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CHARACTERISTICS OF VOCABULARY IN SCHOOL-AGE STUTTERING CHILDREN

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Abstract

Etiology of fluency disorders has been studied for centuries from various aspects, one of those is language aspect. The purpose of this study was to examine semantic abilities in school-age children, and to determine possible differences in semantic possibilities between stuttering and normally fluent children. Sample of subjects consisted of 58 stuttering children and 856 normally fluent children aged from 6 to 15 years. We examined variables describing stuttering severity, and also extracted semantic variables from the test which examined language abilities in children. Results showed that average result of variable describing stuttering severity indicated moderate degree of stuttering. Compared to normally fluent children, stuttering subjects showed poorer language abilities related to variables describing vocabulary characteristics in majority of analyzed variables. Results of correlation analysis revealed no significant correlation between variables describing stuttering severity and variables describing vocabulary characteristics in school-age stuttering children. Within group of normally fluent children, intragroup correlation between examined semantic variables was something weaker compared to intragroup correlation within group of stuttering children. These results indicate the importance of both evaluation of language abilities in stuttering children and improving development of both fluency and semantic abilities as a part of language abilities in general in stuttering children. Consequently, this indicate the necessity for further study of stuttering which should be directed to both detailed research of specific language skills and evaluation of relationship between language abilities and stuttering.

Key Words: Stuttering, Semantic Abilities.

Introduction

In spite of various theories, normal language production is still a mystery, and disorder like stuttering is even more poorly understood (Büchel and Sommer, 2004). It is known that stuttering represents communication disorder which affects speech fluency (American Speech and Language Hearing Association – ASHA, 2007). Peters and Guitar (1991) reported on numerous researches indicating that stuttering individuals lag behind normally fluent speakers in speech and language development. As children grow, their language skills and competencies are normally developed through different stages (Chan-Pensley et al., 2000/2001). By the time children enter school, they learn to control the most, if not all main features (phonology, fluency, semantics and pragmatics) of speech and language (Gleason, 1985, Smith, 1981, Stoel-Gammon and Dunn, 1985, according to Caruso, Ritt and Sommers, 2002). Child's language system represents key factor to her/his education success or failure (Chan-Pensley et al., 2000/2001). During school-age and adolescence child's linguistic repertoire increases in size and complexity and usage of repertoire within conversational and narrative context occur. Many words are added from the context, usually through reading, especially by the end of grade four. Adding new words will increase the size of child's lexicon/vocabulary. However, this improvement could cause

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no changes in mutual semantic context, semantic classes, synonyms, homonyms and antonyms, and child's vocabulary itself is significantly related to general linguistic competence. Overall process of semantic development starts at early school-age and it can be related to general changes in cognitive processing. More than other language areas, semantic development significantly varies depending on educational level, socioeconomic status, sex, age and cultural background (Owens, 2005). Stewart and Turnbull (1995) reported occurrence of pressure which results from semantic development during development of language skills in stuttering children. Child's language skills improve as child's vocabulary expands – greater number of lexical items and semantic fields from which the child can make selection. This makes it more difficult for a child to select specific word and potentially it requires more time consumption. However, in order to equalize that process, the majority of children develop increased capacity to match lexical items with meaning they want to communicate. Finding of appropriate word and matching ability need to mature if child's speech possesses characteristics of fluent speech. Packman et al. (2001) reported that stuttering is caused by difficulties in lexical retrieval process. Considering language research and it's relation to stuttering, Nippold (1990) reported that researchers started to study speech and language disorders in stuttering children as far back as 1920. Since those days, numerous studies researching speech and language development have been published. Results of numerous studies indicate that stuttering children, when compared with children who do not stutter score lower on measurements of expressive and/or receptive language evaluation (Byrd and Cooper, 1989, Murray and Reed, 1977, Westby, 1974, according to Anderson and Conture, 2004) and receptive vocabulary (Ryan, 1992, Meyers and Freeman, 1985, according to Silverman and Ratner, 2002), and they also exhibit significantly more grammatical errors during conversational speech (Westby, 1974, according to Anderson and Conture, 2004), use simpler sentences and exhibit less mature language skills (Howel and Au-Yeung, 1995, Wall, 1980, according to Anderson and Conture, 2004).

