Syntactic Skills of Children who Stutter

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Abstract: The purpose of this study was to examine the syntactic and morphological skills of children who stutter and compare them with those of their fluent peers. Subjects were 58 children, chronological ages of 10 years and 58 of their fluent peers matched by age and gender. For testing of syntactic and morphological skills, we used questions from the informal test Expressive scale of Bosnian/Croatian/Serbian language, as in Bosnia and Herzegovina there is yet no standardized instrument for testing language skills. The results showed that the subjects were significantly different only in the use of gender of pronouns and their endings, and in the task of using different sentence structures, where the analysis showed that subjects who stutter use more simple sentence structures. On other tasks children who stutter showed slightly weaker syntactic and morphological skills. The results suggest that children who stutter at school age show slight linguistic delay in compare to their peers. We could say that there is a subgroup of children who stutter, whose language skills are within the normal range, but who are slightly behind their peers in certain linguistic domains.

Keywords: Syntax, morphology, school children who stutter.

INTRODUCTION

Language skills of children and their competence increases as children grow up and develop normally through certain stages [1]. During school age and adolescence, there is an increase in size and complexity of child's linguistic repertoire and the use of that repertoire, within the context of the conversation and narration. The child now moves on to how to use the language [2]. During this period, a key factor in Childs educational success or failure is their language system [1]. Generally it can be said that they can use it almost like adults, syntactic and phonological structures, their vocabulary expanding rapidly and the children are starting to use one or more responsibilities for the communication. Children have good motor control of their speech muscles and can articulate voices at normal/fast rate. It could be argued that children develop language on an almost automatic level [3]. In terms of demands, it may be that at this age, with the school start, a child who is already on the edge of stuttering starts stuttering and is unable to cope with the demands that are put in front of him, or it may be that the child himself has set unrealistic goals that require highly developed language skills [3]. One can speculate that the reduction of linguistic complexity and length of sentences may result in an increase of fluent speech of people who stutter. This explanation would be consistent with the model requirements and capacity, which emphasizes that stuttering, will worsen when the child's capacity for fluent speech is exceeded due to internal and/or environmental requirements [4]. When it comes to the study of language in terms of its relationship with stuttering, researchers have began to study speech and language disorders in children who stutter back in the 1920s and since then a number of studies have been published that have examined the speech and language development of children who stutter [5, 6], and in the late '60s research of linguistic aspects of stuttering was shifted to the study of influence of words on the frequency of dysfluencies [7]. In the literature, there are empirical studies that suggest that people who stutter have less developed phonology, vocabulary and general language abilities than their peers [8-10]. Numerous studies show that people who stutter are behind people who do not stutter in speech and language development. Complicated expressions may increase demands on the child, which makes the process of language acquisition more difficult, and the child can feel pressured to use equally complex and lengthy expressions [11].

By manipulating the length of sentences and syntactic complexity in the study of children who stutter and those who do not stutter, a strong correlation was found in both groups between the number of disfluencies and syntactic complexities, and only increase in the syntactic complexity, regardless of the length of utterances, increases the number of dysfluencies [12]. Research shows that children who stutter, stutter in several cases the first three words of the statement [13], the syntactically complex sentences [14], the functional words [15] and the statements that are longer than the average length of a child's' statement [16]. These results suggest that there is a link between some aspects of planning speech-

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language production and fluency with which words are pronounced. According to this, speech and language development of children who stutter in a clinical sense should be "disturbed ", or we could rather say that these children are less equipped to cope with different linguistic processes involved in what appears to be successful speech linguistic planning and production [17]. In a study on adults who stutter, it was stated that reduced speech motor stability (e.g. stability of the lower lip during articulation) occurred when syntactic complexity was increased, but not when the length of the statement was changed [7]. Reduction in stability with increasing syntactic complexities suggests that additional requirements that are set in front of the speaker impose demands on the voice system [18]. Although the length of utterances, syntactic complexity and verbal fluency were the subject of research for many years, the nature of relationship of speech production is still not completely clear. For example, the ambiguous relationship between the length of sentences and syntactic complexities and how that relationship affects the fluency of speech, then which are the exact aspects of syntactic complexities that may be connected with the speech fluency and whether the data obtained by the research groups of subjects, can be transferred to each individual. It would be useful and helpful to know exactly which aspects of linguistic structures contribute to the likelihood that a person will falter at some vocabulary [14].

