Abstract: Literacy is one of the most important human abilities even in our technology-based society, since especially in the age of life-long learning; it is the skilled application of reading that enables us to access our cultural heritage. Failure to use literacy skills efficiently will not only result in a disadvantageous position among fellow-students, but in all areas of daily life such as shopping-, or positions in the labour market, as well as chances of advocacy of own interests. These handicaps beside financial difficulties manifest in serious distress and lower quality of life. Literacy is a relatively new development in the evolution of human cognitive abilities, thus, our brains are not innately pre-wired to reading. This biological-cultural gap can be bridged only by explicit instruction that modifies the operation of the underlying visual and linguistic neural structures. Literacy development relies on very different fundamental abilities, some of which are genetically determined while others are shaped by early experiences. Therefore the process of reading acquisition is very vulnerable as it depends on the early development of different cognitive domains. It is crucial to understand the process of the formation of reading ability and the development underlying skills, in order to gain an even more differentiated picture about initial phase of reading acquisition through the detection of typical and atypical ways of development can we attempt to screen and examine the risks of written language acquisition. What is more, regarding on the underlying skills this can be applied even in the final year of kindergarten (or in the preschool age). This could provide the basis of an evidence based, efficient preventive intervention, which has long tradition in history of Hungarian speech and language therapy.

Keywords: literacy, children, reading achievement, linguistic indicators
Theoretical framework

Current research is built on interdisciplinary foundations applying tools and methodology of cognitive sciences. From a psycholinguistic aspect it works based on following theories:

(i) The oral-written paradigm: Along with this paradigm, learning to read is understood as a written language acquisition (Ong, 1982; Benczik, 2001).

(ii) According to cognitive pedagogy literacy is a complex multidimensional ability, which, in Kampis’s (1991) view, is a component system and involves many levels of proficiency. Decoding regarded as a basic component of literacy alongside text comprehension and text creation. In this sense decoding is a tool of knowledge (Csapó, 1992; Nagy, 2010). Researchers generally assume the operations of different skills underlying both of these basic abilities. The mapping of underlying skills of decoding ability has been ongoing ever since the 70’s, therefore, we know considerably more about its developmental processes, whereas the detection of the underlying variables of text comprehension seems to be a more complex task.

(iii) The cultural recycling hypothesis bears similarity with classical Darwinian concept which has been called exaptation process by Gould and Vbra (1982). From Dehaene’s (2004; Dehaene & Cohen, 2007) point of view human brain organization is subject to strong anatomical and connectional constraints inherited from evolution. Organized neural maps are present early on in infancy and bias subsequent learning. Cultural acquisitions (e.g., reading) must find their “neuronal niche,” a set of circuits that are sufficiently close to the required function and sufficiently plastic as to reorient a significant fraction of their neural resources to this novel use.

(iv) The development of reading has been described by several level- or phase-models displaying more or less differences. Researchers found initially that the child typically reads at different levels by using different reading strategies. For example Ehri’s (1987) system consists of four phases which considers a pre-alphabetic phase, a partial alphabetical phase, as a transition between the pre-alphabetic and the alphabetic phases. During this phase the child uses the idea of letter-speech sound mapping mixed with contextual guessing. Finally, Ehri calls the strategy of experienced reader the consolidated alphabetical phase. The theories of development will be renewed by Share’s „self- teaching model” (Share, 1999). He calls our attention to the fact, that the strategy usage of a child does not only depend on which level or phase their development is currently in, but if the word they face seems to be familiar or not. The more they are able to recognize from the given text by using their visual word-form area, the more experienced their reading is.

