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### Testing cognitive abilities and vocabulary of young school-age children

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#### ABSTRACT

#### Keywords

Assessment, Assessing,  
Cognitive Ability, Lexical  
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*One of the fundamental goals of the Croatian language teaching of elementary school children is the mastering of communication competence that also includes the development of lexical competencies, i.e. mastering the dictionary. Also, research shows that a school-age child learns 500 to 700 new words during the year. However, research shows that the development of dictionaries is influenced by numerous linguistic but also discharging factors. Given that the adoption and learning of the language depends on cognitive abilities, equally cognitive abilities will also affect the development of a children's dictionary, that is, its width and depth. Therefore, the cognitive abilities of the students of two other grades of one primary school will be examined, and then a test of lexical competences and a productive dictionary test will be performed. The results obtained processed in the SPSS program for statistics. Children of higher cognitive abilities are expected to have a wider dictionary, that is, a better lexical density and diversity. These results compared with respect to gender, school success and parents' education. Children of educated parents showed better cognitive abilities and better lexical competence, and girls had better results on the lexical competence test compared to boys.*

#### Introduction

Adoption and learning the language of human are different from other beings. Although this process begins in a pre-rate period of human's life, and intensifies with the birth, the pronunciation of the first word and the latter and more complex forms, it is a process that never ends but continues throughout human life. In this process of mastering the language when adoption and learning intertwine, girls show slightly better results in written and oral expression, and the mastering of the language often depends on the number of children in the

family, the order of children, the relationship of parents and the household towards the child, the type of family life, linguistic environment, linguistic intake and social position of parents (Jelaska, 2005). The adoption of the language of the child must master all his levels: the meaning, grammatical and useful, which is extremely difficult and requires a lot of time and effort. The process of adopting a language is influenced by different linguistic and endure factors that greatly affect the overall process of mastering the language. On the other hand, by going to school, the school begins with systematic learning, first of all in the subject Croatian language through linguistic activities of listening, speaking, reading and writing, learning grammar, expanding lexical knowledge, and learning about the peculiarities of local idioms in relation to the Croatian standard language. However, it is evident that Croatian students do not really like the school (Aladrović Slovaček, 2019) and most often in their views towards school they express themselves: I neither love nor love. The Croatian language as a teaching subject with mathematics distributed the last places on the rankings of dear subjects according to research by Miljević Ridički and associates (2000), but in 2006 the Croatian language is in the middle of the dear subject ladder (Pavličević-Franić & Aladrović Slovaček, 2011) . However, students very often express the fear of speaking in front of others and in public, and often the fear of writing is associated with this, which can be associated with rather demanding spelling rules and a series of duplicates that occur among them, and often confuse students. Accordingly, in the public space there is a common so-called. Functional illiteracy, that is, students master the rules, but when it is necessary to apply these rules in concrete situations, then they are quite bad. Even the results of standardized reading tests - PISA (2018) and PIRLS (2021) show that Croatian students are mastered by reading strategy, but do not have a positive attitude towards reading, or do not read from pleasure. It probably also contributes to the increasingly scarce dictionary whose consequences are visible in public communication. The development of dictionaries, that is, mental lexicons, there are numerous linguistic and discharging factors as well as cognitive abilities.

### **Acquisition of the Dictionary and Process of Testing**

Lexical development is the most dynamic part of the linguistic development and is, in the course of our lives, constantly exposed to frequent qualitative and quantitative changes of different intensity depending on the specific period of life. In the preschool period lexical development depends foremost on the exposure to language input, spoken communication and cognitive abilities of a child, whereas one of the crucial steps forward is starting school education when the focus shifts from oral-auditive to written-visual communication (Radić at all., 2010; Ambridge, 2015). In the early stage of school education, the number of acquired words increases, the knowledge of the word formation is broadened and the ability to acquire words from the context is perfected. This is the most dynamic stage in a child's linguistic development and so vocabulary acquisition is subject to both linguistic and extralinguistic factors (Radić at all., 2010). A child begins to understand and use words that are phonologically longer and more complex, semantically marked and that often do not have literal meaning thus creating the so-called linguistic register (Berman, 2007). The possibility of acquiring new words depends naturally on the exposure to the unknown word – the more often a word appears in the text that a child is reading on his own, the more probable that he will understand it correctly and acquire it. Although a common estimate is that a word needs to appear up to

