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## ORGANIC SPEECH NON-FLUENCY AS A COMMUNICATION BARRIER

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***Анотація.** Всі перешкоди, що виникають у процесі комунікації, визначаються як шум. Розлади мови розглядаються як такий комунікаційний шум. Розвиваючи цю ідею, можна стверджувати, що непланне мовлення також може створювати бар'єри і перешкоджати ефективній комунікації. У статті представлені результати експериментів щодо сприйняття непланних висловлювань. Дослідження спрямоване на визначення того, якою мірою непланне мовлення неврологічних хворих може призводити до виникнення комунікаційних бар'єрів.*

***Ключові слова:** комунікаційний бар'єр, непланне мовлення, неврологічні хворі.*

***Аннотация.** Все преграды, возникающие в процессе коммуникации, определяются как шум. Расстройства речи рассматриваются в качестве такого коммуникационного шума. Развивая эту идею, можно утверждать, что неплавная речь может также создавать барьеры и препятствовать эффективной коммуникации. В статье представлены результаты экспериментов по восприятию неплавных высказываний. Исследование направлено на определение того, до какой степени неплавная речь неврологических больных может приводить к возникновению коммуникационных барьеров.*

***Ключевые слова:** коммуникационный барьер, неплавная речь, неврологические больные.*

***Summary.** All the obstacles encountered in the process of communication are defined as noise. Speech disorders are regarded as such communication noise. To develop this idea it can be stated that speech non-fluency may also provide a barrier hindering effective communication. The article presents the results of experiments on the reception of non-fluent utterances. The investigation aimed at determining whether and to what extent the speech non-fluency of the neurologically ill may provide a communication barrier.*

***Key words:** communication barrier, speech non-fluency, the neurologically ill.*

The universal communication process model seems very simple: a person (producer) communicates information (a message) in a particular manner (communication channel) to another person (recipient) [1, 2, 3].

This process, so clearly outlined, would be simply ideal, were it not for the disturbances which frequently hinder its course. All the obstacles encountered during communication are defined as noise [1, 2]. Many of them emerge independently from the producer. Nevertheless, there are obstacles which depend entirely on the communication process participants. Such obstacles definitely affect the ultimate outcome of a communication act, i.e. the mutual understanding, sometimes making it difficult, and sometimes simply impossible.

Speech disorders are regarded as communication noise of that type [4]. To develop this idea, one can say that speech non-fluency may also provide a barrier hindering effective communication.

Even though human speech has probably been affected by non-fluency from the very beginning, this phenomenon has been scarcely studied. It is most commonly dealt with in the context of studies focussing on stuttering and cluttering. And yet it is a universal phenomenon, affecting both ordinary speakers and people with CNS diseases, as is encountered by the author in her everyday work at the Department of Neurology. It is the speech non-fluency that significantly disturbs verbal communication with the neurologically ill, and in the case of a very severe disorder, it even results in the contact with them being broken. These facts have inspired the investigation on the perception of non-fluent utterances of the neurological patients.

A list of fundamental communication barriers was developed by T. Gordon, who divided them into three main categories, i.e. being judgemental, giving solutions and avoiding the participation in another person's concerns [5]. The presented categories are mostly of psychological or social nature. They do not include biological or linguistic problems such as speech non-fluency.

Speech non-fluency provides a specific communication barrier, whose extent is affected by the message producer, its recipient and the relation between them. If the producer is a non-fluent speaker, then the communication barrier extent is determined by:

- the speech non-fluency intensity,
- types of speech non-fluency symptoms,
- the duration of speech non-fluency symptoms,

the duration of non-fluent speech segments,  
 the pace of speech,  
 the intelligibility of the utterance,  
 the social rank of the speaker.

The extent of the communication barrier is also determined by the factors connected with the recipient of the non-fluent utterance, in particular:

the attitude towards the non-fluent speaker  
 being accustomed to the speaker's speech  
 the resistance to the communication-related stress

Undoubtedly, the feedback relationship between the non-fluent speaker and the recipient is also significant in understanding the essence of the communication barrier. Those interactions may occur on the level of both verbal and non-verbal communication [6].

