

CHARACTERISTICS OF STUTTERING-LIKE DISFLUENCIES IN CHILDHOOD STUTTERING

Miglena Simonska

South-West University “Neofit Rilski”, Bulgaria, miglena_simonska@swu.bg

Abstract: There are many publications discussing stuttering-like disfluencies in early stuttering. Although, there are few based on longitudinal studies, most of them are based on small groups' research. Some of the main aspects in them are related to discrimination between early stuttering and normal dysfluency. Repetitions (part - word repetitions and monosyllabic word repetitions), sound prolongations and blocks, are specified as the most typical for stuttering symptoms defined also as “less typical disfluencies”. To determine the stuttering severity rate it is necessary to measure frequency of disfluencies and length of disfluencies. The main purpose of the present study was to find specific features of stuttering-like disfluencies in stuttered Bulgarian children. Twenty six children (aged 36 to 84 months) were included in the examination. Methodology was composed of several steps: (a) audiotape of children's speech; (b) transcription of disfluent speech; (c) calculation of dysfluency index of stuttering-like disfluencies, (d) stuttering severity rating. The data obtained from listed methods was collected in tables and graphically shown by using Microsoft Office Excel 2003 program. Three hypotheses were proposed with the intent to find correlation between stuttering-like disfluencies in early stuttering: (a) there is no significant difference between prolongations and repetitions; (b) there is no significant difference between repetitions and blocks; and (c) there is no significant difference between prolongations and blocks. To find the differences in the data between the grouped symptoms was used Kruskal-Wallis method which is a nonparametric method for statistical analysis, based on χ^2 test. Results indicated: (a) significant difference between repetitions and prolongations ($p \leq 0.001$), (b) significant difference between repetitions and blocks ($p \leq 0.001$), and (c) no significant difference between prolongations and blocks ($p > 0.05$). Based on received data, we can conclude that repetitions are the most frequent symptoms for early stuttering. They outnumber significantly other types of stuttering-like disfluencies: prolongations and blocks. It was found that as severe is stuttering, prolongations and blocks tend to appear more frequently, although repetitions are still the most frequent. Blocks can be noticed mainly in severe stuttered children which means that with increasing the number of block, stuttering severity rate increases also. The most common method for distinction between stuttered and non-stuttered children is Dysfluency index of stuttering-like disfluencies. Repetitions and prolongations are typical for normally disfluent children too, during the intensive language development in preschool age. For that reason clinicians have to be cautious when they count stuttering-like disfluencies to determine a diagnosis “stuttering”.

Keywords: childhood stuttering, stuttering-like disfluencies, repetitions, dysfluency index

1. INTRODUCTION

Stuttering is a neurodevelopmental disorder whose primary symptoms are disfluencies, involuntary disruptions in the normal flow of speech. Stuttering-like disfluencies include syllable and sound repetitions; dysrhythmic phonations, such as blocks and prolongations; and broken words (Smith & Weber, 2017).

There are many publications discussing stuttering-like disfluencies in early stuttering. Some of them, such as Illinois study (Yairi & Ambrose, 2005) and New Castle study (Andrews & Harris, 1964), are based on longitudinal investigation, but most of them are based on small groups' research. Some of the main aspects are related to discrimination between early stuttering and normal dysfluency, and to taking decision whether the child should be recommended for treatment (Curlee, 2007; Pelowski & Conture, 2002; Richels & Conture, 2007; Throneburg & Yairi, 2001; Tumanova et al., 2011; Yaruss, 1998; Yaruss, 1997, Yaruss, LaSalle, Conture, 1998). To state a diagnosis “stuttering”, it is important to measure all characteristics of stuttering disfluencies. Three of the most discussed measures are related to the type of disfluencies, frequency of disfluencies, and length of disfluencies. The mentioned types of measurement are part of one of the most popular instrument for stuttering severity developed by Riley: SSI (Stuttering Severity Instrument) designed for research and clinical implications. Although, Onslow (2019) state that SSI-4 takes considerable time to complete because of transcription and analyses of speech samples and its time requirements are not an issue for research applications, but may be an issue for clinical applications where a stuttering severity measure is required at each weekly clinic visit, we can state that for the present time it is the only standardized stuttering assessment instrument, newly edited in 2009 by Riley.