seven times, Beck et al. (2002) claim that up to twelve times is necessary in order to understand the meaning and acquire a new word. Nouns belonging to general vocabulary are rated as more concrete than verbs from the same register, and verbs as more concrete than adjectives (Peti Stantić et al., 2018). Apart from frequent occurrence of a word, its appearance in various texts also contributes to understanding and acquiring it. Moreover, Beck et al. (2002) distinguish among three categories of words in the adults' vocabulary: words of the first category – basic words that are the most frequent and are acquired very early without formal education (e. g. house, walk, toy, watch); words of the second category that constitute a great part of adult speakers' vocabulary, are frequent and occur in various contexts (e. g. demand, coincidence, intend) and words of the third category that are less frequent and the usage and understanding of which is not of significance for numerous speakers and are best acquired when the need for them arises. Schmitt (2014) describes vocabulary depth as the knowledge of several lexical dimensions of words, some of which include knowing the multiple meanings of polysemous words or the existence of rich associative word networks, which are a part of the holistic approach to word meaning.

A child acquires a new lexical item every day and it is added to his individual cognitive lexis and after successful reception to his general lexis too. A child completes his preschool age having acquired 10 000 words. On average, students in grades 4 to 11 incidentally learn only 15 % of the unknown words encountered while reading texts on their own (Swanborn & de Glopper, 1999). The process of early lexis formation starts from recognition (identification) of a word, through its reception and comprehension to adequate usage of it. Productive vocabulary knowledge is usually assessed through speaking or writing skills, i.e., through tasks which include spontaneous and active use of words (Pignot-Shahov, 2012). According to Scott (2005) children mostly acquire words from the local context whereby properties of a particular word determine the manner in which a child processes a certain word. Nation (2001) summarizes the components of word knowledge into three dimensions: knowledge of word form (spoken, written, morphological), meaning (the connection between form and meaning, concept and referent, associations) and use (semantic, syntactic and pragmatic limitations of use). The author Pacovska (2015) emphasizes the importance of reading and interpreting texts written in different styles and genres, as well as work with different types of dictionaries which may increase the communicative language competence of primary school children. Vocabulary breadth can be also defined as the total number of words which exist in our mental lexicon and operationalizes it through a picture naming task as it is most frequently the case (Logan & Kieffer, 2017).

Research studies (Melka, 1997; Nation & Hu Hscuh-chao, 2000; Cvikić & Bošnjak, 2005; Scott, 2005; Udier, 2009; Schmitt, 2014; Cvikić & Aladrović Slovaček, 2015; 2016; Read, 2006; Duan & Da, 2015; Pavličević-Franić & Aladrović Slovaček, 2018; Kokkola et al., 2019) show that today's primary school pupils' vocabulary is characterized by a multitude of abbreviations, the use of foreign words which are not adjusted to the grammatical structure of the Croatian language, and use of the same or similar words in different contexts, which consequently reduces lexical diversity as well as linguistic creativity and innovation. Acquiring reading skills enables a child to have a contact with a vast amount of new language material

using the new medium of language input. Therefore, the development of lexical competence is greatly affected by the proficiency in reading skills and reading habits. The research (Aladrović Slovaček & Agić, 2019) shows a very low level of lexical diversity in written texts of younger school children which does not vary in a statistically significant way regarding the age (grade) whereas literary works for obligatory reading at that age are lexically diverse, with abundance of archaic expressions, complex sentence structure and very dense lexically. Regardless of that, in their writing students tend to repeat certain phrases, parts of sentences, most frequently the subject and the object and often use the same expressions and sentence structure.

