THE ROLE OF COGNITIVE PROCESSING IN EFL (ENGLISH AS A FOREIGN LANGUAGE) READING SKILLS ACQUISITION

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Abstract

According to research in mother tongue (L1) reading skills, successive processing - the PASS Theory of Intelligence process - affects reading skills through the sequential analysis and blending of phonemes and syllables. The present paper examines whether this cognitive process predicts also reading skills in English as a foreign language (EFL). A group of 81 pupils that had finished their first year of EFL study were administered tests measuring successive processing and EFL decoding sub-skills. The results proved significant relationship between successive processing and decoding skills. These findings emphasize the necessity of successive processing stimulation in FL reading instruction.

Key words: *successive processing, the PASS Theory of Intelligence, decoding sub-skills, English as a foreign language (EFL)*

1. INTRODUCTION

The PASS Theory of Intelligence assumes that the system of successive processing affects reading skills in mother tongue directly through decoding. The present paper assesses whether the same principles apply for reading in a foreign language. The aim of the present paper is to examine the relation between successive processing and individual EFL (English as a foreign language) decoding sub-skills: letter knowledge, lexical knowledge, cipher knowledge, alphabetic principle. More precisely, the purpose of this study is to predict reading decoding sub-skills using a subset of successive processing tests. In exploring this topic, a research question was addressed to find out the nature of the relationship between successive processing (the PASS process) and EFL decoding sub-skills.

In the present paper, we understand foreign language (FL) as a language that is acquired formally and systematically in the school setting of a country where the target language is not an official language in comparison to second language (SL), which is understood as a language which people learn after they have already acquired the mother tongue, and which is being learnt in its natural environment. English language as contemporary lingua franca is being taught as a first FL in almost every European country. The EFL reading instruction begins already in the first years of primary school (not rarely even in kindergarten), where children are getting acquainted with English letters and sounds for the first time. Children struggling with reading in their mother tongue often exhibit learning difficulties also in their FL. Many factors can be labelled as a cause of these problems; unless they are identified and treated, the improvement has no chance to occur.

For this reason, the present paper examines the role of cognitive determinants (as defined by the PASS Theory of Intelligence) in foreign language reading acquisition, decoding skills in particular. Understanding what impact successive processing has on EFL reading acquisition could help to promote the subsequent intervention.

2. DECODING SKILLS

Learning to read, understood as the process of acquiring the skills essential for reading, represents the key process in formal education. Reading is generally defined as "a complex cognitive process of decoding symbols in order to construct or derive meaning (reading comprehension)" (Jimenez 2013). Several models have been developed to describe the basic processes involved in reading acquisition. Some of them are based on behavioural psychology (Samuels & Kamil 1984); others describe reading

from cognitive psychologist viewpoint (Davidson 2010). Another classification of reading models is founded on the order the individual reading sub-skills are being acquired. On the contrary to the top-down model that explains how a child comprehends what is read, the bottom-up model is used to describe how a child perceptually decodes the text. Stanovich (1980) emphasizes the utilization of both models in reading process, depending on the type of information being read and various needs to decipher it. For the purpose of the present paper, however, the latter model is of the importance. Within the bottom-up model, the reader begins with analysing the smallest units of what is read (determining the letter) and then proceeds to higher level of processing (determining the meaning of the text). This alphabetic model involves sequential processing (Volpe 1996), further described in this study.

Learning to read accurately and fluently presents a complex process that requires a coordination of various sub-processes. Literature brings vast discussions concerning the relationship between basal literacy at the level of basic word decoding and reading comprehension understood as a higher level of reading skill (Meltzer 2007; Reid, Kok & Van Der Merwe 2002; Woodcock 2011). According to bottom-up model of reading, before a reader masters text comprehension, the lower stages of reading process must be automated. Reading comprehension is heavily dependent on skilled word recognition and decoding (Kendeou, Savage & Van den Broek, 2009), oral reading fluency, a well-developed vocabulary and active engagement with the text (Hank et al. 2010). Readers that are not very fluent use much of their conscious attention and cognitive ability to decode, thus they have less energy available to focus on the meaning. Indeed, the acquisition of word decoding skill represents the core reading ability fundamental to the development of reading competence.

