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Language awareness as a prerequisite of literacy skills*

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Abstract
Monitoring children's language ability levels makes it possible to predict their school achievement and identify potential difficulties. Identifying literacy difficulties in terms of specific learning disabilities is an important topic for elementary school pupils. Today, there is a general consensus based on research evidence that the diagnostic battery of literacy skills should always include a test of language abilities, through which the prerequisites for individual reading skills and at-risk readers can be identified.

A working group has created a diagnostic tool for language awareness that allows the morphological-syntactic (subtest A and B) and semantic (subtest C) language levels of Czech children of elementary school age to be assessed.

Data analysis examines how individual language skills correspond to reading performance – decoding and reading comprehension in different reading modalities (oral and silent reading) and how they correspond to other prerequisites for reading, such as listening comprehension. The paper introduces a new diagnostic tool using a quantitative methodology. It is based on data from the research project *Key Literacy Skills for Primary School Pupils* – a diagnostic battery, in which 881 elementary grade pupils (Grade 1 – Grade 5) participated. The statistical parameters of the new tool are presented and the relations between the *Language Awareness Test*, decoding skills, and oral and silent reading comprehension are analysed.

Keywords: literacy; language skills; phonology; morphosyntactic ability; prerequisites for reading; diagnostics; reliability

1. Introduction

In this paper, we address the issue of possible diagnosis of language ability in relation to developing literacy in young Czech school-age children. We draw on a standardization study (Kucharska et al. 2021) that focused on the development of diagnostic tools for reading skills, the prerequisites for reading, and the related influences on reading, with an emphasis on the area of comprehension.

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Along with other language tests, the *Language Awareness Test* (LAT) had a significant role in this diagnostic battery. First, we describe its format and features and examine its psychometric properties. Our main goal is to investigate the relationship of children's morphosyntactic and reading abilities. But before that, we would like to mention a few facts that influence the development of reading literacy in Czech children.

1.1. Teaching reading in the Czech Republic

It is a well-known fact that the development of reading skills is not only dependent on traditional reading instruction at school. A child enters school with pre-literacy skills and the level of these skills will determine the success of the reading instruction. The development of pre-literacy skills is part of the pre-school curriculum. There are a number of skills that are developed, and we consider language to be essential. Monitoring (diagnosing) the level of language skills achieved and their potential development through intervention programmes is crucial to the positive development of reading skills.

The focus of the development of reading skills is the first five grades of elementary school. The child progresses through the stages (Helus 2012) of *beginning reading*, when the foundations of reading are being built, through the stage of *developing reading*, when the foundations of reading are already established, and then the child continues to improve in reading (speed, comprehension, reading strategies). The last stage is *practised reading* (Helus 2012). From middle school age onwards, the students should be able to learn through reading. They should also practise reading not only in relation to school but also as part of their leisure activities.

Formal reading instruction in the Czech Republic begins at age six. There are two main methods used in teaching reading – analytic-synthetic (syllabication) and genetic (spelling). Only 10% of children are taught to read using other methods concurrently (e.g. global reading, Sfumato sung reading, etc.).

The two methods used most extensively differ in several aspects. The analytic-synthetic method is based on learning the principle of syllable formation and subsequent syllable reading practice. This skill is gradually improved until the child reaches the stage of fluent reading. The genetic method does not work with syllables and works with the formation of words from phonemes. At first, children acquire the letters of the capital alphabet, form words, and experiment extensively with language itself (listening to stories, storytelling, vocabulary development, word games). The basis of the approach is that everything that happens in reading is linked to comprehension. The letters of the lowercase alphabet and written letters do not come into play until the second half of the first grade, when the child has already mastered the basics of reading.

Czech children tend to achieve disappointing results in international research (PISA, PIRLS). In 2001, they were, for example, rated below average. In a subsequent survey conducted in 2011, there was a slight improvement. These comparative studies show that mastering reading strategies tends to be most problematic, while work with texts and reading comprehension are weaker as well. There is therefore a great emphasis on the question of how to support the further development of literacy skills. One possibility is to enable guidance

workers in the education system who carry out diagnostic assessments of reading skills to have effective diagnostic tools to assess all the relevant factors that enter into the acquisition of reading in children with reading difficulties. Although we have a range of diagnostic tools in the area of reading at our disposal, these are more or less focused on reading aloud and pay more attention to decoding and less attention to reading comprehension. This is also the basis of the approach of a team of experts from the Department of Psychology at the Faculty of Education in Prague, who decided to create a comprehensive battery of reading skills that incorporates foreign research-based approaches and allows for the assessment of all relevant factors – reading prerequisites, decoding, and comprehension, as well as personal and environmental influences. We consider the comprehension of texts to be pivotal – we read in order to understand.

1.2. Supporting poor readers

The Czech Republic has a long tradition of supporting pupils with reading disabilities. Diagnostic tools to identify poor readers have existed since the 1930s, with the most significant development in the diagnosis of reading skills occurring in the 1980s (Matějček et al. 1987). Since the analytic-synthetic method of reading was used exclusively at that time, most attention was paid to the reading technique (decoding) in the construction of diagnostic reading tests. Much less attention was paid to reading comprehension and other reading-related skills. Although children with specific learning disabilities received appropriate support within the emerging model of counselling support, the visual model of dyslexia (a reading problem as a consequence of a visuomotor handicap) was favoured in the interpretation of the nature of specific learning disabilities, which subsequently influenced interventions for poor readers.

Unfortunately, this approach still more or less persists to this day, with a relatively large group of practitioners involved in diagnostic and remedial reading instruction still considering reading to be a visuomotor skill. Although new diagnostic methods of reading are emerging that gradually take into account the linguistic background of specific learning disabilities, they make little use of the assessment of reading comprehension. When they do, the preferred approach is the "retelling" of the story after reading it, which can be subjective. Poor performance in retelling may be due to reasons other than comprehension problems (personal set-up, fear, stage fright, level of expressive skills, etc.).