Speech non-fluency is a universal phenomenon and as such does not provide a communication barrier. Nearly every language user happens to be non-fluent at times. Speaking 3-5% of words or syllables non-fluently is perceived as a normal phenomenon [7, 8], as it does not disturb communication. Such an «acceptable» non-fluency occurs sporadically and is easy to tackle. Nevertheless, its intensity cannot be too high. The level of acceptable non-fluency has not been strictly defined, as the degree to which the communication process is disturbed by the non-fluency intensity is highly affected by such subjective factors as tolerance or being accustomed to non-fluent speech [9].

The extent of the communication barrier is partly determined by the type of the dominant non-fluency symptoms. The speech disfluency called informally «getting stuck», consisting in pauses and sound prolongations, is commonly considered to be the least serious or receding form of stuttering. Stuttering is associated with intensified repetition of sounds or syllables, which is, moreover, easily noticeable. In the case of «getting stuck», however, the primary symptom is sound prolongation of shorter duration. Therefore in the popular belief «getting stuck» provides a smaller barrier than stuttering. The greatest obstacle is the blockage combined with a tense pause, which can last as long as several seconds. Generally, these symptoms are accompanied by involuntary synkineses, and the avoidance of eye contact with the speaking partner, who often becomes disoriented, confused or concerned. Conversation partners frequently wish to help the non-fluent speakers, and not knowing how to do it, they generally finish the sentence for them. They sometimes wait in silence until the non-fluent speaker utters a word with difficulty. There is no doubt that it is a situation of psychological discomfort for the communication participants [6].

The duration of the non-fluent speech segments also has a significant impact on the reception of the utterance. Short non-fluent fragments of utterances are almost imperceptible, whereas longer ones are perceived as symptoms that disrupt communication. E. Szelağ [10] conducted an experiment that showed how the time structure of non-fluent speech is different in comparison with the fluent ones (it takes fluent speakers 2-3 seconds to say a phrase and as many as 7 seconds in the case of non-fluent ones). This significant utterance prolongation causes difficulty in its reception, which may manifest itself in listeners' impatience or annoyance.

Replacing non-fluent speech with unnaturally slow speech gives similar results. Too slow speech pace is a nuisance for both the non-fluent speaker and the recipient.

Frequency and duration of non-fluent speech fragments affect the intelligibility of the utterance. This concept is related more to the field of communication than the normative linguistics. As it is, the utterance may be linguistically correct, but scarcely intelligible. The intelligibility of speech is determined by a number of factors of paralinguistic or sociological nature. One of them is speech non-fluency. If the frequency and duration of its symptoms are too high, then the intelligibility of speech is reduced. Non-fluency may distract the recipient, hence the problems with the reception of the meaning of the message [11].

In summary, it is not enough to speak correctly and logically to achieve good communication. It is equally important that the utterances are swift and smooth.

Speech non-fluency, characteristic of the utterances of the neurologically ill, has seldom been dealt with in separate studies [see: Góral-Półtola 2013], and even though its effect on the reception of verbal expressions seems highly probable, no experimental research has been conducted in this area. In this context, the subject matter of the conducted studies seems to be valid and justified.

#### ***Objective, course and method of investigation***

The aim of the study was to determine whether and to what extent speech non-fluency is a barrier in the communication of neurological patients. The conducted experimental tests on the reception of non-fluent utterances involved 96 participants. They were students of speech therapy, doing either B.A. or postgraduate studies. The participants were divided into three groups with each group consisting of 32 people. Then the previously prepared, digitally recorded non-fluent utterances spoken by neurological patients were played:

group I evaluated the utterance with non-fluency at the level of 7.0%,  
group II evaluated the utterance with speech non-fluency at the level of 14%,  
group III evaluated the utterance with speech non-fluency at the level of 21%.