(v) Cognitive-linguistic indicators underlying reading performance. Researchers’ attention has turned to linguistics
since the 80’s, most especially to those which are in specific relationship with other cognitive abilities (Goswami & Bryent, 1990; Pennington, 2009; Pennington & Bishop, 2009). The most significant underlying factor proved to be the phonological processing, especially the phonological awareness (PA) which not only means the skill of differentiating speech sounds, but rather it is a meta-ability. This enables us to perceive the sublexical units (syllable, rhyme, and phoneme) to use this for performing operations. In the background of word recognition there is the rapid automatic naming (RAN), a skill which performs the rapid naming of overlearned items such as colors or simple objects etc.. The process means practically the “translation” of visual stimuli to verbal ones and has a close relationship not only with the accuracy and pace of reading but with reading comprehension as well (Tóth & Csépe, 2008; Blomert & Csépe, 2012).

(vi) Transmodal connectivity hypothesis. Recent researches emphasize the determining role of the automatic letter-speech sound mapping among the background indicators. During reading acquisition a strong association has to be established through which a tight integration of several modalities emerges. While it has been believed earlier that the process of letter-speech sound integration is completed in the initial phases of reading acquisition, now it is approved that the child needs years for this relationship to be imprinted and integration to be used automatically. As a result of this, a new quality, a completely automatized skill is at the skilled reader’s disposal as opposed to beginners. Current researches proved that this transmodal connectivity problem (Vaessen, 2010; Blomert, 2011; Csépe, 2013) contributes to the emergence of severe reading disorder.

The aims of the research

Our research has a dual purpose:

(i) the investigation of the initial phase of reading acquisition at the end of first year’s first semester of school— from a cognitive-linguistic point of view, involving the exploration of Hungarian children’s reading performance from the aspect of accuracy, fluency and sentence comprehension.

(ii) to explore the relationship of these three reading parameters with the cognitive linguistic skills in the final kindergarten year. Beside the role of phonological processing as a core-deficit of decoding, it is essential to see its correlation with the RAN, with working-memory functions and its relationship with lexical and morphosyntactic linguistic levels.
With regard to practice we have medium-term goals as well: first of all, to modify the Hungarian screening procedure according to our research results. Then to develop a procedure to prevent the formation of poor reading acquisition, right in the final year of kindergarten and at the initial stage of reading. The main questions of the current research are:

1. What kind of developmental dynamics is characteristic of the investigated skills between the final year of kindergarten and the initial year of school in the case of native Hungarian children?
2. What characterizes children at risk for reading disorders among Hungarian kindergarten children?
3. What are the early linguistic indicators of poor reading development in Hungarian?

Sampling pool

Our short-term longitudinal study followed 148 children by way of random selection from final year of the kindergarten, to first grade of school up to the end of first semester, to explore the initial processes of learning to read. Our sample consist of 78 children from the capital city and 70 from the countryside. Among them there were 80 boys and 68 girls. Based on demographic data, findings show no differences regarding reading performance among younger and older children. Children of the countryside performed somewhat poorer, but not significantly. Similarly regarding linguistic skills and the fluency of reading there were no differences to be found, between the two genders. But concerning the reading accuracy boys produced significantly poorer results. And the standard deviation is twice as high as well.

Examinations tools

For examining the cognitive-linguistic skills in kindergarten and school age as well we used the so called SZOL-E? Hungarian screening procedure.
Figure 1. Structure of Hungarian speech and language screening test SZÓL-E? (Kas et al., 2012)

The top part of figure 1 show the tasks off different language and visual skills. Each task consists of at least 6 items. The current research demonstrates only the language results. The middle part shows the location of the tasks in the language hierarchy. For example phonological processing includes nonword repetition, nonword discrimination, and phonological awareness tasks. Morphosyntactic processing includes sentence repetition, and use of grammatical morphemes. Lexical processing includes word repetition and rapid automatized naming. The outcome areas are located at the bottom of figure: Speech disorder, language disorder, risks for literacy disorder. Our investigation cover the area of language disorder and the risk of learning to read.

