The involvement of some cognitive processes in solving selected grammatical tasks

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In the modern world, competence in at least one language other than our mother tongue is absolutely essential. English has conquered the world of languages and won the hearts of many non-native speakers who use various means of acquiring it. More active individuals take the immersion approach and decide to stay in English-speaking countries, buy self-study books, read, listen to and watch English media to increase understanding and fluency in spoken English. Those less vigorous as well as most school-children study it at school; they enrol in language courses or schools or hire a private teacher to explain how the language works before they start using it. In present-day Slovakia, learners are provided with easy access to formal instruction; therefore, it could be said that every healthy individual able to attend school has an equal chance to become aware of and able to use English grammar correctly. However, not everybody achieves the same level. There are considerable differences among learners who are provided with the same learning conditions. How is it possible? What advances or hinders acquisition of English and English grammar in particular?

Just like any other learning process, a foreign language is also acquired under a number of conditions that influence its progress and outcomes. If we take accuracy and fluency as two poles, we immediately think of several typical features that differentiate their development. Accuracy is typically connected to grammar of a language. To be an accurate speaker means to understand how English sentences are constructed and how to use grammatical structures appropriately and correctly. There are several characteristics that are considered important in the process of foreign language acquisition. The role of *language environment* is mentioned very often and immersion approach where the individual focuses on total sensory contact with the target language is becoming more and more popular with not only learners but also teachers and schools. The real-life situations can help the learner realise the characteristics that connect one item to another; however, the actual understanding of how English sentences are built and how individual morphemes and sentence elements function can often be more efficiently acquired when students are provided with *formal instruction* and a chance to try out the correct use of a grammatical aspect in question (Masterman, Macaro, 2006).

For foreign language acquisition to take place, some data in the target language must be available to the learner as *input*. "Input hypothesis postulates that humans acquire language in only one way – by understanding messages, or by receiving comprehensible input" (Svoboda, Hrehovčík, 2006, 204). In the context of grammar acquisition, the input should be clear, correct, concise, and connected to students' real life experience. In this way, the input can positively influence the attitude of learners and, by implication, their effort and the actual acquisition achievement. Another possible influence is *knowledge of the learner's first language*. There are contradictory opinions on whether acquisition of a first language and a foreign language involve the same or distinct processes. Nevertheless, it seems obvious that the existing knowledge of the mother tongue must be admitted and any further experience with another language is based on and referred to it. We can often come across first language

interferences in our pupils, such as confusion in the area of articles (Slovak being a language with no articles), an incorrect discrimination between countable and uncountable nouns (*I have some informations*) or the use of an incorrect primary auxiliary verb if the mother tongue differs from the target language (such as the incorrect *I have 18 years* instead of *I am 18 years old*).

Even if the best possible conditions in every way are provided, further processing within the learner is necessary. According to Dulay et al. (1982), three major *internal processes* are active in foreign language acquisition. (1) *Filter*, which screens all incoming language and allows (or not) its further processing. In my experience as a teacher, I have encountered several students who (in their own words) voluntarily "chose not to acquire" all the English grammatical tenses because "it just made the matter too confusing and native speakers only practically use three or four of them anyway". One of the teacher's tasks is to show the learners that using language becomes considerably easier if they master the rules of its grammar. (2) *Organiser* is responsible for the learner's gradual organisation of newly presented language and its functioning is subconscious. (3) *Monitor* "is responsible for conscious linguistic processing" (Dulay et al., 1982, 58). "Tasks which focus on linguistic manipulation seem to encourage monitoring, while those which focus on communication do not" (Dulay et al., 1982, 61). This means that correct use of grammar (applying rules to morpheme and word manipulation), to a large extent, depends on the function of the learner's monitor. Knowledge of grammar of a foreign language is mainly based on the formal instruction the learner is provided with. This, from the grammar acquisition viewpoint, makes monitor the most important part of internal processing. Apart from those factors that influence learners of a foreign language in general, there is a set of such influences that vary from one learner to another, called *individual learner differences*. Most authors (notably Lujan-Ortega, 2000, Bond, 2002, Ellis, 1985) distinguish several factors which, as they believe, influence foreign language acquisition. They state that age, motivation/attitude, learning style/strategy and attitude/intelligence are of determinate importance. According to some sources, personality and cognitive style play an important role, too.

There are certain processes which govern acquisition of knowledge in humans. *Cognitive processes* are a special group of psychological processes aimed at acquiring knowledge. Cognitive processes and mental functions are often used interchangeably covering those processes (functions) which human beings perform with their minds. Among the most frequently mentioned ones are perception, memory, creativity, imagination, reasoning, generalisation, analogy, association, and emotion (Microsoft Encarta Encyclopaedia, 2004).

