The relationships between 8th graders' L1 and L2 reading skills, inductive reasoning and socio-economic status in early English and German as a foreign language programs

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A R T I C L E   I N F O

Article history:
Received 20 January 2017
Received in revised form 31 October 2017
Accepted 1 November 2017
Available online 8 November 2017

A B S T R A C T

Recent studies have examined how individual differences interact with language choice and achievements. This study analyzes how students' cognitive skills and achievements in English and German reading comprehension depend on parents' level of education. In 2015 data were collected in the Hungarian Educational Longitudinal Program from representative samples of 8th graders. A total of 1334 students learned English and 609 learned German. Online tests assessed students' reading comprehension in English and German, their L1 reading comprehension, inductive reasoning and SES. Children of more educated parents tend to choose English. However, in contrast with earlier research, no significant difference was found between the aptitude levels of the two groups. The impact of background variables is stronger in the group studying English. Mothers' education correlates more strongly with reading comprehension achievements in English (r = 0.401) than in German (r = 0.192). Regression analyses indicate that the impact of inductive reasoning is stronger than that of SES. A stronger relationship was found between inductive reasoning and English reading test results (r = 0.570) than with German reading (r = 0.454). Background variables influence development in English and German differently. Inductive reasoning plays a more important role in studying English, whereas L1 reading comprehension achievements more greatly impact reading in German.

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1. Introduction

Various models have been proposed and tested to predict how proficiency in modern foreign languages (L2) develops and what best predicts success over time (e.g., Ellis, 2008; Mitchell, Myles, & Marsden, 2013). There is a need to examine how models that work with students of different ages in one context can be applied for young language learners in other educational contexts. In this study, we examine how young learners' reading comprehension skills in their first language (L1 = Hungarian) interact with reading in their foreign languages (L2 = English or German) and what role two other variables play: inductive reasoning and socio-economic status (SES).

In the first part of the paper we summarize some of the relevant publications on previous research into these variables. We discuss how reading comprehension skills in L1 and L2 have been found to interact with one another and look into the role

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https://doi.org/10.1016/j.system.2017.11.001
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inductive reasoning and SES play in the level of language proficiency students achieve. Then, we present the main findings on these variables with a special focus on the educational context where the present study was implemented.

In the second part, we analyze the findings of a recent large-scale assessment project involving about 2000 learners of English and German in the last year of their primary-school education (year 8, age 14). By discussing how findings of this study compare to previous research we hope to highlight some recent trends and to offer ideas for further research and recommendations for teaching methodology and language policy.

2. Background to study

The literature on the complex ways in which reading comprehension skills are related in L1 and L2, and what other factors impact their development in the early stages of literacy development is vast (e.g., Baker, 1996; Bialystok, 2002; Cummins, 2000; Hulstijn, 2006, 2015; Koda, 2007; McKay, 2006). The stance proposed by Hulstijn (2006, 2015) offers a sensible starting point for research. He suggests that studies should focus on how language specific cognition interacts with other types of cognition. This is what we set out to examine in the present study.

Inductive reasoning is one of the most often studied general cognitive skills, as it is related both to acquisition (Vainikainen, Hautamäki, Hotulainen, & Kupiainen, 2015) and application of knowledge in new contexts. It is also a key component of problem solving (Resing, Bakker, Pronk, & Elliott, 2016, 2017). There are several approaches to assessing inductive reasoning. For international comparisons culture-free tasks, such as missing pieces of a puzzle, figural matrices, analogies or series are preferred. Whereas in culturally homogenous educational contexts items on verbal or numeric analogies or series work best (Csapó, 1997; Molnár, Greiff, & Csapó, 2013).

There are two reasons for including an inductive reasoning test in the study. First, it is well known that students’ SES impacts their school achievement in all domains. However, its impact is not equally strong on different types of achievements. The impact is stronger in fields where the families’ cultural capital directly exerts its influence. For example, mothers’ vocabulary and the number of books available at home may influence students’ language arts performances. Whereas this impact on students’ mathematics and science achievements or on their fluid intelligence is less manifest. Among others, this is reflected in the PISA assessments, as for Hungary 21% of the variation in science performance, 23% in mathematics performance and 26% in reading performance is explained by students’ SES (OECD, 2010, 2013, 2016). Therefore, it is worth exploring the overall impact of students’ SES on L2 achievements, and how much direct impact remains if it is controlled for students’ general cognitive abilities. In this study, students’ general cognitive ability is measured by an inductive reasoning test. Many intelligence tests (focusing on fluid intelligence, e.g., Raven’s Progressive Matrices) include inductive reasoning tasks. In studies on L2 performances an inductive reasoning test is better for the purpose of a control variable than an intelligence test because of its clearer validity, and also because inductive reasoning is also trainable and it is amenable to education (Klauser & Phye, 2008).