For examining reading performances a self-developed test was applied. First of all we would like to screen the decoding skills. This part consists of several reading-task: reading letters, syllables, nonwords and words. Next we assess the sentence comprehension with drawing. From the different performances of reading like accuracy, fluency we compose a common ratio which named reading efficiency in 1st grade. It is calculated dividing the number of well-read items by time used up. According to this ratio we formed groups with different reading success, in line with their deviation from the average value, were the following:

- more than 1 SD below average – 21 children
- less than 1 SD below average – 64 children
- less than 1 SD above average – 41 children
- more than 1 SD above average – 22 children
Early Linguistic performances

Comparing developmental dynamics of linguistic performances between kindergarten and first year of school our results show the developmental rates corresponding to the literature data. The use of the morphosyntactic linguistic level shows the greatest development: for example the syntactical processing of sentences from 58% to 81%. The rate of development is 22.7% in one year. In area of the morpheme production the rate of development is 20%, from 60.8% to 80.8%. In contrast morpheme comprehension has already reached a ceiling effect at the end of kindergarten from 95.8% to 100%. The nonword discrimination also shows a significant development rate 18.3% from 68% to 86.3%.

Comparing the linguistic skills of reading readiness we found similar results as in scientific references as well. In the field of phonological awareness the first phoneme identification shows the greatest developmental dynamic: 84.25%. Among the kindergarten children only 13.25 per cent can recognize the first speech-sound of the word, but in the middle of first class almost every child (97.5%) is able to do it. The accuracy of RAN has already reached a ceiling effect (from 94.8% to 97.3%), but regarding the fluency, the first graders solve the task in a much shorter time (-21.7 sec).
Comparing linguistic performances with reading efficiency

Statistical analysis of data includes a one-way analysis of variance (ANOVA) on the numbers of correct responses in early linguistic performance measured in kindergarten age. We found significant group effects in all linguistic tasks except phonological awareness. Pairwise comparisons revealed that only the poorest reading group (more than 1 SD below average) differed significantly from the other – more advanced readers. Poor readers showed significantly lower levels in all tasks such as non-word repetition, non-word discrimination, word repetition, rapid automatic naming, sentence repetition and the use of grammatical morphemes but not in phonological awareness.

Figure 3. Differences in early linguistic performances according the reading efficiency groups

When we grouped the linguistic tasks according to linguistic hierarchy by averaging the tasks, we found the same pattern: significant group effects that were caused by the poorest readers performing significantly lower than the more advanced readers. The readers at or above average did not differ in any of these tasks at kindergarten age.
**Discussion**

Our results in Hungarian are mostly in concordance with the international literature while some of the differences are explained by task-specific reasons. According to our assumption in differences in phonological awareness could not by detected because the task measuring this skill not sensitive enough it examines no more than two options, that is, recognition of the initial speech sound of the word and the existence of the given speech sound within the word.

In the contemporary scientific research the receptive morphology and the sentence repetition are not mentioned as the main underlying skills of early decoding. Still it seems that in Hungarian language (probably cause of deep morphology and variable word order in the sentences) these linguistic skills have a stronger role in the initial phase of reading acquisition. Not only in reading comprehension but also in the decoding of words. It would be desirable to make further research to discover the role of morph-syntactic level of language in decoding processes of Hungarian children.

Despite the ceiling effect, it seems that morpheme comprehension is an essential element of linguistic screening, because this skill plays a significant role not only in determining of variance but the week morpheme comprehension in kindergarten predicts poor reading performance.

According to contemporary researches: the role of RAN as an underlying skill of decoding is not too strong in initial phase of Hungarian reading acquisition, despite the transparent phonology. Only at poor readers (in accuracy and comprehension) show a significant difference. The role of PWM in reading development so far is not so clear. In our investigation it seems to play a supporting role in determining the variance, but at poor readers (accuracy and comprehension) show a significant difference.
Thus, it seems that poor reading outcomes in Hungarian can be predicted based on early linguistic measures in kindergarten age on each level of linguistic hierarchy. Based on this measurement, we have the opportunity to develop an evidence-based prevention program.

References