Decoding refers to the activity of "translating" symbols into sounds or visual interpretations of speech. It comprises learning the alphabet and the sounds that letters make, learning to distinguish sounds in speech, and learning to sound out words. To become a skilled decoder, a child needs to learn to decipher words. How do we know that a reader decodes text properly? The answer is, when the reader correctly recognizes irregular or exception words within their vocabulary and pronounces unfamiliar words consistently with the conventions of given language. Readers are exposed to many types of morphemes (such as prefixes and suffixes), and it is not until they learn to read these as "sight chunks" that their reading will speed up dramatically. The difficulty in reading is very often connected with the difficulty in decoding, which is marked by having not acquired the phoneme-grapheme mapping concept (Mather & Wendling 2012).

Decoding skills include several other sub-skills that are important to develop in the first years of reading instruction. Decoding comprises the cipher knowledge, lexical knowledge, phonological awareness, phonics, and letter knowledge (SEDL 2008). First of them, **cipher knowledge**, enables children to understand that certain letter combinations are valid (e.g. "sut"), while others are not (e.g. "svg"). When a child deciphers, they use the spelling-sound knowledge about letters to sound out regular words. This activity is actually involved in "word attack" reading, when a child appropriately sounds out unknown words. The process is described by Dreyer (1989) in the following way: phonemic representations are accessed from memory, modified to fit the surrounding orthographic context, held in sequence and lastly blended to form an internal pronunciation. **Lexical knowledge** is another subordinate skill that enhances decoding skills. It describes the knowledge that helps children to correctly recognize as well as pronounce irregular though familiar words. When a child comes across an irregular word, they mentally compare the word with other known words. The next skill embedded in decoding skills is **phonological awareness**. Within phonological awareness a child learns to manipulate with spoken word, which includes breaking words into syllables or rhyming words. Especially, phoneme awareness as a type of phonological awareness presents a crucial pre-condition for later reading acquisition and text decoding. It works with individual phonemes within a word: children are learning to create new words by adding or deleting one phoneme, to segment words into individual phonemes or put individual phonemes into words as well as to isolate individual phonemes from the word (e.g. "what is *spill* without *s*? *pill*). The child starts to get acquainted with phonological awareness already in the pre-school age and continues to develop it in the school setting together with phonics. Phonics (or **alphabetic principle**) is based on understanding the letter-sound correspondence, i.e., understanding that spoken words are made of phonemes and that those phonemes

are represented in text as letters. Another decoding sub-skill - **letter knowledge** - enables children to get comfortable with alphabet. It includes the knowledge of letter name and how letter sounds. Children should be able to identify letters both isolated and embedded in words, lower and upper case, to recognize different fonts and most importantly to distinguish between individual letters in alphabet (especially letters like p, b, q, d).

These decoding components are interdependent: phonological awareness determines the knowledge of alphabetical principle as well as letter knowledge, while the latter components combine to create both lexical and cipher knowledge. According to Tankersley (2003), letter knowledge together with phonemic awareness represent the best predictors of successful reading acquisition during the first two years in school. In the English language, they are helping children with learning to read because of the alphabetic nature of English writing system. In case of EFL reading instruction, the special focus should be put on the name and pronunciation of those letters that are not present in mother tongue.

3. COGNITIVE DETERMINANTS OF READING

Although reading seems to be very easy and automatic activity for most of the adults, it actually represents one of the most complex and difficult skills a child has to master. In fact, reading disability is the most common disability found in school-aged children (Smith 1992). The process of reading is dependent on various pre-requisites. Besides affective, linguistic and social factors, cognitive determinants play crucial role in successful reading acquisition. Within the present study, two domains are addressed: EFL decoding skills and successive processing. To comprehend reading from the viewpoint of cognitive psychology means to learn how reading takes place when it is understood as a part of information processing. When we read, various cognitive processes are activated in our minds by means of which we receive, process and use the information we are reading. Within information processing we find one crucial process responsible for the work with a stimulus (letter, text) on the level of decoding, and that is successive processing. This process originates in the PASS (Planning, Attention, Simultaneous and Successive) Theory of Intelligence, which seems to be useful for identifying and predicting reading problems (Janzen 2000).