1.3. Diagnostic battery to assess reading skills in younger school-age children

As a reaction to the limits of the current Czech assessment measures, the new test battery *PorTex* was designed. The diagnostic battery was prepared for younger school-age children in grades 1 to 5, a period that is crucial in terms of developing reading skills. The advantage of the battery is its comprehensiveness. The individual tests are grouped into thematic clusters according to common characteristics and an overview of the tests is included in the Appendix.

Unlike any other Czech test battery, *PorTex* focuses extensively on text comprehension. Various comprehension task formats have been included to highlight the developmental nature of comprehension being built (see Figure 1):

- Listening is an implicit skill developed even prior to starting school. We must first understand the spoken word in order to understand a read text. Children with better language skills are likely to have better listening skills.
- At the beginning of the development of reading, reading comprehension is strongly linked to decoding. Children with decoding problems also have poorer comprehension. As literacy skills develop, even children with poorer decoding skills may attempt to understand texts if they identify with the function of reading (reading gives us information and allows us to live through an experience).
- Silent reading comprehension is built in conjunction with reading aloud; it is the beginning of the development of reading strategies. It can allow for better comprehension when a child is stressed by reading aloud.

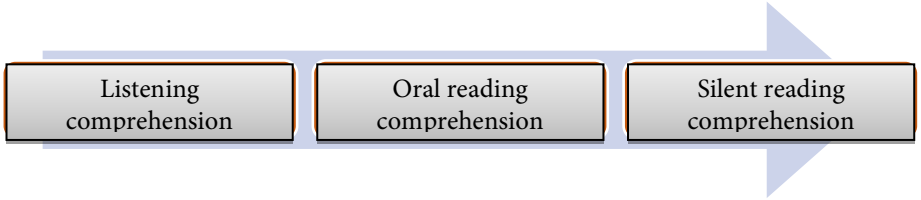


Figure 1: *Development of Comprehension (Kucharská et al. 2021)*

In developing the *PorTex* diagnostic battery, we drew on the theoretical framework of the Simple View of Reading (Gough and Tunmer 1986), which views reading comprehension as the result of two related but somewhat independent components: decoding skills (the ability to read printed words) and linguistic comprehension (the ability to understand oral language). The model thus draws attention to the fact that a good level of decoding is not sufficient for a good understanding of a text, just as linguistic comprehension alone is not sufficient. Both of these components, which are projected into reading performance, can be assessed using diagnostic tools – decoding tests and listening comprehension tests (Hoover and Gough 1990).

The test battery is based on the principle that reading cannot be approached as a monolithic process. The assessment must make a distinction between decoding and comprehension of the reading text. When measuring the level of these sub-skills of reading, however, it is also necessary to map core skills – that is, the skills that are crucial to their development. According to the current state of knowledge, the following core prerequisites constitute language skills.

It is now widely known that phonological awareness across alphabetic languages is closely linked to the development of decoding skills (e.g. Caravolas et al. 2012). Measuring phonological awareness has thus become a common part of the diagnostic process of reading skills. However, this is not the case for language awareness at higher levels of language. The influence of morphosyntax and semantics has been documented primarily in relation to reading comprehension (Tylor and Nagy 1900; Foorman, Petcher, and Bishop 2012; Snowling and Hulme 2012) but test batteries of reading skills for first-graders do not offer measurement scales for these language skills, at least not in the Czech Republic.

If we look at morphological awareness and its role in the development of reading skills in more detail, the longitudinal study of Kirby et al. (2012) came up with interesting findings. In a research sample of 103 younger elementary school pupils, morphological awareness provided an explanation for the variance in reading comprehension even after controlling for the effects of word reading. Furthermore, it also had an effect on word reading accuracy and efficiency above and beyond intelligence and phonological awareness. However, as is the case in several other research studies (e.g. Deacon and Kirby 2004), this relationship did not occur with first-graders. Thus, the role of morphological awareness appears to change over time.

1.4. Aim of the study

In this paper, we set out to introduce one of the language tests in our test battery, namely the *Language Awareness Test (LAT),* which was designed to assess a child's level of morphosyntactic and lexical-semantic abilities. Other language tests include the *Phonemic Awareness Test,* focusing on phonology, and the *Pseudoword Repetition Test*, but these are not presented in this study.

We will describe the test itself and its developmental characteristics in terms of performance and evaluate its psychometric properties. We will examine whether children being taught with the two most commonly used reading methods differ in their performance on the LAT, and whether performance differs by gender. Attention will also be paid to correlation analysis between the LAT and reading tests. Finally, further intentions with this method will be presented.

2. Methodology

2.1. Standardization study

The diagnostic battery was standardized through a project of the Technology Agency of the Czech Republic in 2018–2021 (Kucharská et al. 2021). The main goals of the project were to broaden the view of the diagnosis of reading skills, prepare instruments, and standardize them for use in schools and counselling practice.

The data collection was conducted in two phases in 2018 and 2019, in the first half of the school year (T1) and in the second half of the school year (T2). The sample of children covered the entire Czech Republic. The schools where data collection took place were divided according to socio-economic factors (unemployment rate in the region) into ten clusters and the sizes of the schools were also taken into account, in addition to the socio-economic level in the area. The total number of children whose performance entered into the development of the norms is shown in Table 1.

