



Atena
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PROFESSIONAL VOICE:

Integrated Practices of Teaching,
Research and University Extension

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Aline Menezes Guedes Dias de Araújo
Patrícia Brianne da Costa Penha
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PREFACE

Maria Fabiana Bonfim de Lima-Silva

This e-book is a collection of experiences from my insertion, in 2011, as a professor in the Department of Speech Therapy at the Federal University of Paraíba (UFPB). Upon joining this institution, I developed an extension project called the Voice Advisory Program for Teachers (ASSEVOX), based on the knowledge I gained during the period in which I took my master's and doctorate, at the Pontifical Catholic University of São Paulo (PUC-SP), under the guidance of the Professor Dr. Leslie Piccolotto Ferreira and Prof. Dr. Zuleica Camargo.

So, in the following year, with the desire that extension students could experience the reality of professors through practical experiences that went beyond the walls of the university, I submitted ASSEVOX to the UFPB 2012 Probex Notice, but unfortunately we did not receive the scholarship. Even so, with a pioneering group of six students, we started our actions through a Fluex project (Project only with volunteer students) in a private school with the objective of promoting vocal health for teachers and the school community. I remember that we went through several challenges, because the room that the school gave us for collection was not a clean, pleasant environment, however, we did not get discouraged and cleaned, painted the walls and renovated the entire room. Shortly after the renovation, we started our vocal health assessments and workshops. I remember to this day that many teachers were surprised by our act of cleaning the room, as no one had ever done anything to improve that room, and they said: "*It was an abandoned room*"; "...it was a real storage room for the school, now there is another room, well *organized and clean*".

It is worth noting that in the first meeting with the director of this school, it was emphasized that we would carry out vocal assessments of the teachers, but that after these procedures, the teachers participating in the project would receive the reports with the diagnosis and then participate in voice experience workshops with content theoretical and practical, within the school. In addition, our team inserted vocal health actions in the school calendar events (student day, teacher's day, family day, among others).

Then, in 2013, we took an important step towards ASSEVOX, we managed to get the project approved with a grant in the Probex 2013 Notice, and we entered into a partnership with the Department of Education and Culture of João Pessoa (SEDEC-JP). Thus, between 2012 and 2019, with the support of the Edital Probex and Fluex (UFPB), more than 60 extension workers participated in our project, from undergraduate, graduate and other courses (Psychology, Physiotherapy, among others). Currently, ASSEVOX has managed to cover 15 schools in the public and private network, including kindergarten, elementary and

high school. In addition, during these seven years, in person, we carried out an average of 420 vocal screenings, 44 voice experience workshops and 21 lectures. In the last lecture, held in 2019, we were invited by SEDEC-JP to talk about the importance of voice in teaching work and handling voice amplifiers, in which my doctoral student Patrícia Penha and I presented relevant data from the research developed by ASSEVOX and strategies correct handling of microphones (voice amplifiers). It is worth noting that more than 500 amplifiers were delivered to the teachers participating in this event.

Such actions carried out during this period, yielded us several products, including participation in local, regional and national events (congresses, seminars, meetings), 10 publications of scientific articles in national and international journals, 14 book chapters, 73 complete, expanded abstracts and annals, 21 course conclusion works, 31 scientific initiation works, 5 dissertations, among others.

However, in the first months of 2020, we were surprised by the onset of the SARS-CoV-2 pandemic, a rapidly spreading respiratory syndrome. Since then, several measures by the World Health Organization (WHO) have been taken to prevent the spread of this virus, including social distancing. This fact brought as the main impact to the ASSEVOX project the impossibility of carrying out the actions (workshops, screening and attendance) in person. As a result of these various changes, the project had to reinvent itself and adapt to the new reality, using digital platforms to continue developing its activities and contributing, more than ever, to society and the academic community. In addition, the project, which was previously aimed only at teachers, expanded its target audience to all voice professionals (teachers, telemarketers, digital influencers, actors, singers, telejournalists and others) and thus came to be called Vocal Advisory Program for Voice Professionals (ASSEVOX).

According to this new appearance, ASSEVOX showed itself to have solid foundations and an excellent potential to adapt to new situations. In this period, we idealized to make our *Instagram* profile a digital magazine, containing information accessible to voice professionals and the entire community. Through meetings, we create content, develop means of interaction and broaden our view of the most diverse forms of health promotion. With this, we continue with our scientific initiation projects, discuss book chapters, participate in open classes and regional events, publish scientific articles and, above all, drive our dreams!

