Gramotnost, pregramotnost a vzdělávání

Odborný recenzovaný časopis zaměřený na problematiku čtenářské, matematické, informační a přírodovědecké gramotnosti a pregramotnosti

3/2017 ročník I

PEDAGOGICKÁ FAKULTA
Univerzita Karlova

Obsah/Contents

Editorial/Editorial

Contributions to the Research on the Relationship of Language Skills and Literacy Acquisition in the Czech Literature 3
Klára Špačková, Gabriela Seidlová Málková

Přehledové studie/Theoretical papers

Links Between Specific Language Impairment, Motor Development and Literacy Acquisition in Children 13
Marja Volemanová, Lea Květoňová

Výzkumné studie/Research papers

The Literacy Profiles of Czech Precocious Readers 31
Gabriela Seidlová Málková

Silent Reading Comprehension in Fifth Grade Pupils 55
Zuzana Hoždorová, Olga Kučerová

Children with Specific Language Impairment Through the CCC-2 Questionnaire 67
Helena Podpěrová, Anna Kucharská

Zprávy/Reports

Increasing Quality in Education of Pupils, Development of Key Competencies, Educational Areas and Literacies 79
Klára Špačková, Anna Kucharská

European Literacy Network, ELN – Report on Activities and Events 85
Gabriela Seidlová Málková

Gramotnost, pregramotnost a vzdělávání

Odborný recenzovaný časopis zaměřený na problematiku čtenářské, matematické, informační a přírodovědecké gramotnosti a pregramotnosti

Univerzita Karlova v Praze, Pedagogická fakulta
Praha, 2017

Contributions to the Research on the Relationship of Language Skills and Literacy Acquisition in the Czech Literature

The first special issue of Literacy, Preliteracy and Education resulted in a wide-open call to Czech, Slovak, and international authors in relation to the broader examination of the relationship between language skills and the development of literacy, especially reading.

Linkages between language and typical and/or atypical literacy development have attracted an enormous amount of research attention throughout recent decades. While there is actually huge and comprehensive knowledge about the relationship between the development of language and literacy in English-speaking populations, research from other languages, especially Slavic ones, tends to develop slowly and with less attention from the international audience.

When considering the research on early literacy development in Czech – one of the West Slavic languages – this is just the case. Though interest in early literacy and research into it has a long tradition, with the first research article dealing with reading difficulties being published back in 1904 (Heveroch, 1904), it is only recently that the close relationship between the development of language and literacy started to be emphasised and investigated. As already mentioned, Heveroch (1904) was the first to focus on the issue of reading impairments in his article, where he introduced a case study of an eleven-year-old boy suffering from reading difficulties despite possessing adequate intelligence. Actually, Heveroch was also among the first to point out the connection between language and reading – he was convinced that the reading problems of the boy were caused by minor brain anomalies in the language area of the left hemisphere.

Another influential Czech psychologist famous for his extensive clinical work with dyslexic children in the late 'eighties, Matějček (1974) mentions the high comorbidity between delayed and unbalanced language development and dyslexia. Also, a highly regarded speech therapist, Zdeněk Žlab, noticed as early as in 1960 and later, together with his colleagues, documented (Žlab, Šturma & Šotolová, 1983) a connection between

certain specific speech impairments (clumsiness in articulation and specific sound assimilation) and dyslexia and dysorthographia. Moreover, Matějček (1995) recommended using simple phoneme awareness tasks (blending and phoneme detection) to be used when screening children's very early reading skills or difficulties related to early reading development. He mentioned the predictive role of phonemic skills with respect to reading development (ibid., p. 117). However, he kept stressing the essential role of neuropsychological processes in reading development (1995, p. 76), and for a relatively long time he considered phonemic awareness to be just an aspect of the symptomatology of reading difficulties related to auditory perception (Matějček & Vágnerová, 2006). The integration of Matejček's view on the role of phonological skills and reading development within the current cognitive and psycholinguistic models of reading (and dyslexia) was recently provided by Jošt (2011). His excellent review shows the surprising closeness of Matejček's typology of subtypes of dyslexia to what are termed phonological theories of dyslexia in the current international literature (ibid., p. 65).

When reflecting on the overall approach in Czech research, educational, and counselling practice in relation to the development of literacy, it has to be said that traditionally the visual and auditory processes were believed to be of primary importance for the understanding of reading development and reading difficulties. This probably has its roots in the very strong clinical backgrounds to the study of literacy in Czech Republic. Matějček and his collaborators were mainly practising clinical or counselling psychologists (e.g. Šturma, Zelinková, Jucovičová, Žáčková) with a very strong reliance on clinical experience. This clinically-based approach exerted a great influence on generations of educational psychologists in Czech Republic. There was almost no feeling that it was important for the research to contribute to the understanding of the development of literacy. This, however, slowly started to change in the late 'nineties under the influence of: 1) psycho-linguistically-oriented speech therapists, mainly from the Slovak Republic (Mikulajová, 2008); 2) international research results being translated into the Czech literature (for example, Pokorná, 1997 from German-speaking communities); 3) international researchers studying literacy from what is termed a cross-linguistic perspective (Caravolas & Bruck, 1993; Mertin, 2001), and 4) constructivist approaches in Czech developmental psychology, especially what is known as school ethnography (Kučera, 1992).

School ethnographers influenced by constructivist approaches (mainly Ferreiro) conducted what were probably the first systematic longitudinal studies on the development of literacy in the Czech Republic (Kučera &Viktorová, 1998). The papers published by this research group provided detailed qualitative analyses of children's production and literacy-

related behaviour in schools, or rather classrooms, and provided an understanding of the principles of the interrelationships between cognition and culture and socio-cultural background (Pražská skupina školní etnografie, 2005) However, a specific feature of school ethnography papers is that they report almost no concrete comparable developmental data, so it is very difficult to transfer or generalise the results into counselling practice or assessment procedures.

The psycholinguistic and cognitive approach to studying literacy could be understood as using and appreciating studies on the development of language and cognitive skills to gain an understanding of the principles of the development of literacy. European research within this approach has been shared in English-speaking communities for more than 30 years. The psycholinguistic and cognitive approaches opened up interest in systematic longitudinal research on the development of literacy and on what are called pre-literacy, very often language-related, skills. As a result of this research, the prerequisites for the development of reading and spelling in various European languages were studied and described intensively and hugely and gradually were also compared across languages (cross-linguistic comparisons). This approach actually made language skills for research within literacy important – for example, the essential role played by the quality of phonological skills during preschool age for early reading and spelling development was gradually proven in many research studies in European countries, Australia, and North America (see, for example, the classic studies by Goswami & Bryant, 2016 or earlier editions).

Concerning the Czech research within this psycholinguistic and cognitive approach, the specific contribution of Markéta Caravolas has to be mentioned at this point. The first research papers publishing developmental data on the development of literacy in Czech children were published by her or her research teams (Caravolas & Bruck, 1993; Caravolas & Volín, 2001). She actually succeeded in bringing together phoneticians, psychologists, speech therapists, and linguists in the Czech (and also Slovak) Republic to invest in essential developmental research, both exploratory and confirmatory, to gain an understanding of the development of literacy. Her papers and papers she wrote with her collaborators in the Czech Republic should be understood as being truly influential for research on literacy in the Czech language (Caravolas et al., 2012; Caravolas et al., 2013; Caravolas, Volín, & Hulme, 2005; Hulme, Caravolas, Málková, & Brigstocke, 2005; Caravolas & Volín, 2005; Seidlová Málková & Caravolas, 2013; Seidlová Málková & Caravolas, 2016).

Let us now take a closer look at some of the most important findings of psycholinguistically-oriented research conducted in Czech. In 2005 Caravolas, Volín, and Hulme examined the role of phonemic awareness in relation to other

possible concurrent predictors of literacy skills in a cross-linguistic study of Czech and English children in the second to fifth grades (or the seventh grade in the case of the English ones). Though the central role of phonemic awareness in the development of reading and spelling was well established in the case of languages with inconsistent orthography, such as English, at that time, the generality of the claim was being questioned. To summarise the results, we can conclude that both study 1 (investigating typically developing Czech and English readers) and study 2 (comparing the deficits of Czech and English children with dyslexia) supported the view of phonemic awareness as a core component skill of alphabetic literacy, equally important across orthographies. Additionally, in the case of reading comprehension the path analysis illustrated the strong influence of another oral language skill – vocabulary knowledge.

The importance of various language skills for literacy development in the Czech language was further elaborated as a part of a cross-linguistic longitudinal study assessing the possible predictive role of various language and cognitive skills for early literacy development (Caravolas et al., 2012). Children speaking four different European languages (English, Spanish, Czech, and Slovak) were followed from preschool age to the second grade of primary school (approx. five to eight years of age). The importance of three prerequisite skills – phonemic awareness, letter-sound knowledge, and rapid automatised naming – for the beginning of reading and spelling was confirmed as being applicable to all four languages that were assessed (in reading development by using parallel cross-linguistic comparative longitudinal studies in English, Spanish, and Czech). The results of this study show that children learning to read in more consistent orthographies acquire reading more rapidly than children in less consistent orthographies. However, the cognitive prerequisites for learning to read seem to be universal for alphabetic languages (e.g. English, Spanish, and Czech).

A special contribution to the understanding of the relationship of language skills and reading in Czech should be attributed to Anna Kucharská, who conducted the first longitudinal study of children with specific speech and language impairments (called developmental dysphasia in the Czech literature – Richterová & Seidlová Málková, 2017) and with a group of children with a familial risk of dyslexia (Kucharská, 2014; Moll et al., 2016). First, one hundred and forty-nine children with various risk language- and family-related factors, together with typically developing children of preschool age, were followed for three years, from five to approx. eight years of age (reaching the first or second grade of primary school at the end of the study) and the prerequisite skills for literacy in the case of children at risk of dyslexia were investigated. Data analysis for a combined Czech and Slovak research sample (Moll et al., 2016) revealed a similar pat-

tern of results to that found earlier in a study of typically developing children (Caravolas et al., 2012) and confirmed the key role of phonemic awareness, letter-sound knowledge, and rapid automatised naming for the early development of literacy. Finally, a cohort of 98 children from the original sample of children was further repeatedly assessed till the third grade through an extended follow-up. An alarming result of this study (Kucharská, 2014) points out that throughout the study the language-impaired children were gradually facing more and more serious difficulties in literacy skills (especially in reading comprehension and writing), despite the fact they were identified within the Czech counselling system (and thus received some interventions targeting their difficulties).

Following the study of Caravolas et al. (2012, 2013), systematic research on reading comprehension within Czech primary schoolchildren was gradually conducted by researchers from the Faculty of Education of Charles University from 2013 to 2016 (for example Kucharská et al., 2015; Špačková et al., 2016). Reading comprehension and reading-related skills were investigated in a group of 515 first-to-fourth-graders using several measures of reading comprehension. Regression analysis for two different types of reading comprehension tests revealed the key role of implicit grammatical (especially morpho-syntactic) skills for the development of reading comprehension throughout the first five years of primary school (Seidlová Málková & Kucharská, 2016). Besides the investigation of the typical development of reading comprehension, the research project also examined word-level reading and reading comprehension skills in groups of children who were at risk in terms of their development of literacy (Sotáková et al., 2014; Špačková et al., 2016). Specifically, children in the fourth grade with dyslexia, specific language impairment, and autism spectrum disorders were assessed. What are termed poor comprehenders (children with a low level of oral language and reading comprehension skills), a category relating to reading difficulties that is almost totally neglected in the Czech research literature, were introduced and studied in comparison with a sample of typical developing children (Presslerová, 2016). The results of the study of the at-risk groups point out the fact that in order to characterise the reading profile of a child with a clinical diagnosis the traditional clinical procedures, which include almost no psychometric assessment, are not very helpful. Direct differentiation of at-risk profiles according to the level of word decoding skills and oral language proficiency (listening comprehension) was shown to be very effective, not only for the precise and functional description of reading comprehension difficulties within the assessment procedures but also for the process of setting up the design of tailored interventions.

Concurrently, Seidlová Málková (2015) and Seidlová Málková and Caravolas (2016) studied the developmental rela-

tionship of letter knowledge and phonemic awareness by implementing experimental training designs in the real-world setting of Czech kindergartens. Functional and effective forms of very early systematic educational support for both these important pre-reading skills were provided as a result of the training activities included in the experimental design. In relation to the developmental interaction between phoneme awareness and letter knowledge, phonemic awareness was described in this research study as being an ability that arises separately (not as a result of the development of letter knowledge) and furthermore, an independent predictor of growth in letter knowledge.

As we have been trying to show, the relationship between language skills and the development of reading as an attractive topic in Czech research now has a stable basis and is slowly beginning to show its importance and efficiency for the practice of psychology, speech therapy, and special education counselling too. For now we can rely on research results (including Czech samples) proving the importance of phonological skills, letter knowledge, and rapid automatised naming in the set of skills that are prerequisites for early literacy and the role played by the interaction between phonemic awareness and letter knowledge in the development of literacy. However, there is a growing body of evidence that indicates the importance of broader language skills (lexical and grammatical) for the development of text comprehension skills. The findings also support the conviction that is widely accepted today (e.g. Scarborough, 2005; Keenan & Meenan, 2014) that reading ability cannot be treated as a unitary construct and that reading tests should not be used interchangeably. That is why more interest should be paid to the specific nature of the interaction between phonological (including phonemic awareness) skills and other language skills during preschool age. Of course, the specific role played by other language skills at the beginning and also throughout the development of various literacy skills should be further researched with Czech pupils.

Though some data on literacy and language skills in Slavic languages such as Czech is available, we are still almost at the beginning in understanding the relations and development. Czech research and counselling practice lacks a full set of reliable, sensitive, and standardised assessment tools for many aspects of language and literacy. For the Czech language samples, there is still a lack of longitudinal developmental data covering older primary school readers and many at-risk (clinical) groups of children. Last but not least, there is a need for more intervention studies to test the putative causal links between language and literacy skills.

We think that this special issue could play some role in promoting further interest in various research topics touching on the relationship between the development of language and literacy. The

papers submitted for this special issue truly show a broadness of this topic.

The first paper, a review by Marja Volemanová and Lea Květoňová, provides an insight into the current knowledge concerning the relationship between specific language impairment (SLI), motor development, and the acquisition of literacy in children. Specifically, these authors address the issue of difficulties in balance, general static coordination, and general dynamic coordination often observed in children with speech/language impairments and consider the value of specific movement intervention programmes in order to mitigate the speech/language impairment.

Zuzana Hoždorová and Olga Kučerová focus on the issue of silent reading in their research study. Though silent reading is a common activity performed by Czech pupils in class, not much attention is paid to silent reading in the counselling and diagnostic processes. The main aim of the present study is to evaluate a modified version of a reading comprehension test based on reading a story (Kucharská & Vykoukalová, in preparation) as a possible assessment tool for the explicit and implicit silent reading comprehension skills of fifth-grade pupils. It is important to mention that the study reacts promptly to the current situation in the education system and presents the data analysis in relation to the two main instructional methods for writing used in contemporary Czech elementary schools.

Gabriela Seidlová Malková explores the development of phonological, reading, and spelling skills in preschool children who are precocious (very early) readers. She is actually following the almost forgotten original studies of early readers by Prof. Matějček, the founder of reading research in Czech Republic. The results of this paper show the superiority of precocious readers in terms of the phonemic awareness skills of very early readers and the boosting and stabilising role played by phonological skills in fluency in early reading. This paper is truly an invitation to perform further research on precociously reading children by stressing the importance of family background for early reading development and by pointing out the methodological issues related in conducting research on very early readers.

In the fourth study, Anna Kucharská and Helena Podpěrová introduce a validation study of a pilot adaptation of the Children's Communication Checklist-2 questionnaire (Bishop, 2003) conducted with a group of Czech preschool children. Besides other important results, the study confirms the potential of the Czech version of the tool regarding distinguishing children with Specific Language Impairment from children with typical development.

Finally, two reports introduce the aims and key activities of EU-funded projects concerning literacy and literacy practice in schools. Klára Špačková and Anna Kucharská provide information on the activities and current state of the project "Increasing quality in the education of

pupils and the development of key competencies, educational areas, and literacies". Gabriela Seidlová Málková introduces the European Literacy Network (ELN) and its activities. She also invites us to an interesting upcoming event organised by the ELN network, the first European summit on literacy in Porto, November 2018.

Throughout the whole special issue we can track the effort of the authors to contribute to the understanding of the development of literacy and the associated risks in order to be able to help any child in need. We hope that this special issue can be a source of inspiration for those interested in both literacy and language research. We wish our readers pleasant and thoughtful reading!

The preparation of this paper was supported by the Ministry of Education, Youth, and Sports – Institutional Support for Long-term Development of Research Organizations – Charles University, Faculty of Education (2017, Q17).

Klára Špačková, **Gabriela Seidlová Málková**
editors

Bishop, D. V. M. (2003). *The Children's Communication Checklist version 2 (CCC-2).* London: Psychological Corporation.

Bryant, P., & Goswami, U. (2016). *Phonological skills and learning to read*. Oxon: Routledge.

Caravolas, M., & Bruck, M. (1993). The effect of oral and written language input on children's phonological awareness: A cross-linguistic study. *Journal of Experimental Child Psychology*, *55*(1), 1-30.

Caravolas, M.,Lervag, A., Mousikou, P., Efrim, C., Litavský, M., Onochie-Quantillas, E., Salas, N., Schöffelová, M., Defior, S., Mikulajová, M., Seidlová Málková, G., Hulme, CH. (2012). Common Patterns of Prediction of Literacy Development in Different Alphabetic Orthographies. *Psychological Science*, 23(6), 678–686.

Caravolas, M., LervÍg, A., Defior, S., Seidlová Málková, G., & Hulme, Ch. (2013) Different patterns, but equivalent predictors, of growth in reading in consistent and inconsistent orthographies. *Psychological Science*, 2013, 24, 8, 1398-1407.

Caravolas, M., & Volín, J. (2001). Phonological spelling errors among dyslexic children learning a transparent orthography: the case of Czech. *Dyslexia*, *7*(4), 229-245.

Caravolas, M., & Volín, J. (2004). *Baterie diagnostických testů gramotnostních dovedností pro žáky 2. až 5. ročníku ZŠ. [The Battery for the Assessment of Literacy Skills in Children from the Second to the Fifth Grades of Primary School]*. Praha: Institut pedagogicko-psychologického poradenství.

Caravolas, M., Volín, J., & Hulme, C. (2005). Phoneme awareness is a key component of alphabetic literacy skills in consistent and inconsistent orthographies: Evidence from Czech and English children. *Journal of Experimental Child Psychology*, *92*(2), 107-139.

Heverоch, A. (1904). O jednostranné neschopnosti naučiti se čísti při znamenité paměti. [About one-sided inability in learning to read along with an excellent memory] *Česká škola*, 1904/1905.

Hulme, C., Caravolas, M., Málková, G., & Brigstocke, S. (2005). Phoneme isolation ability is not simply a consequence of letter-sound knowledge. *Cognition*, *97*(1), B1-B11.

Jošt, J. (2011). *Čtení a dyslexie*. [Reading and dyslexia]. Praha: Grada.

Keenan, J. M., & Meenan, C. E. (2014). Test Differences in Diagnosing Reading Comprehension Deficits. *Journal of Learning Disabilities*, 47(2), 125-135.

Kučera, M. (1992). Školní etnografie: přehled problematiky. [School ethnography: state of the art]. *Studia Paedagogica*, 8.

Kučera, M., & Viktorová, I. (1998). *Čtení/psaní v první třídě* [Reading/writing in the first grade]. In: Pražská skupina školní etnografie (Ed.). *První třída* (pp. 61-168). Praha: Univerzita Karlova v Praze.

Kucharská, A. (2014). *Riziko dyslexie.Pregramotnostní schopnosti a dovednosti a rozvoj gramotnosti v rizikových skupinách* [*Risk of dyslexia. Preliteracy skills and abilities and literacy development in at-risk groups*]. Praha: PedF UK.

Kucharská, A. et al. (2016). *Porozumění čtenému III. Typický vývoj porozumění čtenému - metodologie, výsledky a interpretace výzkumu* [*Reading Comprehension III. Typical Reading Comprehension Development – methodology, results and interpretation of the research*.] Praha: PedF UK.

Matějček, Z. (1974). *Vývojové poruchy čtení.* [Developmental disorders of reading]. Praha, SPN.

Matějček, Z. (1995*). Dyslexie -specifické poruchy čtení.* [Dyslexia – specific reading disability]. Praha: H+H (third edition).

Matějček, Z. (1997). Early Readers in Czech. *Dyslexia*, (3(1), 48-54.

Matějček, Z., & Vágnerová, M. (2006). *Sociální aspekty dyslexie*. [Social aspects of dyslexia]. Praha: Karolinum.

Mertin, V. (2001). Fonologický model poruch čtení [Phonological model of reading disabilities]. In Psychologické problémy člověka v měnícím se světě I. Acta universitatis carolinae. Philosophica et historica. *Studia psychologica* IX. Praha : Karolinum, 165-174.

Mikulajová, M. (2008). Možnosti ranej predikcie vývinových porúch písanej reči. [Possibilities of early prediction of developmental disorders in written language]. *Československá psychologie*, 52, 59-69.

