COMPARATIVE STUDY ON THE VOCAL PROFILE OF PROFESSIONAL THEATER ACTORS AND STUDENT ACTORS

Estudo comparativo do perfil vocal de atores de teatro profissionais e atores em fase de formação acadêmica

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ABSTRACT

Purpose: to compare the vocal profile of professional theater actors and of student actors to check if there are differences between their voice use patterns. **Methods:** the sample consisted of 25 professional actors and 25 student actors. The study was carried out by recording and analyzing the subjects' voices, using the GRBASI scale (auditory-perceptual analysis) and the software *Dr. Speech (*acoustic analysis). The computerized analysis assessed fundamental voice frequency, jitter, shimmer, and neutralized noise energy. A questionnaire was applied to measure aspects related to vocal self-image. **Results:** in the auditory-perceptual analysis, a statistically significant difference was found between the groups regarding roughness (p=0,006) and strain (p=0,02), while the acoustic analysis showed no difference between the groups. The vocal self-image report, in both groups, highlighted the perception of being off-key. **Conclusion:** when comparing the groups, vocal changes were more common in professional actors, which suggests this groups experiences vocal overload, which is a warning for the need for developing voice training for actors.

KEYWORDS: Voice; Evaluation; Speech, Language and Hearing Sciences; Voice Quality

■ INTRODUCTION

In the century of technology, communication has increasingly more value in reproducing feelings and facing situations. Dramaturgy seeks to stir in the audience a range of feelings, beliefs, and reflections, however, for this phenomenon to take place, actors need to achieve the best their voices have to offer (shades, nuances, voracity, softness) just as a virtuoso keenly plays his or her instrument[1].

The need for increasing volume, changing *pitch*, and extending the frequency range beyond the typical conversation indicates that actors require efficient vocal performance[2]. Actors, both in rehearsal and during the show, commonly face emotionally challenging behaviors, often producing vocalizations through extreme physical strain or sudden emotional explosions, such as screams, hiccups, and grunts[3]. In order to have a fluent, effortless vocal emission, actors must know their vocal skills[4]. The ability to maintain voice quality throughout their careers[5], as well as discovering and mastering their vocal potential, requires learning techniques to use breathing, voice, articulation, rhythm, and projection, among other skills[1]. Voice workers must be more attentive to and careful with their voices and to continuously monitor their voices since it is a tool of their trade. They must realize that good vocal production depends on the correct association between gift and technique[6], which can be achieved with the aid of a speech pathologist not only for improving the voice, but also to prevent voice changes. In order for the guidance to be more effective in theater courses, the actors' vocal profile must be previously known[7].

Voice assessment tools follow technological development and have allowed specialists to more

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precisely evaluate vocal quality, with great interest on researching the relationship among self-assessment scales, perception evaluations, and acoustic parameters[8]. Auditory-perceptual assessment is considered the gold standard of speech evaluation regarding the voice, whether professional or not, since it enables analysis through hearing vocal quality, variations in pitch, and emphasis resources, among other vocal aspects[9,10]. Having become a sizeable aspect in voice assessment over the last decades, computerized acoustic analysis aims to complement auditory-perceptual analysis with more objective data[11] by using the acoustic signal collected by non-invasive tools and analyzing vocal quality quantitatively. In the [9,10] literature, the most commonly mentioned advantage of using voice analysis software is obtaining standardized data for different vocal realities, be them cultural, professional, or pathological[12].

Knowing the perceptual and acoustic differences between the voices of professional and student stage actors may contribute to a change in focus in both vocal assessment and training, besides providing a customized and efficient vocal program[9,13]. With the above in mind, this research aimed to compare the vocal profile of professional and student theater actors to determine if there are differences in their voice use patterns.

■ METHODS

This cross-sectional, exploratory quantitative study was approved by the Research Ethics Committee of the Federal University of Healthcare Sciences of Porto Alegre (UFCSPA) under protocol 983/12, and was carried out in the university's voice laboratory. The participant sample was derived from several theater groups and performing art students. A labor certificate was the criterion used to consider an actor professional. An experimental group comprising 25 professional theater actors and a control group with 25 student actors were assessed. The only inclusion criterion was the subject being a theater actor – professional or in training. All subjects signed a term of free and informed consent.

First, participants' voices were recorded using a Sony digital audio recorder coupled to a professional Shure microphone in a stand. The microphone was placed at a 45° angle 10 cm from the speaker's mouth to prevent aerodynamic distortion.

