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# Speech Fluency Shaping Techniques as the Basis of Combined Therapy of Older Children and Adolescents Who Stutter

#### **ABSTRACT**

The main assumption of the article is the thesis that speech fluency shaping should underlie all methods of combined therapy of children and adolescents who stutter because the fundamental goal of therapy during this period is to permanently improve speech fluency. The subject of discussion is a comparative analysis of ways of developing speech fluency. Despite the complete awareness of the significance of psychological and communication problems of persons who stutter, the problem of various forms of psychotherapy or social therapy is not discussed in the article. Final conclusions were formulated regarding logopedic practice.

**Keywords:** stuttering, therapy of persons who stutter, fluency shaping

#### INTRODUCTION

Stuttering in older children and adolescents is a frequently encountered problem in logopedic practice. The issue of diagnosis and effective treatment of school-age children and adolescents is a challenge to many logopedists/speech therapists. Stuttering at that period has its specificity, a different picture of symptoms from that in the case of kindergarten children or adults. According to different sources, ca. 1% (0.76% to be precise) of the population stutter (Craig, Tran, 2005). However, the population percentage of persons who stutter is not the same at the same age level.

Stuttering starts mainly in childhood, between the age of 2 and 6, the number of little children who speak dysfluently for six months or longer being ca. 5%. The process of spontaneous disappearance of dysfluency (it is not always the case of stuttering) concerns more or less three quarters of these children. This means that in about one percent of the population this disorder will be more permanent: it will be stuttering (Guitar, Conture, 2012). It would be in order here to focus on the efficacy of therapeutic measures at the kindergarten age in cases of stuttering. With the right influence of the environment (indirect therapy), in 65% of cases stuttering may disappear at the kindergarten age, in 74% of cases it disappears completely by the early school age (often also with direct logopedic intervention), more often in girls than in boys (Guitar, 2005).

However, this is not the case with many children. The causes of this situation are complex: first, there is no effective method of eliminating stuttering, secondly, in the case of each child there is a different set of biological, emotional and social factors; thirdly, parents often wait for stuttering to disappear spontaneously. This means that children who speak dysfluently have to gradually cope with their growing emotions and develop withdrawal strategies and strategies for avoiding social relationships. This problem begins to appear distinctly at the beginning of school. It is at the school age that stuttering children most often become speech therapy patients.

The percentage of children who stutter aged 6–10 is 1.44%, and by adolescence it drops to 0.5% (Craig et al., 2002). This fact can be accounted for by the spontaneous recession of the disorder owing to the improvement of brain functions, the effectiveness of one's own strategies for coping with stuttering, or finally successes of logopedic therapy. In the context of the decreasing general number of persons who stutter (in this age range) it is necessary to point out the growing role psychological-cognitive factors: the likelihood of deterioration of life quality increases, fear of communication grows, and social phobia may occur. Social phobia (social anxiety syndrome) is a mental disorder co-occurrent with stuttering that often appears in the second decade of life and, when highly intensified, may become the dominant problem of an adult who stutters. In such cases the inclusion of pharmacological therapy should be considered (Czernikiewicz, Woźniak, 2018).

Quite interesting appears the general problem of relationships that make up the picture of stuttering, in particular the relationship between fear and dysfluency. For a long time it was believed that stuttering was of psychogenic origin and dysfluency was a symptom of anxiety. In light of contemporary studies, this thesis is not confirmed. Only little evidence shows that psychological factors play a crucial role in stuttering. Scholars believe that anxiety is an independent component of stuttering (Craig et al., 2003).

