ADAPTATION OF A LANGUAGE AWARENESS TEST. A FOCUS OF COGNITIVE- LINGUISTIC AND CULTURAL FACTORS IN PREDICTING READING DEVELOPMENT.

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ABSTRACT

The present study describes the process of adapting the Norwegian "Ringerike Materialet" Language Awareness Screening Tool (Lyster and Tingleff, 1992) to Hungarian. Forty-two kindergarten children were tested with the material, which in addition to language awareness abilities had measures of verbal short term memory, listening comprehension, and letter knowledge as extra tasks. Fifty-eight first graders were tested with the tasks, plus nonverbal IQ, rapid naming and reading after tree months of reading instruction. A cross- sectional comparative and correlational-predictive part were conceptualized in the process of mapping Hungarian children's metalinguistic abilities by this battery and to examine factors accounting for early reading performances in Hungarian, a transparent orthography with a clear grapheme-phoneme correspondence. The comparative part proved a clear developmental progress in children's linguistic abilities. The correlational part gave evidence about inter- correlations between the cognitive and linguistic variables measuring the underlying construct of language awareness as a preliminary demonstration that the awareness of large units of the language may bear a close relationship to reading development in this transparent language. The predictive part of the present study additionally gave more specific information about which cognitive- linguistic factors predicted the growth in reading. The findings supported the relevancy of language awareness theory in the process of learning to read. Phonological, morphological, grammatical awareness as well as broad linguistic skills presented a large contribution to reading after controlling for the effect of intelligence and letter knowledge. An interesting finding was the sensibility of rhyme awareness in predicting reading development in Hungarian. Short term memory and rapid naming did not uniquely predict reading if IQ and letter knowledge were controlled, but were related to reading performances. The contribution of morphological and grammatical awareness was explained by the complexity of the language. Additionally this work describes the method of teaching reading and the effect of home environment on Hungarian children's literacy development in Transylvania.

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Motto: "If you can not explain your research to your mother or to a six year old child that mean that you did not understand nothing."

Jørn Hurum

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1. GENERAL INTRODUCTION

1.1 Introduction

This chapter of the thesis gives a general overview into aspects of Romanian education system with main focus on developing literacy skills. It sets some important features regarding this study which is seeking to map the literacy development of Hungarian children from Romania and gives justification of the importance of conducting such a research in a Hungarian context. Important concepts will be defined.

1.2 Background situation

Romania is located in South-East Europe. Romania is divided into forty-one counties (județe), as well as the municipality of Bucharest (Bucureşti), which has its own administrative unit. According to the 2002 census, Romania has a population of 21,680,974. *Romanians* make up 89.5% of the population. One of the largest *ethnic minorities* are the *Hungarians*, who make up 6.6% of the population and *Roma*, who make up 2.5% of the population. Hungarians, who are a sizeable minority, live mostly in **Transylvania**. The *official language* of Romania is Romanian. *In places where a given ethnic minority makes up more than 20% of the population, that minority's language can be used in the public administration, while native-language education is provided.* Romania became part of the European Union in 2007. The reforms and changes occur also in the **educational system** and the aim is to reach the European Standards. The priority of educational policies is the *equity/ quality in education*, and to observe the international standards of performance. The **National Strategy** for the development of education planning up to 2010 foresees the implementation of inclusion policy, providing supporting teachers, trainings for the staff and flexible curricula, "for each and everyone"(www.anph.ro). The priority of educational policies for the next stage will be the balancing of equity/quality in education, focusing the teaching- learning process on the pupil, according to his/her individual needs and

learning cycle, guarantying equal opportunities to getting access to the education, consolidating the system of social facilities for pupils, educational programs appropriate to the needs of the vulnerable groups, developing programs concerning the fighting and preventing the school abandonment. In the present projects and programs are running for developing the quality of rural education (www.edu.ro). The educational reform has also an **administrative** line aiming to *decentralize* the activity of education to the local public administration, diversifying the services by the development of consultancy and counselling services, training centers.

This study was conducted in the municipality Marosvásárhely (Tîrgu-Mures). Capital of the Mureş County, the municipality is situated in the central part of Transylvania and Romania and represents a powerful administrative, economic, cultural and university centre. There are important improvements after these educational reforms were implemented. Information about how children learn to read and special literacy needs have been spread to the pedagogue society, many alternative teaching reading books was developed, teachers and educators begin to be more aware about this issue. The Hungarians as minority group in this country has the possibility to gather theoretical and practical information also from Hungary. Literacy learning policy for Hungarian children in Romania is that in the kindergartens are emphasised the school readiness skills, and in the first grade the process of learning to read is hurried up. But Romania's educational system is still seeking for its identity. Literacy instruction is still a matter of question in Romania: When to begin schooling? When to begin the formal reading instruction? Which abilities to enhance in a school readiness program? The Curricula is still demanding and the examination and assessment procedures are still competitive. The teaching reform started in 1998 and it gave an impulse for textbook writing and editing. A recent survey of Ráduly- Zörgő and Ferencz (2004) highlights important patterns about the existing trends around teaching literacy for Hungarian children at a given educational reality. The survey is dealing with the first grade textbooks which appeared in the last decades in Romania for Hungarian pupils, from a psychological point of view. They analyzed teacher's opinions regarding considering interdisciplinarity, children's age, psychical and mental development when composing textbooks and their preference of methods of teaching reading. They

asked 237 teachers from Hungarian regions in Romania. The findings were consistent with their assumptions: interdisciplinary (team) work is needed when composing textbooks. The teacher, psychologist and speech therapist contribution came up first (96, 3%, 73, 4%, 60,6%). But the claim for pupils and parents contribution was just 0, 9%. Furthermore teachers considered the psychological aspect to deal with when writing textbooks, mostly the children's mental development, their level of visual perception (letter size in the book, the sequence of teaching letters, illustrations), language development (vocabulary, teaching sounds before starting the letters) and memory capacities (exercises for consolidating the new information, memory strategies). The conclusion regarding the reading methods were not surprising most teachers preferring the synthetic phonic method (66, 7%). The Hungarian pedagogy has a well defined tradition in this and the method best fitting with this language being called: "sounding- analyzing- blending": sounding out the phonemes of the words, analyzing them and blending them together. The frequency for other method preferences were: combined methods 16% and whole-language 8,6%. 3,7% did not consider the method as being important when learning to read. Further, 2,5% reported using interactive methods and 2,5% reported individualized reading instruction. The overall conclusion of this survey is positive. The pedagogue society is ready to consider important psychological aspects when designing the reading teaching textbooks and they are concerned about the importance of the method in the process of reading acquisition. But it was striking to see that the claim to parents and pupils contribution to writing a textbook has such a low consideration. Furthermore the preference of individualized reading instruction is also low. A possible explanation for this is that even if the educational system in Romania begins to be professionalized and quality concerned but the implementation of *individualized education* is not yet integrated. This has many reasons. One of them is that parents not always express their needs, because "the experts know better". The other explication which is more likely is that the curriculum is still difficult and information centered not giving space for more flexibility.

1.3 Statement of research topic

The amount of literature about reading and language awareness is huge and there are concepts and theories which changed in time: emergent literacy versus reading readiness, backward readers or special literacy needs, language related factors in learning to read versus auditory or visual or intermodal capacities. The concept of emergent literacy and language awareness are becoming more and more vogue in the reading literature. The modern theories of reading acquisition do not use the concepts school readiness, reading readiness. These are already old concepts. The literacy development is beginning already from the birth, through discovering more and more aspects of the language. The researches in the field of reading development flowered in the last 30 years, many are engaged to find out and describe the process of learning to read and which factors predict the acquisition of this skill, what characterize a good reader and which capacities are missing in those who have problems. The main factor which underpins the early steps of reading development seems to be *phonological abilities*: the more developed phonological abilities one has, easier it seems to learn to read. Those who have problems in learning to read perform poorly on tasks measuring phonological abilities. Individual differences can be predicted by these abilities and moreover training this ability can improve reading skills (Liberman, Shankweiler, 1991; Goswami and Bryant, 1991; Lyster, 1998; Treiman, 2000).

The aim of this study will be to analyze the process of reading acquisition mostly at the beginning stages (decoding) and to analyze which language related cognitive components are important to predict growth in beginning word decoding. Studies conducted in early stages of reading development will be analyzed because the own study will target this age group. Reading seems to develop differently in different orthographies. Most research was done related to English orthographies and these English models will not always fit with other orthographies (Aro, 2006; Aro and Wimmer, 2003; Hagtvet, Helland, and Lyster, 2006; Hoxhallari, van Daal and Ellis, 2004). A focus will be to find out what researchers discovered about this matter, and which finding can be adjusted to the Hungarian language system.

One aim of this study is to make the chosen tool sensible enough to measure individual differences in the process of reading acquisition and to develop a tool in Hungarian to detect children who may develop difficulties in learning to read. Prevention is more effective than treatment, and the ultimate research results convince that explicit language related activities should be implemented in order to prevent school failure and reading problems. A predictive study measuring cognitive-linguistic capacities will be conducted. Predictions of reading, controlling for letter knowledge, rapid naming, verbal short term memory and nonverbal intelligence will be done to find out which capacities are important in learning to read this transparent language. Focus will be on abilities that are important to train when elaborating a prevention program to those children who are at risk in developing reading skills.

1.4 Justification and significance of the study

The ability to reflect upon the form of a language, language awareness seems to be key ability in the reading development. Studies have demonstrated that an explicit training of such abilities is an effective tool in literacy education, training and reading difficulty prevention. To be able to implement the principle that prevention is more effective than treatment, the Hungarian culture and educational system from Romania need a screening tool based on the ultimate theories, research, and findings. Therefore this study will aim to translate and adapt to the Hungarian culture, language and educational system a Norwegian language awareness tool, based on the ultimate theories of reading research. In a way it will be an awareness rising activity, presenting a new screening tool based on the recent theoretical findings of reading development. Furthermore learning to read is a basic ability for the academic and personality development of a human being. Children who struggle and have difficulty in achieving this ability need individualised intervention and help. Even those who are good readers may need motivation and enjoyment for developing a “reading for meaning” attitude toward the written language. To accomplish the policy of individualized education, where every child’s need, difficulty is mapped and addressed we need an assessment tool. During my work as a teacher in elementary school I experienced a phonics based

teaching plan newly implemented from Hungary, which contained phonological awareness training as preparation, before teaching the real letters. Later on working as occupational therapist, carrying out a school readiness program for the learners unconsciously I implemented phonological, morphological and syntactical awareness activities for enhancing the student's language awareness. These own experiences captured the interest to realise a systematic study on language awareness abilities and learning to read later on.

1.5 Definition of concepts

The research in this area uses a complex psycholinguistic language. Definitions of some concepts are needed. Rohl's (2000) definitions will help in doing this:

Language awareness or metalinguistic awareness: the ability to reflect on language as an object of thought, being able to analyze the form of the language not just the content and meaning.

Phonemes: the smallest units of spoken language that make up words. The concept phoneme is an abstract unit, but we usually call phonemes sounds. They cannot be easily heard individually in their pure form when they are part of words.

Graphemes: the smallest units of written language, the letters of an alphabet or letter groups when more letters are needed for one symbol. Graphemes are the written symbols for the sounds in the language.

Onset- rime: sometimes called alliteration and rhyme. Onset- rime represents the two units of a one syllable word. The onset is the part of the syllable before the vowel; the rime is the rest of the syllable.

Phonological awareness: the ability to recognize the phonological units of language and to manipulate them. Phonological awareness is a broader term; it is identifying and manipulating larger parts of spoken language, such as words, syllables, and onset and rimes- as well as phonemes.

Phoneme awareness: a subcategory of phonological awareness, it is narrower, just identifying and manipulating the individual sounds in words.

Morphological awareness: the ability to be aware of and manipulate morphemes, which are the minimal, meaningful parts of words. This is knowledge about how the words are composed or constructed.

Syntactical awareness: it is connected with the perception of sentence form and sentence structure. Syntactical awareness is the ability to reflect upon the way in which words go together in sentences.

Grammatical awareness: the ability to focus attention on the grammatical structure of the language. In many ways it is closely related to morphological awareness and syntactical awareness.

Rapid naming: also called rapid automatized naming (RAN), naming speed or serial naming. To name symbols (colours, objects, numbers, and letters) in serial order as fast as possible.

Verbal short term memory: holding the phonological information in memory while performing the tasks.

Phonological processing skills: phonological awareness, rapid naming and verbal short term memory function all together.

Phonics: refers to the process of linking the sounds to the symbols that stand for them.

Transparent or shallow orthographies: languages which have regular grapheme-phoneme correspondences.

Deep or opaque orthographies: languages with many words deviating from letter-sound correspondences.

2. THEORETICAL FRAMEWORK FOR UNDERSTANDING READING DEVELOPMENT AND DIFFICULTIES IN READING

2.1 Introduction

The aim of this study was to analyze the process of reading acquisition mostly at the beginning stages (decoding) and to analyze which cognitive and linguistic components are important to predict growth in the beginning of reading. In this chapter studies conducted in the early stages of reading development will be analyzed. Ultimate findings regarding literacy acquisition in English and in other different orthographies will be discussed. Figure 1 shows Lundberg's model of the components and factors influencing reading achievement and the levels where they are situated.

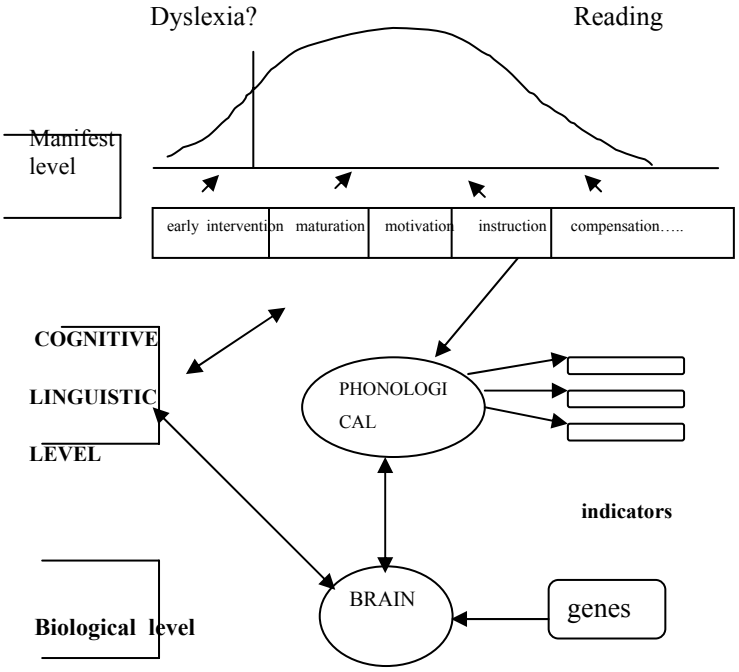

Figure 1. The Lundberg model (1999)

This model demonstrates that reading research is a science, researched on many levels. It allows visualization of how this study is situated at the cognitive- linguistic level. The model shows that there is a percent of children who have difficulties in achieving reading skills. They are labelled dyslectics. The focus of this work was to translate and adapt a Norwegian linguistic and cognitive screening material, the "Ringerike Materialet" (Lyster, Tinglef, 1992) to the Hungarian culture from Romania in a way to

be *sensible* enough to measure individual and age differences in the process of reading acquisition.

Factors that may influence the manifest of reading achievement can be: caring conditions during infancy, literacy practices at home, home resources and cultural features (books at home, reading habits, and the parents' educational level), maturation, instructional methods, school attendance, motivation, compensatory strategies etc. When looking at children's reading development in this work, *parent's educational level* and *methods of teaching literacy* were emphasised.

This study was conducted on the **cognitive and linguistic level**, aiming to adapt the mentioned test that may uncover some important cognitive and linguistic factors related to reading development. Lundberg (1999) also highlights the importance of these skills which has the best explanation for the process of reading acquisition. These cognitive, linguistic capacities are categorized in many ways but this work followed Lyster's (1992) operationalization and the structure of her test. The cognitive, linguistic capacities in question were: *phonological awareness, morphological awareness, and awareness of the grammar, rapid naming, and verbal, serial short term memory. Letter knowledge* as autoregressive variable and *nonverbal intelligence* as extraneous variables were also measured. (Autoregressive effect is the effect of the same skill at an earlier point of time). The main question was how these abilities are in the Hungarian population from Transylvania and how these abilities predict growth in the beginning of reading; they explain shared or unique variance in reading. This research had also a focus on *reading* level acquisition after measuring the above mentioned cognitive- linguistic capacities, mainly the decoding skills at the early stage of reading development.

2.2 What is reading?

This study followed Gough and Juel's (1991) model when operationalizing the concept of reading. Gough and Juel (1991) proposed the Simple View of Reading which was the most applicable for this study because it was conducted at an early

stage of learning to read whereas decoding skills are so important. In their view, reading consists of two components: word recognition (to grasp the strings of letters which form the word) and linguistic, sometimes called listening comprehension (what are the meanings of words, making connection with the inner lexicon).

$$R = D \times C$$

The first component *word recognition* in Gough and Juel's definition of reading refer to decoding skills (D). Moreover some researchers use the term decoding as a synonym for phonics (Chall, 1967, in Hoover and Tunmer, 1993), others describe the correspondence between letter strings and phonetic codes (Perfetti, 1985, Hoover and Tunmer, 1993), and for Gough and Tunmer word recognition is accomplished through phonological coding. These terms reflect the view of authors who are concerned about the alphabetic mode of learning to read where phonological coding is based on knowledge about "cipher" in Gough's term (to know about a code). The beginner reader has to grasp the letter- sound correspondence rules of the language, to transform the graphemic representation of the word into the phonemic representation and finally to find the meaning of the word in the mental lexicon. Firstly to be able to segment the words into their sounds/ letters and after that to combine the letter strings into phoneme combinations which represent the word, and finally activate word meaning or use syntax, text structure, and prior word knowledge to perceive the meaning of the text. Understanding the nature of letter- sound relationship underlies the ability to decode. Phonological awareness is important for decoding, because it provides the basic for understanding the letter- sound relationship, namely that words are made up of particular sounds and the particular letters are associated with certain sounds in the language.

The second component of the Simple View of Reading is *comprehension* (C): the ability to take lexical information (Hoover and Tunmer, 1993). Simply to understand the meaning of concepts and words heard or read. In the Simple View of Reading equation, children must develop effective listening comprehension in order to make meaning of the words that they decode. Listening comprehension involves knowledge of concepts, vocabulary. We could call it a broad language skill which develops

through interaction with the environment from birth through childhood. A controversial question regarding the two issue of reading components is if they are dependent of each other or make independent contribution to reading. Researchers concentrated on normal and disabled readers to answer the question. Since the pioneering research of Vellutino (in Hoover and Tunmer, 1993) many researches demonstrate that dyslexic children have deficiency in decoding skills. Research focusing on normal readers demonstrate that decoding and linguistic comprehension both correlate with reading, but at the first stages, when learning to read, the decoding skills show stronger correlation, which later decreases and the linguistic comprehension becomes dominant (general conclusion of studies made by Hoover and Tunmer, 1993). Other researchers combined these components of reading: both components decoding and comprehension underlies the reading ability, so reading will be improved if either decoding or linguistic comprehension is improved (Perfetti, 1977; Gough, Tunmer, 1986, in Hoover and Tunmer, 1993). Operationalizing this theoretical framework and applying it to this study, being conducted at the early stages of reading development, good readers were considered to be those children, who developed automatic and rapid decoding skills (letter, syllable and word recognition capacities), being aware that they understood the alphabetic principle ("the chiper", the code) and could easily convert the phonemes in graphemes which represent them.

2.3 Language related cognitive abilities which predict reading acquisition

Phonological awareness, morphological awareness, grammatical and syntactical awareness should be considered if we follow the structure of the language. These are *language related skills* which are important conditions in learning to read (Liberman, Shankweiler, 1991; Goswami and Bryant, 1991; Lyster, 1998). Researchers paid attention to this skill around the 80's until that reading readiness was conceptualized as general maturity based on aptitudes and skills which allow the child to learn to read: mental age, visual, auditory and motor skills. The ability to reflect objectively upon language develops gradually, and is intensive when the children are able to decentralize, a turn from the content and meaning of the speech units to their form and

structure (Tunmer and Hoover, 1993). At this stage children can differentiate between the word's meaning and what they represent, ex. a four year old child may say that train is a long word. *Cognitive abilities* and their relation to reading development will be also described and analysed: intelligence, rapid naming, and short term memory. Letter knowledge as an autoregressive factor will also be discussed.

2.4 Phonological skills and their relations to beginning literacy

2.4.1. Phonological awareness: the ability to recognize the sound units of the language and to manipulate them. Levels of phonological awareness are: syllable awareness, onset and rime awareness as larger sound units and phoneme awareness, the ability to be aware of individual sounds. Phonological awareness has received much attention in the reading research literature. It is found to be the second best predictor of growth in reading development after letter name knowledge according to many research results (Adams, 1990 review). *The phonemes* are the smallest units of the speech and to hear them out from the flow of speech is a difficult task for a child. When learning to read children have to understand the alphabetic principle, that there are systematic correspondences between the sounds of the language and the letters of the alphabet or rather the written graphemes. In order to understand the correspondences between the spoken sounds and the written graphemes they have to be able to focus their attention on sounds.

Liberman and Shankweiler (1991), paid attention to the complexity and abstract feature of phonemes, warning that using simply letter- to sound correspondence is a mistake and simplification, because when learning to read the child has to understand the correspondence between the visual shape and the phonology of the word, not just sound. The phonemes are abstract categories of the language, not only sounds. Therefore they are so hard for the child to detect, recognize and manipulate. We can not detach and pronounce the phonemes clearly, and their features are in change dependent upon which other consonant or vowels are around them. Co- articulation makes it difficult to detect the single sounds (or phonemes). These are the reasons why the perception of phonemes is so difficult.

Types of phonological awareness tasks and levels of difficulty: the level of difficulty of a phonological task is important because different tasks seem to be better at predicting reading at different stages of development. The level of difficulty is also important when matching the tasks to the level of the child. Adams (1990) described *five levels* which will be presented in order of difficulty:

1. Phoneme manipulation tasks: to pronounce the word after they have removed its first, middle or last phoneme (hill without /h/, monkey without /k/, pink without /k/) or reorder, to add some extra phonemes to it. This requires hard memory work and spelling skills. It is hard to teach kindergarteners such tasks.
2. Phonemic segmentation tasks (called also tapping task): the children are asked to tap out the number of phonemes in a word ex. mat, /m/, /a/, /t/. This is hard for small children.
3. Syllable- splitting tasks (deletion): to break off the first phoneme of a word or a syllable, to pronounce the phoneme in isolation ex. bear- bbbb (say the first sound in bear). This task is easier because they do not have to think about the syllable (word) as a string of phonemes to succeed.
4. Blending tasks: is similar to phonemic segmentation tasks. In blending tasks the tester provides the segments of the word (/m/ /a/, /p/) and asks the children to put them together (map). This is easier than segmentation and deletion tasks.
5. Oddity and rime tasks: the child is presented with tree or four sets of spoken words and asked which of the words are different or does not belong with the other words. This is one of the simplest tasks. Children compare and contrast similarities and differences.

The predictive value of different forms of phonological awareness: different studies can be categorized as following: predictive studies, searching for variables that are important in good reading achievement, training studies which measure the growth in reading development after a phonological awareness training and studies carried out with children who have problems in reading acquisition and how their phonological processing capacities look like? It is difficult to make a complete overview because every study has different design and they have measured different phonological tasks

with different age groups. The ability to predict reading is of course dependent on the variables taken into account. Another point is that a study has to take care of extraneous variables which can influence the reading development: intelligence, reading or letter knowledge, verbal short- term memory etc. Usually studies of reading development exclude children with speech or neurological impairment, and this is another issue about how broader language skills affect reading development. Yet, another important issue is to let the different phonological awareness variables control for each other. Then one can see whether the different forms of phonological awareness predict unique variance in reading over and beyond the others.

The predictive value of the different tasks measuring phonological awareness is debated in the reading literature. One study which considered the above described conditions support the idea that *syllable* awareness is important for learning to read (Cardoso- Martins, 1995 in: Lervåg, 2005). Syllable awareness predicted reading development, however the author criticised her own study because the syllable tasks were not pure enough. In contrary, a study of Badian (1998) did not find the above mentioned relationship. The syllable tasks are considered simple tasks of phonological awareness because they involve larger units. Therefore they are considered to have no or less strong predictive power.

Rime: rhyme awareness is the most debated factor when its predictive power is discussed. Several studies claim predictive function for rhyme, oddity and onset- rime task (Goswami and Bryant, 1991, Goswami, 2002, Bryant 1990, Bradley 1990), a claim that is disputed by several authors (Hulme, 2002; Muter, Hulme, Snowling and Stevenson, 2004; Savage and Carless, 2005). Goswami and Bryant (1991) give clear evidence that children's early rhyming skills play an important role in their success in reading. Bradley and Bryant (1983, 1985 in Goswami and Bryant, 1991) followed a large group of four to five year old children and proved the importance of rhyme skills in later reading success. They used rhyme and alliteration oddity tests, vocabulary test, memory, IQ and a mathematic test. They found a strong relationship between the children's initial sensitivity to rhyme and alliteration and the progress that they made in learning to read. This relationship held even after controls for the effects of

differences in IQ, in their vocabulary and memory scores. Furthermore rhyme tasks never predicted the achievement in mathematics. Their point of view is that children use both larger (onset-rime) and smaller (phonemes) units when they learn to read, so both rime and phoneme awareness has to have predictive power. Several studies do not find the relationship above mentioned. The question remains, which are better predictors of early reading development rhyme or phonemes, small or large units? The solution depends on the developmental level of the children being studied, the type of the phonological tasks being given (the issue of tests) and the orthography under investigation. In an attempt to solve the question whether rhyme or phoneme awareness predicts reading Muter, Hulme, Snowling and Stevenson (2004) constructed a study at early stages (90 British children with a mean age of 4 years 9 months, at school entry) to be able to follow up their development. They used the rhyme tasks used previously in studies and phoneme sensitivity tasks. They measured early literacy and pre-existing skills and later existing reading skills. The conclusion was that word recognition was predicted by letter knowledge and phoneme sensitivity, not by rhyming. They also measured syntactic, morphologic and grammatical awareness, and vocabulary knowledge in this study, which will be presented later on. Goswami (2002) argued that the formal reading instruction in England does not emphasise enough rhyming abilities. It starts to teach phoneme –grapheme correspondences and many children learn letters before starting school which fosters the phoneme abilities. She is also concerned that giving phoneme manipulation tasks for small children is unreliable because these tasks are too difficult for them. The question if large or small units of phonological awareness are the best predictors for growth in reading is still open in the reading literature.

