

# COGNITIVE FACTORS OF THE DEVELOPMENT OF FOREIGN LANGUAGE SKILLS

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## ABSTRACT

In the framework of a large-scale evaluation project, over 29,000 students' foreign language skills were assessed in 2000. The samples of the three age groups (grades 6, 8 and 10) were representatively drawn from the schools of Hungary. Students' skills (reading, writing and listening) of English or German as foreign languages were tested by the means of paper and pencil tests. The survey was repeated in a similar way in 2002 in four age groups (grades 6, 8, 10 and 12). Several other tests (including an inductive reasoning test) and questionnaires were also administered to the participants. A large proportion of the 8<sup>th</sup> and 12<sup>th</sup> graders of the 2002 survey had been assessed two years earlier (when they were in the 6<sup>th</sup> and 10<sup>th</sup> grade). In this way, the available data sets allow modeling the development on the basis of longitudinal data.

This paper examines how variables from and earlier assessment predict the level of foreign language performance two years later. Multiple regression analyses were separately performed for the younger and the older groups, and for the groups learning English and German. Although the results for the four groups are slightly different, they show that the best predictor of later achievements is preliminary language knowledge, especially reading skills. However, inductive reasoning is a significant predictor in the younger age groups.

## Introduction

This paper reports some results of a long-term research program that aims at studying the development of cognitive skills and abilities in educational context. The analyses presented here utilize the data of two consecutive assessments of foreign language skills on large representative samples in Hungary.

Learning foreign languages has received growing attention everywhere in Europe. The number of national and international developmental programs and research projects marks this phenomenon. The question of language learning is especially important for

countries like Hungary, where the first language is not widely spoken in other countries, and, where – due to several social and historical reasons – foreign language education requires rapid modernization. The overall program that forms the framework of the present analyses has double aims. On the one hand, it aims to describe the level of foreign language knowledge in the school-aged population and the conditions of learning languages to provide policy makers and language educators with the necessary information to establish developmental programs. For this purpose, paper and pencil language tests were administered to nationally representative samples. On the other hand, a research project was embedded in the overall program that aims at answering some deeper theoretical questions. For this purpose, several questionnaires and other assessment instruments complemented the language tests, and when the assessment was repeated, a longitudinal design was devised. In this paper, we use these longitudinal data to examine which variables predict students' foreign language achievements measured two years later.

The previous analyses show that there are differences between students studying English and German as a foreign language. Furthermore, we may presume that conditions of successful language learning depend on age as well. Therefore, our data allow studying predictors of language achievements in four more or less different situations.

## Methods

### Design and participants

In year 2000, a nationally representative sample was drawn from the primary and secondary schools of Hungary. Approximately 200 primary (for 6<sup>th</sup> and 8<sup>th</sup> grades) and 100 secondary schools (for 10<sup>th</sup> and 12<sup>th</sup> grades) were selected for participation. Each student of the selected school attending the chosen grades participated in the project. The overall design of the project, the grades assessed in the two survey cycles and the sample sizes are depicted on Fig. 1.

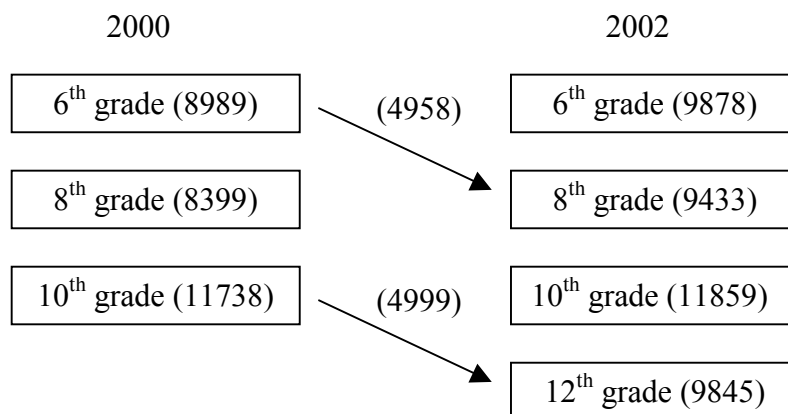


Fig. 1. The design of the entire project (the sample sizes in parentheses)

A general questionnaire and an inductive reasoning test were administered to each student, and paper and pencil language tests to those students who studied either English or German as a foreign language.