Table 1: *Participants*

GRADE	T1 (M)	T2 (M)	TOTAL (M)
1	121 (49%)	129 (52%)	250 (50%)
2	202 (48%)	186 (47%)	388 (48%)
3	213 (40%)	186 (42%)	399 (41%)
4	197 (40%)	190 (40%)	387 (40%)
5	148 (47%)	160 (46%)	308 (47%)
TOTAL	881 (44%)	851 (45%)	1732 (45%)

Note: These are the total numbers of children included in the study. The numbers of children whose performance figures in the analyses may vary slightly. This is because a given test was not always administered to a child, e.g. because of the child being absent at the time of the test. Such a child was not excluded from the study; all available tests were used.

2.2. Methods used

2.2.1. Language Awareness Test (LAT)

The test was developed after a pilot investigation in 2014–2015 (Kucharská et al. 2015) with the aim of assessing morphosyntactic and lexical-semantic abilities in younger school-age children (first to fifth grades). For standardization, which was ensured through the TACR project, it underwent a partial transformation; non-differentiating items were removed. This resulted in a reduction of the total number of items (from 60 to 48). The items to be included in the final version of the test were selected so that adequate percentage amounts were covered while allowing for the option to increase the level of difficulty, so that the test could work both for younger and older elementary school pupils in grades 1 to 5.

The test currently contains three subtests: *Morphology, Word Formation,* and *Sentence Comprehension.* Each section includes four subtests with four items, for a total of 48 points. The test is administered orally; each item includes a practice session, in which the subject becomes familiar with the type of task and the method of response. For most questions, the children answer in their own words; in only four tasks do the children choose from a set of possible answers (B1, C1, C3, C4).

The subtests of individual parts include the following tasks:

A. Morphology

- **A1 Grammatical Number.** Our task was to demonstrate awareness of the opposite of singularity and plurality (on material more difficult than the one banana x two bananas model). The words used are singularia tantum, i.e. words that morphologically have only a singular form but denote multiple items. Thus, these are cases where singular nouns denote more than one entity. The aim is to find out whether the child's morphological awareness of the grammatical feature "singular number" overrides the actual number of entities denoted.
- **A2 Case.** The tasks on the conscious use of the case grammatical category are a standard part of language awareness tests and verify the subject's orientation in the relatively complex situation of Czech as an inflected language which is characterized by a plethora

of seven different cases (in singular and plural forms as well as feminine, masculine, and neuter). In our test, we focused on the declension of pronouns (in Czech, other so-called flexible verbal types, such as adjectives, numerals and pronouns, are also declined). The ability to form the correct case is mainly related to the clear expression of the syntactic function of the noun in question.

- **A3 Voice.** In creating the task, we were inspired by examples that have recently been introduced, e.g. in the *Encyclopedic Dictionary of the Czech Language* (Karlík 2017): "[Voice (genus verbi) is] a grammatical category whose typical representative is the opposition represented by the structures (a) The teacher praises the pupil and (b) The pupil is praised by the teacher." The main purpose of the task was to find out whether the children were aware of the different possibilities "what semantic participant in the event is expressed in the syntactically prominent position of the subject" (Kucharská and Šmejkalová 2017) while fundamentally changing the "external" (from the child's point of view) form of the predicate while preserving the basic meaning of the sentence. Simplified and modelled, this is what is described in traditional Czech linguistics as a situation (ibid.) in which "the originator of the action in the syntactic structure of the sentence is represented either by its subject" (the active or active voice; see structure (a)) or is "expressed in a different syntactic position" (the passive or the passive voice; see structure (b)). The basic meaning of the sentence is preserved.
- **A4 Verbal aspect.** This task tested whether the child could distinguish the fact that "the Czech verb exists in two (up to three) forms that have the same lexical meaning but differ from each other in their relation to the completion of the action" (Grepl et al. 2008: 318). Thus, we respect the generally prevailing notion according to which imperfective verbs "express a loose relation to the completion of the action," while perfective verbs express "the limited duration of the action" in the sense of "completeness, wholeness of the action," where they denote the fact that "the goal has been achieved and there was no point in continuing" (ibid.: 318–319). This category can be supplemented by one of the more recent definitions of verbal aspect: "In general linguistics, the international term aspect denotes a more or less strongly grammaticalized category of the verb that expresses the non-temporal time dimension of the action/state expressed by the verbal lexeme; hence, we speak of verbal aspect" (Nübler et al. 2017).

B. Word Formation

- **B1 Noun formation.** This is an uncomplicated test task to determine whether the child has consciously associated less common suffixes with the word formation of the relevant noun types. The principle of the test task was developed by Hájková (see Hájková et al. 2013). In the task, typical suffixes for deriving nouns were investigated. As an example, the suffix which creates place names (denominatives and deverbatives) such as *cukrárna*/pastry shop, etc. (Dokulil et al. 1986: 235, 284). Since the word formation of nouns is relatively stable in Czech, children should gradually acquire a repertoire of word formation devices automatically.

- **B2 Adjective formation.** Again, this is an uncomplicated test task to see if the child has consolidated the word formation characteristics of (and differences between) meaningfully different types of adjectives. The task is to form an adjective based on information from the previous sentence. As the relevant literature states, "the basic features of adjective derivation arise from the naming character of adjectives" (Dokulil et al. 1986: 316). Here, we built on the earlier research conducted by Šmejkalová (2012; the experimenter was Babušová) that third-grade children already spontaneously label adjectives as "characteristics," which intuitively corresponds to the grammatical and functional-semantic characteristics of adjectives as postulated in the expert literature. We therefore expected relatively developed prerequisites for solving this task and the research results confirmed this expectation
- **B3 Comparative and superlative adjective formation.** It is assumed that children entering formal schooling have a good grasp on grading adjectives, and therefore the test task was made more difficult by the element of suppletion. The solution of the task is strongly dependent on the level of the child's vocabulary. In addition to the regular grading of adjectives, we made the grading of adjectives more difficult by the manifestation of suppletion ((dlouhé – delší – nejdelší/long-longer-longest, dobré – lepší – nejlepší/good-better-best) in order to increase the difficulty of the test. Suppletion can be defined as "a type of allomorphy, in which the relationship between forms of one morpheme is not derivable by phonological (or morphophonological) rules. These irregular forms are referred to as suppletive allomorphs" (Ziková 2017).
- **B4 Adverb formation.** The task involved the formation of adverbs. This is an easier task, especially because "adverbs as a whole are characterized by less word formation specificity and a shortage of derivational devices" (Dokulil et al. 1986: 431) and their formation is largely paradigmatic. That is why we included more demanding adverbs from compound adjectives, which were qualitative, whose linking vocalic is -o-, and which are converted by the formant e/ě (ibid.: 444).