2.4.2 Rapid Naming: another skill that seems to be connected with beginning reading is rapid naming, also called rapid automatized naming (RAN), naming speed or serial naming. This ability has to do with naming symbols (colours, objects, numbers, and letters) in serial order as fast as possible. Originally this association between RAN tasks and reading was found in dyslexics, they are slower in this task (Bowers, 2001-review). At not dyslectic populations it also seems to be associated with reading in several studies (Schatschneider, Francis, Carlson, Fletcher and Foorman, 2004; Kirby

John R., Parrila Rauno K. and Pleiffer Shannon L., 2003 Cardoso, Pennington, 2004). What about other orthographic languages different from English? The German Wimmer (2001) pointed out that rapid naming is a core problem, because poor readers in an orthographic regular language suffer mainly from a massive reading fluency and automatization problem. He concluded that in regular languages the understanding of the alphabetic principle (letter- sound correspondence) is not a problem and children have a minor difficulty on phonological awareness abilities. He also found in this study that the rapid naming skills are not associated with visual processing abilities.

Rapid naming and phonological awareness: there are arguments for rapid naming being a phonological skill or at least an important factor of phonological processing. It involves both retrieval and articulation of phonological information, which are important also in reading.

The study elected for presentation (Cardoso, Pennington, 2004) investigated the contribution of phonological awareness and rapid naming to reading and spelling ability in two developmental periods: kindergarten to grade 1, and grade 1 to grade 2. The children had high (67 children) and low familial risk (57 children) of developmental dyslexia. The measurements used were rapid naming (objects, colours, letters and digits), a well constructed phonological awareness battery (no child had floor or ceiling effect on it) and literacy skills measuring decoding skills for words and nonwords including reading fluency and comprehension. The study showed that both phonological awareness and rapid naming correlated significantly with reading and spelling ability for both groups of children, the rapid naming of letters and numbers even stronger. To the question if these abilities contribution are independent to reading ability, they found that rapid naming was more predictive in the high- than in the low risk group, and generally they shared substantial common variance in the prediction of reading and spelling, however relative to phoneme awareness, rapid naming plays a modest role. This study highlights the importance of phonological awareness and rapid naming skills as an important predictor for beginning reading, and shows us that poor readers may have rapid naming problems.

The study of Kirby et. al (2003) investigated how phonological awareness and naming speed measured before formal reading instruction had begun, predict reading development from kindergarten to grade six. The participants were 161, five year old children when the study started and they were tested annually until fifth grade. The formal reading instruction in the school was mixed, phonics but whole language primarily. They tested the children with four types of phonological awareness tasks (sound isolation, phoneme elision, blending onset, rime and blending phonemes). The naming speed was measured by colours and pictures. They also measured letter recognition and cognitive (verbal- nonverbal) abilities and different measures of reading acquisition. The results were clear: kindergarten phonological awareness and naming speed predicted reading development. These measures made independent contributions to the various reading measures. Kindergarten phonological awareness had most impact in the early grades, whereas naming speed's influence was weaker in the early grades and stronger in the later grades. Their explanation to this was that children's reading changes by the later grades, shifting from reliance on phonetic to more orthographic skills. Naming speed was still moderately associated with reading success 5 years later despite controlling for the other variables and naming speed had significant effect on both word reading and comprehension. In this study and sample one can observe the lasting effect of naming speed, and the prediction power of colours and pictures naming even if in the literature there were given better prediction powers for letter and digit naming (Schatschneider et. al, 2004; Cardoso, Pennington, 2004). Here phonological awareness and rapid naming explain independent variance to reading.

A longitudinal study of Schatschneider et. al (2004) wanted to investigate the best kindergarten predictors of reading acquisition. In doing this they even accounted for perceptual skills in a well constructed measurement battery: letter name/ sound, multiple measure of phonological awareness, oral language skills (vocabulary, expressive, receptive language) and rapid naming on objects and letters. The sample was large (945 children) and diverse. Phonological awareness, rapid naming of letters and letter sound knowledge were "the winners"; they were the most predictive factors of word identification and passage comprehension and fluency in these early stages

(kindergarten, 1, 2 Grade). They consistently accounted for a unique variance across reading outcomes. The researchers also found that letter naming speed was much more predictive of reading fluency outcomes than rapid naming on objects. The National Reading Panel (2000) defines reading fluency as "…the ability to read quickly, accurately and with proper expression." This association between naming speed and reading fluency is obvious, both containing a speed factor.

General **conclusion** about the relation between rapid naming and phonological awareness can be the following: phonological awareness and rapid naming are related, there are studies with evidences that phonological awareness is a better predictor then rapid naming. Contrary studies also show that both rapid naming and phonological awareness explain unique variance in reading. Poor readers seem to have greater problems with rapid naming, and rapid naming seems to contribute to reading fluency. Why then the results are so diverse? This is so probably because different samples are used in these studies at different grade levels and with different measures of reading as outcome.

2.4.3 The impact of verbal short- term memory on reading: many phonological awareness tasks require holding the phonological information in memory while one performs the tasks. Therefore the impact of short- term memory has to be included in the phonological awareness tasks. Short- term memory, or memory span, represents the ability to remember a random sequence of items ex. a list of unrelated words. It is a measure of what the brain is capable of holding in mind. Dealing with memory and its relation to reading is important to control also variables like age, sex and IQ which strongly effect memory skills: memory improves over childhood; females excel in verbal- memory tasks and because subscales in the verbal IQ scale make large memory demands it is hard to distinguish between memory skills and intelligence (McGuinness, 2005). The research on short- term memory and reading is again controversial: when age, sex, and verbal IQ are controlled, there is no contribution of verbal- short term memory to reading. When verbal IQ is not controlled short- term memory is found to be strongly correlated to reading (McGuinness, 2005). The overall

conclusion can be that verbal- short term memory is an effective cognitive "tool" in learning to read.

2.5 Letter knowledge and the ability to learn to read

This issue leads us to the question of which is the relationship between the phonological skills and reading, since it is well documented in the literature, that the ability to manipulate phonemes is largely dependent on alphabetic skills. So we can expect that those children who already have some knowledge about the alphabetic principle (letter- sound knowledge), also will show better phonological skills than children with none or less letter knowledge. This is the causality hypothesis about the relation between alphabetic knowledge and phoneme awareness, but many researchers are convinced that this causality is bidirectional (Carroll, Snowling, Hulme, and Stevenson, 2003). Therefore, one can expect that not just letter knowledge alone lead to good reading, the phonological awareness is also important (Adams, 1990), and it is mentioned that children who have an early developed letter knowledge, before beginning school have already developed phonological skills that give them opportunity to understand the function of the alphabet. One thing is for sure: knowledge about letters must play a crucial role in the development of phonemic and phonological awareness. This was the conclusion of a study by Caroll (2004) who examined the relationship between letter- sound knowledge and phoneme awareness. The participants were 56 children tested on letter knowledge and phoneme skills two times; at the first time they had a mean age of 4.2 years and at the second time 4.9. They also catered for their vocabulary, but not intelligence. Important findings of this study regarding the present study's issues are the following: no child scored two or more correct on either the phoneme completion task or the phoneme deletion task unless they knew at least four letter sounds. It seems that knowing at least a few letter sounds is a threshold for the development of phoneme awareness. As conclusion we can state that phonemic awareness combined with letter knowledge is a good base for young children's progress in reading. The study of Frost (2001) went further when analyzing the pathway from phonemic awareness to reading. He accounted with the

nature of letter knowledge and its relation to phonological abilities at a very early step of reading development. The study had a longitudinal design and followed forty-four Danish children from the beginning of first grade until the end of the second grade. The children's age ranged from 6 years10 months to 7 years 6 months. Their verbal abilities were measured beforehand, forming a group with at least average language comprehension. Phonemic awareness was tested by two kinds of tests: implicit (at the end of kindergarten) and explicit. When performing the implicit phonemic tasks the child is not asked to pronounce phonemes, and when performing the explicit tasks they have to report verbally answers. The interesting design of this study is that the children were divided in a high phonemic awareness (HPA) and a low phonemic awareness (LPA) group after their achievement on implicit phonemic awareness tasks. Two kinds of letter knowledge were measured: formal and functional. Formal letter knowledge is simply to recognize, label and pronounce the sound of the letter. Functional letter knowledge represents the ability to convert letter labelling knowledge into word processing strategies: the children were asked to pronounce two words starting with the sound of the letter shown. Important findings regarding phonemic awareness, letter knowledge and their relation to reading was the following: letter knowledge was generally related to reading ($r= 0.68$, $p= 0{,}001$) and there were differences between the HPA and LPA groups regarding the quality of this relation. The LPA group had more problems with functional letter knowledge compared to the HPA children, and they had more trouble to translate the letter naming knowledge into reading. Conversely HPA children developed faster explicit phonemic awareness, letter naming and word production abilities (as measured by functional letter knowledge) which helped them to reach earlier effective reading strategies. Word production contributed with a major amount of variance in reading scores at the end of grade one. It seems that word production is a powerful expression of functional letter knowledge and represent the link between phoneme awareness skills and learning to read.

2.6 Reading and general cognitive ability

There are a number of studies of the correlation between IQ and reading achievement. IQ is only weakly and non-specifically related to achievement in the early grades (Adams, 1990). The issue of mental age, measured by intelligence tests highlights the question and dilemma, when should reading instruction begin. Over the years some argued that instruction in reading should not begin before children's mental age has reached seven years. Nowadays many theorists are concerned about teaching phonics, through language games and activities designed to develop their linguistic awareness because these abilities exceed mental age (as measured by IQ tests) in predicting success of reading acquisition, and they are conditions for learning to read, stipulating the ground for reading acquisition. Another issue is what IQ tests measure. Which cognitive capacities measure intelligence? Lyster (1995) reported the non-verbal intelligence measured by Raven Progressive Matrices had only a modest impact on reading, if compared to verbal intelligence as measured by the verbal part of WISC- R (Wechsler Intelligence Scale for Children- Revised).

2.7 The effect of morphological awareness on reading

In comparison to phonological awareness, morphological awareness has received less attention in studies. A *morpheme* is the basic element of meaning of a word. Morphological awareness is the ability to be aware of and manipulate morphemes, simply to understand how the words are structured.

The already described study of Muter et. al (2004) also used along with rhyme and phonological sensitivity tasks, a morphological task and word reading skills as outcome measures. Their assumption was that phonological skills will be important predictors for early decoding skills whereas larger morphological skills for reading comprehension. The conclusion was in accordance with their assumption. Reading comprehension is more heavily dependent on higher level language skills such as vocabulary knowledge, morphological- syntactic- and grammatical skills.

A well constructed study of Lyster (2002) addressed to find out the effects of morphological awareness training on metalinguistic awareness, and reading development compared to the phonological training, knowing that the Norwegian language is relatively orthographically regular and the formal teaching methods in the school is based on phonics. Her assumption based on antecedent theories was that phonological skills have the most powerful effects on reading at the beginning stages, at the decoding stage of reading. Due to the characteristics of Norwegian language morphological skills also should have moderate effect, because children are able to understand the alphabetic principle very fast. 273 monolingual Norwegian children participated on the study from kindergarten age through the first grade. Children who read already were excluded from the study so the autoregressive and extraneous variables were controlled in this study cautiously. One group of the children received phonological awareness training. The morphological group received training in morphemic awareness: compound words, grammatical elements, prefixes and suffixes. The results of this study showed that these trainings showed a bilateral effect on children's abilities since phoneme awareness training increased also the morphologic knowledge and vice versa, morphologic training had a positive effect on phonological capacities. Regarding the connection with reading, both experimental groups (phonology, and morphology) outperformed the controls on the word reading tasks, and both trainings had long lasting effect on reading measured at school entrance and at the end of first grade. However, at this time the morphological training showed a stronger effect, along with expectations and due to the language and teaching characteristics. This study demonstrated the importance of the morphological aspect beyond the phonological one.

2.8 Grammatical and syntactic awareness and beginning reading achievement

Since syntax (the word order in a sentence) is viewed as the grammar domain of the language these areas will be discussed together. Grammatical awareness usually is operationalised as the ability to focus attention on the grammatical structure of the language measuring it by: word order correction tasks, to judge the "silly",

ungrammatical sentences. The research findings here are also controversial. Theoretically one can assume that phonological processing skills (phoneme awareness, rapid naming, and short term memory) have important predictive values at the early stages of reading development. Broader language skills are important at later stages to understand the context and content of a text.

The study of Bowey (2005) measuring the performance of 87, four year old children finds an unexpectedly weak predictive association between syntactic, grammatical awareness and first grade reading. Her explanations are that this is so because grammatical sensitivity on early reading was overestimated in previous research or because she also controlled for previous reading skills which was not been done in earlier studies. The grammatical tasks were grammatical error corrections and grammatical understanding (which picture matches the heard sentence).

In contrary Plaza and Cohen (2003) examining 267 first- grade children on tasks assessing phonological awareness (phoneme, syllable level), auditory sequential memory, syntactic awareness (judgement correction tasks), naming speed, and different kind of reading measurements and concluded that early reading skills are associated with phonological, syntactic awareness and naming speed. These abilities contributed significantly to reading and spelling ability at the end of Grade 1.

2.9 Phonological skills, reading and orthography

In addition to the already described variables, orthography is another issue that will be focused on. There seem to be differences in how children develop reading skills in different alphabetic orthographies. Most researches about beginning reading were carried out in English orthography, which is a relatively deviant orthography compared to several other European orthographies. It is therefore important to be careful in generalizing these findings to other orthographies. Languages which have regular grapheme- phoneme correspondences are called transparent or shallow orthographies and those with many words deviating from those correspondences are the deep or opaque orthographies. In the following findings regarding learning reading

in different orthographies as English will be presented and how different language awareness abilities are important or not in these other orthographies. How relevant are findings in English to shallow orthographies? Wimmer (2001) pointed out that in shallow orthographies rapid naming is the core problem, because poor readers in this orthographies suffer mainly from a massive reading fluency disability and an automatization problem. He concluded that in regular languages the understanding of the alphabetic principle (letter- sound correspondence) is not a problem and children have a minor difficulty with phonological awareness abilities.

Spencer and Hanley (2004) found that children (five years old) learning to read in the orthographically transparent Welsh language were significantly better at reading both words and nonwords and their phonological awareness was better than that of English children, reading in English. These results suggest that a transparent orthography facilitates reading acquisition and phoneme awareness skills from the earliest stage of reading development.

An Albanian study by Hoxhallari, van Daal and Ellis (2004) managed to reproduce a study comparing English, Welsh and Albanian children in reading accuracy, latency time and reading errors. This study was chosen for presentation because the Albanian language has a completely shallow orthography like the Hungarian. Their assumption was that Albanian children will be able to read most words in comparison to Welsh and English children, the latencies for the Albanian children will be longer because of the transparency of the language. They will rely more heavily on grapheme- phoneme correspondences, and the errors made by them will be more similar to the errors of Welsh children, because the Welsh is a relatively a transparent language. This is also what they found as a result, their assumptions were confirmed. They found this even if Albanian children had less print exposure and less reading instruction. Unfortunately this study was conducted with just 20, grade 1 children, but the overall conclusion can be that learning to read a transparent language determines the reading strategies (reliance on grapheme- phoneme and phonological strategies), and that understanding the alphabetical principle is faster. Children learn to read a regular script quickly.

A Dutch study of De Jong and Van Der Leij (2003) compared 19 dyslectic, 17 weak, and 19 normal readers on a large variety of cognitive and linguistic measures: phonological processing skills (phonological awareness, working memory, rapid naming), linguistic comprehension (receptive, active vocabulary and listening comprehension), nonverbal intelligence and reading related knowledge as letter knowledge, word and nonword reading speed and accuracy. The reason for presenting this study is that it is carried out in a relatively transparent language, using sensible and valid measurements and has a longitudinal design (follow the children from kindergarten to sixth grade). It gives the possibility to uncover important knowledge regarding dyslectic and poor reader's linguistic awareness profile. Important results are that the performance of dyslectic and weak readers was not significantly different on any test measures in kindergarten and first grade but compared with normal readers they performed worse in rhyme (this difference will disappear as soon as formal reading instruction begins in first grade), and rapid naming, phonological awareness (first and last sound categorization) and reading words and reading comprehension. These differences in reading measurements in sixth grade turned out to differentiate better the group's performance: normal readers read words and nonwords significantly faster, and also the weak readers were significantly faster than the dyslectic children. Normal readers had significantly higher reading comprehension whereas the weak and dyslectics did not differ significantly. There is an interesting finding regarding phonological awareness measurements: the rhyme awareness deficit disappeared, and the phoneme deficit appeared when reading instruction began and tended to disappear later. Therefore the authors designed a second study with 13 dyslectic and 25 normal readers at fourth grade to examine further if phonological deficits disappear over time in a transparent language, constructing more demanding phonological awareness tasks. They concluded that dyslectic children in a transparent orthography can do simple phonological awareness tasks, but when the difficulty level increases they have problems with it. Phonological awareness in dyslectic readers seems more vulnerable than in normal readers. The overall conclusion is that the study has many findings in common with other studies and findings regarding dyslectic children characteristics:

the deficit in phonological awareness and the fluency and speed reading problems due to rapid naming deficit in a transparent language.

2.9.1 Learning to read in the Hungarian orthography

In Hungary, tests of phonological awareness are not in general use (Csépe, 2006). This statement is valid also for the Hungarian community from Transylvania (Romania) whereas children in risk for developing literacy difficulties are detected by using mostly visually based measurements or tests which contain intermodal capacities, or auditive discrimination. However the training which the children get in the kindergarten and at the preparation period before learning to read has phonological elements but is not researched based yet.

A cross- cultural study by Everatt and Smythe, Ocampo and Gyarmathy (2004) was conducted to assess whether the phonological based measures commonly used in dyslexia assessment could be used across language backgrounds. 275 English-speaking and 208 Hungarian- speaking third grade children were involved. They were first grouped after a spelling and reading test as good and poor literacy children. The measurements used were: nonword reading, a test of phonological awareness which contained alliteration and rhyme tasks, phonological short term memory and rapid naming. The results showed significant differences in nonword reading ability, but no significant differences in the rhyme task, across languages. English speaking poor literacy children were weaker in phoneme and memory tasks as their peers, but not the Hungarians. Apart from the nonword reading task, the Hungarian children with low literacy levels presented similar scores on the phonological tasks as their peers. The authors pointed out that to conclude that phonological skills are not important in Hungarian is premature. The result may be caused by measures that were not sensitive enough to detect differences. Rhyming awareness seems to be a less good predictor in transparent languages, and this study measured just rhyme skills.

The first study on phonological skills and learning to read in Hungarian was published by Kassai and Kovács- Vass (1991 in Csépe, 2006). They tested rhyme and syllabic awareness on 260 children at the end of kindergarten and at the end of first grade. The

memory loading was also measured. Correlations were found between short term memory performance and reading and between syllabic awareness and reading. This phonological awareness performances increase after the children learned to read.

Csépe (2006) and her colleagues designed a phonological awareness test to see how reading difficulties in Hungarian are related to phonological awareness. They used a set of tasks measuring rhyme and syllable awareness, phoneme blending, phoneme counting and initial phoneme and syllable judgement with 80 first- fourth graders with and without reading difficulties. Already in the first grade they found ceiling effects for the phonological awareness tasks and these tasks did not differentiate the risk and the not-at risk groups. They realized that deficits in phonological awareness should be measured by more complex tasks. They designed two more complex phonological awareness measures where they proved that phonological abilities are more vulnerable at dyslexic children. Furthermore in dyslexic children a stronger correlation was found between the working memory and phonological awareness measures. They concluded that a language with rich morphology and sentence with free word order how Hungarian is may rely on different memory processes more than the other languages do. It is, however, difficult to understand this conclusion since morphological awareness was not measured.

General **conclusions** about reading and orthography: the above described studies also give importance to phonological awareness in transparent orthographies making allowance that in these orthographies the phonological awareness tasks have to be more difficult to be able to differentiate as well as they should have no floor or ceiling effects. (If it is a floor effect the task is too demanding and if it is ceiling effect the task is too easy). Phonological abilities develop faster in transparent languages and children reach the ceiling level relatively soon after the beginning of reading acquisition. Rhyming awareness seems to be a not so good sensible phonological awareness task to measure individual differences in a transparent language. Children learning to read in a transparent orthography crack the alphabetic code earlier, they read better and faster, their reading strategies rely on phonological strategies and their phonological awareness is better than that of English children at earlier stages of reading

development. The rapid naming deficit seems to be a very important pattern in transparent orthographies. Dyslectics learning to read in a transparent orthography seems to share common phonological and rapid naming deficits. In transparent languages however the tasks have to be demanding. A general overview of the presented studies is available at appendix 9.

2.10 Prediction studies of reading development

Prediction studies in the field of reading have mostly focused on the relationships between different phonological skills, language skills and later reading development. They analyse if phonological skills share broader or represent unique variances in predicting reading acquisition. Usually these studies include measures of phonological awareness together with other language related cognitive factors (verbal short- term memory, rapid naming, letter knowledge or other language related skills such as morphological, syntactical, grammatical awareness). These studies have generally established that after controlling for this language related cognitive factors; phonological awareness makes a unique or shared contribution to explaining reading variance. As well as after phonological awareness is controlled, other variables (verbal short- term memory, naming speed etc.) can make unique or shared contribution to reading development. The design, the type of tests used, as well as the orthographic and phonological system of a language will affect the results, therefore there are many contradictions and debates regarding which skills are the best predictors of early literacy acquisition. Main focus after presenting an English study to see the general findings in this orthography will be discussed and described studies conducted in the context of the Finnish language, a transparent orthography with a clear mapping of phoneme- grapheme correspondences which has the same linguistic roots and much in common with the Hungarian language. The predictive power of different language related and cognitive skills and the literature debates around them has been discussed earlier, but this theoretical part has more focus on Finnish predictive studies, one of them also includes morphological awareness measurements in the analyses. Choosing this study for presentation has the underlying assumption that morphology and large

units of the language are important predictive factors of reading development in transparent languages.

A comprehensive study of Parrila, Kirby and McQuarrie (2004) measured phonological processing skills (161 children) in kindergarten and grade 1 to see how they predict word reading and text comprehension in grade 1, 2 and 3. Verbal short-term memory correlated significantly with the reading measures, but did not account for significant unique variance in any of the regression analyses after the effect of other phonological processing variables were controlled. Naming speed, particularly in kindergarten, made a unique and lasting contribution to predict reading. Phonological awareness accounted for unique variance in all reading measures after the effect of other phonological processing variables was controlled. In Grade1 the strongest predictor of reading across the 3 years was phonological awareness. They also controlled for letter knowledge, which shared large parts of its predictive variance with phonological awareness and naming speed measures. Even if the study has a weakness in not controlling for general cognitive abilities, it represents findings that are common in prediction studies in English orthography. Namely that phonological awareness is a very strong predictor of growth in reading development and will last for years, and that is rapid naming in early years.

A longitudinal study (Lepola, Poskiparta, Laakkonen, and Niemi, 2005) conducted in the context of the Finnish language, followed the children from kindergarten through first grade. It examined how motivational and cognitive- linguistic factors (phonological awareness, letter knowledge, naming speed) predict word recognition. One hundred preschool non-readers participated in the study, and their abilities were measured three times, at kindergarten, preschool and first grade. The following measures were used: non- verbal abilities (Raven Coloured Matrices), word list reading, rhyme awareness, initial phoneme recognition, phoneme blending, rapid serial naming, word recognition and earlier mentioned task orientation and motivational factors. The overall findings were in concordance with previous research: rapid naming, phonological awareness, and letter knowledge were distinct components of beginning reading; phonological awareness and rapid naming were significant,

independent predictors of reading ability and letter knowledge in the kindergarten were contributors to phoneme awareness in preschool. Importantly rapid naming contributed uniquely to word recognition achievement in every point of time examined. The motivational factor also was a good predictor and mediated these measured variables all the time. The study gave an interesting finding regarding the relation between rhyme awareness and letter knowledge: 12% of the kindergarten children who had no letter knowledge did not differ from other children with respect to rhyming, but performed more poorly on the initial phoneme recognition test. This suggests that rhyming is a less sensible phonological awareness task to measure differences and to predict reading in a highly transparent language. Overall this study, as well as other studies cited before demonstrated the predictive roles of the phonological awareness and rapid naming for reading in a transparent language.

A Finnish cross sectional study (Muller, Brady, 2001) conducted with 83 first and 81 fourth graders examined factors accounting for early reading performance, evaluated the correlates of reading acquisition and examined the presence of reading problems for readers of a transparent orthography (which characteristic patterns has those, who perform one below standard deviation). The study has a sensitive, well constructed phonological awareness and decoding measures set which measured the individual differences, and in addition other measures of language and cognitive abilities: morphological knowledge, naming speed (digits, objects), verbal- nonverbal intelligence and vocabulary, listening comprehension, letter knowledge, identification of initial letter, digit span (verbal memory), visuo- motor coordination (to copy four different figures or shapes) and reading outcomes as: reading comprehension, decoding speed and accuracy and spelling. The main result highlights the importance of phonological awareness and its strong effect in reading acquisition in a highly transparent orthography. Morphological awareness was significantly related to reading comprehension for the first grade children even after accounting for influences of age, intelligence, naming speed, listening comprehension and phonological awareness. A positive relationship was observed between awareness of morphological structures and awareness of phonemes (17.6% shared variance). Verbal memory span did not significantly predict reading comprehension, but shared variances with spelling,

decoding speed and accuracy indicating that memory is a cognitive "tool" for decoding capacities (reading the long words which are characteristics of the Finnish language). In the present study naming speed contributed significantly to decoding speed. Deficits in rapid naming rather than in phonological awareness characterize the poor readers in shallow orthographies, how Wimmer pointed out? The present study findings demonstrate that both rapid naming and phonological awareness are present among poor readers of a regular writing system how Finnish language is. Letter knowledge did not differentiate children in this study and visuo- motor coordination skill did not contribute significantly in predicting any of reading measure scores.

Conclusions: the theoretical framework and recent studies about early reading acquisition give support for the importance of cognitive linguistic factors in reading: phonological awareness was found to be a good predictor of reading skills also in transparent languages if the tasks were well compounded and demanding. This was so even if the decoding skills had been mastered earlier in a more consistent orthography. Awareness of larger language units such as morphological units seem to contribute to reading comprehension, the smaller phonological units to decoding skills, whereas naming speed is usually related to reading fluency. Letter knowledge is a prerequisite for better phonological awareness and both are good predictors of growth in reading.

2.11 Environmental influences on early reading acquisition

2.11.1. Home environment: the characteristics of the children's home environment (books available, reading- related activities, parental attitudes toward reading and books, and their involvement in schoolwork) are important predictors of success in school and reading acquisition. Regarding the present study a focus was given for the parent's educational level, having the assumption, that parents with more education provide better literacy environment and more books for their children. The study of Petrill, Deater- Deckard, Schatschneider and Davis (2005) proved the importance of home environment in early reading in a sample of 262 adopted children and their families (they tried to exclude the genetic influences also). Parents were questioned about their educational attitudes, book reading practices, involvement in homework,

and their children's interest in reading- related activities. The family environment was strongly related to the measured reading outcomes.

The study of Levy, Gong, Hessels, Evans, and Jared (2006) which explored aspects of home literacy environment related to early reading (474, four and eight year old children) also reports the importance of parental support and guidance and those literacy activities in which the child is actively involved. Mother's and father's education and family income were not significantly correlated with any of the children's emergent literacy scores, because high percent of the parents were highly educated. It seems that the parent's role in following their children's language and literacy development is enormously important.