Repetitions (part - word and monosyllabic word repetitions), sound prolongations and blocks are specified as the most typical for stuttering symptoms. By reason of this, many definitions for stuttering are based on the indicated symptoms. In the stuttering research literature they are known as *stuttering – like disfluencies* (Yairi & Ambrose,

2005) and *less typical disfluencies* (Gregory et al., 2003). Their frequency could be measured by calculating their number per 100 syllables or words. Length of disfluencies depends on number of repetitions per unit and a mean length of the three longest disfluencies per speech sample. Different kinds of techniques for disfluencies measurement are described by clinicians and researches. One of them is based on a detailed transcript of speech samples like Systematic Disfluency Analyses/SDA which takes longer time for detailed transcription and analyses of all kind of disfluencies. During the process of analyses clinician should also divide more typical from less typical symptoms and to calculate their frequency (Gregory et al., 2003).

Other type for disfluencies measurement is Real-Time Technique, designed to obtain a rapid count of the number and types of disfluencies present in a speech sample, as described by Conture and colleagues in 1990. For this technique, the clinician observes a speech sample (either while the client is speaking or while viewing a videotape) and determines whether each word or syllable is produced fluently or disfluently. Using a standard disfluency count sheet, the clinician marks fluent words or syllables with a dash or a dot, while disfluent words or syllables are identified with an abbreviation indicating the type of disfluency produced (e.g., “SSR” for sound/syllable repetition). Next, the clinician calculates the overall frequency of disfluencies per 100 words or syllables produced, as well as the relative frequencies of various disfluency types (Yaruss et al., 1998).

Certainly, each technique has its advantages and disadvantages. Transcript-based techniques provide more information than can readily be obtained through real-time measures, including more detailed analyses of how a client’s speech and language abilities relate to the production of speech disfluencies. Transcript-based techniques also provide greater opportunities to assess qualitative aspects of speech disfluencies, such as audible and visible tension. Unfortunately, transcript-based analyses are also quite time consuming, so it is generally not feasible to conduct such detailed measurements on a regular basis (e.g., for documenting changes in a client’s progress throughout treatment). Real-time techniques, on the other hand, are much faster to complete, so they provide a method for collecting the objective data necessary to document changes in a client’s stuttering behaviors without requiring a large time commitment. Still, the amount of detail that can be assessed with real-time techniques is somewhat limited (Yaruss et al., 1998, p.138).

For the purpose of this study both of the techniques could be used for measurement and analyzing stuttering-like disfluencies but for stuttering severity determination transcript-based is preferable.

2. MATERIALS AND METHODS

The main aim of the study is to find specific features of stuttering-like disfluencies in early stuttering and to find if there is a correlation between main symptoms.

Twenty six children (aged 36 to 84 months) were included in the examination (see Table 1). To exclude gender influence boys and girls were equal number.

Table 1. Participants in the study.

Age	36-48m	49-60m	61-72m	73-84m	Total
Gender					
Girls	2 (7,7%)	5 (19,2%)	4 (15,4%)	2 (7,7%)	13 (50%)
Boys	3 (11,6%)	3 (11,6%)	5 (19,2%)	2 (7,7%)	13 (50%)
Total	5 (19,2%)	8 (30,8%)	9 (34,6%)	4 (15,4%)	26 (100%)

Methodology consist of several steps:

1. Audiotape of children’s speech
For each child was made an audiotape of his/her speech. All the children were asked to tell the story for 10 to 15 min. During the audio taping was also observed associated motor behavior.
2. Transcription of disfluent speech

A detailed transcription of speech samples was made after the recording. All the stuttered words were written as the way they were spoken. For example: I-I-I-I am Bobby (for repetitions) / This is a (c)at (for blocks) / I am h...ungry (for prolongations). The length of disfluencies was measured, too. For that purpose was used program *Wavesurfer*.