Moll, K., Thompson, P. A., Mikulajova, K., Jagercikova, Z., Kucharska, A. Franke, H., Hulme, C., & Snowling, M. J. (2016). Precursors of Reading Difficulties in Czech and Slovak Children at Risk of Dyslexia. Dyslexia, 22, 2, 120-136, doi: https://doi.org/10.1002/dys.1526

Pokorná, V. (1997). *Teorie, diagnostika a náprava specifických poruch učení* [Theory, assessment and interventions of specific learning difficulties]. Praha: Portál.

Presslerová. P. (2016). Slabý čtenář s deficitem porozumění [Poor reader with comprehension deficit]. In Špačková, K. et al. *Porozumění čtenému IV. Porozumění čtenému u dětí s rizikem čtenářských obtíží – metodologie, výsledky a interpretace výzkumu*. *[Reading Comprehension*

IV. Reading comprehension in children at risk of reading difficulties – methodology, results and interpretation of the research]. Praha: PedF UK.

Pražská skupina školní etnografie (2005). *Psychický vývoj dítěte od 1. do 5. třídy.* [Children's psychic development from the first till the fifth grade]. Praha: Karolinum.

Richterová, E., & Seidlová Málková, G. (2017). Specific language impairment in the long-term perspective – the importance of assessment procedures, reading skills, and communicative competence. *Health Psychology Report*, 3(1).

Scarborough, H. S. (2005). Developmental relationship between language and reading: reconciling a beautiful hypothesis with some ugly facts. In H. G. Catts & A. K. Kamhi (Eds.) *The Connections Between Language and Reading Disabilities*, 3-24. New York: Lawrence Erlbaum Associates.

Seidlová Málková, G. (2015). *Vývojový vztah fonematického povědomí a znalosti písmen*. [The developmental relationship of phonemic awareness and letter knowledge]. Praha:Togga.

Seidlová Málková, G., & Caravolas, M. (2013). *Baterie testů fonologických schopností, BTFS. [The Test Battery for the Assessment of Phonological Awareness].* Praha: Národní ústav pro vzdělávání.

Seidlová Málková, G., & Caravolas, M. (2016). The development of phoneme awareness and letter knowledge: A training study of Czech preschool children. In *Actes du Symposium international sur la litéracie ŕ l'école/International Symposium for Educational Literacy (SILE/ISEL) 2015* (pp. 31-56). Les Éditions de l'université de Sherbrooke, 2016.

Seidlová Málková, G., & Kucharská, A. (2015). Porozumění čtenému a jeho prekurzory, dílčí studie [Reading comprehension and its precursors, a partial study] In Kucharská, A. et al., *Porozumění čtenému III. Typický vývoj porozumění čtenému - metodologie, výsledky a interpretace výzkumu* (*Reading Comprehension III. Typical Reading Comprehension Development – methodology, results and interpretation of the research*]. 127-140. Praha: PedF UK.

Sotáková, H., Špačková, K., Presslerová, P., Richterová, E., Kucharská, A., & Seidlová Málková, G. (2015). *Porozumění čtenému II. Porozumění čtenému u dětí s rizikem čtenářských obtíží – východiska, témata, zdroje - kritická analýza a návrh výzkumu. [Reading Comprehension II. Reading comprehension in children at risk of reading difficulties – theoretical background, topics, sources – critical analysis and research design*]. Praha: Pedf UK.

Špačková, K. et al. (2016). *Porozumění čtenému IV. Porozumění čtenému u dětí s rizikem čtenářských obtíží – metodologie, výsledky a interpretace výzkumu. [Reading Comprehension IV. Reading comprehension in children at risk of reading difficulties – methodology, results and interpretation of the research*]. Praha: PedF UK.

Žlab, Z. (1960). Soubor vyšetřování zvláštností v motorice a percepci u dětí s lehkou dětskou encefalopatií. [The battery for the assessment of motor and perception impairment in children with minimal brain dysfunction]. *Otázky defektologie*, 2, 71-76.

Žlab, Z., Šturma, J., & Šotolová, E. (1983). Specifické poruchy výslovnosti a jejich symptonová hodnota. [Specific articulation impairment and its symptomatological value]. *Psychológia a patospychológia dieťaťa*, 17, 207-213, 319-332.

GRAMOTNOST, PREGRAMOTNOST
A VZDĚLÁVÁNÍ, 1, 3, 13–30

Links Between Specific Language Impairment, Motor Development, and Literacy Acquisition in Children

Marja Volemanová, Lea Květoňová

Abstract: This study set out to explore the links between specific language impairment (SLI), motor development, and literacy acquisition in children. We focused on motor those motor deficits that are most common in children with SLI; furthermore, we investigated whether SLI can be caused by persisting primary reflexes or if they can make the symptoms of SLI worse. After that we tried to find out if it is possible to predict SLI already in small children by an early development assessment and if a specific movement intervention programme would also be useful to help children with SLI because children with developmental speech/language impairments are at higher risk of reading disability than their intact peers with no history of speech/language impairment (Schuele, 2004). We still do not fully understand the causes and biological basis of SLI; however, on the evidence of the sources studied, a significant relationship between motor impairment and speech/language impairments in children was found. Typical difficulties lie in the areas of balance, general static coordination, and general dynamic coordination. This developmental delay may be related to the persistence of primary reflexes or can be caused by a cerebellar deficit. Several early developmental assessments are available, but they do not comprehensively test both motor development and language skills. Specific movement intervention programmes for children with SLI and other developmental challenges have already been developed, but we lack fundamental research (only a few case studies on this topic are available) which shows the success rate for children with SLI. Further research should be conducted to identify children who may need special interventions even before they receive the SLI diagnosis, and to search for approaches which can help to mitigate the impairment.

Keywords: Specific language impairment (SLI); motor development; literacy acquisition; persisting primary reflexes

Definition of specific language impairment

According to the DSM-IV-TR criteria (Diagnostic and statistical manual of mental disorders published by the American psychiatric association, 2000), specific language impairment (SLI) may be diagnosed when language abilities are significantly below age expectations but where non-linguistic developmental abilities are within age expectations. That means there must be a marked discrepancy between language scores and nonverbal IQ on standardised tests. In addition, the language difficulties must interfere with academic achievement or occupational achievement or social communication. The language impairment is not secondary to conditions such as hearing loss, developmental delay, a neurological insult, or environmental deprivation.

In the foreign literature, however, we can also find other terms for developmental language disorders. We can distinguish three groups in the terminology.

In the first group, the focus is on the disorder. In the Netherlands and Belgium these terms are used: specifieke taalontwikkelingsstoornis, primaire taalontwikkelingsstoornis, aangeboren taalontwikkelingsstoornis, taalontwikkelingsstoornis, and spraak- en taalontwikkelingsstoornis. In the UK and the USA the terms (specific) developmental language disorder or language acquisition disorder are used.

In the second group, we see the word dysphasia. In Dutch the terms that are used are ontwikkelings dysfasie or dysfatische ontwikkeling, in German entwicklungsdysphasie, in French la dysphasia, in English developmental dysphasia, and in Czech vývojová dysfázie.

The third group focuses on the impairment without trying to explain the medical origin of the problem. In Dutch, we find the term ernstige spraak/taalmoeilijkheden, in English specific language impairment (SLI), developmental language impairment, or primary language impairment and recently we have also been able to find the term procedural language impairment.

The reason why so many different terms are used for what is essentially the same problem is that the authors want to focus on a part of the problem. For a long time the term developmental dysphasia was frequently used. This term came from the medical world and points to the neurological origin of the language impairment. Later, however, some authors from the non-medical environment determined that the term developmental dysphasia is not accurate, because children with a language impairment do not have a demonstrable brain injury. Moreover, it would be too easy to confuse it with the term “child aphasia”, which is caused by brain damage (Zink & Breuls, 2012). Therefore, in the ’90s some authors in England and the USA started to use the terms “Specific Developmental Language Disorder” and “Specific Language Impairment”. The term “disorder” points out that it is not just a delay in language development,

but it also points out to root cause of the language problem . The term "impairment" shows that there is a problem with language development, but does not call this problem a disorder and does not try to seek the origin of the problem. This group can include children with a language developmental delay, out of which they can grow, as well as children with a persistent language impairment. One of the most significant comments on the term SLI is that the "S" (specific) in SLI would exclude the possibility that a child can have other developmental problems as well. It is true that the definition of SLI states that the impairment is not caused by other developmental problems such as a hearing impairment, socio-emotional problems, etc., but that does not exclude the possibility that the child faces other developmental challenges as well. This is probably the reason why the term "developmental dysphasia" is still firmly embedded in Europe. In this review study, however, I will use the term "SLI" because it is the most common one in English-language sources, but to provide the opportunity to locate as many studies as possible, I also searched for and used studies which use the other commonly used terms mentioned above.

Specific language impairment, motor development, and literacy acquisition

Categorical diagnosis is an integral part of everyday clinical and research practice. We are so insistent on the distinction between disorder and not disorder (normalcy) that clinics and clinicians become more and more specialized and cater to the needs of children with autism spectrum disorder/ASD only, attention-deficit/hyperactivity disorder/ADHD only, language disorder only, reactive attachment disorder/RAD only, or tourette syndrome only. This has led to a situation in which the typical clinical diffuseness of disorder has come to be underestimated (Gillberg, 2013).

A number of studies have shown that SLI is not "specific" and that comorbidities are common (Dyck & Piek 2010; Gillberg, 2010; Hill, 1998; Kaplan et al., 1998; Manor, Shalev, Joseph, & Gross-Tsur, 2001). In particular, there is growing evidence that many children with SLI have some level of motor difficulty (Hill, 2001; Webster et al, 2006). Hill (2001) states that children with SLI generally experience a broader range of difficulties, of which motor incoordination is one. Hill produced a list of studies that investigated non-linguistic abilities in children with SLI. The majority of studies reported have focused on fine motor tasks, and particularly on the time taken to complete the task as the variable of interest. Typically, children with SLI are reported to be impaired relative to their normally developing peers, although on some repetitive finger-tapping tasks their performance was unimpaired, as it was on the task of placing crosses in boxes. In contrast, where performance accuracy on a fine motor task has been

assessed, children with SLI tend to be unimpaired in comparison with their normally developing peers (Johnston et al., 1981; Preis et al., 1997), with the exception of performance on the Ayres motor accuracy test revised. Jenkins and Lohr (1964) point out that for gross motor skills, the typical difficulties lie in the areas of balance, general static coordination, and general dynamic coordination. Powel and Bishop (1992) agree with this result, and state that children with SLI have problems with tasks such as balance, throw-clap-catch, and ball rolling-stick (with the preferred hand). However, ball rolling-stick with the non-preferred hand and ball rolling-foot are unimpaired. Other researchers find different outcomes. Johnston et al. (1981) find that children with SLI have, in the gross motor area, problems with hopping, but are unimpaired in tasks such as line walking, unipedal stand, and bipedal stand (which are balance tasks). Finlay and McPhillips (2013) used the Movement ABC-2 test in their research to compare the motor abilities of children with SLI to age-matched children with typical language development and age-matched children who had not been clinically identified as having SLI but exhibited low levels of language abilities. The objective of their study was to determine whether children with SLI experienced greater motor difficulties than children without an SLI diagnosis. The outcome was that children with SLI scored significantly lower on all three composites ("manual dexterity", "aiming and catching", and "balance") of the MABC-2 test when the age-matched low language and typical (intact) groups were compared.

Estil et al. (2003) also tried to identify children (of the ages of 7–8 years, 9–10 years, and 11–12 years) with motor impairment problems by using the Movement ABC test; the results of the total scores on this test showed a significant difference in overall motor performance between the two groups (a language-impaired group and control group), which confirm the findings of those studies that have shown a significant association between language and motor impairment. But, they add, the coincidence of language and motor impairments is characteristic for only a limited sample of language-impaired children and so caution should be observed in making generalisations on the basis of group data without a more careful investigation of individual language/motor profiles. Where motor and language impairment occur together, they argue, the motor deficiencies may not be general but restricted to a relatively small number of fine motor skills. That is why Hill (2001) proposed that children with SLI who experience motor difficulties are maybe a subset of those with SLI. The first group of children with SLI who were identified as experiencing significant motor difficulties on the Movement ABC test (Clumsy SLI) and the second group are those, who according to the MABC test, are developing in a motorically normal fashion (non-Clumsy SLI). DiDonato, Brumbach and

Goffman (2014) are not surprised that children with SLI are heterogeneous, and only some showed an overt motor deficit. According to DiDonato Brumbach and Goffman, in neuroanatomical studies we find the reason why children with SLI show co-occurring deficits in the language and motor domains. Broca's area, which is involved in syntactic language functions, also coordinates the mirror neuron system, which supports the notion of a specific relationship between syntactic and motor abilities. Jäncke, Siegenthaler, Preis, and Steinmetz (2007) showed that children with developmental language disorders had a reduced volume of white matter in the motor areas of the left hemisphere and also corresponding behavioural deficits in a complex manual coordination task. Estil et al. (2003) also propose two hypotheses on the neuro-psychological level: the cerebellar deficit hypothesis and the inter-hemispheric deficit hypothesis.

The main implication of the automaticity/cerebellar deficit hypothesis is the presence of motor deficits in dyslexic children. Phonological dyslexics is a deficit closely related to phonological language impairment (Plaza, 1997). Using clinical tests of cerebellar function, Plaza found dyslexics to be impaired in terms of balance and a number of fine motor tasks associated with cerebellar function. That language-/motor-impaired children exhibit similar deficiencies in motor skills to those of dyslexic persons suggests that there might be a common mechanism that mediates all these deficiencies (Estil, 2003). Some of the cerebellar tests involve the speed of manual movement (tracking), bimanual co-ordination (for example rapid alternating movements), and static balance, which are similar categories of motor skill to those that appeared to be critical to language and motor impairment. According to Richard Ivry and his colleagues (Ivry & Diener, 1991; Ivry & Keele, 1989; Keele et al., 1985), bimanual movements may be dependent on the temporal coupling of signals within the cerebellum. Each half of the cerebellum has been shown to regulate the temporal aspects of movements on the ipsi lateral side independently. This suggestion is based on findings from repetitive finger-tapping tests on cerebellar patients. The significant differences between the groups on the task of drawing (tracking) can also be accommodated in the cerebellar explanation. A study using positron emission tomography (PET) (Jueptner et al., 1996) showed that the cerebellum, and to some extent also the basal ganglia, was activated during a visually guided tracking task, where the participants had to track a series of lines with a mouse pointer on the screen. Additionally, in a study of cerebral blood flow Grafton et al. (1992) found that tracking a moving target with the index finger activated the primary motor cortex, dorsal parietal cortex, precuneate cortex, supplementary motor area, and ipsi lateral anterior cerebellum. Diamond (2000; Estil, 2003) probes deeper into the causal network in her concept of a neuroanatomical cir-

cuit deficiency between the prefrontal cortex and the cerebellum. She argues that motor and cognitive development are much more interrelated than was previously appreciated, and points to the fact that fine motor control, bimanual co-ordination, and visuomotor skills, together with certain cognitive operations, are not fully developed until adolescence, which may be seen in relation to the phylogenetic development of the neocerebellum and the prefrontal cortex, which proceed in parallel (Estil, 2003). Raberger and Wimmer (2003) attempted to examine, within the cerebellar deficit hypothesis, the relationship of reading disability (RD) and attention deficit hyperactivity disorder (ADHD) with balancing problems. They found that a specific cerebellar dysfunction probably affects only the automatisation of such visual-verbal processes. Other cerebellar functions which are responsible for the automatisation of basic sensory-motor skills such as balancing may not be affected in dyslexic children but are in children with ADHD. Static balancing on one leg involves proprioceptive information from the foot, which is processed in the right hemisphere, and so it is possible that balancing problems in some children with dyslexia and SLI can be caused by right hemispheric insufficiency with or without a dysfunctional corpus callosum. The study of Meister et al. (2003) supports the theory of the existence of a strong evolutionary link between the cortical hand area and the development of language. This hypothesis emerges from the existence of mirror neurons that are active both during observation and the execution of tasks such as grasping objects. These neurons are located in an area of the cortex of macaque monkeys that seems to correspond to Broca's area in the human cortex. The proponents of this theory argue that such an observation/execution-matching system can bridge the gap between action and communication about action and thus forms the neural basis of the development of language. According to this theory, there should be phylogenetically old links between motor hand and language areas, and these would be responsible for the effect they found. Several findings emphasise the assumption of a functional coupling between speech and the hand motor area of the language-dominant hemisphere. One obvious link between these two regions is the fact that involuntary gestures are often performed during speech. Children with speech/language impairments are at great risk of reading disabilities. Schuele (2004) concludes that "proficient reading requires highly integrated skills across word decoding and comprehension that draw on basic language knowledge (semantics, syntax, and phonology). Children with language impairments have problems in decoding and comprehension. Clearly, expressive and receptive oral language deficits are associated with the reading disabilities of young children who have developmental language impairments, but related deficits in phonological awareness are a factor as well."

Specific language impairment, motor development, and primary reflexes

Another hypothesis is that the underlying developmental delay of children with SLI and dyslexia is related to the persistence of primary reflexes. Primary reflexes emerge in utero and their appearance at this early stage of development suggests that they may play an important role in determining the functioning of the central nervous system (Illingworth, 1987). The primary reflexes are critical for the survival of the newborn, ensuring that the baby can breathe and feed (for example, the Moro reflex or infant suck and rooting reflexes). As the nervous system develops, however, they are inhibited or transformed and the persistence of primary reflexes beyond their normal timespan (12 months) interferes with subsequent development and indicates neurological impairment (Holt, 1994). Severe persistence of primary reflexes indicates predominantly intractable organic problems as in cerebral palsy (Bobath & Bobath, 1988), while milder persistence is associated with less severe disorders, including learning disabilities (Morrison, 1985). Certain disorders developed during early stages of life may lead to balance deficits as a consequence of higher-level dysfunctions of the central nervous system. The dysfunctions result in developmental deficits in the coordination of certain neurophysiological and mental functions. One of the particularly important postnatal developmental stages is the disappearance of primary (or primitive) reflexes. The primary reflexes represent specific forms of innate behavioural movement patterns which are replaced with higher motor and cognitive functions during postnatal development. These primitive reflexes may present a form of soft neurological signs if they occur in later stages of ontogenesis (Konicarová, 2013). Primary reflexes help the brain to learn how to control the body – visuomotor skills, processing visual and auditory information, balancing, coordination, gross and fine motor skills, etc. (O'Hara, 2009). It has been shown that some children with reading difficulties have underlying developmental delays and that this may be related to the persistence of primary reflexes (McPhillips & Sheehy, 2004). The findings of McPhillips suggest that for many children in mainstream schooling, the attainment of core educational skills may be affected by the persistence of this brainstem-mediated reflex system that should have been inhibited in the first year after birth, because, as shown earlier in this review study, phonological dyslexics is a deficit closely related to phonological language impairment, and so it is possible that primary reflexes have an impact on SLI as well. That is also proved by the case studies that I performed within my master's thesis (Volemanová, 2016), where a child with SLI had persisting primary reflexes and after inhibiting them, his problems with gross and fine (including oromotor) motor skills got better, as did his concentra-

tion. Also in a study evaluating the effectiveness of a specific movement intervention programme with children aged 8-11 years old with reading problems, it was found that it was possible to reduce the level of primary reflex interference, in particular asymmetrical tonic neck reflex, at this late stage of development and that this led to very significant progress in reading and writing skills (McPhillips, Hepper, & Mulhern, 2000). There are very close links between the inhibition of primary reflexes and the attainment of gross-motor milestones in young children (Capute et al., 1978; McPhillips, Hepper, & Mulhern, 2000). In children with SLI, the following primary reflexes seem to be important: the moro reflex, tonic labyrinth reflex (TLR), and asymmetrical tonic neck reflex (McPhillips, Hepper, & Mulhern, 2000; Volemanová, 2016).

Moro reflex

The moro reflex is an infantile reflex normally present in all infants (new-borns) up to three or four months of age as a response to a sudden loss of support, when the infant feels as if it is falling. If the reflex is absent, reduced, or hyperactive during the first three months of life, this may indicate various pathological conditions, mainly of cerebral origin (Zafeiriou, 2004). Children with a persisting moro reflex often have problems with balance, which is logical because vestibular stimulation seems to play a crucial role in triggering the moro reflex (Hanabusa, 1975 in Rousseaua et al. 2017). This reflex is controlled by the fear system (the primary emotional systems which control nuclei are in the subcortical structures of the brain), which can be activated from birth by unconditioned stimuli such as sudden noise. This also explains why Konicarová (2013) found a link between balance deficits, primary reflex persistence, and ADHD symptoms. Konicarová (2013) concludes that: "According to brain imaging studies these balance deficits are likely linked to prefrontal cortex deficits that influence attention and executive functions. These deficits may have a cerebellar origin and ADHD children in many cases exhibit atrophy in certain cerebellar parts associated with balance control. The deficits may be directly linked to inhibitory deficits and cause balance and motor dysfunctions. As a result of inhibitory deficits related to disturbed balance and motor functions observed with ADHD, the primitive reflexes that were not sufficiently suppressed in later stages of development may most likely persist. According to certain findings similar deficits in the primitive reflex suppression have also been observed in children with dyslexia." In this respect ADHD symptoms may present a compensatory process related to the interference of more primitive neural mechanisms with higher levels of brain functions related to coordination and balancing mechanisms as a result of insufficiently developed cognitive and motor integration. The consequence of this disintegration in the developmental

hierarchy of the central nervous system may be demonstrations of ADHD symptoms in response to various stimuli caused by the conflict between higher and lower levels of cognitive and motor functions within brain processing, which may cause the disintegration of mental functions.