Currently, we had the project "Analysis of the effects of a distance vocal health program for teachers in the state of Paraíba" approved in the Universal Demand Notice n° 09/2021, promoted by the Foundation for Research Support of the State of Paraíba (FAPESQ), which brings unprecedented insofar as there are no other proposals in force in the state with the purpose of assisting and supporting the essential professional for the development of our society, such as the teacher. issues related to the health and quality of life of several educators in the state, especially those who do not have the financial possibilities or conditions to be accompanied by a professional speech therapist.

This *e-book* is part of a beautiful journey full of challenges. A path traveled with dedication, responsibility and union. Therefore, we invite you, the reader, to know a little more about the work performed by the ASSEVOX group over these 10 years.

I wish you a good read and that this work is an inspiration for all those who wish to tread the paths of university extension, teaching and research.

PRESENTATION

This *e-book* entitled “**Professional Voice: Integrated Teaching, Research and University Extension Practices**” is the result of an extension project called “Vocal Advisory Program for Voice Professionals” (ASSEVOX), which has been developed since the year of 2012 with the support of the public notice for the Extension Scholarship Program (PROBEX) of the Federal University of Paraíba (UFPB), whose main objective is to promote vocal health and prevent voice disorders in the most diverse professionals who depend on it to perform their work.

In this work, 14 chapters were gathered that explain from the experience of students and teachers who participated in the voice advisory program, to themes related to the prevention of voice disorders, vocal health promotion and around expressiveness. In them, there are studies about teachers, telemarketers, telejournalists and digital influencers. The purpose of this e-book is to expand the knowledge of undergraduate, graduate and Speech-Language Pathology professionals, as well as all those interested in studying voice professionals. In addition, we hope to encourage and drive the development of research through the vision and experiences of a university extension.

It is important to highlight that this work is composed of results of scientific initiation research and experiences around the ASSEVOX university extension. The chapters were prepared by students (undergraduate and graduate students) and by professional researchers from UFPB and other institutions (UNIPÊe PUC-SP) who, in a responsible and qualified way, proposed to explain their studies with current and relevant themes for the scientific community and society as a whole.

We wish you a great read!


Maria Fabiana Bonfim de Lima-Silva
Aline Menezes Guedes Dias de Araújo
Patrícia Brianne da Costa Penha
Gabriella Lucena Feitosa
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ASPECTS OF QUALITY AND VOCAL DYNAMICS OF TELEOPERATORS OF AN EMERGENCY CALL CENTER

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ABSTRACT: Among the professionals who are part of the area of care call assistance, there are emergency call service operators. These professionals often deal with unfavorable working conditions for good vocal health and, in addition, with a high workload, which considerably increases their risk of developing eminent vocal pathologies.

Objective: to investigate perceptual issues of speech quality and dynamics of telemarketers at an emergency call center. **Methods:** the research was conducted using the script Voice profile Analysis Scheme for Brazilian Portuguese (VPAS-PB), from the Phonetic Model of Vocal Quality Analysis, developed by Laver (1981) for a complete analysis of the vocal quality and dynamics

of speakers. The present study was characterized as being observational, documentary, descriptive, cross-sectional and quantitative and qualitative, with analysis of 20 voice samples from 10 men and 10 women. **Results:** in the male population, the predominant adjustments of vocal quality were found: decreased lips extension; jaw closed; tongue body retracted, lowered and decreased extension; lowered larynx; air escape and harsh voice, while vocal dynamics highlighted the rapid speech rate. And in the vocal quality of the female population, the following were predominantly observed: body with lowered tongue, lowered and reduced extension; pharyngeal constriction; vocal tract hyperfunction; air escape and rough voice, regarding the dynamics, a decreased pitch variability was noted; increased habitual loudness and rapid speech rate. **Conclusion:** it was possible to observe the presence of adjustments in the vocal tract that can point to overload of the vocal tract in emergency telemarketers, which can lead to the development of voice disorder.

KEYWORDS: Voice, Voice Quality, Telecommunications, Occupational Health.

