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Introduction

The present study aims at presenting the instructional material developed in the Brazilian Portuguese (BP) context to apply the Voice Profile Analysis Scheme-VPAS for the perceptual evaluation of linguistic, paralinguistic and extralinguistic uses of voice quality settings, such as marking utterance boundaries, conveying attitudes and emotions and indicating physical and pathological conditions.

Preliminary data on the analysis of two evaluation tasks performed by a group of six judges who attended a workshop on VPAS are also presented.

A. VOCAL TRACT FEATURES	FIRST PASS		SETTING	SECOND PASS											
	Neutral	Non-neutral		moderate	extreme	1	2	3	4	5	6				
1.1. Labial			Lip rounding												
2. Mandibular			Pharyngeal constriction												
3.1. Lingual tip/blade			Pharyngeal expansion												
4. Lingual body			Pharyngeal constriction												
5. Pharyngeal			Pharyngeal expansion												
6. Velopharyngeal			Pharyngeal constriction												
7. Larynx height			Pharyngeal expansion												
8. OVERALL MUSCULAR TENSION			Pharyngeal constriction												
9. Laryngeal tension			Pharyngeal expansion												
10. PHONATION FEATURES			Pharyngeal constriction												
11. Voicing type			Pharyngeal expansion												
12. Laryngeal tension			Pharyngeal constriction												
13. Laryngeal irregularity			Pharyngeal expansion												

Vocal Profile Analysis Scheme VPAS (Laver, Mackenzie-Beck, 2007)

The VPAS profile (Laver et al., 1981; Laver, 2000; Mackenzie-Beck, 2005; Laver, Mackenzie-Beck, 2007), which is based on a phonetically grounded description of voice quality (Laver, 1980), is the result of the continuous work of a team of researchers from *Queen Margareth University College (QMUC-Edinburgh)*.

The phonetic description of voice quality model (Laver, 1980) analyzes voice quality from an analytic unit: the setting (long-term muscular tendency).

The possible voice quality settings include those of phonatory (basically defined in terms of vocal folds modes of vibration), vocal tract (supralaryngeal or articulatory) and tension (laryngeal and vocal tract) dimensions. The aforementioned group of settings is defined from variations of a reference, the neutral setting.

D. PROSODIC FEATURES	Neutral	SETTING	moderate						extreme						
			1	2	3	4	5	6	1	2	3	4	5	6	
13. Pitch	Mean	High													
	Range	Minimized range													
	Variability	Expansive range													
14. Loudness	Mean	High													
	Range	Minimized range													
	Variability	Expansive range													
E. TEMPORAL ORGANIZATION			Interrupted												
15. Continuity			Fast												
16. Rate			Slow												
F. OTHER FEATURES			Adequate												
17. Respiratory support			Present												
18. Dysphonia			Absent												

Vocal Profile Analysis Scheme VPAS (Laver, Mackenzie-Beck, 2007)

Methodological procedures

Instructional workshop material and corpus design

VPAS adaptation to the Brazilian Portuguese context followed a comprehensive theoretical critical review of the bases of the model profile.

Corpus design took into account the principle of susceptibility proposed by Laver (1980) and made use of the key speech segments as proposed by Mackenzie-Beck (2005).

Audio and video recordings of a group of 14 speakers without voice and speech complaints were collected in studio conditions at the Radio Laboratory at PUCSP, so that most of the settings described in the phonetically-grounded evaluation protocol were comprised.

Recording procedures included a head-set microphone placed at 10cm distance from the speakers' mouth. Speech signals were monitored by means of the Soundforge software.

Intensity calibration procedures were introduced (a 1 kHz, 80 dB tone, measured with a Radio-Shack Digital-Display sound-level meter was played in an acoustic amplifier, at a 10cm distance from the microphone).

The recorded material was evaluated by two experts in the use of the protocol (one linguist and one speech therapist) in order to build up the **instructional workshop material**.

Corpus design, which refers to the sentences and the key segments chosen for the sake of making identification of settings easier according to the principle of susceptibility is underlined.

The group of settings potentially best identified by the sentence is also referred to. Although some speech segments are repeated in the sentences of the corpus, the sentences are easy to pronounce as demonstrated by production tasks carried out by speakers of diverse sociolinguistic backgrounds. These sentences are not tongue twisters.

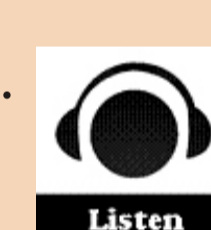
Instructional workshop material comprised recordings of 11 out of the 14 speakers of the group. It exhibits a great variety of voice quality settings (20) representing those most commonly found in normal conditions, such as lip spreading, modal voice and creaky voice and in pathological conditions, such as harsh voice, hyperfunction and nasal air escape.

The recordings of voice qualities to constitute the database for the training were intended to illustrate the variety of voice quality settings rather than differences between normal and deviant voice qualities.