The second reason is that language learning involves inductive processes. Language learning aptitude has been found to be the most important predictor of mastering an L2 in a range of studies, including ones on Hungarian L2 learners (Kiss & Nikolov, 2005; Ottó & Nikolov, 2003). As aptitude measures tend to include inductive reasoning, a validated test was used. Mastering grammar rules from examples and learning word meanings in context involve inductive processes. This involvement of inductive processes may vary from student to student (e.g., Felder & Henriques, 1995 distinguished inductive and deductive learners), and may be different for different languages as well. Previous studies involving Hungarian learners of English and German found differences in how strongly inductive reasoning predicted L2 proficiency. For example, Csapó and Nikolov (2009) concluded that inductive reasoning assessed in Year 6 correlated with Year 8 English reading, writing and listening at 0.446, 0.475 and 0.359 respectively, whereas the same correlations for German skills were 0.345, 0.391 and 0.252.

As for students’ socio-economic status, a number of different indicators have been used to characterize SES. International studies (such as Programme for International Student Assessment, PISA) apply a number of different background variables. As the impact of these may vary from country to country, cross-country comparisons are more valid if a broad array of variables is used (Kuger, Klieme, Jude, & Kaplan, 2016). Out of these variables, in PISA a complex index of economic, social and cultural status (ESCS) is composed (OECD, 2016). As usually strong correlations are found between the background variables, for national assessments, fewer variables suffice to meaningfully represent students’ SES. For example, in Hungary, type of settlement does not have a unique contribution to the variance in students’ achievements. Although there are large differences between learners’ achievements in villages and cities, these are fully explained by the differences in the educational level of the students’ parents living in these two environments. So far the single best SES variable explaining most of the variance in students’ achievements has been their mothers’ level of education (Csapó, 2003).

It is known from international and national assessments that in Hungary there is a particularly strong relationship between students’ school achievements and their SES. For example, in the latest PISA assessment of science, Hungary showed the second largest difference between disadvantaged and non-disadvantaged students in the odds of achieving scores below level two (OECD, 2016, p. 222). Similarly, the ratio of resilient students (who are in the bottom quarter of the PISA index of economic, social and cultural status but perform in the top quarter) is very low (OECD, 2016, p. 223). A cross-sectional study based on large representative samples of the Hungarian school population has indicated that students whose mother has a university degree reach the same developmental level by year 7 as students whose mother has eight years or less schooling by year 11 (Csapó, 2003).
The latest PISA survey results indicate that Hungarian students’ achievements have been declining since the beginning of the PISA studies. The largest drops were found in reading literacy between 2012 and 2015. The high ratio of students achieving below level two (over 25% at each assessment domain) is alarming (PISA represents students’ achievement at six levels; level two is minimum acceptable competence). The strong impact of students’ SES on their achievements is another perennial fact in the PISA studies. In PISA 2015, the ratio of variance in science achievement explained by economic, social and cultural status of students was the highest for Hungary (21%), and much higher than the OECD mean (13%, see: OECD, 2016). Therefore, it is important to examine how SES impacts outcomes in English and German reading achievements.

The current language learning situation in Hungary has been shaped by various changes in recent history. After the political changes in the early 1990s, German and English became the two most frequently learned foreign languages (earlier, Russian was mandatory for decades). The choice between them has been influenced by several interacting factors (Csapó, 2001; Medgyes & Nikolov, 2014). In Hungary proficiency in foreign languages, especially English and German, has been considered a high priority by parents, students, policy makers and the job market (Dorney, Cizer & Nemeth, 2006; Medgyes & Nikolov, 2014). Despite significant investments into teacher education, intensive and early language learning and dual language education programs since the change of regime in 1989, public education has largely failed to come up to expectations. The levels of proficiency students attain upon graduation from high schools lag behind what they would need in order to find a job or to become successful in their tertiary studies.

According to a recent survey (Eurobarometer, 2012), only 35 percent of Hungarians claimed to be able communicate in a foreign language. Despite this extremely low ratio and generally low level of proficiency in foreign languages in the population, some students are highly proficient in more than one L2. They are the exception rather than the rule indicating huge differences in what schools offer. Parents of successful learners invest in foreign language learning by choosing better schools and foreign language programs. Public education, as indicated in the PISA studies, boosts differences in the student population rather than equalizing them. As proficiency in foreign languages, especially in English, is an important asset, stakes are high in foreign language education.

In recent years, the popularity of English and German has been changing gradually, due to the influence of the internet and popular culture, and the increasing importance of English as cultural capital. In addition to these trends, over the last two decades a range of early start programs and various types of intensive and dual language curricula have been offered in public schools (Nikolov, 2009, 2016a, 2016b). Schools compete for students and for state funding by offering better quality foreign language programs, but there is still a shortage of well qualified teachers of English. More educated parents tend to make sure that their children get into groups learning English rather than German. These dynamic changes impact the relationships between students’ SES, language choice and achievements in unique ways.