In addition, it is important to emphasize that the process of adopting the dictionary depends on the numerous escape factors, such as media (cartoon films and computer games), a place of residence and a local idiom that uses the child, the structure of a family where the child grows up, the education of parents, especially the mother who spends more time with children, reading habits that developed a child in early childhood (going to the library, reading picture books, exposure to reading), learning other languages, and institutional upbringing, because it has been shown that children who have been involved in early and preschool for at least three years have been shown Education shows, for example, better reading skills (Jelaska 2005; Aladrović Slovaček, 2019). In addition, cognitive abilities are extremely important because the development of language and speech are necessarily related to the development of opinions, and the development of language, that is, the development of speech, will depend on the development of opinions, and only opinion will develop the development of language and the development of speech, or three: opinion: speech and language make up a triangle that shows that one without each other cannot really develop (Pavličević-Franić, 2005). Even though this type of task is suitable for testing vocabulary knowledge of many different words, academic vocabulary mostly consists of abstract words which makes picture naming inappropriate for operationalizing vocabulary breadth in this register.

### **Cognitive Abilities**

Cognition is part of human intellectual development and experience, and is defined as a mental activity, that is, the process of acquiring knowledge and understanding through opinion, experience and senses. Cognitive functions include different areas of cognition, such as attention, perception, memory and working memory, reasoning and assessing, reason and calculation, solving problems and making decisions, understanding and making language. Cognitive functions are divided into basic and more cognitive functions. Basic cognitive functions are attention, long-term memory, perception, while more cognitive functions are speech, language, decisions and executive functions (Glisky, 2007). Fritith & Dolan (1996) state that the difference between higher and lower cognitive functions is that they are lower automated and do not require a special effort, while more cognitive functions are under conscious control. However, experiences show that some more cognitive functions, such as reading and understanding the language, can become automated, so the most important distinctive feature is that more cognitive functions require a larger cognitive effort than lower cognitive functions. The outcomes of these processes are various cognitions, knowledge and beliefs, schemes, personal constructs, memories, ideas and courts. At the beginning of the 20<sup>th</sup> century, two currents of thoughts appeared about factors that encourage cognitive development.

According to some, cognitive development is a consequence of the interaction of biological maturation of nerve structures and spontaneous action and exploration of phenomena in the world. The second current represents the attitude that the related role in the knowledge and interpretation of events has the relationships of a child with adults in his surroundings. By studying cognitive development, it seeks to explain how intellectual capacities change and develop from birth to maturity, under the influence of genetic and different environmental factors, such as parents, social and emotional environment and play. In doing so, cognitive processes use existing knowledge and create new knowledge, and this is precisely what distinguishes people from other living beings and allows us to understand, explain and control and change the world around us. Cognition changes throughout life by harmonizing the development, maturation and aging of the brain. Cognitive theorists about children are of the opinion that the way children have and the amount of knowledge they possess in their school age influence greatly on the formation of their behavior. Psychologists of cognitive theories, including Piaget, Vigotski, Erixon and Kohlberg have laid the theoretical foundations of cognition in the development of school-age children and give them the relevant importance of studying cognition in such a way that it is important to explore “what children know, how this knowledge is organized and how it changes and develops” (Vasta et al., 1998).

Today we know that a child is not just a passive recipient of the environmental stimuli but plays an active role in exploring and understanding the world around him (Buljan Flander et al., 2018). Piaget points out that the child is a curious being who, through his own actions and activities, constructs knowledge and actively contributes to his development. He believes that the cognitive development of children takes place through four immutable stages in which children's opinion changes, and that the speed of change depends on genetic and environmental factors. Vigothically emphasizes the importance of social and cultural influences on childhood cognitive development and states that quality social influences and interaction contribute to the cognitive development of the child. Bronfenbrenner believes that the child develops within the complex system of relationships affected by several layers of the environment that are connected. In order for the child to understand newly experienced experiences, the active mediation of the adult and the safe and stimulating environment, with a lot of love and absence of fear and stress, is required. The environment that gives moderately new stimuli helps children develop innate preferences. In doing so, the environment affects the child, but the child also affects the environment, especially in the environment of family and friends. From the above, we notice that the cognitive development of school -age children is a complex process that has an upgrade status to the already acquired cognitive development of the child before going to school. Furthermore, the cognitive development of school -age child encourages the further continuing development of the knowledge of his personality, the adoption of new terms he learns at school, the importance of them, as well as the development of competencies learned in the educational institutions of elementary school. Accordingly, the cognitive development occurs with gradual mastery of thought operations and concepts and schemes, that is, increasingly complex replacements for reality (Starc et al., 2004) and includes qualitative but also quantitative changes in opinion, such as greater knowledge and ability. Development changes occur as a result of the interaction of heritage and the environment. Cognitive theorists believe that with the development of cognitive abilities, there is also a