C. Sentence Comprehension

- **C1 Word order**. This is a more difficult syntactic task and a phenomenon in which even adult speakers make mistakes, the so-called false syntagma. It is an inappropriate word order resulting from the interpretation of "a pair of sentence elements as a syntagma when this interpretation is not intended." The aim was to verify whether, or at what age, children are able to distinguish this subtle difference in meaning and apply a more appropriate word order.
- **C2 Topic-focus articulation (sorting utterances).** Although the syntactic literature treats issues of topic-focus articulation differently, we based this task on the theory presented by Grepl and Karlik (1998: 495). Here, the topic-focus articulation is seen as "the division of the content of the utterance into an initial part and a core part," with the initial part being understood as "the part of the utterance that usually expresses what is known in a given situation" and is the lesser component in terms of communicative weight. The core is then understood by the authors as "that part of the utterance which expresses the facts of greatest communicative weight" (ibid.: 495). We observed whether

children identify the core of the utterance as its most communicatively serious part, referring to different communicative contexts and illocutionary consequences; we based this on the model presented in the cited literature (*Peter sent the principal **a letter**. – The letter was sent to the principal by **Peter**. – Peter sent a letter to the **principal**.* – etc., ibid.: 496).

- **C3 Sentence structure – verb valency.** Verb valency is a concept whose understanding has evolved and continues to evolve, as has the development and understanding of syntactic valency theory. We build on the obvious fact that sentences "such as *the mother met, the director dictated, the car was heading, etc.* are nonsensical and therefore non-grammatical" (Hirschová 2012: 8). Our aim was to determine whether children perceive this ungrammaticality. We therefore relied on the notion of the so-called academic Czech Grammar in Use textbook, which indicates – to put it simply – that valency is the ability of a dominant element, usually a verbal predicate, to require a certain number of its complements, to which it also assigns a form (Daneš, Hlavsa, Grepl, et al. 1987: 18). We observed whether the children have a well-established awareness of the form of the syntactic core of the sentence (Hirschová, ibid.).
- **C4 Communicative function of utterances.** The last item tested was the children's ability to identify the likely communicative functions of an utterance, i.e. whether they could identify the current communicative function: "why, with what aim (intention, purpose) it is said" (Grepl and Karlik 1998: 333), in addition to the propositional content of "what is said". We induced the communicative context and observed whether the children distinguished the probable CF. We made the task more difficult by contrasting the probable CF with the learners' preconceptions about the sentences according to the speaker's attitude in some cases ("Break a leg!"); for example, we deliberately formalized the utterance with the CF of warning as a so-called command sentence, and we also involved tropes such as irony.

2.2.2. Comprehension tests

The comprehension tests were constructed on the basis of the same principles in three modes: listening comprehension, oral reading comprehension, and silent reading comprehension. We respected the developmental needs of the children in terms of the content of the texts, as well as in relation to the reading levels they had achieved. We therefore worked with three versions of the tests: version A for Grade 1 pupils, version B for children from Grades 2 and 3, and version C for children from Grades 4 and 5.

One third of the questions in the tests was focused on what is called literal comprehension (explicit comprehension), in which the extent to which the child has understood the information from the text (read, heard) and can recall it by answering questions (open-ended and multiple-choice) is monitored. The second third of the questions was directed towards inference (implicit comprehension). In order to answer correctly, it was no longer sufficient to understand the text, but it was necessary for the child to be able to draw certain conclusions from the information – to be able to "read between the lines." We assume that other cognitive abilities and skills are reflected in these differently focused areas of understanding. The last

third of the questions focused on the interpretation of texts. Here again, the child's other skills and personality traits, as well as their background knowledge, were reflected.

The questions were posed after listening to or reading a text. They were mostly open-ended; the child answered the questions about the text in their own words. For silent reading comprehension, questions were created in which the child chose from a list of possible answers.

In total, a maximum of 30 points could be obtained in each test, while the partial scores for explicit and implicit comprehension and interpretation of the text amount to a maximum of ten points in each test.

Comprehension tests are based on linguistic assumptions. We therefore supplemented all the tests with an orientation vocabulary test (*Control vocabulary test*), which consisted of terms that occur in the text. This was to check that low performance on the test was not due to poor understanding of the words. For this reason, words that were not very common or rather more challenging for a given age level were selected.

2.2.3. Decoding

Oral reading comprehension tests allow for the assessment of decoding in addition to comprehension. The child is asked to read aloud the texts we work with. Several indicators are monitored during the reading process to inform us about the level of reading attained. In this text, we use three of them:

1. the number of words read correctly in the first minute,
2. the total time taken to read the stimulus text, and
3. an accuracy score (not in terms of the number of words read incorrectly, but in terms of their percentage in relation to the total number of words read)

3. Results

3.1. Test performance by children in grades 1 to 5

Table 2 and Figure 2 show the performance characteristics of the *Language Awareness Test* (LAT) from grades 1 to 5 in elementary school.