1 | INTRODUCTION

Professionals who use their voices as a work tool need a good vocal quality to perform their jobs satisfactorily. Among them, teleoperators stand out. First, we can highlight different groups of teleoperators: the active ones, who establish contact with customers, and

the receptive teleoperators, whose function is to receive calls from customers or potential customers (MONTEIRO, 1997). Finally, there are also professionals who fall into the category of commercial tele-operators, responsible for trying to build customer or potential customer loyalty, and assistance tele-operators, who offer emergency call answering services (DE ANDRADE AND AZEVEDO, 2006), the latter being the target audience of the current study.

Most work under unfavorable conditions for good vocal health (CAVAIGNAC, 2011). Added to this is a very abusive and exhaustive work day, which in the case of emergency teleoperators of João Pessoa corresponds to 12 hours, contributing both to possible psychological disorders that may be developed by professionals, as well as to eminent vocal pathologies.

One possibility of vocal evaluation of teleoperators is the perceptual-auditory, although it is considered subjective because it is based on the auditory impression about the vocal emission of a person (NEMR et al., 2012), it is extremely important, while through this modality, it is possible to obtain the inference of important anatomical and physiological data and provide information about the psychosocial aspects of the voice. Thus, with training, it is possible to create the perception of parameters that the individual uses during vocal production (BARAVIEIRA, 2016).

Within the perceptual-auditory field, the Voice profile AnalysisScheme(VPAS-PB) evaluation script is inserted, which studies the vocal quality and dynamics of speakers (LAVÉR, 1981). This is based on the Phonetic Model of Vocal Quality Analysis developed by John Laver (1980), which details vocal quality by combining articulatory, physiological, acoustic and auditory adjustments of compound mobilizations during speech. Later, an adaptation of the script into Portuguese was proposed by Camargo and Madureira (CAMARGO; MADUREIRA, 2008).

Thus, it is important to evaluate the voice of emergency telephone operators, in their vocal quality adjustments and dynamics aspects, since this professional group is extremely important to society, in order to ensure studies that provide more effective speech and hearing interventions in the area of voice and the service provided.

2 | METHODS

The present study was approved by the Ethics Committee on Research with Human Beings of the institution of origin, under process number 0532/14 (CAEE:36516514.0.0000.5188), approved on May 28, 2021. It is classified as a cross-sectional, observational, descriptive, documentary study of a quanti-qualitative nature. It was carried out at the Integrated Center for Police Operations (CIOP). Participants signed the Informed Consent Form (ICF) as per MS/CNS/CNEP Resolution n° 466/12 of December

12, 2012.

A total of 30 samples were received that passed through eligibility criteria, being considered eligible those that: met the proposal of the theme; did not have strong external noises; had the voice of the teleoperator in evidence; had the call made on Saturday and in the last 6 hours of the teleoperator's shift. Moreover, it was necessary that this professional had at least one year of experience. Finally, 20 call samples from 10 male and 10 female tele-operators were part of this study. A total of 10% of the sample was repeated for intra-judge reliability analysis, resulting in 22 samples.

Then, the Praat editing program was used, in order to make sure that a minimum of 20 seconds of speech by the operator alone remained. Later, these files were uploaded to Dropbox and made available to two judges who, using a form based on the Voice profile AnalysisScheme for BrazilianPortuguese (VPAS-PB) script, analyzed them in consensus.

In the first instance, contact was made with the CIOP management, which was responsible for authorizing the development of the research, providing access to the digital bank of recordings of the calls. Thus, a selection of calls from February 2020 was made, most often framed as disturbance of peace, domestic violence and noncompliance with sanitary measures, through Google Drive, the samples were given to a judge experienced in Voice Profile Analysis Scheme (VPAS-PB) (CAMARGO; MADUREIRA, 2008).

Through this script it was possible to analyze the set of factors that contribute to the quality of communication, among them the quality and vocal dynamics adjustments. Vocal quality is characterized by the behavior of the combination of supralaryngeal (articulatory), laryngeal (phonatory) and muscular tension adjustments.

As for the quantitative aspect, the script uses a scale that evaluates the aspects in six grades (from 1 to 6), considering the use of inadequate adjustments by moderate grade when scoring 1, 2 and 3, and by extreme grade when scoring 4, 5 and 6. This measurement is based on the judgment that an unaltered voice uses neutral adjustments. As for the analysis of the evaluation data by means of the VPAS-PB done by the experienced judge, these were described in chart 1 and analyzed qualitatively.