This recording consisted of the emission of sustained vowels, of counting from 1 to 10, and of a report by the subject about his or her voice. After the recording, participants answered a questionnaire to measure aspects related to their vocal self-image[14] this was requested that the participant assigned a score of one to ten to its voice and that marked with an "x" the chosen of eight pairs of descriptive voice, where each pair was composed of two opposites adjectives options terms, denoting a positive or negative opinion about the voice. A speech pathologist specialized in voice and blinded to the sample carried out the auditory-perceptual evaluation (all voice recordings were mingled for the auditory analysis and 10% of the sample were presented again to the evaluator for data reliability). The GRBASI[15] scale protocol was used to classify the voices, where G means the Grade of change; R means Roughness; B means Breathiness; A means Asthenia; S means Strain, and I means Instability. The 4-point GRBASI score was used (0 – normal or absent, 1 – slight, 2 – moderate, and 3 – severe). The sustained vowel "ε" (as in "head") was used for acoustic analysis performed with *Dr. Speech* 3.0 by Tiger DRS. The parameters jitter, shimmer, neutralized noise energy (NNE), and fundamental frequency (F_0) were assessed.

The analyses followed a quantitative and descriptive approach using the SPSS 19.0 for the statistical analysis. For the auditory-perceptual and vocal self-image data analyses, the Chi-squared test was applied. and, when needed, Yates's correction or Fisher's Exact test. Student's t-tests for independent samples were used for comparisons of acoustic measures, after controlling for normal distribution using Kolmogorov-Smirnov test . The statistical significance level used was 5% (p= 0.05 or less). Data were tabbed and presented in tables.

■ RESULTS

Descriptive statistics are presented in Table 1. Of the 50 subjects assessed, 25 (50%) were males and 25 (50%) were females and their ages ranged from 18 to 43 years. In the auditory-perceptual analysis, 13 subjects (26%) had a slight global change in the GRBASI scale. Regarding their vocal characteristics, strain (S) was the most common vocal quality (n=12) followed by roughness (n=11), as shown in Table 2.

Table 1 – Descriptive statistics of the studied sample (age, gender and years of experience)

Variables	Total	Actors		p-value
		Professionals	Students	
Age, mean (standart deviation)	23,4 (5,7)			
Male	24,0 (6,4)	26,4 (6,7)	19,6 (2,2)	0,007*
Female	22,9 (4,9)	27,3 (3,6)	20,4 (3,5)	0,000*
Gender, n (%)				0,090
Male	25 (50)	16 (64)	9 (36)	
Female	25 (50	9 (36)	16 (64)	
Performance time, n (%)				*0,007**
1-3 years	14 (29,2)	6 (26,1)	8 (32,0)	
4-6 years	16 (33,3)	4 (17,4)	12 (48,0)**	
7-10 years	11 (22,9)	6 (26,1)	5 (20,0)	
11 ou + years	7 (14,6)	7 (30,4)**	0 (0,0)	

Used tests: Age – Chi-squared test and, when needed, Yates's correction or Fisher's Exact test;
Gender and performance time – T test for independent samples.
* Significant association among the variables.
** Analysis of the adjusted standardized residues; associated cells.

Table 2 – Comparison of the GRBASI scale between professional actors and student actors

Variables	Total	Actors		p-value
		Professionals	Students	
Global, n (%)				*0,053*
Normal or absent	37 (74,0)	15 (60,0)	22 (88,0)	
Discreet	13 (26,0)	10 (40,0)	3 (12,0)	
Rough, n (%)				*0,006**
Normal or absent	39 (78,0)	15 (60,0)	24 (96,0)**	
Discreet	11 (22,0)	10 (40,0)**	1 (4,0)	
Breath, n (%)				*0,609*
Normal or absent	46 (92,0)	24 (96,0)	22 (88,0)	
Discreet	4 (8,0)	1 (4,0)	3 (12,0)	
Asteny, n (%)				
Normal or absent	50 (100,0)	25 (100,0)	25 (100,0)	
Strain, n (%)				*0,020**
Normal or absent	38 (76,0)	15 (60,0)	23 (92,0)**	
Discreet	12 (24,0)	10 (40,0)**	2 (8,0)	
Instabilidade, n (%)				*1,000*
Normal or absent	48 (96,0)	24 (96,0)	24 (96,0)	
Discreet	2 (4,0)	1 (4,0)	1 (4,0)	

Chi-squared test and, when needed, Yates's correction or Fisher's Exact test.
* Significant association among the variables.
** Analysis of the adjusted standardized residues; associated cells.