Tonic labyrinth reflex (TLR)

There are two labyrinth reflexes that are triggered by the position of the head in relation to gravity – the prone and supine tonic labyrinth reflex. The TLR should be inhibited till the end of the fourth month after birth. When we lean the head of the child forward, all the limbs will flex (arms and legs), and when we tilt the head backwards while the child is lying on its back, the reflex causes the back to stiffen and even arch backwards, the legs to straighten, stiffen, and push together, the toes to point, the arms to extend at the elbows and wrists, and the hands to form fists or the fingers to curl. The purpose of this reflex is to develop the muscles used in flexion, which balance the extensor muscles that are developed when the child is placed on its back. If this reflex persists, the child will have problems with movements against the pull of gravity. This reflex persists if the child does not learn to hold its head properly at the age of three months. The normal motor development of the child goes in the craniocaudal direction, but if the TLR persists, the child will not learn to hold its head in the optimal position, which affects later balance. Balance mechanisms regulate other sensory organs and muscle groups, for example the position of the eye in the orbit (Lorenthe, 1932). At later ages, we see poor body posture, with the head protruding forward in relation to the shoulder joint, and as the body follows where the head goes, the shoulders will also hunch forward with it. In school, when it has to look down at a book, the child will have problems sitting straight. When the head is in a protruding position, the jaws will not be in a stable position for chewing and talking and low tongue posture can occur. The tongue too, at central level, involves several complex movements globally ruled by the central nervous system (CNS), particularly swallowing and mastication, but the tongue position also affects lower limb performance (Vico et al., 2014).

Asymmetrical tonic neck reflex (ATNR)

The most frequently observed persisting primary reflex in infants with neurological lesions is the ATNR (McPhillips, 2004). This reflex is elicited by a sideways turning of the head and the response consists of extension of the arm and leg on the side to which the head turns and flexion of the opposing limbs (Illingworth, 1987). The arm stretches out towards the direction that the eyes are pointing in and as the hand encounters objects, the foundations of early hand-eye co-ordination are laid (Holt,

1994). If the ATNR persists beyond the normal timespan, the child is likely to experience fine and gross motor control problems. The ATNR initially stimulates asymmetrical visual and motor exploration of the young child's environment but as it is inhibited symmetrical movements become possible with, for example, objects being brought to the midline and passed from one side to the other. The transference of objects across the midline is a significant motor milestone usually achieved between six and eight months after birth (Holt, 1994). The persistence of the ATNR will also disrupt the emergence of gross motor abilities such as rolling, creeping, crawling, riding a bicycle, and catching or kicking a ball. At school, when a child with a persistent ATNR looks towards the hand that is holding a pencil in order to write, the ATNR will cause an extensor tonus in that arm. This presents problems for the child in developing a fine flexor, tripod grip or maintaining a flexed elbow when writing or drawing. The child may have to employ excessive tension and effort and this leads to muscular fatigue in the writing arm and poor motor control. Indeed, there are very close links between the inhibition of primary reflexes and the attainment of gross motor milestones in young children (Capute et al., 1978; Volemanová, 2014). When a child climbs, it receives proprioceptive information from its movements, which are repeated again and again with minimal differences. Coordinated movements in climbing promote better differentiation of movements. Climbing improves the coordination of movements and strengthens the deep stabilisation system (which is a functional unit of muscles affecting the stability of the hull in the sagittal plane). It is also noted that the climbing phase stimulates myelination in the CNS (especially the corpus callosum) and improves the eye movements and hand-eye coordination (Volemanová, 2016). In this matter, the problems a persisting ATNR can cause are similar to the cerebellar deficit hypothesis and intra-/inter-hemispheric deficit explained before. McPhillips (2004) investigated the prevalence of persisting primary reflexes in the ordinary primary school population and how this is related to other cognitive and social factors. In the results of the research he summarises the effect of the ATNR on movement, verbal IQ, movement, and sex differences and movement and social disadvantage:

- ATNR and Movement ABC: the bivariate correlation coefficient between the persistence of the ATNR and motor difficulties (as assessed by the Movement ABC) indicated that there was a moderately significant correlation. This suggests that children with a persisting ATNR are also at risk of having motor difficulties (and vice versa);
- ATNR, Movement ABC, and verbal IQ: the bivariate correlation coefficient between verbal IQ and the persistence of the ATNR was moderately significant, while the correlation between verbal IQ and motor difficulties was just significant. This suggests that hi-

gher levels of verbal IQ are associated with lower levels of the ATNR and with higher levels of motor skills;
- ATNR, Movement ABC, and sex difference: there was no evidence of a significant relationship between Movement ABC scores and the sex of the child, while the persistence of the ATNR and sex of the child were found to be almost significantly related. These analyses suggest that the persistence of the ATNR is possibly related to the sex of the child, with boys more at risk than girls, while motor difficulties as measured by the Movement ABC test seem to be very evenly distributed between the sexes;
- ATNR persistence, Movement ABC, and social disadvantage: there is little evidence to suggest that children with high levels of persistence of the ATNR come predominantly from socially deprived backgrounds. The persistence of the ATNR seems to be unrelated to social background. Motor difficulties also seem to be unrelated to social background.

This suggests that the persistence of the ATNR plays a role, direct or indirect, in delaying the reading progress of a significant number of children attending ordinary primary schools (McPhillips, 2004). McPhillips concluded: "It would appear that a persistent ATNR may be a particular problem for many dyslexic children but it is not a defining characteristic of dyslexia and it is important to stress that the phenomenon of persistent primary reflexes and their association with reading difficulties does not constitute a coherent theory of reading development. It may be more appropriate to construe the persistence of primary reflexes as a developmental 'risk factor' that in conjunction with other factors may impact on specific aspects of development (including cognitive development). In other words, persistent primary reflexes cannot adequately explain the emergence of reading difficulties but they may indicate children at risk of reading difficulties."

Relations between motor developmental and communicative milestones

Infants' advances in locomotion are related to advances in communicative development. LeBarton and Iverson (2016) investigated whether motor development was also related to the emergence of both verbal and nonverbal communicative milestones with some specificity: sitting development related to both verbal and nonverbal communication milestones, and prone development related to nonverbal communication milestones. Improvements in sitting relate to advances in consonant-vowel production as a result of the anatomical consequences of the sitting posture. Increasing stability in sitting demonstrates that the infant possesses the trunk control necessary to stabilise sitting while extending the arm. This ability potentially broadens

the infant's opportunities to hold objects and extend them in the direction of the interlocutor to "show" the object to others in a manner that may support coordination with social behaviours (e.g. eye contact with the interlocutor). In other words, advances in sitting and prone development may have a far-reaching influence, impacting on development both within and beyond the motor domain. This far-reaching influence may extend beyond the immediate context through these cascading consequences. Thus, for example, motor development may shape the learning environment in such a way that advances in motor skill bring novel experiences with them (Iverson, 2010). For instance, increasing stability and flexibility in sitting support object manipulation and exploration activity by expanding the manual movement repertoire as well as supporting the coordination of looking while exploring. In addition to supporting the development of manual exploration, gross motor development in infancy supports interaction with people. Meaningful interactions with others may serve as an addition mechanism through which gross motor achievements can support language development. For instance, the production of gestures elicits input from others that may support word learning. Caregivers often "translate" an infant's gestures (e.g. a caregiver may say "that's a ball" when the infant shows a ball to them), and such translations relate to the emergence of these words in the infant's spoken vocabulary (Goldin-Meadow et al., 2007). Thus, developments in gesture production – supported by advances in gross motor skills – may elicit these translations, which may in turn support word learning.

But is it therefore possible to predict SLI in small children by early developmental (motor) assessment? Preschool children also acquire a variety of motor skills which are important for their physical and academic development. Therefore, understanding the relationship between motor skills and speech/language skills at preschool age is important for early intervention. Motor skills in preschoolers were shown to predict later achievement in reading and maths and proved useful in identifying children at risk in terms of their school achievement. Grissmer et al. (2010), for example, found out that together, attention, fine motor skills, and general knowledge are much stronger overall predictors of later maths, reading, and science scores than early maths and reading scores alone. The comorbidity of motor and speech/language impairments in 363 preschool children aged five and six years was also investigated by Cheng et al. (2009). It was determined that the children presented no apparent impairments of the neurological, musculoskeletal, or cardiopulmonary systems or mental insufficiency. Three speech/language tests and a motor test (Movement assessment battery for children, or M-ABC) were administered to them. The results showed a significant correlation between the total score for the motor test and the total score for

each of the speech and language tests. Regression analysis that controlled for IQ (C-TONI, the Chinese version of the Test of nonverbal Intelligence) further showed that the manual dexterity subtest, but not the ball skills or balance ones, of M-ABC was predictive of all the scores on the speech and language tests. Thus manual dexterity, in particular, seems to be an important clue for understanding the shared mechanism of motor and speech/language impairments. Cheng argues that this can be explained by a recent study (Meister et al., 2003) performed with transcranial magnetic stimulation (TMS). There they noted a strong correlation of the excitability of the hand motor area but not the leg motor area with speech events. It indicated a specific functional connection between the hand motor area and the cortical language network. These findings may explain why there were significant correlations of the manual dexterity subtests, but not the ball skill or balance ones, to all the speech/language scores. Meister et al. (2003) examined the excitability of the hand motor area and the leg motor area during reading aloud and during nonverbal oral movements using transcranial magnetic stimulation (TMS). During reading aloud, but not before or afterwards, excitability was increased in the hand motor area of the dominant hemisphere. This reading effect was found to be independent of the duration of the speech. No such effect could be found in the contralateral hemisphere. The excitability of the leg area of the motor cortex remained unchanged during reading aloud. The excitability during non-verbal oral movements was slightly increased in both hemispheres. The results may indicate a specific functional connection between the hand motor area and the cortical language network.

Woods (2014) also agrees that systematic developmental follow-up is important to reliably identify the needs of preterm children and allow for the provision of targeted early intervention. However, she warns that given the complexity of language development, controversy exists regarding the prognostic value of early testing in children later identified with language impairment, as deficits and certain subdomains of complex language function may not be evident when children are tested at an early stage.

Adi-Japha et al. (2011) studied the time-course of the acquisition of motor (including graphomotor) skills in typically developing preschool children and their peers with language impairment. Their findings indicate that when given a graphomotor learning task, kindergarten children with language impairment (LI) presented an atypical learning curve, differing significantly from the comparison group in the practice phase and in the post-training memory consolidation phase. Given the same training experience, the children with LI showed a late onset of rapid learning. Twenty-four hours post-training only the comparison group showed delayed gains in speed of performance, which were retained two weeks post-training. The children with

LI gained in speed from pre- to post-training, as well as from 24 hours post- to two weeks post-training, but at a cost in accuracy. Although at two weeks post-training they closed the gap in performance speed, they did not perform significantly better than their day one post-training level of performance. The matching procedure used in this study suggests that group differences cannot be explained by graphomotor performance per se, as indicated by the Beery-VMI scores. It should be noted, however, that the Beery-VMI test only measures accuracy of performance, and that the sample was small. This result suggests that children with LI may require more training or perhaps need more off-line time (or both) to show delayed gains. It may be hypothesised that retesting their abilities even later, possibly following some additional training, may demonstrate further improvement. The results of this study corroborate the hypothesis of a typical procedural memory system in children with LI. The results suggest that assessment batteries should incorporate assessment of motor skill learning as well as language in order to identify learning, rather than performance, deficits.

No other research was found to test the possibility of predicting SLI in small children by early developmental (motor) assessment, nor if SLI can be predicted by persisting primary reflexes. Finlay and McPhillips (2013) suggest that the clinical diagnosis of SLI may be influenced by the presence of additional developmental difficulties, which should be made explicit in assessment procedures. Additionally, persisting primary reflexes probably point out that the child has developmental difficulties, but it is not possible to specify which kind of difficulty.

Using a specific movement intervention programme with children with specific language impairment

If motor skills can impact on communicative development, then manipulating movement experiences by easing performance demands so that infants are able to perform movements just outside their capabilities may facilitate advances in communication.

Hitherto, only case studies were performed to investigate the effect of specific movement intervention programmes with children with SLI. In my master's thesis, I showed how inhibiting primary reflexes helps children with suboptimal psychomotor development (which may be caused by persistent primary reflexes and the symptoms arising from these). Here I describe how I worked with a boy (6.5 years old) with a diagnosis of developmental dysphasia (SLI) and dysarthria. By means of special exercises (in Czech "neuro-vývojová terapie") we inhibited all the persisting primary reflexes, which helped him to improve his gross motor skills (catching a ball, riding a scooter,

and swimming are no problem for him any more), and fine motor skills such as graphomotor skills and oromotor skills. In speech therapy, he just has to practise the pronunciation of the letter "r". Balance, crossing the midline with the eyes, and bimanual co-ordination tasks also got better, which shows that his interhemispheric coordination has got better.

Additionally, McPhillips (2000) evaluated the effectiveness of a specific movement intervention programme with children aged 8-11 years old with reading difficulties. He found that it was possible to reduce the level of ATNR interference at this late stage of development and that this led to very significant progress in reading and writing skills.

Summary

Schuele (2004) states that children with an oral language impairment, whether or not they have a concomitant speech impairment, are at great risk of reading disabilities. The reason is quite simple; if the child has difficulties with coding events in spoken language structures and in understanding spoken language, the same difficulties will appear in writing and reading. Therefore, it is important to identify children who may need special interventions. A significant relationship between motor impairment and speech/language impairments in children was found. Further research to seek approaches which can help to mitigate the impairment should be conducted. Typical difficulties lie in the areas of balance, general static coordination, and general dynamic coordination. These can be caused by a cerebellar deficit, as suggested by Estil (2003), but they can also be caused by persisting primary reflexes, as McPhillips showed. Within the context of reading disabilities, children with a history of SLI should be viewed as a subgroup of children with reading disabilities, but no history of speech/language impairment, while the intervention needs of children with SLI are potentially different from those of children with reading difficulties alone. However, we still do not fully understand the causes and biological basis of SLI. As Hill (2001) stated: "The only guaranteed conclusion that one can currently draw is that the deficits of children with SLI are not specific to language."

References

Adi-Japha, E., Strulovich-Schwartz, O., & Julius, M. (2011). Delayed motor skill acquisition in kindergarten children with language impairment. Research in developmental disabilities, 32(6), 2963-2971.

Bobath, B., & Bobath, K. (1988). Motor development in the different types of cerebral palsy. W. Heinemann Medical Books.

Brumbach, A. C. D., & Goffman, L. (2014). Interaction of language processing and motor skill in children with specific language impairment. Journal of Speech, Language, and Hearing Research, 57(1), 158-171.

Capute, A. J., Accardo, P. J., Vining, E. P., Rubenstein, J. E., Ronald Walcher, J., Harryman, S., & Ross, A. (1978). Primitive reflex profile: A pilot study. Physical therapy, 58(9), 1061-1065.

Cheng, H. C., Chen, H. Y., Tsai, C. L., Chen, Y. J., & Cherng, R. J. (2009). Comorbidity of motor and language impairments in preschool children of Taiwan. Research in developmental disabilities, 30(5), 1054-1061.

De No, R. L. (1932). The regulation of eye positions and movements induced by the labyrinth. The Laryngoscope, 42(4), 233-238.

Diamond, A. (2000). Close interrelation of motor development and cognitive development and of the cerebellum and prefrontal cortex. Child development, 71(1), 44-56.

Dyck, M., & Piek, J. (2010). How to distinguish normal from disordered children with poor language or motor skills. International journal of language & communication disorders, 45(3), 336-344.

Estil, L. B., Whiting, H. T. A., Sigmundsson, H., & Ingvaldsen, R. P. (2003). Why might language and motor impairments occur together? Infant and Child Development, 12(3), 253-265.

Finlay, J. C., & McPhillips, M. (2013). Comorbid motor deficits in a clinical sample of children with specific language impairment. Research in developmental disabilities, 34(9), 2533-2542.

- Gillberg, C. (2010). The ESSENCE in child psychiatry: early symptomatic syndromes eliciting neurodevelopmental clinical examinations. Research in developmental disabilities, 31(6), 1543-1551.

Gillberg, C., Fernell, E., & Minnis, H. (2013). Early symptomatic syndromes eliciting neurodevelopmental clinical examinations. The Scientific World Journal, 2013.

Goldin–Meadow, S., Goodrich, W., Sauer, E., & Iverson, J. (2007). Young children use their hands to tell their mothers what to say. Developmental science, 10(6), 778-785.

Grafton, S. T., MAZZIOTTA, J. C., Woods, R. P., & Phelps, M. E. (1992). Human functional anatomy of visually guided finger movements. Brain, 115(2), 565-587.

Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: two new school readiness indicators. Developmental psychology, 46(5), 1008.

Hill, E. L. (1998). A dyspraxic deficit in specific language impairment and developmental coordination disorder? Evidence from hand and arm movements. Developmental Medicine & Child Neurology, 40(6), 388-395.

Hill, E. L. (2001). Non-specific nature of specific language impairment: a review of the literature with regard to concomitant motor impairments. International journal of language & communication disorders, 36(2), 149-171.

Holt, K. S. (1994). Child development: Diagnosis and assessment. Newness, Butterworth-Heinemann.

Illingworth, Ronald S. (Ronald Stanley) (1987). The development of the infant and young child : normal and abnormal (9th ed). Churchill Livingstone, Edinburgh ; New York

Ivry, R. B., & Diener, H. C. (1991). Impaired velocity perception in patients with lesions of the cerebellum. Journal of Cognitive Neuroscience, 3(4), 355-366.

Jäncke, L., Siegenthaler, T., Preis, S., & Steinmetz, H. (2007). Decreased white-matter density in a left-sided fronto-temporal network in children with developmental language disorder: evidence for anatomical anomalies in a motor-language network. Brain and language, 102(1), 91-98.

Jenkins, E. & Lohr, F.E. (1964). Severe articulation disorders and motor ability. Journal of Speech and Hearing Disorders, 29 (3), 286-292

Johnston, R. B., Stark, R. E., Mellits, E. D., & Tallal, P. (1981). Neurological status of language–impaired and normal children. Annals of Neurology, 10(2), 159-163.

Jueptner, J., Jueptner, M., Jenkins, I. H., Brooks, D. J., Frackowiak, R. S. J., & Passingham, R. E. (1996). The sensory guidance of movement: a comparison of the cerebellum and basal ganglia. Experimental brain research, 112(3), 462-474.

Kaplan, B. J., Wilson, B. N., Dewey, D., & Crawford, S. G. (1998). DCD may not be a discrete disorder. Human movement science, 17(4), 471-490.

Keele, S. W., Pokorny, R. A., Corcos, D. M., & Ivry, R. (1985). Do perception and motor production share common timing mechanisms: A correlational analysis. Acta psychologica, 60(2), 173-191.

Konicarová, J. (2013). Vývojové aspekty ADD/ADHD – etiopatogeneze a možnosti nápravy. [Developmental aspects of ADD/ADHD - etiopathogenesis and intervention possibilities]. Doctoral dissertation. Fakulta sociálních studií Masarykova univerzita: Brno.

LeBarton, E. S., & Iverson, J. M. (2016). Associations between gross motor and communicative development in at-risk infants. Infant Behavior and Development, 44, 59-67.

Manor, O., Shalev, R. S., Joseph, A., & Gross-Tsur, V. (2001). Arithmetic skills in kindergarten children with developmental language disorders. European Journal of Paediatric Neurology, 5(2), 71-77.

McPhillips, M., Hepper, P. G., & Mulhern, G. (2000). Effects of replicating primary-reflex movements on specific reading difficulties in children: a randomised, double-blind, controlled trial. The Lancet, 355(9203), 537-541.

McPhillips, M., & Sheehy, N. (2004). Prevalence of persistent primary reflexes and motor problems in children with reading difficulties. Dyslexia, 10(4), 316-338.

Meister, I. G., Boroojerdi, B., Foltys, H., Sparing, R., Huber, W., & Töpper, R. (2003). Motor cortex hand area and speech: implications for the development of language. Neuropsychologia, 41(4), 401-406.

Morrison, D. C., Hinshaw, S. P., & Carte, E. T. (1985). Signs of neurobehavioral dysfunction in a sample of learning disabled children: stability and concurrent validity. Perceptual and motor skills, 61(3), 863-872.

O´Hara, B. (2009) *Bewegings- en leerprogramma*, De Hof van Axen.

Plaza, M. (1997). Phonological impairment in dyslexic children with and without early speech-language disorder. European journal of disorders of communication, 32(2), 277-290.

Powell, R. P., & Bishop, D. V. (1992). Clumsiness and perceptual problems in children with specific language impairment. Developmental Medicine & Child Neurology, 34(9), 755-765.

Preis, S., Schittler, P., & Lenard, H. G. (1997). Motor performance and handedness in children with developmental language disorder. Neuropediatrics, 28(06), 324-327.

Raberger, T., & Wimmer, H. (2003). On the automaticity/cerebellar deficit hypothesis of dyslexia: balancing and continuous rapid naming in dyslexic and ADHD children. Neuropsychologia, 41(11), 1493-1497.

Rousseau, P. V., Matton, F., Lecuyer, R., & Lahaye, W. (2017). The Moro reaction: More than a reflex, a ritualized behavior of nonverbal communication. Infant Behavior and Development, 46, 169-177.