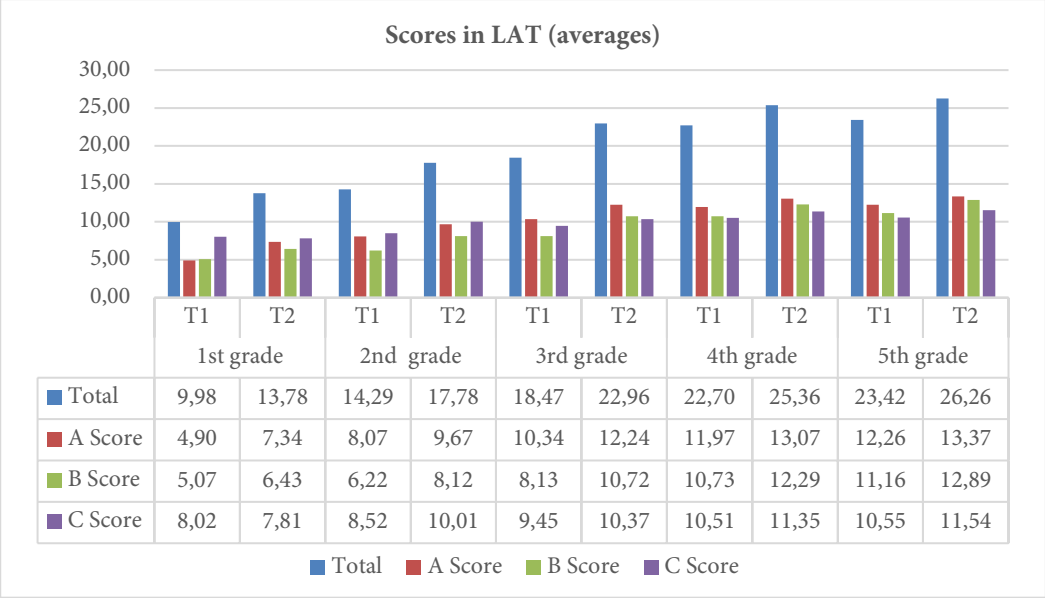
The item analysis (Table 3) shows the average scores achieved in each subtest and partial tasks (the maximum score is one point). In some items, especially in parts A and B, it was possible to set the order with a developmental emphasis – i.e. the easier items appear at the beginning of the subtest, the harder items at the end of the subtest. The other interesting trend in the results achieved is that, with some exceptions, success rates with the testing stages and in the upper grades are higher. This is particularly true for Grades 1–3, with the performance of older children no longer showing large differences and fluctuating across testing stages and grades. Subtest C is the weakest in terms of both tendencies.

Table 2: *Item analysis – means*

	Grade 1		**Grade 2**		**Grade 3**		**Grade 4**		**Grade 5**	
	T1	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**
N	119	102	198	170	212	164	196	181	148	149
A1_1	0.34	0.52	0.58	0.71	0.78	0.87	0.87	0.97	0.90	0.93
A1_2	0.29	0.30	0.47	0.55	0.69	0.84	0.89	0.93	0.86	0.95
A1_3	0.50	0.70	0.68	0.78	0.84	0.91	0.88	0.94	0.84	0.95
A1_4	0.24	0.26	0.40	0.53	0.59	0.72	0.76	0.83	0.76	0.87
A2_1	0.57	0.75	0.88	0.85	0.86	0.88	0.86	0.86	0.86	0.87
A2_2	0.39	0.62	0.71	0.85	0.71	0.89	0.78	0.93	0.76	0.85
A2_3	0.29	0.36	0.49	0.62	0.63	0.72	0.70	0.79	0.76	0.81
A2_4	0.09	0.22	0.34	0.34	0.50	0.57	0.70	0.83	0.74	0.78
A3_1	0.13	0.23	0.30	0.46	0.56	0.79	0.80	0.80	0.82	0.83
A3_2	0.26	0.57	0.46	0.50	0.63	0.80	0.72	0.76	0.72	0.74
A3_3	0.33	0.43	0.54	0.56	0.61	0.79	0.70	0.77	0.74	0.79
A3_4	0.07	0.10	0.13	0.31	0.26	0.49	0.47	0.61	0.50	0.76
A4_1	0.50	0.53	0.58	0.78	0.78	0.85	0.85	0.88	0.81	0.89
A4_2	0.41	0.55	0.67	0.72	0.78	0.79	0.76	0.80	0.75	0.87
A4_3	0.34	0.50	0.56	0.69	0.70	0.80	0.74	0.79	0.82	0.84
A4_4	0.15	0.21	0.28	0.39	0.43	0.55	0.46	0.56	0.59	0.68
B1_1	0.59	0.58	0.64	0.75	0.71	0.85	0.82	0.91	0.84	0.95
B1_2	0.64	0.75	0.70	0.78	0.82	0.92	0.93	0.95	0.95	0.95
B1_3	0.35	0.40	0.33	0.46	0.56	0.74	0.69	0.80	0.74	0.77
B1_4	0.48	0.52	0.55	0.53	0.57	0.72	0.62	0.70	0.68	0.77
B2_1	0.45	0.51	0.49	0.62	0.63	0.74	0.80	0.88	0.72	0.87
B2_2	0.09	0.19	0.15	0.26	0.25	0.51	0.61	0.67	0.61	0.82
B2_3	0.18	0.27	0.24	0.44	0.50	0.71	0.80	0.85	0.80	0.92
B2_4	0.13	0.28	0.21	0.35	0.33	0.42	0.51	0.49	0.49	0.63
B3_1	0.20	0.25	0.26	0.42	0.37	0.61	0.57	0.73	0.68	0.84
B3_2	0.18	0.24	0.22	0.36	0.29	0.59	0.54	0.75	0.64	0.86
B3_3	0.18	0.26	0.24	0.37	0.39	0.57	0.49	0.75	0.61	0.76
B3_4	0.10	0.12	0.16	0.24	0.18	0.30	0.27	0.41	0.37	0.62
B4_1	0.34	0.51	0.60	0.79	0.81	0.91	0.91	0.94	0.82	0.97
B4_2	0.47	0.57	0.60	0.77	0.79	0.93	0.92	0.96	0.90	0.96
B4_3	0.62	0.69	0.74	0.86	0.76	0.90	0.80	0.87	0.80	0.84
B4_4	0.06	0.09	0.10	0.18	0.22	0.35	0.45	0.57	0.52	0.57
C1_1	0.43	0.39	0.53	0.45	0.59	0.55	0.68	0.57	0.65	0.62
C1_2	0.76	0.74	0.63	0.68	0.54	0.67	0.61	0.71	0.67	0.71
C1_3	0.53	0.48	0.65	0.52	0.66	0.70	0.73	0.73	0.79	0.81
C1_4	0.65	0.55	0.45	0.50	0.41	0.41	0.33	0.40	0.36	0.50
C2_1	0.32	0.43	0.55	0.58	0.60	0.69	0.71	0.80	0.68	0.81
C2_2	0.42	0.61	0.50	0.61	0.66	0.77	0.76	0.86	0.73	0.87
C2_3	0.13	0.11	0.17	0.22	0.27	0.49	0.46	0.52	0.41	0.56
C2_4	0.15	0.19	0.12	0.19	0.28	0.39	0.44	0.56	0.39	0.56
C3_1	0.36	0.37	0.46	0.45	0.47	0.47	0.52	0.54	0.54	0.58
C3_2	0.90	0.85	0.93	0.98	0.98	0.98	0.98	1.00	0.99	0.99
C3_3	0.88	0.92	0.97	0.97	0.98	0.98	0.99	0.99	0.97	0.99
C3_4	0.22	0.14	0.13	0.12	0.11	0.16	0.17	0.20	0.20	0.27