The acoustic analysis is presented in Table 3, which shows that the shimmer values found for males are over the limit.

Table 4 shows the answers to the vocal self-image questionnaire.

Table 3 – Comparison of Fundamental Frequency, Jitter, Shimmer and Normalized Noise Energy between professional actors and student actors

| Variables | Total | Actors | | p-value |
		Professionals	Students	
Fundamental frequency, mean (SD)	168,8 (54,9)			
Male	123,3 (20,2)	122,0 (24,0)	125,7 (11,5)	0,669
Female	214,3 (37,8)	191,1 (40,5)	227,3 (30,2)	0,018*
Jitter, mean (SD)	0,2 (0,1)			
Male	0,2 (0,1)	0,2 (0,1)	0,2 (0,0)	0,797
Female	0,2 (0,1)	0,2 (0,0)	0,2 (0,1)	0,653
Shimmer, mean (SD)	3,2 (1,4)			
Male	3,6 (1,7)	3,8 (2,0)	3,2 (0,9)	0,422
Female	2,9 (1,1)	2,9 (1,0)	2,9 (1,1)	0,929
NNE, mean (SD)	-12,6 (3,5)			
Male	-12,0 (3,6)	-11,1 (3,3)	-13,4 (3,8)	0,132
Female	-13,2 (3,2)	-13,5 (3,3)	-143,0 (3,3)	0,684

T test for independent samples.

Table 4 – Comparison of vocal self-image between professional actors and student actors

| Variables | Total | Actors | | p-value |
		Professionals	Students	
Ugly	11 (33.3)	3 (20.0)	8 (44.4)	0.266
Pretty	22 (66.7)	12 (80.0)	10 (55.6)	
Bad	6 (17.1)	3 (15.0)	3 (20.0)	1.000
Good	29 (82.9)	17 (85.0)	12 (80.0)	
Weak	20 (45.5)	10 (47.6)	10 (43.5)	1.000
Strong	24 (54.5)	11 (52.4)	13 (56.5)	
Thin	19 (52.8)	9 (45.0)	10 (62.5)	0.478
Deep	17 (47.2)	11 (55.0)	6 (37.5)	
Sad	8 (22.9)	5 (26.3)	3 (18.8)	0.700
Happy	27 (77.1)	14 (73.7)	13 (81.3)	
Tuneless	29 (74.4)	18 (78.3)	11 (68.8)	0.711
Tuneful	10 (25.6)	5 (21.7)	5 (31.3)	
Slow	14 (33.3)	11 (50.0)**	3 (15.0)	0.038*
Fast	28 (66.7)	11 (50.0)	17 (85.0)**	
Old	6 (17.6)	5 (27.8)	1 (6.3)	0.180
Jovial	28 (82.4)	13 (72.2)	15 (93.8)	

Chi-squared test and, when needed, Yates's correction or Fisher's Exact test.
* Significant association among the variables.
** Analysis of the adjusted standardized residues; associated cells.

■ DISCUSSION

The results of the present study showed differences in the parameters assessed when professional actors were compared to student actors (Table 2) . The auditory-perceptual evaluation showed a greater change in the professional actors, statistically significantly so when roughness and strain are considered. That shows that the longer an actor's or actress's career, the more he or she will have abused their voice by using it professionally, thus tending to have some change compared to student actors. These findings match the literature in stating that actors are led to overwork during their careers, which indicates a major vocal overload and lower vocal change prevalence in the student population, who perform as amateurs and have shorter times as stage performers[16,17]. As the present research shows, being a professional actor is associated with 11+ years performing, while being an amateur actor is associated with performing for 4-6 years.

The computerized acoustic analysis used in this study is in accordance with the current voice research philosophy to seek objective proof, thus contributing to data standardization for different vocal realities. Given the broad range of software and acoustic variables employed in research, the data could not be compared with other studies on actors. Therefore, the values found (Table 3) in the present study were compared to Brazilian Portuguese speakers.

The mean F_0 result for males was similar to what is found in the literature, which ranged from 113.01 Hz to 127.61 Hz [12,18,19]. The average of this same parameter for females also matched the results in the literature, in which the mean F_0 ranged from 205.21 Hz to 215.42 Hz [12,18,19]. The significant difference in mean values for F_0 between genders was already expected since it is influenced by the length of the vocal folds, which is longer in males[8,18,19].