Schuele, C. M. (2004). The impact of developmental speech and language impairments on the acquisition of literacy skills. Developmental Disabilities Research Reviews, 10(3), 176-183.

di Vico, R., Ardigň, L. P., Salernitano, G., Chamari, K., & Padulo, J. (2013). The acute effect of the tongue position in the mouth on knee isokinetic test performance: a highly surprising pilot study. Muscles, ligaments and tendons journal, 3(4), 318.

Volemanová, M. A. (2014). Primární reflexy, opomíjený faktor poruch učení. [Primary reflexes, the forgotten factor of learning difficulties.] Bakalářská práce. PedF UK: Praha.

Volemanová, M. A. (2016). Možnosti ovlivnění vybraných oblastí psychomotorického vývoje dítěte pomocí Neuro-vývojové terapie.[Possibilities of influencing selected areas of children psychomotor development by neuro-developmental therapy.] Diplomová práce. PedF UK: Praha.

Webster, R. I., Erdos, C., Evans, K., Majnemer, A., Kehayia, E., Thordardottir, E., ... & Shevell, M. I. (2006). The clinical spectrum of developmental language impairment in school-aged children: language, cognitive, and motor findings. Pediatrics, 118(5), e1541-e1549.

Woods, P. L., Rieger, I., Wocadlo, C., & Gordon, A. (2014). Predicting the outcome of specific language impairment at five years of age through early developmental assessment in preterm infants. Early human development, 90(10), 613-619.

Zafeiriou, D. I. (2004). Primitive reflexes and postural reactions in the neurodevelopmental examination. Pediatric neurology, 31(1), 1-8.

Zink, I. Breuls, M. (2012). Ontwikkelingsdysfasie. Maklu.

Mgr. Marja Volemanová, Dis
doc. PhDr. Lea Květoňová, Ph.D.
Department of Special Education, Faculty of Education, Charles University
marja.volemanova@pedf.cuni.cz
lea.kvetonova@ pedf.cuni.cz

The Literacy Profiles of Czech Precocious Readers

Gabriela Seidlová Málková

Abstract

This study examines whether nine Czech precocious readers' performance of a set of pre-literacy, early reading, and spelling tasks from kindergarten through the first two grades of primary school was different from that of nine non-precocious readers selected as matched according to school, age, and gender. The profiles of Czech precocious readers for literacy and literacy-related language skills are reported and discussed in line with the international literature. The data analyses showed that compared with their matched peers, Czech precocious readers show superior performance on knowledge of letter sounds and letter names, phoneme awareness, reading fluency (decoding), and spelling in kindergarten and also in the first grade. In the second grade, the two groups of children do not differ in terms of phoneme awareness and reading comprehension performance, while significantly better scores are reported for reading accuracy, fluency, and writing for precocious readers.

Key words: precocious readers, phoneme awareness, letter knowledge, reading fluency, reading comprehension

Research on early reading and spelling skills and their relationship to language development in what is termed the psycholinguistic approach to studying literacy has opened up a space for the systematic description of the pathways of the typical development of reading and spelling. Of course, a large body of research has been conducted on children's various reading and spelling difficulties. However, less attention has been paid, and significantly less research is available, on children who were able to show functional reading skills well before they entered any formal system of literacy teaching.

What are termed precocious readers show a mastery of fluent or almost fluent reading before beginning the first grade of primary school or before any formal literacy training. As is the case for many other areas in reading research, here too most of the available information on precocious readers comes from English-speaking backgrounds. Notable studies on precocious readers in international research seem to span more than 50 years and today also include know-

ledge from other European languages (classics from Durkin 1966 and Clark 1976 – papers in international journals: Anbar 1986; Tafa & Manolitsis 2008; Olson, Evans, & Keckler 2006; Silvén, Proskiparta, & Niemi 2004).

A typical characteristic of precocious readers is that they had no formal instruction in mastering decoding or reading skills and, according to the available knowledge from international research, these children do not seem to be primarily influenced by exceptional intellectual ability or specific socioeconomic status (Olson et al. 2006). Of course, as is the case for many other phenomena in the psychology of reading acquisition, the definition of a precocious reader is a matter of variability at the level of key aspects of the definition of a precocious reader. In their review, Olson et al. (2006) attempted to analyse concrete content presented in definitions of precocious readers in the currently available research and proposed three key features of the definitions of precocious readers (Olson et al. 2006, pp. 206-207). A precociously reading child:

- demonstrates the ability to decode words
- demonstrates comprehension of written material (ruling out hyperlexia, that is, decoding without comprehension); very often, norm-referenced information identifies precocious readers as decoding and comprehending at or above second-grade level while still of preschool age
- had some, albeit "non-formal", instruction in reading acquisition – such as spontaneous, intuitive, or unplanned instruction provided by parents, caregivers, or siblings. In other words, precocious readers typically do not participate in any "formal" or systematic reading instruction to become readers.

According to Olson et al. (2006), approximately 1% of children entering school are precocious readers.

Studies on precocious readers in the Czech research literature are rare. Probably the only psychological study of this kind to have been published so far comes from Matějček (1979, 1997, and 1999), the founder of reading research in the Czech Republic. In his research and practice Matejček concentrated on dyslexia or various reading difficulties. As a part of his screening studies on preschool children, he tried to identify "early readers" or, as he called them, "hyperlectic" children and provide a rough picture of the early reading skills these children show before they enter the first grade. He was especially interested in the description of the family background of these children. His study from 1997 thus presents comments on the family context related to the early reading behaviour of precocious readers. This report study is based on clinical samples Matejček collected through approx. 20 years of his clinical practice in Prague, specifically the notes about 76 families Matejček worked with. The results of this study report that most of the parents of early readers were col-

lege- or university-educated. The children were reported as going through rapid language development in their early years, reaching "rich and mature speech at the age of two and showing spontaneous interest in letters and digits at the same time (around the age of two). Blending sounds into syllables was typically reported by parents at the age of three and a half. Soon after that fluent reading appeared – Matejček linked these early reading skills with exceptional phonemic awareness skills in precocious readers. Matejček stresses the fact that the sample of precocious readers was balanced from the gender point of view.

His 1999 screening study was then more concentrated on general descriptive information related to the sample of precocious readers. Out of the sample of 85 children reported by the kindergarten teachers as precocious readers, Matejček selected those children reading at least 50 words per minute (the criterion is not explained in detail, so it is not obvious why this reading level was applied). The children selected for the study were children from kindergarten classes from Prague (the capital) and two more medium-sized cities in the Czech Republic throughout the spring months (the second part of the preschool year) before they entered the first grade of primary school. Out of this sample, precocious readers created a group of 12 (14% of the sample). All of the children in this group of precocious readers were boys (p. 41); both parents of these 12 boys were college- or university-educated and none of their families had only the lower, compulsory education. In his conclusions in both studies (1995 and 1999), Matejček repeatedly stresses the importance of interaction between exceptional or accelerated speech development and with a supportive and generally pro-reading mobilizing family background.

Various studies from English and non-English-language backgrounds seem, according to Olson et al., to relate in their structure and aims to the pioneering work of Durking (1966). In other words, three areas are typically studied intensively in relation to precocious reading: 1) the personal and environmental correlates of very early readers (such as intellectual skills, parental and caregiver's behaviour, typical activities while of preschool age, exposure to reading material, etc.); 2) the process of the development of very early reading, and 3) the academic skills of precocious readers. The primary interest of this study lies between the second and third areas; specifically, our aim is to study precocious readers' performance in various pre-literacy, language, and literacy tasks and compare their performance to that of their age-matched peers.

Studies with a similar target have also been conducted in other European languages. Stainthorp and Hughes (1999) conducted a study with English-speaking children comparing the performance of various literacy and phonological tasks of precocious and normally developing readers at the age of five (before entering primary school). These authors also

followed the same group of 61 children up to the age of 11. The precocious readers showed, according to this study, the same developmental pattern as the normally developing children; however, they also generally proved to perform all the tasks that were assessed much better than the control group of typically developing children. More than that, the precociously reading children continued to achieve better scores in reading accuracy, reading rate (speed), reading comprehension, and also in phoneme awareness up to the age of 11.

Finnish-speaking precocious readers were compared to their typically developing agemates as a part of a longitudinal study reported by Silven, Poskiparta, and Niemi (2004). The authors followed children between the ages of one and approx. seven years, assessing various language and literacy tasks. Their analyses of the performance of the subgroup of precocious readers in phonemic awareness tasks showed that these children – in contrast to the typically developing readers – had superior skills at various levels of phonological awareness as early as at the age of four. Actually, three years before they become readers, they outperformed their agemates on phoneme awareness tasks and oral language tasks (such as vocabulary, word inflections, and morphology). The superior phoneme awareness of the precocious readers was still present even at the age of six, at the time when the non-precocious readers were just starting to read. The authors interpret this observed "spurt" in phoneme awareness in precocious readers as a consequence of the spurt in their reading acquisition.

Tafa and Manolitis (2008) compared the development of thirteen precocious and twelve non-precocious Greek readers from kindergarten to the fourth grade of primary school. As reported in this study, the Greek precocious readers also showed superior phoneme awareness in contrast to the age-matched control group; however, this applied only to the kindergarten and first-grade data collection points. Reading fluency was maintained as better in the precocious readers till the fourth grade. The advantage the precociously reading children had in spelling and reading comprehension was maintained till the end of the second grade.

Previous studies reported for English and also for more transparent orthographies such as Finnish or Greek agree on the superiority of phoneme awareness, reading accuracy, reading comprehension, and spelling of precocious readers from kindergarten till (at least) the end of the second grade. The aim of this study is to add more information on the development of precocious children by monitoring Czech precocious readers and the age-matched controls in their class from kindergarten up to the beginning of the second grade. Phoneme awareness and reading and spelling performance will be reported. More details (in comparison to the studies mentioned previously) will be provided on the orthographic skills of these children. Our aim is to construct

literacy skills (specifically. literacy, pre/literacy, and literacy-related language skills) profiles of Czech precocious readers for three educational levels – kindergarten and the first and second grades. The literacy profiles of precocious readers will be compared and contrasted to the profiles of non-precocious readers of the same age, gender, and school. We expect the results for Czech precocious readers concerning reading, spelling, and phonemic awareness to more or less follow the results reported in Tafa and Manolitis (2008) or in Silven et al. (2004) because of the similar levels of orthographic consistency in Czech and Greek and Finnish orthography. This study is specifically important for the Czech research and professional readership as it provides the first detailed description of precocious readers' development in literacy-related and early literacy skills.

Literacy instruction in Czech kindergartens and schools

Formal literacy education typically starts in primary schools in the Czech Republic at the age of six. Therefore the kindergarten curriculum does not include an obligatory system for the teaching of the alphabet, phonics, or reading skills. Children are, however, exposed to some letter-sound knowledge or phonemic awareness training activities (for example, identification of the first sound in a word, recognizing the uppercase versions of some letters, recognizing the letter at the beginning of the child's name, or even writing the child's name.) These pre-literacy activities are closely tied to the teaching strategies and activities within the development of language and oral language skills. The preschool curriculum in the Czech Republic is based on the idea of key competencies creating prerequisites for lifelong learning. Pre/literacy skills are included as a part of the language and oral skills curriculum content area (Splavcová, Šmelová, Kropáčková, & Syslová 2016), and do not stand as an independent area in the curriculum. Kindergartens have relatively great freedom to choose teaching strategies, programmes, materials, or activities to promote pre-literacy skills or phonological awareness skills. This results in a certain variability between kindergartens; on the other hand, preschool teacher professional training and the associated community generally prefer to support the development of phoneme awareness and letter/sound knowledge within the broader area of oral language skills and game-like training. Work in classes focuses more on oral language skills, including phonology, and there is no systematic teaching of the knowledge of letters. Children are exposed to print in the classroom (books, signs), but there is no formal instruction about print. Children in the Czech Republic typically enter the first grade of primary school at the age of six; specifically, children should reach the age of six before entering the first grade. The

current educational policy in the Czech Republic provides space for variable approaches to delivering reading and spelling instruction. Literacy instruction is traditionally rooted in "phonics" methods of teaching literacy.

Method

Design of the study

This study was developed as a part of the ELDEL longitudinal project "Establishing the Foundations of Literacy in European Languages" (www.eldel.eu). This longitudinal project was aimed at studying the pathways of the development of literacy in selected European languages, including Czech. Six data collection rounds were conducted with the Czech sample, measuring literacy, pre-literacy, and language or cognitive skills before preschool age and throughout the first two years of primary school attendance. Two data collection rounds were conducted in each school year.

This study uses data from only three selected testing rounds: one at each school level. The first one (T1) was conducted in February/March of the kindergarten school year, then T2 approx. 10 months later, in the middle of the first grade of primary school. T3 concerns children in the middle of the second grade of primary school.

Participants

For the purpose of this study we only use data from a selected group of precocious readers and the group of their normally developing schoolmates. The original longitudinal sample consisted of 153 Czech monolingual children with no neuro-cognitive deficits or diagnosed learning or language difficulties at preschool age (mean age approx. 72 months, ranging from 64 to 85 months – for details see Caravolas et al. 2012, p. 681). The children were recruited from kindergartens in Prague, a suburb of Prague, and also in three more medium-sized Czech cities on the basis of parents' consent forms.

A group of precocious readers was selected from the whole longitudinal sample according to their performance in a reading fluency task, one-minute reading, during the T1 testing. We consider a precocious reader to be a child showing a reading performance 1 SD above the mean of the whole longitudinal sample: M = 3, 76, SD = 10.41 (Caravolas et al. 2012, online appendices), which means reading 15 or more words in the one-minute reading task. The mean age of the group of precocious readers was 72.67 months (SD = 3.76, ranging from 67–77 months).

The nine precocious readers were then paired with a comparison group of nine non-precocious readers selected from the longitudinal sample. We paired the control group according to age, gender, kindergarten type, and the region (the city placement). The control group contained nine children (four boys and five girls) with a mean age of 72.90 months

(SD = 3.10, ranging from 69-77 months). The children for the control group were selected primarily according to gender, age (the same age or a maximum of two months' difference), and school, meaning taken from the same kindergarten (to ensure similar teaching experience). If that was not possible then the pair was selected from kindergartens in the same city region and from schools of similar type and size (suburb of the city – inner-city parts, small kindergartens – larger schools).

Measures and Procedures

Both selected groups were first compared at the level of verbal skills and non-verbal IQ. We consider these two measures as rough indicators of the level of general cognitive skills and of the socio-cultural background.

Vocabulary task

As a general measure of the vocabulary knowledge of the children from both groups, the vocabulary subtest of the third United Kingdom edition of the Wechsler Preschool and Primary Scale of Intelligence for Children (WPPSI-IIIUK; Wechsler 2003) was adapted into the Czech language. Standard scores for this subtest are not available for the Czech preschool children, so the raw scores are reported in Table 1.

Non-verbal IQ tasks

The block design subtest from the third United Kingdom edition of the Wechsler Preschool and Primary Scale of Intelligence for Children (WPPSI-IIIUK; Wechsler, 2003) was used to measure non-verbal IQ. The norms and standard scores of this subtest are not available for the Czech children, so the raw scores are reported in Table 1.

We think that possible differences at the level of vocabulary and non-verbal IQ could indicate important factors (both at social and individual level) with a possible influence on the development of literacy and pre-literacy skills. Table 1 shows descriptive statistics for these control variables. The precocious readers generally show higher scores in the lexical task and non-verbal IQ task. The difference is greater for lexical skills. It may reflect a generally more pro-reading-oriented family background, and may also be a result of the active use of reading and, as a result of that, access to new lexical knowledge. At the same time, the difference is not significant, so we could conclude that the children from both the target and control groups do not differ significantly from each other at the level of vocabulary skills and non-verbal IQ skills at the beginning of the study (to be precise, in the middle of their kindergarten attendance).

To monitor the children's progress in reading and spelling, a set of tasks was selected from the large test battery used in the longitudinal study. As the aim of this study is to describe possible differences between precocious and non-precocious readers at the level of literacy skills, we selected all the measures

Table 1. Descriptive statistics of control measures (productive vocabulary and non-verbal IQ).

Tests	Groups				Comparison
	Precocious readers		Non-precocious readers		
	Median /Mean	SD (Range)	Median /Mean	SD (Range)	Mann-Whitney U /p
Vocabulary (WPPSI)	24/23.67	4.56;17-29	18.75/18.5	6.23;9-27	17.5/0.074
Block design (NVIQ)	28/28.56	5.64; 22-37	30/30.13	3.73;26-34	37/0.796

available in the original study for which we could report some reading and spelling performance. As the data reported in this study covers three years of the development of reading and spelling, we were able to include both measures of decoding, fluency and comprehension. The reading comprehension tasks were only administered in the second grade. According to Caravolas et al. (2012 and 2013), phonemic awareness, letter knowledge, and rapid naming tasks seem to be particularly important as indicators of variability in the development of early reading and spelling. We report these measures for the first two data collection points, where these measures seem to be the most sensitive (Seidlova Malkova & Caravolas 2013; Caravolas et al. 2012; Hulme et al. 2005).

Reading tasks

One-minute reading task As a measure of decoding and reading fluency the one-minute reading task from the battery for the assessment of literacy skills for primary school children (Caravolas & Volín 2004), which is widely used in the Czech psycho-educational counselling system, was used. Standardized scores are, however, only available for the second-grade children. The kindergarten and the first-grade scores are then reported as raw scores.

Picture-word matching task To assess general reading ability in its beginning phases, we administered a picture-word matching task. In this task the children work with paper-and-pencil worksheets containing a list of approx. 50-60 words (the shorter version for younger children, the longer one for the older ones) sourced from the frequency corpora of graded school reading materials currently used in the Czech Republic (Kessler & Caravolas 2011). On the worksheets words are represented by a simple black-and-white drawing accompanied by a set of four printed versions of the target word. The printed words include the target word, two distractors – one "phonographic", with a similar spelling, and one "seman-

tic", with a similar meaning), and one unrelated word. The order of the target word and the distractors was counterbalanced; all the children used the same worksheets. The picture-word matching task is a silent reading task. For the purpose of the testing, the children were divided into small groups (three to five children), in which they worked individually to fill in the worksheets. The test is time-limited; the children work with the pictures and related words to choose the one printed word corresponding with the target picture for three minutes. Further details on the construction of this task are available as a part of the study of Caravolas et al. (2013). No norms for this test are available yet. We report the raw scores of correctly matched pictures and words. Each picture correctly matched with its printed version was awarded one point.

Reading comprehension task As an indicator of general reading ability and reading comprehension, a timed cloze reading comprehension test from Caravolas and Volín (2004) was used. This task was modelled on the Gates Basic Reading Test, Type LC, Form 3 (Gates 1958). Children read short passages and fill blank spaces with words that are accessible to choose from. The test includes a total of 23 short texts (7-45 words) on various culturally suitable topics. The passages are graded for difficulty in terms of length, vocabulary, and general world knowledge. Two words are deleted from each passage and blanks labelled A and B are left in their place. The children choose from the two series of five words provided under each text, headed by a capital A and a capital B, respectively. One word from each series fits the corresponding blank in the text; the remaining four words are phonological or semantic distractors. The children worked for seven minutes only, reading passages and choosing the words that fit each sentence item best. One point was awarded for each correctly filled word. Norms for second-grade Czech children are available; we report the general score for reading comprehension, where fluency and reading speed might also influence the quality of the child's performance. The reading comprehension accuracy score assesses reading comprehension skills more precisely by calculating the ratio of items filled correctly and the total number of items filled. This task was only administered in the second grade of primary school (T3).

Spelling (Writing) tasks

Encoding skills were examined by means of two different spelling tasks: letter writing and word writing. To accommodate early spelling skills measures to the developmental level of the children who were being assessed, we provided different versions of these tasks in T1, T2, and T3.

Letter writing of 15 letters (five vowels, five consonants with relatively consistent sound-letter mappings, and five consonants with relatively inconsistent sound-letter mappings) from the Czech alphabet was administered to kindergar-

ten and first-grade children (T1 and T2).

The word writing (dictation) task had two different versions in T1 and T2. A set of seven frequently-occurring and familiar words, along with the task of writing their names, was administered to kindergarten children during T1. The first-grade children wrote the same set of seven primer words and also a set of 30 words representing graphotactic, lexical, and morphological knowledge relevant to Czech orthography. The procedure for the administration of this task was inspired by a spelling (dictation) task included in a Czech reading and spelling test battery by Caravolas and Volín (2004). The children write single words; to write a word they hear the word three times, first in isolation, then in a short sentence or phrase to provide the necessary orthography-related context, and finally, again in an isolated position. The T3 version of the word writing task was an elaborated version of the T2 task, consisting of a set of seven primer words and a set of 34 target words to be dictated. Thus the maximum score in the letter writing task for the kindergarten children was seven, for the first-grade children 37, and for the second-grade pupils 41 points.

Phoneme awareness tasks

Three different tasks across all the data collection rows were used to measure phonemic awareness: phoneme isolation, phoneme blending, and phoneme deletion. All the phonemic awareness tasks used map "explicit" phonemic awareness skills, that is, they require reflection upon or manipulation of, speech sounds in words. Explicit phonemic awareness is known to have a stronger relationship to reading than what are termed implicit phoneme awareness skills (automatically engaged when working with speech units; Hulme & Snowling 2010, p. 42).