development of language, the ability that allows us to understand and create spoken and written words. Gnjidić et al. (2021) state measuring general vocabulary knowledge available in Croatian – the Croatian version of the Peabody Picture Vocabulary Test (PPVT-III-HR, Dunn et al., 2009), the Croatian version of the Mill Hill Vocabulary Scales and a translation of Manuel's test from the Inter-American series, which is used by some researchers. The mentioned tests indicate the connection between thinking, language and speech, that is, thinking and language, but they do not measure cognitive abilities as a whole, but give a picture based on observations about the language development of the child with regard to its specificities. This is precisely why this research connects the results of tests that provide a complete picture of cognitive abilities and a test that provides insight into dictionary knowledge, that is, lexical competence. The very connection of these two concepts stems from the inextricable connection of language, speech and thought, but from the perspective of the environment, the space of growing up, free play, collaborative learning and the like.

### **Research Methodology**

Twenty children (N = 20) of the second grade of elementary school (eight years of age) from one school in the eastern part of the Republic of Croatia participated in this study. It is part of the students who participated in the experimental program of development of narrative abilities that lasted for three months. The same number in the study was a boy (N = 10) and a girl (N = 10).

Respondents were tested by a dictionary test prepared for checking the narrative experimental program, which contained 32 particles and Wechsler's intelligence for children (Wechsler, 2009), the fourth edition-WISC-IV-HR. WISC-IV is one of the most famous and most commonly used intelligence tests for children who provide information on the general intellectual ability of the child and a series of his specific cognitive abilities. The WISC-IV test reflects contemporary achievements in the theory and practice of testing the cognitive abilities of children and adolescents. Results on 10 fundamental and 5 supplementary subtests can be combined in four indexes: Verbal understanding index (IVS), perceptual disperse index (IPR), working memory index (IRP) and information speed index (IBOI). The combination of these results can also be obtained by two alternative indexes - a general ability index (iOS), composed of verbal understanding and perceptive reasoning, and an index of cognitive skill (IKV), which form information and work of processing and working memory. The general ability index (gai-general ability) is especially useful when the results on other indexes show a significant deviation with each other and is a valuable contribution to the existing indexes of cognitive abilities in the WISC-IV test. With the application of WISC-A-IV, it is possible to identify children with moderate or severe learning and reading difficulties, hyperactive children, children with attention disorders, emotional disorders, behavioral disorders, hearing impairments, and with problems in production and understanding speech. It is used as part of the identification and assessment of intellectual disabilities, as an integral part for neuropsychological assessment of children and adolescents and for identifying gifted children, as early as the age of 6. The verbal understanding index is a measure of verbal resonance, formation of verbal terms and previously learned knowledge. Working memory index measures the ability of short-term retention and manipulating auditory information. The

perceptual reasoning index examines fluid resonance, visual processing and the ability to analyze and synthesis a concrete material, while the speed of the speed of information processing is a speed of mental and graphomotor processing, short-term memory and attention. All these measures were used in this study. The results were processed in the SPSS program for statistics of non-parametrical statistics.

### The Study

The fundamental goal of this research is to examine the connection between cognitive abilities and understanding the fundamental meaning of the word of young school-age children. In accordance with the fundamental goal, the following research questions were set up:

- Examine the connection between cognitive abilities and lexical competences of young school-age students.
- Examine the connection between cognitive abilities and semantic fluid students of younger school age.
- Examination of whether the education of parents and gender of children is affected by the results.