Underlying stuttering is a physiological deficit, probably of genetic origin, of connections in neural pathways, in the areas of speech programming and perception. The thesis is already substantiated by many objectively documented studies, which find inter alia that:

- 1. In comparison with non-stuttering peers, children who stutter may display weakened functional and structural connectivity both in the neural networks of auditory-motor areas (responsible for self-control) and in the connections of basal ganglia with the thalamic and cortical areas (responsible for "forward" planning of utterances), first of all in the left cerebral hemisphere (Chang, Zhu, 2013).
- 2. In children who stutter there may occur differences in the organization of the white matter (structures responsible for connections in the brain), particularly in the areas indicated above but also in other cerebral areas (the right hemisphere and corpus callosum the structure that joins both hemispheres together), which is caused by subtle differences in the development of the white matter between 3 and 10 years of age (Chang et al., 2015).
- 3. In adults who stutter, research confirms significant anomalies regarding the arcuate fasciculus, i.e. the area of the white matter that, while connecting the temporal region with the temporal region (especially in the left hemisphere), is also responsible for the motor functions of speech (Cieslak et al., 2015).
- 4. A considerable reduction in blood flow, i.e. reduction of activity, in the Broca's area, was found in adult stutterers. Intensification of stuttering symptoms is in direct proportion to the degree of blood flow reduction (Desai et al., 2017).

The consideration of the causes and symptoms of stuttering at a given age level is the basis for selecting a method of treatment that should be adjusted to a patient's individual needs associated with factors both underlying the disorder and with the accompanying secondary symptoms. In light of the presented studies, it should be said that:

- 1. The primary symptom of stuttering is a biologically-conditioned dysfluency;
- 2. The consequence of persistent dysfluency are secondary symptoms: spasticity, anxiety, expectation of dysfluency occurrence, aggression, frustration, and social contact disorders;
- 3. In older children and adolescents, the importance of secondary, psychological-social symptoms significantly increases.

The theses concerning the treatment of older children and adolescents who stutter that can be formulated based on the foregoing findings are as follows:

1. Firstly, dysfluency of utterances should be reduced. The reduction should involve the improvement of the motor control of the speaking process (coordination of breathing, phonation and articulation). It appears that dysfluency modification techniques should not be used at the age in question but the improvement of the whole process of speaking should be sought (Craig, 2010);

- 2. It is necessary to reduce muscle tone while speaking. The condition of heightened muscle tone is a secondary symptom, but indisputably a feedback arises between spasticity and speech dysfluency;
- 3. It is necessary to include psychosocial therapy.

It is already insufficient to shape speech fluency alone at this stage. On the basis of my own practice, I can say that in planning their own tasks for the stabilization period (after completing the basic speech fluency training), older children, adolescents and adults who stutter prefer exercises focused on communicative-social training. Such exercises constitute 80–90% of planned tasks. This gives the picture of the importance of psychological and social problems in these patients but this does not challenge the fact that between the age of 7 and 18 the speech fluency shaping techniques should be the essential element of the treatment of persons who stutter because the fundamental objective of therapy at that stage is to achieve a permanent improvement in speech fluency.

# SHAPING SPEECH FLUENCY IN OLDER CHILDREN AND ADOLESCENTS WHO STUTTER

The survey of the utilized methods of therapy in older children and adolescents showed that in the majority of cases, in addition to techniques of speech fluency shaping, some form of social, psychological or behavioral-cognitive therapy is introduced (cf. Adamczyk, 1993; Engiel, 1976; Engiel, 1977; Chęciek, 2007; Craig, 2010; Woźniak, 2018). The subject of the present article is a comparative analysis of the ways of speech fluency shaping, which is why the problem of different forms of psychotherapy or social therapy will not be discussed here at length despite my complete awareness of the significance of these issues.

Below is a review of selected, most frequently applied speech fluency shaping techniques chosen on the basis of the survey of methods of treatment of older children and adolescents who stutter. It may be surprising that the juxtaposition of different effective ways of achieving speech fluency used in the world yields a fairly limited repertory that, upon closer analysis, may display even closer similarities. The following techniques should be named:

- 1. Prolonged Speech Technique (PST, Polish TPM)
- 2. Delicate Start of Speech Technique (DSST, Polish TDSM)

- 3. Smooth Speech Technique (SST, Polish TSS)
- 4. Rhythmic Speech Technique (RST, Polish TMR)
- 5. Breathing Techniques (Polish TO)
- 6. Natural Speech Rhythm Technique (NSRT, Polish TNRM)

## 1. Prolonged Speech Technique (PST)

This technique produces an improvement in speech fluency by prolonging the time of vowel articulation in individual words. The first methodological presentation of this technique in Polish logopedic literature is found in Wilczewski (1967), who associated the efficacy of PST with practical observations concerning the total absence of speech dysfluency in stutterers who were singing. He interpreted this fact in phonetic terms, which resulted in the necessity of the singing prolongation of vowels during normal speech. In his practice Wilczewski used PST from the 1920s, achieving very good results. It should be observed that speaking with the constant aid of echo-corrector produces a similar effect. Essentially, the DAF (delayed auditory feedback) effect forces the prolonged duration of vowel production (Adamczyk, 1993).