According to the PASS Theory of Intelligence, human cognition is organized in three systems: 1) planning, which is responsible for programming and behaviour control; 2) attention, which regulates alertness and an activated state of mind; 3) simultaneous and successive processing, which covers encoding, transforming and retaining information. These three systems are subsequently divided into four processes which represent the functions of four areas in the brain, based on Luria´s (1973) work in the field of neuropsychology: 1) planning is associated with the frontal lobe; 2) attention occurs in the brain stem and medial regions of the hemispheres; 3) simultaneous processing is located in the occipital and the parietal lobes; 4) successive processing is a function of the frontal-temporal lobes. All these processes are separate but interdependent. This means that effective functioning in any cognitive task is conditioned by the proper functioning of these processes. Nevertheless, the processes are rarely equally involved in a task. Each of them contributes differently, depending on the nature of a task. For instance, planning is responsible for spontaneous speech (Luria 1980), attention for reading a book in a noisy environment, simultaneous processing for copying a design such as a cube and successive processing for word decoding and understanding statements such as "the girl hit the boy", taking into account the order of the words within the sentence (Naglieri & Das 1990).

Successive (or sequential) processing in particular helps to understand the way information is coded, transformed and stored (Naglieri 1999). It represents a mental process in which stimuli are integrated into specific serial order where the elements form a chainlike progression (Luria 1973). Being involved in numerous activities related to reading, successive processing participates in sequential analysis and phoneme and syllable connecting (Kirby 1992). It is also present in the repetition of words or numbers in proper order, such as, for instance, in digit span tasks. Research in the field of L1 (Carlson & Das 1992; Krywaniuk & Das 1976; Spencer, Snart & Das 1989) refers to reading improvement as a result of successive processing training. Janzen (2000) found out that successive tasks significantly predict phonetic analysis. Similarly, Walker (2010) proved that the successive PASS composite is the strongest predictor of reading achievement.

4. MEASURING THE RELATIONSHIP BETWEEN SUCCESSIVE PROCESSING AND DECODING SKILLS

Currently in central Europe, researchers are dealing with pupils` deficient cognitive processes, the effects these problems cause and the ways such processes can be stimulated (e.g. Kovalcikova 2010, 2012). Taking into account that information processing influences the progress in the first years of formal reading and spelling instruction (Clemens 1984) as well as that successive processing correlates with specific reading abilities, several stimulation programmes have emerged, among which the PASS Reading Enhancement Programme (PREP) seems to be of the most significance. PREP is considered an effective remedial programme to enhance reading disabilities in word decoding (Das & Naglieri 1996), word identification and word attack skills (Boden & Kirby 1995; Carlson & Das 1992; Das, Parrila & Papadopoulos 2000). Proposed by Das, Naglieri and Kirby (1994), PREP is derived from the PASS Theory of Intelligence and utilizes simultaneous and successive processing, the PASS processes. Harvey`s (2000) results confirm the positive effect of PREP on decoding skills. Forget (2001) in his study also proved the significant improvement in decoding skills measured by Word Identification subtest of Woodcock Reading Mastery Test- Revised (WRMT-R) after the intervention with PREP. Similarly, the experimental group scored significantly better on Nonverbal Matrices and Word Series subtests of Das-Naglieri Cognitive Assessment System (DN-CAS). These results supported the study of Volpe (1996), in which reading decoding skills measured by Word Attack test were significantly predicted from successive processing subtest in DN- CAS.

Indeed, there is a large body of literature bringing the information about experiments in the field of cognitive remediation of problems with spelling and word decoding (see Das, Mishra & Pool 1995). The two-year longitudinal study (Reid et al., 2002), which proved the significant correlation between reading ability and mentioned cognitive process, belongs amongst the available studies describing the mutual relationship between word decoding and successive processing. Further, Naglieri and Reardon (1993) examined the relationship between intelligence and phonological coding when ability was redefined according to the PASS cognitive processing model. They delivered the evidence of successive processing as a significant predictor of phonological coding (R^2= .267). Similarly, Kaufman and Kaufman (1983) proposed that reading-disabled children exhibit difficulty in sequential processing and consequently decoding skills are affected. Also Kirby and Booth (1996) connected successive processing with word decoding (see also Cummins & Das 1978).