2.11.2 Reading instruction: reading instruction raises the question of how children learn to read, which methods of teaching literacy are the best, and how important theoretical findings are implemented in the classrooms. The *National Reading Panel's review (2000)* concluded that the most effective reading instruction is teaching children to manipulate phonemes (phonemic awareness), teaching them that these sounds are represented by letters of the alphabet which can then be blended together to form words (phonics), reading aloud with guidance and feedback (guided oral reading), and applying reading comprehension strategies to improve reading comprehension. So, there are three important aspects to consider when teaching children to learn to read: phonemic awareness which is a prerequisite of learning to read, phonics for understanding the alphabetic principle and comprehension strategies. *Systematic phonics* instruction is another expression used by the Panel, which means that the instruction should have a planned sequence and it is not occasional. Another aspect which determines the literacy teaching method is the characteristics *of the language*: the transparent or shallow languages, with exact letter –sound correspondences are mostly taught by phonics methods. Importantly the method of instruction has an effect on the reading development and therefore has to be taken into account.

2.12 Reading instruction in Hungarian language in Transylvania

The structure of the Hungarian language favours a synthetic- phonics approach, because it has a regular orthography and consistent letter- sound correspondence system. There were attempts to try the global, analytical, whole-language approach, but it did not become widespread (Ványi, 1998). The kindergarten programs in Romania in the last preschool year begin to emphasise the school readiness skills: training the children's visual, motoric and language ability (nursery rhyme, tales, and poems), however it does not involve explicit training in phonological awareness. It is important to mention that the Hungarian language is very rich in nursery and rhyming poems, which are daily used by the educators, combining them with some movements (clapping, marching) to feel the rhythm of the language. This game is also helpful for developing syllable awareness. Educators reported that they used to play with the individual sounds mostly to tap the first sounds of a word, or to say words which are beginning with the asked sound. The National Curriculum for Hungarian 1 Grade children (2003) foresees children's development in three areas: understanding the verbal communication, expressive communication, developing text comprehension capacities and writing skills. The Curriculum requires the development of communicative and broader language skills (sentence analysing, sentence and text understanding, the use of language in different situations) as well as grammatical skills (words position in the sentence, counting words in the sentence, syllables in the words, and the use of affixes). Reading instruction in Grade 1 relies on a synthetic- phonic approach. The fall semester has a six week *preparation period* where phonological and phonemic awareness exercises can be followed: rhyming poems, syllabization analysing the sounds place in a word and blending exercises. This is followed by teaching the letter and sound correspondences and an intensive decoding and spelling instruction in which many letters and syllable construction are taught. They have to learn the four types of a letter: printed, written, uppercase, and lowercase. By the spring semester of the first grade, children are expected to read sentences, short stories accurately at moderate speed. These requirements are operationalized in teaching reading textbooks, which are presented in the appendix 3.

3. METHODOLOGY

3.1 Introduction

This study was designed to reveal the linguistic and cognitive factors influencing reading achievement in Hungarian a highly transparent language. In doing so the main focus of this work was to translate and adapt a Norwegian linguistic and cognitive screening material, the "Ringerike Materialet" (Lyster, Tinglef, 1992), aiming at the one hand to have an instrument to map the Hungarian children's metalinguistic abilities and to explore the predictive value of influencing variables. On the other hand, the Hungarian Education from Transylvania (Romania) needs a tool based on ultimate theories of reading development in order to be able to design preventive programs for children in risk for developing literacy. The translated screening tool was presented to pedagogues in Mures County (Romania) where the research took place, covering the awareness training part of this study. The measured cognitive and linguistic capacities were: *phonological awareness, morphological awareness, and awareness of the grammar, rapid naming, and verbal, serial short term memory* following the original test writer Lyster ans Tingleff's (1992) categorization. *Letter knowledge* as autoregressive variable and *nonverbal intelligence* as extraneous variables was also measured. Furthermore as environmental and cultural influence on reading development was extremely important to get acquainted with what was happening in the classrooms, how Hungarian children learn to read, and what is their socioeconomic background. This research also focused on *reading* level acquisition after measuring the above mentioned cognitive- linguistic capacities, mainly the decoding skills of an early stage of reading development. School children were followed up in order to conduct a predictive study and to explore which capacities are important when learning to read in Hungarian.

3.2 The process of test adaptation

Translation and consultations: the test material was translated from Norwegian to Hungarian and revised three times by a linguist, a teacher and by a university teacher working as speech therapist (Appendix 1). **Pilot study:** was conducted with this test, (Appendix 2) getting important feed-back regarding: how the children understood the instructions, how much time it took to test with this tool, what was the educator, tester opinion about the test items, which test items were revised, removed or changed, descriptive statistics, reliability alpha and item correlations were measured and considered. **Adaptation:** the language awareness material was adapted to the Hungarian culture, language and educational system with a more varied and numerous samples of Hungarian children, containing 42 kindergarteners and 58 first grade children. Comparing these two different age groups made it possible to evaluate how the material measured age differences. The training in school readiness capacities were considered, when mapping the metalinguistic abilities of this sample. The predictive power of this test was also carried out in order to evaluate which abilities are important in learning to read and to train in a preventive program.

3.3 Research goals

- To translate and adapt the Norwegian screening tool "Ringerike Materialet" into Hungarian evaluating and validating its usefulness for the following issues: to describe the theoretical framework on which this tool is based, to map the Hungarian children's language awareness abilities, to analyze how the material predict children's literacy development in Hungarian. What parts of the material are the best predictors?

- To examine which cognitive- linguistic factors effect beginning reading acquisition, they share or they are unique variances in predicting growth in reading, the relation between these measures and reading development in a transparent language. A special interest was to evaluate how the construct of language awareness is able to explain reading in the shallow Hungarian orthography.

3.4 Hypothesises

1. I expect that phonological, morphological and grammatical awareness skills will be predictive in learning to read, but phonological awareness will be the strongest predictor regarding this early, decoding stage.
2. I expect that rapid naming will have significant contribution in learning to read a transparent language even at this early stage.
3. I expect that verbal short term memory will have no unique prediction of reading, but will be an effective cognitive "tool" for the other measured skills.
4. The nonverbal intelligence will not influence the acquisition of reading in these early stages.

3.5 Describing the population

The study took place in Târgu- Mureş (Marosvásárhely) a little town in the middle of Transylvania region in Romania. Statistics According to the results of the last census of 2002, the municipality of Târgu- Mureş counts 149,577 inhabitants. The population of the town is made up of the following ethnic groups: Romanians – 75,317 (50.35%), Hungarians – 69,825 (46.68%), Gypsies – 3,759 (2.51%), Germans - 275 (0.18%), other ethnic groups – 367 (0.17%). This research was conducted with Hungarian children who learnt and attended Hungarian groups in the institutions. These children are not bilingual, the policy being to learn the Romanian language from the second grade of formal schooling; however it happens that the mixture with Romanian people and the education in the kindergarten allow them to learn some words in Romanian.

3.6 Sample

One hundred children were recruited. Forty two of them were kindergarten children and fifty eight first graders based on cluster sampling procedures. They attended educational institutes at three different parts of the town: one school was situated in the suburb with two groups of children, one in the center with one group and one kindergarten also in the suburb area, with two groups; however the town is small not

giving space for such differentiation. But still the children from the center scored significantly better in most of the tests administered to them, which may be due to the good reputation of the school. Another issue which methodologically has to be taken into account is that town children usually have better socioeconomic status and better educational possibilities then children from rural areas. This may be the main reason for the town children's high scores on the administered tests. Developing the rural education is an ongoing process in Romania. The occupations of the parents were categorized in two groups: workers and highly educated. In the kindergarten there were available data regarding the education level of the parents, but in school just information regarding their occupation existed. Those parents were considered highly educated which had occupations which required that (teachers, doctors).

Parents occupation	Kindergarten	Schools			Total
		Group one	Group two	Group three	
workers	25	7	13	16	61
highly educated	17	8	4	10	39
Total	42	15	17	26	100

The children's age ranged from 5 to 7 years and 9 months. In Romania the compulsory primary elementary school begins when children turn 7 years of age, but it is possible to begin at 6 years and conversely it is possible to prolong the kindergarten program with one year mostly if the child has signs of not being mature for starting school. This is the reason why 3 school children are younger regarding their chronological age (one of them is 6 years 4 mounths and the other two 6 years 5 months), and 10 kindergarteners being older than 6 years 5 months.

Age	Kindergarten	Schools			Total
		Group one	Group two	Group three	
5- 6,5 years	32	1	2	0	35
6,6- 7,9 years	10	14	15	26	65
Total	42	15	17	26	100

Gender did not differentiate children in any of the measurements in this study and did not correlate with any of the reading outcome variables, and consequently it was dropped from the analysis.

3.7 Design of research

This study was about test adaptation and an investigation of predictive variables in reading acquisition in a Hungarian context after mapping Hungarian children's language awareness abilities. Kindergarten children were tested with the "Ringerike Materialet" and letter knowledge in the autumn period, before any school readiness program and instruction has been given to look for their linguistic level before entering school and before instruction. First grade children were tested with "Ringerike Materialet" and letter knowledge shortly after they entered school to look for their linguistic level after a last year kindergarten instruction. Their nonverbal intelligence was also tested and later on after three months formal reading instruction their reading skills were followed up. The approach of this study is *quantitative* in the way that children's test scores were statistically analyzed, but there is also a *qualitative dimension*, to the study in developing the test material, observing the child in the test situation, observing, analyzing and describing the methods of teaching literacy.

The main question regarding the test adaptation was: "Does this test measure individual and age (developmental) differences on the language awareness capacities? Last year kindergarteners and first grade school children's achievement on language awareness tasks were analyzed and *compared*. A longitudinal design would be the best choice in this part of the study to be able to map how different language awareness skills develop on time, but unfortunately the time restriction did not allow this, therefore a cross- *sectional* design was chosen. Gall, Gall and Borg (2003) underline that "… researchers can simulate longitudinal research by doing cross- sectional research" (p.295) in this kind of design different ages at different stages of development are studied.

A predictive and correlational study was conceptualized, examining how cognitive-linguistic capacities are related with each other and are able to predict growth in

reading development, and to analyze the characteristics of learning to read in a transparent orthography. The *correlational* and *predictive part of this study* gave additionally more information about the predictive power of the translated screening tool and allowed for conducting a prediction study on which cognitive- linguistic factors predicted the growth in reading. This study's hypothesises were based on other studies conducted in highly transparent languages. Gall, Gall and Borg (2003) described the prediction studies having different purposes: describing the theoretical significance of a finding, the purpose of a test development (the predictive validity of a test) and the extent to which criterion behaviour can be predicted. This study implemented all these aspects, analyzing how the described reading theories are applicable to the Hungarian population and how the translated test had predictive power on the reading development as "criterion behaviour".

3.8 Methods for collecting data

3.8.1. Measurement tools, instruments:

***3.8.1.1. Ringerike Materialet" Screening Tool (Lyster, 1992)*:** a cognitive and linguistic test measuring: phonological awareness (rhyme, syllable, onset and phoneme awareness), morphological awareness, grammatical awareness, rapid naming (homophones), verbal short- term memory, and listening comprehension. The test was administered in groups; the kindergarteners were taken in smaller groups around 6, 7 children per time. A detailed description of the Hungarian version of the test is available in appendix 1.

3.8.1.2. Letter knowledge, as autoregressive variable. The task was group-administered, the examiner said the letter names/sounds of the Hungarian alphabet (Appendix 8) and the children had to write them on their answer sheet. The Hungarian language has 14 vowels (7 are accented) and 25 consonants (9 digraphs; consonant pairs read out as single sound). The accented vowels and digraphs were not used. The score was the number of correctly written letters. The table below (Table 1) presents how the children performed the task.

Table 1: Frequency of letter knowledge

Number of letters	Frequenc	Percent
0- 3	41	41
4- 10	36	36
11- 28	19	19
39	4	4

Four children were able to read already before reading instruction.

3.8.1.3. Nonverbal intelligence, as extraneous variable. Raven's Colored Matrices were used to assess nonverbal IQ. The test was administered to school children individually.

***3.8.1.4. Rapid naming of pictures*:** the participants were asked to name as quickly as possible 5 small pictures of high frequency objects 20 times (pincers, key, umbrella, clock, and comb) that were presented on a sheet. The task was administered individually just for school children, they were timed with a stop watch.

***3.8.1.5. Outcome measures for the first grade children*:** the study had to count with the time restriction and that the first graders had very short time interval between knowing and not knowing to read, therefore only decoding skills were measured as *reading outcomes*. The children had already learnt 6 letters when their reading and decoding ability was tested. Fluent letter knowledge, syllable structures and word reading tasks were used. The reading tasks were administered individually, and were timed with stop watch, mistakes were counted (see Appendix 4). Summing up the time needed for reading the letters, syllables and words were conceptualized as reading speed (who is slow needs more time) and summing up the mistakes for reading accuracy (who commit many mistakes is less accurate in reading).

Rating scales for teachers: teachers were asked to judge how children do read. The aim was to validate the measurement's used by the examiner.

Table 2: Correlations between the reading measures and teachers rating scale

Measures	1.	2.
1. Reading speed		
2. Reading accuracy	.849**	
3. Rating scale for teachers	.505**	.715**

The strong correlation between the reading measurements as outcome variables and the teacher's rating scale shows the accuracy and validity of them.

3.8.2. Observation: there were implemented 2 hours observations in every classroom for the school sample, all together 6 hours. The Hungarian language emphasize the synthetic- phonics *reading instruction* methods, it was observed and analyzed, how much accent was given for phonological awareness training, before starting teaching letters and what was the theoretical base of the used instructional method.

3.8.3 Document consultation: a questionnaire for parents about home based reading habits would be better, but the too many measurements and tests to conduct and the main goals of this study testify that only *school documents* were consulted about the parents' educational and occupational level. Analysing the national *reading curriculum* and *reading text books* gave additional information about the reading instruction (Appendix 3).

3.9 Validity and reliability

When analyzing the validity and reliability of a study one has to differentiate between measurement validity/reliability and internal/ external validity. The first one is an attribute of data- information (how the data is collected in the process of research: tests, measurements) and the second one is an attribute of conclusions and inferences after the data is analysed (Tashakkori and Teddlie, 1998).

3.9.1 Measurement validity and reliability

When regarding measurements validity and reliability a requirement is to put two questions about the nature of the used instrument: "Am I measuring what I intend to

measure?" and "Am I measuring the construct that I want to measure without error? The first question is validity and the second one is a reliability question.

Measurement reliability refers to the consistency, stability and precision of scores achieved (Gall, Gall and Borg, 2003), to measure the construct without error. When a score has a large amount of measurement error, it is unreliable. How reliable a score is can be described through a reliability coefficient. This coefficient shows the internal consistency of a tool, the degree on which items in a test measure the construct in a consistent manner, that the items of a test measure the same ability. Cronbach's Alpha coefficient is a reliability measure of a test, which was counted when piloting the "Ringerike Materialet" and will be used also when adapting this tool with a larger sample. The Cronbach's Alpha coefficient has to be as high as possible. Gall, Gall and Borg (2003) proposes .80 or higher reliability coefficient, but the minimum necessary level of test score reliability depends on the particular research. If the reliability measure of a subtest/test is very low, it will not give adequate information and will be practically useless. Another issue is that because a measurement has to give trustworthy information about the abilities which are measured, when translated the "Ringerike Materialet" was followed the structure and principles of the original in order to reduce error possibilities as much as possible. The instructions were formulated clear and understandable and the achievable scores are quantified objectively not giving space for subjective evaluations.

Determining the **measurement validity** of this study three types of validity were chosen, being aware, that there are no types of validity just different ways to gather evidences about it (Gall, Gall and Borg, 2003).

Content validity: "experts", key informants were asked to evaluate and to judge the content of the translated "Ringerike Materialet" language awareness screening tool since this was the main instrument of this study (Appendix 1).

Item analyses were conducted when piloting the material to evaluate the degree of validity of each item (Appendix 2). If in a group of respondents an item score is consistent with the total test score (high "item total correlation") that item is

considered to be a valid measure of the construct language awareness or rather the different constructs measured in the different subtests. Another issue is that the test items have to discriminate; they have to give a valid picture of the measured constructs. If every or any respondent do not know an item, that will not assure relevant information about the measured construct.

Predictive validity: language awareness as predictor variable on reading outcomes as criterion variable were analysed to map the predictive power of this screening tool.

The reading measures of this study were validated by asking the teachers to fulfil a rating scale about children's reading level. Since teachers have pedagogical experience, knowledge about reading development and they knowing their students, comparing the achieved reading scores with their opinion was relevant.

3.9.2 Internal validity of this study

Internal validity is to evaluate the results and conclusions of a study. Planning a research (defining important concepts from the theory and operationalizing them, the design, sample selection and instruments) affects the results and findings many preliminary evaluations of validity can be done.

The present study operationalized two abilities, language awareness and reading. Regarding *language awareness* the conceptualization of Lyster (1992) were used. Despite of the many *reading* research it is very hard to define what reading is because it is a complex ability, with many underlying capacities. This study followed Gough and Juel's (1991) conceptualization and definition being aware that this study was conducted at the very first stage of reading development, and therefore put accent on early decoding skills.

The predictive part of this study sought to find how *linguistic* and *cognitive* measures are related to each other and to reading, how these skills can predict growth in reading development. But a variable's ability to predict reading is dependent on the variables are taken into account. The problem with language awareness is that if it can not be measured distinctly; there will be a third variable problem, which will influence the

results: ex. IQ, short term memory, letter knowledge, vocabulary. Therefore it was so important to *take control of these extraneous variables.* Another issue was to take control of *autoregressive effects* ex. control for reading. This is particularly important if one want to measure prediction of growth in reading. There is no agreement in the reading literature regarding letter knowledge being an autoregressive variable or not. This study measured letter knowledge as an autoregressive variable, because it is easier and faster to learn to read a transparent language, like Hungarian, and one could argue that those children who already know a lot of letters, may have developed decoding skills as well. One school child who could read before the reading instruction started was excluded from the regression analyses.

Of special interest, according to language and phonological awareness was to see how well the phonological awareness construct was able to explain reading in the shallow Hungarian orthography. The phonological awareness construct in "Ringerike Materialet" is represented by larger and smaller parts, by easier and more difficult tasks. Will they discriminate properly amongst the children? Do they have an adequate level of difficulty? Weak relationship between phonological awareness and reading ability in shallow orthographies may be a result of floor and/or ceiling effects, that these measurements do not differentiate adequately individual differences. Children in shallow orthographies seem to acquire both reading and phonological awareness skills rather quickly. This is a matter which has to be considered when analysing the results of the predictive study.

Yet another issue which was important to consider is that different tasks of the language awareness construct had different power in predicting reading development in early stages ex. larger parts of language awareness (grammatical and syntactical elements) predict reading comprehension better later on, but not in the first stages of decoding skills. That this study was conducted at a so early stage without possibility to follow up reading development in later grades had to be taken in consideration when evaluating the predictive validity of the translated test.

Rapid naming in this research was measured by homophone tasks. The reasoning behind this is that the child has to retrieve as fast as possible from his/her inner lexicon

the homophone words. But because this homophone tasks did not come out to measure the speed factor in this Hungarian sample there was included a measure of rapid naming of objects. Is this task of rapid naming a good predictor of reading development? We know already from the reading theory the importance of speed factor when learning to read a transparent language.

Yet another and final issue is the sample that can influence the quality of inferences of this study and can be a treat to internal validity. This research included only town children, which in the given Romanian society and reality came out to give asymmetric data; however it was an attempt to stratify the population. Since this research is limited only to children from the town and did not find the normal variation, it will affect the results and inferences which could be driven.

A model about the procedures for the implementation of this study is available at appendix 10.

4. FINDINGS AND DISCUSSION

4.1 Correlates of pre-reading performances in a transparent language

4.1.1 Correlations between the language awareness subtests and their relation to reading

Language awareness, the ability to focus on the form and structure of a language is a complex concept; it is operationalized by different researchers in many ways and measurements. The present study follows Lyster's (1992) operationalization the language awareness construct being measured by following the structure of the language: small (phonemic) and larger (rhyme, syllables) units as well as morphological, syntactical and grammatical awareness. In addition a verbal memory, naming speed and listening comprehension measurement is constructed in the material.

Looking for patterns of relationships between these measurements (subtests), the aim is to analyze how the different subtests influence each other, measuring the underlying construct of language awareness. Their relation to the reading measures as outcome variable will give a preliminary overview about which subtest of the language awareness material was important for developing reading skills in the Hungarian language. Further analyses will be given about how extraneous variables influence each other and the language awareness ability.

Table 3 presents two- tailed simple correlations between the different subtests of the material. There are significant and strong correlations between most of the measures, however the tasks "Syllable Identification" and "Counting sounds" seem to have just weaker relationships with the other linguistic variables. As table 3 shows the syllable subscale correlates weakly with "Sound Blending" (.217), "Word Compounds" (.243), "Grammatical Understanding" (.219), and modestly with "Listening comprehension" (.406). "Counting Sounds" correlates with three morphological subtest "Analyses of Compound Words", "Knowledge of Compound Words" and "Counting the Words" (.291, .266, and .208) but it is more strongly related to letter knowledge (.549).

“Rhyme Identification”, “Word Length” and “Identifying the First Sound” tasks correlate relatively highly and significantly with all the other measurements as does “Sound Manipulation”.

The morphological awareness tasks (“Word Compounds”, “Analyses of Compound Words”, “Knowledge of Compound Words” and “Counting the Words”) seem to be in significant strong relation with all the other subscales, however “Counting the Words” has modest significant correlations with the other measurements. Grammatical and syntactical awareness, the “Listening Comprehension” subscales also strongly or modestly correlates with the other measurements.

Three subscales had no effect on the reading measures (“Syllables Identification”, “Counting Sounds” and “Counting Words” subtests) while all the other tasks were significantly and strongly related to them.

TABLE 3: Correlations between the subtests (*= correlation is significant at the 0.05 level; **= correlation is significant at the 0.05 level; a= just children in first grade are included)

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Rhyming																
2. Word length	.615**															
3. Syllables	.267**	-														
4. Identifying the first sound	.385**	.222*	-													
5. Sound Manipulation	.531**	.515**	-	.355**												
6. Blending	.460**	.406**	.217*	.393**	.442**											
7. Sound counting	-	.225*	-	.324**	-	.223*										
8. Word compounds	.409**	.287**	.243*	.277**	.341**	.249*	-									
9. Analyses of compound w	.526**	.375**	-	.459**	.351**	.253*	.291**	.353**								
10. Knowledge of compound w.	.523**	.371**	-	.530**	.456**	.437**	.266**	.413**	.471**							
11. Grammatical	.600**	.443**	.219*	.359**	.396**	.540**	-	.408**	.509**	.609**						
12. Counting words	.250*	.238*	-	.248*	.273**	.227*	.208*	.244*	-	.356**	.256*					
13. Listening comprehension	.586**	.518**	.406**	.371**	.462**	.484**	-	.374**	.444**	.498**	.640**	.333**				
14. Syntactic awareness	.470**	.416**	-	.369**	.244*	.379**	-	.334**	.487**	.377**	.487**	-	.363**			
15. Letter knowledge	.793**	.317**	-	.545**	.272**	.312**	.549**	.367**	.378**	.438**	.305**	.327**	.359**	.314**		
16. Reading speed [a]	-.403**	-.279*	-	-.629**	-.492**	-.396**	-	-.375**	-.557**	-.598**	-.568**	-	-.462**	-.567**	-.632**	
17.Reading accuracy[a]	-.698**	-.376**	-	-.574**	-.529**	-.491**	-	-.359**	-.541**	-.530**	-.663**	-	-.577**	-.582**	-.707**	.849**

4.1.2 Correlations between the extraneous variables and their relation to literacy:

Further analysis of this study will examine which cognitive- linguistic and environmental factors effect beginning reading acquisition, the relation between these measures and reading development in a transparent language. In doing so there were counted bivariate correlations looking after relationships between language awareness (a sum of all the subscale of the battery) as a language factor and the other extraneous variables which could effect literacy development (Table 4). These measured extraneous variables were: nonverbal intelligence, rapid naming, and short term memory as cognitive factors, and parent's occupation as environmental factor. Children's age were also taken into account.

Table 4: Correlations between language awareness and the extraneous variables

Measures	1.	2.	3.	4.	5.	6.	7.
1. Age							
2. Language awareness	.489**						
3. Intelligence [a]	.265*	.597**					
4. Rapid naming [a]	-.265*	-	-.274*				
5. Verbal Short Term Memory	.399**	.647**	.411**	-			
6. Homophones	.300**	.643**	.325*	-	.391**		
7. Parents occupation	-	.248*	.574**	-	.246*	.203*	
8. Letter knowledge	.377**	.541**	.468**	-.322*	.323**	.285**	-

*Correlation is significant at the 0, 05 level; **Correlation is significant at the 0, 01 level; a= just children in first grade are included; - = correlation is not significant

Table 4 shows that language awareness had a strong significant correlation with all the extraneous variables except rapid naming of pictures (RAN). The nonverbal IQ intersected all the other variables as well as letter knowledge. Short term memory (STM) was also strongly and significantly associated with all the measured variables except for rapid naming of pictures (RAN). It seems that this speed measuring variable was weakly related just with age, intelligence and letter knowledge. Furthermore the homophones subscale which was originally also meant to measure speed is related to other extraneous variables as age, intelligence, short term memory, parent's

occupation and even with letter knowledge. Parent's occupation had the highest influence on the children's intelligence, and still had affected the language awareness, short term memory and homophones tasks. Finally, one surprising finding is that letter knowledge had no significant correlation with the parental occupation. This was so even if letter knowledge had a significant correlation with all the variables presented, especially with "Language Awareness". There is no immediate explanation for this finding.

For better overview correlations between the language awareness subtests on the other extraneous variables and reading development were analyzed and discussed (see Table 5). Parent's occupation as environmental influence on literacy skills, had a smaller degree of significant correlation with some language awareness subtests such as: "Rhyming", "Identifying the First Sound", "Sound Counting", and "Analyses of Compound Words" (Table 5). When it comes to reading and decoding parents occupation correlated significantly just with reading speed.

The other extraneous variables such as IQ, homophones, short term memory and letter knowledge and also the age were in strong relationship with most of the subtests in the battery. Age and "Identifying the first sound" task was not connected significantly as well as" Syllable" task and "Counting the Words" was not connected to the nonverbal intelligence.

By analyzing the reading measures as outcome variables (reading speed and accuracy) one can see these had strong or medium relation with: intelligence (.550, .578), and letter knowledge (.543, .455) and a somewhat weaker but significant correlation with rapid naming (.395, .295). Short term memory just modestly influenced the reading accuracy (.331) and parent's occupation just the reading speed (.298).

Language awareness as a total construct is highly and significantly related to the reading measures.