Based on the above, some interesting questions arose regarding factors influencing the acquisition of English grammar and, especially, the extent to which cognitive processes in learners improve or impair their ability to solve grammatical tasks. In the effort to find an answer, I conducted research in this area. The objective of my research was *to find out to what extent the observed cognitive processes are involved in solving selected grammatical tasks*; in other words, to clarify the relationship between the competence in the forming and use of active verb forms, auxiliary verbs, countable and uncountable nouns, articles and prepositions and the involvement of creativity, associative thinking, combination ability, "feeling for language", conceptual thinking, verbal intelligence, judgement formation, sense of reality, practicality and independence of thinking, numerical factor, short-term memory, visual memory, concentration, inductive verbal thinking, perception of words, empathy and conceptual verbal thinking.

In total, 143 students (83 girls and 60 boys) attending 8-year secondary comprehensive schools in eight Slovak towns were examined. Schools in Košice, Lipany, Prešov, Revúca, Sabinov, Sečovce, Snina and Stará Ľubovňa were involved in the research. All the students

were of approximately the same age (born within a year of each other), and when the research was conducted, they were attending the fifth grade of the aforementioned schools. They had been taking formal instruction in the form of English lessons with qualified teachers for four years prior to the research and there was no native speaker participating in or leading the education process in any of the classes. That is how possible discrepancies in the learners' proficiency were avoided. To ensure the group's homogeneity even further as well as to achieve the most relevant results possible, those respondents who misunderstood any task in either test involved in the research were excluded from the final target group.

The respondents were subjected to two tests – a *grammatical test* divided into five sections and a *test of cognitive processes* compiled from standardized psychological tests. The grammatical test was focused on the following parts of grammar: *Active verb forms*, where the respondents were supposed to put the provided verbs into the correct forms (twenty verb forms altogether). The following tense-aspect combinations were used: present simple and continuous, past simple and continuous, present perfect simple and continuous, future simple and continuous. In the subtest *Primary auxiliary verbs*, the students' task was to fill the correct auxiliary verbs in the blanks. Twelve verbs were provided to be put into ten gaps with the possibility of the same auxiliary verb to be used more than once, which prevented the respondents from 'guessing' the correct answer by choosing from the 'left over' auxiliaries. In the section *Countable and uncountable nouns*, the respondents were asked to fill in the blanks in twelve sentences, choosing between the correct form of the indefinite article (a/an) and quantifier some. The subtest *Articles* comprised five meaningful paragraphs consisting of sentences with noun phrases functioning as subjects, objects and complements, and the students were supposed to fill a correct article in fifteen blanks (the – definite, a/an – indefinite or -- for zero article). In the section *Prepositions*, the respondents were asked to provide their own answers in fifteen sentences of varying difficulty.

The test of cognitive processes comprised the following sections: *Sentence identification*, based on the idea of forming sentences using a group of provided words, omitting the three words that are redundant. By this subtest, the following cognitive processes were measured: creativity, associative thinking, combination ability, "feeling for language" and conceptual thinking. In *Thought completion*, the respondents were given five options in the form of a multiple choice task to choose the correct word to logically fill in the sentence. By means of this subtest, such cognitive processes as verbal intelligence, practical thinking, judgement formation, sense of reality, independence of thinking and numerical factor were examined. *Working memory* tested the respondents' ability to memorise five word sequences, each forming a category of common nouns (flowers, tools, birds, artistic works and animals). After the time limit was up, they were asked to recall to which category the word beginning with a particular letter belonged. Apart from short term memory and visual memory, concentration was also tested by means of this subtest. In the section *Analogy*, the respondents were asked to find out what the relationship between the two given words is and, consequently, provide a word that forms an analogical relationship with the word after the equals sign. Five options to choose from were given.

After all the results were collected and processed, *correlation analysis* was applied to determine the relationships between the grammatical aspects listed above and their counterparts represented by cognitive processes. The results express correlations between individual grammatical tasks the solving of which was required from the respondents and their scores in the subtests of the psychological diagnostic test.

Table 1 shows the correlations calculated between each pair of variables. The highest correlations with the subtests measuring cognitive processes found within respective grammatical aspects are marked darkest and the lighter and lighter colouring represents the consequent decrease in the significance of the results.