An interesting interplay has been observed between the foreign language (English or German) that students study, the length, intensity and success of various L2 curricula they follow; and their SES and other individual difference variables (Nikolov & Józsa, 2006; Nikolov & Szabó, 2015; Nikolov, 2016b). Access to English has been limited by what schools offer and the demand for good quality English education has had a higher prestige than opportunities to study German or other L2. Previous studies have consistently showed that language choice is determined by students’ SES (indicated by parents’ level of education). More students want to learn English than schools can accommodate and students are often streamed according to their abilities and achievements in other school subjects. Learners of English are more motivated than their peers studying German, and performances in English tend to be significantly better in large-scale assessment at all stages of public education. These characteristics motivate the present study into the relationship between students’ abilities, SES and which of the two foreign languages they study.

Since the 2000s, large-scale L2 assessments have been implemented in Hungary in two phases: (1) in the early 2000s and (2) in 2015. Studies conducted in the first phase examined how 8th graders’ individual differences interact with their language choice and achievements (Csapó & Nikolov, 2009; Nikolov & Csapó, 2010; Nikolov & Józsa, 2006). Findings indicate that parents tend to influence when and which foreign language their children start learning first and they also impact their general cognitive development and educational achievements, including their results in learning L2. Therefore, the impact of students’ SES on their achievements in L2 is a result of complex interactions of several variables.

In the second phase, recent national assessment projects initiated by the Hungarian government also document these trends. However, no data were collected on individual variables. In the spring of 2015, all 8th graders were assessed in three skills (listening, reading, and writing) in English and German. Two types of curricula were included with different achievement targets. Students in regular L2 programs (between 3 and 5 weekly classes starting any year between year 1 and 4) are expected to achieve A2 level proficiency (Tanulmány, Idégen nyelvi mérés, 2015). The target level for their peers in so called dual language schools (where some of the school subjects are taught in English or German, is B1 (Erdemények összesítése & Célnyelvi mérés, 2015; Nikolov & Szabó, 2015). Participants were all 8th graders. They were assessed in English and German at all schools in the spring of 2015. The English tests were completed by 61,826 students, whereas the German tests were taken by 22,842, following regular curricula. Thus, the percentage of students learning English and German was 73% vs. 27%. In the dual language programs, 1067 students completed the English and 432 the German tests. Their percentages were similar to those in the previous group: 75% vs. 25%. In contrast with results of a survey 15 years earlier (Csápo, 2001), the ratio has dramatically changed. In 2000, the ratio of students learning English and German was the same.

As for the results, in both programs, 8th graders learning English outperformed their peers learning German. At A2 level in the traditional programs, they achieved 70.5% and 58.5%, and in the dual language schools at B1 level, 84% and 78%, respectively. Although the constructs of the assessments are similar to those of the tests used in the present study, the results
are not directly comparable. First, these two national assessments targeted higher levels (A2 and B1) due to changes in the curriculum, whereas the present study focused on A1 and the lower band of A2, in line with earlier curricular targets. Alternately, in the present study only L2 reading skills were assessed with the help of five tests and further data were collected with other instruments. In the national projects only two L2 reading comprehension tests were applied and detailed data on the outcomes are not publicly available.

The present study was motivated by the need to include individual differences in a large-scale assessment project in order to examine how the influence of L1 reading comprehension skills, inductive reasoning and SES on English and German reading comprehension achievements has changed in recent years.

3. The study

3.1. Context of study

Data for this study were collected in the Hungarian Educational Longitudinal Program assessing students’ development in various school subjects over their eight years in public education (Csapó, 2007, 2010, 2014). Reading comprehension tests in the two most widely taught foreign languages, English and German are included in the program; 8th graders’ datasets collected in 2014 and 2015 were used for the analyses.

3.2. Research questions

(1) How are the choice of L2 (English or German) and students’ SES related?
(2) What are the relationships between achievements on reading comprehension tests in L2 and L1, inductive reasoning, and SES?
(3) How are participants’ reading comprehension skills in their L1 (Hungarian) and L2 (English and German) related?
(4) How do 8th graders’ reading comprehension skills in L1 and L2 interact with their inductive reasoning?

3.3. Participants

The sample of participants was drawn from Hungarian public schools representing students in seven statistical regions of the country and schools located in settlements of different sizes proportionally. The representative sample comprised 1334 learners of English (49% boys) and 609 students of German (47% boys). Thus, a total of 1943 8th graders (age 14) filled in the data collection instruments. The percentages of students filling in the English and German reading comprehension tests were 68.7% and 31.3%, respectively, very similar to the ratios found in the national assessments conducted in 2015 (Eredmények összesítése & Célszinti mérés, 2015; Tanulmány, Idegen nyelvi mérés, 2015).