5. PURPOSE OF THE STUDY

As Das, Naglieri and Kirby (1994) proposed, the basic reading is characterized by sight-symbol relationship and involves, beside others, one separate process assumed to involve information processing mechanisms: phonological coding related to successive processing (Powell 2000). Despite numerous studies dealing with the relation between information processing and L1 reading ability (Crawford & Snart 1994; Das et al. 1978; Johnson 1997; Kirby 1992; Kirby 1996; Kirby & Robinson 1987; Leong, Cheng & Das 1985; Solan 1987), it can be said that there is an absence of similar research examining FL decoding skills. Available literature does not offer information about studies connecting the concept of successive processing with FL reading ability and decoding skills in particular. In other words, although the research in the field is vast, it involves almost exclusively L1, occasionally L2 (Oller 1971), but almost never foreign language; this relationship is relatively unexplored.

Based on these findings, a research question about the relationship between successive processing (the PASS process) and EFL decoding sub-skills was formulated (phonematic awareness was not included in the measurement, since the focus of the study was put on the written language). For each of the four decoding elements (alphabetic principle, cipher knowledge, letter knowledge, and lexical knowledge), two hypotheses were posed. Firstly, we hypothesized that successive processing significantly predicts individual EFL decoding sub-skills. In the second hypothesis, a positive correlation between the level of successive processing and four EFL decoding sub-skills was anticipated. These predictions were based on the theoretical assumptions as well as on empirical findings in mother tongue disclosed above.

6. METHOD

6.1 Participants

The sample chosen for the present study consisted of 41 girls and 40 boys (*N*=81). The children had finished their first year of EFL study, third grade, and were gathered from four classes at primary school. Their mean age at the beginning of the research was 9 years and 6 months. All the children were native Slovak speakers with standard exposure to English language through mass-media and English lessons at school. The sample came from a population of standard (without diagnosed severe psychological disorders) pupils.

6.2 Measures

The data were gathered using the method of testing. The test array consisted of two parts: a) test measuring EFL decoding skills; and b) test measuring successive processing. Both parts of the test array were adjusted for the purposes of the present study.

EFL decoding skills were measured by a test battery adapted from Kahn-Horwitz, Shimron and Sparks (2005). The test battery measures EFL reading acquisition of children at primary school. It is divided into five tasks assessing several sub-skills of word decoding and reading comprehension. For the purpose of the present study, the four tasks described below were used. The performance in these tasks provided us with the operational definition of the EFL decoding skills.

The first task measured the knowledge of English letter sounds and names. Within the *letter knowledge* task, a child was presented with 26 lower case letters of the English alphabet ordered randomly. The child was expected to pronounce the sounds represented by the letters and name the letters. The maximum score was 26 points for correctly pronounced sounds and 26 points for correctly named letters, i.e., a point per each sound and name. The total score served as the dependent measure. This task actually measured the ability to decode at the letter level.

The second task measured *lexical knowledge*. Focusing on the speed and accuracy of reading, it consisted of 20 basic English words of various word classes (cat, green, stop, you...) that were familiar to the participants from their EFL study. The list of words comprised most of the English alphabet letters (with the exception of the letters d, q, v, x, z), common digraphs (ee, oo, th, ch) and two irregular verbs. The child was supposed to read the list of words aloud as accurately and quickly as possible. The score for accuracy (maximum 20 points) and reading speed (measured in seconds) was calculated. The time taken to complete the task and the number of correctly read words were used as dependent measures.

Another task, pseudo-word decoding, was originally taken from WRMT-R Woodcock Reading Mastery Test- Revised (Woodcock 1987). Word Attack required reading English non-words with increasing difficulty. This task measured the *cipher knowledge* as a decoding sub-skill. The number of correctly pronounced words was used as the dependent measure. The test was discontinued when a child made six consecutive errors.