Table 5: Significant correlations between the extraneous variables and linguistic subscales as well as reading

	Age	IQ[a]	Homo-phones	RAN[a]	STM	Letter Know.	Parent occup.	L. Awarenes
Rhyming	0,304**	0,501**	0,491**	-0,306*	0,510**	0,353**	0,207*	0,793**
Word length	0,308**	0,356**	0,274**	-	0,407**	0,317**	-	0,632**
Syllables	0,343**	-	0,327**	-	0,260**	-	-	0,400**
Identifying the first sound	-	0,508**	0,282**	-	0,342**	0,272**	0,212*	0,606**
Sound manipulation	0,459**	0,452**	0,288**	-	0,364**	0,545**	-	0,596**
Sound Blending	0,331**	0,448**	-	-	0,465**	0,312**	-	0,622**
Counting the sounds	0,375**	0,331*	0,218*	-	0,319**	0,549**	0,248*	0,373**
Word Compounds	0,227*	-	0,431**	-	-	0,367**	-	0,577**
Analyses C. Words	0,256*	0,479**	0,476**	-	0,421**	0,378**	0,257**	0,685**
Knowledge of C. Words	0,433**	0,432**	0,403**	-	0,389**	0,438**	-	0,738**
Grammatical U.	0,384**	0,395**	0,399**	-	0,428**	0,305**	-	0,767**
Counting Words	-	-	0,207*	-	-	0,327**	-	0,408**
Listening Comprehension	0,368**	0,483**	0,441**	-	0,472**	0,359**	-	0,796**
Syntactic awareness	-	0,356**	0,315**	-	0,302**	0,314**	-	0,583**
Reading speed[a]	-	-0,550**	-	0,395**	-	-0,543**	-0,298*	-0,636**
Reading accuracy[a]	-	-0,578**	-	0,295*	-0,331*	-0,455**	-	-0,707**

*Correlation is significant at the 0, 05 level; **Correlation is significant at the 0, 01 level; a= just children in first grade are included; - = correlation is not significant

An interesting pattern appeared regarding the relation between the homophones and rapid naming tasks (both conceptualized for measuring the speed factor) with reading. Since the homophone subscale had been influenced or influenced all the other language awareness subscales but had no effect on reading one should argue that the homophone tasks measured greatly the underlying construct of language awareness. This argument is accentuated by the rapid naming tasks which came out to have a great influence on reading and decoding skills and no significant relationships with the other subscales of the language awareness battery. The rapid naming of the picture task was significantly, but only weakly correlated to the “Rhyme” task. It seems that

rapid naming of pictures was able to measure the speed factor, and that the homophone tasks measured something else.

4.1.3 DISCUSSION

The above presented correlation tables investigate the patterns of relationships between the cognitive, linguistic, environmental and cultural factors and how these measures correlate with reading acquisition for children learning the transparent Hungarian writing system. The Hungarian tradition of kindergarten program as well as teaching literacy will cover the cultural factor, which could reveal some explanations for the findings of this study. Correlational statistics can not explain the directions and strength of the relationships. Further analysis is needed for doing that, but correlational statistics will show us which cognitive or language related skills were associated with literacy acquisition. But since the reading measures are collected later than the language measures the correlation between these measures may to some extent be predictive. The main findings of the correlational analysis were that small and large units of phonological awareness, morphological, syntactical and grammatical awareness intercorrelated subsequently with each other. This pattern was valid regarding the broader language skills measured by the "Listening Comprehension" subscale and the "Letter knowledge" as a measure of pre- reading, emergent literacy skills. It seems that this broader language skill and letter knowledge mediates all the language awareness ability. Their close relation to the language awareness subscales indicates that the Hungarian language, where the orthography is highly transparent, those children who have a well developed language base and who can pick up knowledge about letters, perform better on tasks measuring language awareness skills. The strong relation between the subscales measuring different metalinguitic abilities should be explained by how they develop in time following the rule of difficulty. The awareness of larger parts is discovered easier and faster than the awareness of smaller units and the ability to manipulate individual phonemes. The data in many ways supported this assumption since the manipulation of the individual phonemes (counting the number of sounds in a word) showed the weakest relation with the other

subtests. Another explanation should be that mastering a larger language awareness construct should foster the development of phoneme awareness. Since morphemes have a phonological structure, and the ability to manipulate and analyze morphemes is the same as manipulating and analyzing single phonemes just that the child has to operate with larger units should be the best explanation of this finding. Lyster's (2002) training study revealed that training in morphological awareness enhanced the children phonological awareness as well. Conversely the knowledge about how the words are compounded gives support for better grammatical and syntactical awareness or vice versa. A study about the bidirectionality of language awareness constructs and about their relationship to each other would be welcomed. Two subscales of the phonological awareness tasks had no or weaker significant relationships with the other language awareness subscales namely, "Identification of the Syllables" and "Counting the sounds" (phoneme segmentation). "Identification of Syllables" was an extremely easy task for the Hungarian children since all the kindergarten program is based on singing, saying, learning rhyming poems connected with movements and syllabification. Furthermore the Hungarian language is very reach in nursery and rhyming poems which helps the children to develop naturally to segment words in smaller parts as syllables. Developing awareness of the larger parts of the language should be so important to phoneme awareness? This statement is valid also in a so highly transparent language? Even if being an easy task, "Syllable Identification" correlated modestly with a phoneme awareness subscale ("Sound Blending"), with a morphological subscale ("Word Compounds"), with "Grammatical Understanding" and strongly with the "Listening Comprehension" subscale. Even if being an easy task identifying syllables seems to be connected to every units of language awareness in this Hungarian sample.

"Counting the Sounds" was the other subscale which had no or weak significant correlation with the other subscales of the language awareness battery. Perhaps because this ability does not develop before children learn to read. Otherwise all the subscales where the task was to count something (sounds in the words or words in the sentences), Hungarian children wanted to count syllables. This is because how it was

explained already syllabization is so much emphasized in the kindergarten. “Counting Words” also had just modest correlations with the other subscales; the explanation for this was already given, namely that they wanted to count syllables. When it came to reading measurements and their relation to the language awareness material these three subscales (counting syllables, counting sounds, counting words) did not correlate significantly with the measures of reading speed and accuracy while all the other subscales correlated significantly stronger with them. This result indicates that morphological awareness and even larger units of the language (grammar, listening comprehension), like phonological awareness may bear a close relation to reading achievement even at early stages of development. Another set of the correlational analyses (Table 4, 5) investigated the relations between the measured extraneous variables looking for patterns how this variables influence each other and the underlying construct of language awareness. The theories based on the ultimate research highlights the importance of phonological processing skills when learning to read. The phonological processing skills are: phonological awareness, rapid naming and verbal short term memory. The conjunction of this skills make possible to retrieve phonological strings (information) and to name them as fast as possible from the mental lexicon. This is the reason why these phonological processing skills should be related, but the present data just partially support this assumption. Verbal short term memory highly and significantly correlates with the phonological awareness subtests (see Table 5) and with all the language awareness constructs (Table 4). Rapid naming however only correlated significantly just with “Rhyming” and not with short term memory. There are two possible explanations behind this. Rapid naming on the one hand was influenced by age and letter knowledge since there are significant correlations between age and rapid naming (.265), letter knowledge and rapid naming (.322) as well as letter knowledge and age (.377). It seems that the smaller children of the present sample had less letter knowledge or no letter knowledge at all which in return require well developed processing skills, which these children had not yet developed. On the other hand the speed factor was measured just with rapid naming of pictures, however many studies report a smaller effect of rapid naming of pictures than rapid naming of digits and letters when it comes to reading (Cardoso,

Pennington, 2004; Schatschneider et al., 2004). Otherwise age was affected by all the other extraneous variables and had strong relationships with the measured language awareness subtests. Age and "Identifying the first sound" and" Syntactic Awareness" tasks are not significantly correlated. These results may be explained by the fact that all children had focused on "Identifying the First Sound" tasks in kindergarten and by the possibility that the "Syntactic Awareness" subtest came out to be a little sensible measure for age differences. Educators reported that they used to play with sounds, tapping out how the words are beginning, and the first sound of their name. This finding highlights the importance of training phonological abilities at early stages to help most children to develop good phonological skills. When analyzing the relations between decoding skills, short term memory and both phonological and morphological awareness (Table 5) one can observe that short term memory is associated just with reading accuracy, but strongly correlates with many phonological and morphological awareness subscales. The relation with the phonological awareness subtests is evident since performing these tasks is a burden also for memory capacity. But the short term memory has significant correlations with most of the morphological awareness subtests. This can be explained by the rather complex system of Hungarian language regarding inflections and affixes and the numerous long words which the language contains. The memory capacity's relation to reading and metalinguistic performances is in line with the Hungarian studies Kassai and Kovács- Vass (1991 in Csépe, 2006) and Csépe (2006). It seems that the complex orthographic structure of the Hungarian language relies on memory capacities when mastering the language and reading performances. Parent's occupation an environmental influence on children's development had the strongest significant correlation with intelligence, which is an evident finding. However, it was interesting to observe that parents' occupation and education had no significant correlation with knowing letters. How can this pattern be explained? It seems that teaching children letters is possible after they have developed their cognitive and language base, letter knowledge being highly associated with age (.337), language awareness (.541.), intelligence (.468), rapid naming (-.322), verbal short term memory (.323) and homophones (.285).

In the present study, the "Homophones" subscale did not succeed to measure the speed factor. It was too demanding for the children, having difficulties when translating it and finding well- known homophone Hungarian words. IQ, short term memory, letter knowledge all correlates strongly with each other and with the language awareness subtests therefore it will not be easy to define which extraneous variable is most relevant to control for when running regression analysis for examining which cognitive- linguistic skill were the most important in learning to read in a transparent language. When analyzing their relationship with reading intelligence and letter knowledge it seems to be in a strong correlation with the reading measurements.

4.2 Hungarian children's metalinguistic abilities

A cross- sectional, comparative study was conceptualized to map the Hungarian children's metalinguistic abilities. Furthermore the aim of the test adaptation was to analyze if the instrument would measure age and individual differences. Forty-two kindergarten children were tested with the "Ringerike Materialet" language awareness screening tool as well as tested for letter knowledge. Ten of these children were older than the rest of the group. They were tested in the autumn period (October 2006), before any school readiness program and instruction had been given to look for their linguistic level before entering school and before instruction. Fifty-eight first grade children shortly after they entered school (September 2006) were tested with the same instrument and letter knowledge to look for their linguistic level after a last year kindergarten instruction. All together 100 children participated, their age rating from 5 until 8 years (mean age is 6, 3). Analyzing and comparing their achievement on the language awareness tasks will allow the researcher to analyze which language awareness tasks were easier/harder to complete and how the linguistic test measured age differences (see Table 7). Furthermore a qualitative evaluation of the kindergarten program will testify the overall results. The children from the sample were categorized in function of their age. The table below shows this categorization.

Table 6: The age of the children

Age	Kindergarten	Schools			Total
		Group one	Group two	Group three	
5- 6,5 years	32	1	2	0	35
6,6- 7,9 years	10	14	15	26	65
Total	42	15	17	26	100

Descriptive statistics (mean, standard deviation) and independent sample t-test were computed in order to analyze and compare the children's achievement in every subtest of the screening tool. Reliability analyses were computed for every subtest (table 7).

"Rhyme Identification": the mean scores for young children were 7.7 (SD= 3.2) out of 11 and for the elders 9.3 (SD= 2.5). The ceiling effect exists at the older group showing that they performed the tasks better, but the high mean scores at both groups and the negatively skewed distribution (skewness: -1.197, kurtosis .301) testify that this task was easy for the children. Important to mention that those children who are not sensible in detecting words which sound the same (rhyming words) should be considered risk children with respect to reading development. The internal consistency of the subtest was high 0.86.

"Identification of Word Length", "Identifying the First Sound" tasks: the ceiling effect is present at both groups and the distribution is also negatively skewed (see Appendix 5). The scholars have higher mean scores showing that they performed better. The internal consistencies of the scales were relatively good, 0.73 and 0.78 respectively. Since the test was administered for average population, might be to screen those children who are in risk for developing reading difficulties.

"Syllable Identification": there is no ceiling effect for this task, but the relatively high mean scores and the negatively skewed distribution shows that it was an easy task for most of the children of this sample. The reliability coefficient shows a low, but still a somewhat acceptable level 0.66. The differences between the two groups may appear because small children had difficulties to count the number of syllables, but they could clap it out so naturally.

Table 7: Comparing achievement on the Language Awareness Screening Tool in function of age

Subtest	**Age**	**Maximum score**	**Mean**	**SD**	**t-test**	**Reliability N=100**
Rhyme Identification	5- 6,5 years 6,6- 7,9 years	11	7,7 9,3	3,2 2,5	t = -2,738 p = 0,007	0,86
Identification of Word Length	5- 6,5 years 6,6- 7,9 years	6	4,3 5,02	1,7 1,4	t = -2,063 p = 0,04	0,73
Syllables Identification	5- 6,5 years 6,6- 7,9 years	16	12,3 13,6	2,3 2,2	t = -2,896 p = 0,005	0,66
Identifying the First Sound	5- 6,5 years 6,6- 7,9 years	10	8,57 8,48	1,8 2,2	t =0,209 p = 0,835	0,78
Sound Manipulation	5- 6,5 years 6,6- 7,9 years	10	3,1 4,8	1,5 1,9	t = -4,321 p = 0,000	0,49
Sound Blending	5- 6,5 years 6,6- 7,9 years	10	8,03 9,03	1,7 1,6	t = -2,434 p = 0,006	0,70
Counting the Sounds	5- 6,5 years 6,6- 7,9 years	6	1,3 2,4	1,5 1,5	t = -3,32 p = 0,001	0,67
Short Term Memory	5- 6,5 years 6,6- 7,9 years	9	5,2 7,08	2,02 2,2	t = -4,00 p = 0,000	0,77
Homophones	5- 6,5 years 6,6- 7,9 years	16	3,3 4,6	2,4 2,8	t = -2,412 p = 0,01	0,68

Word Compounds	5- 6,5 years		4,9	2,3	t = -1,497 p = 0,138	0,80
	6,6- 7,9 years	8	5,7	2,4		
Analyses of Compound Words	5- 6,5 years		4,6	2,3	t = -2,022 p = 0,04	0,76
	6,6- 7,9 years	9	5,7	2,5		
Knowledge of Compound Words	5- 6,5 years		6,9	2,2	t = -3,117 p = 0,002	0,69
	6,6- 7,9 years	13	8,6	2,8		
Grammatical Understanding	5- 6,5 years		8,1	2,7	t = -3,781 p = 0,000	0,73
	6,6- 7,9 years	13	10,06	2,2		
Counting Words	5- 6,5 years		2,2	1,4	t = -0,46 p = 0,963	0,60
	6,6- 7,9 years	6	2,2	1,6		
Listening Comprehension	5- 6,5 years		11,7	4,6	t = -2,893 p = 0,005	0,84
	6,6- 7,9 years	18	14,05	3,3		
Syntactic Awareness	5- 6,5 years		7	1,7	t = -0,78 p = 0,437	0,44
	6,6- 7,9 years	10	7,2	1,6		
Letter Knowledge	5- 6,5 years		4,5	8,4	t = -2,319 p = 0,02	
	6,6- 7,9 years	20	8,3	7,2		
Language Awareness	5- 6,5 years		99,46	22,67	t = -4,065 p = 0,000	
(Sum of all the subtests)	6,6- 7,9 years	187	118,17	21,54		

"Sound Blending": The mean scores for both age groups are high, the distribution is negatively skewed. There was a ceiling effect for the scholars showing that the task was easy for this age group. It was an easy task for the Hungarian children. The reliability coefficient was acceptable 0.70.

"Sound Manipulation" and "Counting the Sounds" (phoneme segmentation): these tasks were the hardest to perform, but shows the best normal distributions (to delete the first sound and pronounce the remaining word, and to count sounds). Those children who could read (4 out of 100) enhanced the mean scores. The elder group's performance was better than the younger. The internal consistency of the manipulation task was low 0.49. It would be interesting to make this subtest easier. After the pilot study it was only changed to be easy 5 items. The internal consistency of the segmentation task ("Counting Sounds") was near the acceptable level 0.67.

"Short Term Memory": it was also easy, the older group showing ceiling effect. It would be important to make it more difficult (negatively skewed), however it detected very well how the memory function is dependent on age, small children performing it significantly harder. The reliability coefficient was good 0.77.

"Homophones": was extremely hard for both group of this sample. Children obtained 3.3, 4.6 mean scores out of 16. This high level of difficulty is caused by the translation, not finding so well- known Hungarian homophone words. Observation gives support that those children managed to complete 5, 6 items out of 16 who had a good vocabulary and originated from highly educated families. The internal consistency is near the acceptable level 0.68.

"Word Compounds": this morphological awareness measuring task was to set together two word, which makes up the compound word. It was performed easily for most of the children, the older group even reaching the ceiling effect. The negatively skewed distribution underline the mentioned pattern, however the internal consistency of the subscale was good 0.80.

"Analyses of Compound Words": to delete the first word of the compound word and to name the remaining one was harder to perform, comparing with the previous task, but even like this presented negatively skewed distribution. The reliability coefficient is good 0.76.

"Knowledge of Compound Words": This was a relatively hard task for the youngest children. The distribution is negatively skewed and the reliability coefficient is relatively low 0.69. It probably was hard because the words were not very frequent words for young children. Otherwise the above presented morphological awareness tasks were unfamiliar and interesting tasks for the children.

"Grammatical Understanding" and "Listening Comprehension": the first scale is to map children's grammatical knowledge, the second one their listening comprehension. It seems that children did not have problems to perform these broader language skills; they could comprehend grammatical structures of the language. The distribution of both is negatively skewed, but they have a good level of reliability coefficient 0.73 and 0.84 respectively. The scales were sensible to detect age differences.

"Counting Words": The Hungarian children had great difficulties with this, they were not aware yet of this entire large unit of the language, namely word. They could not find the boundaries between the words in a sentence. The same mean scores of the two groups show that small as well as old children had the tendency to count syllables, however the instruction was explicit and more trials were included. The reliability coefficient also shows the above mentioned tendency being quite low 0.60. This was experienced at the pilot study also.

"Syntactical Awareness": the task was to decide if a heard sentence is correct or not. This measurement came up not to be reliable (reliability coefficient is very low 0.44) this was either due to the fact that children influenced each other in making their decisions, or that because the translation failed.

"Letter Knowledge": evidently small children had less knowledge about the letters, their mean score is smaller. It was not counted reliability analysis for this measurement.

Language Awareness: this construct is computed from summing the subtests of the battery. The aim was to grasp the language awareness ability as whole, and to see if there are differences between the children regarding this ability. Reliability analyses were not counted.

4.2.1 DISCUSSION

As documented in the literature (Goswami, 2002; Goswami and Bryant, 1991; Libermann and Shankweiler, 1991) tests of metalinguistic awareness differ with regard to difficulty and discrimination power depending on the child's age and level of development. Adams (1990) described five levels of difficulty of the tasks measuring the phonological awareness construct: phoneme manipulation which in the present study is measured by the "Sound Manipulation" task (to delete the first sound and pronounce the remaining word), phoneme segmentation or "Counting the Sounds" in a word, blending, rhyming and onset. This order of difficulty level seems to mach the Hungarian sample also, the hardest task being the sound manipulation and segmentation. Many researchers are concerned about the above mentioned tasks being an extremely difficult requirement for the small children (Goswamy, Bryant, 1991, Libermann and Shankweiler, 1991; Goswami, 2002) and that these abilities will develop by print/ letter exposure (Lyster, 2002; Caroll, 2004). Caroll (2004) in his experimental study proved that children did not scored in phoneme tasks unless they knew at least four letter sounds. Liberman and Shankweiler (1991) went even further when analyzing the phonemes, being abstract structures of the language which can not be pronounced and heard clearly out from the flow of the speech. The phoneme affect each other and they are co- articulated. These are the reasons why the perception of phonemes is so difficult. When learning to read the children have to understand the phonology of the words, not just learn about sounds. This is what Frost (2001) proved

in his study, that the pathway from phoneme awareness to reading is through word processing ability. Letter knowledge itself is not enough. Regarding the sample in this study one can observe that even if many school children had knowledge about letters, the manipulation and segmentation was difficult to perform. One should argue that to complete these tasks children have to understand the alphabetic principle, to understand the letter- sound correspondences and how Liberman and Shankweiler (1991) pointed out the phonology of the word and how Frost (2001) pointed out word processing abilities. This study had a small number of children who could read when administering the test (one scholar and 3 kindergarteners), and only these children were able to do the manipulation and segmentation tasks. This result supports Liberman and Shankweiler's (1991) assumption. The children who could read mastered the above mentioned tasks better than the children who could not read. One could argue that they were phonemically more aware of the words. Drawing conclusions on the basis of four children is not valid, but the tendency was clearly observed. Goswamy and Bryant (1991) described the rhyming skills being a prerequisite for the further phonological and phonemic awareness development, and that even holds to predict reading acquisition. The Hungarian kindergarten program from Transylvania is based on rhyming poems which can be associated with movements for syllabification. This intensive training in rhyming and syllabification seems to have affected the results of this study. There are many signs of this statement: the larger units of phonological awareness subtests were easy to perform. At the subtests measuring the large units of phonological awareness ("Word Length", and "Identifying the First Sound") ceiling effects were detected for both groups. Scholars reached the ceiling effect for more subtests than the kindergarteners ("Rhyming", "Word Length", "Identifying the First Sound", "Blending", "Short Term Memory", "Word Compounds"). "Syllable Identification" was an extremely easy task for the Hungarian children. Mastering the tasks of "Counting Sounds", and "Counting Words" interfered with "Syllable Identification", supposedly because the syllabization is so much emphasized in the kindergartens. A clear developmental progress is observable. Generally the children performed well, however this might be caused by the patterns of sampling also. Even if age and different kinds of experiences may have

affected the children's development from kindergarten to school, the kindergarten training may explain most of the changes.

The most important finding regarding age related differences was that small children performed more poorly than the older children on most of the language awareness measures. The differences as shown by t- test (Table 7) were not significant on subtest which underlies the nature of metalingustic abilities of the Hungarian children. One of this is the "Identifying the First Sound" task (which word begins with the given sound). Educators reported that in kindergarten they used to play games about how the words begin. This is the reason why both groups of children had ceiling effect on this tasks and no significant developmental difference. The other subtest is "Counting Words". As it was already explained, children are not sensitized to detect the large structures in the language, but they get more instruction in syllabization, therefore the tendency was to count syllables instead of words, at both group. Yet another subtest which did not show significant differences was one of morphological awareness, "Word Compounds" (to blend two words), which pattern is hard to explain. How it was mentioned the morphological tasks were interesting to fulfill, because children were not used to perform such tasks. A possible explanation not finding significant differences between the groups at "Word Compounds" task could be, that since they mastered well on the "Sound Blending", to set together larger units as words was even more easy. Finally the "Syntactic awareness" subtest did not detect the significant differences between the groups, probably because it's low reliability. This subscale should not be taken into account when performing further statistical analyses. "Language Awareness" as total construct shows the highest significant difference between how the older and younger groups of this sample performed, the smaller being weaker at this ability. This may be so because the language awareness ability develops by time, or because the language based kindergarten program made a contribution in order to enhance the student's awareness of language. A longitudinal study would be the best to answer this question. Whatever is the assumption the translated language awareness battery succeeded to map Hungarian children language awareness ability, to measure age related differences and to point out important

features as consequence of trainings which are going on in the Hungarian institutions from Transylvania.

4.3 Prediction of reading development in the Hungarian language

The predictive part of this study was conceptualized to examine how cognitive-linguistic capacities are able to predict growth in reading development in Hungarian and to analyze further the characteristics of learning to read in this transparent orthography. The correlational study already gave information about the connection between the measured linguistic and cognitive measures and their relation to reading. This part of the study, using hierarchical regression analyses will give additional and more specific information about the predictive power of the cognitive and linguistic variables. In addition partial correlation controlling for age aimed to prepare the data before running regression analyses to see how age differences affected the cognitive and linguistic measurements. If age made an impact on correlations, it should also be used as a control variable in the regression analysis. Controlling for age seems to be important since two large groups of children were tested one from kindergarten and one from first grade. For the whole group age was ranging from 5 to 7 years 9 months and it was already proved by the comparative part that there were significant age differences on most of the subtests. However only first graders were followed up, but it is important to see how homogenous that group of children is and to look for different patterns of correlations after controlling for age. The theoretical base of the findings will be discussed and analysed.

4.3.1 Partial correlations for the measured cognitive and linguistic variables when controlling for age is presented in Table 8. The overall patterns of relationship between the measured variables remained; however, there are some important patterns which are worth mentioning. After controlling for age the relationship between many linguistic subtests and letter knowledge disappeared, confirming that letter knowledge is needed to master the language awareness subscales, and after controlling for age less children had letter knowledge. This pattern also confirms the importance of controlling

for letter knowledge as autoregressive influencing variable when running regression analysis and looking for the unique influence of linguistic variables on reading measures. Letter knowledge remained significantly related to the"Counting sound" subtest underlying once again the relevancy of letter knowledge to master phonemic awareness skills, even if we have to keep in mind that correlation analyses do not say anything about the directions of the impact. When age was controlled it was possible to tell more about the nature of the "Homophones" subtest. The "Homophone" subtest was significantly related to a range of morphological and grammatical tasks and to listening comprehension skills. This relationship as well as its correlation to parent's occupation strengthens the assumption that the "Homophone" measure covers a broad area of linguistic capacities. One can argue that the older children did better on the "Homophone" task since they have developed a better language base and a broader vocabulary. After controlling for age it seems that the "Syllable" subtest correlated significantly just with the "Listening Comprehension" subtest giving the argument that syllabification is a broader language skill. Parent's occupation and educational level correlated significantly with the total language awareness construct and with cognitive skills such verbal short term memory and intelligence testifying that they can do a lot for the children's linguistic and cognitive development which in turn will influence the reading development of their children. The correlation between parent's occupation and reading speed measure gives support for this statement. There also was a question concerning possible changes regarding the relationship between the linguistic, cognitive and reading measures after controlling for age. Since just first graders were followed up, reading and cognitive tests were measured in this group only. Answering the above question will give support to how homogenous this group is regarding age. The partial correlational table shows that the patterns of correlations between reading and cognitive- linguistic measures remained the same just that they are a little bit less strong. This gives support for first graders being more or less a homogeneous group regarding age differences. The table 8 on the next page shows the partial correlations for the measured cognitive and linguistic variables and their relation to reading measures when controlling for age. Linguistic measures with low reliabilities (less than .60) are not included.