3.4. Instruments

Four instruments were used. All were validated in previous research (L2 tests in 2002; see Csapó, 2014; Csapó & Nikolov, 2009) both in paper-and-pencil and online versions prior to use in the present study.

(1) Structurally equivalent English and German reading comprehension tests were used online to assess students’ L2 reading skills (Table 1);
(2) Four equivalent versions of paper-and-pencil Hungarian reading comprehension tests assessed students’ L1 reading skills;
(3) Students’ general cognitive abilities were measured by an online inductive reasoning test; (4) Participants’ socio-educational status was tapped by a short questionnaire (Table 3).

Five English and five German reading comprehension tests were included in the online assessments. They were estimated to cover a relatively wide range of proficiency (A1 and lower band of A2 on the Common European Framework of Reference levels, Council of Europe, 2001) in line with earlier requirements for 8th graders in the national curriculum.

Table 1
The online English and German reading comprehension tests.

<table>
<thead>
<tr>
<th>Number of test</th>
<th>Task</th>
<th>Input text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading 1</td>
<td>Match word with appropriate sentence</td>
<td>Definitions of words</td>
</tr>
<tr>
<td>Reading 2</td>
<td>Match notice with meaning</td>
<td>Public notices and their meanings</td>
</tr>
<tr>
<td>Reading 3</td>
<td>Match question with answer</td>
<td>Interview from youth magazine</td>
</tr>
<tr>
<td>Reading 4</td>
<td>Match question with answer</td>
<td>Quiz texts for teenagers</td>
</tr>
<tr>
<td>Reading 5</td>
<td>Match short ad with missing word</td>
<td>Advertisements</td>
</tr>
</tbody>
</table>
3.5. Procedure

Data collection in the overall longitudinal project started when students entered primary school. They were assessed every year in several domains by paper-and-pencil test in their first years (not analyzed in this paper) and with the help of an online testing platform (eDia) in their 8th grade. All instruments (except L1 reading) were administered via the eDia platform in computer rooms at schools. Students had 45 min to take the inductive reasoning tests and the questionnaire on their SES in their 8th grade. All instruments (except L1 reading) were administered via the eDia platform in the parents are the more often their children are placed in groups learning German and not English. These trends may be linked.

As indicated in Table 2, the means on the English reading tests was significantly lower than that of the German tests. The reliabilities of both L2 best batteries were high: Cronbach’s Alpha 0.943 for the English reading tests, and 0.935 for the German reading tests. The mean on the Hungarian reading comprehension tests was higher (74.1 and the standard deviation was lower (no item level data were saved in the database). Cronbach’s Alpha values for the four L1 tests ranged between 0.706 and 0.718.

In addition to the L2 and L1 tests, an inductive reasoning test was also used. It comprised verbal analogies, number analogies, and number series tasks in Hungarian. This test was found to assess students’ general cognitive developmental level reliably (Csapó, 1997, 2003; Molnár, Greiff & Csapó, 2013). It was used in previous research to measure the cognitive contribution to achievements in English and German listening and reading comprehension and writing skills (Csapó & Nikolov, 2009). This time an online version was applied.

Students’ SES was measured by their parents’ level of education on a 6-point scale. This questionnaire was used in a range of educational research studies in Hungary. Students were asked to specify their mothers’ and fathers’ highest level of education from these options: (1) did not graduate from 8-year primary school; (2) 8-year primary education; (3) vocational school; (4) high school diploma; (5) undergraduate degree; (6) graduate degree. A combined parents’ education index was computed by adding up mothers’ and fathers’ data.

3.6. Results and discussion

3.6.1. Relationships between choice of L2 (English or German) and students’ SES

Previous studies conducted over a decade earlier found a thought provoking relationship between students’ SES and choice of L2. The more educated the parents were, the more probable it was that their offspring studied English (Csapó & Nikolov, 2009; Csapó, 2001; Nikolov & Csapó, 2010; Nikolov & Józsa, 2006).

As the data in Table 3 indicate, the earlier trend is confirmed in the present study. Both parents of students learning English are better educated. The percent of mothers and fathers with an undergraduate or graduate degree is 24.7 and 18.6 (17.0 + 7.7; 10.6 + 8.0). The percentages characterizing parental education for learners of German are 18.2 and 11.4 (13.7 + 4.5; 6.9 + 4.5) for mothers and fathers, respectively.