But according to research not all language skills of children who stutter are lower then skills of their peers who do not stutter. There are empirical studies that have not found any evidence to confirm that the speech or language skills of people who stutter are less developed compared to people who do not stutter [19]. Some studies even suggest that people who stutter have above average expressive language skills that are associated with their development expectations [20]. Language skills of children who stutter, as a group, are either within the norms or exceed them [21], and therefore it is suspected that there are differences in the way that children who stutter process language [22]. The results are not consistent to support the view that people, who stutter, as a group, have deficient areas of morphology and syntax [5]. Despite the obvious differences, in the findings between descriptive studies of speech and language of people who stutter, almost everyone agrees that the linguistic characteristics are associated with stuttering [23]. The association between stuttering and several linguistic variables exists, but so far no causal relationship has been found, so there is no consensus about their exact role or contribution, as a risk factor for the development of stuttering, duration of stuttering or the impact on the natural recovery. This and several other aspects of the relation between stuttering and language is still the subject of scientific discussion and controversy [24]. What is known is that most researchers who deal with this problem are beginning to increasingly speculate that stuttering is related to linguistic processes above the level of motor performance, and move from the standpoint where stuttering was exclusively considered as a motor problem, and adopt that for stuttering, at least partially responsible, are linguistic processes [8].

The aim of this study was to examine the syntactic and morphological skills of children who stutter and compare the results with syntactic and morphological skills of their fluent peers. The study provides insight into general development of syntactic and morphological skills of children who stutter in the Bosnia and Herzegovina area, because this type of research is not common in the Balkans, and this study also provides insight into the syntactic and morphological skills of school children who stutter compared to the skills of children who stutter in other languages.

METHODS

Participants

The sample was formed using data from the project "Language characteristics of children who stutter and children with normal fluent speech". The project was carried out in Bosnia and Herzegovina, Tuzla Canton. The framework of this research project included examining linguistic characteristics of students in 10 elementary schools. For the purpose of this study it was formed the sample of 58 subjects (43 male participants and 15 female participants) who stutter and 58 of their fluent peers (matched by age and gender with the experimental group). The average age of the subjects was 10 years (± 2.54 years).

Measures of Speech Disfluency

Subject was classified as a subject who stutters when he showed three or more stuttering-like disfluencies per 100 words of conversational speech (based on 300 sample) [25], and had a score of 11 or higher (at least "mild" in severity) on the Stuttering Severity Instrument for Children and Adults (SSI-3) [26]. Subject was classified as a subject who does not

stutter when he showed two or more stuttering - like disfluencies per 100 words of conversational speech (based on 300 sample) and showed a total score of 8 (less than mild) or below on the SSI-3 [26]. The subjects of this study did not show any obvious neurological disorders or abnormalities.

Procedure

As in Bosnia and Herzegovina there is still no standardized instrument for the assessment of language, for this study it was used the Expressive scale of Bosnian/Croatian/Serbian language -test protocol with images [27]. This Scale is an informal instrument that was created in collaboration with speech therapists from the USA, and the test was adjusted to the Bosnian /Croatian / Serbian language. In this work we have presented only the results of tests on tasks that tested the syntax and morphology, namely: RRAZSI - receptive understanding of syntax and morphology; general expressive syntax and morphology of the tasks: MLU -mean length of utterance, OPEXSI1-complete sentences versus sentence fragments; OPEXSI2- MLU age-appropriate, OPEXSI3 - subjects as part of the syntactic structure, OPEXSI4 - verb/verbal phrase as part of the syntactic structure, OPEXSI5- correct word order, OPEXSI6 - sentences in accordance with the age of the participants in relation to the word endings used, OPEXSI7-diversity of sentence structures , then SPOL-gender and word endings; PRISZAM- possessive pronouns, MNOZ-number-plural; PADEZ-case endings; KOMPSUP-comparative and superlative; GVREM-tenses; RAZREC-sentence formation. The tasks were scored with one point for correct answers and 0 points for incorrect answers, while on seven tasks OPEXSI1 to OPEXSI7 subject was expected to respond with a yes or a no based on the qualitative analysis of the story, depending on the results achieved by the subject.