A phoneme isolation task was administered to the kindergarten children during T1 and in the first grade (T2). This task had previously been shown to be very sensitive at preschool age at the onset of the first grade of primary school, at the age of five to seven (Hulme, Caravolas, Brigstocke, & Malkova 2005; Seidlova Malkova & Caravolas 2013). This task was assessed in two different parts, the first one assessing the ability to isolate and pronounce the initial phoneme in a one-syllable word and the second part requiring the isolation of the final phoneme, again in a one-syllable word. Each part consisted of two different blocks varying in difficulty from the point of view of their phonemic structure. In the first block of each part, the children isolated and pronounced the target phoneme from a simple consonant-vowel-consonant word (CVC). In the second block of each part, the children isolated it from a consonant-consonant-vowel-consonant word (CCVC), specifically from consonant-vowel-consonant-consonant (CVCC) words when isolating the final phoneme. This task was developed according to the task used in a study by Hulme et al. (2005). For this task, there are no norms available; we report the raw scores. Each correctly isolated and pronounced word

was awarded one point. The maximum points for each part were 16 (8 items for each block); for the whole test the children could receive a maximum of 32 points.

A phoneme blending task requires children to blend aurally presented phonemic sequences into target words. We used the version of this task that is now available as a part of the test battery of Seidlova Malkova and Caravolas (2013). The test consists of a list of 24 one-to-two-syllable words varying in their phonological structure and complexity. The task was assessed in both T1 and T2, again showing very good sensitivity at this age (Seidlova Malkova & Caravolas 2013). The target words were presented in a fixed order organized according to increasing complexity of the syllabic structures of the words (VC, VCV, CV, CVC, CCVC, CVCV). The maximum score for this task was 24. Norms are not available for this task; we report raw scores.

A phoneme deletion task was administered in the first (T2) and second grades (T3). This task requires a child to delete the first or final phoneme of a short word and to say the resulting word aloud when the specified part is not sounded. In the first-grade version, the children were asked to delete the first phoneme of 10 target words with a simple syllable structure: consonant-vowel-consonant (CVC). The task for the second-grade children consisted of 20 one-syllable words. For the first 10 items, five with a CVC and five with a CCVC structure, the children were asked to delete the initial phoneme and provide the resulting word. For the next set of 10 words (five CVC and five CVCC), the children were instructed to delete the final phoneme and again to say the resulting word. The maximum score for the first grade was 10, for the second grade 20. There are no norms available for this specific version of the phoneme deletion task in the Czech literature, and therefore we report the raw scores.

Rapid Automatized Naming (RAN) is considered to be an important predictor of early reading and spelling (Caravolas et al. 2012). The task is widely used for assessing phonological processes influencing the development of literacy. A RAN objects task was used in this study. The children named a set of five picture items sequentially, as fast as they could. The items were placed on a landscape A4 card and organized into lines. The whole card contained five lines with eight items on each line. The scores for this test were estimated from the average time taken to name 40 picture items across two trials. The accuracy score was constructed as the average error for two trials. Error rates tend to be low in typically developing children, and this was also the case with our children. Rapid naming was administered across all the testing points (T1, T2, and T3).

Letter knowledge

Letter knowledge was assessed by a *letter recognition task*. The children were asked to supply the names and the sou-

nds of letters presented on cards. Separate cards for upper- and lowercase letters were provided. The 34 letters of the Czech alphabet were presented in a fixed, but not in an alphabetical order, separately for upper- and lowercase. One point was awarded for each correctly named sound and name. We report the scores for sounds and names separately. The maximum score for the letter recognition task for sounds or names is 68 (covering lower- and uppercase letters). Raw scores are reported for this task as there are no age norms available for this task in Czech. Letter knowledge was assessed in kindergarten (T1) and in the first grade of primary school (T2). We understand knowledge of the names of letters as being more related to some form of the explicit and formalized teaching provided by adults or in the formal schooling context – as this is knowledge of the names of the letters as they appear in the alphabet. Letter sound knowledge, on the other hand, is more open to the implicit, spontaneous forms of learning as it is related more to the sounds appearing in words.

Reliability scores for the measures used in this study were calculated on the basis of the data from the whole longitudinal sample, as this gives more accurate information. All the measures reported for kindergarten and most of the measures reported in primary school children, including their reliability, were described in detail in our previous study, Caravolas et al. (2012). Internal consistency reaching middle to high scores for the Cronbach's alpha was reported for the One-minute Reading task (.91), both spelling tasks (.82, .92), phonemic awareness (.96, .95), and letter knowledge tasks (.95, .98); test-retest reliability was reported for the picture-word matching task (.92) and rapid naming tasks (.79; Caravolas et al. 2012, Table 1 and Table 2, online appendices). The reliability of the reading comprehension task is reported by its authors as being valid and reliable for use in the second grade (Caravolas & Volín 2004, p. 14). For the phoneme deletion task, its reliability was calculated on the basis of the whole longitudinal sample; the internal reliability of this task at T2 is .85 and at T3 0.92.

Procedure

During the three years of the original study all the sample children were given a set of tasks administered – in most cases – individually at a total of six data collection points. The picture-word matching task and word writing task in T2 and T3 and the reading comprehension task in T3 were administered in small groups of four or five children to make the data collection more effective. All three of these tasks require some individual production by a child by filling in simple prepared sheets of paper in pencil.

At all the data collection points, the tests were administered to each participant in a fixed order. For this study we only selected three data collection points representing different educatio-

Table 2. Mean scores, standard deviations, and medians for all measures administered in kindergarten (T1)

	Precocious			*Non-precocious*		
Measures	M (SD)	Median	Min-Max	M (SD)	Median	Min-Max
Letter recognition – sounds	56.7 (4.2)	57.0	51-63	15.3 (16.0)	15.0	0-46
Letter recognition – names	30.4 (14.5)	32.0	5-45	5.4 (8.8)	1.0	0-24
Letter writing	27.3 (4.4)	28.0	16-30	16.2 (9.5)	14.0	4-30
Phoneme isolation	61.1 (2.6)	61.0	57-64	28.3 (22.3)	28.0	0-58
Phoneme blending	10.1 (0.92)	10.0	9-11	0.78 (1.2)	0.0	0-3
RAN objects – time	40.4 (8.2)	37.5	30.5-56.5	52.4 (13.7)	53.5	31.5-70
One-minute reading	35.6 (27.4)	25.0	15-87	1.1 (1.2)	1.0	0-3
Picture-word matching – accuracy	1.7 (3.0)	0.0	0-9	4.4 (3.3)	3.0	1-10
Picture-word matching – errors	2.67(2.83))	2.0	0-8	12.78 (9.39)	10.0	3-34
Word writing	5.4 (1.6)	5.0	2-7	1.3 (1.1)	1.0	0-3

nal grades. All the data collection points were administered in the middle of the respective school year.

Letter knowledge tasks and phoneme isolation and phoneme blending tasks were only administered at the T1 and T2 levels. Phoneme deletion was not administered at T1 as the task would be too difficult for normally developing children. The reading comprehension task was only administered at T3. The rapid naming, reading, and writing tasks (rapid naming of objects, one-minute reading, picture-word matching, and word writing) were administered throughout all the three data collection points.

For each data collection point included in this study (T1 for kindergarten, T2 for the first grade, and T3 for the second grade), we conducted non-parametric alternatives of the t-test analyses (Mann-Whitney test) to test the differences between the performance of the groups of precocious and non-precocious readers on all the selected metrics. As the set of tasks administered at each data collection point is not identical (to reflect the developmental changes at the level of literacy and literacy related skills), we provide separate comparisons for each grade. This enables us to concentrate on the complete set of literacy and literacy related skills relevant in each grade that was monitored. Only the one-minute reading task and rapid naming task were administered in identical formats at each

data collection point. These measures are constructed in a format that could stay sensitive throughout the whole period of our data collection time.

Results

Tables 2, 3, and 5 report the mean scores, the medians, and the standard deviations for all the measures included at each testing point. The results of the Mann-Whitney test for each testing points are available in Table 4 and Table 6.

Kindergarten literacy profiles of precocious readers

As we can see in Table 2, the precocious readers show generally higher scores for almost all the measures administered at T1. Higher means, reflecting better performance for the group of precocious readers, apply to almost all the measures, except the picture-word matching task. RAN is a timed task, where lower mean scores relate to a better outcome (i.e. faster naming), so as we could expect in fluent readers, RAN would be faster for the precocious readers. The picture-word matching task is also timed; however, we do not report the time but the number of correctly paired pictures and words. We also report the number of errors made in this pairing. As we could see, the precocious readers generally achieve a lower number of correct items; however, at the same time, they also show fewer errors in the items they manage to pair. The performance of the group of precocious readers on the letter recognition (both sounds and the names of letters from the alphabet), phonemic awareness tasks (both isolation and blending), reading (the fluency assessed by the one-minute reading task), and word writing tests is significantly better in comparison to their non-precocious age- and classmates (see Table 4). So we can conclude that the precocious readers' literacy profiles consist of superior phonemic awareness and orthographic (meaning letter) knowledge performance – the core and essential skills for beginning to acquire the skills of reading. As expected, the precocious readers can use the phoneme-grapheme correspondences effectively and fluently, so they show superior performance in decoding (early reading fluency). This is what we can interpret as in line with the dual route theory of the foundations of literacy (Hulme et al. 2005; Byrne 1998). The rapid naming speed, however, is not significantly faster in the precocious readers in kindergarten in comparison to the non-readers. The results in the picture-word matching task show that the precocious readers do not differ significantly from the non-precocious readers in terms of the number of correctly solved items. However, they show significantly lower numbers of errors in this task. This may be interpreted as a result of the careful reading these children perform. While trying to solve the picture-word pairing task, they probably spend more time on reading each of the four words to be paired with the picture because they use a phonological reading strategy (typical

Table 3. Mean scores, standard deviations, and medians for all measures administered in first grade (T2)

	Precocious			*Non-precocious*		
Measures	M (SD)	Median	Min-Max	M (SD)	Median	Min-Max
Letter recognition – sounds	61.9 (3.3)	62	58-68	37.7 (13.2)	35	17-58
Letter recognition – names	49.8 (10.9)	52	27-62	15.7 (16.6)	11	0-44
Letter writing	29.7 (0.7)	30	28-30	25.9 (5.7)	28	14-30
Phoneme blending	23.3 (1.0)	24	21-24	12.6 (6.6)	13	2-23
Phoneme deletion	19.6 (0.7)	20	18-20	5.8 (8.3)	0	0-19
RAN objects (time)	37.0 (6.4)	36.5	27.5-50	42.8 (12.7)	42	25-58
One minute reading	59.0 (25.3)	58	23-100	8.9 (7.5)	7	2-24
Picture-word matching – accuracy	27.0 (9.4)	23	17-45	12.2 (3.5)	11	9-20
Picture-word matching – errors	2.33 (2.60)	2.0	0-7	4.44 (4.85)	3.0	0-15
Word writing	21.3 (5.8)	22	11-29	5.7 (3.6)	5	3-14

of fluent readers). The non-precocious readers probably rely – very effectively – on a non-phonemic reading strategy, for example a whole word reading strategy, relying more on the visual patterns of the written form of words) and this may give them more speed in this task.

First-grade literacy profiles of precocious readers

The performance pattern the precocious readers show in the middle of the first grade seems to be very similar to the kindergarten one (see Table 3), except for the picture-word matching task. Now, the precocious readers show generally higher accuracy scores in this task than the non-precocious readers; they also keep making fewer errors in this task.

The performance in letter knowledge scores (both the sounds and the names of the letters of the alphabet, phonemic awareness task scores (blending and deletion), reading (number of correctly read words in one minute together with the accuracy and error rates in the picture-word matching task), and writing (both letters and words) is significantly better in the precocious readers in comparison with the non-precocious readers in the middle of the first grade. The pattern of the picture-word reading

Table 4. Mann-Whitney tests comparing the performance of the precocious readers and non-precocious readers on the letter knowledge, phonemic awareness, rapid naming, reading, and spelling tasks in kindergarten (T1) and the middle of grade 1 (T2)

	T1 – kindergarten		*T2 – middle of first grade*	
Measures	*U*	*p**	*U*	*p**
Letter recognition – sounds	0.00	**0.000**	5.0	**0.000**
Letter recognition – names	4.0	**0.000**	4.0	**0.000**
Letter writing	12.0	**0.011**	22.5	0.113
Phoneme isolation	1.5	**0.000**	11.5	**0.008**
Phoneme blending	0.0	**0.000**	2.5	**0.000**
RAN objects	20.0	0.077	29.0	0.340
One minute reading	0.00	**0.000**	1.0	**0.000**
Picture-word matching – accuracy	15.5	**0.024**	20.	**0.000**
Picture-word matching – errors	6.0	**0.001**	29.0	0.340
Word writing	2.5	**0.000**	1.0	**0.000**
Phoneme deletion	-	-	2.0	**0.000**

*p< 0.05

task now changes in comparison with the kindergarten one: the precocious readers show significantly higher accuracy scores than the non-precocious readers. The error rate, however, is not significantly different in both groups of readers. We can interpret these results as a consequence of the use of a different reading strategy by the non-precocious readers. Children are being taught to read in school at this time. So as beginner readers, the non-precocious readers are also starting to use a phoneme-based reading strategy. This, of course, slows down the speed at which they deal with the picture-word matching task.

Second-grade literacy profiles of precocious readers

As a part of the literacy profile of the precocious readers in the second grade, we report one measure of phonemic awareness, the phoneme deletion task; rapid naming is again assessed by RAN objects. Then various tasks to measure reading and spelling were administered. In contrast to the kindergarten and first-grade data collection points, we now also report on the reading comprehension task. As we can see in Table 5, the precocious readers achieve generally higher (or better in the case of RAN) scores than the non-precocious readers in all

Table 5. Mean scores, standard deviations, and medians for all measures administered in second grade (T3)

	Precocious			*Non-precocious*		
Measures	M (SD)	Median	Min-Max	M (SD)	Median	Min-Max
Phoneme deletion	34.8 (4.8)	37	28-40	32.2 (6.8)	34	19-40
RAN objects	30.9 (9.6)	30	21-53.5	37.8 (8.9)	41	25-49
One-minute reading	97.2 (20.3)	92	76-135	57.4 (30.0)	45	22-119
Picture-word matching – accuracy	44.9 (7.9)	44	36-61	30.4 (8.2)	29	24-48
Picture-word matching – errors	0.44 (1.01)	0.00	0-3	0.67 (1.00)	0.00	0-3
Word writing	31.3 (4.5)	31	26-39	25.9 (5.0)	27	16-32
Reading comprehension – general	17.4 (1.7)	18	14-20	15 (3.9)	17	10-20
Reading comprehension – accuracy (%)	87.2 (8.7)	90	70-100	75 (19.7)	85	50-100

the tasks measured. Table 6 then shows that the significantly better performance of the precocious readers applies only to the one-minute reading task, the picture-word matching accuracy and word writing task. Their scores for phonemic awareness, RAN, and reading comprehension are not significantly better. The superiority of the precocious readers in the second grade is associated with their higher speed and precision of reading and greater accuracy of word writing. Reading comprehension is probably still quite a difficult task for both reading groups, so it is difficult to differentiate their performance.

Discussion and conclusion

The aim of this longitudinal study was to monitor the development of early precocious readers by contrasting the development of their literacy with the development of their age-, gender-, and class-matched peers. According to the current state of knowledge in the area of the precursors of early literacy, the sets of literacy and literacy-related measures were created to construct literacy profiles applicable to each of kindergarten and the first and second grades.

According to the data available in our

Table 6. Mann-Whitney tests comparing the groups of precocious readers and non-precocious readers on phonemic awareness, rapid naming, reading, and spelling tasks in the middle of grade 2

	T3 – middle of the second grade	
Measures	U	p*
Phoneme deletion	33.0	0.546
RAN objects	23.0	0.236
One-minute reading	11.0	**0.008**
Picture-word matching – accuracy	9.0	**0.004**
Picture-word matching – errors	32.5	0,489
Word writing	17.0	**0.040**
Reading comprehension –general score	28.0	0.297
Reading comprehension –accuracy score	28.0	0.297

*p< 0.05

study, precocious readers of kindergarten age show superior levels of literacy foundation skills: phonemic awareness performance (at various levels of difficulty – isolation, blending) and letter knowledge (obvious at the level of their knowledge of both the sounds and names of letters). As expected, according to the studies available on the early precursors of the development of reading (Caravolas et al. 2012 – this one including a Czech sample; Ziegler et al. 2010), precocious readers use their superior literacy foundation skills to boost their basics in reading – the decoding skills. So, in contrast to their classmates, these children also show a superior level of decoding skills when of kindergarten age. This was observed in the one-minute reading task as a significantly higher number of words read correctly in one minute and also at the level of the word spelling task (more words spelled correctly). The precocious readers seem to rely more on phonological reading strategies, which brings them less effectiveness in solving the picture-word reading tasks. As already explained, the picture-word matching tasks require the child to choose the appropriate written form of a word presented as a picture – within a certain time limit. As a part of this task, four possible forms of the word are presented and the children have to choose the correct one. For children relying on a phonological ("non-lexical") strategy to read (sounding out each letter in a word), this task could be demanding in terms of the time needed. So children relying more on a "lexical" (sight word) reading strategy (typical of the pre-reading attempts of kindergarten children before the formal

teaching of literacy (Coltheart 2005) or, in relation to Czech early readers, Špačková, Kucharská, & Seidlová Málková 2015) might be more effective for this task.

The first-grade literacy profiles of the Czech precocious readers show their superiority in literacy foundation skills: letter knowledge (both the sounds and names of letters) and phonemic awareness. However, the first-grade profile shows that the performance of the precocious readers for phonemic awareness is only superior at the level of the more difficult phoneme task (blending). The phoneme isolation task also becomes feasible for typically developing readers and does not differentiate them from the precocious ones. Reading is significantly better in the precocious readers at all the levels we attempted to describe. The precocious readers read more words accurately in the one-minute reading task, solve significantly more items correctly, and make significantly fewer errors in the picture-word matching task than the non-precocious readers. The average number of words read in the one-minute reading task by the precocious readers in this study applies to the typical performance of typically developing Czech second-grade children (Caravolas & Volín 2004, p. 38). The spelling of letters, similarly to word writing, is much more precise and accurate in the precocious readers when they reach the first grade.

The second-grade literacy profiles of the precocious readers maintain their superior performance at the level of reading accuracy and writing. As in the first grade, the precocious readers can read significantly more words in the one-minute reading task and can correctly solve more items and make fewer errors in the picture-word matching task than the non-precocious readers. Their word writing performance also maintains its superior level. On the other hand, the phoneme deletion task used to monitor the phonemic awareness performance in the second grade does not differentiate between the precocious and non-precocious readers (probably because this task starts to be easy for the precocious readers). The timed reading comprehension cloze test task did not differentiate the precocious readers from their classmates either.

The structure of the Czech precocious readers' literacy profiles has a few aspects in common with the study of Tafa and Manolitis (2008). To the extent to which we can compare our study with that study (which is not constructed in such a way as to be directly comparable), both Czech and Greek precocious readers show superior phonemic awareness performance in kindergarten and in reading fluency and spelling superior scores throughout the first and second grades. However, a direct cross-linguistic study with a comparable methodology and measures would be needed to provide a reliable cross-linguistic comparison of the development of precocious readers.

The results of the rapid naming (i.e. RAN objects) tasks might look surprising.

The rapid naming speed did not prove to be significantly better in the precocious than the non-precocious readers at any of the data collection points. At the same time, as reported in Tables 3 and 5, in all the data collection rows, the RAN speed was generally faster for the precocious readers than for the non-precocious ones. RAN is, of course, along with letter-sound knowledge and phonemic skills, an important foundation skill for early literacy (Caravolas et al. 2012). Performance on the rapid naming tasks clearly differentiates between good and poor readers (Jones, Ashby, & Branigan 2013) but probably cannot differentiate precocious and typical (non-precocious) readers so clearly. This may relate to the fact that RAN seems to "…tap a separable mechanism that is involved in forming associations between printed words and their pronunciations" (Caravolas et al. 2012, p. 684).

Discussion may arise around the issue of the selection or identification of the precocious readers. The broader data sample we used in this study was not primarily constructed for the assessment of precocious readers. That, of course, brings some limits of this study. First, there is the issue of the criteria for selecting precocious readers. The studies we referred to from the previous research articles typically selected precocious readers according to the judgement of kindergarten teachers (for example Tafa & Manolitis 2008; Matejček 1995, 1999) and these preselected groups of children were then assessed by means of specific reading tests, either a word reading test (assessing fluency and speed – Matejček 1995, 1999) or more general reading tests assessing reading at the level of fluency, speed, and comprehension (Tafa & Manolitis 2008) or just selected measures from a large assessment battery containing various language (both receptive and expressive) and reading skills (Silvén, Poskiparta, & Niemi 2004). Our research data did not allow us to follow any of these procedures in detail. The original larger sample in our study was a part of a longitudinal study assessing very early literacy skills and only some of the language skills (mainly expressive). Reading comprehension tasks were administered only in the second grade (T3), so we could not use the reading comprehension tasks for the selection procedures. For that reason we could not fully differentiate precocious readers from what are termed hyperlexic children in our sample – see the introductory part of this study: the definition of precocious readers by Olson et al. (2006). The careful combination of both reading fluency and reading comprehension tasks for the purpose of the selection of precocious readers in kindergartens should be a focus of future research. On the basis of our experience and the results of this study, we propose a general three-step screening procedure in kindergartens for selecting precocious readers. As a first step the screening should contain a letter knowledge task (preferably capital letters in Czech), then as a second step a one-minute word reading task, and, in the event of positive

results (above the normal level of the results achieved by their agemates in standardized measures), to add as a third step a reading comprehension task to differentiate hyperlexic children.