This outcome is due to the fact that there has been a higher demand for places in English classes than schools can offer and parents who are more aware of the importance of English in their children’s life make sure that they learn the more desirable L2. Less educated parents may be less willing or able to enforce this principle or they may not associate English with cultural capital. The schools fill up the German classes with students whose parents do not demand English. Thus, the less educated the parents are the more often their children are placed in groups learning German and not English. These trends may

<table>
<thead>
<tr>
<th>Tests</th>
<th>M (SD)</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>54.3 (24.7)</td>
<td>0.943</td>
</tr>
<tr>
<td>German</td>
<td>45.0 (24.3)</td>
<td>0.935</td>
</tr>
<tr>
<td>Hungarian</td>
<td>74.1 (14.9)</td>
<td>0.706-0.718†</td>
</tr>
</tbody>
</table>

† The lowest and highest values of the four paper-and-pencil tests.
negatively impact students’ motivation (Nikolov, 2008), which may ultimately result in lower proficiency, since they learn German and not the more favored English.

3.6.2. Relationships between achievements on reading comprehension tests in L2 and L1, inductive reasoning, and SES

First, we analyze data on students’ general cognitive developmental levels (Table 4). The means of inductive reasoning scores are 35.89 for learners of English and 35.97 for students studying German. Thus, there is no measurable difference in inductive reasoning in the two groups of L2 learners. This finding is surprising, as it is not in line with previous research results. In similarly representative cohorts, significantly higher levels characterized learners of English than their peers studying German in data collected in 2002 (Csapó & Nikolov, 2009). The reasons why in this dataset no significant difference is found for 8th graders learning English and German can only be guessed. Three reasons seem realistic to assume. Two of these relate to improvement in conditions of foreign language instruction and the third one concerns how the perceived usefulness of two target languages has shifted. First, most probably, in recent years, due to a general decline in the number of student populations, the lower number of students has allowed schools to better cater for students’ and parents’ needs. Streaming of students according to their abilities (more able students were “awarded” by learning English) is less typical than it used to be (Nikolov, 2008, 2016b). Second, schools must have managed to hire more teachers of English, as teacher education has caught up with schools’ needs. Now learning English is less of a privilege of able students and a larger percentage of disadvantaged students are studying it. Third, it may also be the case that a growing number of students and their parents bear in mind utilitarian reasons for learning German: proficiency in German may enable them to take job opportunities in nearby Austria and Germany.

In order to answer the second research question more specifically, the relationships for learners of English and German (Table 4) are further analyzed and compared with one another as well as with findings of previous studies. As Table 4 shows, the strongest relationship (0.570) is between inductive reasoning and achievement on the English reading comprehension tests. The mother’s level of education is more strongly correlated with both English reading (0.401) and inductive reasoning (0.357) than father’s education (0.372; 0.298, respectively). The results are slightly different in the case of German learners. Though, the strongest relationship (0.454) is still found between inductive reasoning and scores on the German reading comprehension tests, the mother’s and father’s education variables are similarly correlated with German reading (0.195 .196, respectively), but both data are lower than in the case of English reading. However, the relationship between inductive reasoning and mother’s education (0.262) is stronger than in the case of father’s education (0.230).

Comparing the correlation coefficients in Table 4, it is obvious that in all cases the values for German are lower. For both foreign languages, relationships are the strongest, although moderate, between students’ level of inductive reasoning and L2 reading comprehension. This result shows that inductive reasoning plays a more important role in the achievements on the English and German reading tests than SES (indicated by both parents’ education).

Two other relationships are also meaningful: the correlation between father’s and mother’s education in the case of English learners is higher (0.568) than in the case of their peers learning German (0.525). These results are very similar to findings of the previous study (Csapó & Nikolov, 2009) in which the actual data collection instruments were the same, except for two features. In the earlier project, all data were collected in paper-and-pencil format, whereas in this study all were online, except for the L1 reading tests, which were different (more valid and reliable) from the ones used earlier.

In order to compare the variables discussed so far with results on the Hungarian reading tests, Table 4 includes correlations between L1 and L2 reading comprehension test results. The correlation between Hungarian and English reading is higher

### Table 3

<table>
<thead>
<tr>
<th>Parents’ level of education</th>
<th>English</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed to graduate from 8-year primary school</td>
<td>1.8</td>
<td>2.2</td>
</tr>
<tr>
<td>8-year primary education</td>
<td>12.3</td>
<td>13.7</td>
</tr>
<tr>
<td>Vocational school</td>
<td>27.2</td>
<td>35.6</td>
</tr>
<tr>
<td>High school diploma</td>
<td>34.0</td>
<td>30.3</td>
</tr>
<tr>
<td>Undergraduate degree</td>
<td>17.0</td>
<td>13.7</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>7.7</td>
<td>4.5</td>
</tr>
</tbody>
</table>