3. Calculating dysfluency index of stuttering-like disfluencies

All disfluencies were filled in the special developed fluency grid. Each square was marked depended of spoken syllable. If the syllable is fluent the square is marked with a dot. For all kind of disfluencies were used special initials/abbreviation such as **R(s)** for sound repetitions, **R(syl)** for syllable repetitions, **B** for blocks, and etc. Dysfluency index was calculated by dividing the number of stuttered syllables by total number of spoken syllables and then this result was multiplied by 100.

4. Stuttering severity rating

To determine stuttering severity was used Stuttering Severity Instrument/SSI-4. It includes three main types of measurement: calculation of *stuttering dysfluency index* and *mean length of the three longest disfluencies*, and evaluating the *associated motor behavior*.

Three hypotheses were proposed in order to find typical for early stuttering symptoms (stuttering-like disfluencies):

- H1: there is no significant difference between prolongations and repetitions
- H2: there is no significant difference between repetitions and blocks
- H3: there is no significant difference between prolongations and blocks.

To meet the purpose of this study was applied method of Kruskal-Wallis, which is a nonparametric method for statistical analysis, based on χ^2 test.

3. RESULTS

As it can be seen on Figure 1, the Dysfluency index of repetitions has the highest rate in correlation with prolongations and blocks. The most common repetitions are repetitions of monosyllable words, repetitions of syllables and repetitions of sounds. As distinct from this data, frequency of prolongations and blocks is significantly lower and it can be confirmed by statistics (see Table 2).

Table 2. Results from statistical analysis regarding symptoms.

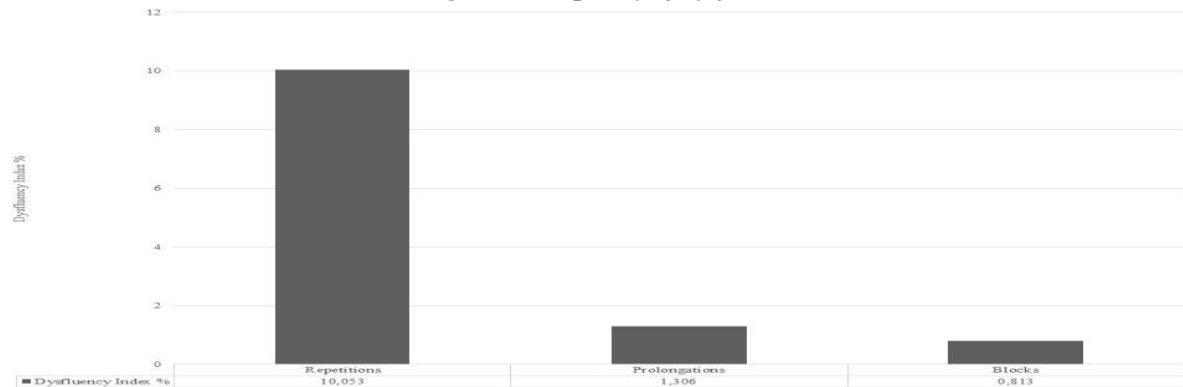
Categories for statistical testing	Mean DI		Var		Df	χ^2	P
Repetitions (R) and prolongations (Prols)	R	Prols	R	Prols	1	22.25	0.0000
	7.76	1.08	12.29	1.32			
Repetitions (R) and blocks (B)	R	B	R	B	1	21.31	0.0000
	1.06	7.76	3.16	12.29			
Prolongations (Prols) and blocks (B)	Prols	B	Prols	B	1	0.82	0.3650
	1.08	1.06	1.32	3.16			
Repetitions of sounds (Rs) and clusters (Rcl)	Rs	Rcl	Rs	Rcl	1	13.27	0.0003
	2.32	0.26	1.50	0.07			
Repetitions of syllables (Rsyl) and clusters (Rcl)	Rsyl	Rcl	Rsyl	Rcl	1	14.41	0.0002
	2.38	0.26	1.91	0.07			
Repetitions of one-syllable words (Rw) and clusters (Rcl)	Rw	Rcl	Rw	Rcl	1	14.39	0.0002
	2.20	0.26	2.83	0.07			
Moderate stuttering – prolongations (Prols) and blocks (B)	Prols	B	Prols	B	1	11.15	0.0009
	2.69	0.13	13.01	0.21			
Severe stuttering – prolongations (Prols) and blocks (B)	Prols	B	Prols	B	1	6.38	0.0116
	0.59	2.32	0.41	4.05			