3 | RESULTS AND DISCUSSION

Laver (1980) proposes that the quality adjustments and the aspects of vocal dynamics must be understood through the factors of interdependence (one adjustment interfering in the work of the other which may favor or hinder), compatibility (one adjustment excludes by antagonism the production of the other) and susceptibility (a segment may be more vulnerable to interference from an adjustment). It is necessary to understand that the totally neutral production of the adjustments is very rare to be verified among speakers.

It was verified through perceptual-auditory analysis that prevalently the professionals present some adjustment of quality and vocal dynamics from moderate to extreme, a fact also present in other studies, which verify the presence of these adjustments and mention that these generate overload to the phonator apparatus. (MEDEIROS, 2019; SILVA, 2021).

The results of the perceptual-auditory evaluation of vocal quality and dynamics are shown in the following table, men are represented by TH and women by TM.

VOCAL QUALITY	FIRST PASS		ADJUST	SECOND PASS					
	Neutral	Non-neutral		Moderate			Extreme		
				1	2	3	4	5	6
A. ELEMENTS OF THE VOCAL TRACT									
1.lips			Rounded/ Practiced				TH5		
			Stretched						
			Labiodentalization						
			Decreased extension			TH6 TH7	TH1 TH5 TM1 TM5 TM6 TM8	TH2	
2. Jaw			Extended						
			Closed				TH1 TH4 TH5 TH6 TM6	TH2 TH7 TM5 TM8	
			Open			TM2	TH3 TM3		
			Protracted						
			Decreased Extension				TH2 TH5 TH6		
			Extended				TM9		
3.tongue tip/ blade			Advanced			TM2	TH7		
			Pulled back						

4. Tongue body

Advanced

TH8	TH1	TM3
TM1	TH2	
	TH3	
	TH4	
	TH5	
	TH6	
	TH9	
	TH10	
	TM2	
	TM4	
	TM5	
	TM6	
	TM8	

Retreated

TM10

Raised

TM1	TH2	TH6
	TH3	TH8
	TH4	TM3
	TH5	TM4
	TH7	
	TH9	
	TH10	
	TM5	
	TM6	
	TM8	

Lowered

TM2	TH1	TH2
	TH5	TH6
	TH7	TM5
	TH8	
	TM1	
	TM6	
	TM8	

5. pharynx

Increased Extension

Constriction

TM10	TM1	TH1
	TM6	TH3
	TM7	
	TM9	

Expansion

TM3

6. velopharynx

Audible nasal leak

TH5

Nasal

TM1	TH3	TH5	TM7
-----	-----	-----	-----

Denasal

7. Laryngeal height

Elevated

TH7	TM7	TM9	TM10
-----	-----	-----	------

Lowered

TH8	TH2	TH6
TM2	TH4	
TM4	TH5	
	TH10	
	TM3	
	TM8	

B. GENERAL MUSCLE TENSION

8. Vocal tract tension

Hyperfunction

TH8	TH9	TM9
TH10	TM2	
TM5(i)	TM4	
TM7	TM10	

Hypofunction

9. Tensão laríngea

Hyperfunction

TM1 TH3 TH8 TH10 TM6 TM9

Hypofunction

C. PHONATORY ELEMENTS

	ADJUST	Present Neutro	No Neutral	Scale Degrees						
				Moderate			Extreme			
				1	2	3	4	5	6	
10. Phonation mode	Modal Falsete Voice crackle/ vocal fry Voice crackle									
11. Laryngeal friction	Air leak		TH1 TH3 TH8 TH9 TH10 TM1 TM5 TM6 TM8 TM9							
12. Laryngeal irregularity	Blowing voice Rough voice			TH9	TM5 TM6 TM7 TM8 TM9		TH3 TH8 TH10 TM1		TH1	

LEGEND: Teleoperators 1, 5, 6, 7, 8, 9, 11, 13, 14, 17 - male sex; Teleoperators 2, 3, 4, 10, 12, 15, 16, 18, 19, 20 - female sex.

Table 1. Perceptual-auditory judgment of the vocal quality and vocal dynamics of emergency telephone operators.

In the vocal quality of women it was possible to observe predominantly the following vocal quality adjustments: pharyngeal constriction; retracted tongue body, lowered and reduced extension; rough voice; air leak and vocal tract hyperfunction. As for dynamics, increased habitual loudness, decreased pitch variability and fast elocution rate were noticed.