Prolonged vowel articulation involves a significant decrease in the speech rate. Initially, during exercises this rate is one syllable per one second, assuming that it will be accelerated at later stages. The slowing down of the rate during therapy is permanent and involves the maintenance of continuing vocalization while articulating individual words. During exercises visual feedback is required (exercises are performed in front of a mirror). It should be pointed out that this therapy requires two or three months of training, the way of speaking at this time being unnatural and monotonous. Problems may also arise with the articulation of longer words and production of voiceless sounds, especially in consonant groups. The difference in the way of speaking while using PST as compared with natural speech may discourage many persons, therefore it is particularly important in this case to properly motivate the patient.

Despite these reservations, PST may be an effective basis for therapy, especially when combined with DSST which is evidenced by the consistent use of both techniques in the present-day therapy programs for stutterers, proposed by Checiek et al. (2014).

# 2. Delicate Start of Speech Technique (DSST)

DSST is the second element of speech fluency shaping in Wilczewski's method (1967) and in Chęciek's therapy program (2007). The use of this technique involves a reduction in the tone of articulation muscles in the case of sounds in the initial position. This means weakened occlusion in the articulation of initial stops and sonorants, gentle exhalation during the articulation of fricatives, and

introduction of aspiration (a kind of voiceless *x*) before vowels. The use of DSST allows a more fluent starting of words but does not guarantee fluent production of the whole phrase, which is why it is necessary to combine the technique with other ways of speech fluency shaping. The duration of training is two to three months. A thesis can be advanced that the combined use of PST and DSST is more effective in reducing dysfluency and brings closer the way of speaking by the patient undergoing therapy to the technique described in literature as Smooth Speech.

## 3. Smooth Speech Technique (SST)

SST is a technique that is often used in English-speaking countries and described in literature in terms of Evidence Based Practice standards, which means presenting the rules of SST application, but also highlighting the theoretical and empirical foundations of its effectiveness as well as showing the therapy results as compared with the control group (Craig, 2010). The underlying principle of SST is, firstly, to maintain the constant flow of air during articulation, which also requires the introduction of aspiration while producing vowels and the reduction of the occlusion force with stop consonants. Secondly, in this technique 1–2-second pauses are consciously used between individual phrases. Visual feedback is also utilized. Worth noting is also a tendency for the relatively fast transition from slowed down speech to normal speech; this is possible already after five weeks of training. On the first day, exercises start with the rate of 0.8 syllable per second to achieve 1.2 syllable per second at the end of the day. During the next weeks the speech rate increases from 2.6 syllable per second to 3.3 syllable per second. The naturalness of utterances, i.e. the rate of 4-5 syllables per second (i.e. on average 2–2.5 word per second, 120–150 words per minute) is achieved after a minimum of 5 weeks. Despite similarities in the slowing down of speech in the case of PST and SST, the technical difference in articulation should be highlighted: in the case of PST it is more important to maintain the continuity of vocalization, whereas in SST – the continuity of air flow (Craig, 2010), although, as has been said earlier, the joint use of PST and DSST causes the way of speaking to substantially resemble the one that is achieved in SST.

# 4. Rhythmic Speech Technique (RST)

The technique is based on the observation that speech divided into rhythmically uttered syllables is far more fluent than in those who stutter. A metronome can be used as an aid to facilitate maintaining a constant rhythm, so can tapping out syllables with fingers. RST, which uses a metronome, is widely known all over the world (cf. Tarkowski, 1987). However, indications concerning the setting of a metronome and procedures for transition from syllabic speech to natural speech have not been sufficiently described. We can only point to Brady's sugges-

tion (after: Tarkowski, 1987), who proposes five stages of therapy: 1. Speaking to the rhythm of the table metronome (slow), 2. An increase in speaking speed, 3. Replacement of a stationary metronome with a portable one, and speaking rhythmically in different situations with the increasing level of difficulty 4. Like in no. 3 but without a metronome 5. Attempts to eliminate mild stuttering which recurred from time to time.

