

Spelling skills of Czech primary school children in relation to the method of literacy instruction

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Abstract

This study investigates the importance of having a set reading instruction method for the development of spelling skills among Czech children ranging in age across the four beginning grades of primary school. 238 children learning to read and spell using an analytical-synthetic method and 251 children learning to read and spell using a genetic method participated in this study. The outcomes of word spelling tests were assessed for the different grade and age levels: first, second- third and fourth. Distributional patterns of spelling skills performance for both instruction method subgroups were created in each of the grade groups. Comparisons of spelling task outputs between both methods were conducted using a non-parametric Mann-Whitney test. Results indicate that children using the genetic method are more effective in acquiring phoneme-grapheme correspondences throughout the first grade, and thus show more accurate word spelling in the first grade spelling task. However, this initial advantage for children learning to spell using the genetic method soon disperses, and it is not reflected in better spelling performance throughout the second to third and fourth grade.

Key words: spelling, literacy, reading instruction method, spelling test, genetic method

Introduction

Spelling is an important aspect of literacy development. Children's explorations within the spoken language representations, or so called invented spellings (Read, 1971; Ouellette & Sénéchal, 2008), are very often the first important signs of emerging literacy. However, spelling is a complex task that requires a long term process of learning (Hagtvet & Lyster, 2003; Caravolas, 2004), which is rooted in systematic instructional strategies. Put simply, spelling in alphabetic languages is a transfer of phonological, morphological, and grammatical information from speech to the orthographic code. It is founded on three basic skills: 1) the ability to consciously manipulate speech at the level of phonemes (this ability is referred to as phoneme awareness), 2) knowledge of letters of the alphabet, and 3) the ability to learn correspondences between phonemes and

letters or graphemes (i.e. letter strings of letters used in correspondence with phonemes) mapped by the speed of the so called RAN- rapid automatized naming of visual items like objects, digits or letters (Caravolas, Hulme, & Snowling, 2001; Caravolas et al., 2012; Lervåg, Bråten, & Hulme, 1997). However, development of conventional spelling also requires the integration of further skills, such as syntactic and semantic knowledge, knowledge about morphology, and knowledge of orthographic rules and the conventions involved. Therefore, it takes time to learn, and this typically poses a difficult task for children throughout the whole period of primary school education.

A large body of research evidence about the development of early spelling skills in school age children is now available for many alphabetic languages (Caravolas et al., 2001 for English, for consistent orthographies similar to Czech for example: Aarnoutse, Van Leeuwe, Voeten, & Oud, 2001 in Finish; Landerl & Wimmer, 2008 in German; Notarnicola, Angelelli, Judica, & Zoccolotti, 2012 in Italy; Mikulajová, Váryová, Vencelová, Caravolas & Škrabáková, 2012 in Slovak, etc.). However, for Czech language there have been few published studies addressing the issues of early spelling skills development. Studies on the spelling development of Czech children could be (with no exaggeration) counted on the fingers of one hand. Studies in international journals reporting some data on spelling development are mostly represented by the cross-linguistic studies of Markéta Caravolas: descriptive data on early spelling skills in late preschool and first primary school grade Czech children could be found in Caravolas & Bruck (1989), while data from older primary school children aged between 7 to 11 are reported in Caravolas, Volín & Hulme (2005). In both studies spelling is assessed and analysed as a concurrent measure, and this serves a different role rather than being used for descriptive developmental purposes. More studies on spelling development in Czech children have been published, but only in the Czech language. For example, Kučera & Viktorová (1998) provided an extensive report rooted in a qualitative research approach called school ethnography. Their study draws data from structured observation in primary school classrooms and provides a detailed description of the process of spelling acquisition and its instruction, socio and cultural aspects of literacy training, and the general educational context related to literacy development in Czech primary schools. However, the study does not report any measures of early spelling skills, and also reports almost no concrete comparable developmental data. A study by Kucharská & Veverková (2012) with Czech first grade children provided general descriptive data on spelling, concentrating mainly on error analyses. The study served the purpose of providing an example of good practice for assessment procedures in psychological and educational counselling contexts.

To the best of our knowledge, the only developmental descriptive data on spelling abilities of Czech primary school children were published by Caravolas & Volín (2005) as a part of manual for a literacy assessment battery for young primary school children. This assessment battery covers norms for children from the 2nd to the 5th grade. There are no such data available for Czech first graders.

The present study was therefore motivated by the limited amount of basic research on spelling skills development with Czech monolingual primary school children. The general aim of this study is to examine the developmental flow of spelling skills in Czech primary school children from 4 successive early years (1st, 2nd, 3rd and 4th). The specific aim of this study is to test for possible differences in spelling skills between children learning to read and spell by the two most dominant current methods of literacy instruction in the Czech Republic: the so called analytical-synthetic method (AS), and the genetic (G) method (see below for a detailed description of both methods). The issue of possible differences among children being taught spelling within genetic or analytical- synthetic method holds a huge practical relevance for primary school practices. To the best of our knowledge no study testing this influence has thus far been published.