Speech evaluation and analysis was conducted by a speech and language pathologist. Testing was carried out individually for each subject in a way that parents brought respondents who stutter in a clinic room. Every school have employed a pedagogues-psychologist who performs the assessment of all children. According to the findings of pedagogues-psychologists psychological development of children who stutter was normal. Also, no patients have developed negative attitudes toward stuttering.

Data Analysis

Data was statistically analyzed using statistical computer package SPSS 16.0. For all the variables we calculated basic statistical parameters: mean, standard deviation, minimum and maximum results, range of results. To test the existence of differences in the analyzed variables between subjects who stutter and fluent subjects it was applied t-test and χ^2 test.

RESULTS

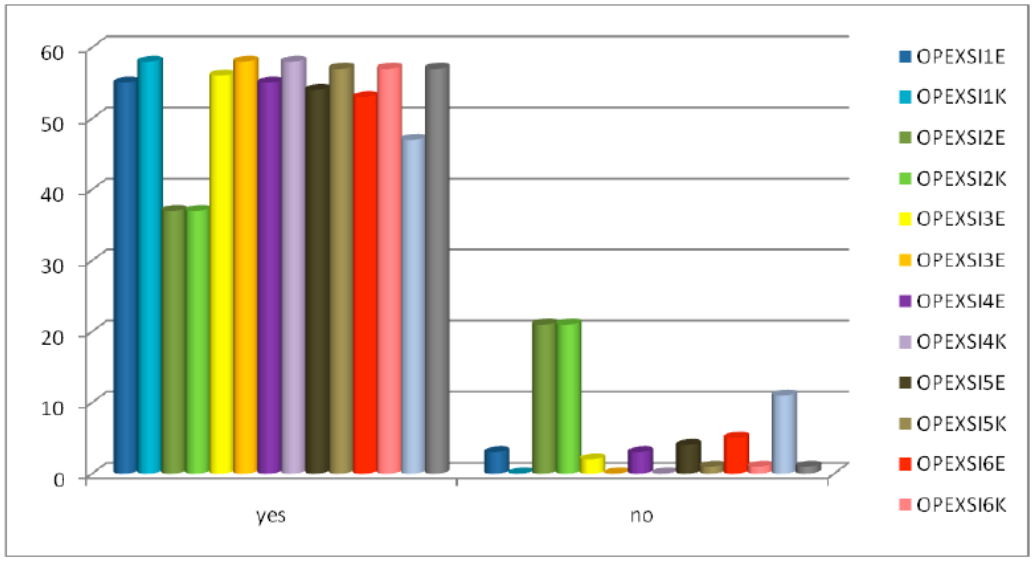
The average frequency of dysfluency in subjects of school age (N =58) was 14.13 points on the Stuttering Severity Instrument for Children and Adults [26] with a minimum score of 6 and a maximum score of 18 points. Average time of a blockade amounted to 6.72 points, which corresponds to the period of stuttering from 1 to 1.9 seconds. As a side effect, subjects who had the most pronounced stutter also had the most pronounced limb movement. The total average score of stuttering severity was 27.32 points with a high standard deviation (SD = 10.06), which actually corresponds to a moderate level of stuttering (Table **1**).

Table 1: Basic Statistical Indicators Analyzed Variables of Severity of Stuttering

Variables	Mean	SD	Minimum	Maximum	Range
UCMUC	14,13	3,46	6	18	12
TRZAST	6,72	3,36	2	16	14
POPZVUC	1,48	1,73	0	5	5
GRLICA	1,44	1,41	0	4	4
POKRGL	1,6	1,65	0	5	5
POKREX	1,89	1,69	0	5	5
UKPP	6,46	4,99	0	17	17
UKREZ	27,32	10,06	8	49	41