<p>| Distribution of parents’ level of education (%) in the groups studying English and German. |
|----------------------------------|---------|--------|</p>
<table>
<thead>
<tr>
<th>Gender</th>
<th>English</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s education</td>
<td>0.330</td>
<td>0.324</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.283</td>
<td>0.306</td>
</tr>
</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>Variables</th>
<th>English阅读 comprehension test scores</th>
<th>Inductive reasoning</th>
<th>German阅读 comprehension test scores</th>
<th>Inductive reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 reading skills</td>
<td>0.574</td>
<td>0.357</td>
<td>0.499</td>
<td>0.306</td>
</tr>
<tr>
<td>Inductive reasoning</td>
<td>0.330</td>
<td>0.301</td>
<td>0.496</td>
<td>0.262</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>0.330</td>
<td>0.357</td>
<td>0.324</td>
<td>0.196</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.283</td>
<td>0.298</td>
<td>0.206</td>
<td>0.230</td>
</tr>
</tbody>
</table>

All correlations are significant at p < 0.001.
The patterns in the correlations for L1 and the other variables are similar to the ones discussed in Table 4 in that they tend to indicate stronger relationships for English learners. In the case of German learners, the correlations between L1 and L2 reading (0.499), and inductive reasoning and L1 reading (0.496) are very similar, and the relationship between inductive reasoning and German reading is somewhat weaker (0.454). The pattern is different in the case of English learners. The relationship between L1 and L2 reading (0.574) is the strongest, and almost identical (0.570) with the correlation between inductive reasoning and L2 reading, whereas the relationship between inductive reasoning and L1 reading is weaker (0.530). Inductive reasoning and L1 reading comprehension skills play a different role in the two groups.

These findings in Table 4 can be directly compared to results of the earlier large-scale study (Csapó & Nikolov, 2009). In the dataset collected in 2002, the relationships were as follows: In both groups, the relationships between L1 and English and German reading were weaker: (0.375 and 0.278, respectively), whereas correlation between inductive reasoning and English reading was 0.505, and between inductive reasoning and German reading was 0.427. Two important differences characterize the present study: (1) the correlations between Hungarian and L2 reading skills are higher for learners of English as well as for students of German, and (2) the interactions between L1 and L2 reading skills and cognitive skills are more similar in the two groups learning English and German.

As to why this is the case, the following explanation is offered. The L1 reading tests in the present study were different from the ones used earlier. In the earlier version (Csapó & Nikolov, 2009) two tasks were used and they both used short narratives and no other text type. In the new Hungarian reading comprehension tests, a wider range of text types, more items, and a wider range of test types were included. Most probably the new tests were more valid and reliable measures of L1 reading comprehension. This reasoning is further supported by findings of a study assessing a smaller sample of Hungarian 8th graders’ L1 and English skills (Mihaljevic Djigunovic, Nikolov, & Ottó, 2008). The English reading comprehension tests were identical with the ones used in the present study and in Csapó and Nikolov (2009). However, students’ L1 reading comprehension was assessed with five tests of different text and task types. The correlation between Hungarian and English reading comprehension was 0.564, very similar to the results in the present study (Table 4). Therefore, it is reasonable to assume that the relationships in the present study offer more valid and reliable insights into the relationships involving L1 reading comprehension than the study conducted in 2002.

In order to compare the role of parents’ education in L2 choice and L2 reading achievements, regression analyses were run with L2 achievements as dependent variables and mother’s and father’s education and inductive reasoning as independent variables (Table 5). The enter method was used; all independent variables were entered in one step. The regression analyses indicate that a higher ratio of variance is explained by inductive reasoning scores than students’ SES (parents’ education) in the case of both target languages. Overall, the total explained variance is higher ($R^2 = 0.384$) in the group of English learners than in the group of German learners ($R^2 = 0.216$). In the latter group parents’ education does not significantly contribute to explaining the variance in the German reading comprehension results.

In this regression model inductive reasoning has a far stronger impact on L2 reading achievements in both English and German than parents’ educational level. In the case of English reading comprehension, as the three variables explain altogether 38.4% of the variation in reading achievements, out of this, the share of inductive reasoning is 26.9%. Parents’ education still significantly contributes in this model. In contrast, in the case of German reading comprehension, 21.6% of the variance is explained and the impact of parents’ education is not significant; the contribution of inductive reasoning is 19.3% (Table 5).

### 3.6.3. The relationships between participants’ reading comprehension skills in their L1 (Hungarian) and L2 (English and German)

As is presented in Table 6, no significant difference was found in the level of inductive reasoning and a very small but (due to large sample sizes) still significant ($p < 0.05$) difference characterized the groups of students learning English and German. These results indicate that the two groups were equal in their general reasoning skill and very similar in their L1 reading, allowing a comparison of relationships computed parallel for these two groups.