The possible influence of reading instruction methods was previously researched in Czech in relation to the quality of reading skills, fluency, and comprehension (Kucharská & Barešová, 2012; Kucharská & Wildová, 2015). Kucharská & Barešová (2012) followed approx. 400 children in three successive measurement times within the first two school years (middle of the first grade, end of the first grade, and middle of the second grade). The development of reading skills of children from both method groups was described. The study aimed to identify possible differences at the level of reading speed and technique, error rates, and reading comprehension. The authors report significantly better reading speed and lower error rates at the time of the first measurement point (measured as words per minute) of the children using the G method in comparison to the first grade children using the AS method. Also, the maximum error rate was much higher in the AS group (20%) than in the G group (5%), showing a larger variability at the level of errors in the AS group children. Throughout the following months of the first and second grade these differences gradually disappeared. The bigger differences, again favouring the G method children, were described for reading comprehension measures: Children using the G method outperform AS groups in reading comprehension steadily throughout all measuring time points. Kucharská & Wildová (2015) provided even more detailed analyses of reading performance from the point of possible differences between the previously mentioned methods. This latter study covered the first 4 grades of primary school classes and included a larger set of decoding and reading comprehension tests in order to allow for a more detailed description of possible differences between the reading method

subgroups. Analytical-synthetic method children proved to be better decoders throughout the very early months of the first grade, showing significantly better results for word and non-word reading tasks. Kucharská & Wildová interpret these results carefully in relation to the content and learning demands related to both methods. Children from the analytical –synthetic method classrooms start letter learning by learning all of the possible variants of letter shapes (upper and lower cases, handwritten, and printed version of the letter), while with the G method the children initially start to learn letters by only learning the upper letter shapes during the first months of the first grade. So the measure used to assess reading speed in this study which contained words represented by upper and lower letter shapes might have created a constraint for the G method subgroup. Differences at the level of reading comprehension were not described for 2nd to 4th graders as significant, but they were approaching the level of significance (.006) for the timed closed test in favour of the G group. Significantly better results were also described for children using the G method in listening comprehension tasks, but only for the initial part of the first grade. The authors again interpret this result as showing the influence of the more variable and systematic training of reading comprehension strategies in the G method. As we can see, results of previous studies assessing the influence of the teaching of specific reading methods to the reading skills development do not provide clear patterns of results. However, we can conclude that differences do appear at the level of both reading speed and fluency (decoding) and reading comprehension, especially throughout the first year of reading instruction. In relation to early spelling and spelling development, decoding is of particular interest as it presupposes similar processes to happen: both skills rely on effective grapheme –phoneme/phoneme grapheme correspondence. We may thus expect that initial spelling skills will be affected by the different reading instruction methods the most.

Methods to teach literacy in Czech educational system

Czech orthography is considered to be consistent (Caravolas 2004). Literacy instruction is a matter of primary school curriculum. Letters are not being systematically taught in kindergartens, and phoneme awareness systematic training is also not a part of the preschool curriculum. However, the typical Czech pre-schooler knows some letter sounds and a few letter names (Caravolas et al., 2012), and has quite a good level of phoneme awareness (Hulme, Caravolas, Málková & Bridgstocke, 2005). Most children enter primary school at the age of 6. Current educational policy in the Czech Republic gives space to variability in educational methods to deliver literacy in primary school children. The spelling curriculum spans all of the primary school years. Spelling is explicitly taught as a part of Handwriting and Czech language lessons from the first to third grades of

primary school. This allows for detailed instruction, not only at the level of content (i.e. grapheme –phoneme correspondence, orthographic rules), but also at the level of effective use of the motor skills involved in writing. In the first grade, initial spelling is typically tight to the reading instructions and follows the respective method to teach reading (for example AS or G). Analytical-synthetic and Genetic methods are currently the two most dominant methods to teach reading in the Czech Republic (AS is used by approx. 85% of schools in the Czech Republic, the genetic method by approx. 12% - Wildová, 2002). By the end of the first year children should learn basic phoneme-grapheme correspondences, become independent decoders, and typically they should also manage to write short and simple sentences. Throughout the later primary school years (2nd – 5th grade), spelling instruction is a part of Czech language lessons, and spelling rules are explicitly taught. During grade 2 the orthographic rules are taught, and they are then reviewed and consolidated through grade 3. Grammatical rules (including morphological and syntactic analysis), and their applications in spelling are taught in grades 3, 4 and 5.

Both literacy instruction methods are understood as so called “phonics” methods, however there are differences between them in respect to the didactic approach that they use.

The *Analytical-synthetic method* is understood as more traditional, and there is a long tradition of its use in Czech schools, meaning teachers can rely on decades of experience in using it. AS gradually applies identification and isolation of phonemes in words, identification of graphemes in a word (letter knowledge of the whole alphabet, upper and lower case), grapheme - phoneme correspondences, syllable identification, reading by syllables, and continuous reading. This method emphasises how the teaching of decoding throughout the initial stages of reading and reading comprehension is trained rather later after a certain level of speed and fluency of reading is acquired (60 words per minute and a less than 8% error rate is accepted as a pre-requisite of reading comprehension- Matějček, 1987). Letters are introduced and taught in both upper and lower cases at one time, along with the introduction of handwriting versions/shapes of letter cases (upper and lower again). So children typically have to acquire 4 variants of one letter throughout the first half of the first grade.

The *Genetic method* is rooted in the reading instruction method developed at the beginning of the 20th century by the writer and teacher Josef Kožíšek (1929). It was reintroduced and established for educational purposes by Wágnerová during the late nineties (Wágnerová 1998), and since then it has been used more and more in schools around the country. It is very often considered to be something “new”, an appreciated alternative to the established and traditionally used AS method. The G method gradually applies identification and isolation of

phonemes in words, identification of graphemes in a word, grapheme – phoneme correspondences, and blending short words from learned letters. Initial reading is developed on the implementation of phoneme blending and phoneme identification in word strategies. Children are encouraged to use grapheme – phoneme correspondences to blend letters into short words (sounding out and spelling attempts where children can incorporate invented spelling knowledge acquired in preschool periods of intuitive literacy learning). Children learn letter sounds and names, however only capital letters of the alphabet are introduced during the initial stages of literacy training. Reading comprehension is systematically supported and trained alongside decoding from the initial phases of reading (i.e. by using pictures producing short stories, text writing).