Table 2: Basic Statistic Indicators of Syntactic and Morphological Variables

Variables	Mean		SD		Minimum		Maximum		Range	
	E	K	E	K	E	K	E	K	E	K
RRAZSI	10,89	11,34	1,37	1,25	7	5	12	12	5	7
PDI	6,47	6,93	2,67	2,21	2	2	15	15	13	13
SPOL	2,96	3,48	1,1	0,84	0	0	4	4	4	4
PRISZAM	4,36	4,25	1	1,05	0	0	5	5	5	5
MNOZ	4,41	4,55	1,09	0,79	0	0	5	5	5	5
PADEZ	6,36	6,68	1,25	0,62	0	5	7	7	7	2
KOMPSUP	2,44	2,5	1,12	0,94	0	0	3	3	3	3
GVREM	7,68	7,89	0,86	0,44	3	5	8	8	5	3
RAZREC	14,56	14,08	4,12	4,73	0	2	18	18	18	16



Legend: E-experimental group; K-control group

Figure 1: The frequency response of subjects on tasks that tested overall expressive syntax and morphology.

Comparing the results achieved between the test subjects who stuttered and their fluent peers, it can be seen that the subjects who stuttered on all of the variables, except for the variables for testing possessive pronouns (PRISZAM) and building sentences (RAZREC), achieved only slightly worse results. Standard deviation results of the nonfluent subjects were slightly higher compared to the results of the control group, except for the two mentioned variables, where the nonfluent subjects achieved slightly better result (Table **2**).

Even on the first look on Table **1**, it can be seen that the subjects have achieved approximately the same results on all tasks. T-test results showed that there were significant differences between fluent and nonfluent subjects only regarding the variable that examined gender and word endings (SPOL) ($t = 2.83$, $df = 114$, $p = 0.05$). To determine the differences in non-parametric variables it was used χ^2 test. The results showed that in six of the analyzed variables (OPEXSI1, OPEXSI2, OPEXSI3, OPEXSI4, OPEXSI5, OPEXSI6) there were statistically no significant differences among the subjects, while in one variable OPEXSI7 relating to the use of different sentence structures $\chi 2$ test determined statistically significant difference between the subjects who stutter and their fluent pairs ($\chi^2 = 9.29$, $df = 1$, $p= 0.00$).

DISCUSSION

The etiology of stuttering has been explored for centuries from various aspects. Researchers' interest in resolving this issue is focused on the examination of

causality of stuttering through the research of various linguistic aspects. Sequencing the adoption of language forms reflects shapes that emphasize cognitive and social growth, learning and linguistic complexity [2]. The literature also states that stuttering is a result of disruption in the syntactic, lexical and/or phonological processing skills. Results of thise research showed that participants who stutter achieved slightly lower scores than their peers on tasks that examine syntactic and morphological skills. The results achieved by the children who stutter and their fluent peers were statistically similar for all non-standardized measurements of linguistic abilities, with the exception of lexical diversities. Only in this task there was a statistically significant difference between children who stutter and the fluently talking children. As a group, children who stutter showed slightly reduced lexical diversity [28]. Children who stutter, as a group, have slightly inferior results compared to fluently talking children, in two measures, but neither measure has given a result that could be used to identify a child who stutters as a child with language impairment. Based on the results given above, it raises a question of what causes and constitutes the "demand" for children who stutter so that it becomes a complicated task; is it possible that the ability of children who stutter to adapt linguistic input, which is the same as the input for children who do not stutter, is reduced because of their linguistic vulnerability [28].