Results show:

- significant difference between repetitions and prolongations ($p \leq 0.001$)
- significant difference between repetitions and blocks ($p \leq 0.001$)
- no significant difference between prolongations and blocks ($p > 0.05$).

Based on statistical data, the H1 and H2 can be rejected, and H3 can be confirmed.

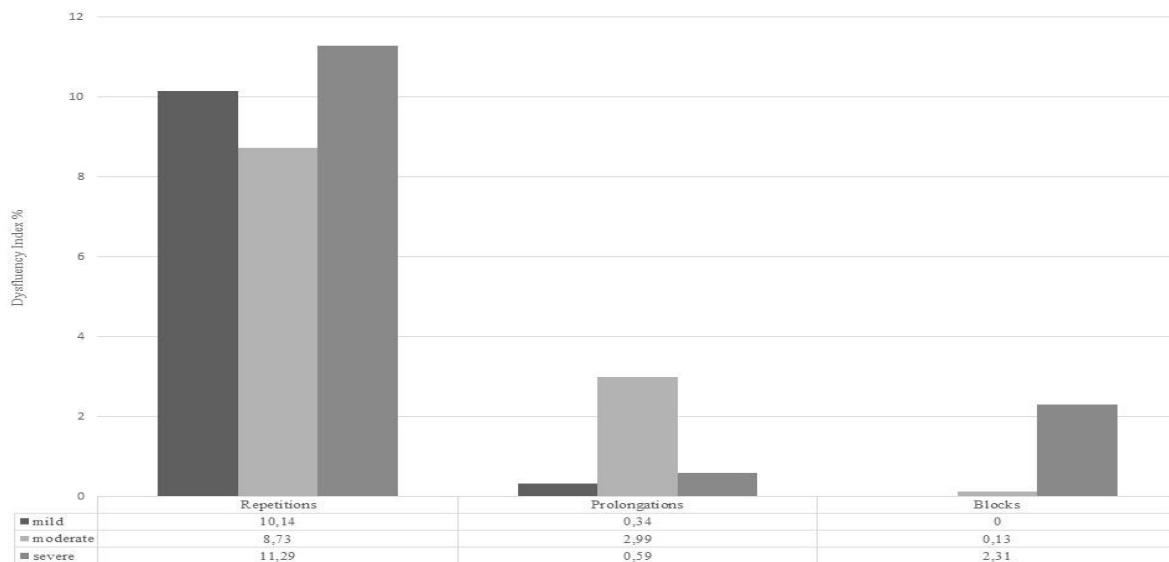
Figure 1. Frequency of dysfluencies.



Also, it was found that repetitions of sounds, syllables and one-syllable words are more frequent than repetitions of clusters. The frequency of repetitions of sounds, syllables and one-syllable words is much closed. In contrast with them was found significant difference between: (a) sound repetitions and clusters ($p \leq 0.001$), (b) syllable repetitions and clusters ($p \leq 0.001$), and (c) one-syllable word repetitions and clusters ($p \leq 0.001$).

Other correlation, was verified, is between stuttering severity and frequency of disfluencies. On Figure 2 can be seen that repetitions are the most typical symptom for all types of stuttering severity. Nevertheless, for moderate stuttering prolongations are more typical than blocks ($p \leq 0.001$) in contrast with severe stuttering where blocks are more typical than prolongations ($p \leq 0.05$).