Table 8: Partial correlation for the measured variables when controlling for age

	Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	Rhyming	-																			
2.	Word length	.590**	-																		
3.	Syllables	-	-	-																	
4.	Id. first sound	.458**	.536**	-	-																
5.	Blending	.495**	.276*	-	.518**	-															
6.	Sound counting	-	-	-	-	-	-														
7.	Word compounds	.257*	-	-	-	-	-	-													
8.	Word analyses	.533**	.368**	-	.347**	.258	.311*	.380**	-												
9.	Know of comp w	.516**	-	-	.471*	.381**	-	.359**	.443**	-											
10.	Grammatical und.	.684**	.345**	-	.435**	.495**	-	.493**	.550**	.498**	-										
11.	Word counting	.302*	-	-	.277*	-	-	.327**	-	.400**	-	-									
12.	Listening compr	.544**	.367**	.367**	.457**	.392**	-	.311**	.521**	.372**	.586**	.379**	-								
13.	Language awa.	.791**	-	.624**	.587**	-	.485**	.745**	.683**	.776**	.468**	.759**	-								
14.	Letter knowledge	.259*	-	-	-	-	.339**	-	.345**	.410**	.328**	-	.290*	.412**	-						
15.	Intelligence[a]	.465**	.310*	-	.476**	.413**	.317**	-	.447**	.368**	.347**	-	.437**	.554**	.398**	-					
16.	Short term memory	.421**	.331**	-	.290*	.396**	-	-	.493**	-	.349**	-	.334**	.584**	-	.360**	-				
17.	Rapid naming[a]	-.263*	-	-	-	-	-	-	-	-	-	-	-	-	-.301*	-	-	-			
18.	Homophones	.406**	-	-	-	-	-	.326**	.344**	-	.330**	.302*	.358**	.587**	-	.315**	.344**	-	-		
19.	Parents occupation	-	-	-	-	-	-	-	.384**	-	-	-	-	.350**	-	.624**	.303*	-	-	-	
20.	**Reading speed[a]**	-.470**	-	-	-.471**	-.372**	-	-.335**	-.538**	-.576**	-.544**	-	-.432**	-.618**	-.520**	-.528**	-	.363**	-	-.300*	-
21.	**Reading accuracy[a]**	-.688**	-.354**	-	-.513**	-.474**	-	-.327**	-.525**	-.511**	-.654**	-	-.561**	-.706**	-.433**	-.562**	-.304*	.264*	-	-	.844*

*Correlation is significant at the 0, 05 level; **Correlation is significant at the 0, 01 level; - = no significant correlation; a= just children in first grade are included

4.3.2. Hierarchical regression analyses- methodological issues: there are some critical factors as described by Mc Nemar (in Mc Guinness, 2005) to take into account when choosing the methods for data analysis. One of them is the question about the random *sampling* if one wishes to generalize the findings. The present study does not meet this assumption; groups of children were selected from a certain region. The homogeneity of the sample is partly assured, by using age as controlling variable, which proved that the significant correlations between the used predictive cognitive, linguistic and reading measurements were not changed drastically after controlling for age. There were tested Hungarian first grade children, their age ranging from 6 year 4 month to 7 year 9 month. The other requirement is that scores should be *normally distributed* or skewness and kurtosis should be within certain limit. Regarding the measurements of this study, the negative skewness in some of the subtests was within acceptable limits. Therefore it was concluded that the distributions of scores for each test, with few exceptions are acceptable. However the kurtosis is high for "Sound blending" and "Syntactic awareness" subtests. Therefore they will not be introduced in regression analysis (see appendix 5). *The measures have to be reliable.* Hierarchical regression analyses were conducted only with school children. The table below presents how they performed on the linguistic tasks.

Table 9: First graders performance on"Ringerike Materialet" Screening Tool

Subtests	Mean	SD	Reliability, N=57
Rhyme Identification	9.2	2.7	0.88
Identification of Word Length	4.9	2.2	0.73
Syllable Identification	10.9	1.8	0.60
Identifying the First Sound	8.6	2.1	0.82
Sound Manipulation	4.8	1.8	0.39
Sound Blending	8.9	1.7	0.78
Counting the sounds	2.5	1.5	0.58
Verbal Short Term Memory	7.02	2.3	0.83
Homophones	4.8	2.8	0.70
Word Compounds	5.6	2.3	0.80
Analyses of Compound Words	5.8	2.6	0.82
Knowledge of Compound Words	8.8	2.8	0.75
Grammatical Understanding	9.9	2.6	0.78
Counting Words	2.2	1.6	0.61
Listening Comprehension	13.8	3.6	0.82
Syntactic awareness	7.1	3.4	0.57

Three subscales had extremely low consistency:" Sound manipulation" (0.39),"Sound counting" (0.58) and "Syntactic awareness" (0.57). The subtests with low reliability will be not considered when running regression analyses.

Yet another methodological issue to be considered is that, because regression analyses may be an unstable form of correlational statistics, if too many measures are entered, there are "rules" for *how many variables can be entered* into analyses as a function of the number of children in the study. Biddle and Martin (in Guinness, 2005) set a criterion, which was applied in this study: Number of children/10-2. The number of school children after excluding one child who could read already before the reading instruction was started is 57 (57/10-2=3.7), meaning that 3.7, maximum 4 tests is possible to enter when running regression analysis in this study. Then the variable entered at the third step should be the most information rich variable regarding the predictive power after controlling for the two most important extraneous variables. *The sequence of how the measures were entered* was decided on the background of some criteria: the partial correlation after controlling for age between the predictor and criterion variable to be high, in order to avoid as much as possible of prediction error. Welkowitz, Ewen and Cohen (2000) stated:" If the correlation between the predictor and the criterion is numerically small, even linear regression will make a substantial amount of predictive error, because the relationship between the two variables is so weak" (p. 185). Other criteria was the formulated hypothesises, based on the reading research theories and other predictive studies, in order to analyze how these assumptions can be confirmed or not by the Hungarian sample. Following the above mentioned critical assumptions the most important extraneous, controlling variables seems to be intelligence and letter knowledge since they correlated highly with the reading measurements even after controlling for the effect of age (see Table 8: -.528, -.562; -.520, -.433).

4.3.3. Prediction of reading ability: a series of regression analyses will examine the predictors of reading measurements with emphasise on other extraneous variables (short term memory, rapid naming), phonological, morphological, grammatical and broader language abilities as listening comprehension. The following subtests will be analyzed fulfilling the above described requirements: "Rhyme Identification", "Identifying the first sound" (as phonological awareness tasks), "Analyses of Compound Words" (as morphological awareness task), "Grammatical Understanding" and "Listening Comprehension".

To investigate the effect of other extraneous variables (rapid naming, verbal short term memory) on reading measures beyond intelligence and letter knowledge, they were entered at the third step. Nonverbal intelligence assessed by Raven's Progressive Matrices had the strongest correlation with the reading measures even after controlling for age; this is the reason that will be entered at the first step. The results are presented in Table 10. The result is surprising. It can be seen that nonverbal IQ accounts for about 30% of the variance in reading (30.3% for reading speed; 33.4% for reading accuracy). Letter knowledge explains the additional variances (11.3% for reading speed; 5.1% for reading accuracy).

Table 10: Hierarchical regression analyses of predictors of *reading speed and accuracy* with emphasize on verbal short term memory and rapid naming after the effect of intelligence and letter knowledge is partialled out:

		Reading speed		Reading accuracy	
Order		R	R²change	R	R²change
A.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Short Term Memory	.647	.003	.625	.006
B.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Rapid naming of pictures	.667	.029	.626	.007

*p<.05, **p<.01, ***p<.001

Verbal short term memory and rapid naming of pictures did not account for a significant part of the variance neither for reading speed, nor for accuracy when entered at the third step. This may be so because intelligence and/or letter knowledge cover what short term memory and rapid naming may have explained if entered at an earlier step.

The other set of analyses investigate the variances in reading performances accounted for by phonological awareness skills. "Rhyme Identification" and "Identifying the first sound" will be examined since these subtests had the strongest significant correlation with the reading measures.

Table 11: Hierarchical regression analyses of predictors of reading speed and accuracy with emphasize on phonological abilities:

		Reading speed		Reading accuracy		
	Order	R	R²change	R	R²change	
A.	1. Intelligence	.550	.303***	.578	.334***	
	2. Letter Knowledge	.645	.113 **	.620	.051*	
	3. Rhyme Identification	.681	.048 *	.767	.204***	
	4. Identifying the first sound	.708	.037	.780	.020	*Reversing the order 3, 4*
B.	1. Intelligence	.550	.303***	.578	.334***	
	2. Letter Knowledge	.645	.113**	.620	.051*	
	3. Identifying the first sound	.692	.063**	.679	.077**	
	4. Rhyme Identification	.708	.022	.780	.148***	

*p<.05, **p<.01, ***p<.001

As can be seen from the above presented table (table 11), identification of rhyming words contributed to a large, significant variation to reading measures even after controlling for the effect of intelligence and letter knowledge. Two important patterns are observable. The phonological skills had stronger effect on reading accuracy, and the order seemed to affect the results. Rhyming skills seem to be a very strong unique predictive measures of reading, it added as much as 20.4% of the variance in reading accuracy, entered at third step and 14,8% of the variance even entered at a fourth step after "Identifying the first sound". This last phonemic awareness tasks seem to be predictive when entered at the third step, adding 7.7% unique variance to reading accuracy. The four variables entered in this analysis share as much as 61% of variance explaining reading development in Hungarian (R^2=.78 X .78).

The following analyses investigate the variances in reading performances accounted for by morphological and grammatical awareness skills.

Table 12: Predictors of *reading measures* with emphasize on morphological and grammatical abilities:

		Reading speed		Reading accuracy	
	Order	R	R²change	R	R²change
A.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Word analyses	.699	.072**	.672	.067**
	4. Identifying the first sound	.728	.042*	.712	.054*
B.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Word analyses	.699	.072**	.672	.067**
	4. Rhyme Identification	.709	.014	.772	.144***
Reversing the order of 3, 4					
C.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Identifying the first sound	.692	.063**	.679	.077**
	4. Word analyses	.728	.051*	.712	.045*
D.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Rhyming	.681	.048*	.767	.204***
	4. Word analyses	.709	.039*	.772	.007

		Reading speed		Reading accuracy	
		R	R²change	R	R² change
A.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Grammatical und.	.713	.092**	.753	.183***
	4. Deletion of the first sound	.729	.024	.765	.018
B.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Grammatical understanding	.713	.092**	.753	.183***
	4. Rhyme Identification	.714	.001	.789	.055**
Reversing the order of 3, 4					
C.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Deletion of the first sound	.692	.063**	.679	.077**
	4. Grammatical understanding	.729	.053**	.765	.124***
D.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Rhyming	.681	.048*	.767	.204***
	4. Grammatical understanding	.714	.046*	.789	.034*

*p<.05, **p<.01, ***p<.001

Morphological and grammatical awareness seems to be significantly related to reading measures after the effect of intelligence as extraneous and letter knowledge as autoregressive variable were accounted for. Grammatical awareness seems to be a better predictor than the morphological task, accounting for as large as 18.3% of the variance in reading accuracy and even when entered at a fourth step, after controlling for the effect of intelligence, letter knowledge and phonological abilities, grammatical awareness remains a good predictor (accounts for 12.4% of unique variance in reading accuracy entered after "Identifying the first sound" and still 3.4% unique variance after rhyming, which as we have seen came out to be a very strong and sensible predictor of reading). The morphological awareness task ("Word analyses") loses its predictive power if it is entered after rhyming skills. This is another sign of how sensible measure the rhyme awareness is and also underlines the impact of grammatical awareness.

It was hard to differentiate and measure reading speed and reading accuracy apart from each other at this early stage of reading development, these measures strongly intercorrelated with each other therefore it is not surprising that the measures of morphological and grammatical awareness have impact also on reading speed.

The last set of analyses investigate the variances in reading performances accounted for by listening comprehension as broad language skill.

Table 13: Hierarchical regression analyses of predictors of reading speed and accuracy with emphasize on listening comprehension:

		Reading speed		Reading accuracy	
Order		R	R^2change	R	R^2change
A.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Listening comprehension	.667	.030	.693	.095**
	4. Rhyme Identification	.686	.026	.778	.125***
B.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Listening Comprehension	.667	.030	.693	.095**
	4. Identifying the first sound	.698	.042*	.717	.034

Reversing the order of 3, 4

C.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Rhyme Identification	.681	.048*	.767	.204***
	4. Listening Comprehension	.686	.007	.778	.016
D.	1. Intelligence	.550	.303***	.578	.334***
	2. Letter Knowledge	.645	.113**	.620	.051*
	3. Identifying the first sound	.692	.063**	.679	.077**
	4. Listening comprehension	.698	.009	.717	.053*

*p<.05, **p<.01, ***p<.001

As the above presented table shows listening comprehension as a broad language skill present the same patterns as the morphological skills. Entered at the third step after controlling for the effect of intelligence and letter knowledge "Listening Comprehension" were able to explain a unique significant variance of 9.5% in predicting reading accuracy, but entered after rhyming skills lose its part of the variance in reading accuracy. Listening comprehension as a broad language skill accounts for a significant variance only to reading accuracy.

4.3.3.1 DISCUSSION

The predictive part of this study was designed to investigate the predictive power of the different linguistic and cognitive measures on reading acquisition for children learning the transparent Hungarian writing system. As a main linguistic measure the translated Norwegian "Ringerike Materialet" screening tool was used as well as measures of cognitive abilities (IQ, RAN, STM) and reading (accuracy and speed measures) after three month's of reading instruction. The intelligence was assessed by Raven's Progressive Matrices, the speed factor (RAN) by rapid naming of pictures and the verbal short term memory contained memory for word sequences was included in the "Ringerike Materialet" as extra task. Lyster (2002) reported a more modest impact of *nonverbal intelligence* on reading assessed by Raven's Progressive Matrices after controlling for age, mother's educational level compared with the effect of verbal

intelligence. Adam's review (1990) pointed out that IQ is only weakly and non-specifically related to reading achievement in the early grades, but learning to read will enhance the general cognitive ability. Supported by these theoretical base it was hypothesized, that the nonverbal IQ measured by Raven's Progressive Matrices will not influence reading acquisition in the early stages of reading development. This hypothesis was not supported by the present data. We simply have to accept as fact that in this study sample non- verbal intelligence had a large effect on reading development. One simply could argue that Raven's Progressive Matrices, which was destined to measure non- verbal intelligence based on visual abilities, is not only poorly visually based.

Letter knowledge came out to be an important extraneous variable to be controlled for since it added 5, 1% of variance to reading accuracy and as much as 11, 3% to reading speed after controlling for the effect of intelligence. It seems that it adds more variance to reading speed, which could be explained by this early stage of development. Namely at this early stage of reading development authomatized letter knowledge enhance the speed of reading. The importance of letter knowledge is not an unexpected finding since learning to read a transparent language is relatively easy (Spencer and Hanley, 2004; Hoxhallari, van Daal and Ellis, 2004; Wimmer, 2001). The correspondences between sounds and letters are regular and those children who have already developed letter knowledge break the alphabetic code even earlier. The children with well developed letter knowledge also had well developed cognitive and linguistic abilities (according to their age).

Wimmer (2001) pointed out that when learning to read a transparent language *rapid naming* is the core problem, because it is more related to authomatization and the developing of reading fluency skills. Finnish studies (Muller and Brady, 2001; Lepola, Poskiparta, Laakkonen, and Niemi, 2005) also highlight the importance of rapid naming alongside the linguistic and phonological measures in predicting reading. In the study of Muller and Brady (2001) rapid naming contributed significantly to decoding speed and in the study of Lepola, Poskiparta, Laakkonen, and Niemi (2005) rapid naming contributed to word recognition. Both studies were conducted at early

stages of reading development. It was hypothesised that rapid naming would have a significant contribution in learning to read a transparent language at this early stage. This hypothesis was not confirmed by regression analysis. But it is important to take into account that letter knowledge covers part of what rapid naming would have covered if entered at an earlier step in the analysis. There should be many reasons underlining this result. One of them could be that rapid naming of pictures are not so sensible measures of reading development. Cardoso and Pennington (2004) reported that numeric rapid naming is a more sensible and predictive measure of reading development. However Kirby et. al (2003) managed to prove the predictive influence of rapid naming of colours and pictures, and this was so in later grades when children changed their reading strategy from the phonetic to the orthographic skills. A follow up study with this sample should give an answer. Another explanation could be that rapid naming may play an important role among less skilled, dyslectic readers, how it was described by De Jong and Van Der Leij (2003), and this study sample had focus on "normal" population. The last plausible explanation should be that rapid naming contributes better to reading fluency and it was not possible to measure reading fluency at this early stage. This result with rapid naming and its relation to reading invite further investigation.

Another question regarding underlying factors in reading acquisition in Hungarian pertains to how *verbal short term memory* effects reading development. McGuinness (2005) stated that when dealing with memory and its relation to reading is important to control also variables like age, sex and IQ which strongly affect memory skills: memory improves over childhood; females excel in verbal- memory tasks and because subscales in the verbal IQ scale make large memory demands it is hard to distinguish between memory skills and intelligence. Therefore those studies in which age, sex, and verbal IQ are controlled, there is no contribution of verbal- short term memory to reading. When verbal IQ is not controlled short- term memory is found to be strongly correlated to reading (McGuinness, 2005). The present study controlled for non-verbal intelligence, it was argued also that the first grade sample is more or less homogeneous regarding age differences. Regarding gender it is plausible that because

this first grade had been participated in a school readiness program in the kindergarten, should be possible that this training is responsible for the disappearance of gender differences. The overall conclusion can be that how it was hypothesised, verbal- short term memory is an effective cognitive "tool" in learning to read. Even if it does not contribute significantly to prediction of reading but correlates significantly with quite a lot of linguistic subtests and with reading accuracy as well.

Regarding the *phonological awareness abilities* and learning to read, the present study confirms previous findings, namely that phonological awareness is related to reading in an alphabetic orthography (Liberman, Shankweiler, 1991; Goswami and Bryant, 1991; Cardoso and Pennington, 2004; Kirby et.al, 2003; Schatschneider et al., 2004) and this is so even in a transparent language (Lyster, 2002; Lundeberg, 1999; Muller and Brady, 2001; Lepola, Poskiparta, Laakkonen, and Niemi, 2005; Kassai and Kovács- Vass 1991 in Csépe, 2006). As it was described previously phoneme awareness could explain variance in reading when entered after intelligence as extraneous influencing variable and letter knowledge as children's initial literacy skills. Rhyming skills could explain a unique part of the variance in reading accuracy, namely 20, 4% when entered at a third step and still 14, 8% of variance entered at the fourth step. "Identifying the first sound" contributes uniquely to reading accuracy 7, 7% of variance entered at the third step after controlling for the effect of non- verbal intelligence and letter knowledge (see Table 11). The phonological awareness abilities presented this large contribution to reading even showing ceiling effect at the first grade sample. Weak relationship between phonological awareness and reading ability in shallow orthographies in some of the studies may be a result of ceiling effects, that these measurements do not differentiate adequately the individual differences. It seems that this was not the case in this study, since even showing a small ceiling these subtests were able to measure individual differences. This pattern was also observed at test situation, since the mentioned subscales detected well the less skilled children's linguistic abilities. It seems that being able to focus on how the words sound is a milestone in learning to read. Finnish studies (Muller and Brady, 2001; Lepola, Poskiparta, Laakkonen, and Niemi, 2005) also highlights the importance of

phonological awareness skills in learning to read. Moreover the study of Lepola, Poskiparta, Laakkonen, and Niemi (2005) used the same tasks which were used in the present study, namely rhyming and initial phoneme recognition. The hypotheses regarding phonological abilities being important predictive skills in learning to read a transparent writing system was confirmed. But still there are some debatable questions. The Finnish study of Lepola, Poskiparta, Laakkonen, and Niemi (2005) found rhyming awareness as not being a so sensible phonological awareness measure. The study of Gyarmathy (2004) in the context of Hungarian language reported the same pattern. Even in English writing systems rhyme awareness is the most debated concerning its predictive power. Several studies claim predictive function to rhyme task (Goswami and Bryant, 1991, Goswami, 2002, Bryant 1990, Bradley 1990; Cardoso- Martins, 1995), a claim that is disputed by several authors (Hulme, 2002; Muter, Hulme, Snowling and Stevenson, 2004; Savage and Carless, 2005). Goswami and Bryant (1991) are concerned that children's early rhyming skills play an important role in their success in reading and the present study seems to support the authors who are concerned about rhyming skills being an important and sensible measures of reading acquisition. A further investigation would be welcomed to clarify further this pattern of reading development in the Hungarian context.

Regarding *morphological and grammatical awareness* abilities theoretically was assumed that phonological processing skills (phoneme awareness, rapid naming, short term memory) has important predictive values at the beginning stages of learning to read, at decoding stages when the child has to crack the code of alphabet and larger, broader language skills are important at a later stage, when understanding a text (Muter et al, 2004; Muller, Brady, 2001) This is the assumption underlining the Simple View of Reading equation (Hoover and Tunmer, 1993) whereas children have to learn and crack the alphabetic code, by using their phonological skills and after the decoding stage becomes more and more authomatized to activate word meaning ,or use contextual cues in order to perceive the meaning of the text. But it is still a controversial question in the reading theories if the reading components as decoding skills and comprehension skills are dependent of each other or make independent

contribution to reading. This has to be the main reason why some of the studies find relatively weak correlations between morphological and grammatical awareness and early reading development. The structure of the studied language also has to be taken into account. Plaza and Cohen (2003) managed to prove the importance of syntactic awareness and its significant contribution to reading by assessing first grade children. Lyster (2002) proved in the Norwegian language, which is relatively orthographically regular and the formal teaching methods in the school is based on phonics, that the morphological training showed an unexpectedly strong effect on reading even at early stages. The present study applied her categorization of metalinguistic abilities and her assessment tool, and it was therefore hypothesised that when learning to read the Hungarian transparent language it is important to count with large morphological and grammatical language awareness units. This hypothesis was confirmed by the present data in a way, since both morphological and grammatical linguistic units came out to be predictive measures at this early stage of reading development. This finding contrasts Bowey's (2005) findings, which proved weak predictive association between syntactic, grammatical awareness and first grade reading. The present study found an unexpectedly high association between grammatical awareness and learning to read the transparent Hungarian language at early stages, and was so after controlling for the effect of intelligence and previous literacy skills. Moreover the same grammatical awareness tasks were used as in the Bowey (2005) study, namely which picture matches the heard sentence. In the present study grammatical awareness accounted for 18, 3% unique variance in reading accuracy almost as high variance as accounted rhyming awareness. This finding is strikingly unexpected, which can be explained merely by the complexity of the Hungarian language regarding its grammar. And this was so even that only a translated Norwegian grammatical awareness subtest was used, and the Norwegian language has a more simple grammar. At early stages English speaking children still struggle to crack the code, Hungarian children learning to read in a very regular language, crack the reading code early and easily. Therefore they may at an earlier time develop automatized word identification that may be guided by their morphological and grammatical knowledge.

The overall conclusion is that the results confirm the stated hypothesis about phonological, morphological and grammatical awareness skills being predictive measures of reading development in the Hungarian writing system even at early stages of reading development. And if the rough statistical numbers are concerned, the last part of the hypothesis is also proved since the phonological abilities seem to be stronger predictors. The phonological awareness skills account for 28,1% variance in predicting reading accuracy and the grammatical and morphological awareness tasks accounts for 25% variance after controlling for non- verbal intelligence and previous literacy skills. But a follow- up study measuring reading comprehension would still be important being able to compare these results with measures of reading comprehension. Reading is searching for meaning. If you comprehend the word you are reading even its morphological components, you can even "guess" the word before truly decoding it.

The last regression analysis was about *listening comprehension* skills predictive power on reading development. Listening comprehension is conceptualised as the second component of the Simple View of Reading (Hoover and Tunmer, 1993), the ability to understand the meaning of concepts and words heard or read. In the Simple View of Reading equation, children must develop effective listening comprehension in order to make meaning of the words that they decode, therefore should be related more to reading comprehension. Unfortunately the present study did not have the possibility to measure reading comprehension, but proved that listening comprehension skills contributed significantly to the early decoding skills adding 9,5% variance to reading accuracy after intelligence and letter knowledge was controlled for. The listening comprehension subscale was able to prove an important pattern described already in the reading theory adding its contribution to reading accuracy. Namely that broad language skill predicts reading accuracy and rapid naming is the reading fluency and speed factor.

5. Adapting the language awareness screening tool "Ringerike Materialet"

5.1 Introduction

One focus of this work was to translate and adapt a Norwegian linguistic and cognitive screening material, the "Ringerike Materialet" (Lyster, Tinglef, 1992), to the Hungarian language and culture from Romania. The test material was translated from Norwegian to Hungarian and revised by a linguist, a teacher and a university teacher working also as speech therapist (see appendix 1). After piloting (see Appendix 2) the language awareness material, it was adapted to the Hungarian culture, language and educational system with a more varied and numerous sample of Hungarian children, containing 42 kindergarteners and 58 first grade children. The translated screening tool was presented to pedagogues in Mureş County (Romania) where the research took place, covering the awareness training part of this study.

5.2 Adaptation

The measured cognitive, linguistic capacities by the mentioned test were: *phonological awareness, morphological awareness, and awareness of the grammar, rapid naming, and verbal, serial short term memory* following the original test's Lyster and Tingleff (1992) categorization. When translated *the structure and principles of the original* test were followed in order to reduce error possibilities. "Experts", key informants, were asked to evaluate and to judge *the content* of the translated "Ringerike Materialet" language awareness screening tool and *item analyses* were conducted when piloting the material to evaluate the degree of validity of each item. The correlational part of the present study gave evidence about inter- correlations between the cognitive and linguistic variables measuring the underlying construct of language awareness.

Since factor analyses examine the pattern of inter- correlations between the variables it was used to show more precisely how the different subtests of the "Ringerike Materialet" Screening Tool correlated with each other. The factor analysis seemed important for determining the, content validity of the translated measurement tool. Two subtests having extremely low reliability "Sound manipulation" and "Syntactic awareness" were left out from this analysis. As is shown in appendix 6 the factor analyses revealed four factors. This result showed that some of the measures in the test measured the same construct and therefore the total language awareness construct can be grouped in smaller number of factors. The following subtests loaded on the first factor: "Rhyme Identification", "Word- length", "Identifying the First Sound" and "Blending". This factor represents a phonological awareness construct. The second factor contains the morphological and grammatical awareness units, being loaded by "Word Compounds", "Analyses of the Compound Words" "Knowledge of Compound Words", "Counting the Words" and "Grammatical Understanding". Thus this factor seems to represent a morphological or grammatical construct. The subtest measuring phonetic awareness, namely phoneme segmentation ("Counting sounds") loads on the third factor together with the memory, the homophones subscale and the "Analyses of Compound Words". This factor therefore seems to represent a general linguistic construct. Otherwise verbal short term memory together with the "Homophones" and "Listening Comprehension" subscales loads on more factors, giving evidence that they were important for all the other language awareness units. The fourth factor seems to underlie the construct syllable awareness, being loaded highly by the "Syllable Identification" task and "Listening comprehension". It seems that syllable awareness could be categorized as a broad language skill. The overall conclusion is that the cognitive and linguistic measurements as they are conceptualized in Hungarian, match Lyster and Tingleff's (1992) categorization and the structure of their test. This gives support for the *content and constructs validity* of the translated "Ringerike Materialet" Screening Tool.