Starting with the lack of limited developmental data published on early spelling development in the Czech language, the first aim of this study is to provide descriptive characteristics of the spelling performance of the first four grades of primary school. In relation to results which are not fully or consistently reported in previous studies on the influence of reading instruction method on the reading performance of Czech speaking children (Kucharská & Barešová (2012), Kucharská & Wildová (2015), the second aim of this study is to examine differences at the level of spelling skills performance between groups of children using the AS and G reading instruction methods.

Method

The data for analyses were taken from the larger corpus of a small scale longitudinal study primarily aimed at reading comprehension across the initial four grades of primary school (for detailed description of this study see Kucharská et al 2015). Throughout this study, groups of children from the first, second, third and fourth grades were assessed close to the beginning of the school year (October – November), and then reassessed at the end of the school year (April – May). Children were recruited in schools implementing either the analytical- synthetic or genetic method for reading instruction. Large sets of tasks to assess reading and reading related skills in all grades were implemented: tasks to measure reading speed and fluency, reading comprehension, spelling, listening comprehension, phoneme awareness, rapid automatized naming, morpho-syntactic and grammatical skills, lexical skills, and nonverbal IQ. The research project provided a detailed description of the reading comprehension development within all target school grades itself, and in relation to: 1) reading speed and fluency, and 2) language (phonemic, grammatical and lexical skills). Predictors of reading comprehension development were also tested. By means of comprehensive questionnaires the influence of specific social and educational variables (family

background and pro-reading support, teacher's attitudes, and teaching strategies etc.) on reading comprehension were also studied.

Spelling skills, which are of importance for this study, were assessed as part of the above mentioned assessment battery throughout the second data collection round in April/May of a school year. For the purpose of this paper we only report data from spelling and nonverbal IQ measures assessed to children attending the 1st, 2nd, 3rd and 4th grades.

Participants

488 monolingual Czech children (238 learning by the AS method and 250 by the G method) participated in this study. The children were recruited from 17 primary schools and represented a wide socioeconomic range in the City of Prague (the capital of the Czech Republic), Prague suburbs, and two smaller cities in the middle and southern areas of Bohemia (Kladno, Plavsko). Only children with no documented impairments in hearing, vision, speech and language, motor skills, or behaviour were recruited. The recruitment was based on parental and school informed consents. For the purpose of our analyses we created 3 participant subgroups relating to the level of spelling instruction and covering 4 primary school grades. The first subgroup (N=118) is a group of children from grade 1, the second subgroup consists of children from grades 2 and 3 (N= 245), and last subgroup are 4th graders (N= 125). Table 1 contains the descriptive statistics about age for all of the grade subgroups.

Table 1: Descriptive statistics of age for all grade subgroups

Grade group	1	2-3	4
Age in months M (SD)	89 (5.4)	105 (7.4)	123 (4.6)

Measures

Each grade level subgroup was assessed by a spelling test related to the level of spelling skills expected at the concrete grade level.

Nonverbal IQ- Block Design

In order to ascertain that any differences in the spelling between children learning spelling via different teaching methods were not due to IQ differences we administered a Block Design subtest from Wechsler's Intelligence Scale Czech version (Krejčířová, Boschek, & Dan, 2002). Recent norms were not available for Czech children, therefore the mean raw scores are reported in Table 2.

Spelling

Spelling tests were administered to children across all 4 initial primary school grades. All of our measures assess spelling as a skill to write a word and implement orthographic and linguistic rules for conventional spelling. Sets of words for each grade subgroup reflect the educational level of each subgroup. We used different measures in grades 1, 2- 3 and 4 so that we could reflect on the differences in the level of efficiency and ability across all grades. If possible we preferred to use standardized measures (sets of words), or measures tested in previous research with Czech children.

Set of words for first grade. The set consisted of 10 words varying in frequency, length, phoneme structure, and the use of diacritics. The list of items is presented in appendix 1. Frequency of words was assessed in Weslalex (Kessler & Caravolas 2011). Words were dictated in a normal reading pace, repeated 3 times, first as an individual word, then accompanied by a context giving phase, and for a third time again as an isolated word. The maximum score for the grapheme level of this task is 46 points. Words in this task vary in length from 3 to 7 graphemes.

Set of words for 2nd and 3rd grades. The set of items and procedures were taken from Dictation tests in the Caravolas & Volín (2005) test battery. A set of 30 words was dictated in a normal reading pace, repeated 3 times, first as an isolated word, then accompanied by a context giving phase, and for a third time again as an isolated word. All words in this test were selected by the authors as high frequency words and constructed to reflect phonological, morphological, grammatical, and lexical and/or orthographic difficulties in the Czech writing system. The maximum possible score for grapheme level of this task is 171 points. Words in this task vary in length from 3 to 9 graphemes.

Spelling test for 4th grade. The set of 30 items for grade 4 was also taken from the Dictation tests in Caravolas & Volín (2005) test battery and was administered by using the same procedures as dictated for the 2nd and 3rd grade group. The set of words for older children is generally more difficult than the set for grades 2 and 3, consisting of words related to the linguistic and orthographic constraints taught in grades 4 and 5. The maximum possible score for grapheme level of this task is 199 points, reflecting the number of graphemes that children could represent correctly. The length of words included in this task vary from 3 to 11 graphemes.