Correlational analyses were conducted to answer the third research question by examining how students’ reading comprehension skills in Hungarian (L1) and English and German compared to one another. The correlations between L1 and L2 are somewhat different for English and German: $r_{HE} = 0.574$ ($p < 0.001$) and $r_{HG} = 0.499$ ($p < 0.001$).

To exclude the indirect impact of family background (SES) and general intellectual abilities, regression analyses were performed. In order to make the picture clearer, an index was composed for SES to represent the families’ cultural background in a single variable by combining mother’s and father’s educational level.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable: English R Square = 0.384</th>
<th>Dependent variable: German R Square = 0.216</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>$t$</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>0.149</td>
<td>5.227</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.146</td>
<td>5.245</td>
</tr>
<tr>
<td>Inductive reasoning</td>
<td>0.473</td>
<td>19.303</td>
</tr>
</tbody>
</table>
The differences in Table 7 are obvious. A larger amount of variance is explained in the case of reading comprehension in English (46.5%) than in German (29.4%) by these three independent variables. No significant direct contribution of parents’ education is seen in the case of German learners, whereas the contribution is significant in the group of English learners. The direct impact of L1 reading on L2 reading is larger for English reading (20.4%) than for German reading (17.8%). In other words, approximately 44% of the known explained variance in the case of English reading achievements can be attributed to Hungarian reading skills, whereas the percentage is about 61% for German reading achievements. These findings indicate that the level of reading comprehension impacts learners of English and German somewhat differently. These results overlap with previous outcomes where the explained variance was higher for English reading than for German reading (Csapo & Nikolov, 2009).

3.6.4. Interactions between 8th graders’ reading comprehension skills in L1, L2, and inductive reasoning

The last research question concerned the interactions between reading comprehension skills in Hungarian (L1), L2 (English and German), and students’ inductive reasoning. As was shown in Table 4, correlations between L2 reading and inductive reasoning were 0.570 for English and 0.454 for German. These data prompt further analyses of what role inductive reasoning plays. Regression analyses were conducted to analyze the extent to which the variables included in the model predicted students’ scores on the L2 reading comprehension tests. English and German reading achievements were used as dependent variables to determine the contribution of L1 reading ability and inductive reasoning (Table 8). In these analyses, parents’ education was omitted from the models in order to focus on the cognitive predictor.

In the case of English learners, inductive reasoning and L1 reading skills have similar path coefficients (beta: 0.370; 0.378), unlike in the group of German learners, where differences are larger between these coefficients (0.274; 0.363) (Table 8). These figures show that the contribution of cognitive abilities is less substantial in the group of German learners than in the group of English learners. In the latter group, the total explained variance is higher ($R^2 = 0.428$) than in the case of German learners ($R^2 = 0.305$). This result concerning learners of German can be attributed to a smaller impact of inductive reasoning.

In these models (Table 8), the direct contribution of inductive reasoning to the achievements in L2 reading comprehension (English: 21.1%, German: 12.4%) is smaller than in the previous models (Table 5) in which L1 reading achievements were not included. The direct impact of inductive reasoning is still much larger for English reading achievements than for German reading comprehension scores.

The reason why this is the case may be related to how Hungarian learners of English rely more successfully on inductive reasoning because they get more opportunities to guess meaning and rules in context. This hypothesis could have important implications for teaching methodology. In fact, if this were the case, it would support a key principle in how languages are learnt. However, inquiries into classroom practice found that both target languages tend to be taught rather traditionally even in the early years (Nikolov, 2008, 2009). Extracurricular exposure to English may also play a role, as a lot of intrinsically motivating cultural materials are available on the internet in English. Thus, more autonomous learning may occur in English than in German. Parents may also contribute to their children’s English learning by simply making resources available and by modeling how they use English for various purposes. It may also be the case that other components of language learning aptitude contribute to language proficiency in English and German differently.

Another approach to finding the reason may relate to cross-linguistic influence and linguistic distance between Hungarian, not an Indo-European language, and English and German. Although Hungarian is not included in lists of linguistic distance, it would make sense to hypothesize that the learnability of English and German varies for Hungarian learners. Recent studies on the explanatory power of cognate and genetic linguistic distance measures (including morphological and lexical distance) offer some new insights into how certain languages interact (e.g., McMahon & McMahon, 2005; Schepens, Van der Slik, & Van Hout, 2013; Van der Slik, 2010); however, this focus is beyond our inquiry. In fact, due to its complex morphology and transparent spelling system, German should be easier to learn for Hungarians, which is not the case in the dataset.