The assessments were repeated basically in the same way in year 2002. Mostly the same schools participated in the project and this allowed a longitudinal design for those students who were already assessed in the first cycle in the 6<sup>th</sup> and 10<sup>th</sup> grade. These students mostly attend the same schools in the second assessment cycle and they were in the 8<sup>th</sup> and 12<sup>th</sup> grade the second time. However, due to the 8 plus 4 system, after the 8<sup>th</sup> grade students change schools, thus, no such a link could be established between the 8<sup>th</sup> and 10<sup>th</sup> graders. Those students, who changed schools between the two longitudinally assessed grades, were not followed either. For the following analyses, altogether data are used for 4,958 students from the younger and 4,999 students for the older age group.

### **Instruments and processes**

Three language skills (reading, writing and listening) were assessed by paper and pencil achievement tests in the regular classroom settings at the end of the school years. The English and German tests were identical in their structure, type of texts and tasks and length. Besides the language tests, a general questionnaire, a questionnaire on language learning and an inductive reasoning test was administered to every participant in both assessment cycles. In addition to these, other instruments were administered to sub-samples of the 2002 project. In this paper, only the data of a mother tongue (Hungarian) reading comprehension test will be used, that was administered to each student in the 2002 assessment. Data collection was organized in a similar way in both assessment cycles.

In this paper, some items of the questionnaires, the data of inductive reasoning and language skills tests will be used on the longitudinal samples. When we focus on the predictors of foreign language achievements in some analyses the language knowledge measured in 2002 will be represented by one single variable. For this purpose, the equally weighted reading, writing and listening test results were transformed into a Z-scale and Z-scores of the three skills were summed up.

### **Results and discussion**

Since previous analyses indicated differences between students studying English and German in a number of aspects, first we compare these groups according to the variables that will be used in the later sections. The means of these variables for students learning English and German and the significance levels of differences are presented in Table 1.

Grade point average (GPA) characterizes students' general school achievements. These data are based on the local values of the school and subjective judgements of teachers. Language mark indicates how well students achieve in the particular foreign language. These data are also based on the judgements of the teachers, but however subjective these evaluations are, they provide the major feedback students receive about their language competencies at school. The attitudes towards learning language

represent how much students like to learn foreign languages at school. The intended level of education is a good indicator of students' academic ambition and a general attitude toward learning and formal education. Language learning plans indicate how important role the particular language plays in students' future plans (from quitting language learning up to studying it at university level). Parents' level of education is a good global indicator of the socio-economic status of the family. Language self concept is measured by a question inviting students to estimate how many scores they would gain at a foreign language test. Finally, the inductive reasoning test, comprised of verbal analogies, number series and number analogies, indicates the general intellectual developmental level of the students.

*Table 1. Comparison of students studying English and German*

	6 <sup>th</sup> grade			10 <sup>th</sup> grade		
	English	German	Diff. sign	English	German	Diff. sign
Grade point average	3.94	3.86	p<0.001	3.70	3.63	p<0.005
Language mark	3.86	3.71	p<0.001	3.85	3.68	p<0.001
Attitude toward language learning	3.74	3.59	p<0.001	3.82	3.59	p<0.001
The intended level of education	4.73	4.49	p<0.001	5.30	5.04	p<0.001
Language learning plans	3.37	3.09	p<0.001	3.28	3.03	p<0.001
Parents' education	6.08	5.52	p<0.001	6.09	5.72	p<0.001
Language self concept	65.04	61.83	p<0.001	63.92	60.36	p<0.001
Inductive reasoning	35.44	34.46	p<0.05	59.88	58.00	p<0.001

As Table 1 shows, there are usually minor, but statistically significant differences between students studying English and German. Those who learn English achieve better at school, get better marks in the foreign language, like more to learn their foreign language, their families enjoy a higher social status, they estimate their own language skills higher, and they are slightly more developed intellectually. Since the questionnaires and the inductive reasoning test were identical for the two age groups, the data of these groups are also comparable.

In this way, separating the analyses by the languages we may study different conditions of language learning. For the two languages and two ages, four longitudinal transitions can be modeled.

For a first overview of the relationships, the correlation coefficients of the language skills for the younger group studying English are presented in Table 2. In the three other groups, similar patterns of relationships were found, though the level of relationship in general was somewhat lower. For a comparison, in this table the relationships with the mother tongue reading test are also presented.