The *Non-Fluent Utterance Reception Scale* was used to study the perception of non-fluent utterances [9]. The scale evaluates the reception indicators such as the intelligibility of speech, the sense of its meaning, grammatical correctness, pronunciation correctness, fluency, the degree of irritation, the willingness to communicate with the person speaking non-fluently.

To assess the indicators a 5-point scale was used, for which the following grades were accepted: 1 - insufficient, 2 - mediocre, 3 - satisfactory, 4 - good, 5 - very good

To demonstrate the varied impact of speech non-fluency intensity on the perception of utterances, a speech reception reference model was established for the speech non-fluency at the level of 7%. The reception grades of the utterances with the speech non-fluency of 14% and 21 % were related to the model.

The following statistical operation was conducted.

The first row shows the individual grades.

The second row shows the number of people who gave a particular grade and the total number of people.

The third row shows the results obtained through the multiplication of the appropriate grade by the number of people who have given it, and the total of these numbers.

The mean number was calculated by dividing the total value from row three by the total value from row two.

The fourth row shows the squares of the mean result deviations and their total value.

The standard deviation was calculated by dividing the total from row four by the total from row two, and then the square root was calculated, and the result was recorded in row five (the last column).

The appropriate grades from row 1 are presented in the T1 scale.

The results in the T1 scale are registered in row five.

The results calculated in accordance with the procedure from point 1 to 8 were adopted as the model of the reception of an utterance with 7% speech non-fluency.

The results of the reception of an utterance with the speech non-fluency at the level of 14% and 21 % were related to the model.

The mean reception grades for 14% and 21 % non-fluency utterances were converted into the T1 scale, adopting the average grade of the recipient population that listened to and evaluated the 7% non-fluency utterance.

The obtained reception grades (in the T1 scale) for 14% and 21% n-f utterances were compared to the appropriate grades in the T1 scale evaluating the perception of 7% non-fluency utterances [12]. This table 1 presents the grading of the verbal utterance with the 7% speech non-fluency.

*Results: The reception of the verbal utterance with the 7, 14 and 21 % non-fluency levels.*

Table 1

**Grading of verbal utterance with 7% speech non-fluency**

UTTERANCE INDICATOR	GRADE				
	1	2	3	4	5
Intelligibility	0	2	12	14	4
Sense	0	2	11	14	5
Grammatical correctness	0	6	11	10	5
Pronunciation correctness	0	5	16	9	2
Fluency	4	13	11	4	0
Irritation	1	4	15	9	3
Willingness to communicate	1	1	18	10	2

The intelligibility of the utterance with 7% speech non-fluency was graded by the listeners in the following way. 50.85% of the total value of grades, which is the highest percentage for that indicator, corresponds to the value of «good» grades. 30.51% of the total value of grades is constituted by the value of «satisfactory» ones, 16.95% by «very good» grades, 1.69% by «mediocre» grades and 0.0% by «insufficient» ones.

The sense of the utterance was graded in the following way. 47.46% of the total value of grades is constituted by the value of the «good» grades, 27.97% – of the «satisfactory» grades, 21.19 – of the «very good» ones, 3.39% – of the «mediocre» ones and 0.0% – of the «insufficient» ones.

As far as the grammatical correctness is concerned, the listeners graded it in the following way. The highest percentage i.e. 36.36% of the total value of grades is constituted by the value of «good» grades, slightly fewer i.e. 30.00 % by the «satisfactory» grades, 22.73% by «very good» grades, whereas 19.91% by «mediocre» grades and 0.0% «by insufficient» ones.

The correct pronunciation was graded as follows. 46.15% of the total value of grades is made up of the value of «satisfactory» grades, 34.62% – of the «good» ones, 9.62% of the «mediocre» ones, the same percentage (9.62%) of «very good» ones, (0.0%) of the «insufficient» ones.