Results

Table 2 shows the means, standard deviations, and medians for spelling measures in all respective grades for both reading method groups.

Table 2.

Descriptive statistics: raw mean scores, standard deviations and medians for measures of spelling and nonverbal IQ in all assessed grades for both teaching methods (analytical-synthetic - AS and genetic - G).

Grade	1		2-3		4	
	M(SD);Mdn AS (N=58)	G (N=60)	M(SD);Mdn AS (N=123)	G (N=122)	M(SD);Mdn AS (N=57)	G (N=68)
Word spelling - words	6.74(1.69); 7.0	7.20(1.71); 7.5	21.54(4.31); 22.0	21.57(3.87); 23.0	18.18(4.04); 19.0	18.41(4.04); 19.0
Word spelling - graphemes	42.14(2.79); 42.5	43.57(2.18) ; 44	109.22(14.52) ; 113.0	108.54(12.65); 110.0	184.98(5.68); 186.0	185.57(4.21); 186
Nonverbal IQ	10.28(2.11);1 0	10.23(2.49) ;11	11.84(1.98); 12.0	11.56(1.98); 12.0	12.61(1.69); 13.0	13.26(1.88); 14.0

Reliabilities of the spelling measures we used are reported in Table 3. All of our spelling measures proved to have middle to high reliability. Lower reliability of the first grade spelling set probably reflects the fact that this set of words was relatively short (in comparison to both sets used for other grades). The fourth grade spelling tests lower reliability may signal that the set of words included are probably slightly too difficult for children of this grade (this set of words was standardized for both 4th and 5th grades in the original test battery- Caravolas & Volín (2005)).

Table 3: Reliabilities of spelling measures used in the 1st, 2nd - 3rd and 4th grades, reported as Cronbach alpha

Measure	Reliability (Cronbach alpha)
Word spelling grade 1	.590
Word spelling grade 2 and 3	.776
Word spelling grade 4	.629

The ensuing analyses addressed two aims regarding the development of spelling skills throughout the initial years of primary school. First, for a detailed description of the development of spelling skills in all respective grades and teaching method groups the distributional properties of children's spelling outcomes were investigated and visualized. Second, in order to assess the possible differences in spelling skills as a result of the specific structure and content of both teaching methods implemented in the classrooms, normal distribution was tested and a series of t- tests were conducted.

Spelling skills were assessed at two different levels in our analyses: at the general level, where spelling of the word is assessed at the level of the whole word - each word is either correctly or incorrectly spelled, before spelling skills were then also assessed at the level of quality of phoneme –grapheme correspondence - the number of correctly spelled graphemes in all words was analysed. Before conducting any statistical tests to compare spelling outcomes of the AS and G teaching method groups distributional patterns of the spelling development were inspected. For each grade and each teaching method group histograms of spelling accuracy at the level of word and graphemes accuracy were generated. Figures 1–3 show all of the relevant histograms. It is clear that histograms describing outcomes of children at the detailed “grapheme” level (counting on correctly spelled graphemes in a word) bring a more precise and neat picture of the developmental pattern of spelling skills among children. This helps to complete the picture of the actual developmental level of phoneme – grapheme correspondence.

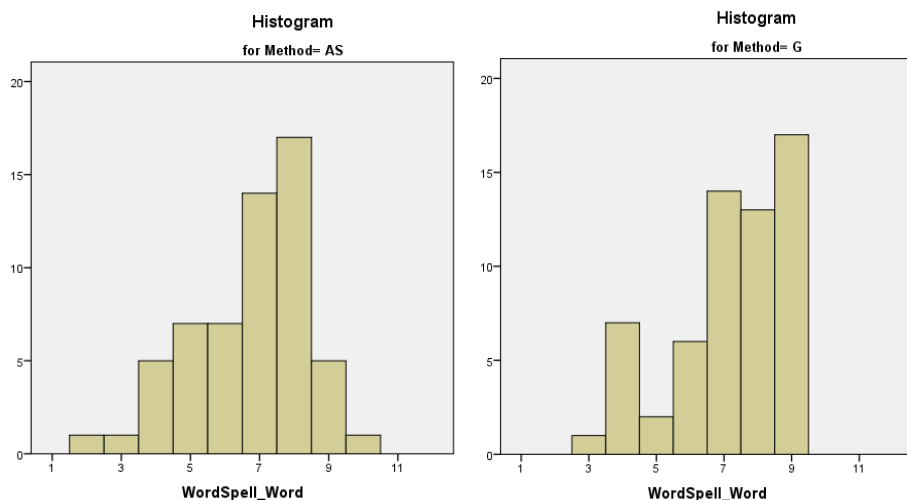


Figure 1. Histograms of performance in spelling development of the 1st grade children at the level of word; the AS group histogram on the left, the G group histogram on the right.