The main purpose of this study was to examine vocabulary characteristics in school-age children, and to determine possible differences in semantic abilities between stuttering and normally fluent children.

Subjects and Methods

Sample consisted of 58 stuttering children (experimental group) and 856 normally fluent children (control group), both male and female.

Sample of variables consisted of following variables:

- **Anamnesis variable:** age of a child expressed in years;
- **Variables of stuttering severity** – which represented evaluated stuttering episodes which met the criteria according to the "Stuttering Severity Instrument for Children and Adults" (A Stuttering Severity Instrument for Children and Adults SSI-3) (Riley, 1994): frequency of repetitions and prolongations of voices and syllables (stuttering frequency) in spontaneous speech and reading (FRSR); average duration of three longest stuttering blocks (DB); four types of physical concomitants: sounds that advert attention (SA), facial grimaces (FG), head movements (HM), extremities movements (EM); total number of accessory features (TNAF); total result of stuttering severity (TRSS); type of stuttering (TS).
- **Semantic variables extracted from Expressive scale of Bosnian / Croatian / Serbian language (**Jewett and Echols, 2003**):** receptive vocabulary (RECV); expressive vocabulary (EXPV); definitions (DEF); categories (CATH); associations (ASSOC); comparison and contrast (COMCON); sequential stories (STOR); specific vocabulary (SPVOC); vocabulary appropriate for specific age (VAS); grammar used in story (GST); procedure for tooth brushing (PTB).

This study was conducted in 10 primary school in the area of Tuzla Canton as follows: "Ivan Goran Kovacic", "Mejdan", "Turija", "Dr. Safvet-beg Basagic", "Jala", "Kreka", "First Primary School Zivinice", "Pazar", "Solana", and "Second Primary School Zivinice". "Stuttering Severity Instrument for Children and Adults" was used for assessment of stuttering severity (A Stuttering Severity Instrument for Children and Adults SSI-3) (Riley, 1994). Verbal and nonverbal stuttering episodes were evaluated, and according to the Test rules tape recordings of subjects' stuttering were made. Expressive scale of Bosnian / Croatian / Serbian language – Test protocol with picture material (Jewet and Echols, 2003) was used for evaluation of language abilities. In the purpose of this evaluation, tasks examining vocabulary characteristics were extracted from the Test protocol (receptive vocabulary, expressive vocabulary, definition, categories, associations, comparison and contrast, sequential stories, storytelling, procedure explanation). This evaluation was performed on each subject, and test procedure was performed according to the Test propositions. Test responses were written down in Test protocol designed especially for the purpose of this study.

Statistical computer package SPSS 16.0 was used for statistic data processing. Basic statistic parameters were calculated for each variable: mean, standard deviation, minimum and maximum result, range of results. T-test was used for examination of differences in analyzed variables between stuttering and normally fluent children. Correlation analysis was used for determining possible correlation between stuttering and normally fluent children in analyzed variables (Pearson correlation coefficient).

Results

Mean age of stuttering subjects was 10 years. Sample of stuttering subjects consisted of children aged from 6 to 15 years. From inspection of the Table 1 and 2 it can be concluded that stuttering subjects scored lower in greater number of examined variables describing vocabulary characteristics compared to maximum values determined by Test. Results of stuttering severity evaluation showed that mean value of variable describing stuttering severity (TRSS) was 27,32 points which indicate moderate stuttering degree. The variable describing frequency of repetitions and/or prolongations of voices and syllables (stuttering frequency) in spontaneous speech and reading (FRSR = 14,14 points) and variable average duration of three longest stuttering blocks (DB: mean value = 6,72 points, with range up to 14 points) contributed particularly to the mean value of TRSS.