The performance in the fourth task reflected the knowledge of *alphabetic principle*. This task, word recognition, also originates from WRMT-R. In Word Identification, a child was supposed to read English words with increasing difficulty. The test was discontinued when a child made six consecutive errors in pronunciation. Similarly as in Word Attack, the number of correctly pronounced words was defined as the dependent measure.

For the purpose of measuring the latent variable successive processing, two tests were selected: Digit Span and Word Series. These tests originated from the following testing batteries: (1) WISC-IV (Wechsler 2003), from which *Digit span* was used; (2) CAS (Das & Naglieri 1989) with *Word series*. *Digit Span (Forward)* measures the level of successive processing (Kirby & Robinson 1987). The administrator read a sequence of digits with increasing length and the child was asked to repeat the sequence of digits in the same order. The dependent measure was the score which represented the number of sequences the child repeated correctly. The test was discontinued after a child made two mistakes in a group of trials with the same span length.

Word Series from the CAS battery is a test that involves serial memory recall and includes the demand for successive processing paradigm linearity (Naglieri & Das 1990). The administrator read out a set of one-syllable words (one word per second) in the examinee´s mother tongue L1 (in the present study these were Slovak words, e.g. dom, strom, pes,...), that were familiar to them. The child´s task was to repeat the words in the same order as they heard them. The test was discontinued after 3 consecutive scores of 0. The number of sequences the child repeated correctly was in this case the dependent measure used as an indicator of successive processing.

6.3 Procedure

Each child was tested both in EFL decoding skills and in successive processing. The testing batteries were administered consecutively, i.e., the children were first tested in EFL decoding skills and then the cognitive tests were administered to them. EFL decoding skills were tested in the order set by the original test as listed above.

Children were tested individually with a mean time duration of 35-45 minutes. The testing days started at 8 a.m. and finished at 12 p.m. at the latest. Appropriate conditions, such as a silent room, suitable light and temperature, were all provided within the school premises. The children sat opposite the administrator of the test in such a way that the administrator could keep track of their activities. An important role of the administrator was to maintain a positive rapport.

7. DATA ANALYSIS AND INTERPRETATION

Before data analysis was made, variables were screened in order to find out their distributional qualities. For the four decoding tests and two successive processing tests, minimums, maximums, means, standard deviations, skewness, and kurtosis are provided in Table 1. These values show that data are normally distributed.

	Minimum	Maximum	Mean	Std.Deviation	Skewness	Kurtosis
DS	6	12	8,01	1,545	,583	-,443
WS	6	15	9,38	2,077	,286	-,477
ABC 1	0	26	13,53	6,411	,076	-,928
ABC 2	19	26	24,27	1,696	-1,259	1,197
R- A	7	20	16,02	3,521	-,791	-,197
R- S	1,11	1,86	1,4411	,19852	,415	-,786
WI	1,41	5,20	3,6423	,70199	,062	,434
WA	0	18	8,38	3,491	,215	,498

Table 1. Descriptive statistics

Note: N=81; Standard error of skewness: ,267; Standard error of kurtosis: ,529
DS = Digit Span; WS = Word Series; ABC1 = Letter Sound ; ABC2 = Letter Name; R- A = Reading Accuracy; R- S = Reading Speed; WI = Word Identification; WA = Word Attack.

Since our variables present latent, not directly measurable constructs, it was necessary to define observable, manifested variables for their measurement. Manifested variables were represented by individual tests described above. The partial least squares regression method (PLS), carried out using SmartPLS 2.0 software (Ringle, Wende & Will 2005), enabled us to define latent variables. In PLS, each latent variable explains the performance in several indicators (scores of tests).