The mean jitter for both genders was 0.2%, below the value found in the literature[12,19,20], which is inferred to be due to the stability actors have over their voices since *jitter* changes mainly due to the lack of control over vocal fold vibration. Taking into account the values considered normal by the makers of *Dr. Speech*, i.e., equal to or below 0.5% [21], the result found is within the normal range.

The mean shimmer for males was 3.6%, which is higher than the value considered by the makers of *Dr. Speech*, i.e., equal to or below 3% [21], and also higher than values reported in other studies[12,19], which may be caused by inappropriate vocal habits. The mean shimmer for females was 2.9%, which is similar to what is found in the literature[12,19,10].

The NNE results both for males (-12 dB) and females (-13.2 dB) were below those found in another study[12], but also matched the normal values suggested by the makers of *Dr. Speech*, i.e., equal to or below -10 dB [12].

No significant difference was found between the research groups for any of the acoustic analysis variables. The results are comparable to those by Kovacic and Budanovac [22] and Awan[23], who also found no difference in acoustic parameters. However, the subjects of those studies were not taken from the same population, so the results must be compared with caution. It should be pointed out that the acoustic analysis does not prevail over the auditory-perceptual evaluation, but rather complements it.

The vocal self-image report has been used both in clinical practice and in research since it is able to capture the patients' perception regarding their voices[24]. In the present study, a statistically significant difference was found between the groups regarding slow or fast speech, with the former mentioned more often by professional actors and the latter, by student actors, which can be seen in Table 4. It can be said that, save for obvious exceptions, the essence of voicing for an actor is in "saying the text"[25], hence the professional actor is aware that a fast speech makes it harder for the audience to understand the performance.

Individuals carrying characteristics such as muscle strain, inappropriate vocal range, lack of respiratory coordination, inappropriate use of the vocal register, or imprecise articulation tend to have tuneless voice[26], one of the items that stood out in the vocal self-image questionnaire particularly by the professional actors. The results indicate the need for including speech pathology into the theater practice since voice tuning can be improved through specific techniques and exercises.

■ CONCLUSION

Regarding the values of the GRBASI scale, it can be seen that the variables roughness and strain in the perceptual-auditory analysis are significantly more prevalent among the professional actors than in the group of students, which shows vocal overload among the former.

The values of Fundamental Frequency, Jitter, Shimmer, and Glottal Noise Energy both among the student actors and the professional ones were within the normal range, except for shimmer among males. No significant difference was found between the groups studied.

In the comparison of the vocal self-image, a significant difference was found between the groups

regarding slow and fast voice, the former being more reported by professional actors and the latter, by student actors, with tuneless voice standing out in both groups.

Thus, the present study contributes to the knowledge in the overlapping between speech pathology and theater since few studies are available in the literature regarding auditory-perceptual analysis and vocal self-image of stage actors.

Although the sample size is admittedly limited, these initial results call attention to an important population to be worked on since the repercussions of these vocal aspects impact both their work and their quality of life.

RESUMO

Objetivo: comparar o perfil vocal de atores de teatro profissionais e de atores em fase de formação acadêmica para verificar se existem diferenças entre o padrão de uso de voz. **Métodos:** a amostra consistiu de 25 atores profissionais e de 25 atores em fase de formação acadêmica. O estudo foi realizado por meio do registro e análise de vozes dos participantes, utilizando-se a escala GRBASI (análise percepto-auditiva) e o *software Dr. Speech* (análise acústica). Com relação à análise acústica, foram analisadas as seguintes variáveis: frequência fundamental, *Jitter, Shimmer* e energia de ruído glótico. Aplicou-se um questionário para mensurar aspectos relacionados à autoimagem vocal. **Resultados:** na análise perceptivo-auditiva, houve diferença estatisticamente significante entre grupos nas variáveis rugosidade (p=0,006) e tensão (p=0,02). A análise acústica não demonstrou diferenças entre os grupos. Quanto à autoimagem vocal, um item que se destacou em ambos os grupos foi desafinação. **Conclusão:** levando em consideração a comparação realizada entre os grupos estudados, a frequência das alterações vocais foi mais encontrada nos atores profissionais, o que nos aponta para uma sobrecarga vocal nesse grupo, alertando para a necessidade do desenvolvimento de um trabalho de preparação vocal do ator.

DESCRITORES: Voz; Avaliação; Fonoaudiologia; Qualidade de Voz

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