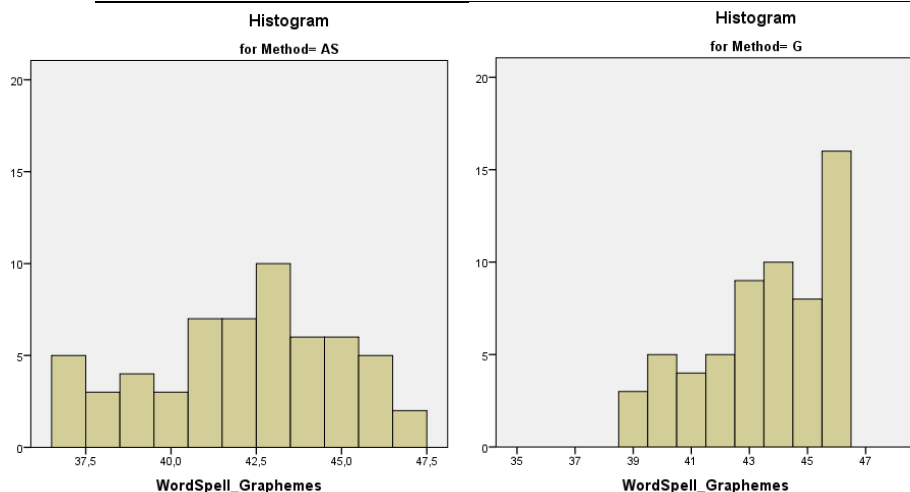


Figure 2: Histograms of performance in spelling development of the 1st grade children at the level of grapheme; the AS group histogram on the left, the G group histogram on the right.

The distributional patterns of scores for first grade children are presented in Figure 1 and Figure 2. The distribution of the AS group scores seems to be more variable than the distribution of those in the G group. G group patterns are rather skewed in the direction of better outcomes - both at the level of words and graphemes. The AS group generally shows more variation from the low to the excellent scores, and the distribution of children's outcomes resembles the normal distribution more than in the G group. Detailed analyses however show that almost 80% of all the children from both the AS and G groups can correctly spell words that require simple joining of grapheme and phoneme and do not need application of any grammatical rule or usage of diacritics (for example words like robot, tunel-see appendix for the complete list of items). Also, histograms at the level of graphemes show that the AS group has more children in middle to low scores area than the G group. What seems to differentiate the groups here are the scores related to more difficult words, the words that require diacritics or some grammatical rule to apply (words like pyžamo, džungle, garáž...), so it is clear that the G group children were generally more successful at spelling the set of words we provided than the children from the AS group.

Spelling performance distribution patterns for children from the 2-3rd grade groups are presented in Figures 3 and 4.

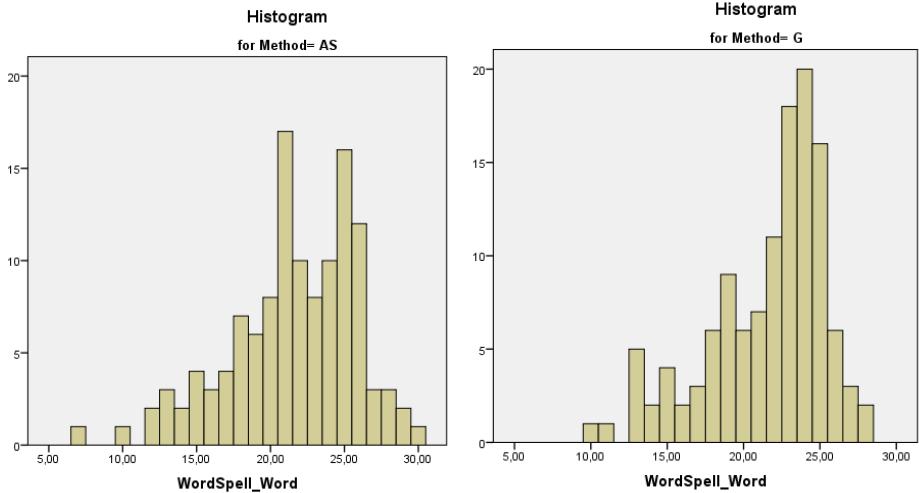


Figure 3: Histograms of performance in spelling development of the 2-3rd grade children at the level of word; the AS group histogram is on the left, and the G group histogram is on the right side.

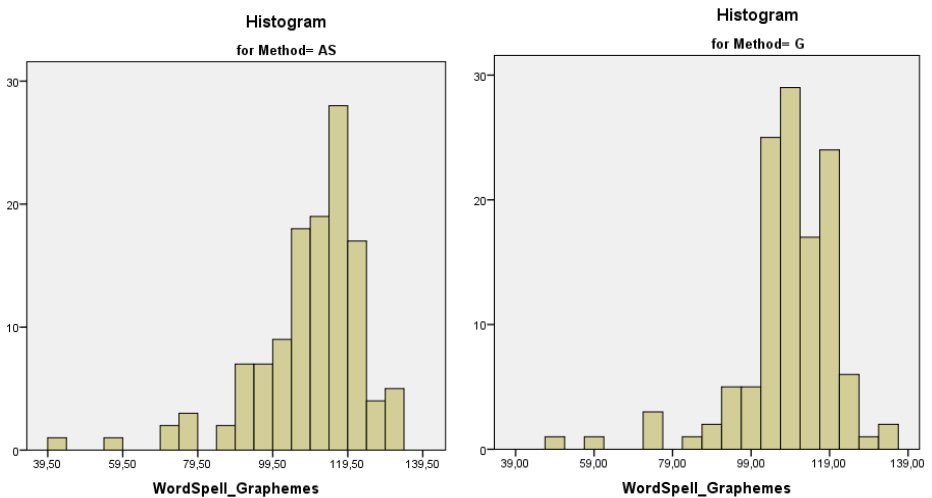


Figure 4: Histograms of performance in spelling development of the 2-3rd grade children at the level of graphemes; the AS group histogram is on the left, and the G group histogram on the right side.