Table 1: Basic statistic parameters of analyzed language variables for stuttering children

Variable	N	Mean	Minimum	Maximum	Range	Std.Dev.
AGE	58	10	6	15	9	2,54
RECV	58	9,93	0	11	11	1,75
EXPV	58	8,10	0	10	10	2,20
DEF	58	2,78	1	3	2	0,53
CATH	58	5,41	2	6	4	0,89
ASSOC	58	4,79	0	6	6	1,62
COMCON	58	4,64	0	6	6	1,70
STOR	58	1,12	1	2	1	0,32
SPVOC	58	1,10	1	2	1	0,30
VAS	58	1,14	1	2	1	0,34
GST	58	1,17	1	2	1	0,38
PTB	58	1,03	1	2	1	0,18

Legend: AGE - age of a child expressed in years; RECV - receptive vocabulary; EXPV - expressive vocabulary; DEF - definitions; CATH - categories; ASSOC - associations; COMCON - comparison and contrast; STOR - sequential stories; SPVOC - specific vocabulary; VAS - vocabulary appropriate for specific age; GST - grammar used in story; PTB - procedure for tooth brushing

Table 2: Basic statistic parameters of analyzed variables for stuttering severity

Variable	N	Mean	Minimum	Maximum	Range	Std.Dev.
FRSR	58	14,14	6	18	12	3,46
DB	58	6,72	2	16	14	3,36
SA	58	1,48	0	5	5	1,74
FG	58	1,45	0	4	4	1,41
HM	58	1,60	0	5	5	1,65
EM	58	1,90	0	5	5	1,69
TNAF	58	6,47	0	17	12	4,99
TRSS	58	27,33	8	49	36	10,06
TS	58	3,41	1	5	4	1,18

Legend: FRSR - stuttering frequency; DB - average duration of three longest stuttering blocks; SA - Sounds that advert attention; FG – facial grimaces; HM - head movements; EM - extremities movements; TNAF- total number of accessory features; TRSS - total result of stuttering severity; TS - type of stuttering

Mean age of normally fluent subjects was 10,4 years. Control group of subjects also consisted of children aged from 6 to 15 years. Analyzing the evaluated semantic abilities in normally fluent children it can be seen that subjects approached to maximum values, which indicate well developed language abilities in normally fluent children (Table 3).

Table 3: Basic statistic parameters of analyzed variables for normally fluent children

Variable	N	Mean	Minimum	Maximum	Range	Std.Dev.
AGE	856	10,4	6	15	9	2,84
RECV	856	10,55	6	12	6	0,84
EXPV	856	8,73	2	11	9	1,53
DEF	856	2,83	0	3	3	0,53
CATH	856	5,5	0	6	6	0,95
ASSOC	856	5,3	0	6	6	1,34
COMCON	856	5,2	0	6	6	1,32
STOR	856	1,03	1	2	1	0,16
SPVOC	856	1,08	0	2	2	0,31
VAS	856	1,03	0	2	2	0,22
GST	856	1,05	0	2	2	0,27
PTB	856	1,01	0	2	2	0,11

Legend: AGE - age of a child expressed in years; RECV-receptive vocabulary; EXPV-expressive vocabulary; DEF-definitions; CATH--categories; ASSOC-associations; COMCON-comparison and contrast; STOR-sequential stories; SPVOC- specific vocabulary; VAS-vocabulary appropriate for specific age; GST-grammar used in story; PTB-procedure for tooth brushing

Examination of differences in analyzed variables (using t-test) between stuttering and normally fluent children revealed lower language abilities in stuttering children related to variables describing vocabulary characteristics (in majority of analyzed variables) compared to normally fluent children. Statistically significant differences were determined in receptive vocabulary, expressive vocabulary, association abilities, ability to compare and contrast, sequential storytelling, usage of vocabulary in story telling appropriate for specific age, and ability to use basic grammar elements in story telling (Table 4).

Table 4: Analysis of statistically significant differences in analyzed variables between stuttering and normally fluent children

Variable	Mean 1	Mean 2	SD1	SD2	t-value	df	p
RECV	10,55	9,93	0,84	1,75	4,93	912	0,00*
EXPV	8,73	8,1	1,53	2,2	2,90	912	0,00*
DEF	2,83	2,78	0,53	0,53	0,72	912	0,46
CATH	5,5	5,41	0,95	0,89	0,65	912	0,51
ASSOC	5,3	4,79	1,34	1,62	2,72	912	0,00*
COMCON	5,2	4,64	1,32	1,7	3,07	912	0,00*
STOR	1,03	1,12	0,16	0,32	-3,79	912	0,00*
SPVOC	1,08	1,1	0,31	0,3	-0,62	912	0,53
VAS	1,03	1,14	0,22	0,34	-3,45	912	0,00*
GST	1,05	1,17	0,27	0,38	-3,17	912	0,00*
PTB	1,01	1,03	0,11	0,18	-1,48	912	0,13

