five or six in the public health department. For this subgroup, the classification of children as those who lived in the "best" five districts or those who lived in other districts at the age of five or six was cross-tabled with sociolinguistic and demographic characteristics of the same children at the age of four. Out of a large list of variables, very few yielded statistically significant results:

- Children from the "best" five districts liked more often to play with other children than children from other districts: $lbl = 4.38$, $p = .036$, $N = 190$;
- Marginally significantly, their pronunciation was more often categorized as age-appropriate by daycare center teachers: $lbl = 3.79$, $p = .052$, $N = 189$;
- Marginally significantly, they heard better according to daycare center teachers: $lbl = 3.74$, $p = .053$, $N = 218$;
- They scored higher in the modified, validated short version of the "Marburger Sprachscreening" (subtests on speech comprehension, vocabulary, grammar, articulation, phonological short-term memory; Euler et al. 2010; Neumann et al. 2011): $U = 2446$, $Z = -2.47$, $p = .014$, $N = 211$.

Because of the limited space, only statistically significant results can be reported here. A full list of items in the questionnaires from the "Marburger Sprachscreening" can be found in Zaretsky et al. (2014).

4. Discussion

The study aimed at the identification of demographic and sociolinguistic characteristics of Frankfurt/Main districts associated with relatively advanced or limited German language skills in a large group of German preschoolers. Advanced German language skills correlated with the following district characteristics: less unemployed inhabitants, less recipients of subsistence grants and various kinds of financial help from the state, higher average gross salary, larger average living area (interestingly, a better indicator of advanced German skills than salary), less lone parents, less mini-jobbers, less immigrants (except Italians, generally Europeans, Americans). Because native Germans are on average older than immigrants and have very few children in their families, relatively good German skills were found in the districts with the higher average age, with less inhabitants under the age of 18, less families with children, especially three or more children. However, low correlation coefficients in all calculations mean that the identified tendencies had numerous exceptions, and that children who lived in the most disadvantageous surrounding had a chance to speak German age-appropriately.

Although children from districts with relatively unfavorable language acquisition conditions needed medical help in acquiring/learning German

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significantly more often, no significant difference on the item related to the participation in language therapies was found for children from the "best" five and comparatively linguistically weak eleven districts.

Children from five districts with the highest total scores of the language tests acquired German under very favorable conditions in respect to the quality and quantity of the language input. Their parents were highly educated and had a good command of German, their relatives had less often language disorders, their peers spoke less often other languages than German. Also, children from these districts suffered less often from language-related illnesses or disorders, their contact to the German language began comparatively early (since birth or in the nursery schools). Already at the age of four, their total scores of language tests were higher than those of children from other districts. Children from other districts, one might conclude, were trapped in a vicious circle of intercorrelations between numerous factors negatively effecting language acquisition, which resulted in comparatively low language test scores in most cases.

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Table 1. Spearman correlations (ρ) between children's total scores of correct answers in the language tests and demographic characteristics of Frankfurt districts