C4_1	0.71	0.78	0.79	0.86	0.80	0.86	0.84	0.92	0.84	0.87
C4_2	0.59	0.50	0.45	0.51	0.62	0.74	0.63	0.81	0.72	0.81
C4_3	0.46	0.53	0.55	0.66	0.69	0.75	0.76	0.81	0.72	0.80
C4_4	0.52	0.47	0.64	0.69	0.81	0.89	0.90	0.90	0.89	0.93

Figure 2 describes the average values in each LAT subtest. It also shows the developmental character of performance – the trend of gradually increasing performance in the individual subtests (A, B, C) of the test.



	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
	1st grade		2nd grade		3rd grade		4th grade		5th grade	
Total	9,98	13,78	14,29	17,78	18,47	22,96	22,70	25,36	23,42	26,26
A Score	4,90	7,34	8,07	9,67	10,34	12,24	11,97	13,07	12,26	13,37
B Score	5,07	6,43	6,22	8,12	8,13	10,72	10,73	12,29	11,16	12,89
C Score	8,02	7,81	8,52	10,01	9,45	10,37	10,51	11,35	10,55	11,54

Figure 2: *Average values in the total LAT score, in the scores of subtests A, B, and C*

3.2. Reliability

When designing a diagnostic tool, it is necessary to check its reliability. We assessed it through the internal consistency coefficient (Cronbach's alpha). We were also interested in the test-retest reliability using the correlation coefficient between the results in T1 and T2.

Table 3 shows the reliability (Cronbach's alpha) of each subtest for testing stages and grades. The results show that the values are sufficient for subtests A and B, while insufficient reliability was identified for subtest C (Kline's rule states that it should be at least 0.7).

The reasons for the low reliability (i.e. low correlation of items with the overall test score) are apparent in several factors. Table 3 shows that some items have high performance across all grades (e.g. C2.2, C2.3) but it is also clear that there is no ascending trend between grades and stages of testing as in subtests A and B. This could be due to either poorly chosen tasks (subtests) to represent sentence comprehension or poorly chosen tasks within them, or it could be in relation to the way the questions were posed. Unlike the previous tasks, here the children were largely asked to choose from a list of answers, and thus they could guess rather than actually answer. Intonation could also have played a part here – in the way the sentence was pronounced – and it may be that it was the intonation that in fact cued the child to the correct answer without lexical-semantic links. We have therefore decided to exclude this subtest from the standards we are preparing. It is necessary for the subtest to undergo further

revision. However, we are not abandoning the domain as such – sentence comprehension is an important aspect of language awareness that we would like to develop further in the future. For these reasons, we will not address Subtest C below.

Subtests A and B have sufficient reliability and on aggregate, when considered across grades and stages of testing and working with only these two subtests, it reaches a value of 0.9 (removing one subtest increases the internal consistency of the test).

The test-retest reliability assessed by means of correlation coefficients (Pearson's *r*) between stages T1 and T2 reaches a value of 0.85, which is a satisfactory result.

Table 3: *LAT Reliability (Cronbach's alpha)*

	Grade 1		**Grade 2**		**Grade 3**		**Grade 4**		**Grade 5**	
	T1	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**
Total	0.72	0.75	0.78	0.83	0.80	0.81	0.77	0.80	0.83	0.81
Subtest A	0.70	0.68	0.71	0.72	0.71	0.71	0.62	0.63	0.75	0.70
Subtest B	0.66	0.71	0.70	0.74	0.73	0.70	0.67	0.67	0.74	0.76
Subtest C	0.31	0.11	0.21	0.42	0.34	0.41	0.40	0.45	0.43	0.33
Reliability (after corrections)										
Total	0.78	0.82	0.8	0.84	0.81	0.81	0.75	0.76	0.83	0.83
Subtest A	0.70	0.72	0.71	0.72	0.71	0.70	0.62	0.62	0.75	0.74
Subtest B	0.60	0.71	0.70	0.69	0.75	0.73	0.69	0.67	0.74	0.75

3.3. Differences in performance in the LAT between reading instruction methods and gender

When constructing diagnostic tools, it is also necessary to monitor whether there are differences in performance between children in terms of belonging to certain groups. It would seem that there may be differences between various methods used for teaching reading, and one cannot overlook gender differences.