Regarding the vocal quality of men, the following adjustments were predominantly observed: retracted tongue body, lowered and reduced extension; reduced extension of the lips; lowered larynx; air escape; harsh voice and closed jaw. As far as vocal dynamics goes, we noticed a fast elocution rate, as well as a decreased pitch variability.

In all individuals in the sample studied, the high occurrence of changes in the adjustments of lowered tongue body (six women and nine men), retracted (eight men and seven women) and decreased extension (six men and five women), can be explained by

the intensive use of this organ, and that there is hypertension of it, leads to the retracted position and changes the pattern of the vocal tract (CAMARGO; MADUREIRA, 2009).

In the female population was verified presence of hyperfunction of the vocal tract (six women), where this is related to increased effort during phonation and these individuals studied here, can direct us to evidence that the 12 hours of work practiced by this group can lead to the maintenance of a setting that the sample already has, increasing the risk of developing voice disorders. Emergency teleoperators may also present behaviors arising from the work environment, such as effort to speak and stress after work, arising from patterns with tension (SANTOS et al., 2016).

Pharyngeal constriction may also be related to the previous adjustment, leading to a reduction in vocal tract extension, due to the closure of the middle part of the pharynx by contraction of the pharyngeal walls and retraction of the dorsum of tongue, leading to an impact on vocal quality, where the voice will be pitch sharp and there will be significant effort when speaking (LIMA-SILVA, 2012; MEDEIROS, 2019; SILVA, 2021). This adjustment has also been related to the Pessoa accent, since Lima et al (2007) noticed this same configuration in a set of women speakers in the city of João Pessoa. These data were also corroborated in a study that investigated the vocal profile of emergency teleoperators after working hours (MEDEIROS, 2019).

The hyperfunction of the vocal tract alters the closure and vibration devices of the vocal folds promoting a decrease in the extension and variability of f_0 , leading to an increase in the tension of the system, which explains in this study the appearance of pitchdecreased variability (five women) (ANDRADE et al., 2016; MEDEIROS, 2019).

The decrease in pitch variability can negatively affect the communication of teleoperators with the users of the service, in the sense that it is through the prosodic indicators that emotion is expressed, with the presence of this monotonicity in speech the listener may have the impression that the teleoperator does not present an intention to solve their problem (MEDEIROS, 2019).

Air escape and harsh voice adjustments were found in both genders and there was a high prevalence (respectively five men and five women, and five men and six women). Air leakage occurs when there is imperfect glottal closure, which can cause noise, while the rough voice points to irregular mucosal vibration from stiffness. The excessive and incorrect use of the voice can lead to hoarseness, which comprises the combination of the adjustments of air leak and rough voice (CAMARGO, 2002).

When analyzing the male population one of the most frequent adjustments and with greater impact (it happened in six of the ten teleoperators) was the closed jaw. Through the presence of this parameter we can verify the functional imbalance of the extrinsic muscles of the larynx, the increased adductor force of the vocal folds, as well as, can interfere

with the articulation of sounds, affecting the sending of the message (LIMA-SILVA, 2012). The setting of decreased lip extension may present a relationship with the previous one, because when a decrease in jaw amplitude is observed, there is an associated articulatory imprecision, demonstrating the frequent appearance of this configuration (SILVA, 2021).

With regard to vocal dynamics, a parameter quite observed in this population was the increase in elocution rate, which can impair both the quality and duration of segments affecting in prosody, as well as generate overload (MADUREIRA, 2016; MEDEIROS, 2019). This fact corroborates with another study conducted with teachers with vocal complaints and laryngeal changes (LIMA-SILVA, 2012).

The high habitual loudness was an aspect found in five women and refers to the increase in voice intensity unconsciously. This parameter is present in teleoperators, commonly associated by the need to compete with noise in the work environment (SANTOS et al., 2016).

4 | CONCLUSION

We observed peculiarities both in vocal quality adjustments and in vocal dynamics parameters of emergency teleoperators in this study, which signaled an overload of the phonation system. As far as vocal quality adjustments are concerned, male operators had a recessed tongue body, lowered and reduced extension; reduced extension of the lips; lowered larynx; air leakage; harsh voice and closed jaw. In the female gender we noticed pharyngeal constriction; lowered tongue body, lowered and reduced extension; harsh voice; air leak and vocal tract hyperfunction.

As far as vocal dynamics are concerned, both groups showed decreased pitch variability and fast elocution rate, and only the teleoperators showed increased habitual loudness.

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