It is useful to remind the reader here that we reflect on the spelling outcomes based on a larger set of words with more variations at the level of difficulty and complexity of words spelled. Despite this, we can see in Figures 3 and 4 that the distributional patterns for spelling at the level of words and graphemes somehow retains the structure demonstrated for first grade children. There is more variation in spelling among the AS group children than those in the G group, and children in the G group show a rather more positively skewed distributional pattern for both word and grapheme level. However, these differences seem to be less clear than they were in the firstgrade histograms. What is interesting here is the clear picture of the emerging low performance subgroup in both the AS and G groups. Approximately 5-6 children from both the AS and G groups provided extremely low scores for spelling at the level of graphemes. They score in the area lower than 1 SD below the mean of their groups, which could be considered a borderline for the identification of deficits for assessed skill. We think that these children show signs of difficulties at the level of phoneme-grapheme correspondence, which we could understand as an early sign of phonologically rooted reading difficulties (e.g. dyslexia).

Histograms describing the performance of 4th grade children are presented in Figures 5 and 6. The performance pattern of AS and G group children looks more or less similar when absorbing variability around the mean score.

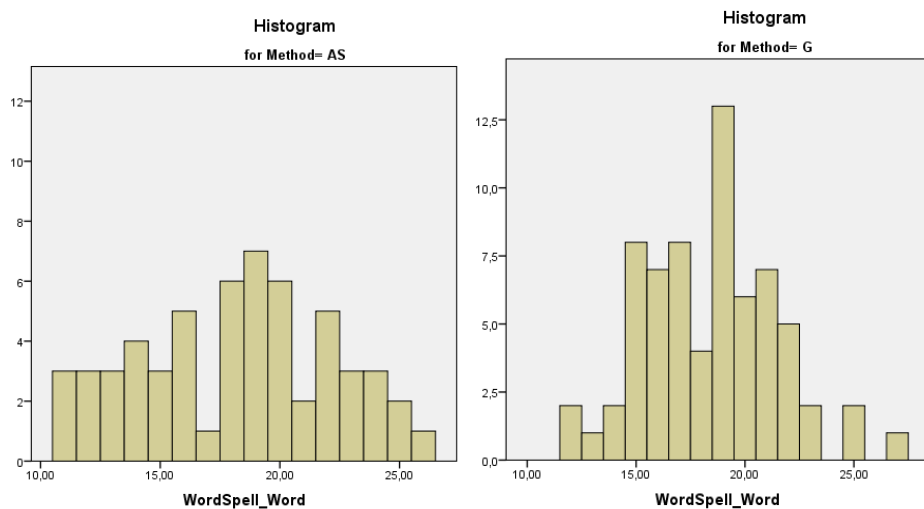


Figure 5: Histograms of performance in the spelling development of the 4th grade children at the level of word; the AS group histogram is on the left, and the G group histogram on the right side.

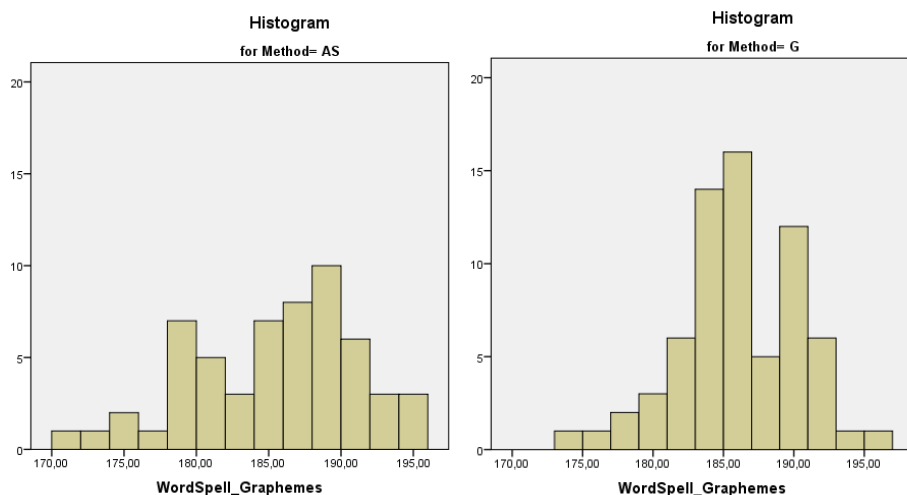


Figure 6: Histograms of performance in the spelling development of the 4th grade children at the level of graphemes; the AS group histogram is on the left and the G group histogram on the right side.

Based on the provided distributional patterns of spelling scores of children across the initial four years of primary school we can see that children from the G reading method groups from all grades show relatively stable, less variable, and positively skewed distributional patterns of spelling skills. They seem to be more effective in developing stable and fluent phoneme –grapheme correspondences throughout the initial stages of spelling development.

Along with the distributional patterns of spelling outcomes, we also tested possible differences between both teaching method groups in all of the assessed school grades. First we tested the presence of normal distribution of our data samples. The distributions of spelling skills both at the level of word and grapheme in both teaching method groups were not normal in the first and second/third grade groups (Kolmogorov-Smirnov was $p < 0.05$). For the groups of 4th grade children, the normal distribution appears to show up for spelling at the word level (test of Kolmogorov-Smirnov reveals $p < 0.05$), but not for the grapheme level (Kolmogorov Smirnov AS: $p=0.2$, G: $p=0.06$). Therefore, we decided to use a nonparametric equivalent, and carried out a Mann Whitney series of t-tests in order to compare AS and G groups in each grade sample.

The Mann Whitney test of spelling performance of first grade children indicated that spelling at the word level in the AS group was not significantly different from the G group: $U = 1437$, $p=0.096$. However, spelling performance

analysed at the level of graphemes shows significantly better outcomes for the G group in the first grade (Mdn= 44) than for the AS group (Mdn= 42.5); $U=1213.5$, $p=.006$.