General evaluation of voice quality	O objeto de estudo da Fonetica é essa complexa, variável e poderosa face sonora da linguagem: a fala.	
Specific settings	Key-sentence	Key-segments
Phonatory and lingual body settings	<i>A Lara guarda figuras de pássaros em uma caixa e suas preferidas são a da arara, da patativa, da garça, do canário e do sabiá amarelo.</i>	Low central and mid-high vowels
	<i>Liliane diverte-se imitando os trinitos do periquito, do bicudo, do bem-te-vi e do tico-tico.</i>	High front vowels
	<i>O garoto tirou muitas fotografias do tucano, da coruja, do pombo e do jaburu.</i>	High back vowels
Labial, lingual (tip, blade and body) and velopharyngeal (nasal and audible nasal escape)	<i>Soube que a Casa dos Bispos é visitada por turistas todos os dias e que o roteiro de visita dura cerca de duas horas para ser percorrido.</i>	Oral, posterior and mid-high and high vowels
	<i>Detesto ir à casa dele, pois fica do outro lado da cidade e o acesso é difícil.</i>	Alveolar fricative consonants
lingual (tip, blade and body) and velopharyngeal (denasal)	<i>Não mencionei anteriormente, mas minha mãe morreu muitos anos em Santos, numa mansão à beira-mar.</i>	Nasal vowels
		Alveolar fricative consonants

Corpus designed to evaluate vocal qualities in Brazilian Portuguese - PB-VPAS

Listen to the recordings.



Preliminary report on the analysis of voice quality evaluation tasks

Workshop on phonetic description on voice quality

A six-judge group, composed by speech therapists and linguists, was trained to apply BP-VPAS (20 hours workshop- 5 sessions).

At the first session (**Stage 1**), judges were requested to listen individually (by headphones) and judge a corpus of 20 samples of settings of voice quality produced by 11 speakers available in the computer. They were requested to fill the BP-VPAS profile

	LR	Spr	LTA	LTRe	FTB	BTB	Poon	Pexp
LR (N=18)	5	0	0	0	0	0	0	0
Spr (N=18)	0	4	0	1	1	1	0	0
LTA (N=09)	1	2	3	1	3	0	1	1
LTRe (N=18)	0	1	0	0	0	0	3	0
FTB (N=18)	1	2	3	0	4	3	1	0
BTB (N=09)	0	1	0	0	0	1	1	1
Poon (N=18)	0	4	0	1	1	1	4	1
Pexp (N=27)	4	0	2	3	3	1	5	4

Legend: LR: Lip Rounding; Spr: Spread lips; LTA: Lingual tip advanced; LTRe: Lingual tip retracted; FTB: Fronted tongue body; BTB: Backed tongue body; PCon: Pharyngeal constriction; PExp: Pharyngeal expansion

Confusion matrix of vocal tract settings (lips, tongue and pharynx) related to voice quality judgment in Stage 1

	Rlar	Llar	Lhip	Lhyp	Mod	Cvoi	Bvoi
Rlar (N=18)	3	0	1	0	4	0	1
Llar (N=18)	0	5	1	0	5	0	1
Lhip (N=18)	0	3	0	0	4	0	4
Lhyp (N=18)	2	3	0	0	10	1	3
Mod (N=09)	1	2	0	0	6	0	0
Cvoi (N=27)	0	0	1	1	7	2	3
Bvoi (N=18)	0	5	1	0	5	0	1

Legend: Rlar: Raised larynx; Llar: Lowered larynx; Lhip: Laryngeal hipofunction; Lhyp: Laryngeal hyperfunction; Mod: Modal Voice; Cvoi: Creaky Voice; Bvoi: Breathy voice

Confusion matrix of vocal tract (larynx) and some laryngeal (phonatory) settings related to voice quality judgment in Stage 1

	LR	Spr	LTA	LTRe	FTB	BTB	Poon	Pexp
LR (N=18)	7	0	0	0	1	0	0	0
Spr (N=18)	1	3	0	0	0	0	0	0
LTA (N=09)	1	0	6	0	0	0	0	1
LTRe (N=18)	1	0	0	1	0	0	0	0
FTB (N=18)	0	1	3	1	1	1	1	1
BTB (N=09)	0	1	0	0	0	0	0	1
Poon (N=18)	1	3	0	0	0	0	3	2
Pexp (N=27)	1	0	0	0	0	0	4	0

Legend: LR: Lip Rounding; Spr: Spread Lips; LTA: Lingual tip advanced; LTRe: Lingual tip retracted; FTB: fronted tongue body; BTB: Backed tongue body; PCon: Pharyngeal constriction; PExp: Pharyngeal expansion

Confusion matrix of vocal tract settings (lips, tongue and pharynx) related to voice quality judgment in Stage 2

	Rlar	Llar	Lhip	Lhyp	Mod	Cvoi	Bvoi
Rlar (N=18)	2	0	0	2	0	0	3
Llar (N=18)	1	5	4	0	7	0	0
Lhip (N=18)	2	0	7	0	7	0	3
Lhyp (N=18)	3	0	0	5	12	3	0
Mod (N=09)	0	1	1	0	6	2	0
Cvoi (N=27)	0	3	9	2	7	3	6
Bvoi (N=18)	0	0	0	0	7	0	4

Legend: Rlar: Raised larynx; Llar: Lowered larynx; Lhip: Laryngeal hipofunction; Lhyp: Laryngeal hyperfunction; Mod: Modal Voice; Cvoi: Creaky Voice; Bvoi: Breathy voice

Confusion matrix of vocal tract (larynx) and some laryngeal (phonatory) settings related to voice quality judgment in Stage 2

Conclusions

The adaptation of the VPAS into Brazilian Portuguese was accomplished and the corpus to be used in the training of judges was built up. Furthermore, the voice quality database necessary for the application of the protocol was recorded, evaluated by expert subjects and integrated into an instructive material. The material was used to train judges and their performance was evaluated. Preliminary data on the analysis of the judges' performance indicate their progress in evaluating settings of voice quality.

The relevance of the application of the protocol to the analysis of voice disorders and expressive uses of voice quality derives from its potential to investigate compensatory mechanisms used by individuals in cases of voice disorders and its suitability for describing the combination of laryngeal and vocal tract settings used to express attitudes and emotion as well as to consider uses of sound symbolism and sound metaphors.

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