District characteristics	Vocabulary (AWST-R)	Grammar (ETS 4-8)	Speech comprehension (ETS 4-8)	Repetition of words (S-ENS)	Repetition of sentences (S-ENS)	Articulation (S-ENS)
% of the employed	.186***, N = 610	.176***, N = 571	.192***, N = 586	n. s.	.176***, N = 758	n. s.
% of the unemployed	-.280***, N = 610	-.239***, N = 571	-.268***, N = 586	n. s.	-.229***, N = 758	n. s.
% of the unemployed (SGB III)	-.226***, N = 610	-.181***, N = 571	-.198***, N = 586	n. s.	-.174***, N = 758	n. s.
% of the unemployed (SGB II)	-.275***, N = 610	-.234***, N = 571	-.262***, N = 586	n. s.	-.231***, N = 758	n. s.
% of the unemployed men	-.281***, N = 610	-.237***, N = 571	-.263***, N = 586	n. s.	-.230***, N = 758	n. s.
% of the unemployed women	-.265***, N = 610	-.231***, N = 571	-.269***, N = 586	n. s.	-.225***, N = 758	n. s.
% of the unemployed Germans	-.287***, N = 610	-.244***, N = 571	-.267***, N = 586	n. s.	-.236***, N = 758	n. s.
% of the unemployed foreigners	-.218***, N = 610	-.179***, N = 571	-.218***, N = 586	n. s.	-.191***, N = 758	n. s.
% of recipients of basic social help for the unemployed	-.279***, N = 610	-.234***, N = 571	-.275***, N = 586	n. s.	-.245***, N = 758	n. s.
% of recipients of basic social help for poor senior citizens	-.257***, N = 610	-.179***, N = 571	-.204***, N = 586	n. s.	-.171***, N = 758	n. s.
% of recipients of subsistence grants	-.261***, N = 610	-.195***, N = 571	-.199***, N = 586	n. s.	-.178***, N = 758	n. s.
% of mini-jobbers	-.201***, N = 610	-.162***, N = 571	-.215***, N = 586	n. s.	-.197***, N = 758	n. s.
% of recipients of subsistence grants for senior and disabled citizens	-.254***, N = 610	-.175***, N = 571	-.205***, N = 586	-.071*, N = 758	-.173***, N = 758	n. s.
living area per person (m^2)	.264***, N = 610	.200***, N = 571	.256***, N = 586	n. s.	.214***, N = 758	n. s.

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average gross salary	.229***, $N = 610$	.189***, $N = 571$	.232***, $N = 586$	n. s.	.214***, $N = 758$	n. s.
% of the employed in the service sector	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
private cars per inhabitant	.109**, $N = 610$	n. s.	n. s.	n. s.	n. s.	n. s.
% of inhabitants under the age of 18	n. s.	n. s.	-.102*, $N = 586$	n. s.	-.105**, $N = 758$	n. s.
average age	.140**, $N = 610$	.098*, $N = 571$	.103*, $N = 586$	n. s.	.126***, $N = 758$	n. s.
% of people living alone	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
% of lone parents	-.126**, $N = 610$	n. s.	-.143**, $N = 586$	n. s.	-.162***, $N = 758$	n. s.
population density per hectare	n. s.	n. s.	n. s.	n. s.	n. s.	.075*, $N = 704$
number of people per household	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
% of families with children	n. s.	n. s.	-.082*, $N = 586$	n. s.	-.077*, $N = 758$	n. s.
% of families with 3+ children	-.134**, $N = 610$	-.101*, $N = 571$	-.175***, $N = 586$	n. s.	-.152***, $N = 758$	n. s.
% of children who stay in daycare centers for 7+ hours/day	n. s.	n. s.	.119**, $N = 586$	n. s.	n. s.	n. s.
% of children who spoke German age-appro-priately in the school enrolment test	n. s.	n. s.	.087*, $N = 582$	.094*, $N = 754$	.111**, $N = 754$	n. s.
% of children who attended grammar schools	.233***, $N = 592$	.180***, $N = 554$	.243***, $N = 569$	n. s.	.231***, $N = 742$	n. s.
% of foreigners	-.267***, $N = 610$	-.235***, $N = 571$	-.231***, $N = 586$	n. s.	-.200***, $N = 758$	-.088*, $N = 758$
% of Germans with immigration background	-.216***, $N = 610$	-.158***, $N = 571$	-.227***, $N = 586$	n. s.	-.173***, $N = 758$	n. s.
% of daycare center children with immigration background of at least one parent	-.290***, $N = 610$	-.247***, $N = 571$	-.272***, $N = 586$	n. s.	-.233***, $N = 758$	n. s.