The LAT points to implicit language abilities that develop without intentional development in preschool. At school age, however, it is not through teaching alone that schools can have an impact. It is also about how teaching encourages language development. The genetic method of reading builds more on the child's language competence and develops it in reading instruction. This was also in fact reflected in the results obtained (see Table 4), where in the overall summary, children taught with the genetic method reached better results, with a medium effect size (−0.41). Looking at the results in more detail, we see (outside the table) that this applies to all three scores – the overall score, the score for subtest A, and the score for subtest B. If we look at the differences across the grades, it is especially apparent in first grade at T2, which may indicate that the method may already have this effect after six months of application. In the other two grades, when the foundations of reading are established and the child is at the stage of developing further reading skills, we found only minor and nonsignificant differences between the methods. And subsequently, the differences between the methods are already identified in Grades 4 and 5. At this stage, the child is already practising reading and it is possible that children taught with the genetic method are more successful in this respect and benefit more from reading and the teaching method.

The findings have also contributed to the way in which the standards are handled. We have a procedure in place that will allow for some correction of the results precisely with regard to the method used for teaching reading.

The results of the international comparative studies PIRLS (2011) and PISA (2015) show significant differences in reading test scores between girls and boys; girls are statistically significantly better readers than boys. Authors in Anglo-Saxon countries, such as Robinson and Lubienska (2011) in the USA, have also reached similar results using data from a longitudinal study of reading in children from grade 0 (K – Kindergarten) to grade 8. According to them, girls' improved performance is evident at the beginning of schooling and persists throughout compulsory schooling. The same findings have been echoed in the UK, where the focus has been on identifying early reading strategies and developing them specifically in boys to reduce the gap between boys and girls (DfES 2009; Price-Mohr and Price 2017). We were therefore also interested to see whether the differences would be reflected in the LAT (see Table 5).

As is apparent in Table 4, there were no gender differences in the level of linguistic ability in the area of morphosyntactic processing. The boys and girls in our test battery show similar aptitudes for the development of reading competence.

Table 4: *Differences between Reading Teaching Methods and Gender in the LAT*

	method	**N**	**IRT score**		***t*-value**	**degrees of freedom (*df*)**	***p*-value**	**Cohen's *d***
			arithmetic mean	**standard deviation**				
Reading Teaching Method	AS	1276	−0.07	0.93	−7.27	1691	<0.001	−0.41
	G	417	0.31	0.95				
Gender	F	960	0.05	0.96	−1.63	1730	0.104	−0.08
	M	772	−0.04	0.93				

3.4. Relationships between Reading Tests and the Language Awareness Test – a correlational study

The *Language Awareness Test* (LAT) was subjected to correlational analysis with the reading aloud tests that were prepared to assess the level of decoding and comprehension. Table 5 offers the results of the relationship between the two variables in terms of decoding and Table 6 in terms of comprehension.

In the theoretical part of this paper, we referred to sources that examined the relationship between language ability and reading skills. One could therefore expect to see higher correlation coefficients in terms of comprehension as opposed to decoding. Yet, as shown in Table 5, these relationships were confirmed, albeit with varying degrees of substantive and statistical significance.

The number of words read in one minute does not show as strong a relationship with the LAT in Grade 1, but from Grade 2 onwards these are correlation coefficients with high statistical significance. We can find reasons for this in the stage of the development of the reading skill itself; reading is only in its early stages at this point and variables other than morpho-syntactic ability may enter into reading performance.

A similar interpretation is possible in relation to other parameters of reading performance – the total time needed to read the text and reading accuracy (the score reflects the total number of words read in one minute and the number of misread words).

We have interesting results for accuracy scores. Here, the significance of the relationships is strongest in the highest age group, i.e. in the fourth- and fifth-graders. In general, the accuracy is high in this age group, so it seems that if the child reads inaccurately, then it will most probably be a child with difficulties with the recognition of morphemes and syntactic structure.

Overall, the child's morphosyntactic abilities, as measured by the LAT, are related to the reading skills affected by our tests. The differences in statistical significance between subtests A and B are not very pronounced.

Table 5: *Relationship between the LAT and decoding*

Grade	Title	Language Awareness Test		
		Total score	Subtest A	Subtest B
	Number of words read correctly in the first minute			
1	Preparing for the Journey	0.25*	0.20*	0.24*
2–3	Feeding Rabbits	0.44***	0.40***	0.41***
4–5	Ice-skating	0.41***	0.30***	0.42***
	Total time taken for the reading			
1	Preparing for the Journey	−0.15	−0.12	−0.15
2–3	Feeding Rabbits	−0.40***	−0.36***	−0.37***
4–5	Ice-skating	−0.34***	−0.24***	−0.37***
	Accuracy			
1	Preparing for the Journey	0.21*	0.20*	0.19*
2–3	Feeding Rabbits	0.07	0.05	0.07
4–5	Ice-skating	0.35***	0.28***	0.34***

Table 6 shows the relationships between the LAT performance and comprehension scores in our new tests. Consistently with the expert literature, we can conclude that there is a relationship between the LAT and the comprehension tests – that is, in their respective modes. The relationships are mostly highly statistically significant ($p < 0.001$ or $p < 0.01$, respectively). While *Listening Comprehension* correlates significantly with the *Language Awareness Test* scores, there were no statistically significant relationships with the test of oral reading for first-graders (*Preparing for the Journey*) and a weaker relationship with the test of silent reading (*The Snowman*). This is consistent with the findings that early in the development of reading skills, reading comprehension is more strongly influenced by the level of decoding (ability to read words) than by language ability.