Within a PLS analysis, a model characterizing the relationship between the latent and manifested variables was created and subsequently tested. Loadings and regression paths in the present model are visible in Figure 1. In view of the fact that the PLS regression does not rely on parametric distributions, it is not possible to determine statistical significance in a standard way. Thus, statistical

significance was determined by using the resampling technique of bootstrapping (Hesterberg et al. 2005). Values of $t > 2$ are statistically significant at the level of $p < .01$.
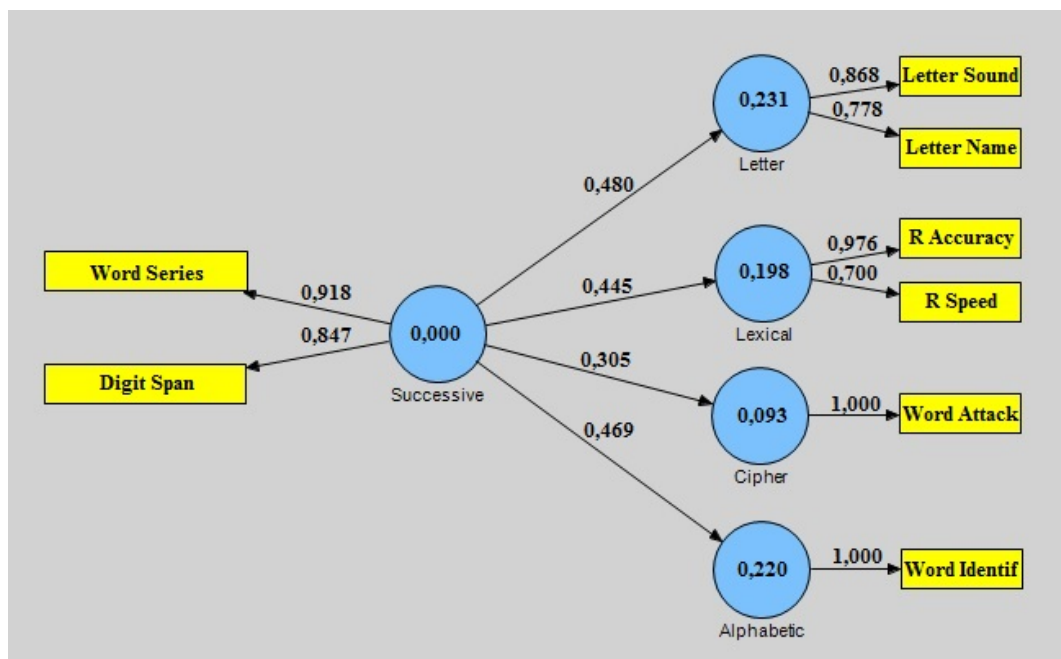

Figure 1. Loadings and regression paths

Note: All factor loadings are significant at the .01 level (p<.01).

When analysing the model, focus was put on variation in the latent variables. R^2 (the coefficient of determination) represents the proportion of variance that the model explains in the outcome variable. The R^2 for these analyses are shown in Figure 1in relevant circles. We hypothesized that successive processing significantly predicts individual EFL decoding sub-skills. The results show that successive processing accounted for 23% of the variance in letter knowledge sub-skill, 20% of the variance in lexical knowledge sub-skill and 22% of the variance in alphabetic principle sub-skill. This significant amount of EFL decoding skills variance suggests the considerable role of successive processing in decoding skill acquisition. Successive processing significantly predicted also cipher knowledge sub-skill. However, the amount of variance was mere 9%. The amount of variance indicates that besides successive cognitive aspects of reading skills, there probably also exist other factors, or constituents of EFL decoding skills (e.g. other cognitive aspects, visual-motoric skills, affective, social and behavioural aspects etc.). Nevertheless, the hypothesis has been accepted.

Correlation analyses were conducted to test the second hypothesis. Based on the knowledge that successive processing plays a crucial role in developing L1 reading skills and decoding in particular, we hypothesized a positive correlation between successive processing and individual EFL decoding skill. One selected study (Kirby 1992) put the positive correlation between latent variables successive processing and word decoding at .365 ($p<.05$, N=74). These values can be considered moderate to strong. Our attention was focused on EFL decoding skills.

The correlations between the successive processing scores and EFL decoding components are shown in Table 2. Pearson correlation r was used to estimate standardized covariance. Each of these correlations is significant at the .01 level. The analysis revealed an existing positive relationship between the domains of successive processing and individual EFL decoding skill. More precisely, the correlation between the successive processing and letter knowledge at .48 ($p<.01$), lexical knowledge at .45 ($p<.01$), cipher knowledge at .31 ($p<.01$), and alphabetic principle at .47 ($p<.01$) supported our hypothesis and proved the moderate to strong nature of the relationship.