The highest correlations were found between the reading and writing skills tested at the same time (0.648 for 6<sup>th</sup> grade and 0.628 for 8<sup>th</sup> grade). Beyond the similarities of the underlying cognitive and linguistic processes of reading and writing, the high correlations may be attributed to the well-known phenomena that writing also develops by reading. Furthermore, some technical aspects of testing may also strengthen this relationship, e.g. writing tests also require some reading comprehension. As for the inter-age relationships, reading proved to be the most stable skill with a correlation of 0.580. The same is true for inductive reasoning:  $r=0.600$ . It is remarkable that both

assessments of inductive reasoning show stronger correlation with the 8<sup>th</sup> grade English reading achievements (0.453 and 0.487) than with the mother tongue reading assessed at the same time (0.368 and 0.420). An explanation of this may be that mother tongue reading is a more commonly mastered skill and the level of text comprehension in the first language does not distinguish so sharply between students with different intellectual capacities. On the other hand, a higher level of general intellectual skills may facilitate constructing meaning of a text in another language. Especially the processes of induction may be similar to that of meaning making. Reading in a first language requires less conscious knowledge, whereas in a foreign language readers rely more on conscious efforts, therefore on their higher order thinking skills.

*Table 2. Correlations between test results on language skills and inductive reasoning tests*

Assessment grade	Skill	6 <sup>th</sup> grade			8 <sup>th</sup> grade				
		Inductive reas.	Engl. reading	Engl. writing	Engl. listening	Inductive reas.	Engl. reading	Engl. writing	Engl. listening
6 <sup>th</sup>	English reading	0.451							
	English writing	0.461	0.648						
	English listening	0.386	0.492	0.534					
8 <sup>th</sup>	Inductive	0.600	0.412	0.458	0.386				
	English reading	0.453	0.580	0.520	0.417	0.487			
	English writing	0.499	0.537	0.518	0.382	0.463	0.628		
	English listening	0.368	0.412	0.430	0.401	0.438	0.553	0.495	
	Hungarian reading	0.368	0.360	0.391	0.344	0.420	0.326	0.345	0.268

n>2100, p<0.001 for each coefficient

On the basis of the relationships between the data collected in 2000 and the achievements measured in 2002, factors influencing the success of language learning can be estimated. In other words, we can explore the characteristics of those students who benefit the most, compared to the others, from language education and opportunities to learn foreign languages in and out of school. These analyses will be performed by the means of multiple regression.

Figure 2 presents the base model for these regression analyses with the data of the younger group studying English. Beyond the variables presented in Table 1, the achievements on the language tests at the first assessment point are used as independent variables in these models. These variables were selected out of the available data on the bases of correlations so that they represent several areas of conditions that affect language learning. The figure shows the proportion of the variance of the dependent variable (language knowledge of the students at the end of grade 8) explained by the independent variables in percentages (correlation coefficient multiplied by beta and by 100).

As expected on the basis of the correlations presented in Table 2, the best predictor of the overall language knowledge in grade 8 is the level of reading comprehension measured in grade 6 (14.6 %). The other components of preliminary knowledge, the two other language skills have smaller contributions to the variance

explained. In this case, the second best predictor of the language knowledge is the score on the inductive reasoning test.