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% of daycare center children who speak predominantly (a) foreign language(s)	-.283***, $N = 610$	-.241***, $N = 571$	-.260***, $N = 586$	n. s.	-.236***, $N = 758$	n. s.
% of native Germans from all children under the age of five	.303***, $N = 610$	.267***, $N = 571$	.294***, $N = 586$	n. s.	.254***, $N = 758$	n. s.
% of native Germans among primary pupils	.312***, $N = 592$	.236***, $N = 554$	.282***, $N = 569$	n. s.	.250***, $N = 742$	n. s.
% of Greeks among immigrants	n. s.	-.105*, $N = 571$	n. s.	n. s.	n. s.	n. s.
% of Turks among immigrants	-.213***, $N = 610$	-.153***, $N = 571$	-.231***, $N = 586$	n. s.	-.202***, $N = 758$	n. s.
% of inhabitants from Turkey among foreigners	-.087*, $N = 610$	n. s.	-.149***, $N = 586$	n. s.	-.113**, $N = 758$	n. s.
% of Turkish citizens among foreigners	-.211***, $N = 610$	-.150***, $N = 571$	-.227***, $N = 586$	n. s.	-.200***, $N = 758$	n. s.
% of inhabitants from Russia among foreigners	n. s.	.090*, $N = 571$	n. s.	n. s.	n. s.	n. s.
% of EU-foreigners among all foreigners	.157***, $N = 610$	.093*, $N = 571$	.169***, $N = 586$	.082*, $N = 758$	.140***, $N = 758$	n. s.
% of Europeans among foreigners	.112**, $N = 610$	.089*, $N = 571$	.102*, $N = 586$	n. s.	n. s.	n. s.
% of Italians among immigrants	.169***, $N = 610$	.138**, $N = 571$	.118**, $N = 586$	n. s.	.076*, $N = 758$	n. s.
% of Africans among foreigners	-.246***, $N = 610$	-.194***, $N = 571$	-.264***, $N = 586$	n. s.	-.209***, $N = 758$	n. s.
% of Asians and Australians among foreigners	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
% of Americans among foreigners	.207***, $N = 610$	.180***, $N = 571$	.224***, $N = 586$	n. s.	.193***, $N = 758$	n. s.
number of foreign citizenships	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
number of significant results	34	33	37	3	35	2

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, n. s. = not significant

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Table 2. Distribution of total scores of correct answers in language tests in the Frankfurt districts with *N*s ≥ 20

	Vocabulary (AWST-R)	**Grammar (ETS 4-8)**	**Speech comprehension (ETS 4-8)**	**Repetition of words (S-ENS)**	**Repetition of sentences (S-ENS)**	**Articulation (S-ENS)**
Kruskal-Wallis *H* test	$\chi^2_{(15)} = 65.83$***	$\chi^2_{(15)} = 46.35$***	$\chi^2_{(15)} = 50.64$***	n. s.	$\chi^2_{(15)} = 40.46$***	$\chi^2_{(15)} = 25.95$*
Sample size (*N*)	*405*	*382*	*388*	*497*	*497*	*494*

Note. *** $p < .001$, * $p < .05$, n. s. = not significant

Table 3. Sociolinguistic/demographic characteristics of children from five Frankfurt districts with the highest language test scores

Items from the questionnaire for parents + language experts' judgements	**Chi-Square or lbl**	**Sample size**
There are less immigrants (than in all other districts with *N*s ≥ 20)	$\chi^2_{(1)} = 16.18$***	791
Children attended more often nursery schools in the first two years of life	$\chi^2_{(1)} = 27.96$***	496
Children have less often relatives with language disorders	$\chi^2_{(1)} = 5.26$*	519
Children speak more often only German at home	*lbl* = 24.21***	512
Children speak more often German age-appropriately (according to parents)	$\chi^2_{(1)} = 7.02$**	474
Mothers' educational level is higher	*lbl* = 32.55***	504
Fathers' educational level is higher	*lbl* = 25.93***	493
Mothers' German skills (in reading and writing) are better	*lbl* = 14.45***	315
Fathers' German skills (in reading and writing) are better	*lbl = 13.92***	*298*
Children were less often classified as needing additional educational help in acquiring/learning German	$\chi^2_{(1)} = 21.27$***	555
Children were less often classified as needing additional medical help in acquiring/learning German	$\chi^2_{(1)} = 5.40$*	555

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, lbl = linear-by-linear association

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