The *Control Vocabulary Test* showed highly statistically significant relationships with the LAT, which was designed to assess the child's morphosyntactic abilities. This is not surprising as both relate to higher levels of language.

Table 6: *Relationship between the LAT (total score) and comprehension tests (listening, oral reading, silent reading, Pearson's r)*

Grade		Total score	Explicit comprehension	Implicit comprehension	Interpretation	Control Vocabulary Test
Listening comprehension tests						
1	The Forest Elves	0.23**	0.15*	0,21**	0,18*	0,30***
2–3	The Fidgety Little Star	0.56***	0.51***	0.44***	0.38***	0.60***
4–5	How to Mushroom	0.45***	0.36***	0.32***	0.28***	0.44***
Oral reading comprehension tests						
1	Preparing for the Journey	0.04	0.10	0.11	0.10	0.10
2–3	Feeding Rabbits	0.56***	0.44***	0.40***	0.50***	0.42***
4–5	Ice-skating	0.50***	0.37***	0.36***	0.37***	0.52***
Silent reading comprehension tests						
1	The Snowman	0,23*	0.17	0.26**	0.13	0.15
2–3	Big Friends	0,60***	0.51***	0.48***	0,.41***	0.45***
4–5	A Trip to Kořenov	0,48***	0.46***	0.35***	0.18**	0.34***

*Statistically significant values on the following level: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

4. Discussion and conclusion

A number of international research studies have pointed to the key role of morphological awareness in relation to the development of reading skills (Carlisle 2003; Nagy, Berninger, and Abbott 2006; Nunes and Bryant 2006, etc.) and scholars continue to discuss the inclusion of morphological awareness within models of reading development (e.g. Kirby et al. 2012). One cannot say that the topic has not been under discussion in the Czech Republic, where Žlab addressed it in detail in the 1980s and 1990s (Žlab 1992); however, counselling professionals today lack developmental data and the tools to measure these language abilities. We have therefore built on our initial research on the development of reading comprehension (Kucharská et al. 2015) and continued to develop a new diagnostic tool aimed at mapping morpho-syntactic awareness. In our work we refer to morphosyntactic awareness as the handling of linguistic resources on the basis of prior knowledge of the principles of the structure and functioning of the language system. Out of the possible measuring methods, we have chosen an orally administered format that maps the production abilities of the observed phenomena.

The present study aimed to analyse the *Language Awareness Test* (LAT) results in the *PorTex* test battery. Norms are currently being developed and the results can be used for this purpose.

As for the design of the LAT test itself, it turned out that not all the subtests provided satisfactory results. Subtests A and B show the developmental nature of the items through item analysis, i.e. that children in higher grades perform better than those in lower grades and at the same time we also see different percentages reached in each item, which allows for differentiation in the assessment. Good reliability (Cronbach's alpha, test-retest reliability) was also demonstrated. On the other hand, subtest C does not meet the requirement for developmental performance of the items. In many cases the items performed identically (yet

with high scores) from Grade 1 onwards – the subtest therefore does not have much differentiating power. In addition, low reliability was also found. This may be due to the nature of the answers – three out of four questions were answered by selecting a set of possible answers, while intonation was also at play here. This may account for the higher scores as opposed to if open-ended answers had been required. However, we are not abandoning the Sentence Comprehension subtest and will continue to work on modifying or redesigning the items.

Given the specifics of reading instruction in the Czech Republic, we also sought to answer the question of whether performance on the LAT is related to the method used for teaching reading and gender. If differences were found, it would be necessary to adjust the standards as well. Differences did indeed emerge. Children who are taught using the genetic method (spelling) scored better on the LAT with a medium effect and the preparation of the standards will reflect this finding. Differences between boys and girls have not been demonstrated.

The final finding concerned the LAT's relationship to the newly constructed comprehension tests. According to the theoretical background, the relationships were shown to exist, with text comprehension having higher correlation coefficients than decoding. Nevertheless, language ability as measured by our new test shows a relationship with both variables of interest. This general assessment has two exceptions: the relationships are weak or even non-existent for first-grade pupils. Other factors probably also play a role (ability to work, comprehension of instructions) in listening or oral reading. Also, a weak or no relationship with the LAT was shown for silent reading, again in the lower grades. Here, the child's ability to work may have once again figured in the results. In fact, findings of low correlations between morphological awareness and reading skills in the early years of elementary school are also shown in international studies (Kirby et al. 2012). They cite overly difficult tasks in the morphological awareness test as a possible explanation, as well as the developmental nature of the relationship between morphological awareness and reading skills related to the development of reading for meaning.

On the basis of the data presented, we believe that the LAT demonstrates good psychometric properties, and we consider it an important component of the newly developed *PorTex* literacy skills test battery. We believe that the LAT will be beneficial not only for diagnostics and educational psychologists (counsellors), but also for research.

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Appendix

Measures of the *PorTex* test battery

- **Phonological skills**
  - Tests of phoneme awareness
  - Pseudowords repetition task
- **Linguistic awareness test** (assessing morphology, word formation, and sentence comprehension)
- **Decoding tests**
  - Word reading test
  - Pseudoword reading test
- **Comprehension tasks**
  - Listening comprehension tests
  - Oral reading comprehension tests
  - Silent reading comprehension tests
- **Reader's self-concept assessment scal**e
- **Environmental factors questionnaires** (Questionnaire for schools, Questionnaire for parents).