### Results

The first research problem was to examine the connection between cognitive abilities and lexical competencies of younger school students. Table 1 shows the results that show a minimal and maximum result on each particle that is tested and mean.

**Table 1**

*View of all Parameters Studied*

	N	min	max	M
Semantic fluid - animals	20	6.00	25.00	14.94
Semantic fluid - parts of the body	20	9.00	22.00	13.68
Dictionary test	20	20.00	26.00	23.01
Verbal understanding index (IVS)	20	85.00	144.00	103,94
Perceptual disperse index (IPR)	20	81.00	135.00	106.57
Working memory index - IRP	20	88.00	131.00	107.05
Information Treatment Index (IBOI)	20	80.00	134.00	103.01
Total IQ	20	88.00	141.00	106.04
Education - mother	20	2.00	4.00	3.05
Education - Father	20	1.00	4.00	2.94

Table 2 is showing the results of the intelligence test with the subtests that are visible: the verbal understanding index, the perceptive solution index, the working memory index, the information index of the processing of information and the total IQ. It can be seen from the table that statistically significant connection obtained by the implementation of Spearman's correlation coefficient between the dictionary test and the intelligence test only between the result on the vocabulary and the working memory index ( $r = 0.628$ ,  $p < 0.05$ ) and between the

results on the dictionary test total IQ ( $r = 0.535$ ,  $p < 0.05$ ). This partially confirms the first set up that assumes that respondents with better cognitive abilities will also show better results of lexical competencies. Specifically, it has been shown to be significantly connected by the results of the dictionary test and the working memory index that measures the ability of short-term retention and manipulation of auditory information, which can definitely be linked to the word adoption process, as well as the overall intelligence test that views intelligence as a whole of these tests, which implies, which implies a certain degree of cognition, which is associated with the adoption/learning process.

**Table 2**

*The Results of the Intelligence Test with the Subtests*

	The Verbal Understanding Index	The Perceptive Solution Index	The Working Memory Index	The Information Index of the Processing of Information	Total IQ
Liquid-Animals	0.519*	0.42	0.258	-0.426	0.291
Fluid-Parts of the Body	0.335	-0.019	0.68	-0.163	0.164
Dictionary	0.403	0.324	0.628*	0.085	0.535*

Another problem of research was to examine the connection between cognitive abilities and semantic fluid students of younger school age. As the results shown in Table 2 show, a statistically significant difference is shown in the connection of the semantic fluid in the appointment of animals, as the ability to produce words in a certain time without previous preparation, and the verbal understanding index ( $r = 0.519$ ,  $p < 0.05$ ) the measure of verbal resonance, the formation of verbal terms and previously learned knowledge. In the measurement of semantic fluid in the appointment of parts of the body, there is no statistically significant connection with any of the index measured. These results have shown that other hypothesis can be partially confirmed, which was expected that students of better cognitive abilities would show better results in semantic fluid. Specifically, the connection was measured in only one particle, while for the processing index of processing information, correlation was even negative.

The third research problem was to examine whether the education of parents and gender of children was influenced by the results. Results of the tests have shown that there are no statistically significant differences in the results of the respondents with respect to the education of the mother ( $p > 0.05$ ) and the father ( $p > 0.05$ ) and given the sex of the respondents ( $p > 0.05$ ) (table 3). The results obtained refute the third hypothesis that expected that the children of educated parents and girls would have better results on all particles of the intelligence test, and the dictionary and semantic liquid test. Research conducted earlier (Aladrović Slovaček & Magašić, 2023) showed that statistically significantly better results on dictionary tests have children of educated parents (mothers) (in knowledge of individual words - *factory*, *fair*, *fantasy*, *modest*), then girls (in knowledge of specific words - *Fanta*, *modest*, *librarian*, *factory*), but also children who have been included in the kindergarten program (in specific

words a well, *curious, sad, worry*) and children who are starting an early learning of English (in specific words of the *fair, a factory, a factory, surprised, fantasize*).