Legend: RECV- receptive vocabulary; EXPV - expressive vocabulary; DEF - definitions; CATH - categories; ASSOC – - associations; COMCON - comparison and contrast; STOR - sequential stories; SPVOC - specific vocabulary; VAS - vocabulary appropriate for specific age; GST - grammar used in story; PTB - procedure for tooth brushing; Mean 1 - mean value of results in normally fluent children; Mean 2 - mean value of results in stuttering children; SD1 - standard deviation of results in normally fluent children; SD2 - standard deviation of results in stuttering children

As can be seen from Table 5, which presents correlation analysis, there was correlation between variables describing vocabulary characteristics in stuttering children. Correlation analysis also revealed no statistically significant differences between variables describing degree of stuttering severity and variables describing vocabulary characteristics in school-age stuttering children, therefore those results are not presented in this paper.

Table 5: Correlation analysis of variables describing vocabulary characteristics in stuttering children

	AGE	RECV	EXPV	DEF	CATH	ASSOC	COMCON	STOR	SPVOC	VAC	GST	PTB
AGE	1											
RECV	0,23*	1										
EXPV	0,51*	0,78*	1									
DEF	0,39*	0,26*	0,45*	1								
CATH	0,45*	0,30*	0,56*	0,41*	1							
ASSOC	0,54*	0,29*	0,54*	0,53*	0,69*	1						
COMCON	0,53*	0,39*	0,60*	0,31*	0,59*	0,53*	1					
STOR	-0,25	-0,19	-0,42*	-0,34*	-0,35*	-0,21	-0,51*	1				
SPVOC	-0,22	-0,14	0,32*	0,50*	-0,41*	-0,41*	-0,36*	0,56*	1			
VAC	-0,29*	-0,24	-0,38*	-0,58*	-0,46*	-0,57*	-0,50*	0,46*	0,84*	1		
GST	-0,41*	-0,32*	-0,46*	-0,49*	-0,46*	-0,65*	-0,65*	0,53*	0,59*	0,74*	1	
PTB	0,11	-0,26*	-0,31*	-0,45*	-0,51	-0,32*	-0,23	0,22	0,55*	0,47*	0,41	1

Legend: AGE - age of a child expressed in years; - receptive vocabulary; EXPV - expressive vocabulary; DEF - definitions; CATH - categories; ASSOC - associations; COMCON - comparison and contrast; STOR - sequential stories; SPVOC - specific vocabulary; VAS - vocabulary appropriate for specific age; GST - grammar used in story; PTB - procedure for tooth brushing

Correlation analysis of variables describing semantic abilities in normally fluent children showed intragroup statistically significant differences between majorities of semantic variables group. It is important to point out that normally fluent children had somewhat higher negative statistically significant differences than stuttering children, for example correlation coefficient for stuttering children in variable GST-grammar used in story was -0.41 and in normally fluent children correlation coefficient was -0.08, as can be seen from tables 5 and 6.

Table 6. Correlation analysis of variables describing vocabulary characteristics in normally fluent children

	AGE	RECV	EXPV	DEF	CATH	ASSOC	COMCON	STOR	SPVOC	VAC	GST	PTB
AGE	1											
RECV	0,28*	1										
EXPV	0,50*	0,44*	1									
DEF	0,24*	0,24*	0,29*	1								
CATH	0,42*	0,24*	0,41*	0,40*	1							
ASSOC	0,34*	0,32*	0,47*	0,30*	0,41*	1						
COMCON	0,33*	0,37*	0,52*	0,38*	0,46*	0,59*	1					
STOR	-0,12*	-0,16*	-0,17*	-0,27*	-0,26*	-0,18*	-0,21*	1				
SPVOC	-0,14*	-0,12*	-0,11*	-0,30*	-0,16*	-0,12*	-0,19*	0,18*	1			
VAC	0,00	-0,13*	-0,09*	-0,24*	-0,12*	-0,07*	-0,14*	-0,26*	0,56*	1		
GST	-0,08*	-0,20*	-0,18*	-0,12*	-0,15*	-0,20*	-0,21*	0,17*	0,46*	0,59*	1	
PTB	0,01	0,08*	-0,12*	-0,08*	-0,07*	-0,02	-0,09*	0,17*	0,14*	0,17*	0,09*	1

Legend: AGE - age of a child expressed in years; RECV - receptive vocabulary; EXPV - expressive vocabulary; DEF - definitions; CATH - categories; ASSOC - associations; COMCON - comparison and contrast; STOR - sequential stories; SPVOC - specific vocabulary; VAS - vocabulary appropriate for specific age; GST - grammar used in story; PTB - procedure for tooth brushing

Discussion

One of the popular measurements used for stuttering is frequency measurements (percentage of words or syllables stuttered) (Riley, 1994). Results of this study indicate that variable frequency of stuttering (FRSR =14,14) contributed the most to the total result of stuttering severity. Junuzovic-Zunic (2008) found in her study that average result for variable describing frequency of stuttering in group of children with moderate stuttering was 14,46 points, and that variable mostly determined total result of stuttering severity. Salihovic (2002) also reported that variable stuttering frequency contributed the most to the total result of stuttering severity. Except of this variable, average duration of three longest stuttering blocks also contributes to the total result of stuttering severity. Similar results in group of children with moderate stuttering reported Junuzovic-Zunic (2008) in her study. Measurement of average duration of three longest stuttering blocks generally contributes more to stuttering severity, and it causes more difficulties for stuttering individual than shorter stuttering episodes do (Riley, 1994). Stuttering individuals substantially differ in how frequent they stutter and how long will their individual primary behavior last. Results of this study indicate that total average result of stuttering severity is at level of moderate stuttering degree. Peters and Guitar (1991) reported that individuals with moderate stuttering degree are typically children aged from 6 to 13 years. Basic characteristics of individual with moderate stuttering degree are that person feels fear of his/her stuttering and reacts to his/her fear of stuttering by avoidance behavior. Child with that stuttering degree still repeats and prolongs sounds and syllables, however now blocks becomes his/her most often basic behaviors. At that degree child is not completely conscious of what he/she has been doing during stuttering block, however is conscious of being "stacked", helpless and that the word that he/she wants to produce simply would not come out. Escaping behaviors, which stuttering individual uses in order to interrupt his/her stuttering, are more often and complex in individual with moderate degree of stuttering.

In certain literature reviews and empirical studies it is reported that stuttering children in generally have poorly developed phonological abilities, vocabulary and language abilities compared to their peers (Anderson and Conture, 2000, 2004; Byrd and Cooper, 1989, Louko, Conture and Edwards, 1999, according to Anderson, Pelowski and Conture, 2005; Paden, Yairi and Ambrose, 1999; Silverman and Ratner, 2002; Pelowski, Conture, Anderson and Ohde, 2001, according to Anderson, Pelowski and Conture, 2005). On the other hand, some empirical studies found no evidence which could suggest that speech and language abilities in stuttering children were weaker than those in normally fluent children (Nippold, 2002). Results of this study showed that stuttering children achieved somewhat poorer results in evaluated tasks which examine semantic abilities, i.e. vocabulary characteristics than normally fluent children. Descriptive studies research on speech and language abilities of stuttering children show inconsistent findings. There has been numerous studies which confirmed that stuttering children compared to their normally fluent peers scored lower on measurements of expressive and/or receptive language (Byrd and Cooper, 1989, Murray and Reed, 1977, Westby, 1974, Howel, Au-Yeung and Sackin, 1999, Hubbard and Prins, 1994, Zackheim and Conture, 2003, according to Anderson and Conture, 2004) and receptive vocabulary (Meyers and Freeman, 1985, Ryan, 1992, according to Silverman and Ratner, 2002), and they also exhibited substantially more grammatical errors during conversation (Westby, 1974, according to Anderson and Conture, 2004) and simpler less mature language (Howel and Au-Yeung, 1995, Wall, 1980, according to Anderson and Conture, 2004). It was determined that stuttering children exhibited significantly greater differences between measurements of receptive/expressive language and receptive vocabulary compared to nonstuttering children (Anderson and Conture, 2000), which indicates bias possibility between components or aspects of speech-language system in stuttering children (Tetnowski, 1998, according to Anderson and Conture, 2004). Peters and Guitar (1991) reported that stuttering children do not achieve as good results in school as their nonstuttering peers do. These findings could be partly related to poorer language skills in stuttering children. Further evidence on language factor significance resulted from researches which exhibited that stuttering children lag behind nonstuttering children in speech and language development.

Results analysis of this study showed statistically significant differences between stuttering and normally fluent children in majority of analyzed variables. Junuzovic-Zunic (2008) also determined statistically significant differences between stuttering and nonstuttering children in great number of examined semantic variables. Rommel et al. (1999, according to Yairi, 2006) reported that different responses to semantic and phonological distractions, slower reaction time and/or alternative activation pathways can exhibit differences in language processing. Several studies emphasized differences in receptive vocabulary between small stuttering and nonstuttering children (Andrews, Craig, Feyer,

Hoddinott, Howie and Neilson, 1983, Bernstein-Ratner, 1987, according to Anderson and Conture, 2000, Bloodstein, 1995). Dunn and Dunn (1997, according to Anderson and Conture, 2000) determined that stuttering children had poorer results on Peabody Picture Vocabulary Test (PPVT) which measures receptive vocabulary. Bloodstein (1995) emphasized that this early "linguistic loss" in small stuttering children can become less visible as child gets older, and this suggestion can contribute to results on differences in receptive vocabulary between older stuttering and nonstuttering children (Perozzi and Kunze, 1969, Wiliams, Melrose and Woods, 1969, according to Anderson and Conture, 2000). Results of correlation analysis in this study exhibited no statistically significant differences between variables describing vocabulary characteristics and stuttering severity variables. Junuzovic-Zunic (2008) determined in her study that minor number of variables, mostly variables describing accessory features correlated statistically significant with some of the variables describing vocabulary of stuttering children. Results of that study showed intragroup statistically significant differences between variables describing vocabulary characteristics in both experimental and control group of subjects, only stuttering children exhibited somewhat higher negative correlation between analyzed variables compared to nonstuttering children. Some other authors obtained similar results in their studies. Furthermore, Anderson et al. (2005) reported on results of correlation analysis obtained on EVT Test (test which assesses vocabulary and retrieval of words from memory) compared to results obtained on PPVT-III test (test which assesses expressive and receptive vocabulary). It appears that stuttering children from this study showed weaker negative correlation coefficients compared to nonstuttering children. Results of correlation analysis on TELD-3 test compared to total results achieved on TELD-3 test, like on previous tests and research of same authors, also revealed slightly lower correlation in nonstuttering children compared to correlation between observed variables in stuttering children. Hartfield and Conture (2006) reported that results of their study suggest that stuttering children have tendency to organize lexical information more functionally than physically, and that tendency could be related to difficulties in establishing normally fluent speech and language. In relation to this, something higher relationship between semantic variables in stuttering children in copares to their nonstuttering peers could be interpreted.

Whether or not there is causal relationship between language development and occurrence of stuttering, it is obvious that fluent speech production and development of language skills interact mutually (Hall, Wagovich and Ratner, 2007). It is very important to evaluate language abilities in stuttering individual, because in some children other language disorders coexist with stuttering (Arndt and Healy, 2001, Blood, Ridenour, Qualls and Hammer, 2003, Yaruss, La Salle and Conture, 1998, according to Hall et al., 2007).

CONCLUSION

Results of this study indicated that stuttering children achieved lower results on greater number of examined variables describing language abilities. In addition to this, stuttering children, if we perceive them as a group, differ statistically significant from normally fluent children in ability to use vocabulary. These results also indicate the importance of evaluation both language abilities in stuttering children and improving development of fluency and semantic abilities, i.e. language abilities in general in stuttering children. According to such overall evaluation speech-language pathologist needs to plan a treatment for a stuttering child. Future research in the field of stuttering should be directed to detailed research of specific language skills and evaluation of relationship between language abilities and stuttering.

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