Predictive validity: language awareness as a predictor variable for reading outcomes as a criterion variable, were analysed using regression analyses to map the predictive

power of this screening tool. When analysing the predictive power of every subscale those with low reliability were excluded. Since the most important extraneous controlling variable seemed to be non- verbal intelligence and letter knowledge, these measures were controlled for. The linguistic subscales were entered at the third step. Appendix 7 shows the results of the linguistic variables when entered at a third step. The results from the regression analyses show that in addition to "Rhyme", "Identifying the First Sound" another phonemic subscale ("Blending") had prediction power, only that should be taken orientatively since it had high skuwness and kurtosis. The other two morphological tasks ("Word Compounds", Knowledge of Compound Words") in addition to "Analyses of Compound Words" account for developing reading in Hungarian language. The total, language awareness subscales accounted for as much as 16.5% of the variance in reading ability in the transparent Hungarian writing system after controlling for non- verbal intelligence and previous literacy knowledge.

5.3 Summary of the findings regarding test adaptation

One of the goals of this study was to translate and adapt the Norwegian screening tool into Hungarian, evaluating and validating its usefulness and applicability on the Hungarian transparent language and to analyze how the material predict children's literacy development in Hungarian. An important question was that "What parts of the material are the best predictors?" A special interest was to evaluate how the construct of language awareness can explain reading in the transparent Hungarian orthography. The main question regarding the test adaptation was: "Do this test measure individual differences and age (developmental) differences on the language awareness capacities? The Hungarian Educational system in Transylvania (Romania) needs a tool based on ultimate theories of reading development in order to be able to design preventive programs for children at risk for developing literacy problems. The Cronbach Alpha coefficient as a measure of reliability was used for all subtests in the translated

linguistic battery. The following presentation gives an overview of what is already known about the subtests.

"Rhyme Identification": this was an easy task for most of the Hungarian children, but it detected those who had problems identifying rhymes. This may tell us that the test is sensible in detecting "children at risk". The "Rhyming" subscale had a good consistency and measured age differences. It came out to be the most sensible measurement of predicting reading development even in the transparent Hungarian language. This finding supports authors who claim predictive function and importance of rhyme awareness in the process of learning to read (Bradley, 1990; Bryant, 1990; Goswami and Bryant, 1991). This was found even if rhyming and syllabification are highly emphasised in the Hungarian educational system. In future it would be interesting to make this subscale more difficult (scholars showed a small ceiling effect on it), but before doing this the sample should be considered. The sample consisted of "town children", known to come from a better social background than "country side children". This could be the reason for their good results. Therefore to reproduce this study with a more varied sample or with dyslectic children would be welcomed.

"Word length": as well as rhyming the "Word Length" subtest measured well if the children could focus their attention to how the words sounded when asked to find the "longest" word among two words. This subscale had good consistency, and measured age differences. Even if this test accounted for no significant part of the variance in reading, it should be considered an important task, when assessing children at risk or in a training program. A task like this could be a "good" starting point.

"Syllable Identification": it was an easy task for Hungarian children; possibly due to the training that they attended in the kindergarten program. The "Syllable" subscale had a somewhat low, but acceptable reliability coefficient and supports those authors who proved that syllable awareness has no predictive power for developing reading skills, being a broad language skill (Badian, 1998). The present data best shows this by the factor analysis, where the "Syllable" subscale loaded highly at the fourth factor together with the "Listening Comprehension" subscale. Even if "Identifying Syllables"

did not account for predicting reading, but has to be an important skill for developing phonological awareness skills and reading abilities, just in line with the Hungarian study of Kassai and Kovács- Vass (1991 in Csépe, 2006).

"Identifying the First Sound" and "Sound Blending": being easy tasks, they were able to predict reading development. The scores were negatively skewed (the "Blending" task more strongly). It would be advisable to replace harder items. "Identifying the First Sound" task detected well that kindergarten children had experience with this kind of "language games". No age differences were shown, highlighting the importance of early training of phonemic awareness abilities at lower ages, before starting reading instruction. The subtests had good consistency and together with rhyme awareness supported the phonological awareness theory being an important skill in acquiring growth in reading (Liberman, Shankweiler, 1991; Goswami and Bryant, 1991; Cardoso and Pennington, 2004; Kirby et.al, 2003; Schatschneider et al., 2004; Lyster 2002; Muller and Brady, 2001; Lepola, Poskiparta, Laakkonen, and Niemi, 2005).

"*Counting the Sounds":* this subscale is also called phoneme segmentation. It was a hard task to master; supposedly it requires developed reading skills to master fully. Theoretically this supports authors claiming that phoneme awareness skills as it is measured by segmentation are an extremely difficult requirement for small children (Goswami and Bryant, 1991; Libermann and Shankweiler, 1991; Goswami, 2002) and that it requires print knowledge (Lyster, 2002; Caroll, 2004). "Counting sounds" at the present sample interfered highly with counting syllables, probably because syllabication is highly emphasised in the Hungarian education from Transylvania. The task had a relatively low, but acceptable consistency, and managed to prove significant age differences. Older children were better to master it, supposedly because they had more letter knowledge and more pre- reading experiences. This task loaded at the third factor in the factor analyses, together with short term memory and the "Homophones" subscale, underlining that it requires good memory skills and good general language skills to master it. "Counting Sounds" as training exercise is recommended at school age, when children had already learnt some letter- sound correspondences.

"Word Compounds", Analyses of Compound Words" and "Knowledge of Compound Words": these were the morphological awareness tasks in the battery. It was observed that Hungarian children found it interesting and also easy to master. They detected well the morphemes in words and were able to manipulate these morphemes. These tasks loaded on a single morphological awareness factor. One morphological subscale, "Word Compounds" failed to measure age differences. This was explained by its high similarity with the "Blending" phoneme awareness subscale, and because children were able to master easily the blending exercises it was even easier for them to set together larger units as words. This pattern gives support for starting a training program with large language units, which are easier to observe and master for the children. The morphological subtests had good reliability coefficients and they accounted for a significant part of the variance in reading development in the transparent Hungarian language. This was explained by the long words, which the Hungarian language contains and by the many affixes and inflections that the language has. This finding requires further investigation and even a better compounded morphological awareness measuring test, since the Hungarian language is more complex regarding its morphophonemic structure. Since the tasks in this study strictly followed the structure of the Norwegian language battery, they probably were relatively easy for the Hungarian children. In the present study the morphological awareness subscales were able to predict significantly even decoding skills. Lyster (2002) also reported an unexpected high contribution of morphological awareness to reading skills explained by the transparency of the Norwegian language and by the teaching method. A follow up study would be interesting to see how morphological awareness relates to the reading comprehension. The present study gave support for implementing morphological awareness exercises in the training program given to the children in pre-school.

"Grammatical Understanding": this subscale measured well what was intended to measure, namely grammatical awareness and had a good reliability coefficient. It measured age differences and loaded on a factor together with the morphological subtests. A somewhat unexpected finding was its strong predictive power even on

decoding skills. This might be due to the complexity of the grammar of the Hungarian language. A follow up study would be extremely important here, with a more accentuated measurement focusing on the Hungarian language's grammar.

"Counting Words": it was a hard task to master for Hungarian children. They had not developed this kind of word awareness. To segment the words of a sentence is difficult if it has not been trained. It was observed that after a while they started to count syllables when processing these tasks. This may be the main reason for this subtest having a somewhat low, but acceptable reliability. This may also be the main reason for not detecting age differences. This measure loaded on the second factor in the factor analyses together with the morphological tasks, underlining its connection to other morphological tasks. It would be a good exercise for developing children's word awareness, to focus on words in the pre-school training activities.

"Listening Comprehension": this subtest had a relatively high significant correlation with the morphological tasks, but mostly with the grammatical awareness subtest, measuring general language ability. This could be one explanation for why it loaded on a factor together with the morphological measures. The task measured well if the children were able to understand the meaning of the words in the sentences, and the flow of the speech. It had good reliability and accounted for a significant part of the variance in reading accuracy. It seems that broad language skills are also important when learning to read in Hungarian.

"Verbal Short Term Memory": this subtest measured well what was intended to measure, the memory for word sequences. Since there was a ceiling effect for the school children's results it would have been wise to make the task harder, by implementing items with longer sequences of words. Otherwise this set of tasks had a good reliability and measured age differences. The memory task loaded on more factors showing that this cognitive task was important for the other linguistic elements. This may underline that short term memory is an important cognitive "tool" for mastering the language awareness tasks and that it is important in the process of learning to read (Kassai and Kovács- Vass in Csépe, 2006; Csépe, 2006). Supported

the studies reviewed by (McGuinness, 2005) namely, when the effect of age, intelligence, gender is controlled, verbal short term memory has no contribution to predicting reading acquisition, but is an important cognitive "tool" for it.

"Homophones": this set of tasks did not manage to measure what it was intended to measure, namely the rapid naming of linguistic elements. One main reason for this may have been problems with the translation. The analysis gives support that the task measured broad language ability, such as vocabulary. This is supported also by the factor analysis, since loaded on the morphological and general factor. Having an acceptable reliability should be used as training children's language awareness and vocabulary knowledge.

"Sound Manipulation": it was an extremely difficult task for the Hungarian children. If the children have been guessing, this may be one reason for a low reliability. It was observed in test situation that those children could master it that were already readers or had good letter knowledge. Because it's low reliability the result was not entered in the regression analysis. It would be important to make this subtest easier.

"Syntactic Awareness": this subtest failed to measure what it intended to measure. It should be reformulated.

5.4 General discussion and summary

The main aim of the present study was to map the Hungarian children's metalinguistic abilities and to analyze the process of reading acquisition, with focus on which cognitive and linguistic factors are related to reading and predict reading development in the Hungarian transparent language. It was a concern to take most of the influencing factors as a combination of cognitive- linguistic (language awareness skills, intelligence, rapid naming, verbal short term memory and letter knowledge), the social- cultural (the orthography of the language, parent's occupation and educational level) and environmental (the "school readiness" program, teaching reading methods)

into account, when analyzing the growth in reading development at Hungarian children.

The study reported in this thesis has two parts: a predictive and correlational part based on correlational statistics and a comparative part evaluating the age differences of this study sample. Both parts contributed to evaluate the function and applicability of the translated "Ringerike Materialet" as main linguistic awareness tool of the present research.

The *predictive and correlational part* of this study described how the language awareness and cognitive skills are related to each other and to reading, how these skills can predict growth in reading development. The predictive part of this research followed up first graders, measuring their language and phonological and cognitive processing skills as predictor variables on reading later on. The correlational part showed that there were significant correlations between most of the cognitive and linguistic measures. Factor analyses suggested that four factors accounted for the children's performance: a phonological awareness factor, a morphological awareness factor, a general linguistic factor and the syllable awareness factor. The *comparison* between age groups revealed significant age differences on most of the linguistic subscales. The kindergarten rhyming and syllabification training program had an effect on children's metalinguistic development, it seems that school children gained from this training, since they performed significantly better on the "Ringerike Materialet" Language Awareness Screening Tool.

5.4.1 Phonological awareness and learning to read in Hungarian

The present data supports the stated hypotheses and the phonological awareness theory, phonological awareness being an important ability in growth in reading. Most of the phonological awareness subtests were significantly correlated to reading measures, they stemmed on one factor and they predicted reading development. *Rhyming* skills got a special role in predicting reading even in the Hungarian transparent language and supports Goswamy's (2002) theory of reading acquisition.

She is concerned that children are growing up with nursery poems, they spontaneously engage in word play and rhyming games, a precursor to phoneme awareness and to the prediction of the mastery of an alphabetic writing system. She is also concerned that giving hard phoneme awareness tasks for small children is unreliable, because it is too difficult to master it. The present data is in line with this concern since the phoneme awareness tasks ("Counting Sounds" and "Phoneme Manipulation") were extremely difficult to master. The "Sound Counting" subtest as a phoneme segmentation task behaved somewhat differently when processing the statistical analyses. Even if it seemed to be a very hard task it loaded on the general linguistic factor in the factor analyses together with broad language skills. Being strongly related to letter knowledge it supports the observed pattern that children are able to master it after they learn to read. Otherwise the "Sound Counting" subtest had no significant correlation with the reading measurements telling us that this is a hard task for all children. However there were still two phoneme awareness subscales ("Identifying the first sound" and "Sound Blending") which were easy to master in this Hungarian sample, and which contributed uniquely to reading even after controlling for IQ and letter knowledge. It seems that the type of the phoneme awareness task also affect children's performance. What we know about identifying the first sound is that children get some training in pre- school (even if not explicit). It seems easier to observe and recognize the first sound of a word than the middle or last sounds. The "Blending" task is a synthesis task, which hypothetically has to be easier to master than the segmentation. The results as mentioned are in concordance with Adams' (1990) categorization of difficultness of phonological awareness skills. To segment words into *syllables* was also easy and something natural to the present sample, children succeeded well in this task. That the task measured age differences could be due to small children having difficulty to count the number of syllables in a word. In the present study and sample "Identifying Syllables" came out to be a large unit task without any predictive power on reading development. This is supported by the study of Badian (1998).

The overall conclusion can be that the translated test managed to map important theoretical findings regarding the structure and difficulty level of phonological and phoneme awareness skills.

5.4.2 Rapid naming and learning to read in Hungarian

Rapid naming in this study was supposed to be measured by the "Homophone" tasks, the ability to recall as fast as possible linguistic elements from the mental lexicon, but unfortunately this measurement did not manage to measure what it intended to measure in the Hungarian version. Therefore it was replaced by rapid naming of pictures. The rapid naming of pictures correlated with one linguistic measure, namely with rhyming, and seemed to be very dependent on age. The rapid naming of pictures correlated strongly also with letter knowledge. The rapid naming of pictures was not found to be a sensible measure of reading development in the Hungarian language. This finding contrasts with Wimmer's (2001) finding. In the present study, rapid naming was not a "core problem" of reading development, since it failed to count predicting of reading after intelligence and previous reading experience was controlled. However rapid naming of pictures was significantly related to the reading measures testifying its small contribution to reading development. Being so related to letter knowledge it seems that letter knowledge took its predictive variance on reading. We should state that the hypothesis regarding rapid naming having a significant contribution in learning to read the transparent Hungarian language is just partly true. Rapid naming came out to be a less sensible measure than many of the other measures. It could be explained by the fact that this study had a focus on an average population. Dyslectic children seem to have more problems with this phonological processing skill. Further investigation would be welcomed before concluding any inferences regarding rapid naming and its relation to reading development in the transparent Hungarian language.

5.4.3 Verbal Short Term Memory and learning to read in Hungarian

Verbal short term memory was significantly related to the linguistic measures showing that mastering these tasks is a burden for memory capacity also. The factor analysis showed that memory for word sequences loaded on more factors, underlining that it is an important element for most of the linguistic measures. Furthermore, verbal short term memory correlated significantly with the reading accuracy measure, being in line with the stated hypothesis that is an important cognitive "tool" for developing reading skills. A follow up study would be able to tell us more about its relation to reading comprehension.

5.4.4 Letter knowledge and learning to read in Hungarian

Letter knowledge was an extremely important autoregressive controlling variable, when learning to read the transparent Hungarian writing system. The reason behind this may be that it is easier to "crack the code" when learning to read a transparent language. Letter knowledge came out to be a very predictive measurement of reading development since it was strongly related to the subtests of the linguistic battery and to the reading measures directly. An interesting pattern was found regarding letter knowledge: children with good letter knowledge and well developed linguistic and phonological awareness were able to master the difficult phoneme awareness tasks ("Counting Sounds", "Sound Manipulation"). This pattern supports the bidirectionality theory of the phonological awareness and reading development (Adams, 1990). But we have to be careful with this statement, however, since only a longitudinal study would be able to prove its validity. In first grade the most important task is to learn to decode words quickly and accurately, and familiarities with letters seem to be very important.

5.4.5 Non- verbal intelligence and learning to read in Hungarian

Results from the predictive part of this study indicate that non-verbal intelligence accounts for a substantial amount of variance in reading acquisition. This finding is not in line with the review of Adams (1990) who stated that IQ is only weakly and non-specifically related to achievement in the early grades. Lyster (1995) also reported a lower effect of non- verbal intelligence measured with Raven Progressive Matrices in comparison to the verbal intelligence. Non- verbal intelligence at the present study sample was strongly and significantly related to most of the linguistic measures and to reading measures as well. It seems that language and cognition is inseparable. The hypothesis was not confirmed. It could be that the relationship between IQ and reading differs in different orthographies.

5.4.6 Morphological and grammatical awareness and learning to read Hungarian

It was an intercorrelation between the linguistic measures: phonological awareness was related to these large language unit skills as morphological and grammatical awareness. This was explained by how the tasks were compounded, since the morphological tasks being the same as the phonological just that the child had to operate with larger units. The best example is how “Blending Sounds” and “Word Compounds” did not show age differences, because both task, were synthesising tasks (to set together sounds/words), and both tasks were mastered well by the Hungarian children at the pre-school level as well as at school level. Otherwise the morphological and grammatical awareness measures loaded on one common factor, and showed a strong predictive power on reading development in Hungarian just in line with the hypotheses of this study. This was explained by the complexity of Hungarian language regarding its grammar and having long words with many inflections and affixes. A more specified measurement battery as well as a follow up study would be important to see how these large unit language skills contribute to reading comprehension. The morphological and grammatical awareness abilities were able to show large variances in predicting even decoding skills, at this early stage of reading development. This was

explained by the structure and transparency of the language. When learning to read a transparent language children crack the code early and easily and in the process of further automatazing their word recognition skills, they may be supported by morphological awareness skills.

5.4.7 Home environment and learning to read in Hungarian

The home environment raises questions like: What is the language atmosphere at home? What do parents teach at home? How much do they teach letters to their children? The present study investigated only document consultation regarding parent's educational level and their occupation, based on the assumption that parent's education may affect the children's language development and their emergent literacy skills (Petrill, Deater- Deckard and Schatschneider 2005; Levy, Gong, Hessels, Evans, and Jared, 2006).

Parent's occupation as an environmental or cultural influence on children's development at the present study had a strong significant correlation with intelligence, showing that they are responsible for their children's cognitive development. There were found also some significant correlations with some of the linguistic subtests, and most importantly, parent's occupation was related also to one measure of reading (reading speed). These are findings in line with the reading theories: the home environment affects the literacy and language development of children. The present findings are in line with findings presented by Petrill, Deater- Deckard and Schatschneider (2005), Levy, Gong, Hessels, Evans, and Jared (2006).

5.4.8 Reading instruction in Hungarian language

The method of teaching reading and the used textbooks with the present study sample have a detailed description in the appendix 3. The method used in school for reading instruction according to the observation and analyzed teaching reading textbooks was phonic based. The sequences of letters being taught were systematic, preceded by a six week preparation period. Identifying the first sound, phoneme isolation (first, middle

last) and blending tasks were emphasised as phoneme awareness exercises. Rhyming and syllabification as larger phonological tasks were often used. The overall conclusion is that the teaching reading method was systematic and phonic based. The present study highlights and gives argument for using continuously phonics based methods in the process of teaching children since those phonological awareness measures were the most relevant to consider and those predicted reading which were used at practice. After the educational reforms in the country many alternative textbooks appeared and there are still 8, 9% of the teachers preferring the whole-language method (Ráduly- Zörgő and Ferencz, 2004). The present research gives support and recommends phonics bases methods, when learning to read the Hungarian transparent language since intelligence, letter knowledge, phonological, morphological and grammatical awareness tasks were good predictors of reading development. Even if intelligence may be a factor independent of the school system, the other variables can be focused by the school/kindergarten so that all children can be helped in developing adequate reading abilities.

5.5 Awareness training

This research had also a so called awareness raising part since a new tool based on the ultimate findings of reading research was presented for pedagogues and parents from the region where the study took place. Professionals (speech therapists, itinerant teachers, educators, and teachers) are aware of the importance of early identification and prevention and they were interested to hear about the translated "Ringerike Materialet" Language Awareness Screening Tool. There was a lot of discussion about how the present educational system is too information centered and more time is needed for "discovering the language". Some of the tasks from the translated battery were printed in the children's workbook "Döncike".

5.6 Ethical considerations

The following steps have been taken for the present study to be conducted in an ethical manner:

Access in institutions from the Regional Inspectorates of Education and allowance from headmasters, teachers and educators who participated in this study was asked for. Parental approval for testing their child was also assured (see appendix 11). Approval for observing reading lectures and feed back about what was observed was given. It was told to the children that they will participate in a project; they will be the first who will complete some exercises. The process of testing children was playful. In the end they got diplomas as showing thankfulness for their participation (Appendix 12). Pedagogues and thirty parents got feed- back about the performance of the children. The anonymity of the institutions where the study was conducted is assured. Data analysis was statistically based; children's anonymity is also assured. Pedagogues got reports about the findings of this study.

5.7 Limitations of the study

The study has not controlled for verbal abilities as extraneous variable measured by a vocabulary test, however, a lot of measurements were linguistic measures. The "Listening comprehension" subscale of the language awareness test measured this broader language skill. Due to the limited time it was not possible to retest children's rapid naming abilities, this measurement not having any reliability measurement. Even if the pilot study of the translated "Ringerike Materialet" showed no problem, the morphological and grammatical awareness measures should be more developed since the Hungarian language has a more difficult morphophonemic and grammatical structure than the Norwegian language. The present study did not put much accent to the duration of sounds an important characteristic of the Hungarian language. It was an attempt to account for relevant linguistic, cognitive, environmental, cultural influencing factors of reading development. However it was not possible to include

also measures of teacher's style, their teaching reading experience and personality, important factors which also affect the learning process. The present study did not account for the children's motivation in learning to read, which is another and already proved important factor when learning to read.

5.8 Concluding remarks and recommendations

The overall conclusion can be that the present research was successful and managed to reach its goals: the translated screening tool "Ringarike Materialet" was a valuable tool when mapping the Hungarian children's metalinguistic abilities and described important theoretical features. The study has a large **practical applicability**.

One of them is *test development:* some of the subtests worked very well with this Hungarian sample, with acceptable reliability, so these test are valid tools to use when screening children in risk for developing reading failure. Some of the subtests in their recent form seem not to be good tools; some of the items have to be thrown out or reconstructed to become useful and valid measurement tools.

Training: the present study gives scientifically based information about what language related abilities are the most relevant to train in kindergarten or school for enhancing children's language awareness in order to help them acquire reading skills. Children differ on their talents and preparation for learning to read. The "Ringerike Materialet" available also in Hungarian, has many various and different tasks to meet the children level of development.

Preventive actions: the present study strengthens the ultimate theoretical findings to build on language awareness skills when elaborating preventive programs for children with special literacy needs or to prepare children with poorly developed linguistic knowledge and awareness for reading instruction.

Implication for *reading instruction:* how it was already mentioned the present study gives support for phonics based reading methods when learning to read in Hungarian.

Since both small and large units of linguistic measures had good predictive power when learning to read in Hungarian it would be recommended that the decoding skills and comprehension skills, strategies be developed simultaneously.

5.9 Recommendation for further studies

It could be recommendable a follow up study on reading comprehension to map the linguistic measures relation to reading comprehension. It would be extremely important how it was already described a study with more specified morphological and grammatical awareness tasks. It would be relevant to try out the language awareness theory with Hungarian dyslectic children.

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Appendices

Appendix 1 – The "Ringerike Materialet" Language Awareness Screening Tool

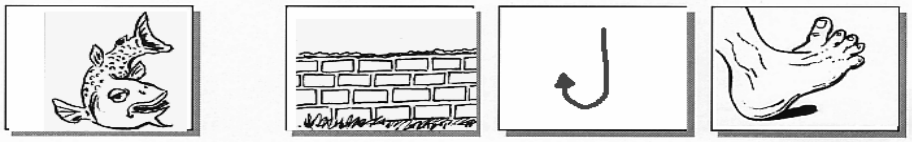
The history of this screening tool

In a county of Norway (Buskerud) in two municipalities (Ringerike and Hole) there were conducted a project within the field of learning difficulties. The focus was mostly directed at prevention of reading and writing difficulties. The project leader was Lyster who together with Tingleff (1992) developed this screening tool for assessing Norwegian pre-school children's language development and linguistic awareness. The tool was used at pre-test and post- test in an intervention study. The theoretical base of most sub- tests constitutes of language awareness, the capacity to observe the form of the language making a shift of attention from the content to the external aspects and construction and structure of the spoken language. In 1989- 1991, 19 educators and first grade teachers got training on language awareness theory, and participated in piloting the screening tool. When the screening tool was developed into its final form 230 children were recruited to participate in an experiment, where smaller and larger parts of their language awareness were trained and followed up. The focus of this experiment was to map if language awareness training has any effect on children's language awareness and to measure the connection between the different levels of language awareness and learning to read later on. Ideas were taken from other Scandinavian projects and authors, researchers such as: Lundberg (1988), Torneus (1983), Elbro (1990), and Hagtvet (1989) in Lyster, Tingleff (Ringerike Materialet Instruction Book). It was constructed as a test and screening tool, but can give many ideas for activities aiming to enhance kindergarten children's and school children's language awareness, who has some difficulties in learning to read. It was used by many people as ideas material, which can give ideas for language awareness activities. The battery was tried out with 200 preschool children whose average age was 6 years 10 months, and 273 preschool children whose average age was 6 years and 3 months. The material has not been tested to such a degree, or reworked in such a way, that is completely suited to serving as standardised test material. Group- administering is possible for around ten children in a group. The battery has 16 subtests, most of them compounded in a way to measure the smallest and largest skills of language awareness, rhyme awareness, phoneme (sound) awareness, morphological (word) awareness and grammatical awareness, including also a subtest for measuring rapid naming, and verbal short term memory. A couple of the subtests aim at assessing the children's listening comprehension. The maximum achievable score on every subtest is the number of items in a subtest solved. The last subtest is not scored.

In the following every subtest (set of tasks) will be presented, describing which ability they measure, how they are structured and what was important to observe and consider in the process of translation.

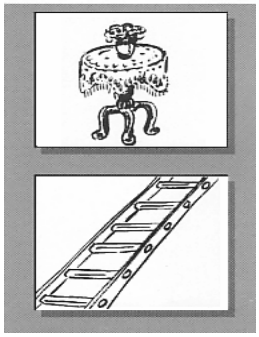
I. Rhyme Identification

This set of tasks was constructed to test the children's ability to identify words that rhyme. They have to find the rhyme pair in a row of 4 pictures representing words.



Since all words can be presented orally word retrieval problems should not influence the responses. It was contently changed finding words that rhyme in Hungarian language, being aware to include in the row words which are commonly used or are well known by 6 years old children, including also words with semantic distracters (a word conceptually close to the target word ex. fish, fish-hook). This subtest consists of 2 trials and 11 items.

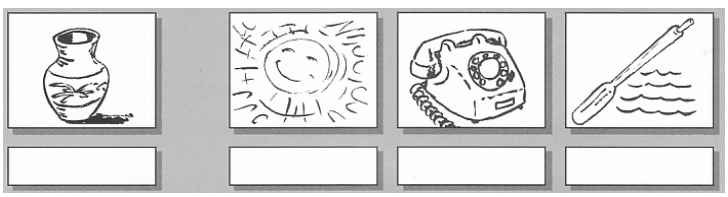
II. Identification of Word Length



This set of tasks was constructed to test the children's ability to compare the length of words. They have to choose which of the two words sound to be the longest, one word representing a short phonetic structure and the other one a longer phonetic structure. The selected words in Hungarian followed this principle and also words which phonological length did not correspond with their content, short phonetic structure with the meaning of something long or large in the real life and conversely long phonetic structure representing something smaller to be able to map children's ability to shift their attention from the content of the concept and to address the form of the words. There are 2 trials and 6 items in this subtest. The pictures can be orally presented. One may ask if the items are too few especially when reliability and validity are concerned.