Another issue concerning the selection criteria for the precocious readers used in our study may relate to the fact that the one-minute reading test we used for selecting precocious readers was also used in the study to construct the reading profiles of both precocious and non-precocious readers and to contrast these two groups. Ideally, we would use a different measure of word reading to select precocious readers and to contrast them with non-precocious readers. However, as already mentioned, the set of tasks we were able to use in our study was limited by the original longitudinal study and it was not possible for us to implement another special measure of word reading. At the same time, we wanted to retain the possibility of tracking the development of these word reading skills throughout both the following primary school years. So the differences between precocious and non-precocious readers in word reading at T1 should be viewed with caution (as these are obvious). The important information, however, is that the differences at the level of reading efficiency are also maintained in the first- and second-grade (T2 and T3 data collection time) measures.

The control measures used in this study (lexical skills and non-verbal IQ) also argue for the importance of a more precise description of the socioeconomic and family background of precocious readers. This study provided a description of the structure of the literacy and, of course, some pre-literacy language-related skills of the precociously reading children. However, our data does not allow us to take into consideration the wider socioeconomic or family background influences. So this study should be considered as a beginning, as baseline material to show the strength of the differences between precociously reading children and their peers. The knowledge provided in this study is therefore of particular importance for the practice of psychological counselling.

This study reports on data from the "Enhancing Literacy Development in European Languages – ELDEL" project, FP7-PEOPLE-2007-1-1-ITN 215961. The preparation of this study was supported by the Ministry of Education, Youth, and Sports – Institutional Support for Long-term Development of Research Organizations – Charles University, Faculty of Education (2017, Q17).

References

Anbar, A. (1986). Reading acquisition of preschool children without systematic instruction. *Early Childhood Research Quarterly*, *1*(1), 69-83.

Byrne, B. J. (1998). *The foundation of literacy: The child's acquisition of the alphabetic principle*. Hove, UK: Psychology Press.

Caravolas, M., & Volín, J. (2004). *Baterie diagnostických testů gramotnostních dovedností pro žáky 2. až 5. ročníku ZŠ. [The Battery for Assessment of Literacy Skills in Children from 2nd–5th grade of primary school]*. Praha: Institut pedagogicko - psychologického poradenství.

Caravolas, M., LervÍg, A., Mousikou, P., Efrim, C., Litavský, M., Onochie-Quintanilla, E., Salas, N., Schoffelova, M., Defior, S., Mikulajova, M., Seidlova Malkova, G. Hulme, C. (2012). Common Patterns of Prediction of Literacy Development in Different Alphabetic Orthographies. *Psychological Science*, *23*(6), 678-686. http://doi.org/10.1177/0956797611434536.

Caravolas, M., LervÍg, A., Defior, S., Seidlová Málková, G., & Hulme, C. (2013). Different patterns, but equivalent predictors, of growth in reading in consistent and inconsistent orthographies. *Psychological Science*, *24*(8), 1398-1407.

Clark, M. (1976) Young fluent readers. What they can teach us: London: Heinemann.

Coltheart, M. (2005) Modeling Reading: The Dual-Route Approach, In Snowling, M. J. & Hulme, C. (Ed.) *The science of reading: A handbook* (pp. 6-23). Oxford, UK: Blackwell Publishing Ltd. doi: 10.1002/9780470757642.ch1

Durkin, D. (1966). *Children who read early: Two longitudinal studies*. New York: Teachers College Press.

Hulme, C., Caravolas, M., Málková, G., & Brigstocke, S. (2005). Phoneme isolation ability is not simply a consequence of letter-sound knowledge. *Cognition*, *97*(1), B1-B11.

Hulme, C., & Snowling, M. J. (2009). *Developmental disorders of language learning and cognition*. Chichester: Wiley-Blackwell.

Jones, M. W., Ashby, J., & Branigan, H. P. (2013). Dyslexia and fluency: Parafoveal and foveal influences on rapid automatized naming. *Journal of Experimental Psychology*: Human Perception and Performance, 39(2), 554-567.

Kessler, B. & Caravolas, M. (2011). *Weslalex: West Slavic lexicon of child-directed printed words*. Retrieved from http://spell.psychology.wustl.edu/weslalex.

Matějček, Z. (1997). Early Readers in Czech. *Dyslexia*, (3(1), 48-54.

Matějček, Z. (1999). Časní čtenáři z mateřských škol [Precocious readers in kindergartens]. In A. Kucharská (Ed.), *Sborník specifických poruch učení a chování* (40-42). Praha: Portál.

Olson, L. A., Evans, J. R., & Keckler, W. T. (2006). Precocious readers: Past, present, and future. *Journal for the Education of the Gifted,* 30(2), 205-235.

Seidlová Málková, G., & Caravolas, M. (2013). *Baterie testů fonologických schopností, BTFS. [The Battery for assessment of Phonological Awareness].* Praha: Národní ústav pro vzdělávání.

Silven, M., Poskiparta, E., & Niemi, P. (2004). The odds of becoming a precocious reader of Finnish. *Journal of Educational Psychology. 96.* 152-164.

Splavcová, H., Šmelová, E., Kropáčková, J., & Syslová, Z. (2016). Rámcový *vzdělávací program pro předškolní vzdělávání.* [online; Framework Education Programme for Preschool Education]. Praha: Národní ústav pro vzdělávání, [cit. 2018-02-5]. Available from: http://www.msmt.cz/areas-of-work/preschool-education?lang=2

Stainthorp, R., & Hughes, D. (1999). *Learning from children who read at an early age*. London: Routledge.

Špačková, K., Kucharská, A., & Seidlová Málková, G. (2015). Vývojová dynamika čtení – dekódování. [Developmental Dynamics of Reading - Decoding]. In. Kucharská, A. et al. *Porozumění čtenému III. – Typický vývoj porozumění čtenému – metodologie, výsledky a interpretace výzkumu* (pp. 57-84). Pedagogická fakulta UK v Praze.

Tafa, E., & Manolitsis, G. (2008). A Longitudinal Literacy Profile of Greek Precocious Readers. *Reading Research Quarterly*. 43(2) (pp. 165-185).

Wechsler, D. (2003). *Wechsler Preschool and Primary Scale of Intelligence—Third UK Edition* (WPPSI-IIIUK). Oxford. England: Psychological Corp.

Ziegler, J. C., Bertrand, D., Tóth, D., Csépe, V., Reis, A., Faísca, L., . . . Blomert, L. (2010). Orthographic depth and its impact on universal predictors of reading: A cross-language investigation. *Psychological Science*, 21, 551-559. doi:10.1177/0956797610363406

PhDr. Gabriela Seidlová Málková, Ph.D.
Department of psychology, Faculty of Education, Charles University
gabriela.malkova@pedf.cuni.cz

Silent Reading Comprehension in Fifth Grade Pupils

Zuzana Hoždorová, Olga Kučerová

Abstract: The submitted contribution is an introduction to a research study that focussed on the charting of the mode of silent reading comprehension of fifth grade students. Attention is paid to the theoretical concept of the national reading diagnostics by advised practice that more closely introduces the silent reading test. The test is the subject of modification and examination in our research, which is hereafter described as the phenomenon of silent reading. Subsequently we introduce the introduction of the research methodology, including the aims, useful methods, a description of our sample and experimental questions that will follow up with research findings. The data acquisition took place through group administration. The research was conducted with a collaboration of 8 elementary schools and 127 fifth grade students took part in the research study. Statistically significant differences were established from the viewpoint of a) gender (girls scored higher than boys in the explicit score in the original version of the test) and b) the effect of handwriting, where we found marginal statistical significance. This statistical difference lies in the fact that the students who write in traditional cursive score higher in silent reading than the students writing in Comenia Script in the implicit score in the new test version.

Keywords: reading development, silent reading, reading comprehension, assessment of reading

Introduction

Reading diagnostics in advisory (counseling) practice

In Czech counseling system is the assessment of the quality of reading is basis of the pedagogical-psychological diagnostics. For a high-quality handling of this skill belongs to the basic qualifications for a successful education.

The counsellor worker analyzes three fundamental aspects in the reading test. Among them are quantitive parameters such as the speed of reading and its fluidity, then the error rate and accurate reading in accordance with the template and the last observed aspect is the reading's usefulness that includes the understanding of the read text (Svoboda, Krejčířová & Vágnerová, 2015).

In the traditional assessment of the level of reading comprehension, a child

retells a story that he had just read. In cases when he is unable to recollect specific passages, the examiner poses guiding questions that arise from the read text. In one of the most used reading exams (Matějček et al., 1987), these supplemental questions are precisely formulated; the examiner formulates them according to his experience and current test situation. This method of administration can lead to certain distortions.

The degree of understanding the meaning on sentence level is verified through tasks in which children fill in the missing word from an offered selection (Vágnerová, 2005). This method of examining the skill level of text comprehension can have its limits in the same way as there are limits when we assess the understanding of a text through its retelling. Kucharská (2014) and Schimmel (2016) draw attention that such a way of reproducing a read text can have a considerable effect on the quality of the child's linguistic expression ability and his personality characteristics (ex. anxiety, fear of failure, self-presentation ability etc.). The motivation behind one's own examination can also have an impact on the final result.

Among the most frequently used diagnostics methods belong the *Reading test* (Z. Matějček et al., 1987) that serves as an evaluation of speed, accuracy and understanding of the read text. Other diagnostic tools are *Testing reading and understanding* (Caravolas & Volín, 2005) that stems from the filling of missing words into sentences. According to Kucharská et al (2014), one of the possible areas of assessing the understanding of a read text is not related however to the child's ability to work with the entire concept of the story. The research project of the GAČR (Czech Science Foundation) "Reading comprehension – typical development and its risks"[1] reacts to the shortcomings of our pedagogical and psychological diagnostics and new tests were developed within its frame. All of the tests were put together on the basis of the same principle – watching both the explicit and implicit levels of understanding. The tests chart the understanding of a reading from the point of view of hearing, loud reading and silent reading. We now introduce in more detail a test that focusses on one of the methods of text comprehension: silent reading that was used, modified and examined in our research study. It is the case of one of the two variants of the test of silent reading and understanding that is conceived for more mature readers (from the third year up), within the frame of the project also a simpler option emerged for beginning readers, but that was not the object of our research.

In our research, we decided to measure the level of reading comprehension by having the students respond to questions,

[1] Research project of the GAČR "Porozumění čtenému – typický vývoj a jeho rizika" [Understanding the read text – typical development and its risks], P407/13-20678S, 2013-2015.

which belongs to the most traditional forms of assessing reading comprehension (Schimmel, 2016). Question responses make it possible to focus on concrete facts and conclusions. In order for the questions to be a good measurement of understanding, they must be based on the text and the reader must read the given text so as to prove an understanding of the question (Schimmel, 2016). In contrast to the current diagnostic tools (Matějček et al., 1987), the created test must be read until the end, only then can the student answer all questions (Kucharská et al., 2015). The question formulation stems from the difficulty of the given text and from the age category of the target group of students to whom the test will be given. The questions should be concisely formulated - they should not include, for example, double negatives that may lead to the distortion of responses.

Going on a trip

The authors of the text are Anna Kucharská and Věra Vykoukalová. The test is composed of 175 word long stories. A text is printed on the register sheet; it is the case of a plot line that describes the departure of a mother and her two children to visit their grandfather. When leaving, the family go through difficulties and remember their experience with the previous departure. There is a recording sheet that is created for the test. The test is conceived for group administration. First, a preprinted text is distributed to each student who then reads it to himself; there is no time limit at this stage and we wait until all students in the class finish reading. Then, a recording sheet with printed questions is distributed among the students. The maximum time for responding to the questions is 15 minutes. The exact version of the administration and scoring of individual answers lead to the structural layout of the test material and prevents the emergence of random errors when measuring the results.

Introducing the phenomenon of silent reading

We will define the phenomenon of silent reading in opposition to reading aloud, even though we do not see them as activities of completely dissimilar characters, but rather as skills that concur each other especially in the child's developing period and the practice of his reading skills.

Reading aloud is a natural part of the first two years of elementary school when it is used especially within the frame of practicing reading aloud. Students perceive the text on the basis of sound impulses and articulatory movements of speech organs. Thanks to reading aloud, the child as well as the teacher have the chance to quickly correct the fluency and accuracy of the read text.

The introduction of silent reading takes place naturally during the third year of elementary school, for it is in this time when the school increases its

requirements on the student in the area of functional silent reading (ex. independent task work during the lesson). According to Prior & Welling (2001), silent reading begins later in the fourth year.

Researches dedicated to the differences between reading aloud and in silence are at times contradictory, whereas studies describe different results. Experts do agree, however, on that the differences often depend on the students' age and reading level. The disagreement is in the used methods and measurements of charted reading developments. Dissimilar results are also supplied by studies that have the aim to find the age when students move from vocal to silent reading. Reading comprehension is a complex skill that was the concern of many researchers, even though they differ in various approaches to measurement methods (compare Prior and Kragel). We can consider other causes such as the different methods of reading and writing.

The international comparison study PIRLS (2001), which examines the level of reading literacy across the states of the European Union, indicates the fact that students in Czech schools read silently less than in others (Kratochvílová, 2010).

Kratochvílová (2010) highlights that the key to the development of reading literacy – reading comprehension – is actually silent reading, for its focus is dedicated to the work with meanings and does not have to address formal aspects of reading such as the sound aspect and the short-time memory is not congested by, for example, pronunciation corrections. On the contrary, the reader can use and develop strategies that reading aloud does not allow - for example, skipping some passages or vice versa re-reading them (in the case of miscomprehension).

Methods

Aims of the research and research questions

The primary aim of the research study was the modification of the silent reading test *Going on a trip*. The test makes it possible to observe the students' text comprehension, including the reading strategies through the form of silent reading. The objective of the modification was to increase the test difficulty and to find whether a test is able to differentiate fifth year students, considering the test's previous use for third and fourth year students. During the construction of the method, we stemmed from the 80% success rate of the previously used test and from the published list analysis (Kucharská et al., 2015). The realization of the test's design changes was based on the creation of a new recording sheet. One of the resources for increasing the test difficulty was to double the number of test questions and change the question typology while keeping the text the same. One of our aims was to keep the same test time limit of 15 minutes, therefore the questions were formulated by

declarative sentences that the examined individual either marks as true (YES) or false (NO) and he can also choose the option (I DON'T KNOW). This typology bears sixteen questions. In the remaining six questions, the individual chooses from a word selection with (three to four) words that did or did not appear in the text.

Within the frame of the test, our assessment moves between two levels of reading comprehension - implicit and explicit.

1) Implicit comprehension concerns the deduction of information that is not given in the text, it is the case of finding answers to hidden meanings.
2) Explicit comprehension concerns searching for factual information in the text.

Our objectives included the verification of the test's statistical parameters so that they could be potentially used for standardization and could then contribute to our pedagogical as well as psychological diagnostics.

Among our secondary aims were the verification of differences between students from the perspective of writing sample and gender. Students who write in the traditional cursive and unconnected lettering – Comenia Script – were included in the research. In previous projects (ex. Kučerová & Hoždorová, 2016), a higher level of writing abilities was proved in the case of students writing in Comenia Script, which could also influence their reading development. For this reason we investigated whether the performances in silent reading are dependent on the method of writing or not. The inclusion of the influence of gender will contribute to the clarification of the fact whether it is necessary to differ diagnosticapproach or intervention to girls and boys.

The first step after modifying the silent reading test was to implement a pilot study in which the new recording sheet was tested and verified. Questions with a 95 to 100% success rate were replaced in the final version of the test, as they would not allow differentiation between performances. It was the case of changing altogether four questions.

We posed the following research questions during the research study:

1. Does the *Going on a trip* test – after our modification - have a discriminatory and communicative value for fifth grade students?
2. Does the writing sample have an effect on the student's success in the silent reading comprehension test?
3. Do we record different results in the silent reading comprehension test for boys and girls?
4. Can we compare the students between each other on the basis of categories in the test and from the aspect of rough scores (explicit and implicit comprehension)?
5. Will an adequate level of reliability be reached after the change of questions in the test?

The quantitative research study was car-

Table no. 1: Sample of 5th grade students

	Traditional script	Comenia Script	In total
Girls	34	33	67
Boys	31	29	60
In total	65	62	127

ried out in the academic year 2015/2016. The data was collected in two time periods – in October and November 2015 and in May and June 2016. In the first wave of the data collection, the students were given the original test version and in the second wave, the students were divided: one half was administered based on the former test version and the second based on the new edited version. More methods that served to chart students reading, scribal and writing were administered simultaneously with the silent reading comprehension test, but they are not part of this contribution.

The test was evaluated according to a given scoring system that contained 24 questions and a maximum number of 40 points. Within the scope of the test analysis, calculations of arithmetic averages and success rates were assessed from the perspective of percentage occurrence.

Some statistical parameters of the test were also followed and the testing of hypotheses in the given questions were carried out.[2]

Participants

The research study collaboration was with eight elementary schools; in terms of demographics, five of these schools are located in the capital city of Prague, one is in the Vysočina region and the last two schools are in North Bohemia. Altogether 127 fifth year students participated in the research. From the overall number, the students who participated in only one of the data collection waves were eliminated. The gender in the

[2] The Reliability (inner consistence) test was calculated as an ordinal alpha, because the test scorings had an ordinal character (sorted category) instead of cardinal (which the classic Cronbach alpha expects). The ordinal alpha has the same interpretation as Cronbach's alpha, but otherwise it is taken into account that for the calculation we use the so-called polychoric correlation that expects a normal distribution of values, which is of course marked by the help of an ordinal scale (Zumbo, B. D., Gadermann, A. M., & Zeisser, C., 2007).The ANOVA method was used to find the differences between the genders and writing sample. The calculation of differences between the students in the original test version in the first and second data collection waves was executed through the couple t-test (Student's). Considering that the difference between the first and second data collection waves was conducted did not have a normal division (Shapiro-Wilk test), even the nonparametric Wilcoxon signed-rank test was calculated.

Table 2: Statistical processing of the students' advancement

Paired Samples T-Test

	Test	Statistic	df	P	Mean Difference	SE Difference	Cohen's d	95% Confidence Interval Lower	Upper
Overall2 – Overall1	Student's	4.938	68	< .001	1.290	0.261	0.594	0.769	1.811
	Wilcoxon	1506.000		< .001	1.500	0.261	0.594	1.000	2.000
Explicit2 – Explicit1	Student's	3.727	68	< .001	0.652	0.175	0.449	0.303	1.001
	Wilcoxon	984.500		< .001	1.000	0.175	0.449	0.500	1.500
Implicit2 – Implicit1	Student's	3.832	68	< .001	0.638	0.166	0.461	0.306	0.970
	Wilcoxon	989.000		< .001	1.000	0.166	0.461	0.500	1.500

research sample is more or less balanced – only lightly do girls outbalance the boys (67:60). There is also a close balance from the perspective of writing font, where the usual writing sample lightly outweighs the Comenia Script (65:62). The average age of the students in the first wave of data gathering is 11,0 years, the second wave took place seven months later. The criteria for registering the students into the research was to fill an informational agreement by the child's parent. The results were processed anonymously under identification codes.

Results

Entry analysis

From the perspective of the tests' item analysis, we can consider the test that underwent our alterations to be more demanding with a higher discrimination value in the results. The overall percentage success of the new test version was 63,63 % (N = 64) whereas for the original test version it was 85% (N = 82). In the new test version, the minimal success rate decreased and a greater variance of success appeared which may add greater sensitiveness to the test when recording individual differences between the students.

The students' advancement at the beginning and end of the school year

Within the framework of checking the statistic differences, significant statistical differences were proved in all of the observed scores (overall, explicit and implicit) in terms of the students' advancement at the beginning and end of the school year. Statistically, the students score considerably better at the end of the school year than at the beginning in the original test version.

Table 3: Statistical processing of implicit scores

Implicit comprehension					
Effect	DFn	DFd	F	P	Ges
Gender	1	60	0,797559	0,375392	0,013118
Script	1	60	3,932486	**0,051945**	0,06151
Gender : Script	1	60	1,22339	0,273112	0,019982

Reliability

The overall reliability of the tests ranged between the coefficients 0,7 and 0.8; the tests' high reliability was certified by the reliability test. No more significant differences in the reliability of the original and new test versions were recorded. The level of reliability was lower in the comprehension score than in the score of simple comprehension in both test versions.

When constructing the reading comprehension test, a question structure is created, similarly focussed questions are related to the explicit (literal) comprehension and implicit (deduction, reading "between the lines", understanding the connotations) comprehension. However, according to Kucharská et al. (2015), we can doubt that we will find one factor of this comprehension, i.e. that all the questions should correlate together. Some questions can be more related to reading skills, others with cognitive and linguistic abilities, the individual's experiences etc. The child's experiences, mental abilities, ability to use the context and more play a role in the case of the implicit scores. In both test versions we came out with reliability coefficients that were lower for implicit comprehension. We can therefore presume that it is more difficult to find questions focussed on deduction that would mutually correlate than in the case of explicit, literal comprehension.

Assessing the results from the aspects of the influence of writing sample and gender

In terms of finding differences between the observed changes, the following differences were proved:

- The students who write in cursive obtained better results in the implicit score than the students writing in unconnected font (in the new test). We can therefore speak of a marginal statistical significance (p = 0,051945).