Worth noting is also Szamburski's proposal, according to which speech with the division into syllables (without a metronome) is assisted by the movements of the leading hand, which movements are to subsequently ensure fluency in combining syllables into words without the need to chant. However, the improvement of fluency through this technique involves a substantial reduction of speech rate to on average 2.1–2.4 syllables per second even after six months after therapy (Kowalczuk, Jankiewicz, 2015).

In both solutions it is necessary to highlight the necessity of going through a fairly long stage of artificially rhythmized and unnatural speech (chanted and slowed down), which may, in many patients, produce an emotional rejection of this way of speaking.

### 5. Breathing Techniques (BT)

In this case one should speak of a group of various ways of breathing control in order to improve speech fluency. Diaphragmatic respiration is usually applied here, particularly the mechanism of appoggio, by using which we not so much "lean" the voice on the diaphragm (as is the case with vocal training) as we consciously regulate the rhythm, continuity and duration of expiration when uttering a phrase that can consist of one, two or more words. We thereby restore physiological respiratory-phonatory-articulatory coordination which is usually disturbed in dysfluent speech (cf. Mitrinowicz, 1952; www.mcguireprogramme.com). The technique of controlled breathing involves free and deep breathing, with regular pauses during which speech muscles become relaxed within the respiratory system, larynx and the parts situated above the larynx. The activation of self-control and self-correction in this respect may produce a quick result in improving fluency and the efficacy of verbal communication (even after several days), while long maintenance of breathing techniques (BT) usually causes generalization in speech and a constant reduction in dysfluency as compared with the control group (Azrin, Nunn, 1974). Worth noting is also the lack of requirements to slow down the pace of utterance, only to use regular pauses for inhalation.

## 6. Natural Speech Rhythm Technique (NSRT)

In its underlying principles, NSRT coincides with BT, but it emphasizes to a larger extent the role of supporting respiratory-phonatory-articulatory co-

ordination by rhythmical hand movements. The rhythm of control movements should coincide with the natural speech rhythm because speech fluency should be defined in relation to phenomena connected not only with the transition from one movement sequence to another but also in terms of rhythmic organization. Speech fluency consists in the continuity of the realization of successive speech sounds that are found within regularly recurring rhythmic units/groups (phrases), lasting about 2-3 seconds, almost identically ordered in prosodic terms. A phrase can be filled with a different number of sounds (syllables), depending on the rate of speech, the average speech rate in colloquial speech being 10–12 sounds (4–5 syllables) per second. Between the phrases there is a short pause whose duration is not strictly defined. In the case of uninterrupted speech, it should, however, be shorter than two seconds, because it is then of no significant value (Szelag, 1999; Woźniak, 2012). To achieve such rhythmicity is consistent not only with the physiological organization of motor processes associated with speech but first of all with the processes of information organization in the brain. NSRT can be found in the methods of Engiel (1976; 1977) and Woźniak (2018). From the beginning, the objective and model of the application of NSRT is the normal train of speech. In Engiel's method, two types of exercises are distinguished:

- 1. Speech-start exercises;
- 2. Train of speech exercises.

Coordination between breathing, phonation, and articulation is achieved by using appropriate, conventional hand movements that control and coordinate the course of utterance. In this method there are no intermediate links that require slower or syllabic speech, which makes it very attractive to patients. Patients utter phrases in a regular manner, divided by a 1–2 second pause to take breath. The effectiveness of this method in reducing dysfluency is high already from the first meeting. This is caused not only by the coordination of the physiologically correct course of speech but also owing to the segmentation of the phonic sequence into phrases, which facilitates programming and self-control of utterances. Not without significance is also probably the involvement of the leading hand stimulating the motor area of the dominant cerebral hemisphere (mainly: right hand – left hemisphere). The duration of the basic training is about three months.