III. Syllable Identification

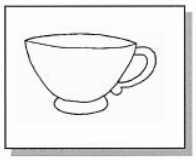
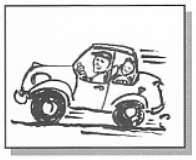
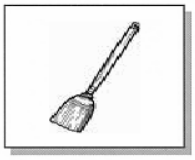
The children are asked to count the number of syllables in words drawing one line for each syllable in a word. The original subtest present one-, two-, three-, and four syllable words, but in translation was included also a five syllable word, the latter being that the Hungarian language contain quite long words. Several graphemes to phoneme relationships were selected: word containing syllable breaks between vowels ("teherauto"), between consonants ("labda"), between vowels and consonants



("krokodil"), words with consonant clusters ("templom"). The words can be presented orally. There are 4 trials and 16 items in this subtest.

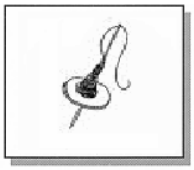
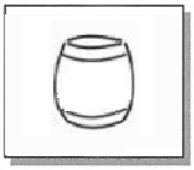
IV. Identifying the First Sound.

The children have to identify words that start with a given sound. Was followed the structure of the original subtest, placing Hungarian words with the same phonetic structure as the Norwegian were. There was replaced the Norwegian phoneme /skj/ with the Hungarian /cs/ as target sound and there was also placed a /gy/ a consonant compounded by two phonemes (/g/ and /y/) as a characteristic of the Hungarian language. The children can listen first the words and after that to find which word begin with the target sound. There are 2 trials and 10 items in this subtest.

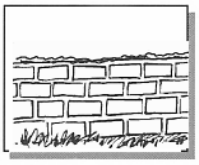
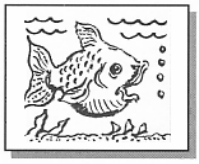
V. Sound Manipulation

This subtest is composed to test the children's ability to decide what is left of a word when the first sound is removed, deleted. For each item the children has to identify one picture out of four, representing the target word. When translating was followed the original subtest principle finding words in Hungarian which contained sounds in common with the target word, or words as distracters which even rhymed with the target word. Ex. (k) orso, orso- hordo- felmoso, (g) oz, foz- ot- oz). There are 2 trials and 10 items in this set of tasks.

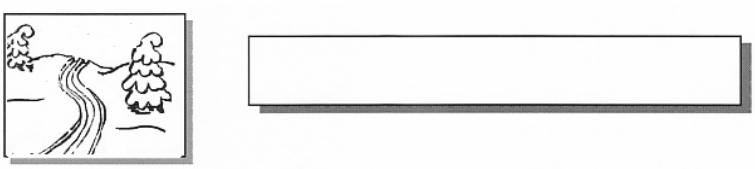

VI. Sound Blending

The children have to blend together sounds into words. They have to find one picture out of four, representing the target word after listening for the other words. There are 3 words with two sounds to blend, 4 words with three sounds to blend, and 3 words with four sounds to blend following the original test construction. The constructions of the words are CV, VC, CVC, CVCV, and two words with consonant clusters VCCV. In some items there were included as distracters words which have common sounds with the target word following the original test principle. There are 2 trials and 10 items in this subtest.

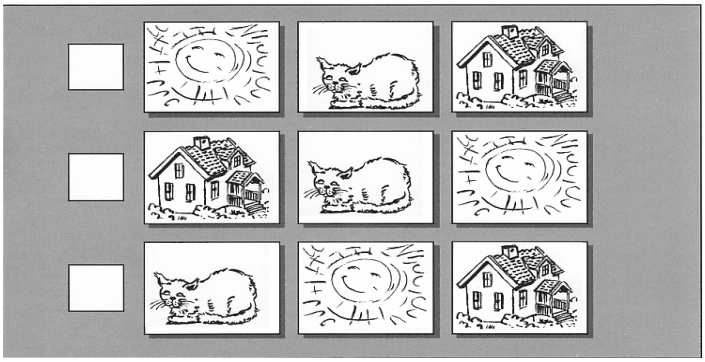
VII. Phoneme Segmentation. Counting the Sounds

These tasks was constructed to test the children's ability to segment words into phonemes, counting and drawing one line for each sound or phoneme in a word presented orally and visually by pictures. The children's are allowed to whisper the words to themselves, but not speaking aloud. When it was translated was followed the structure of the original regarding the word length: 2 words with two sounds, 2 words with three sounds and 2 words with four sounds on the following compositions: VC, CVC, CV, VCC, CVCV, CVCC. In the original there are two words with consonant clusters. When was translating it were difficult to found short words in Hungarian beginning with consonant clusters as in Norwegian (CCV, CCVC) therefore the consonant clusters are in the end of the words in the Hungarian version. Otherwise the composition of the original is followed. There is 1 trial and 6 items in this subtest.



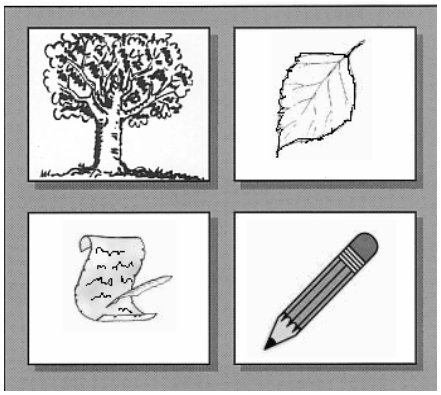
VIII. Memory for Word Sequences (Short Term Memory)

At this subtest is tested children's ability to remember word sequences, sequences of three to five unrelated words. The translator was aware of the length of the words to remember, following the original structure. This subtest contains 1 trial and 9 items.



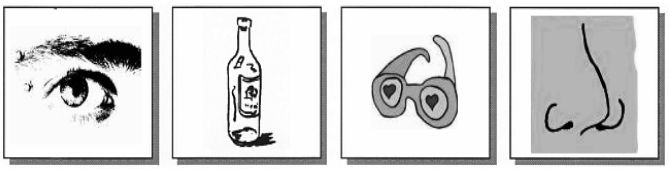
IX. Homophones

This set of tasks is created to test the children's naming ability, the speed of their lexical access. There is a time limit of 5 minutes in finding the pair of homophone words out from other distracter words. As the original test, the Hungarian also has drawings of nouns- nouns and verb- nouns as homophones. Additionally were also included words where the meaning bearing unit were the accent, and just that differentiated the words, in Hungarian language this being an important feature. Ex.megy-meggy, ora- orra, toll-tol. There is 1 trial and 16 items in this set of tasks.



X. Word compounds.

These set of tasks was constructed to test the children's ability to make a compound word of two presented words and to test their knowledge of the word they have created. They have to identify the compounded target word among four drawings. Ex. szem- uveg- *szemuveg*- orr (eye- glass- eyeglass- nose). When translating the original principle was followed. There are 1 trial and 8 items in this subtest.

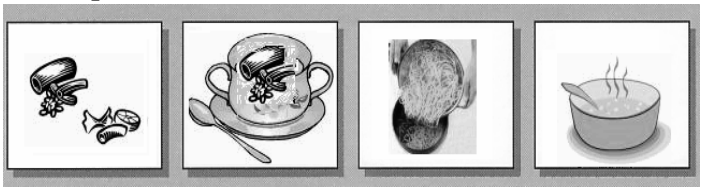


XI. Analyses of Compound Words.

The children are asked to find the word that is left from a compound word when one of the words in it was deleted. They have to identify the target word among four drawings representing the compounded word, the two other words which compound that word and a distracter. Ex. szemuveg- *uveg*- szem- orr (eyeglass- glass- eye- nose). When translating the original principle was followed. This subtest has 1 trial and 9 items.

XII. Knowledge of Compound Words.

This subtest is composed by words which there and back are meaningful compounded words. Ex. laskaleves- leveslaska (pasta soup- soup pasta). When translating was followed the original principle even if in the Hungarian language such words are not so frequent, or was hard to visualize them, but for children's words awareness this was the best choice. These tasks are constructed to reveal the children's knowledge of compound words. They have to find the compounded target word out of four drawings, among them being also the other compound word. Ex. laska- laskaleves- leveslaska- leves (pasts- pasta soup- soup pasta- soup). This subtest has 1 trial and 13 items.



XIII. Grammatical Understanding

The children have to find the correct drawing representing a sentence with different grammatical rules in it: present past, future tenses, plurals, prepositions, adjective comparisons. When translating sentences were formulated following the Hungarian language grammatical rules. This subtest has 1 trial and 13 items.

XIV. Segmentation of Sentences into Words. Counting Words.

The children have to find the number of words in a sentence. They have to draw a line for each word in a sentence. When formulating the Hungarian sentences there were followed the original structure, including two to five word sentences. This subtest has 1 trial and 6 items.

XV. Listening Comprehension.

These set of tasks are constructed to measure the children's ability to understand the meaning of sentences with different morphemic and syntactic difficulty. They have to find the correct picture representing sentences with different length. It was just formulated Hungarian sentences for the given pictures. There is 1 trial and 18 items in this subtest.

XVI. Syntactic Awareness.

This subtest was constructed to test the children's ability to detect syntactic irregularities in sentences. They have to judge if a presented sentence is correct or not. There were formulated grammatically correct and incorrect Hungarian sentences violating some rules: word order, wrong affixes, incongruence. There are 2 trials and 10 items in this set of tasks.

XVII. Writing and Drawing

The children are asked to draw themselves and if they know to write their names. These drawings can be indicators of children's mental and motor development.

General considerations when translating the "Ringerike" Material

When this material was translated was followed the original structure and principles. There were replaced the very culturally based Norwegian words, which are not meaningful to the Hungarian population as: ski stick ("skistav", "skihopp"), pirate ("sjørøver"), syrup ("brus"), a special cake ("kransekake"). There were two pictures where the persons had to be dressed better to be suitable to this culture and not to distract the attention of children. The consultations with the other specialists (linguist, teacher and speech therapist) were very useful; they helped in getting the right words, following the original structure, and visualizing the words. The pilot study gave a lot of feed backs from the children itself: ex. "Don't you see that here the girl is running and not picking flowers!" sad one child when completing the grammatical awareness subtest. Her remark was considered.

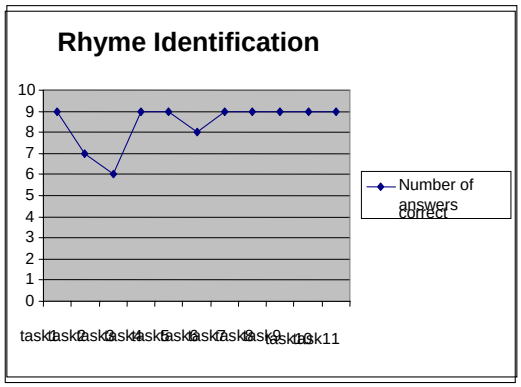
Appendix 2 - Piloting the "Ringerike Materialet" Screening Tool

The Norwegian Screening Tool Ringerike Materialet composed by Lyster and Tingleff (1992) was translated from Norwegian language to Hungarian and revised three times by a linguist, teacher and speech therapist then a pilot study was conducted. The sample was composed of 10 last year Hungarian kindergarteners (6-7 years olds children) who from autumn until the spring period participated already in a systematic school preparation program based on Romania's educational program and policy for Hungarian children. This kindergarten is situated in Marosvasarhely, a small town in the middle of Transilvania region in Romania, and the kindergarten was situated in the middle of this town. Every child tested was Hungarian as nationality. The testing was accomplished by an experienced teacher who knew beforehand the test construction and composition. When analyzing the results, the data was visualized by graphs how children as a group mastered each of the tasks within every subtest and descriptive statistics (mean, standard deviation, reliability analyses and corrected item- total correlation) was counted. This was done to reconsider furthermore if more changes should be implemented in this test. When effectuating these changes was important to consider the small sample size, and also the valuable information's getting from the practical observations when the test was tried out: instructions, which items the children did not understood even after grounded explanation, what is their strength because they are taught on it.

The table below presents an overview of the measured descriptive statistics and internal reliability Cronbach's Alpha coefficients of internal consistency:

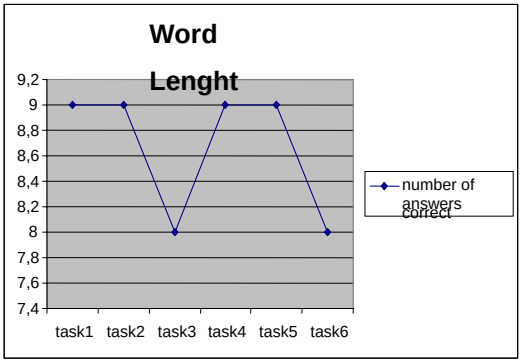
Subtests	**Maximum**	**Mean**	**SD**	**Reliability**
Rhyme Identification	11	9, 1	2, 7	0,89
Identification of Word Lenght	6	5, 2	1, 8	0, 95
Syllable Identification	16	11, 5	4, 3	0, 93
Identifying the First Sound	10	7, 3	2, 4	0, 89
Sound Manipulation	10	3, 6	1, 3	0, 07
Sound Blending	10	7	2, 4	0, 88
Counting the Sounds. Phoneme Segmentation	6	1, 9	0, 8	-0, 20
Short Term Memory	9	5, 8	1, 8	0, 84
Homophones	16	7, 1	3, 8	0, 84
Word Compounds	8	5, 3	1, 1	0, 30
Analyses of Compound Words	9	6, 9	1, 8	0, 79
Knowledge of Compound Words	13	8, 1	2, 8	0, 75
Grammatical Understanding	13	7, 8	2, 8	0, 87
Counting Words.	6	2, 1	1, 2	0, 63
Listening Comprehension	18	11, 4	3, 4	0, 83
Syntactic awareness	10	4, 5	1, 2	-0, 22

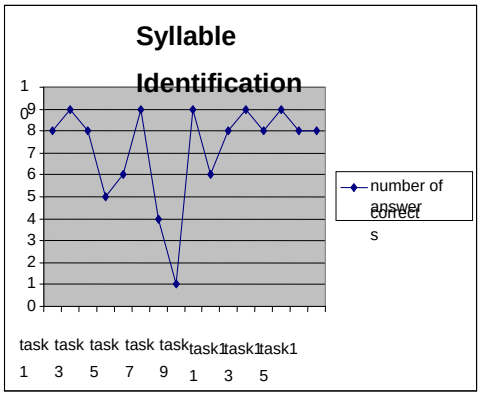
In the following I will present these results and the effectuated changes based on the above mentioned criteria's:



Maximum achievable scores in this set of tasks was 11, mean was 9, 1, and standard deviation 2, 7. A ceiling effect can be detected here at this subtest. This was expected however from results of previous studies. Reliability analyses, meaning the internal consistency reliability was conducted using Cronbach's Alpha coefficient with standardized item alpha 0, 89, considered a sufficient level of reliability. The task number 4 and 10 has shown a negative corrected item total correlation of (-, 148; -, 224). Better pictures were replaced for these tasks, knowing also from the tester that these pictures were not so recognizable for the children.

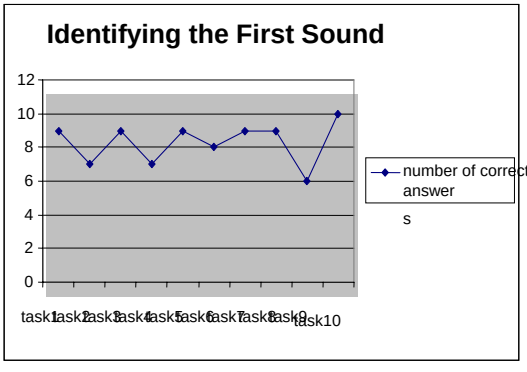
Maximum score in this subtest was 6, mean was 5, 2, and the standard deviation 1, 87. The reliability analyses on standardized item alpha shows a suitable value of 0, 95. The corrected item- total correlation represents adequate values also. In this subtest were not changed items.





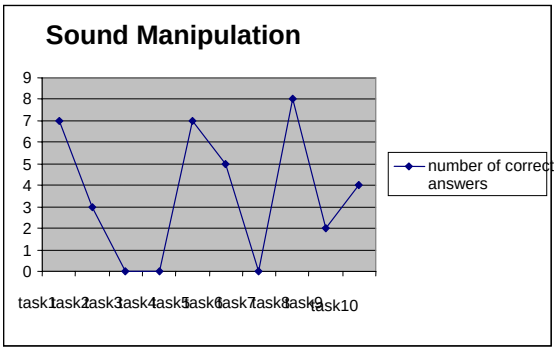
Maximum achievable scores in this set of task was 16, mean was 11, 5, while the standard deviation was 4, 3. Chonbach's Alpha coefficient had a standardized item alpha of 0, 93, which represent adequate reliability. The corrected item- total correlation also represents adequate values. There were reorganized the items following the logic of difficulty.

Maximum score achievable was 10, mean was 7, 3, and the standard deviation 2, 3. The Cronbach's Alpha coefficient with standardized item alpha was 0, 89 which represent a sufficient reliability. The corrected item- total correlation

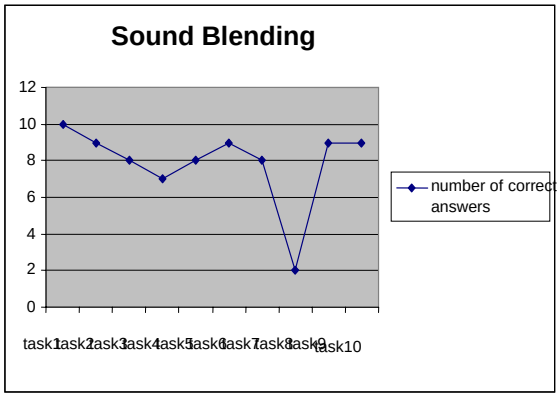


also showed adequate values. On this subtest there were not effectuated changes.

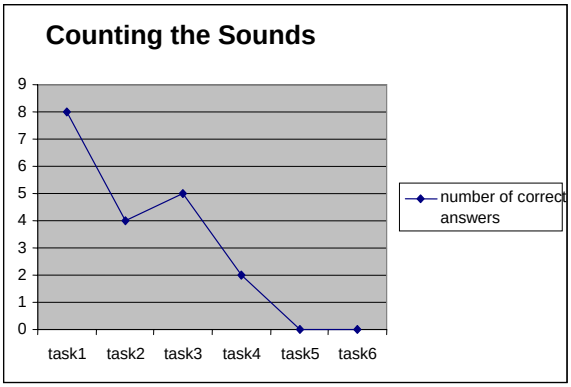
Maximum achievable score on this set of tasks was 10, but tasks 3, 4, 7 were excluded from the scale, because had no variance, the children did not performed on it. Mean was 3, 6 and the standard deviation 1, 3. As expected from the reading literature this tasks are very demanding for the kindergarten children. The reliability measure Cronbach's Alpha coefficient with standardized item alpha was extremely low of 0, 07 and the corrected item- total correlation was low on the following tasks: 1, 2, and 5. Decision was taken to make this scale easier on 5 tasks: tasks 3, 4, 7 which showed no variance because were too hard, and tasks 1, 2 because the low item correlation. Task 6 was changed because a word which was hard to understand by the children. There was also a task (task 7) where the picture was confusing, so it was reconsidered. These effectuated changes hopefully will contribute to the increase of internal reliability.



The maximum achievable score in this subtest was 10, mean was 7, and the standard deviation 2, 4. Cronbach's Alpha coefficient had a standardized item alpha of 0, 88 and the corrected item total correlation showed high values meaning that this scale has internally consistent tasks. There were not effectuated any changes.

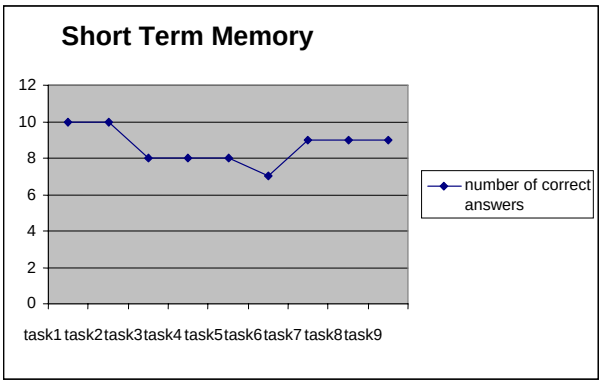


Maximum achievable score was 6, but task 5, 6 was removed from statistical measurements, because nobody performed on it. Mean was 1, 9 and the standard deviation 0, 87. This scale measuring the awareness of phonemes was extremely difficult for the children. An explanation for this can be that interference occurred, because these children were taught to count syllables and they wanted to do this also on these set of tasks.

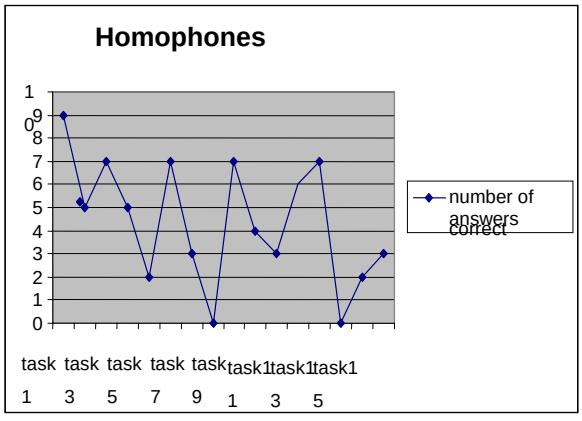


Cronbach's Alpha coefficient on standardized item alpha had an extremely low, negative value of -0, 20 demonstrating just chance level and the item total correlations concomitantly showed low values. Even having these statistical results the decision was not to change items, because originally the structure of the Norwegian test was followed. Furthermore the above mentioned effect of interference should be considered. Maybe more explanation and test trials will help the children to acquire better results.

The maximum achievable score on this subtest was 9, mean was 5, 8 and the standard deviation 1, 8. Internal reliability, Cronbach's Alpha coefficient with standardized item alpha was sufficient of 0, 84 this subscale having sufficient number of internally consistent tasks. There was not effectuating any change on it however the first two tasks were too easy for the children (everybody reached the maximum score on it) and statistically were removed from the measures. The small sample size and the structure of the original test were considered: the first short term memory tasks are to remember shorter serial stimulus and on this small sample everybody did well.

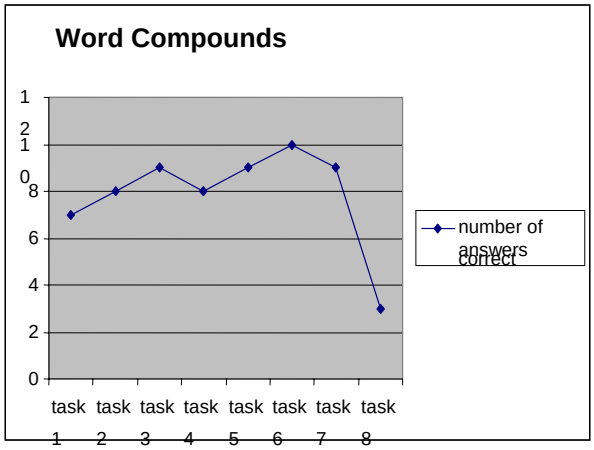


Maximum achievable score on this set of tasks was 16, but the tasks 8, 14 were removed from the statistical measures because nobody performed on it (showed no variance). These tasks were removed and replaced with other ones. Mean was 7, 1 and the standard deviation was 3, 8. The internal consistency testing had a standardized item alpha of 0, 84, which value shows a sufficient reliability, however task 5 showed a negative item total correlation of -0, 38, therefore was replaced. Relevant information was gathered also from the process of testing: task 9, 3 had to get better visualization and this is a very important issue at this subscale because the picture can not be named. Originally this subscale measure rapid naming capacities therefore has to be timed, but piloting it was without timing the aim being to map if the children recognize every picture. Contain even now difficult tasks, the problem being to find words that physiologically fit the children, or contains homophones compounded by one verbs and one noun. Because this subscale will be timed a decision were taken to align these tasks according to their difficulty level. In

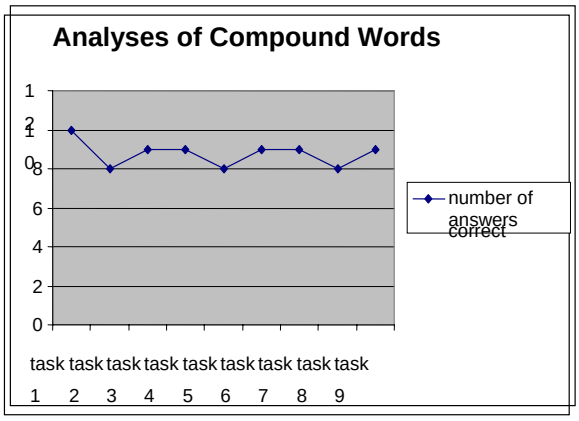


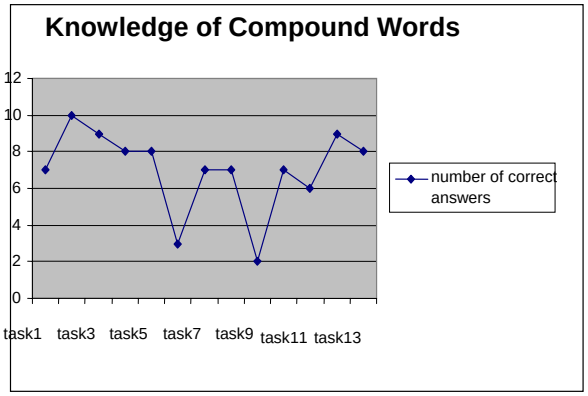
the Hungarian language the accents are with high importance therefore in some tasks were implemented words where the accent is the meaning bearing unit (the two word have different meaning because the accent or the shorter or longer consonant). It seems that there were no problems on these tasks on this pilot testing.

Maximum achievable score on this set of tasks was 8 points; the mean was 5, 3 and the standard deviation 1, 1. Cronbach's Alpha coefficient on standardized item alpha had just a chance level of 0, 30 resulting on low corrected item total correlations. Task 6 was removed from the statistical measures, because everybody performed it well, but will be not replaced because the small sample size. Conversely was changed the task number 8, because the word was meaningless for the children. The tester reported no other difficulty in administering these tasks.