Forming what is already included in the texts only implicitly, presuming the contained effects in the collection of claims is the most complicated level of reading comprehension (Průcha, Walterová, & Mareš, 2009). In the average results of individual (explicit and implicit) scores, the students were on average more successful in the implicit than explicit scores. We can say that the fifth grade

Table 4: Statistical processing of explicit scores

Explicit comprehension					
Effect	DFn	DFd	F	P	Ges
Gender	1	77	5,246307	**0,024731**	0,063788
Script	1	77	0,301406	0,584591	0,003899
Gender : Script	1	77	0,26355	0,609162	0,003411

students have no trouble with deducing hidden information that is more difficult than literal comprehension.

Considering the definitions of the implicit scores, we believe that it is mainly the individual characteristics (cognitive aspects of the students, ability to make use of the context, ability to solve crisis situations, necessary imagination for understanding the context, understanding the relation between two events and more) that are projected into the deduction have influence on the students' results.

– A statistically significant difference was established for the results in the explicit score of the girls and boys. The girls score better in the 2% significance level than the boys (in the second wave of data collection for the original test version).

We could explain the higher scores for girls with their better verbal proficiency and more positive relation with reading that Ronková indicates in her research (2012). Alternatively, it is possible that due to the higher number of read books that is implied on the basis of such a claim, the quality of comprehension will be on a higher level. Girls also tend to be more motivated in tasks reminiscent of a school situation.

Statistical differences were not manifested in other observed parameters.

Discussion

In our research, we have chosen answers to questions that focus on concrete facts and conclusions and belongs to the most traditional forms of text comprehension (Schimmel, 2016). In contrast with existing diagnostic tools (Matějček et al., 1987), the pupil has to read the entire text and then answer all questions. The possibility to return to the read text eliminates the influence of memory abilities that can influence the pupils' performance when paraphrasing text. In usually used diagnostic methods, the most widely understood reading is read through text paraphrasing, for example Reading Test (Matějček et al., 1987).

There is no possibility in Czech diagnostics for quiet reading. For this reason, we cannot compare domestic

results with other studies. If we compare the results with pupils of the 4th grade (Kucharská et al., 2015, p. 107), we can say that the difficulty of the test has been improved in terms of percent success with a satisfactory degree of reliability. It has been confirmed that older pupils can better manage judgmental questions than younger pupils (1st and 2nd year) who are predominant in literal comprehension (Kucharská et al., 2015).Considering the character of the research study, it is impossible to deduce more general characteristics that could be projected onto the found differences. It is the first case of a test description of prospective differences between the observed indicators. In this case it would be good to verify the differences with more studies in order for it to be possible to describe the potential factors that could affect the silent reading comprehension. A deeper exploration of the Wildová (2012) assumption would be really interesting. Comenia Script will help pupils with learning disabilities, and the general principle of simplicity could help to improve comprehension of the text.

Similarly to other diagnostics tools, the test is necessary to use together with other tests. The analysis of the test of silent reading point out differences between the observed groups of students. We were not interested in generalising the results, but rather in an experimental charting of possible differences. For the generalisation of data, it would be necessary to conduct a research with a greater sample of student population and utilise a bigger battery of diagnostic methods.

We believe that the performed research study will contribute to the verification of the efficiency and utility of the *Going on a trip* silent reading test as a standardisation (as one of the subtests of assessing reading comprehension) and will therefore expand the options of our pedagogical as well as psychological diagnostics.

The study was supported by the Charles University, project GA UK No. 311015 – The development of writing from 1st to 5th grade of elementary school

References

Hoždorová, Z. (2017). *Tiché čtení s porozuměním u žáků 5. ročníků.* [*Silent reading with comprehension of fifth grade students*].(Master thesis). Prague: Faculty of Education CU.

Kratochvílová, S. (2010). *Tiché čtení zlepšuje porozumění textu*. [*Silent reading improves text comprehension*].*Čtenářská gramotnost*. Available at http://www.ctenarska-gramotnost.cz/ctenarska-gramotnost/tiche-cteni-zlepsuje-porozumeni-textu.

Kučerová, O., & Hoždorová, Z. (2016, 24th of November). *Jak píší žáci na prvním stupni základní*

školy? [*How do students write in their first year of elementary school?*]. The contribution was presented at the 2016 conference in Dyskorunka.

Kucharská, A., Seidlová Málková, G., Sotáková, H., Špačková, K., Presslerová, P., & Richterová, E. (2014). *Porozumění čtenému I.* [*Reading comprehension I.*] Prague: Charles University – Faculty of Education.

Kucharská, A. et al. (2015). *Porozumění čtenému III. Typický vývoj porozumění čtenému – metodologie, výsledky a interpretace výzkumu (Reading Comprehension III. A Typical Reading Comprehension Development – Methodology, Results and Interpretation of the Research)* Prague: Charles University – Faculty of Education.

Matějček, Z. et al. (1987). Zkouška čtení. Bratislava: Psychodiagnostika.

Průcha, J., Walterová, E., & Mareš, J. (2009). *Pedagogický slovník.* [*Pedagogical dictionary.*] Prague: Portál.

Ronková, J. (2012). *Děti a čtení.* [*Children and reading.*] Available at: http://scac.cz/wp-content/uploads/D%C4%9Bti_a_%C4%8Dten%C3%AD.pdf

Schimmel, N. L. (2016). *The effects of oral and silent reading on.* (Dissertation). New York: George Washington University.

Svoboda, M., Krejčířová, D., & Vágnerová, M. (2015). *Psychodiagnostika dětí a dospívajících.* [*Psychodiagnostics of children and adolescents.*] Prague: Portál.

Vágnerová, M. (2005). *Školní poradenská psychologie.* [*School counselling psychology.*] Prague: Karolinum.

Wildová, R. (2012). *Závěrečná zpráva o výsledcích pokusného ověřování písma Comenia Script.* [*Final report on results of experimental examination of the Comenia Script font.*] Prague: Charles University – Faculty of Education.

Zumbo, B. D., Gadermann, A. M., & Zeisser, C. (2007). "Ordinal Versions of Coefficients Alpha and Theta For Likert Rating Scales." *Journal of Modern Applied Statistical Methods* (6).

Mgr. Zuzana Hoždorová
Mgr. et Mgr. Olga Kučerová
Department of psychology, Faculty of Education, Charles University
zuzka.hozdorova@centrum.cz
olga.kucerova@pedf.cuni.cz

Children with Specific Language Impairment Through the CCC-2 Questionnaire

Helena Podpěrová, Anna Kucharská

Abstract: The contribution presents pilot adaptation of the Children's Communication Checklist-2 questionnaire by Bishop (1989) within the Czech population, specifically aimed at the assessment of its ability to distinguish children with Specific Language Impairment from children with typical development. The work includes comparisons of basic scores, as well as of the questionnaire subtests. The sample comprised 77 children of preschool age. The analysis performed has confirmed statistically significant differences between the groups that were researched and therefore also an accordance with the declared objectives of the questionnaire. The findings are discussed within the context of theoretical grounds, current knowledge, possible limitations, and possible options for future investigation.

Key words: Specific Language Impairment, questionnaire, CCC-2, communication, verbal communication skills

Introduction

The Children's Communication Checklist (CCC-2) was developed by Dorothy Bishop in 2003 as a revised version of the CCC questionnaire (1998) to assess the aspects of the Specific Language Impairment and/or dysphasia that are inadequately assessed by the current standardised language tests and are considered clinically significant. Such aspects include pragmatic abnormalities occurring in social communication and other quantitative traits of speech and language included within the scale of the phenomena being researched. The aim of this study was to present a means for distinguishing specific subtypes within the population of children with language disorders. We have particularly focused on the question of whether the professionals, who are familiar with their child clients, would be able to agree on a technique for the assessment of communicative behaviour within the population with a previously identified language impairment and – if so – whether there is any proof of a distinct subgroup of children with complications affecting mainly semantic and pragmatic speech.

The CCC-2 instrument enables screening of communication disorders and identifies pragmatic and social deficiencies in interaction. According to Bishop (1998), these are the very deficiencies that are neglected by standard language tests – pragmatic speech deficiencies are less distinguishable in a common examination compared to daily life. The author of the CCC-2 defines pragmatics as a choice of appropriate communication and/or interpretation depending on the communication context (in Franke, Mikulajová, & Buntová, 2011).

The questionnaire was standardized on a wide sample of 542 UK children and youngsters with typical development ranging from four to 16 years of age, and with the assistance of their parents as informants, as they are naturally those who are in the closest contact with their children. The parents' assessments proved to coincide with clinical diagnoses. The informants might nevertheless differ in their ability to comprehend the specific items/topics and might be biased through subjective interpretations and prejudice. On the other hand, this approach made it possible to gain information on the day-to-day communication from persons who know the children intimately. Bishop et al. (2006) found out that the CCC-2 could be as effective as standardized tests in the identification of children with impaired speech development.

Methodology

General Background to the Research

The study was carried out within the scope of the research project *Enhancing Literacy Development in European Languages (*2008-2012). It was based on two fundamental pillars: international research in the field of the development of literacy at the European level (six research areas in total) and a training programme for beginning researchers (Sotáková, 2012). The questionnaire presented here formed part of the test battery in the section WP2 (*Identifying Risk Factors for Failure in Literacy Development in European Languages*), dealing with the links between preschool development and the level of pre-literacy and early literacy in the risk groups. Within a period of three years and in three stages (T1, T2, T3), three groups of children were repeatedly examined: children with Specific Language Impairment (SLI), children with family risks of learning disorders (FR), and children from the mainstream population (typical development, TD), with the objective being to find out what specific areas of the child's development are critical for the occurrence of specific learning disorders and/or what other influences cause the occurrence of the specific learning disorders in some children while not in others.[1]

[1] The author, D.V.M. Bishop, gave a permission for the use of the CCC2 questionnaire for research purposes in the ELDEL, W2 project. The results of the study were published in 2016. (Moll, K., Thompson, P. A., Mikulajova, K., Jagercikova, Z., Kucharska, A. Franke, H., Hulme, Ch., & Snowling,

Table 1. Target groups of WP2 respondents

Typical development children (TD)	Control group – children with standard development of speech; specific learning disorders excluded in close relatives.
Specific Language Impairment (SLI)	Experimental group – children with Specific Language Impairment (with developmental dysphasia).

Table 2. Criteria for inclusion into the SLI group

Pronunciation	Children pronouncing over 80% of phones incorrectly (the most frequently diagnosed dyslalia) were excluded from both the TD and SLI groups.
Language skills	Children achieving scores below -1δ in two of three tests (Vocabulary, Morphological Awareness Test, and Speech Recognition Test) and/or children whose score fell below -1δ in one test and equalled -1δ in the two remaining tests were included into the SLI group.

Research Sample

The research participants were mostly recruited in a leaflet campaign in kindergartens and paediatricians ´offices. 160 interested persons from among the parents or close relatives of the children showed their interest in participation in the research. This study involves data on typical development children (TD) and on children with Specific Language Impairment (SLI).

The CCC-2 questionnaire was distributed to the parents of children in the course of the T1 stage (April-October 2009). For the purposes of data processing it was possible to utilize questionnaires filled in by the parents of 77 children, of whom 43 children were from the TD (typical development) group and 34 children were diagnosed with SLI (Specific Language Impairment). The ages of the children ranged between 58 and 84 months. Further descriptive characteristics of the sample are listed in Table 3.

The comparison of both groups with respect to sex and age shows a disproportion between the boys and girls in both groups. The higher number of boys in the SLI sample shows agreement with the literature (Vitásková & Peutelschmiedová, 2005) – the boys show a greater inclination towards the incidence of impairments in the development of their speech than the girls do.

Tests and Procedures

The CCC-2 (Bishop, 2003) is composed of

M. J. (2016). Precursors of Reading Difficulties in Czech and Slovak Children At-Risk of Dyslexia. Dyslexia, 22, 2, 120-136, doi: https://doi.org/10.1002/dys.1526)

Table 3. Descriptive statistics of the research sample with respect to sex and age

Group		Total number	TD	SLI	Girls			Boys		
					TD	SLI	Total number	TD	SLI	Total number
		77	43	34	29	10	39	14	24	38
Age in months	Min	58	58	58	61	61	63	58	58	58
	Max	84	84	84	73	68	75	84	84	84
	Average	65	66	66	67	65	69	66	67	67
	Median	67	65	65	67	66	69	65	68	68
	SD	12.6	5	5	3	2	3.67	6	5.4	5.4

70 items divided into 10 sub-tests: A Speech, B Syntax, C Semantics, D Coherence, E Inappropriate initiation, F Stereotyped language, G Use of context, H Non-verbal communication, I Social relations, and J Interests. Each of the sub-tests is formed of seven items, of which five relate to deficiencies in communication and two are focused on various strengths in communication. To avoid confusing the examiner, the items evaluating difficulties in communication are listed in the first part of the questionnaire, while those relating to communicative skills are included in the second part of the CCC-2.

The examiner's task is to assess the frequency of each of the described aspects of the child's behaviour on a four-point scale where 0 means *"less than once in a week (or never)"*, 1 relates to the frequency of *"less than once in a week but not every day"*, 2 means behavioural aspects occurring *"once or twice in a day"*, and 3 means behavioural aspects occurring *"several times (more than twice) in a day"*. This method enables the child to be assessed in a more specific and less subjective manner.

The CCC-2 features two composite scores for the purposes of assessment:

- *General Communication Composite* (GCC) distinguishing children with communication disorders from children with typical development;
- *Social Interaction Deviance Composite* (SIDC) set up in order to be able to distinguish children with the typical image of SLI and those with a pragmatic language impairment.

The sum of sub-scales A-H states the GCC score used to identify children with a prospective clinical display of communication disorders. It is the index of the overall *communicative competence*. The sum of sub-scales A-D subtracted from the sum of sub-scales E, H, I, and J gives us the SIDC score used for the identification of children whose *pragmatic disorders* match their structural

Table 4. Descriptive statistics n of TD and SLI groups with respect to composite GCC and SIDC scores

Group		Composite score		Group		Composite score	
		GCC	SIDC			GCC	SIDC
TD	Average	74.23	-0,21	SLI	Average	54.85	7.91
	Median	73	-1		Median	54.5	6
	Mode	73	-4		Mode	62	5
	SD	13.15	7.74		SD	11.87	8.33
	Min	48	-16		Min	35	-7
	Max	101	18		Max	89	39

language skills inadequately. The SIDC score is also able to identify children with the communication profile of the autism spectrum disorder.

The GCC scores of children with typical development range above the boundary of 55, regardless of the SIDC score. Scores below 55 suggest clinically significant communication disorders. In such cases it is advisable to apply the SIDC score. The negative SIDC values indicate a disproportion between the pragmatic aspect of language and social aspects of communication, while its positive values suggest disproportions in the structural language skills. The profile of SLI children is typically associated with a value of nine points and more. Negative SIDC values ranging below -15 are considered diagnostically significant regardless of the GCC score. Such strongly negative values suggest a possible diagnosis of Asperger syndrome and autism spectrum disorder (Norbury et al., 2004; in Ferguson et al., 2011).

Results

Composite GCC and SIDC scores

The TD children reached an average GCC score of 74.23 points, with a median value of 73 points and with a relatively wide span of results ranging from 48 points (below the GCC standard boundary) to 101 points (table 4). Though the children in the TD group had been assessed in the standardized tests as pertaining to the "standard", four of them (9.3%) achieved a GCC score below the boundary for standard values.

The average GCC score in the group of SLI children amounted to 54.85 points, with a median value of 54.5 points. The scores generally pertain to the area described as a critical zone of output (10 percentile). The children's performances range within a rather wide span from 35 to 89 points. This group also includes children whose results in the criterion-referenced tests classify them into the SLI

group, who nevertheless do not belong in this group according to the assessment of their parents, who evaluate the language skills of their children as better than indicated by the results of the criterion-referenced tests. The CCC-2 results show that 15 children (44%) have no difficulties, i.e. their GCC score is above the critical value of 55 points. If a standard deviation of 3 is considered, the majority of the children (12) scored below the arithmetic mean (56-80). Three children even closely approached the critical value of 55, thus making the aforementioned information more accurate. It should be noted that the findings mentioned above did not mean exclusion of the children in question from the SLI group. The findings were regarded as evaluations of the child's manifestations by their parents, as will be discussed below.

The SIDC score average in the SLI group amounted to 7.91, with a median value of 6 and a span between -7 and 39. The average score achieved suggests belonging in the group of children with communication disorders. Ten children (29.4%) achieved an SIDC score of 9 or above, thus meeting the criteria for a communication profile typical of a more critical form of SLI. The SIDC scores of seven children (20.6%) within the group indicate impaired structural language skills. The negative SIDC value in two children suggests a significant imbalance between their social and/or pragmatic difficulties and their impaired structural language skills, which could indicate a pragmatic disorder.

The children with typical development reached an average SIDC score somewhere near 0 (-0.21), which is a balanced result with respect to the structural and pragmatic aspects of speech and communication.

When evaluating the statistical significance of the difference between the TD and SLI groups it was initially necessary to verify the normality of distribution. As this had been confirmed for the GCC scores (TD 0.720, SLI 0.348, p=0.05), we were able to apply a T-Test for two independent samples (unilateral) to assess statistical significance. As far as the SIDC scores are concerned, the normality of distribution had been confirmed only in the group of TD children (0.826, p=0.05, SLI 0.000) and a non-parametric Mann-Whitney U Test (unilateral) was therefore applied to evaluate the statistical significance of the differences. On the basis of the value of the observed significance of the F test criterion (of equality of variances), in case of GCC composite score we can assume the sample variances are equal (F=0.258, p=0.001). It should be noted that the SLI group shows worse results in its GCC score as regards the statistical significance (p=0.001) in comparison to the TD group.

CCC-2 sub-tests

Table 5 indicates the way the parents evaluated their children in the TD and SLI groups. Standard scores were applied here – the higher the score value, the better the communicative skills (average of 10, standard deviation of 3).

Table 5. Descriptive statistics of the TD and SLI groups with respect to sub-tests A-J and Analyses

		Subtests									
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
TD	Average	**9.79**	**10.02**	**7.74**	**9.42**	**9.16**	**9.47**	**9.02**	**9.60**	**9.14**	**8,86**
	Median	10	10	7	9	9	9	8	9	10	8
	Mode	14	13	7	9	9	8	7	8	10	7
	SD	3.75	3.14	2.23	2.94	2.12	3.01	3.08	2.53	2.81	2,94
	Min	2	4	5	4	6	4	4	5	4	5
	Max	14	13	16	15	17	15	17	14	13	17
SLI	Average	**4.65**	**6.00**	**6.47**	**6.32**	**8.35**	**8.29**	**6.94**	**7.82**	**6.18**	**9,00**
	Median	4	5.5	7	6.5	8.5	8	7	7	5	9
	Mode	4	4	7	5	9	7	7	6	5	8
	SD	2.87	3.60	1.54	1.49	1.15	2.58	1.67	2.66	2.62	1,88
	Min	0	0	3	4	6	4	4	4	2	6
	Max	14	13	10	10	10	14	11	14	13	14
Man-Whit. U test		212.5	301	505.5	267.5	561.5	570	430	423.5	298.5	652.5
Asymp. Sig. (1-tailed)		0.000***	0.000***	0.009**	0.000***	0.038*	0.048*	0.001***	0.0005***	0.000***	0.208

Note: A non-parametric Mann-Whitney U Test (unilateral) was applied as the sub-test scores showed abnormal distribution
**p = 0.05; **p = 0.01; ***p = 0.001*

The SLI group achieved worse results (lower standard scores) in comparison to the TD group in all the sub-tests, except for sub-test J (Interests). It is obvious that the structural language aspects (A-D) are at a significantly lower level within the SLI group than in the mainstream population. As far as the pragmatic aspect of speech is concerned (E-H), there are certain differences; these are, however, less distinct. The last two sub-tests (I-J), dealing with the issue of social relations and unusual interests, showed important differences in the assessment. While in sub-test I the children in the TD group showed significantly higher average values, the differences were not that distinct in sub-test J. The results confirmed the

statistical significance of the differences between the TD and SLI groups, except for sub-test J (see Table 5).

Discussion and Conclusion

CCC-2 as a tool for the identification of children with SLI

On the basis of the evaluation of the CCC-2 questionnaire, we obtained two elementary outputs – two composite scores (GCC and SIDC) for the two groups that were examined (TD and SLI). We confirmed the good ability of the questionnaire to distinguish these groups. Further on, we concentrated on the separate CCC-2 sub-tests and compared them mutually with respect to the evaluation by parents. Considering the knowledge on specifically impaired development of speech that can manifest itself in one, several, or all language aspects, as well as in the emotional, social, and/or behavioural areas (Lechta et al., 2003; Klenková, 2006), the children in the TD group achieved significantly better evaluations than the children with SLI. This assumption was confirmed in the sub-tests that focused on the structural and pragmatic skills in communication, as well as in the sub-test mapping social relations, but (nevertheless) was not confirmed in sub-test J (Interests), where the difference between the two groups was not significant.

Ferguson et al. (2011) gained similar results in the assessment by means of CCC-2 from the viewpoint of the parents of SLI children in comparison with children attending mainstream schools, concluding that there was a statistically significant difference in the GCC scores between the two groups. The authors of the study observed the same group differences in all ten CCC-2 sub-tests. In a study aimed at testing the Norwegian adapted version of the CCC-2 on a sample of children aged 6-12 with SLI and TD, Helland et al. (2009) confirmed the differences between the groups on all the scales (A-J), as well as in the GCC score.