**Table 3**

*The Results of Differences through Education of Parents and Gender*

Education of mother	p = 0,546, df = 39
Education of father	p = 0,123, df = 39
Gender	p = 0,034, df = 39

This shows that children whose parents are more educated show statistically significantly better lexical competence in some words, because it is probably parents who read to their children more, who talk to their children more and who invest in their children's extracurricular activities in which, among others, language and communication skills are also strengthened.

### Discussion

The assessment of the cognitive abilities of children in the third grade of primary school show how much differences there are within a homogeneous group and how significantly students differ from each other in their results, and how low values obtained on some tests are an indicator for values on other subscales of the test, i.e. on the vocabulary test. Equally, differences are also observed with regard to the testing of individual vocabulary segments. Since working memory and the overall result on the intelligence test are related to the result of the vocabulary test, i.e. the correlation is statistically significant and there is a positive connection, it can be concluded that the development of the vocabulary, in addition to the external factors presented in the paper, will largely depend on other factors as well, and one of them is working memory. Evaluating children with regard to the number and content of words presented as part of the second part of the research, i.e. testing semantic fluency, is also an indicator of lexical competence and its development, especially if all three categories of words that are represented are taken into account.

Although the results show that children know a wider range of words when naming animals, they express themselves more easily by naming body parts. The reason is probably that they can name body parts so that they look at their own body, which also serves as a reminder. It is interesting to note that children express themselves significantly worse, i.e. with a less wide vocabulary, when they talk about naming feelings and most often state the basic feelings of happiness, sadness and anger. A similar finding was also found in the research of Aladrović Slovaček (2019), which shows that children of preschool and early school age express their anger verbally most easily. On the test of cognitive abilities, children on average show the best results in terms of working memory and then perceptual memory, however, looking at the lowest and highest results, a significant dispersion of results is shown, i.e. how some students show significantly poor results on the test, while there are others who show significantly high results. It is interesting to note that the respondents show a slightly worse average result in the area of verbal comprehension, which coincides with the research that is being conducted, which is related to reading comprehension. Namely, children of early school age achieve significantly worse grades and achievements in understanding the read text, i.e. in tests of reading

comprehension. Although, in view of some earlier studies, it was expected that children of mothers and fathers who are better educated would show statistically significantly better results on vocabulary and semantic fluency tests, as well as on intelligence test items, this difference was not found here. It was shown that mothers are more educated than fathers in this group of children, but parents' education does not make a difference in the results. Similar results were obtained by Aladrović Slovaček (2019), where it was shown that nowadays parents are more and more busy, and even though they have higher education, parents do not spend much free time with their children and thus do not encourage their expression, so more and more children have communication difficulties. Thus, parents' education does not play a significant role in student achievement, although on the other hand, it could be said that parents' education can have a distinctive role in terms of guiding children and encouraging them to work and to structure their free time, which is often used to "fill in" possible deficiencies. in school success and encourages better results and success in acquiring content.

When looking at the results of the vocabulary test, it can be seen that the average result is such that the children recognize 23 of the 30 words offered to them. Most often, they do not recognize those actions that are archaic, they do not recognize feelings that need to be interpreted with regard to the child's non-verbal communication, which is visible from the picture, and they have difficulty recognizing adjectives as a type of word that needs to be recognized. All of the above points to the need to constantly expand the vocabulary and develop strategies to enrich the vocabulary. However, this can also be helped by testing students and giving insight into which words they understand and which they don't, but this is a very rare activity in the Croatian school system. Finally, as it was expected that better cognitive abilities should be a prerequisite for better lexical competence, it was confirmed by the obtained results, as it was expected that students with better semantic fluidity would show better results on the cognitive ability test. By confirming the first two hypotheses, the fact that the development of language is closely related to the development of cognitive abilities was confirmed, that is, that cognition, language and speech form a triad (Pavličević-Franić, 2005), and if any part of that triad is damaged, it is impossible to establish any part. So, if a child has poorer cognitive abilities, he will also have poorer language skills and speech, but conversely, language is a prerequisite, like the development of speech, for the development of intelligence, that is, for the development of thinking. All of this shows how important it is to encourage language and speech development and to work on it all the time, especially at an early age. However, the third hypothesis was rejected, in which it was assumed that students whose parents are more educated will show better results, as well as that girls will show better results compared to boys. Since no differences were found, the hypothesis was rejected. However, it can also be said that this is a very small sample, and different findings are possible with a larger number of respondents. Finally, it is important to cooperate with the professional service of the school and the teachers and to test children as often as possible in order to obtain a better insight into the students' language knowledge through the use of standardized tests and to formulate strategies based on the results that would help in their improvement. Testing and assessment of the achieved results gives both the teacher and the student, but also the parent, an insight into what additional work needs to be done. Since there are not many tests for the dictionary that are adapted or developed for testing the Croatian language, it would be worth working on

