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Do clutterers really speak fast?

Hızlı-bozuk konuşanlar gerçekten hızlı konuşur mu?

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ABSTRACT

Objectives: This study aims to determine whether there is a difference between the speech and articulation rates of people with cluttering (PWC) and controls.

Patients and Methods: The descriptive study included 11 PWC (4 males, 7 females; mean age: 36±11 years; range, 23 to 52 years) and 11 controls (4 males, 7 females; mean age: 35.5±10.7 years; range, 22 to 50 years) between February 2023 and May 2023. Three hundred syllables of speech samples were recorded and analyzed using two different rates of speech techniques. Normal disfluencies and pauses were included in the measurements of speech rate, but these linguistic elements were excluded from global time in the calculation of articulation rate. The ratios of 300 syllables to time were compared between the PWC and control groups.

Results: According to the descriptive results, the standard deviations of the PWC in both rate assessments were higher. A significant difference was found between the two groups in the speech rate (p=0.001) and articulation rate (p<0.001). The PWC talked about 1.5 syllables per second faster than typical speakers.

Conclusion: The objective measurements showed that PWC were mostly rapid speakers. Speech rates of PWC should be addressed as a therapy goal, but there is a need for further studies to examine the speech motor characteristics of PWC.

Keywords: Articulation rate, cluttering, fluency disorders, speech rate.

ÖZ

Amaç: Bu çalışmanın amacı, hızlı-bozuk konuşanlar (HBK) ile kontrol grubunun konuşma hızları ve artikülasyon hızları arasında fark olup olmadığını belirlemekti.

Hastalar ve Yöntemler: Şubat 2023 - Mayıs 2023 tarihleri arasında, 11 HBK (4 erkek, 7 kadın; ort. yaş: 36±11 yıl; dağılım, 23-52 yıl) ve 11 kontrol (4 erkek, 7 kadın; ort. yaş: 35.5±10.7 yıl; dağılım, 22-50 yıl) tanımlayıcı çalışmaya dahil edildi. Üç yüz hecelik konuşma örnekleri kaydedildi ve iki farklı konuşma hızı tekniği kullanılarak analiz edildi. Normal akıcısızlıklar ve duraklar konuşma hızı ölçümlerine dahil edildi ancak bu dilsel öğeler artikülasyon hızının hesaplanmasında global zamandan çıkarıldı. Hızlı-bozuk konuşan ve kontrol grupları arasında 300 hecenin zamana oranları karşılaştırıldı.

Bulgular: Tanımlayıcı sonuçlara göre, her iki hız ölçümünde de HBK standart sapmaları daha yüksekti. İki grup arasında konuşma hızı (p=0.001) ve artikülasyon hızında (p<0.001) anlamlı bir fark bulundu. Hızlı-bozuk konuşanlar tipik konuşmacılara göre saniyede yaklaşık 1.5 hece daha hızlı konuştu.

Sonuç: Objektif ölçümler, HBK'nin çoğunlukla hızlı konuşmacılar olduğunu gösterdi. Hızlı-bozuk konuşanların konuşma hızları bir terapi hedefi olarak ele alınmalıdır ancak HBK konuşma motor özelliklerini incelemek için daha fazla çalışmaya ihtiyaç vardır.

Anahtar sözcükler: Artikülasyon hızı, hızlı-bozuk konuşma, akıcılık bozukluğu, konuşma hızı.

Although cluttering has been categorized differently over the years and there are still alternative proposals regarding its conceptual framework,[1] it is generally currently accepted that cluttering is a speech fluency problem that occurs when speech rate is not regulated according to linguistic and motor

needs.[2] In a review of 29 clutterers, St. Louis[3] listed a broad variety of symptoms (e.g., extreme disfluency, excessively high and irregular speech rate, abnormal writing skills, and abnormal pragmatic skills), and in the lowest common denominator, which is the most strongly accepted definition in recent literature, speech perceived as too fast or irregular remains as the obligatory symptom.[4] Some researchers have stated that rapid speech rate might be within the normal ranges for objective measures.[5] The rate of speech is perceived as too fast by the average listener due to excessive disfluencies, abnormal pauses, and impaired prosody. Hence, whether the speech rates of people with cluttering (PWC) are considered perceptual illusions or whether they objectively talk faster than typical speakers has remained uncertain in the literature.

To understand cluttering, speech rate and articulation rate are crucial.[6] Speech rate refers to the number of words or syllables per minute or second, including linguistic components, such as disfluencies and pauses. Articulatory rate represents the number of syllables per second (SPS) of perceptually fluent utterances, excluding stutter-like disfluencies, normal disfluencies, and pauses longer than 250 msec.[7] Studies in recent years[6,8] have affirmed that cluttering speech has a faster speech rate and articulation rate than control speech. In Turkish, normal speaking adults have been found to have approximately 6.74 SPS,[9] although there are not enough studies comparing the speech rate and articulation rate of Turkish-speaking PWC and normal speakers. Using these two techniques, the aim of this study was to determine whether there is a difference between the speech rates and articulation rates of PWC and controls.

PATIENTS AND METHODS

The descriptive study was conducted at the MEDKOM (İstanbul Medipol University Language,

Speech and Swallowing Therapy and Innovative Technologies Research and Application Center) between February 2023 and May 2023. The study included 22 participants, comprising 11 PWC (4 males, 7 females; mean age: 36±11 years; range, 23 to 52 years) and 11 controls (4 males, 7 females; mean age: 35.5±10.7 years; range, 22 to 50 years). The Turkish version of the Predictive Cluttering Inventory-revised (PCI-r)[10] was applied to all participants. No stuttering comorbidity was present in the PWC group. All the participants were native Turkish speakers.

Spontaneous speech samples about the topics of work, education, and daily activities were taken from the participants and recorded using the Praat program (Developer(s): Paul Boersma and David Weenink).[11] All the recordings were written orthographically. For analysis, 300 syllables were obtained from each participant. The speech sample measures were calculated by dividing 300 syllables by the whole time. In the measurement of articulation rate, normal disfluencies and pauses longer than 250 msec were excluded from the speech (total time - [A+B+C]; D is not excluded because it is less than 250 msec; Figure 1). The ratio of 300 syllables to the remaining time was computed.

Statistical analysis

Data were analyzed using IBM SPSS version 23.0 software (IBM Corp., Armonk, NY, USA). All the data were normally distributed. The speech rate and articulation rate variables were compared between the PWC and control groups using the independent samples t-test. A p-value <0.05 was considered statistically significant.

RESULTS

The mean and standard deviation values of the speech rate and articulation rate for each group are shown in Table 1. The mean PCI-r score was 114±16.25 (range, 90 to 139) for the PWC group
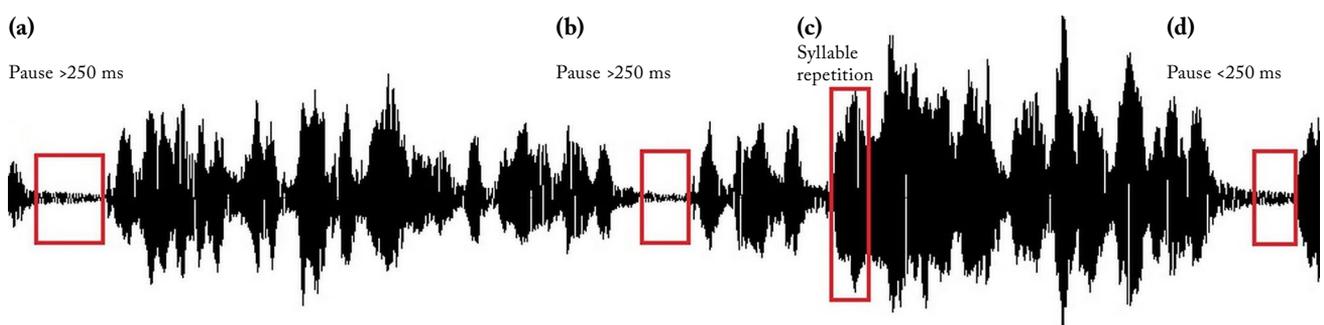

Figure 1. The excluded sections **(rectangles of a, b and c)** for articulation rate in Praat.

Table 1												
The mean values and t-test results												
	Speech rate						Articulation rate					
			T-test						T-test			
	n	Mean±SD	t	df	*p*	Mean difference	n	Mean±SD	t	df	*p*	Mean difference
PWC	11	5.87±0.98	3.713	20	0.001	1.30	11	7.81±1.08	4.297	20	0.000	1.59
Controls	11	4.56±0.62					11	6.21±0.58				
SD: Standard deviation; PWC: People with cluttering.												

Table 2						
The demographic data and PCI-r scores of the PWC and control subjects						
	PWC			Controls		
Participant no	Sex	Age	TR-PCI-r scores	Sex	Age	TR-PCI-r scores
1	Male	30	96	Male	31	20
2	Female	23	113	Female	22	17
3	Male	27	133	Male	27	16
4	Male	46	139	Male	48	0
5	Male	43	116	Male	41	11
6	Female	23	109	Female	24	23
7	Female	36	103	Female	32	13
8	Male	42	120	Male	42	14
9	Female	52	90	Female	50	1
10	Male	25	101	Male	25	23
11	Male	50	134	Male	49	29
PCI-r: Predictive cluttering inventory-revised; PWC: People with cluttering.						

and 15.18±8.91 (range, 0 to 29) for the control group (Table 2). The results showed that both speech rate and articulatory rate mean and standard deviation values were statistically significantly higher in the PWC group than in typical speakers. The mean speech rate difference was 1.3 (PWC: 7.81±1.08; Controls: 6.21±0.58) syllables, with the values of t(20)=3.71 (p=0.001). When the articulation rates of the PWC and control groups were compared, a mean difference of 1.59 (PWC: 7.81±1.08; Controls: 6.21±0.58) syllables was determined [t(20)=4.29, p<0.001]. The linear relationship between speech rate and articulation rate was found to be strongly correlated [r(9)=0.934, p<0.001]. These findings demonstrated that both the speaking rates and articulation rates of PWC and typical speakers differ, with PWC uttering about 1.5 SPS more than control subjects.