When it comes to grading the fluency of the utterance, the highest percentage of the total value of grades, i.e. 41.77% is made up of the «satisfactory» grades, 32.91% of «mediocre» grades, 29,21% of «good» grades, 5.06 of «insufficient» grades and 0.0% of «very good» grades.

The level of irritation for the utterances with the 7% speech non-fluency was graded in the following way. 41.77% of the total value corresponds to the value of «satisfactory» grades, 34.29% – to the value of «good» grades, 14.29% – «very good», 7.62% – «mediocre» and 0.95% – «insufficient».

In the field of the willingness to communicate with the non-fluent speaker, over half of the total value of grades i.e. 50.47% is made up of «satisfactory» grades, 37.38% of «good», 9.35% of «very good» and 0.93% of «insufficient» ones.

Table 2 presents the grading of the verbal utterance with the 14% speech non-fluency.

Table 2

**Grading of verbal utterance with 14% speech non-fluency**

UTTERANCE INDICATOR	GRADE				
	1	2	3	4	5
Intelligibility	1	7	18	6	0
Sense	4	17	10	1	0
Grammatical correctness	2	11	16	3	0
Pronunciation correctness	2	20	9	1	0
Fluency	13	19	0	0	0
Irritation	1	14	13	4	0
Readiness for communication		18	6	1	0

The intelligibility of the utterance with 7% speech non-fluency was graded by the listeners in the following way. 58.06% of the total value of grades, i.e. the highest percentage for that indicator, corresponds to the value of «satisfactory» grades. 25.81% of the total value of grades is constituted by the value of «good» ones, 15.05% by «mediocre» grades, 1.69% by «insufficient» grades and 0.0% by «very good» ones.

The sense of the utterance with the 14% speech non-fluency was graded in the following way. 47.22% of the total value of grades is constituted by the value of the «mediocre» grades, a slightly lower percentage, i.e. 41.67% – by the «satisfactory» grades, 5.56% of the total value is constituted both by «good» grades and by «insufficient» ones, respectively, whereas 0.0% corresponds to the value of «very good» grades.

As far as the grammatical correctness is concerned, the listeners graded it in the following way. The highest percentage, i.e. 57.14% of the total value of grades, is constituted by the value of «satisfactory» grades, the value of «mediocre» grades corresponds to nearly half less i.e. 26.19%, 14.29% of the total value is made up of «good» grades, 2.38% of «insufficient» grades. The percentage of «very good» grades' value fell to 0.0%

The correct pronunciation was graded as follows. 46.15% of the total value of grades is made up of the value of «mediocre» grades, 36.99% – of the «satisfactory» ones, 9.62% – of the «mediocre» ones and the same percentage (9.62%) of «very good» ones, (0.0%) of the «insufficient» ones.

When it comes to grading the fluency of the utterance, the highest percentage of the total value of grades, i.e. 74.51% was made up of the «mediocre» grades, and the remaining 25.49% of «insufficient» ones. The value of the other grades corresponds to 0.0%.

Grading the level of irritation for the utterances with the 14% speech non-fluency gave the following results. 46.43% of the total value corresponds to the value of «satisfactory» grades, 33.33% – to the value of «mediocre» grades, 19.05% – «good», 1.19% – «insufficient», 0.0% – «very good» ones.

Analysing the willingness to communicate with the non-fluent speaker, it can be seen that as much as 55.38% of the total value of grades is made up of the «mediocre» grades, 27.69% of «satisfactory» grades, 10.77% of «insufficient» and 6,15% of «good» ones. The percentage of «very good» grades' value equals zero.

Table 3 presents the grading of verbal utterances with 21% speech non-fluency.

Table 3

Grading of verbal utterance with 21% speech non-fluency

UTTERANCE INDICATOR	GRADE				
	1	2	3	4	5
Intelligibility	20	11	1	0	0
Sense	24	7	1	0	0
Grammatical correctness	17	11	4	0	0
Pronunciation correctness	14	17	1	0	0
Fluency	31	1	0	0	0
Irritation	19	10	3	0	0
Readiness for communication	26	6	0	0	0

The respondents graded the intelligibility of the 21% speech n-f utterance in the following manner. The highest value, i.e. 48.89,% of the total value corresponds to «mediocre» grades, slightly less, i.e. 44.44% corresponds to «insufficient» grades and 6.67% to «satisfactory» ones. The percentage of other grades was 0.0%.

Analysing the reception of the sense of the utterance, one can see that over half of the total grade value, i.e. 58.54%, corresponds to the value of «insufficient» grades, 34.15% of «mediocre» grades, and 7.32% of «satisfactory» grades. The other grades represented 0% of the total value. The grammatical correctness was graded in the following way. 43.14% of the total grade value is made up of «mediocre» grades, 33.33% – of «insufficient» grades, 23.53% of «satisfactory» grades. There was zero percentage of other grades. As far as the evaluation of the pronunciation correctness is concerned, «mediocre» grades are definitely dominant, making up 66.67% of the total grade value. They are followed by «insufficient» grades with 27.45% of the total grade value, and «satisfactory» grades with the percentage of only 5,85%. The other grades represent 0.0%. The fluency reception was graded as follows. 94% of the total grade value corresponds to «insufficient» grades, and 6% to «mediocre» grades. Grading the irritation of the analysed utterance gave the following results. It can be seen that the «mediocre» grades correspond to 42.55% of the total grade value, «insufficient» ones to 38.30%, and «satisfactory» ones to the remaining 19.15%.

The willingness to communicate with a non-fluent speaker was graded as follows: 68.42% of the total grade value is constituted by «insufficient» grades, the remaining 31.58% by «mediocre» ones.

**Varied effect of speech non-fluency severity on the perception of a non-fluent utterance**

In order to manifest a varied effect of speech non-fluency on the utterance perception, the reception model for utterances with a 7% non-fluency was established. The reception results for utterances with 14% and 21% speech non-fluency were related to this model. That gave the following results.

Grading the intelligibility of utterances with speech non-fluency of 7%

	0	1	12	15	4	32
	0	2	36	60	20	118
			3.687			
		2.8476	5.6718	1.4648	6.8906	16.875
		<b>26.7621</b>	<b>40.53271</b>	<b>54.3033</b>	<b>68.0739</b>	0.7261
X intelligibility (14%) =		2.91				X intelligibility (21%) = 1.41
Y intelligibility (14%) =		<b>39.35</b>				Y intelligibility (21%) = <b>18.58</b>

The intelligibility of utterances with 14% speech non-fluency was valued slightly lower than «satisfactory» with reference to the evaluation of this indicator in the case of 7% speech non-fluency, whereas the intelligibility of utterances with 21% speech non-fluency was valued below «mediocre» grade.

Grading the sense of utterances with speech non-fluency of 7%

	0	2	11	14	5	32
	0	4	33	56	25	118
			3.687			

5.6953 5.1992 1.3671 8.6132 20.875

**29.1067 41.4879 5.,8691 66.2502 0.8076**

X sense (14%) = 2,25      X sense (21%) = 1.28

Y sense (14%) = **32,20**      Y sense (21%) = **13.11**

The increased severity of speech non-fluency has a negative effect also on the perception of the sense of the utterance. As it is, the sense of utterances with 14% speech non-fluency was valued below «satisfactory» with reference to the evaluation of the sense in the case of 7% speech non-fluency, whereas the sense of utterances with 21% speech non-fluency was valued significantly below «mediocre».