Statistically significant differences in this study were found in only two variables. These variables were related to the proper use of gender and word endings and in the use of different sentence structures (simple sentences, longer, complex sentences containing negation, interrogative sentences, etc). Subjects who stutter used more simple sentences than their fluent peers. When it came to building sentences using the given words, subjects who stutter were even better in formulating the sentences, although the sentences contained somewhat simpler structure. Hall *et al*. cite a study done by Weiss and Zebrowski who insist that children who stutter pronounce insignificantly shorter and less complete story in compared to children who do not stutter [6]. Howell and Au- eung cite a study by Kadi-Hanifa and Howell who examined the frequency of use of different types of sentences in the group of children who stutter and children who do not stutter, the average chronological age of 4, 6 and 11 years. The authors found that, compared with fluent speakers with whom they were matched by age, there were no differences in the frequency of different categories of sentences. The same authors found that the younger speakers who stuttered differed from older children who stutter. Younger children showed proportionately more stuttering in simple sentences, while older children stuttered more on complex types of sentences [13]. In their study, Howell and Au-Yeung established the existence of the biggest differences between children who stutter and fluent speakers in the use of simple sentences, where the children who stutter showed a higher frequency of use of simple sentences. It was also found that there was an interaction between syntactic categories and ages, showing that children at different ages use different types of sentences [13]. Adults who stutter can pronounce different types of grammatical sentences with equal fluency and they can do so without the use of compensatory strategies. There are no significant differences in fluency of the sentences of different syntactic complexity [29]. Yaruss examined the differences in structure between sentences where stuttering was present and sentences in which there was no stuttering in terms of grammar and structure (simple versus complex sentences) and functions of the sentences. Group analysis showed that there was no statistically significant correlation, regardless of stuttering, the sentence was grammatically correct. It was also found that the stuttering occurs more frequently in longer sentences. By the use of regression analysis, it showed that the length of the statement was a strong predictor for the occurrence of stuttering, then syntactic complexity of sentences, but the author points out that it would be valuable to estimate even the syntactic complexity, because there are some aspects of syntactic complexity associated with stuttering. The length of the statements and the complexity of sentences can not always predict stuttering, which means that there are some other factors (speech rate, response time, etc.) that should be taken into consideration [14]. Anderson *et al*., cite the research conducted by Howell, Davis and Au-Yeung, who found that children who stutter and children who do not stutter , ages 2-10 years, achieved similar results in the test "Reception of Syntax Test" which measures syntactic development [23]. Stuttering is not associated with syntactic complexity in children ages 10-18 years [30].

Descriptive studies often point out that there is a relationship between speech dysfluencies, long sentences and syntactic complexity. Speech dysfluency is not a random event and it is inextricably linked to the linguistic environment, which in turn is a product of the process of language formulation.

Bearing in mind a clear correlation between the final statements, children who stutters may have difficulty with the process of constructing of sentences, which leads to delays in creation of sentences. This slower speed may reflect a problem with calling on the syntactic frame (syntactic rules) or integration/assembly of syntactic frame structure components [31]. What is still unclear is whether the stuttering refers to "errors in linguistic planning" or if there are problems with "access or returning to the linguistic elements" (e.g. word forms) or if it is a complex combination of both. Given that it is still unclear whether some people who stutter have language difficulties due to stuttering or stuttering because of language difficulties, or if these two are simply two unrelated problems, the research of this paper contributes to clarify these issues.

Numerous studies show that when comparing children who stutter and their fluent peers, the children who stutter achieve lower scores on tests of expressive and/or receptive vocabulary [9, 10, 15, 16], as well as the use of more simple sentences and less mature language skills [13]. In five of the seven studies it states, that people who stutter are late in language development compared to those who do not stutter. However, the interpretation of the results of these studies is controversial. Some researchers suggest that people who stutter have a deficit in certain areas, while other researchers disagree [5].

Weber-Fox discussed neurological evidence of how individuals who stutter process the linguistic information. She questioned whether people who stutter show atypical brain function when processing linguistic information, such as deciding whether the sentence contains an error or whether two words rhyme. Her work is based on the theory that the moments of stuttering or interruptions in speech motor control are associated with processing elements of language such as grammar, invoking certain words or processing of small units of speech such as articulatory sounds or syllables. She states that there is a two-way influence between language and motor processing. Research results in adults who stutter showed differences in their ability to properly settle the grammatical information, such as distortion of the verbal agreement. This reduced ability is also characterized by differences in the degree and forms of energy in the brain [32].