DISCUSSION

The study examined whether there are differences between control subjects and PWC with respect to speech and articulation rates. The results demonstrated that the standard deviation areas of the PWC were wider than those of the control group in both rates, which was accepted as evidence that the speech and articulation rate limits of the PWC group were distributed over more extreme points (Figure 2). This may have been due to the inclusion of normal disfluencies and pauses in the speech rate, which tends to be lower than articulation rate values. Therefore, it may not be the best measure of rate.[12] It has been stated in the literature that since normal disfluencies and pauses greatly affect the speech durations of PWC, it would be better to measure articulation rate.[7,13]
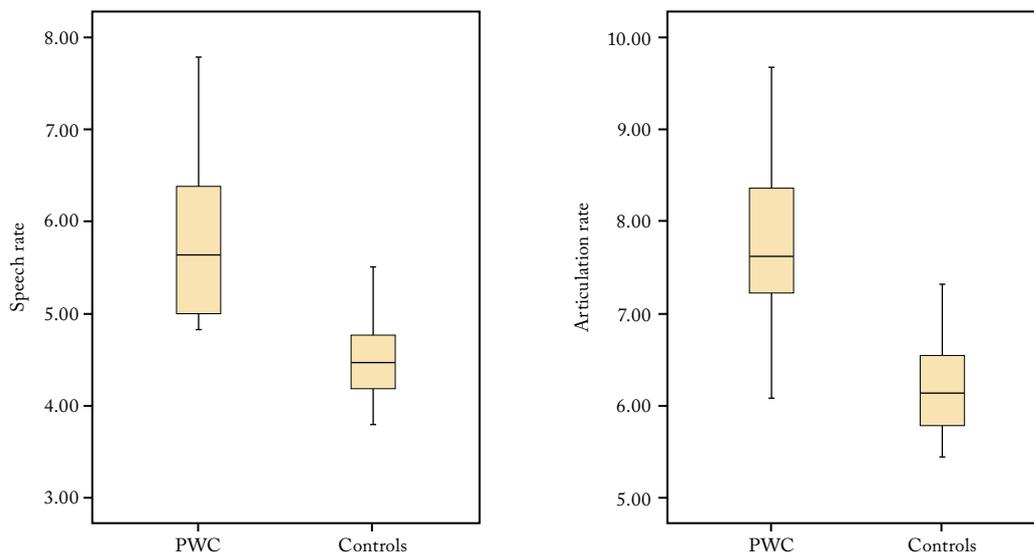
Figure 2. The candle graph of the speech and articulation rates of the PWC group and the control group.
PWC: People with cluttering.

The results also showed that PWC speak faster than the controls in both rates. In a study by Bóna,[14] no difference was determined between the speech rates of PWC (5.1 SPS) and a control group (4.1 SPS), but there was a significant difference between the articulation rates of the two groups (PWC: 6.7 SPS; controls: 5.9 SPS). However, Oliveira et al.[8] found significant differences between the speech rates of PWC and control subjects. It has also been proven that the speech of PWC is more rapid than that of stutterers but not more rapid than that of typical speakers.[15] Some other studies have reported differences not only in articulation but also in speech rates of PWC and controls.[6,16] The findings of the current study are consistent with these studies.

St. Louis et al.[5] stated that due to the extreme disfluencies, unusual pauses, and poor prosody, the listener might perceive the speech rate as being too fast, even if the speech was within the acceptable boundaries. However, the current study's results showed consistency between the perceptual speech rate and the objective measurements. Therefore, it can be easily said that adults can decide if someone is a fast talker in parallel with a previous study,[15] even with a difference of 1.5 SPS.

This study has some strengths and limitations. First, there has been no normative data on speech rate in Turkish yet; therefore, the findings of this study can be used as a reference for PWC diagnosis and therapy goals. It is also a noninvasive technique to record speech rate, but analyzing these recordings takes time.

On the other hand, the limitation of this present study is the small number of participants. Individuals with cluttering consider their fast speech rate as a minor issue and do not seek professional aid.[17] For that reason, this population visits speech and language therapy clinics less frequently. Nevertheless, it is believed that the study's findings will help clinicians better comprehend PWCs.

In conclusion, the current study results showed a significant difference between the speech rate and articulation rate of PWC and controls. Focusing on the rapid speech of PWCs appears to be the right technique among therapy goals. Valid and reliable but also simple to analyze measures are required in speech clinics. Therefore, there is a need for further research with higher numbers of participants to be able to investigate the speech motor abilities of PWC in greater detail.

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