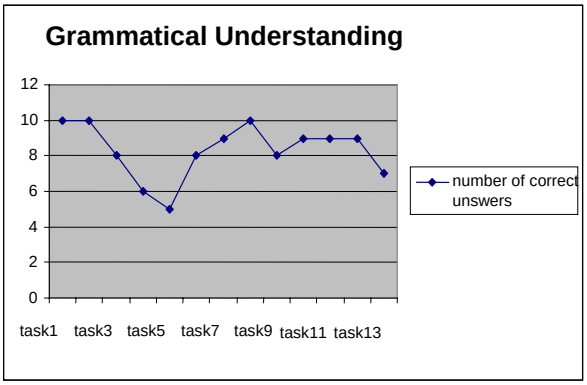
Maximum achievable score in this set of task was 9, mean was 6, 9, while the standard deviation 1, 8. Internal reliability conducted using Cronbach's Alpha coefficient with standardized item alpha of 0, 79 considered to present almost a sufficient level of reliability. The corrected item total correlation was adequate on all the tasks, but was replaced the task number 2, getting a better, understandable word/picture.





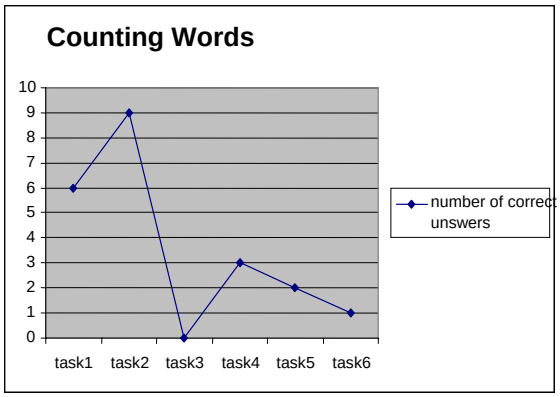
Maximum obtainable score in this subtest was 13, mean was 8, 1, while the standard deviation was 2, 8. Cronbach's Alpha based on standardized items had a value of 0, 75. Negative number, low item total correlation (-0, 217) was found at task number 13, therefore got a better visualization. There was also replaced the task number 4 with an easier,

understandable word/picture.

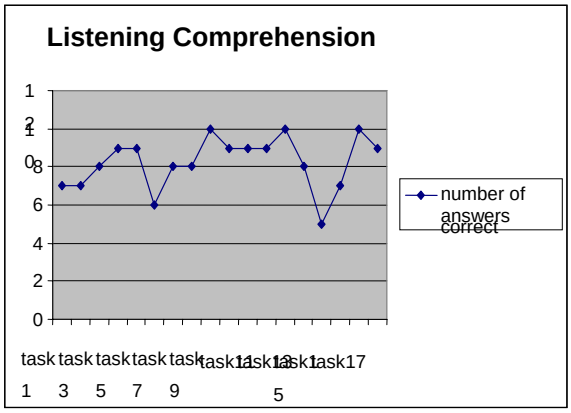


Maximum achievable score was 13, but the tasks 1, 2, 8 were removed from statistical measures because all the children did it well. Mean was 7, 8, while the standard deviation was 2, 8. Internal reliability, meaning the internal consistency testing was conducted using Cronbach's Alpha coefficient with standardized item alpha of 0, 87. There were effectuated changes on the tasks number 8 and 11 because they were too easy.

Maximum achievable score in this subtest was 6, mean was 2, 1 and the standard deviation 1, 2. A floor effect is observable on this set of tasks, but the tester warned me to be attentive when administering this set of tasks. On the trial period we should accentuate better the pause between the words in a sentence. An aspect is that the children did not count the Hungarian language definitive article, which is just one phoneme ("a") as a word.The internal reliability Cronbach's Alpha value was 0, 63 while all the tasks had adequate corrected item total correlations. There were not changed any tasks, but the above mentioned observations will be considered when administering this subtest.

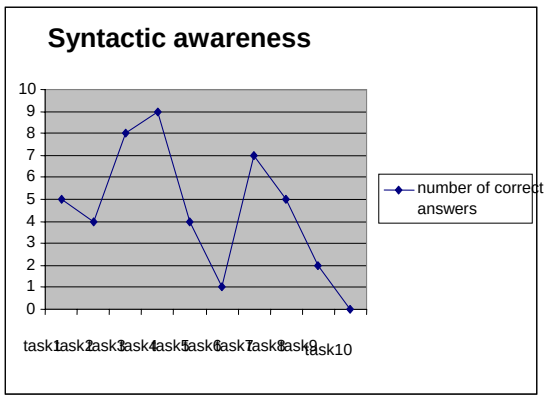


Maximum achievable score in this set of tasks was 18, but tasks 9, 13, and 17 were removed from the statistical measures because everybody performed well in this small sample. Mean was 11, 4, while the standard deviation was 3, 4. Cronbach's Alpha coefficient showed an adequate value of 0, 83, but it was found negative number corrected item total correlations on the following tasks: 10, 14, and 18. There was formulated another sentences for the first two



task (10, 14). The last task (18) remained the same, this is the hardest and the longest sentence therefore had the children problems with it.

The maximum achievable score in this set of tasks was 10, the mean was 4, 5, while the standard deviation was 1, 2. A floor effect is observable. The internal reliability measured by Cronbach's Alpha on standardized item alpha ended up with an extremely negative value of -0, 22, demonstrating just chance level. Many items in this subscale had negative number or low corrected item total correlations. The reason for this was that the children did not understood the instruction, they were confused when and where to put the cross. The original design of the test is to follow the row and the two columns, visualized by a picture of a baby (if the sentence is wrong, incorrect the child has to put a cross under the baby) and a mother picture for the correct sentences. This structure was too long and confusable for the children therefore were decided to omit the two columns design remaining just a box. The instruction will be shorter and understandable: "Put a cross in the box if you hear a correct sentence."



Writing and drawing

This is the last subtest of the Ringerike Materialet battery, asking the children to draw themselves and write their names. Letter knowledge enhances the language awareness abilities and when it comes to drawing which can serve as one of the indicators of children's mental and motoric development. This subscale was not analyzed at this time.

Conclusion

This pilot study gave valuable feed- backs to consider what enriched and justified the further changes. The general conclusion can be that the tool measured individual differences and physiological patterns and was in concordance with the theoretical findings. Furthermore one can expect that these changes and reconsiderations will make this tool more reliable and better. After this pilot study the process of test translation will end here, the test getting the final shape, being ready for further adaptation to the Hungarian population, educational system and culture with a more larger and varied sample (kindergarten and first grader school children). This final shape of the test fulfils also the criteria's for being an important language awareness measurement tool in conducting a predictive study on it the main research question

being how important this capacities are in reading development of children's learning to read in a highly transparent language.

Appendix 3 - Presentation of applied reading instruction method with this study sample

Before starting the presentation of methodology of teaching reading Hungarian pupils from Romania a clarification of used concepts is needed. The National Reading Panel's report (2000) makes allowance that the terms are often misused. They underlay the difference when defining them. Phonemic awareness is not phonics. *Phonemic awareness* is knowledge that spoken words are made up of sounds, phonemes while *phonics* refers to the process of linking these sounds to the symbols that stand for them, the letters of the alphabet. If children are to benefit from phonics instruction they need phonemic awareness. Furthermore phonemic awareness is not the same as phonological awareness. Phonemic awareness is a subcategory of phonological awareness, is narrower, is just identifying and manipulating the individual sounds in words (ex. which word begin with the same sound, isolating the first or last sound of a word, blending, segmenting). *Phonological awareness* is broader term, is identifying and manipulating larger parts of spoken language, such as words, syllables, and onset and rimes- as well as phonemes. When analyzing the teaching reading process a focus will be on how much phonological and phonetic awareness instruction the methods used contain and describing the phonics instruction: which are the important aspects to consider when planning reading instruction based on phonics. These aspects of teaching reading were analyzed from the first grade textbooks and were observed in the classrooms.

"Program on the Wall" ("Programfal")

This marvelous program, method written by Tolnai was borrowed from Hungary, and is largely used by teachers in Mures County from Transilvania, however they can implement just elements, the Romanian Educational program being another then in Hungary. The program is amazing because contain not just phonemic and phonological awareness training but also develops larger units of the language. This is a systematic training of language awareness: phonetic, phonologic, morphological and grammatical awareness. A board hanging on the wall having three elements: the vowels, the consonants and the uppercase letters presented together with a picture. Every letter has his well defined place in the rows following the Hungarian language structure: how is sounded (long and short vowels/ consonants, simple or double consonants) preventing children not to confound them. Is called program because instruct children to resolve or make "mathematical" programs since the verbal instructions are transformed in a mathematical cod using geographic forms and numbers Ex. Say words where the /a/ is the first, second, third can be transformed as: I.o/ 1 2 3. The program starts with deleting the first sound of the words presented by the picture, sounding them out and giving accent to consider their length, the pronunciation being fallowed by movements: alma- a, árvácska-á, ernyö- e, érem-é…., aá, eé… After this being understood to blend sounds together is the next step: the consonants will visit the vowels and vice versa. There are many combinations and

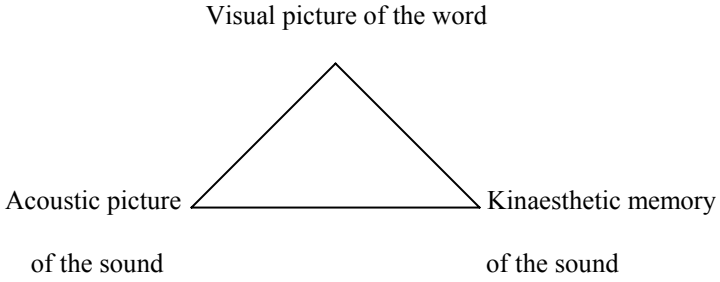
possibilities to play with: za, zá, az, áz…they can even rich the level to blend three, four, five sounds together. The program gives room also for exercising the right pronunciation, articulation, breath as well as verbal memory exercises. Rhyming poems for every letter gives another possibility to exercise. The larger units of the language are taught by formulating sentences, sentence analyzing, finding words after roles (compound words, words having affixes…). There is an explicit instruction going on about grammatical awareness: formulating sentences answering the "What?" "Where?" "How many?" etc. questions using words from the program. Teachers usually use this "program on the wall" at the preparation period for enhancing the pupil's phonemic and phonological awareness (deletion of the first sound, blending and playing with words) as vocabulary and grammatical awareness training before starting the real phonics instruction based on textbooks and the Hungarian tradition.

Reading instruction in Hungarian

The reading instruction in Hungarian language is phonics based, following the structure of the language. Is often called sounding out- analyzing the sounds and-blending it together ("hangoztató- elemző- összetevő"). As far as reading instruction consists of teaching children to transform the letters into sounds, (to understand the alphabetic principle), and then blend the sounds together to form words (to make a synthesis) the method can be named synthetic phonics as well. Important aspects which are considered when teaching children to read are:

- At the beginning stages children are not taught on the letter names, the method try to express and sound out just the phoneme Ex. "l" is not named as "el"
- Sounding out the phonemes in isolation: the textbooks from which this study sample learn to read (Kénosi, 2005; Makkai, Nagy, 2006) uses exercises for imitating different sounds from the environment, which represent phonemes of the Hungarian language (the baby is crying, which sound make the buzz, the airplane, the bear etc.)
- Analyzing the sounds of the word: deleting the first sound of a word, which picture of a word contain the sound given, where is their place in the word (first, middle, last part of the word), counting the sounds in the word. These exercises are for racing the pupil's phonetic awareness.
- Blending exercises: when already two letters are taught blending them together is possible. They can even implement it beforehand as an "ear", phonetic awareness exercise.
- Teaching phonemes/graphemes, by helping the children to differentiate them from each other acoustically, visually and by articulation, kinaesthetic features.

A Hungarian author, Meixner's model (2000), emphasizes the importance of developing a ternary association when learning about phoneme/grapheme correspondences (sound/letter) between the following elements: the visual picture of the letter, the acoustic picture of the sound and the kinaesthetic memory of the sound (how we pronounce it):



All the senses are involved in the process of learning about a letter.

- How to organize the sequence of teaching letters in order to not confound them.

Ranschburg a Hungarian researcher (in Meixner, 2000) find out the phenomenon of "homogeneous blockage": congenial elements pose blockage in the process of learning therefore is more difficult to learn them; they are confoundable and easier to forget.

Ő- Ű É- E E- A E- Á
Ó- Ú É- I É- Á Ó- Ű
Ú- Ű Ő- Ú
Ó- Ő

The Hungarian language vowels which are easy to confound (Meixner, 2000)

The Hungarian language consonants which are easy to confound (Meixner, 2000)

Visual	Phonetic				Visual + Phonetic
t- f	b- p	gy- d	s- sz	t- p	d- b
t- j	d- t	gy- j	cs- c	k- t	m- n
h- n	g- k	gy- g	cs- s	g- d	zs- sz
k- v	v- f	ny- n	cs- t	n- d	
v- z	z- sz	ny- j	zs- z	n- l	
v- r	zs- s	ty- t	zs- cs	n- t	
d- p	gy- ty	ty- j	c- sz	n- j	
u- n		ty- ny	c- t	ty- cs	
		ty- ly	f- sz	r- l	
		gy- ly		r- j	
		ny- ly		l- j	

Applying this principle Meixner (2000) developed and proposed a sequence when teaching the phoneme/ grapheme correspondences. The textbooks used by this study sample (Kénosi, 2005; Makkai, Nagy, 2006) take care of the above mentioned

principle: the letters/souns which are easy to confound visually or phonetically (sounded- not sounded phonemes) are not taught near each other, the sequence of teaching the phoneme/grapheme correspondences is organized.

This study sample learned to read from the mentioned two reading textbooks and the described program („programfal"). The Makkai Emese M., Nagy Anna M. (2006) textbook is more „lighter" comparing to Kénosi Dénes I. (2005) textbook regarding how much phonetic instruction contains. Have also exercises for visuo- spatial training mixed with phonetic, phonological instruction, since the other book is more consistent in language and phonological based instruction. However having this differences is hard to make an assumption regarding which reading textbook is more efficient, because a group of this sample learning to read from the Makkai Emese M., Nagy Anna M. (2006) textbook uses also the described method „programfal", which is a very language and phonetic based training and conversely there are a lot of elements in the Kénosi Dénes I. (2005) textbooks which has the root from the „programfal". Furthermore the aim of this study is to get insight in the process of reading acqusition in a transparent language, how Hungarian is, and from the above analyses of reading method as environmental influence on reading, one can conclude that this study sample had a structured and planned instruction. But still one important feature were observed which is important to mention. The tendency for homogenizing the class, to be able to fullfill the curiculum requerements. In such an environment, the few children with weaker abilities will not have the needed time and individualised training and their academical progression and motivation for learning will lack after a while.

Appendix 4- Applied reading measures

Olvasási szint felmérő lap (Reading level measurement)

a m e t i z t i m a

_____mp _____hiba

ma zi te et mi et za ti am it

_____mp _____hiba

itt ima mit mez amaz tati

izma tizet temet Timea

_____perc _____hiba

mp=second

hiba=mistakes

Appendix 5 - Skewness and kurtosis for the measures

Measure	Skewness	Kurtosis
1. Rhyme Identification	-1.197	.301
2. Identification of Word Length	-1.086	.079
3. Syllable Identification	-1.111	.900
4. Deletion of the First Sound	-1,348	2.327
5. Sound Manipulation	.612	.370
6. Sound Blending	-1.958	5.094
7. Counting the Sounds	.625	-.380
8. Short Term Memory	-.792	-.143
9. Homophones	.370	-.762
10. Word Compounds	-.832	-.192
11. Analyses of Compound Words	-.269	-.685
12. Knowledge of Compound Words	-.185	-.543
13. Grammatical Understanding	-1.306	1.665
14. Counting Words	.154	-.956
15. Listening Comprehension	-1.222	.969
16. Syntactic Awareness	-1.275	2.592
17. Letter Knowledg	1.472	1.654
18. Language awareness (all subtests)	-.630	-.007
19. Rapid naming of pictures	.604	.861
20. Reading speed	1.364	1.377
21. Reading accuracy	1.742	2. 921
22. Reading rating scale for teachers	1.842	1.810

Appendix 6- Factor loadings for the translated test variables

Subtests	Factor1	Factor2	Factor3	Factor4
Rhyme Identification	.697	.378	.282	.037
Identification of Word Length	.731	.054	.223	-.108
Syllable Identification	-.025	-.008	-.009	.944
Deletion of the First Sound	.786	.228	.029	-.096
Sound Blending	.743	.136	-.008	.256
Counting the Sounds	.002	-.022	.817	-.119
Verbal Short Term Memory	.455	.051	.615	.228
Homophones	.062	.588	.441	.135
Word Compounds	.064	.831	.024	-.055
Analyses of Compound Words	.353	.440	.597	.064
Knowledge of Compound Words	.438	.611	.183	-.200
Grammatical Understanding	.573	.572	.153	.078
Counting Words	.215	.654	-.074	.093
Listening comprehension	.492	.490	.205	.436

Loadings after varimax rotation

Appendix 7- Predictors of reading in Hungarian

Hierarchical regression analyses of predictors of *reading speed and accuracy* with emphasize on the linguistic subscales of the "Ringerike Materialet" Screening Tool after the effect of intelligence and letter knowledge is partialled out:

Subscales entered	Reading speed		Reading accuracy	
at third step	R	R^2change	R	R^2change
Rhyme Identification	.681	.048*	.767	.204***
Identification of Word Length	.647	.003ns	.641	.026ns
Syllable Identification	.650	.007ns	.620	.000ns
Deletion of the First Sound	.692	.065**	.679	.077**
Sound Blending	.668	.030ns	.674	.070**
Word Compounds	.688	.058**	.670	.064**
Analyses of Compound Words	.699	.072**	.672	.067**
Knowledge of Compound Words	.716	.097**	.672	.067**
Grammatical Understanding	.713	.092**	.753	.184***
Counting Words	.653	.011ns	.624	.005ns
Listening Comprehension	.667	.030ns	.693	.095**
Language Awareness All	.712	.091**	.741	.165***

*p<.05, **p<.01, ***p<.001

Appendix 8- The Hungarian sounds and letters representing the alphabet

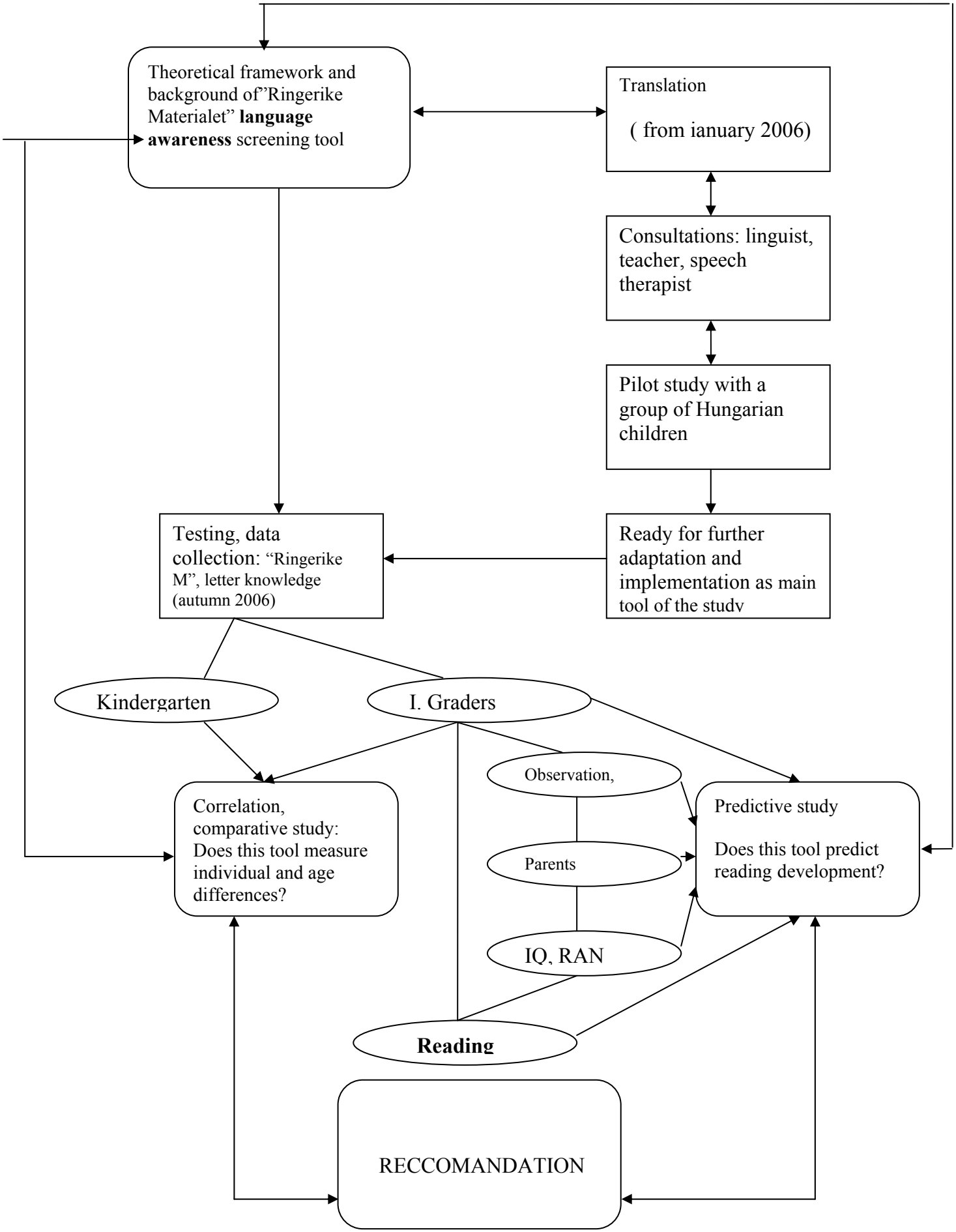
The Hungarian sounds and letters representing the alphabet transcribed in the symbols of the International Phonetic Association (IPA). The long vowels are represented by **":"** ex. o:

Soun	Letter	Sound	Letter
a:	á	b	b
∂	a	p	p
o	o	d	d
o:	ó	t	t
u	u	ʒ	gy
u:	ú	c	ty
ø	ö	g	g
ø:	ő	k	k
y	ü	v	v
y:	ű	f	f
e	e	z	z
e:	é	s	sz
i	i	Ʒ	zs
i:	i	ʃ	s
		j	j, ly
		h	h
		ts	c
		tʃ	cs
		dz	dz
		dƷ	dzs
		l	l
		r	r
		m	m
		n	n
		ŋ	ny

Appendix 9- Overview of the described studies in this thesis

Study	Findings
Cardoso- Martins (1995)	Syllable and rhyme awareness had a predictive power on reading development.
Badian (1998)	Syllable awareness did not contribute to predict reading.
Bradley and Bryant (1983, 1985); Goswami and Bryant, (1991)	Rhyme and alliteration sensitivity is important in learning to read and have predictive function. Phoneme awareness tasks are too difficult to master for small children, rhyming awareness has to be a prerequisite of developing phoneme awareness.
Muter et.al (2004)	Contradict the findings of Goswami and Bryant. Emphasises the phoneme awareness skills and letter knowledge when learning to read. Morphological awareness is predictor for reading comprehension.
Wimmer (2001)	Learning to read a transparent orthography is easier to crash the cod, the phonological awareness skills are not so important. Rapid naming is the core problem, because is more related to automatization and developing reading fluency skills.
Cardoso, Pennington (2004)	Phonological awareness and rapid naming share common variance in prediction of reading; phonological awareness is the better predictor. Rapid naming is better predictor in the group of children for risk in developing reading.
Kirby et. al (2003)	Proved the independent contribution of phonological awareness and rapid naming to reading. Phonological awareness contributed in early grades, rapid naming contributed in later grades.
Schatschneider et.al (2004)	Gave importance for phonological awareness, rapid naming and letter knowledge in predicting reading development. They account for a unique variance. Naming speed was much more predictive of reading fluency.
Lyster (2002)	A training study which showed the bidirectional relationship of phonological and morphological awareness abilities. Both abilities contributed to reading development, morphological awareness showed a stronger effect how it was expected, due to the transparency of the language.
Bowey (2005)	The grammatical and syntactical awareness has a week power to predict reading in early stages of reading development.
Plaza and Cohen (2003)	In contrary find the contribution of syntactical awareness to reading in early stages, behind the effect of phonological and speed factor.
Spencer and Hanley (2004); Hoxhallari, van Daal and Ellis (2004)	Learning to read a transparent language is easier, understanding the alphabetic principle is faster.
De Jong and Van Der Leij (2003)	Dyslectic and weak readers perform worse at rhyme, phonological awareness and rapid naming tasks compared to normal readers. The phonological awareness task has to be demanding for readers of a transparent language. Dyslectic readers show phonological awareness and rapid naming deficit.
Everatt and Smythe, Ocampo and Gyarmathy (2004); Kassai and Kovács-Vass (1991); Csépe (2006)	Gyarmathy not find at all the relationship of phonological awareness and learning to read the transparent Hungarian language. But in this study were used just rhyme and alliteration tasks. Kassai et.al (1991) found correlations between short term memory and reading and syllable awareness and reading. Csépe (2006) the phonological tasks have to be complex and demanding to show individual differences. Hypothetically the complex and rich morphology of the Hungarian language relies on memory capacities more than other languages do.

Appendix 10- Procedures for implementation of the study



Appendix 11- Letter of consents

Letter of Consent to Mureş County School Inspectorates

My name is Karacsonyi Tunde, full- time student pursuing a course of study at the Department of Special Needs Education at the University of Oslo, Norway. I should kindly request access to Hungarian Institutions (kindergarten and school) in order to effectuate my research. The aim of the research is to evaluate the development of reading acquisition.

Yours sincerely

Karacsonyi Tunde

Dear Parents

My name is Karacsonyi Tunde, student at the Department of Special Needs Education at the University of Oslo, Norway. In order to accomplish this study plan I need to realize a research. The aim of my research is to evaluate the development of early stages of reading acquisition. In order to realize this study I translated a Norwegian linguistic test battery. The test measures the language awareness ability and contains language tasks as: rhyming, playing with sounds, playing with words.

Additionally children from the first grade are planned to be tested by a test measuring nonverbal intelligence and rapid naming.

I should kindly request your agreement to effectuate these tests with your child.

Yours sincerely

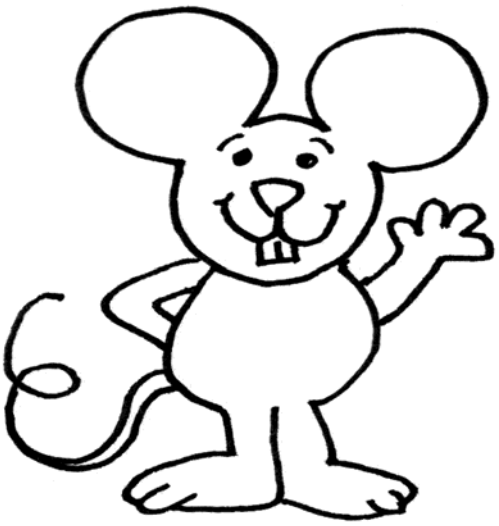
Karacsonyi Tunde

Appendix 12- An example of diplomas for children

Oklevél

……

kitartó munkájáért



Keltezés, hely: Aláírás: