INFLUENCE OF LENGTH OF SENTENCES ON THE FREQUENCY OF SPEECH DISFLUENCIES IN CHILDREN WHO STUTTER

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ABSTRACT

The main purpose of this study was to investigate whether the length of sentences has influence on the frequency of speech disfluencies for children who stutter. The participants included 30 children who stutter 19 male participants and 13 female participants, whose age ranged between 4 years and 8 months to 6 years and 11 months (56 to 83 months of age). Research was conducted in kindergartens and primary schools in Tuzla Canton in Bosnia and Herzegovina[2]*. The test consisted of 36 sentences. In relation to the length, sentences were divided into three groups: in the first group there were 9 sentences which included 3 to 5 words, in the second group, there were 14 sentences which included 6 to 8 words and in the third group there were 13 sentences which included 9 to 11 words. Testing was conducted so that the examiner was pronouncing one sentence after which the participant repeated the same sentence. Each participant was requested to repeat exactly what he/she had heard. Speech and language pathologist has recorded all speech disfluencies in all sentences. The results showed that the sentences containing 9 to 11 words had most effects on the overall dynamics of speech disfluencies in children who stutter. The results suggest that during the process of assessment and diagnosis of children who stutter, it should be required to assess the child's ability to use complex linguistic statements and to assess the frequency of disfluencies in relation to the complexity of the sentences. Precision diagnostics would provide guidelines for the treatment of stuttering in terms of implementation of approaches and strategies which include language treatment and gradually increasing the length and complexity of statements of children who stutter during speech.*

Key words: *sentences lengths, speech disfluencies, children who stutter*

INTRODUCTION

Stuttering is an abnormal disruption of speech fluency and it is recognized by frequent repetitions of sounds or words, by the prolongations of sounds, or by „blocks“ that interrupt the airflow or voicing in speech (Wright, 2005).Many variables such as language, cognitive and genetic factors and emotional motor interact in complex ways in the development of stuttering and in the overt breakdowns in speech motor control that are perceived as stuttering-like disfluencies (Conture, 2001; Smith,1999, Smith & Kelly, 1997,Van Riper, 1982, according Macpherson & Smith, 2013).The most distinguishing characteristic of stuttering is its variability (Sawyer, Chon and Ambrose, 2008). Factors that influence the variability in stuttering have been the object of several investigations. Speech rate, utterance length and grammatical complexity are three parameters that have received considerable attention.

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[2]The sample was formed using data from the project “Influence of sentences lengths on the frequency of speech disfluencies for children who stutter”. The project was financed by The Federal Ministry of Education and Science in Bosnia and Herzegovina.

Disfluencies during speech tend to increase with increased grammatical complexity and length (Bernstein-Ratner & Sih, 1987; Gaines, Runyanand Meyers, 1991; Logan & Conture, 1995).

Considering that stuttering usually occurs at a time when speech and language most develops, there is a lot of testing that attempt to determine the association between stuttering and sentence length (Zackheim & Conture, 2003). There is a wealth of data including behavioral findings explaining that increases in utterance length and/or syntactic complexity are associated with the increased occurrence of disfluency in children and adults who stutter (Bernstein-Ratner & Sih, 1987; Logan and Conture 1995; Sawyer, Chon and Ambrose, 2008).Language development is oneof the factors that affect the stuttering. Children are more disfluent in periods of development of longe rand more complex statements. The child is most disfluent while planning long and complex linguistic structures (Salihović, 2005).Clinical observations and research suggest that stuttering increases when children are using advanced forms of speech and language. Stuttering can be increased when an individual uses longer words, rare words and longer sentences (Peters & Guitar, 1991). Salihović, Junuzović-Žunić & Ibrahimagić (2006) suggests that stuttering can occur when a child speaks linguistically complex sentences. As much the child is trying to imitate speech and language of adults, using longer words and sentences, or trying out less familiar words, the greater the possibility of development of stuttering is. Tetnowski (1998) proposed that speech disruptions like normal disfluencies (phrase repetitions and phrase revisions) and speech disruptions like stuttering disfluencies (part-word repetitions and sound prolongations) may be associated with speech planning and monitoring processes. Some factors that increase language formulation demands, such as syntactic complexity or greater utterance length are believed to contribute to a greater incidence of speech disruptions in children who do not stutter (Tetnowski, 1998). Findings from most such research have indicated that increases in utterance length and complexity are associated with increases in speech disfluencies (Zackheim & Conture, 2003). Since the results of numerous studies have shown a correlation between the length of sentences and the appearance of greater disfluency in the speech, but also that most of the literature refers to the English language, we wanted to examine the impact of sentences length on the frequency of speech disfluency of kindergarten and preschool children who stutter in Bosnia and Herzegovina.

RESEARCH METHODS

Respondent's sample

The sample was formed using data from the project "Influence of length of sentences on the frequency of speech disfluencies in children who stutter". The project was funded by The Federal Ministry of Education and Science in Bosnia and Herzegovina. The sample included 30 children who stutter (19 male participants and 13 female participants). The age of the participants was from 4 years and 8 months to 6 years and 11 months (56 to 83 months of age).

Variable sample

AGE- Age of the child; FR- Frequency; DU- Duration; PC- Physical concomitants; TOS- Total overall score; LSS- Level of stuttering severity (1 – very mild level of stuttering severity; 2 – mild level of stuttering severity; 3 – moderate level of stuttering severity; 4 – severe level of stuttering severity; 5 – very severe level of stuttering severity); NSD3-5- The number of speech disfluencies in sentences that included 3 to 5 words; NSD6-8- The number of speech disfluencies in sentences that included 6 to 8 words; NSD9-11- The number of speech disfluencies in sentences that included 9 to 11 words; TNSD- The total number of speech disfluencies in sentences.

The method of conducting research and measuring instrument

The research was conducted in kindergartens and primary schools in Tuzla Canton in Bosnia and Herzegovina. Each subject was treated separately. A child was classified as stuttering when he or she showed 3 or more stuttering moments (i.e., sound/syllable repetitions, sound prolongations, broken words, and/or monosyllabic whole-word repetitions) per 100 syllables of conversational speech (Bloodstein, 1995; Conture, 1990,2001; Pellowski & Conture, 2002), and had a score of 11 or higer on the "Stuttering Severity Instrument for Children and Adults (SSI-3)" (Riley, 1994).We used the "Stuttering Severity Instrument for Children and Adults" for the assessment of the stuttering severity.

This test was divided into five parts: Frequency (a score from 2 to18 points), Duration (a score from 2 to 18 points), Physical concomitants (a score from 0 to 20 points), Total overall score and Tables summarizing the level of stuttering (Riley, 1994). We made tape recordings of spontaneous speaking for all subjects. All participants were a non – reader, and the speech sample was only recorded during their spontaneous speaking. The spontaneous speaking was elicited trough pictures from a Manual. Each speech sample was consisted of at least 200 syllables. The values for the stuttering frequency were obtained in the following way: the number of stuttered syllables was divided by the total number of syllables and then multiplied with 100. The duration of stuttering blocks was measured by a stopwatch in seconds, after which the three longest blocks were used for evaluation. The physical concomitants were observed during the tape recordings and were noted on the record form. After that, the results for all three parts were summarized (frequency, duration and physical concomitants),from where a total result of stuttering severity was obtained. After that, we converted the percentage of severity into points. The stimuli, for testing the influence of sentences lengths on the frequency of speech disfluencies for children who stutter, were subtest "Sentence imitation" taken from "Test of language development" (Newcomer & Hammill, 2008), which was translated and adapted into Bosnian language. The subtest "Sentence imitation" consisted of 36 sentences. In relation to the length, sentences are divided into three groups: the first groups were 9 sentences that included 3 to 5 words, the second group were 14 sentences that included 6 to 8 words and the third group were 13 sentences that included 9 to 11 words. Testing was conducted so that the examiner was pronouncing one sentence after which the participant repeated the same sentence. Each participant was requested to repeat exactly what he/she had heard. Speech and language pathologist has recorded all stuttering disfluencies in all sentences.

Statistical data processing

Data was statistically analyzed using statistical computer package SPSS 20.0. Basic statistic parameters were calculated for each variable: mean, standard deviation, minimum and maximum. Multiple regression analysis was performed to determine the prognostic validity of the predictor variables in relation to the criterion variable. The study was conducted with the significance level of 5%.

RESULTS

Table 1 displays the results of descriptive statistics of analyzed stuttering severity variables. The age of participants ranged from 56 to 83 months. The average of "Frequency" on the "Stuttering Severity Instrument for Children and Adults" for 30 children who stutter was 12.27 points, with a minimum score of 6 and a maximum score of 18 points. The average of "Duration" was 8.47 points, but it ranged from 2 to 12 points. The value of "Physical concomitants" ranged from 1 to 11 points, with a mean value of 5.6 points. The Total overall score was 26.33 points with a standard deviation of 6.88, which actually corresponds to a moderate level of stuttering severity.

Table 1. Basic statistical indicators analyzed variables of stuttering severity

Variables	N	Mean	SD	Min	Max
AGE	30	74.57	8.042	56	83
FR	30	12.27	3.352	6	18
DU	30	8.47	2.862	2	12
PC	30	5.60	2.699	1	11
TOS	30	26.33	6.880	11	38
LSS	30	3.23	0.898	1	5

Legend: AGE- Age of the child; FR- Frequency; DU- Duration; PC- Physical concomitants; TOS- Total overall score; LSS- Level of stuttering severity

In Table 2, basic statistical indicators of frequency of speech disfluencies in children who stutter are displayed. The mean value of "The total number of speech disfluencies in sentences" was 20.2, with a minimum value of 7, and maximum value of 66 disfluencies. The mean value of" The number of speech disfluencies in sentences included 3 to 5 words" was 1.3, and the results ranged from 0 to 8 disfluencies. The mean value of" The number of speech disfluencies in sentences included 6 to 8 words " was 6.77, with the minimum value of 1, and the maximum value of 22 disfluencies. When we analyzed the most complex sentences, which contained 9 to 11 words, the mean value was 12.13, but it ranged from 5 to 36 disfluencies.

Table 2.Basic statistical indicators of frequency of speech disfluencies for children who stutter

Variables	N	Mean	SD	Min	Max
TNSD	30	20.20	11.79	7	66
NSD3-5	30	1.30	1.841	0	8
NSD6-8	30	6.77	4.352	1	22
NSD9-11	30	12.13	6.75	5	36

Legend: NSD3-5- The number of speech disfluencies in sentences included 3 to 5 words; NSD6-8- The number of speech disfluencies in sentences included 6 to 8 words; NSD9-11- The number of speech disfluencies in sentences included 9 to 11 words; TNSD- The total number of speech disfluencies in sentences

Multiple regression analysis was performed to determine the prognostic validity of the predictor variables that describe the number of speech disfluencies in different lengths of sentences in relation to the criterion variable that describes the total number of speech disfluencies in sentences. The results showed that the multiple correlation coefficients, indicated by a value R, were 1,000. The percentage of variation described by the coefficient of determination (R2) explains100% of common variability, which is statistically significant. Methods of forming the regression model showed that, in the space of predictor variables that describe the different length of sentences, elimination of any of the variables cannot be done. Based on the results of beta coefficient, it can be concluded that there is a statistically significant effect of predictors on the criterion variable. The results showed that the sentences containing 9 to 11 words had most effects on the overall dynamics of speech disfluencies of children who stutter (ß=0.573, p= 0.00).Following are sentences containing 6-8 words (ß=0.369, p= 0.00) and the least impact, but still statistically significant impact on the overall dynamics speech disfluencies demonstrated sentences containing 3-5 words (ß=0.156, p= 0.00) (Table3).

Table3.Results of Multiple regression analysis of the predictor variables in relation to the criterion variable

R	R^2	Adjusted R^2	St.Er.E	df	F	p
1.00	1.00	1.000	0.000	29	0.000	**0.000**

Variables	BETA	B	St.Er.E	p	Partial cor.	Part cor.
NSD3-5	0.156	1.000	0.000	**0.000**	1.000	0.108
NSD6-8	0.369	1.000	0.000	**0.000**	1.000	0.239
NSD9-11	0.573	1.000	0.000	**0.000**	1.000	0.349

Legend: NSD3-5- The number of speech disfluencies in sentences included 3 to 5 words; NSD6-8- The number of speech disfluencies in sentences included 6 to 8 words; NSD9-11- The number of speech disfluencies in sentences included 9 to 11 words

DISCUSSION

Results in our investigation showed that there were influences of sentences lengths on the frequency of speech disfluencies in children who stutter. The number of speech disfluencies significantly increased as the length of the sentence increased. Also, the results showed that the sentences containing 9 to 11 words had most impact on the overall dynamics of speech disfluencies of children who stutter. Results of numerous studies have found that there is a relation between stuttering and the length of the statement, and that there is influence of sentences lengths on the frequency of speech disfluencies in children who stutter. Yaruss, Newman and Flora (1999) examined relationships between syntactic complexity, utterance length, and disfluency in the spontaneous speech of 12 normally fluent children (six girls and six boys, age 44–64 months), who produced 50-utterance spontaneous speech samples during conversations with a speech and language pathologist. The results showed that the disfluent utterances were longer and more syntactically complex than fluent utterances. The results also showed that the length was a better predictor of disfluency than complexity. Discriminate analyses indicated that utterance length in clausal constituents was the most important factor for predicting the likelihood that an utterance would be disfluent. Logan and Conture (1995) conducted research in which they examined individual utterances of children who stuttered. The authors categorizing them as either "high" or "low" in the parameters of rate, length and grammar. The authors found that stuttered utterances were more often rated as "high" in length and/or grammatical complexity, but were not characterized by fast speaking rates.

Some linguistic factors, such as utterance length and grammatical complexity have been found to make demands on children's fluency (Bernstein – Ratner & Sih, 1987). Zackheim and Conture (2003) examined the influence of utterance length relative to each mean lenght of utterance of child on stuttering – liked is fluencies in stuttering children and their fluent peers and found that utterances above children's mean length of utterance account for approximately 70% of all speech disfluencies. Logan and Conture (1997) found that preschoolers who stutter and preschoolers with typical fluency speech are more likely to produce stuttering – liked is fluencies on utterances containing relatively many grammatical constituents. Gaines, Runyanand Meyers (1991) conducted a study where they attempted to clarify the relationship between stuttering in young children and the language factors of length and grammatical complexity. The 12 stuttering children, age 4-6 years, in spontaneous conversational dyads produced sentences containing stuttering within the first few words, in which authors were analyzed for length and grammatical complexity. The sentences in which an episode of stuttering occurred within the first three words were significantly more complex and longer than sentences that were free of perceptible stuttering and all other forms of fluency failure. Sawyer, Chon and Ambrose (2008) conducted a study in which they analyze the influences of rate, length and complexity on speech disfluency in a single speech sample in preschool children who stutter. They found that some of the factors which influenced disfluency in previous research seemed to be relevant at the end of a long speech sample, in which children became more disfluent. Mean length of utterance was significantly longer in the speech section that contained more stuttering like disfluencies. There were no differences in grammatical complexity, but clausal constituents were highly correlated with Mean length of utterance. That results are giving support to the perspective of length serving as a macrovariable affecting planning time and fluency. Perkins (1992) suggested that people who stutter are more fluent when using simple and short statements. Sawyer, Chon and Ambrose (2008) explained that findings of their investigation support the use of speech and language, pathologists measured that emphasizing shorter utterance lengths will establish speech fluency. Onslow, Packman and Harrison (2003) suggested that many of the resulting analysis disfluencies and complexity statements have clinical implications. The Lidcombe Program, the treatment approach for stuttering children, incorporates the principle of utterance length and syntactic complexity. In the early stages of the Lidcombe Program, the child's verbal output is manipulated to ensure that short, syntactically simple utterances are produced. When the child achieves fluency at this level, then the syntactic demand placed on the child is gradually increased.

CONCLUSION

Results of conducted research showed that there were influences of length of sentences on the frequency of speech disfluencies in children who stutter. The number of speech disfluencies significantly increased as the length of the sentences increased. Also, the results showed that the sentences containing many words had most impact on the overall dynamics of speech disfluencies in children who stutter. The results suggest that during the process of assessment and diagnosis of children who stutter, it should be required to assess the child's ability to use complex linguistic statements and to assess the frequency of disfluencies in relation to the complexity of the statements. Precision diagnostics would provide guidelines for the treatment of stuttering in terms of implementation approaches and strategies, which include gradually increasing the length and complexity of the utterances in children who stutter during speech and language treatment.

REFERENCES

Bernstein Ratner, N., Sih, CC. (1987). Effects of gradual increases in sentence length and complexity on children's disfluency. *Journal of Speech and Hearing Disorders,* 52: 278 -287.

Bloodstein, O. (1995). *A handbook on stuttering*. San Diego: Singular Publishing Group, Inc.

Conture, EG. (1990). *Stuttering*. New Jersey: Prentice Hall.

Conture, EG. (2001). *Stuttering: Its nature diagnosis and treatment*. Boston: Allyn & Bacon.

Gaines, ND., Runyan, CM., Meyers, SC. (1991). A comparison of young stutterers' fluent versus stuttered utterances on measures of lenght and complexity. *J Speech Hear Res*., 34(1): 37-42.

Logan, KJ.,Conture, EG. (1995).Lenght, grammatical complexity and rate differences in stuttered and fluent conversational utterances produced by children who stutter.*Journal of Fluency Disorders*, 20: 35-61.

Logan, KJ., CONTURE, EG. (1997). Selected Temporal, Grammatical, and Phonological Characteristics of Conversational Utterances Produced by Children Who Stutter. *Journal of speech, language and hearing research*, 40: 107-120.

Macpherson, MK., Smith, A. (2013). Influences of sentence length and syntactic complexity on the speech motor control of children who stutter. *Journal of speech, language and Hearing Research*, 56: 89-102.doi:10.1044/1092-4388(2012/11-0184)

Newcomer, PL., Hammill, DD. (2008). *Test of language development*. Austin, Texas: Pro-ed.

Onslow, M., Packman, A.,Harrison, E. (2003). *The Lidcombe Program of Early Stuttering Intervention: A Clinician's Guide.Astin.* TX: Pro-Ed.

Pellowski, MW.,Conture, EG. (2002). Characteristics of speech disfluency and stuttering behaviors in 3- and 4-year-old children.*Journal ofSpeech, Language, and Hearing Research*, 45: 20–34.DOI: 10.1044/1092-4388(2002/002)

Perkins, WH. (1992).*Stuttering Prevented.* San Diego: Singular Publishing Group, Inc.

Peters, TJ., Guitar, BE. (1991).*Stuttering: An integrated approach to its nature and treatment.* Baltimore: Williams & Wilkins.

Riley, GD. (1994). *Stuttering severity instrument for children and adults*. Austin: Pro-Ed.

Salihović, N. (2005).*Poremećaji tečnosti govora.* Tuzla: Univerzitet u Tuzli.

Salihović, N., Junuzović-Žunić,L., Ibrahimagić, A. (2006). *Poremećaji glasa, govora i jezika.* Tuzla: Harfo-graf.

Sawyer, J., Chon,HC.,Ambrose, NG (2008). Influences of rate, leght and complexity on speech disfluency in a single-speech sample in preschool children who stutter.*Journal of Fluency Disorders*, 33(3): 220-40.doi: 10.1016/j.jfludis.2008.06.003

Zackheim, CT.,Conture, EG (2003).Childhood stuttering and speech disfluencies in relation to children's mean length of utterance: a preliminary study.*Journal of Fluency Disorders,* 28(2): 115-142.

Wright, L. (2012). *Children who stammer.* In Kersner M.& Wright JA.(Eds.), Speech and language therapy. Oxon, Abingdon: Routledge,173-182.

Yaruss,SJ.,Newman, RM., Flora, T. (1999). Language and disfluency in nonstuttering children's conversational speech. *Journal of Fluency Disorders*,24: 185-207.

Tetnowski, JA. (1998). *Linguistic effects on disfluency.* In R. Paul (Ed.),Exploring the speech–language connection. Bern: Paul H. Brookes Publishing Co.: 227–247.