it. Namely, the test that is mainly used is the PPVT, which is a standardized test that gives insight into lexical competence, but more to determine whether a child has proper language development and vocabulary comprehension or not and is most often used by speech therapists. This shows the need to develop dictionary tests according to the age of the students and thus open the proctor for possible structured activities, the implementation of which will enrich the vocabulary, and which are not exclusively related to known strategies that are already implemented, for example, reading mandatory reading works. What this research also showed is that children are happy to participate in it, that they are comfortable answering questions, that they have the opportunity to express themselves, and that it means a lot to individuals. And this realization shows the need for more frequent testing of the active dictionary, because the dictionary changes significantly under the influence of various, especially extra-linguistic factors. For example, just ten years ago, there were most English words in the language of elementary school students, and today there are more and more Serbian words through the media. Therefore, it is important to monitor and coordinate the education system, i.e. language learning and teaching, in accordance with these insights and monitoring. Testing and assessment of reading competence is carried out significantly more often, and PIRLS (2021) and PISA (2018) results really help in understanding what happens in the reading process and evaluating what is read, that is, in understanding what is read. The same can be applied to the development of vocabulary, especially since comprehension of the text, written and oral expression, sentence structure, and confidence in writing and speaking will largely depend on understanding the meaning of words. All of the above confirms the need to evaluate and test the language, and consequently the vocabulary, on the widest possible sample so that the results are representative and widely applicable.

### **Conclusion**

The aforementioned study, although made on a small sample, showed that cognitive abilities, in accordance with expectations, affect the development of dictionaries and semantic fluids. Specifically, the speed of processing of information, that is, working memory and the total cognitive ability expressed by the intelligence test, proved to be key in connection with the results on the dictionary test, and thus partially confirmed the first hypothesis. Another hypothesis was partially confirmed to expect that cognitive abilities were also associated with the results of semantic fluid, but there was a distinctive index of verbal understanding. Furthermore, the connection between the results in all tests is not shown to be withdrawn or social factors, such as the education of parents and the sex of the respondents.

As emphasized in the beginning, linguistic abilities are associated with the development of cognitive abilities, that is, they function with one another in the triads, and it is precisely the cognitive abilities depend on linguistic abilities, and thus the development of dictionaries and semantic fluids. It should be emphasized that the ability of working memory of this verbal understanding are shown important for the development of dictionaries, as well as the total intelligence quotient and should not be neglected in further research of the dictionary. On the other hand, the discharge factors have shown themselves less important in this sample, but they certainly have an impact on the development of dictionaries and in further research you need to include more factors that, in addition to cognitive, influence the development of dictionaries

and semantic fluids. However, the limitations of this research should also be emphasized, which is a small sample ( $N = 20$ ). However, these results also indicate the implementation of such explorations of the wider spectrum in order to fully illuminate the extent to which cognitive abilities affect the development of dictionaries and semantic fluids and to what extent it is possible to affect this process in a younger school age when the dictionary changes intensively and it needs to be rich in different approaches. Perhaps these results show the direction that would be worth going along the way to get generations that express themselves without fear, safe and confident, which is greatly contributed by the wealth of the dictionaries.

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