Grading the grammatical correctness of utterances with speech non-fluency of 7%

0	6	11	10	5	32
0	12	33	40	25	110
3.437					

12.3984    2.1054    3.1641    12.2070    29.875

**35.1225    45.4721    55.8216    66.1712    0.9662**

X grammatical correctness (14%) = 2.23      X grammatical correctness (21%) = 1.34

Y grammatical correctness (14%) = **41.59**      Y grammatical correctness (21%) = **28.33**

The grammatical correctness of utterances with 14% speech non-fluency is valued below «satisfactory» with reference to the evaluation of this indicator in the case of 7% speech non-fluency, whereas the grammatical correctness of utterances with 21% speech non-fluency is valued significantly below «mediocre».

Grading the pronunciation correctness of utterances with speech non-fluency of 7%

0	5	16	9	2	34
0	10	48	36	10	104
3.25					

7.8125    1.0    5.0625    6.125    20.0

**34.1886    46.8377    59.4868    72.1359    0.79056**

X pronunciation correctness (14%) = 2.91      X pronunciation correctness (21%) = 1.59

Y pronunciation correctness (14%) = **45.69**      Y pronunciation correctness (21%) = **29.05**

As in the case of the previously analysed utterance reception indicators, grades for the pronunciation correctness decrease as the speech non-fluency becomes more severe. While the pronunciation correctness in the case of utterances with 14% speech non-fluency is graded slightly below «satisfactory» as related to the pronunciation correctness grades for the utterances with 7% speech non-fluency, in the case of 21% speech non-fluency this type of correctness is graded below «mediocre».

Grading the fluency of utterances with speech non-fluency of 7%

4	13	11	4	0	32
4	26	33	16	0	79
2.468					

8.6289 2.8564 3.1044 9.3789      0 15.3398

**49.0425 49.6944 50.3463 50.9982 51.6501 0.69236**

X fluency (14%) = 2.19      X fluency (21%) = 1.03

Y fluency (14%) = **45.97**      Y fluency (21%) = **29.34**

The fluency of the utterances with non-fluency of both 14% and 21% is graded below «insufficient» as related to the evaluation of this indicator in the case of utterances with speech non-fluency of 7%.

Grading the irritation of utterances with speech non-fluency of 7%

1	4	15	9	3	32
1	8	45	36	15	105
3.2812					

5.2041    6.5664    1.1865    4.6494    8.8623    21.2646

**48.9272    49.3974    49.8677    50.338    50.8082    0.8151**

X irritation(14%) = 2.63      X irritation(21%) = 1.59

Y irritation (14%) = **41.95**      Y irritation (21%) = **29.3**

The irritation of utterances with speech non-fluency of both 14% and 21% is graded far below «insufficient» as related to the evaluation of the irritation of utterances with speech non-frequency of 7%.

Willingness to communicate

1	1	18	10	2	32
1	2	54	40	10	107
3.343					
5.4931	1.805	2.1269	4.3066	5.4863	13.7255
<b>48.2924</b>	<b>49.0209</b>	<b>49.7495</b>	<b>50.4781</b>	<b>51.2066</b>	0.65492

X readiness to communicate(14%) = 2.03      X readiness to communicate (21%) = 1.18

Y readiness to communicate (14%) = **29.88**      Y readiness to communicate (21%) = **17.06**

The willingness to communicate with a person whose speech non-frequency is at the level of 14% or 21% is graded far below «insufficient», as related to the same indicator in the case of speakers with 7% speech non-frequency.

The results of the experiment showed clearly that the speech non-fluency which is characteristic of the utterances of neurological patients provides a significant communication barrier. While the grades for the utterance intelligibility, sense, grammatical and pronunciation correctness as well as fluency all go down, the irritation increases and the willingness to communicate with a non-fluent speaker diminishes. Speech non-fluency at the level of only 7% already provides an obstacle for the utterance perception. The difficulties become worse as the severity, number and duration of symptoms increase. If the severity of speech non-fluency is at the level of 21%, the utterance ceases to be clear to the listener. The negative emotions that emerge usually lead to the avoidance of the neurological patient, or even to breaking the contact with such a speaker. Hence it can be argued that the willingness to communicate decreases with the increasing severity of speech non-fluency.

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