Second and third grade reading method groups do not differ at any of the tested levels of spelling performance; word level: $U= 7498$, $p=.993$; grapheme level: $U=6998$; $p=.362$.

Spelling outcomes of fourth grade groups do not differ at any of the tested levels: word level $U=1895$, $p=.830$; grapheme level: $U=1886$, $p=.796$.

Mann-Whitney analyses represent an important component of our test of differences between the AS and G reading method groups in spelling performance. We can conclude that first grade children learning via the G method are more effective in acquiring phoneme-grapheme correspondences, which results in more accurate spelling throughout the initial stages of spelling development. However, this pattern does not last, and the second, third, and fourth grade spelling performances provide almost the same results for both reading method groups. As we could see in distributional patterns of the AS and G grade groups (histograms presented in figure 1 – 6), G group pupils show less variable spelling performance profiles.

Discussion and conclusion

This study with primary school Czech children learning to read and write via the analytical-synthetic (AS) and genetic (G) methods provided descriptive and analytical data to (1) construct the AS and G method subgroup's developmental patterns of spelling skills of children from the first, second, third and fourth grades, and (2) assesses the differences in spelling performance among the AS and G method subgroups for each grade level.

The first interesting finding related to the distributional patterns of spelling outcomes among children from the AS and G method subgroups is that the first grade G method groups show more tight (slightly positively skewed) and less variable performance patterns; G method first graders seem to be better ("fluent") coders than the AS group children, showing faster developmental progress in acquiring early spelling skills. Throughout the latter grades the pattern of spelling performance shows more variability among children using the G method, and the distribution pattern of both word and grapheme levels looks very similar to the AS grade subgroups. The "spurt" of G method groups of children probably reflects the fact that these children (in comparison to AS method children) start learning to read and spell with "less content" at the level of letters and letter clusters (only capital letters, no syllabification). As a result of this they probably have more time to concentrate on the internalization of the core principle of alphabetic literacy -

the grapheme-phoneme/phoneme-grapheme correspondence, and thus acquire the basics of spelling skills faster.

Distributional patterns of second and third grades from both reading method subgroups enabled us to nicely “show” the emergence of ‘slow speller’ subgroups within each target method group of children. The fourth grade spelling outcome patterns in both the AS and G methods tend to “stabilize” toward the normal distribution pattern, “absorbing” the lower spelling outcomes in a “developmental continuum”. We interpret these observations as being related to the different level of difficulty and “learning outcomes” sensitivity of the word spelling tests we used in 2- 3rd and 4th grade groups. The word spelling test used in the 2-3rd grade groups of children was probably working very well in respect to learning (spelling and reading instruction related) demands. Children showing difficulties here should be those who show difficulties despite working with content which is well abbreviated in the formal instruction context. In contrast to this, the test used for assessing the fourth grade children contained words reflecting orthographic and grammatical issues that are taught and abbreviated throughout the 4th and also the 5th grade. We can therefore consider the word spelling test we used for 2-3rd groups of children as being sensitive towards the presumed learning outcomes at the end of 3rd grade (and possibly also a very good test to be used in the assessment procedures for identifying developmental dyslexia). The test we used in 4th grade should be considered as being more sensitive to the individual developmental level of the child (if thinking about the children from the 4th grade).

Finally, a Mann-Whitney test we conducted provided results supporting the way we described the distributional patterns of the spelling skills of the assessed children. The only significant differences were between the first grade children, showing the G subgroup as being better (more accurate) in representing phonemes in words. We can therefore support our previous suggestions that the genetic reading instruction method seems to create more effective settings for children to acquire, internalize and use the alphabetic principle in the initial stages of spelling development than the analytical-synthetic method.

It may be that the G method settings open up more time for intensive work at the level of reading practice – at this point the study of Kucharská & Barešová (2012) - cited in the introduction parts of this text - should be mentioned: the authors reported lower reading error rates of the G method groups of children than those in AS method groups. Conversely, according to Kucharská & Barešová (2012), differences at the level of reading accuracy disappear quickly in the second grade, and G method groups of children read and spell more or less at the same level as AS method groups. It could also be possible that the extra time produced by the faster spelling acquisition opens up more time for reading comprehension practice – which would relate to the results of the Kucharská & Wildová (2015)

study, where first grade G group children proved to be better than AS children in listening comprehension tasks. However, more research is needed in order to specify very early reading comprehension strategies and their relationship to early spelling.

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Appendix

Set of words for the spelling test for the first grade children:

tunel; salát /sala:t/; robot; pyžamo /pɪʒamo/, park; král /kɪa:l/; atlet; džungle /dʒʊŋgle/; sůl /su:l/; lev /lef/.