Table 7
Regression analyses with L2 reading achievements as dependent variables and L1 reading, parents’ level of education and inductive reasoning.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable: English R Square = 0.465</th>
<th>Dependent variable: German R Square = 0.294</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta t Sig</td>
<td>Beta t Sig</td>
</tr>
<tr>
<td>Hungarian reading</td>
<td>0.356 13.685 0.000</td>
<td>0.358 8.153 0.000</td>
</tr>
<tr>
<td>Parents’ education</td>
<td>0.191 8.043 0.000</td>
<td>0.031 0.777 0.438</td>
</tr>
<tr>
<td>Inductive reasoning</td>
<td>0.309 11.779 0.000</td>
<td>0.256 5.939 0.000</td>
</tr>
</tbody>
</table>
4. Conclusions and recommendations for further research and language policy

The present study has contributed to the field of applied linguistics in multiple ways. It was conducted in a context where SES has been found to strongly impact students’ school achievements and due to societal and historic reasons English and German have played uniquely different roles. It examined how SES and cognitive abilities influence reading comprehension achievements in two foreign languages.

An important change was found in language choice: in contrast with an equal ratio of students learning English and German in 2002, in the present study, three out of four students studied English and one learned German. This finding is in line with national assessments conducted in 2015. It may reflect more equal opportunities for young learners to study the more desirable English language associated with high culture capital. However, it is still true that more educated parents’ children more typically have access to English than children of less educated parents. Also, achievements in English reading comprehension are significantly higher than in German. More research is needed to find out how these relationships concern the quality of programs students attend (earlier and more intensive curricula). This project did not allow us to collect data on finer details, but it would be important to examine in national assessment projects how students’ achievements on all L2 skills in English and German relate to their SES and the quality of their school programs.

Results of the present analyses as well as those of earlier studies clearly indicate the complex interactions between students’ language choice, inductive reasoning, SES, and reading comprehension achievements in L1 and L2. The strengths of the determining factors vary for reading comprehension in Hungarian and English and German. Large-scale studies like the present one are useful for drawing the larger picture, for testing models, and offering insights into how things are in general. In this respect, the findings are similar to those found in the dataset collected over a decade earlier, except for the role inductive reasoning plays in L2 reading comprehension achievements. Further research is needed to explain the relationships found in the present study. As was pointed out, inductive reasoning seems to play a more decisive role in reading comprehension achievements in English than in German. Whether this is a result of classroom methodology or is related to the linguistic features of the target languages is to be the focus of further research on learnability of foreign languages. In the present project, only inductive reasoning was measured. It would be useful to examine how deductive reasoning, phonemic awareness and memory interact in the development of listening comprehension, speaking and writing skills. These areas are under researched and should offer new insights into how the variables studied interact in smaller scale or case studies. Triangulation of data would allow researchers to analyze and understand how the details, not visible in large datasets, work out locally and over time.

It would be useful to explore (1) why and how SES interacts with learners’ cognitive and language abilities in particular classrooms in Hungary and in other countries; (2) in what particular ways learners of English apply their cognitive abilities compared to other foreign languages; (3) how parents impact their children’s attitudes and motivation to study English and other languages at school and in their free time; (4) how these variables are impacted by classroom-related variables, including quality and quantity of practice, teachers’ language and pedagogical skills, motivation, beliefs, etc. As everything else in language learning, these variables interact dynamically. Therefore, in addition to cross sectional studies, longitudinal research is also needed and certain qualities of the languages should also be included (e.g., linguistic distance). Further research is necessary to examine how relevant these issues might be in other educational contexts, where students’ first languages may vary.

Besides the results, we also point out the limitations. In all models of foreign language learning, multiple variables impact learning outcomes in L2 proficiency. These include individual differences (aptitude, motivation, anxiety, SES, etc.), language and classroom related variables, etc., and they tend to interact over time in a dynamic fashion. It is not feasible to include all variables. Decisions have to be made what to focus on and what to exclude, as the number of instruments students can be expected complete is limited. Students’ motivation, how it is mediated by parents and teachers, other components of their aptitude, L1 and L2 skills should also be studied, especially speaking.

Finally, there are important recommendations for language policy. Students’ SES plays an important role in (1) which foreign language students can learn and (2) how successful they are. All students should be given an opportunity to study the language they are motivated to learn and good quality programs should be available to everyone. Schools should offer more help to disadvantaged students rather than favoring more privileged ones. A lot more data should be collected in national assessment projects on key variables impacting language learning success in order to take action based evidence to improve foreign language education.

<table>
<thead>
<tr>
<th>Table 8 Regression analyses with L2 reading achievements as dependent variables and inductive reasoning and L1 reading.</th>
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</thead>
<tbody>
<tr>
<td>Independent variable</td>
</tr>
<tr>
<td>Beta</td>
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<tr>
<td>Inductive reasoning</td>
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<tr>
<td>Hungarian reading</td>
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</tbody>
</table>
References