	Alphabetic	Cipher	Letter	Lexical	Successive
Alphabetic	1				
Cipher	,60	1			
Letter	,64	,52	1		
Lexical	,77	,63	,68	1	
Successive	,47	,31	,48	,45	1

Table 2. Latent variable correlations

In addition, the matrix of correlations for indicator variables can be seen in Table 3. Both successive processing tests - Digit Span and Word Series - correlated the most strongly with Reading Accuracy decoding subtest (r=.38, *p*<.01 and r=.47, *p*<.01, respectively), the measure of lexical knowledge. Similarly, the successive processing measures correlated noticeably with Word Identification test measuring alphabetic principle (r=.37, *p*<.01and r=.45, *p*<.01, respectively) and Letter Sound test (r=.34, *p*<.01and r=.42, *p*<.01, respectively).

	DS	WS	ABC 1	ABC 2	R- A	R- S	WI	WA
DS	1							
WS	,57**	1						
ABC 1	,34**	,42**	1					
ABC 2	,22	,38**	,36**	1				
R- A	,38**	,47**	,60**	,52**	1			
R- S	-,17	-,11	-,33**	-,35**	-,53**	1		
WI	,37**	,45**	,57**	,48**	,77**	-,47**	1	
WA	,16	,35**	,40**	,46**	,61**	-,46**	,60**	1

Table 3. Correlation matrix for the indicator variables

Note: Pearson correlation r was used to estimate standardized covariance. N=81.
DS = Digit Span; WS = Word Series; ABC1 = Letter Sound ; ABC2 = Letter Name; R- A = Reading Accuracy; R- S = Reading Speed; WI = Word Identification; WA = Word Attack.
**. Correlation is significant at the 0.01 level (2-tailed).

8. DISCUSSION AND CONCLUSIONS

Information processing represents a crucial pre-condition of reading skills in general. The intent of the study was to determine the relationship between EFL reading decoding skills and successive cognitive processing. More precisely, the goal was to examine whether reading decoding skill in foreign language can be accurately predicted by successive cognitive processing as defined by the PASS Theory of Intelligence. It was hypothesized that 1) successive processing would predict EFL decoding sub-skills and that 2) significant relationship would emerge between successive processing tasks and reading decoding tasks, which covered the following decoding sub-skills: letter knowledge, cipher knowledge, lexical knowledge and alphabetic principle.

Analysis of the model, i.e. the relationships between outcome variable and individual predictor variables was then carried out, which resulted in the confirmation of stated hypotheses. As expected, successive processing positively correlated with individual decoding sub-skills. Results show that the scores in tasks involving letter knowledge, lexical knowledge, alphabetic principle and cipher knowledge were significantly determined by children´s level of successive processing. In predicting cipher knowledge, however, successive processing explained the smallest amount of variance. Similarly, the weak correlation between the mentioned variables raised the questions. Cipher knowledge was measured by Word Attack test, the test concerning English non-words. As Naglieri

and Das (2005) assert, successive processing is involved in the decoding of unfamiliar words. One would thus expect the presence of stronger relationship between the variables. Hence, the need for further investigation in the field of successive processing to find out the cause of its weak relationship with cipher knowledge emerged within the present study.

The aim of this study was to extend the current knowledge in the field of information processing by providing quantitative data concerning the relationship of successive processing and EFL decoding skills. The present study supported the PASS Theory of Intelligence, which emphasizes the crucial role of successive processing in early reading. The significant contribution of successive processing to the variance of decoding skills was consistent with the argument that successive processing is effective predictor of reading achievement in normally achieving children (Kirby & Das 1977). Results in this study provided further support for this argument, confirming also our earlier findings (Filickova 2013) that successive processing represents effective predictor of performance in EFL decoding skills` tasks.

These results appear to be important as they show successive processing as a necessary pre-requisite for the improvement of the basic reading skills at the word level. If problems at the word level are neglected, they can possibly persist, increase and, last but not least, grow into the difficulties with higher level reading skills. In this sense, the proper functioning of successive processing can even influence reading at the comprehension level.

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