Table 1: **Correlations between selected grammatical tasks and cognitive processes**

	SUBTESTS MEASURING SELECTED COGNITIVE PROCESSES			
	Sentence identification	**Thought completion**	**Working memory**	**Analogy**
COGNITIVE PROCESSES TESTED	creativity, associative thinking, combination ability, "feeling for language", conceptual thinking	verbal intelligence, judgement formation, sense of reality, practicality and independence of thinking, numerical factor	short term memory, visual memory, concentration	inductive verbal thinking, perception of words, empathy, conceptual verbal thinking
GRAMMATICAL ASPECT				
Active verb forms	**0,46**	**0,33**	**0,37**	**0,16**
Auxiliary verbs	**0,42**	**0,35**	**0,45**	**0,20**
(Un) Countable nouns	**0,25**	**0,34**	**0,31**	**0,13**
Articles	**0,22**	**0,22**	**0,22**	**0,05**
Prepositions	**0,37**	**0,38**	**0,32**	**0,22**

The results show that solving tasks focused on *active verb forms* was, out of the observed groups of cognitive skills, most strongly enhanced by creativity, associative thinking, combination ability, "feeling for language" and conceptual thinking (measured by *sentence identification*), to a lesser extent, by memory and concentration (*working memory*) and a yet lesser effect was observed in the case of verbal intelligence, practical thinking, judgement formation, sense of reality, independence of thinking and numerical factor (tested by the subtest *thought completion*). The correct use of *primary auxiliary verbs* in context, on the other hand, seemed to be primarily enhanced by memory and concentration, while creativity, associative thinking, combination ability, "feeling for language" and conceptual thinking appeared to be less important; and verbal intelligence, practical thinking, judgement formation, sense of reality, independence of thinking and numerical factor had a yet less significant influence. Understanding the rules that should be applied when distinguishing between *countable and uncountable nouns* was, in the respondents most highly supported by verbal intelligence, practical thinking, judgement formation, sense of reality, independence of thinking, numerical factor, followed by the influence of memory and concentration and, thirdly, by creativity, associative thinking, combination ability, "feeling for language" and conceptual thinking. Surprisingly, to fill in the correct *articles* (differentiating between indefinite, definite and zero article) required an approximately equal level of all the tested cognitive processes, as the correlations reached the same number. The choice of a correct *preposition* in each sentence was, in the target group, primarily enhanced by the level of verbal intelligence, practical thinking, judgement formation, sense of reality, independence of thinking, numerical factor, followed by creativity, associative thinking, combination ability, "feeling for language" and conceptual thinking, while memory and concentration seemed to be less important still.

The far right column of Table 1 shows an interesting finding. *Analogy*, which measured inductive verbal thinking, perception of words, empathy and conceptual verbal thinking was found, across all grammatical aspects, to have by far the least influence. This is quite surprising as analogy is considered an important cognitive process involved in acquisition of knowledge in people. Further research would be necessary to find out whether this was an irregular finding only applying to the target group involved in the research or whether these processes actually participate in solving the given grammatical tasks to a much lesser extent.

From the research conducted, it seems that there *is an underlying link* between successful solving of grammatical tasks and certain cognitive processes. The results show that the correct formation and use of *active verb forms* is mainly enhanced by an increased level of associative and conceptual thinking, combination ability and creativity, while the correct discrimination between *countable and uncountable nouns* as well as *prepositions* is to a greater extent influenced by verbal intelligence, practicality and independence of thinking, sense of reality and numerical factor is also involved. The use of correct *primary auxiliary verbs* seems to be enhanced by working memory, while discrimination between *grammatical articles* appears to require the involvement of all of the above cognitive processes.

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Abstrakt

Autorka v článku predstavuje výsledky výskumu, prostredníctvom ktorého sa snažila zistiť mieru účasti kognitívnych procesov pri riešení gramatických úloh v angličtine ako cudzom jazyku. Výskumu sa zúčastnilo 143 študentov osemročných gymnázií na Slovensku. Výsledky naznačujú, že správnemu použitiu slovesných foriem napomáhala vyššia úroveň asociatívneho a koncepčného myslenia, kombinačnej schopnosti a kreativity. Použitie počítateľných a nepočítateľných podstatných mien ako aj predložiek bolo do veľkej miery ovplyvnené verbálnou inteligenciou, praktickosťou a nezávislosťou myslenia. Výskum ďalej naznačil, že zaradenie pomocných slovies do viet vykazovalo najbližší súvis s pracovnou pamäťou respondentov, zatiaľ čo aplikácii gramatických členov napomáhali všetky pozorované kognitívne procesy.