Comparing the results of subjects who stutter and their fluent peers in this survey, showed that in most of the surveyed variables there were no statistically significant differences. Actually, there were very small differences between these two groups of subjects. Examining articulatory status, language status and fluency between people who stutter and normal fluent speakers it was established the existence of some small differences, between the two groups [33]. Westby exmined syntax and semantics in three groups of children (children with normal disfluencies who do not stutter, children who stutter and children with a number of disfluencies, but which still did not stutter). It was found that these three groups did not differ significantly in the results achieved in the analysis of the formulating the sentence, although children who stutter and children with a number of influences that still did not stutter, showed a significantly lower score on receptive vocabulary, made significantly more grammatical errors and provided significantly more incorrect answers on the semantic tasks [34].

Hall *et al*. cites the results of the research done by Kadi-Hanifa and Howell where it was found that there were no differences between children who stutter and children who do not stutter in the use of different syntactic categories in children ages 2-12 years [6]. The frequency of stuttering is not affected by the changes in syntactic complexity of the target stimuli. These results suggest either reducing the impact on the syntactic complexity of stuttering during the process of language acquisition or changes that may have occurred due to a mixed pattern (people with chronic and not chronic stuttering) in relation to the changes made in previous studies on the influence of linguistic structure on stuttering of children [30].

Increasing the length of the sentence leads to the increase in the number of disfluent moments and it is well documented in people who stutter [7]. When it comes to measuring the average length of utterances, children who stutter are more disfluent if the statement is longer, but it was also found to be such with more normal disfluencies [16]. This study found that subjects who stuttered had slightly shorter MLU compared to their fluent peers, but there were no differences in MLU between these two groups of subjects.

This still does not clarify the question of whether there are differences in language skills between people who stutter and their peers. One possible reason for this is the use of different methodologies in studies by different authors. However, the overall trend suggests that the stuttering affects grammatical complexity and/or length of the statement. In recent years, a lot of

research was done in order to find out whether the speech and language skills of children who stutter differ in regards to their fluent peers. Nippold made a review of the literature in the area since the beginning of the development of language, articulation, syntax and morphology, semantics and finding words. She identified a number of methodological errors in several studies, but concluded that the view that children who stutter, as a group, compared to their peers are more likely to have delayed or disrupted speech and language development, has still not been proven. However, she added that in some studies there were significant differences in these areas, and clinicians should be aware of the possibility of these problems in every child [5]. The question is whether these problems result or cause disfluencies [3, 5].

Many variables may not be directly associated with speech fluency, but should be considered, such as: the development of phonological, lexical access/retrieval of words and speech/language development. Variables are in an interaction and manifest differently in different children who stutter [14]. People who stutter, who have difficulties in syntax, grammar, and other skills necessary for linguistic formulation are classified into one subgroup [35]. A child can have above average skills in speech and language components, but if one component of the speech and language system, is average or below average, then his/her production of speech and language may be less than the fast and/or sufficient, making the child more sensitive to failure in fluency or error. Your child can have mediocre results on measures of expressive vocabulary, but it may take significantly longer to say the "right" answer, resulting in non-sinhronization in the operation speech-language planning. Children who stutter put inappropriate cognitive and /or linguistic emphasis on their already vulnerable speech- language system, and will thus become more sensitive to failure in fluency [23].

CONCLUSION

Results of the study suggest that children who stutter at school age are slightly behind in syntactic and morphological skills of their peers. Results also show agreement with the results of some research conducted in other languages, mainly English. It is possible that there is a subgroup of children who stutter, whose language skills are in accordance with their age, but still slightly behind their peers in language skills. Differences between fluent and non-fluent subjects are in the sentence structure which is somewhat simpler in subjects who stutter, but these subjects still have good lexical recalling skills. Bearing in mind that the subjects were children who stutter at school age whose average score on the severity of stuttering was in the middle of intensity level, it is likely that these children use simpler sentence structures to avoid the occurrence of disfluencies or respond out of fear of stuttering by avoiding complex sentence structures. The results also suggest that the diagnostic and rehabilitation process of children, who stutter, must also assess the language ability of a child, and in accordance with all the results obtained, plan the treatment of the child.

So far there has not been established a causal relationship between language skills and stuttering, but the question that needs to be considered is the relationship between language skills and the non-fluent speech itself, and if stuttering is the cause or consequence of weak results obtained in the field of language skills.

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