We assume that the CCC-2 questionnaire meets the purpose it was developed for in the Czech environment too and that it distinguishes the children with Specific Language Impairment from children with typical language development. Our findings can be compared with those of Franke, Mikulajová, & Buntová (2011), who verified the validity and reliability of the Slovak version of the CCC-2. Their conclusions are similar as regards the GCC score, where the TD children reached statistically significant higher values than the children from the SLI group.

Communication profiles by means of CCC-2

Further on, we wanted to describe the extent of the concordance between the classification of a child on the basis of the CCC-2 (i.e. from the viewpoint of the parent) and on the criterion-referenced tests.

The limit of the GCC score to distinguish the norm from the risk is set to 55 points. In cases where the GCC score ranges below this limit, it is possible to additionally carry out interpretation of the SIDC score distinguishing between pragmatic/structural conditions and the communication profiles of ASD/Asperger syndrome. Our sample included 77 children (43 TD and 34 SLI). The average GCC composite score reflecting the general language level of the specific individual amounted to 74.23 (median 73, SD=13.5) in the TD group. These values are comparable with those of the verification study by Franke, Mikulajová, and Buntová in 2011 (GCC average of 75.98, median 76, and SD 14).

86% of the children classified into the TD group on the basis of the standard tests were assessed by their parents as developing typically with respect to their use of language in their day-to-day life. Out of the remaining six children (14%), one showed great disproportion in the resulting values for their GCC and SIDC scores (101/-16), which – according to Norbury et al. (2004; in Ferguson et al., 2011) – could indicate a communication profile corresponding to Asperger syndrome/ASD. In the case of a further two children we could consider deficiencies in the structural aspects of language, two children demonstrated a communication profile corresponding to SLI (SIDC > 9), and one child demonstrated a communication profile indicating deficiencies in pragmatic skills and social communication.

The group of children identified as SLI in the criterion-referenced tests showed interesting results. 56% of the children (19) were assessed below the norm limit (10th percentile, GCC < 55), 44% of the children had a higher score than the critical boundary or the same. From among the children with a GCC score below 55, almost half, we identified SLI (SIDC > 9) in 10 children (29% of the SLI group) and deficiencies in the structural language aspects in seven children (21%). (The GCC score in this group had very similar values to those of the TD group in the aforementioned study by the Slovak authors).

When interpreting the results we have to consider the fact that the parent's assessment may be subjective as the parents understand their children and tend to judge the children's potential problems in communication less strictly. We should also take into account the question of whether the parents are able to assess all the aspects of the child featured in the questionnaire. There is a tendency towards overestimation. Franke, Mikulajová, and Buntová (2011) observed that the parents and their sensitive tuning to the children's needs and communication style and the non-verbal communication, emotional, and other factors affecting communication, enhance the performance of the child. The children with such favourable conditions for their language development have positive prospects and a good prognosis for the improvement of their language skills.

The interpretation of the children

from the TD group who reached the norm in the standard tests and examinations while remaining below the norm in their assessment with the CCC-2 is interesting too. It still holds true that the results might be caused by the subjectivity of the parents' assessment, as the parents judge the communication skills of their children incorrectly. We should also consider the aspect of the family social background – the parents who classified their children into the zone of structural deficiencies or conditions indicating the SLI profile while being excluded from the risk groups in the criterion-referenced tests might have a good socioeconomic status and high level of education and therefore have high expectations of their child. Another option is either the lack of communication opportunities offered by such parents to their children because of their workload or the absence of sufficient speech models, preventing the child from adopting correct communication and language habits.

Further prospects

We compared two groups of children (TD and SLI) in the study. The third group, composed of children threatened by hereditary predisposition in the form of the incidence of certain specific learning disorders within their closest relatives (the child's parents and siblings), has been omitted. We are nevertheless planning the inclusion of the group into the next assessment of the CCC-2, as well as more detailed evaluation of the statistical indices of the test.

The validation of the questionnaire could be carried out by means of correlations between the tests used within the ELDEL project for the classification of children into the individual groups and between their criteria. The correlation coefficients could be significant for the evaluation of the extent of the concordance between the parents' assessment in the individual CCC-2 sub-tests concentrating on the specific skills of the child and the language tests/examinations used in the individual stages. This would give us the opportunity to evaluate the communication skills of children at the separate language levels that the tests and examinations focus on.

The study was supported by the project 215961FP7-PEOPLE-2007-1-1-ITN, Marie Curie Actions – Networks for Initial Training, ELDEL – WP2 coordination by Margaret Snowling, Senior Researchers Marina Mikulajová (SR), Anna Kucharská (ČR), Experienced Reseacher in ČR Zuzana Jagerčíková.

References

Bishop, D. V. M., McDonald, D. (2009). Identifying language impairment in children: combining language test scores with parental report. *International Journal of Language & Communication Disorders*, 44, 5, 600–615.

Bishop, D. V. M. (1989). Development of the Children's Communication Checklist (CCC): A Method for Assessing Qualitative Aspects of Communicative Impairment in Children. *Journal of Child Psychology and Psychiatry*, 39, 6, 879–891.

Ferguson, M. A., Hall, R. L., Riley, A., Moore, D. R. (2011). Communication, Listening, Cognitive and Speech Perception Skills in Children with Auditory Processing Disorder (APD) or Specific Language Impairment (SLI). *Journal of Speech, Language, and Hearing Research*, February, 54, 211–227.

Franke, H., Mikulajová, M., Buntová, D. (2011). Dotazník komunikačných schopností dieťaťa CCC-2 – slovenská overovacia štúdia. [Child Communication Questionnaire CCC-2 – Slovak Verification Study]. *Logopaedica XIV.* Bratislava: Mabag, 96–105.

Helland, W. A., Biringer, E., Helland, T., Heimann, M. (2009). The usability of a Norwegian adaptation of the Children's Communication Checklist Second Edition (CCC-2) in differentiating between language impaired and non-language impaired 6-to 12-year-olds. *Scandinavian Journal of Psychology*, 50, 287–292.

Klenková, J. (2006). *Logopedie [Speech therapy].* Praha: Grada.

Lechta, V. et al. (2003). *Diagnostika narušené komunikační schopnosti [Diagnosis of impaired communication ability].* Praha: Portál.

Moll, K., Thompson, P. A., Mikulajova, K., Jagercikova, Z., Kucharska, A. Franke, H., Hulme, Ch., & Snowling, M. J. (2016). Precursors of Reading Difficulties in Czech and Slovak Children At-Risk of Dyslexia. *Dyslexia*, 22, 2, 120–136, doi: https://doi.org/10.1002/dys.1526

Norbury, C. F., Nash, M., Baird, G., Bishop, D. V. (2004). Using a parental checklist to identify diagnostic groups in children with communication impairment: a validation of the Children's Communication Checklist-2. International *Journal of Language & Communication Disorders*, 39, 3, 345–364.

Podpěrová, H. Rodičovská zkušenost s dětmi s narušeným vývojem řeči. [Parental experience with children with language impairment]. Bakalářská práce. Bachelor thesis (Praha: PedF, 2013.

Sotáková, H. (2012). ELDEL projekt [The ELDEL project]. *Pedagogika*, 1–2, 211–216.

Vitásková, K., Peutelschmiedová, A. (2005). Logopedie [Speech therapy]. Olomouc: UP.

doc. PaedDr. et PhDr. Anna Kucharská, Ph.D.
Mgr. Helena Podpěrová
Department of psychology, Faculty of Education, Charles University
anna.kucharska@pedf.cuni.cz
helena.podperova@seznam.cz

Increasing Quality in the Education of Pupils and the Development of Key Competencies, Educational Areas and Literacies

Since January 2017 the Faculty of Education (Charles University) has become a beneficiary of EU funding from the European Social Fund (ESF) under Priority Axis 3: Equal access to high-quality pre-school, primary and secondary education. Together with Masaryk University, the University of South Bohemia in České Budějovice and the Technical University of Liberec, the Faculty of Education successfully entered the initial phase of the project Increasing quality in the education of pupils and the development of key competencies, educational areas and literacies.

In comparison to the previous participation of universities in ESF projects, this project has a different specification. It is based on the reflective model of future teacher education – a model that emphasizes action research and systematic reflection on teaching practice as a key factor in increasing the professional competence of teachers. In this way it represents an innovative approach to enhancing quality in education.

1. Main aims of the project

The aim of the project is to focus not only on improving the professional competencies of teachers and students training to be teachers but especially building a supportive and sharing platform, in which positive changes for all of the project actors (educators, academic staff, students training to be teachers) can be achieved. This brings a great challenge in the way that it changes the form of cooperation between practice (teachers) and academic research (represented by university teachers). The participation and cooperation is based on sharing professional experience and providing mutual professional feedback rather than educating and training teachers.

It is expected that the benefit of the project will result in two levels

1) *Support for increasing the competences of all project participants.* Teachers will improve their didactic, educational-psychological, mentoring and research competencies. They will be able to reflect better on what is happening in their classes and apply

empirically-based knowledge to improve the quality of education of pupils. Academic staff will be better informed about the actual needs and situation in schools. The subject 'didactics' will have the chance to link subject teaching to educational-psychological knowledge. The network created within diverse departments and universities will be of use even in the future. Undergraduate students in teacher education programmes will gain practical experience. They will improve their planning skills and abilities to implement and evaluate educational content through their engagement in action research. Employees of non-profit organizations will also become part of the network.

2) *Improving the quality of education of pupils in key competences.* The aim of increasing the efficiency of primary and secondary education is in line with the project proposal on the development of basic literacies (reading, mathematical, information), civic and social competencies and technical fields and natural science. Within these thematic objectives national and school curricula will be analyzed and reviewed and effective methodological approaches summarized. It is also intended to introduce, create and pilot new teaching strategies and approaches. On the basis of the findings, examples of good practice and video recordings of new approaches will be prepared. New teaching strategies and materials will be published online on the web pages of the project and in electronic media and also by official publishers. The project results and findings will also be used as study material for professionals in education and students (future teachers) in higher education.

2. Key project activities

2.1 Cooperation of the subject 'didactics' with specialists from departments of psychology, general didactics, psychodidactics and special pedagogy

An important part of the project is to establish close cooperation between distinct university departments to share research findings, theoretical background and conceptual terminology across specializations with educators in the Community of Practice platform. The activity of close cooperation is essential for any other key activity of the project so it takes place throughout all stages of the project.

2.2 Community of Practice for increasing quality in the education of pupils and the development of key competencies, educational areas and literacies

As already mentioned, the main activity of the project is to create a mutual platform for sharing experience among teachers, academic staff and represen-

tatives of non-profit organizations, and also other possible partners (school directors, future teachers). What is termed the Community of Practice is intended to take place on a regular basis, thus setting up long-term mutual cooperation. Throughout the three-year project this key activity will take place for 25 months.

The support of educators and the progress of their teaching competences is organized into two types of cooperation groups:

Horizontal groups. In the horizontal form teachers, academic staff and representatives of NPOs work together in separate groups according to specific and thematic objectives (for instance a reading literacy group, mathematical literacy group, etc.).

Vertical groups. In vertical groups project participants meet, share experience and generate and discuss teaching strategies and methods together in a diverse community across literacies according to participants´ interest in selected thematic curriculum.

The content of this key activity is realized in three thematic blocks: a focus on the curriculum, a focus on teaching and a focus on the actors in the educational process.

2.3 Mentoring in Community of Practice

The main aim of this key activity is to train and enhance the mentoring skills of primary/secondary school teachers to become leaders – supervisor teachers of students in teacher education programmes or beginner teachers.

2.4 Action research of students in primary and secondary schools

Academic lecturers and teacher practitioners will be selected from the Community of Practice and together they will work as mentors of students in teaching education programmes. The students will first be introduced to the theoretical background and concepts of action research. After this introduction, the students, in cooperation with their mentors, identify the topic of an action research project in the context of a specific class. The students then propose a hypothesis and prepare an intervention plan. The action research will be analysed and the efficiency of the intervention programme evaluated. The results and findings will be shared with the wider team.

2.5 Conference of Community of Practice as an effective factor in enhancing the quality of primary and secondary education – linking theory and practice

A conference open to all of those interested in cooperating will be used for introduction and dissemination of the project findings and results.

3. Target groups

There are two target groups: teachers (160) and higher education students (70).

The project targets primary and secondary school teachers. When the total number of schools is considered, not more than 10% can be upper secondary schools. Additionally, in order to foster the establishment of new cooperative relationships between universities and schools a maximum of 30% can be what are termed Faculty teacher training schools. Teachers (160) are expected to form the Community of Practice in which they could work closely with the academic staff in terms of sharing the experience, creating and piloting methodology materials and teaching strategies expected to improve the key competences of pupils in basic literacies and to encourage the interest of the pupils in technology and natural science. They are the key players in order to connect theory, research and practice.

The second already-mentioned target group is a group of students (future teachers) from the participating universities. In line with the aim and specific objectives of the project, the participants will be chosen from among the students following Teacher Education programmes: the Teaching at primary level in basic schools Master's study programme and the Training Teachers of General Subjects at Lower and Higher Secondary Schools Follow-up Master's study programme.

4. Current status of the project

With the beginning of 2018, the second year of the project has just started.

By the end of April 2017, the initial phase of the key activity of the Community of Practice was successfully completed. The project team was set up on the basis of cooperation between universities and departments. On the horizontal level individual teams introduced thematic objectives as a framework for possible cooperation with practising teachers. These topics were published on the web pages of the project. Next, schools and teachers suitable for possible cooperation were searched for and contacted.

On May 17th the first Community of Practice meeting, with over 220 participants, was held. The management team and representatives of NPOs as well as working teams were introduced, as were the thematic objectives and topics for cooperation. The emphasis was placed on the issue of the curriculum. So, together, the Community of Practice on the horizontal as well as the vertical level discussed the form, benefits and deficiencies of the national curriculum with respect to specific objectives (literacies, technology and natural science). For the next two-day meeting, held in September, the opening lecture introduced the participants to the issue of portfolios and their role in a reflective approach to teaching. In the programme that followed teachers were encouraged to become engaged in close cooperation in working

teams according to their professional interests. In thematic workshops university teachers, together with practising teachers, started to review and share their experiences of the didactic approaches, materials and instructional strategies used for the development of pupils' key competences in selected areas of reading literacy, mathematical literacy and so on. Additionally, school curricula were analyzed and discussed.

The next two meetings were held in November and January. The trajectory of the thematic block moved from a focus on the curriculum to a focus on teaching. On the vertical level the participants had the opportunity to attend a lecture on formative evaluation and, on the basis of their choice, they participated in one of the workshops focusing on interdisciplinary teaching. On the horizontal level, working teams based on the previous analysis and reviews started the process of creating and piloting appropriate methodological strategies, didactic material and instructional approaches that, it was hypothesized, would enhance the quality of education in the selected area.

At present the last two meetings of the Community of Practice are about to be planned, with their focus being on the actors in the teaching process. The initial phase of the following key activity, Mentoring, is going to start in the Community of Practice.

The article is a constituent part of outputs of the project Zvýšeníkvality vzdělávání žáků, rozvoje klíčových kompetencí, oblastívzdělávání a gramotností , Enhancing the Quality of Education,Developing Key Competences, Areas of Education and Literacy, No. CZ.02.3.68/0.0/0.0/16_011/0000664 supported from European Social Fund. Charles University, Masaryk University, University of South Bohemia České Budějovice and the Technical University of Liberec are the beneficiaries of the funding.

Klára Špačková, Anna Kucharská

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ
MLÁDEŽE A TĚLOVÝCHOVY

European Literacy Network ELN – Report on Activities and Events

ELN (which stands for European Literacy Network) is currently operating a large network of European researchers and professionals interested in research related to the field of literacy and transformations of research findings into outputs relevant for practice (most often educational).

The network was established in December 2014 and is – till the end of 2018 – funded by the European COST Action IS1401 https://www.is1401eln.eu/en/. (COST is the European framework funding supporting trans-national cooperation among researchers, engineers, and scholars across Europe.) The IS1401 ELN network currently includes members from 35 countries in Europe and what are termed "near neighbour" or partner countries (see https://www.is1401eln.eu/en/action/management-committee-mc/). The system of funding of COST allows each member country to have at least one or a maximum of two official representatives in the network. The representatives create the management committee of the network, the institution that is in charge of the coordination, implementation, and management of the IS1401ELN activities and the use of funding.

It could be said that the network is connecting reading and writing research communities across Europe, enabling them to meet, share experience, integrate findings and experience, collaborate on research projects, or plan new research projects and, of course, also develop various ways of transforming research findings into practice.

The aims of the network can be divided into scientific, technological, and societal goals.

As a network based on scientific communities ELN helps experienced and early-stage researchers from reading and writing communities to connect and develop a comprehensive understanding of literacy and literacy practices in European countries. An important aspect of all the COST-based network is represented by various forms of systematic support for young researchers. Specifically, the COST network organises what are termed training schools or short-term scientific missions (STSM). Training schools are typically organised on a specific topic for a small group of interested young researchers. They can transfer specific knowledge or skills relevant for a research career within a specific area. This kind of training is organised by more experienced members of the network, influential, innovative, or interesting laboratories or schools. Short-term scientific missions (called

STSMs) allow young researchers to visit one member of the network for a specific research-related scientific purpose. STSMs typically last up to three months. An important aspect of the scientific goals of the network is communication or translation of influential scientific knowledge on literacy into a format that can be understood by the general public and thus can have an impact or a positive influence on everyday practices wherever literacy relevant issues are being dealt with.

Technological goals include, for example, the goals of fostering the development of various digital tools to aid literacy learning and teaching, fostering the development of innovative tools and techniques for scientific studies of literacy, or developing high-quality assessment tools for literacy in multilingual or cross-linguistic contexts.

Goals at the societal level stress the importance of opening the network to educators, practitioners, and the interested general public. The network aims to communicate and share evidence-based methods for enhancing literacy education and improving literacy practices across various national curricula and to connect the network to critical national and international stakeholders and policymakers. The ELN network aims to remain functional after the end of COST funding in 2018 with the will to keep raising public awareness on the pivotal role of literacy in society and keep researchers on literacy active and connected.

Within the network the Czech Republic is now represented by the group of researchers from the Faculty of Humanities and the Faculty of Education of Charles University. The official representative for the Czech Republic and the member of the COST ISO1401 management committee is now Gabriela Seidlova Malkova. The Faculty of Humanities of Charles University hosted the inaugural conference of this network in November 2015.

As far as I can evaluate from my personal experience, the COST system and the networks this amazing funding supports still do not attract enough attention within the Czech research community on literacy. I think it should be especially recognised and used more as an excellent system for the effective support of doctoral students and early-career stage researchers. The beauty of the networks created through COST lies in their open attitude and formats. The already-existing and established networks that COST supports very often invite members to join throughout their whole period of existence. Young researchers or doctoral students can apply for STSM grants or training schools even if their country is not officially represented in the network. This is, I think – at least for the Czech literacy community – an underestimated opportunity.

The ELN COST IS1401 framework is now living through its final months with the support of COST funding. It should show its outputs, impact, and strength at the First Literacy Summit (November 1-3, 2018) in Porto, Portugal, the country that

chairs the ELN COST framework. This summit is considered not only as closing the first period under the COST system, but it is now widely understood by active members of the ELN network as a potential platform to establish a sustainable and functional form of ELN network for future. Not only researchers on literacy, but also practitioners (psychologists, teachers…), software developers with an interest in literacy, as well as not-for-profit literacy organisations, are welcome. For more details on this event and registration see: https://www.is1401eln.eu/en/gca/index.php?id=144

Te vejo no Porto!

COST Action IS1401 – Strengthening Europeans' Capabilities by Establishing the European Literacy Network (ELN); www.is1401eln.eu/en/

Gabriela Seidlová Málková

Název: Gramotnost, pregramotnost a vzdělávání
Odborný recenzovaný časopis zaměřený na problematiku čtenářské, matematické, informační a přírodovědecké gramotnosti a pregramotnosti
Číslo 3/2017, ročník I, webová adresa: http://pages.pedf.cuni.cz/gramotnost/

Jazyková korektura: Daniela Čechová, Pedagogická fakulta Univerzity Karlovy
Grafická úprava časopisu: MgA. Denisa Kokošková
Evidence periodického tisku: MK ČR E 22524, ISSN 2533-7882 (Print), ISSN 2533-7890 (Online)

Vydává: Univerzita Karlova, Pedagogická fakulta, M. Rettigové 4, Praha 1, 116 39
Adresa redakce: Gramotnost, pregramotnost a vzdělávání, Katedra psychologie PedF UK, Myslíkova 7, Praha 1, 116 39, e-mail redakce: gramotnost@pedf.cuni.cz
Návrh obálky a sazba: MgA. Denisa Kokošková, tiskárna a DTP: Nakladatelství Karolinum
Cena za 1ks: 80 Kč, roční předplatné 200 Kč + poštovné a balné

Marja Volemanová, Lea Květoňová. Links Between Specific Language Impairment, Motor Development and Literacy Acquisition in Children

Gabriela Seidlová Málková. The Literacy Profiles of Czech Precocious Readers

Zuzana Hoždorová, Olga Kučerová. Silent Reading Comprehension in Fifth Grade Pupils

Helena Podpěrová, Anna Kucharská. Children with Specific Language Impairment Through the CCC-2 Questionnaire

ISSN 2533-7882