#### TOWARDS THE MODEL OF OPTIMAL THERAPY

A comparative analysis of speech fluency shaping applied in the treatment of older children and adolescents who stutter shows that different therapeutic solutions can result in dysfluency reduction to the normal level. This is confirmed by the initially adopted thesis that the key to therapeutic success lies only partly in dysfluency reduction during therapy, but also in maintaining this condition and

protecting the patient from relapses of stuttering. One can say that prognostically decisive factors are the following:

- the patient's emotional attitude to therapy and faith in its success,
- consistency in exercising the technique of speaking in different social situations
- support by his/her environment
- simplicity and naturalness of the techniques applied
- development of the feeling of controlling one's speech and behavior in different communication situations.

Therefore, the elimination of stuttering in older children and adolescents obviously depends on many factors not related to the technique of fluency shaping: the therapist's personality, inclusion of psycho-social therapy, support by the family, teachers and friends. However, the application of the technique that enables speech fluency is of fundamental significance. Such a technique convinces the patient that stuttering can be brought under control and is a basis for social communication exercises. In this sense it becomes the keystone of therapeutic management.

The analysis of the techniques presented in this study highlights certain points shared by some of them. They are speech principles that ensure the patient-stutterer's fluency improvement without significantly affecting the naturalness of his/her verbal behaviors. The following components of the effective methods of speech fluency shaping should be named, selected according to the principle: "the simplest and the most effective":

- rhythmic, free diaphragmatic breathing,
- reduction of the tone of muscles involved in speaking
- use of 1-2 second pauses
- the principle of gradually increasing the number of words in the spoken phrase
- use of the slowed down rate of utterances only at the beginning of exercises, then seeking as fast as possible to achieve the naturalness of utterances, e.g. the proposal to use the smooth speech technique (SST) suggests the possibility of achieving the natural rate within 4 days of intensive exercises (the first day (1/4) of the average rate, second day –

The adoption of these general principles should allow the logopedist/speech therapist to creatively modify different speech fluency shaping techniques applied in his/her practice and provide the patient with an effective basis for social communication exercises.

#### CONCLUSIONS

The final test of a therapy is the assessment of its efficacy. It should be assumed that the assessment of effectiveness depends on the adopted evaluation criteria. The current practice emphasizes the fact that it is necessary to take into account at least three basic criteria for the evaluation of a completed therapy of stutterers that also take the prognosis of the permanence of its effects into account. Moreover, the perspective of assessment by both the specialist and the patient should be taken into consideration. The following assessment categories need therefore to be distinguished:

- 1. (Quantitative, qualitative) assessment of speech fluency
- 2. Assessment of the quality of the patient's life/communication
- 3. Assessment of the likelihood of dysfluency recurrence.

In Polish logopedic literature to date there are no studies showing therapy results in all the foregoing respects. However, in literature, this kind of evaluations can be found. For example, studies should be mentioned concerning the use of the SST method alone or combined with psycho-social therapy (combined therapy) (Craig et al., 1996; Craig, 2010). These studies take into account the quantitative measuring of dysfluent syllables per second, the qualitative assessment of the naturalness of speech, results of anxiety scales for children and the assessment of effects after a long time since the therapy ended (from 2 to 6 years). And thus, the average effectiveness of therapy measured by the normative average percentage of dysfluent syllables below 2% (as compared with initial 10–13%) is reported in 90% of patients right after completion of therapies of different duration: a week of intensive therapy or 5 weeks of less intensive therapy. This level increases to 2-3% after a year, with a persistent qualitative improvement in speech (including the normal speech rate) and a reduced anxiety level. After 5 years, in 28% of patients in the group in question, the results remained within the norm, in 50% there was a slightly increased dysfluency, and stuttering recurred in 12%. It can be said that the effect of fluency improvement thus persisted in 78% of patients, but the group that had undergone a combined therapy displayed a lower anxiety level after five years, which also means a higher life quality.

The data presented above confirm the need to apply combined methods in older children and adolescents: to use speech fluency shaping techniques as the basis for therapy and to combine them with anti-relapse therapy, i.e. psychological-social measures that allow patients to maintain fluent speech for a long time.

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