References

- Aarnoutse, C., Van Leeuwe, J., Voeten, M., & Oud, H. (2001). Development of decoding, reading comprehension, vocabulary and spelling during the elementary school years. *Reading and Writing*, 14(1-2), 61-89. DOI: 10.1023/A:1008128417862
- Caravolas, M. (2004). Spelling development in alphabetic writing systems: A cross-linguistic perspective. *European Psychologist*, 9(1), 3-14. DOI: <http://dx.doi.org/10.1027/1016-9040.9.1.3>
- Caravolas, M., & Bruck, M. (1993). The effect of oral and written language input on children's phonological awareness: A cross-linguistic study. *Journal of Experimental Child Psychology*, 55(1), 1-30. DOI: <http://dx.doi.org/10.1006/jecp.1993.1001>
- Caravolas, M., Hulme, C., & Snowling, M. J. (2001). The foundations of spelling ability: Evidence from a 3-year longitudinal study. *Journal of Memory and Language*, 45(4), 751-774. DOI: <http://dx.doi.org/10.1006/jmla.2000.2785>
- Caravolas, M., & Volín, J. (2005). *Baterie diagnostických testů gramotnostních dovedností pro žáky 2. až 5. ročníku ZŠ*. Praha: Institut pedagogicko-psychologického poradenství.
- Caravolas, M., Volín, J., & Hulme, C. (2005). Phoneme awareness is a key component of alphabetic literacy skills in consistent and inconsistent orthographies: Evidence from Czech and English children. *Journal of experimental child psychology*, 92(2), 107-139. DOI:<http://dx.doi.org/10.1016/j.jecp.2005.04.003>
- Caravolas, M., Lervåg, A., Mousikou, P., Efrim, C., Litavský, M., Onochie-Quintanilla, E., Salas, N., Schöffelová, M., Defior, S., Mikulajová, M., Seidlová Málková, G.,

- Hulme, CH. (2012). Common patterns of prediction of literacy development in different alphabetic orthographies. *Psychological Science*, 23 (5), 678-686. DOI: <https://doi.org/10.1177/0956797611434536>
- Hulme, C., Caravolas, M., Málková, G., & Brigstocke, S. (2005). Phoneme isolation ability is not simply a consequence of letter-sound knowledge. *Cognition*, 97(1), B1-B11. DOI: <http://dx.doi.org/10.1016/j.cognition.2005.01.002>
- Kessler, B., & Caravolas, M. (2011). *Weslalex: West Slavic lexicon of child-directed printed words*. Retrieved from: <http://spell.psychology.wustl.edu/weslalex>.
- Krejčířová, D., Boschek, P., & Dan, J. (2002). WISC-III. Wechslerova inteligenční škála pro děti. Praha: Testcentrum.
- Kučera, M. & Viktorová, I. (1998). Čtení/psaní v první třídě. In: Pražská skupina školní etnografie (Ed.). *První třída* (pp. 61–168). Praha: Univerzita Karlova v Praze – Pedagogická fakulta.
<http://kps.pedf.cuni.cz/psse/pdf/tridy/1/kuc.pdf>
- Kucharská, A., & Barešová, P. (2012). Vývojová dynamika čtení v analyticko-syntetické metodě čtení a metodě genetické v 1. a 2. třídě a její uplatnění v poradenské diagnostice. *Pedagogika*, 1-2(1), 65–80.
- Kucharská, A. & Veverková, J. (2012). Vývoj písarských dovedností v průběhu první třídy u analyticko-syntetické metody a genetické metody. *Pedagogika*, 1-2.
- Kucharská, A. & Wildová, R. (2015). Čtení z pohledu výukových metod: analyticko-syntetická metoda a metoda genetická. In: A. Kucharská (Ed.), *Porozumění čtenému; III. Typický vývoj porozumění čtenému - metodologie, výsledky a interpretace výzkumu* (pp. 29-56). Praha: Pedagogická fakulta Univerzity Karlovy.
- Kožíšek, J. (1929). Počátky čtení: Metodický průvodce čítankou malých" Poupata". Praha Státní nakladatelství.
- Landerl, K., & Wimmer, H. (2008). Development of word reading fluency and spelling in a consistent orthography: An 8-year follow-up. *Journal of Educational Psychology*, 100(1), 150. DOI: <http://dx.doi.org/10.1037/0022-0663.100.1.150>
- Lervåg, A., Bråten, I., & Hulme, C. (2009). The cognitive and linguistic foundations of early reading development: a Norwegian latent variable longitudinal study. *Developmental psychology*, 45(3), 764. DOI: <http://dx.doi.org/10.1037/a0014132>
- Matějček, Z. et al. (1987). Zkouška čtení. Bratislava: Psychodiagnostika.
- Mikulajová, M., Váryová, B., Vencelová, L., Caravolas, M., & Škrabáková, G. (2012). Čítanie, písanie a dyslexia s testami a normami. Bratislava, Mabag.
- Notarnicola, A., Angelelli, P., Judica, A., & Zoccolotti, P. (2012). Development of spelling skills in a shallow orthography: the case of Italian language. *Reading and Writing*, 25(5), 1171-1194. DOI: 10.1007/s11145-011-9312-0

- Read, C. (1971). Pre-school children's knowledge of English phonology. *Harvard educational review*, 41(1), 1-34.
- Ouellette, G., & Sénéchal, M. (2008). Pathways to literacy: A study of invented spelling and its role in learning to read. *Child development* 79 (4), 899-913. DOI: 10.1111/j.1467-8624.2008.01166.x
- Hagtvet, B. E., & Lyster, S. A. H. (2003). The spelling errors of Norwegian good and poor decoders: A developmental cross-linguistic perspective. In. N. Goulandris (Ed), *Dyslexia in different languages: Cross-linguistic comparisons* (pp. 181-207). Philadelphia, PA, US: Whurr Publishers.
- Wágnerová, J. (1998). J. Metodická příručka k učebnici Učíme se číst pro 1. ročník základní školy. Praha: Státní pedagogická nakladatelství.
- Wildova, R. (2002). Současné trendy rozvoje prvopočátečního čtení a psaní v české škole. In:
- Wildova, R.. *Aktuální problémy didaktiky prvopočátečního čtení a psaní*. Praha: Univerzita Karlova.
- Zubáková, M., & Mikulajová, M. (2013). Fonematické uvedomovanie ako prediktor vývinu písania a čítania . *Psychológia a patopsychológia dieťaťa*, 47 (4), 302-317.

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