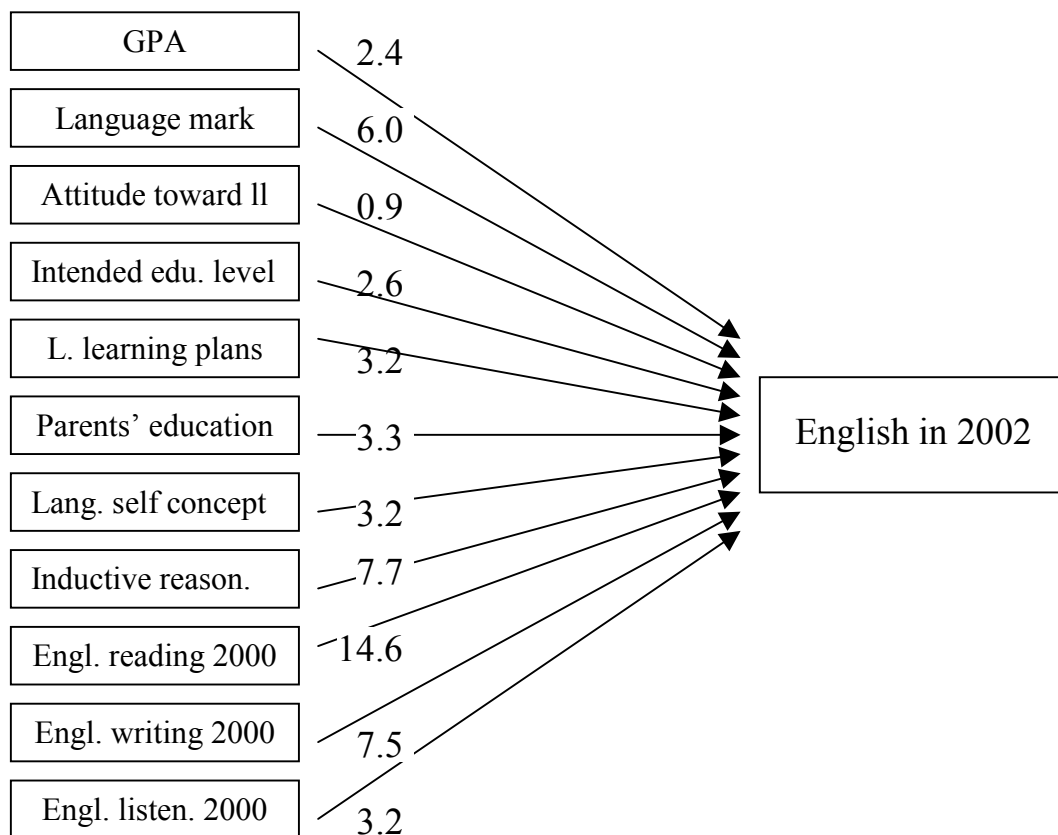


Fig. 2. The regression model data of students learning English assessed in 6<sup>th</sup> grade and 8<sup>th</sup> grade

The same regression model was applied to the other three groups. The results of the four analyses, the proportions of the variance explained by the independent variables are summarized in Table 3.

Although the data suggest a different picture for each group, there are some similarities between them. The most remarkable common feature is that in each case the preliminary level of language knowledge explains a large proportion of the variance of the language knowledge measured two years later. The developmental level of the three skills altogether explains 26.3% and 22.3% for the two groups of English learners, and 17.9% and 42.8% of variance in the case of the two German groups. Reading and writing skills play major roles, while listening skills explain a smaller part of the later language knowledge. Reading skills are especially important in the case of German in both ages. Within the three skills there are fluctuations in the actual percentages and these can be attributed to the varying achievement levels measured in these skills.

Beyond reading test scores, no other variable was found to have a consistently significant impact in all four groups. Inductive reasoning has significant effects in three groups, and so has GPA in the same three groups. The older German learning group is an exception in these cases. This German group is exceptional in some other aspects as

well. In this group, an extremely high proportion (21.7%) of variance is explained by the writing skills.

*Table 3. The percentage of variance of language knowledge explained by the values of variables assessed two years earlier*

Independent variables: measured in the first assessment (in 6 <sup>th</sup> or 10 <sup>th</sup> grade)	Dependent variables assessed in the second assessment			
	English in grade 8	English in grade 12	German in grade 8	German in grade 12
Grade point average	2.4	5.0	7.6	0.0
Language mark	6.0	1.4	3.8	0.5
Attitude toward learning language	0.9	0.6	2.0	3.6
The intended level of education	2.6	1.2	0.0	0.2
Language learning plans	3.2	1.9	0.9	2.0
Parents' education	3.3	2.2	0.0	0.3
Language self concept	3.2	0.6	4.3	2.9
Inductive reasoning	7.7	2.1	4.6	1.3
Reading	14.6	5.7	17.6	17.3
Writing	7.5	11.0	0.3	21.7
Listening	4.2	5.6	0.0	3.8
Total variance explained (R <sup>2</sup> )	55.7	47.2	41.1	53.2

Attitudes towards language learning have significant effects only in the German groups. In contrast, parents' educational level has significant effects only in the English learning groups. These phenomena may be explained by the specific contexts of learning these languages in Hungary. English is more popular among "upper class" families and these families may afford extra means and incentives to facilitate their children's learning. As for the case of German learners, this language is less popular, and it is considered more difficult to master. So, if someone likes to learn it, it really makes a difference.

The analyses presented here indicate that although there are some major tendencies, no strict universal patterns have been identified in the factors that determine success in foreign language learning. Each language is a different case and influencing factors changing by age. Further, more detailed analyses are necessary to understand the details of these learning processes and how they contribute to differences.

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