Figure 2. Relation between disfluencies and stuttering severity.



4. DISCUSSIONS

As it was mentioned above the most frequent symptoms for early stuttering are repetitions. They outnumber significantly other types of stuttering-like disfluencies: prolongations and blocks. Received data could be correlated with other scientific investigations. For example Yaruss, LaScalle and Conture (1998) find that repetitions of sounds and syllables (47%) have the highest frequency, following by prolongations (26%) and one-syllable word repetitions (20%) (8). Later Pellowski and Conture (2002) confirm that 41.8% of all typical for stuttering symptoms are part-word repetitions.

With regard to relation between stuttering-like disfluencies and stuttering severity could be concluded that as severe is stuttering, prolongations and blocks tend to appear more frequently, although, repetitions are still the most frequent. Also, blocks can be noticed mainly in severe stuttered children. Tumanova et al. (2011) get an opinion that some scientists find prolongations as one of the main features for stuttering severity rate. It is based on publications of Conture (1990), Curlee (1980) and Van Riper (1972) in which they state that if prolongations of sounds prevalent over repetitions, then the possibility of natural recovery decreases. Similar results are presented by Walsh et al. (2020). They found that children who are persisting have significantly higher frequencies of part-word repetitions and dysrhythmic phonations and maximum number of part-word repetitions compared to children who eventually recovered from stuttering. Other interesting fact is findings of Throneburg and Yairi (2001). They examine two groups of children: with chronic stuttering and with natural recovery and conclude that naturally recovered children demonstrate higher frequency of prolongations than the one-syllable word repetitions. Singer et al. (2020) similarly summarize in their meta-analytic study, based on 405 reports, that children with persisting stuttering produce a higher frequency of stuttering-like disfluencies than recovered children.

As it was mentioned, dysfluency index of stuttering-like disfluencies is also used for distinction between stuttered and non-stuttered children because repetitions and prolongations are typical for normally disfluent children during the intensive language development in preschool age. For that reason clinicians have to be cautious when they count stuttering-like disfluencies. Einarsdottir & Ingham (2009) also state that not all stuttering-like disfluencies are stuttering events. Single part-word repetitions, single-syllable word repetitions, or short prolongations typically occur within the speech of nonstuttering children, and listeners have no difficulty in classifying their speech as normally fluent. Children who are suspected of stuttering should be given a thorough evaluation of their speech, receive treatment if warranted, and be monitored for signs of struggle, frustration, or avoidance surrounding communication (Nippold, 2018). Yairi (1997) also recognized that a stuttering-like disfluency is not a synonym for stuttering, remarking that “if disfluencies that are called ‘stuttering’ are counted in the speech of nonstuttering children” the result would “contradict common sense”. Little wonder, therefore, that researchers have had difficulty in deciding just what a stuttering-like disfluency unit is supposed to be measuring (Einarsdottir et al., 2009, p. 264).

Therefore, when clinicians state diagnosis they have to use stuttering severity instruments and to measure disfluencies length and associated motor behavior.

5. CONCLUSIONS

In this connection could be concluded that repetitions of sounds, repetitions of syllables and one-syllable words repetitions are the most typical symptoms for early stuttering. Nevertheless, prolongations and blocks can be presented from stuttered children also, but their frequency increases with increasing of stuttering severity. The most common method for distinction between stuttered and non-stuttered children is Dysfluency index of stuttering-like disfluencies. Repetitions and prolongations are typical for normally disfluent children too, during the intensive language development in preschool age. For that reason clinicians have to be cautious when they count stuttering-like disfluencies to determine a diagnosis “stuttering”.

REFERENCES

- Andrews, G. & Harris, M. (1964). The syndrome of stuttering. London: Heinemann. *Clinics in Developmental Medicine*, No 17.
- Curlee, R. (2007). Identification and Case Selection Guidelines for Early Childhood Stuttering. In E., Conture, & R., Curlee (Eds.). *Stuttering and Related Disorders of Fluency* (pp. 3-22). New York: Thieme.
- Einarsdottir, J., & Ingham, R. (2009). Does Language Influence the Accuracy of Judgments of Stuttering in Children? *Journal of Speech, Language, and Hearing Research*, 52, 766-779.
- Gregory, H., Campbell, J., & Hill, D. (2003). Differential Evaluation of Stuttering Problems. In H., Gregory, (Ed.). *Stuttering Therapy: Rationale and Procedures* (pp. 78-141). Boston: Allyn & Bacon.
- Nippold, M. (2018). Stuttering in Preschool Children. Direct Versus Indirect Treatment. *Language, Speech, and Hearing Services in Schools*, 49 (1), 4-12.

-
- Onslow, M. (2019). Stuttering and its Treatment. Eleven lectures. Retrieved from https://www.uts.edu.au/sites/default/files/2019-02/Stuttering%20and%20its%20Treatment%20-20Eleven%20Lectures%20February%202019_1.pdf
- Pellowski, M. & Conture, E. (2002). Characteristics of speech disfluency and stuttering behaviors in 3- and 4-year-old children. *Journal of Speech, Language, and Hearing Research*, 45, 20-34.
- Richels, C. & Conture, E. (2007). An Indirect Treatment Approach for Early Intervention for Childhood Stuttering. In E., Conture & R., Curlee (Eds.). *Stuttering and Related Disorders of Fluency* (pp. 78-99). New York: Thieme.
- Riley, G. (2009). Stuttering Severity Instrument for Children and Adults (4th ed.). Austin, Texas: Pro-ed, Inc.
- Singer, C., Hessling, A., Kelly, E., Singer, L., & Jones, R. (2020). Clinical Characteristics Associated With Stuttering Persistence: A Meta-Analysis. *Journal of Speech, Language, and Hearing Research*, 63, 2995-3018.
- Smith, A., & Weber, C. (2017). How stuttering develops: The multifactorial dynamic pathways theory. *Journal of Speech, Language, and Hearing Research*, 60, 2483–2505. doi:10.1044/ 2017_JSLHR-S-16-0343
- Throneburg, R. N., & Yairi, E., (2001). Durational, Proportionate, and Absolute Frequency Characteristics of Disfluencies: A Longitudinal Study Regarding Persistence and Recovery. *Journal of Speech, Language, and Hearing Research*, 44, 38-51.
- Tumanova, V., Zebrowski, P., Throneburg, R., & Kayikci, M. (2011). Articulation rate and its relationship to disfluency type, duration, and temperament in preschool children who stutter. *Journal of Communication Disorders*, 44, 116-129.
- Walsh, B., Bostian, A., Tichenor, S., Brown, B., & Weber, C. (2020). Disfluency Characteristics of 4- and 5-Year-Old Children Who Stutter and Their Relationship to Stuttering Persistence and Recovery. *Journal of Speech, Language, and Hearing Research*, 63, 2555-2566.
- Yaruss, S. (1997). Clinical measurement of stuttering behaviors. *Contemporary Issues in Communication Science and Disorders*, 24, 33–44.
- Yarus, S. (1998). Real – Time Analyses of Speech Fluency: Procedures and Reliability Training. *American Journal of Speech - language Pathology*, 7, 25-37.
- Yairi, E. & Ambrose, N. (2005). Early Childhood Stuttering: for clinicians by clinicians. Texas: Austin: Pro-ed, Inc.
- Yarus, S., LaSalle, L., & Conture, E. (1998). Evaluating young children who stutter: Diagnostic data. *Journal of Speech - Language Pathology*, 7, 62-76.
- Yaruss, E., Max, M., Newman, R., & Campbell, J. (1998). Comparing Real-Time and Transcript Based Techniques for Measuring Stuttering. *Journal of Fluency Disorders*, 23, 137-151.