Evaluating speech samples designed for the Voice Profile Analysis Scheme for Brazilian Portuguese (BP-VPAS)

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Abstract

The present study aims at evaluating a corpus designed for voice quality settings analysis (Laver, 1980). It addresses the role of keyspeech segments for the identification of voice quality settings. The corpus, recorded by 60 speakers, contained repetitions of 10 keyspeech sentences, and semi-spontaneous speech samples. These samples were evaluated by two expert subjects according to the BP-VPAS Profile (Camargo, Madureira, 2008). These data were analyzed by means of an artificial neural network and statistically by multiple regression analysis. The data reinforce the importance of the description of voice quality based on the phonetic model and the relevant role of keyspeech segments.

Key words: voice quality; auditory perception, phonetics, evaluation; corpus

Introduction

This study aims at evaluating a corpus designed for voice quality evaluation, based on the phonetic description of voice quality model (Laver, 1980), addressing the role of keyspeech segments in detecting voice quality settings in Brazilian Portuguese context. The *Vocal Profile Analysis Scheme- VPAS*, which is based on a phonetically description of voice quality (Laver, 1980), is the result of the continuous work of a team of researchers from *Queen Margareth University College-Edinburgh* (Laver et al, 1981; Laver, 2000; Laver, Mackenzie-Beck, 2007).

The application of the VPAS at the Brazilian context to investigating linguistic, paralinguistic and extralinguistic uses of vocal quality and acoustic and physiological correlates of settings of voice quality besides the experience derived from structuring a voice quality database, from introducing the model in workshops and from answering questions, posed by learners in these workshops, about voice data collection procedures and application procedures, led a group of researchers at LIAAC- PUCSP (Integrated Acoustic Analysis and Cognition Laboratory of the Catholic University of São Paulo) to systematize and improve the material aimed at instructional purposes (Camargo, Madureira, 2008).

The phonetic approach to voice quality, based on the susceptibility of speech segments to the effects of voice quality settings was considered in order to elaborate a corpus of 10 keyspeech sentences (Camargo,

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Madureira, 2008) specially designed for auditory voice quality evaluation by VPAS, as an adaptation for Brazilian context (BP-VPAS).

This adaptation of the VPAS to the Brazilian Portuguese context followed a comprehensive theoretical critical review of the bases of the model profile. The adaptation of the terminology took into account advances in speech science research related to studies on the physiology and speech signal research (Hammarberg, Gauffin, 1995; Chasaide, Gobl, 2005).

Methods

The corpus was recorded by 60 speakers and retrieved in the voice database, being 12 men and 48 women averaged 39,7 years-old. (19 to 58). It contained repetitions of 10 keyspeech sentences (ks) built with keyspeech segments (named as *ks fala*, *ks cidadeSP*, *ks Roberta*, *ks Lara*, *ks Liliane*, *ks garoto*, *ks Cbispos*, *ks detest*, *ks Santos*, and *ks filosofia*) and semi-spontaneous speech samples as answers to the request: "Talk about the city where you were born". These samples were recorded in a radio studio and analysed by means of perceptual (vocal profiles in terms of vocal tract, tension and phonatory settings) and acoustic (f0 measures- median, quartil semi-amplitude and 99,5% quantil- extracted automatically by means of Expression Evaluator script- Barbosa, 2009- version 2011) procedures.

These data were analyzed by means of an artificial neural network and statistically by multiple regression analysis, in order to investigate the speech samples (keyspeech sentences) as related to the evaluation of voice quality settings (in scalar degrees between 1 and 6).

Results

The results contemplate some correlations, detected by means of statistical analysis, between perceived voice quality settings and characteristics of the keyspeech sentences of the corpus. The degree of voice quality settings was found to be related to their incidence in the distinct sentences evaluated.

Almost all the keyspeech sentences were suitable for analyzing both phonatory and non-phonatory voice quality settings evaluated with degree 3 or higher (Figure 1): tongue tip/blade (advanced); jaw (minimized range), tension (laryngeal hyperfunction) and phonatory (creaky and harsh voice).

For the purpose of differentiating degrees lower than 3, the keyspeech sentences were useful to detect distinct lip (spreading, labiodentalization and minimized range), jaw (open), tongue tip/blade (retracted), tongue body (fronted, backed, lowered and minimized range), velopharyngeal (nasal), pharynx-constriction/expansion and tension (vocal tract hyperfunction) voice quality settings.

The semi-spontaneous speech samples allowed the identification of lip spreading, and labiodentalization, advanced and lowered tongue body, nasal, lowered larynx, and breathy voice quality settings (Figure 1).

Figure 1. Perceptual evaluation of vocal tract, tension and phonatory settings based on keyspeech sentences (ks) and semi-spontaneous corpus.

For the group of f_0 measures, it was found that median values of f_0 of ks fala were related to that found in semi-spontaneous recordings. However, the f_0 values of all the other keyspeech sentences turn out to be higher. The quartile amplitude were similar between semi-spontaneous samples and ks

detesto, *ks santos* and *ks filosofia*. The semi-spontaneous samples and *ks Roberta* were found to be similar in relation to the 99,5% quantil.

The *ks fala* (*O objeto de estudos da fonética é esta complexa, variável e poderosa face sonora da linguagem: a fala*) allowed the identification of a wide range of voice quality settings, probably due to its composition. It contained as key segments all oral vowel sounds, three nasal vowels, fricatives, plosives, liquids and nasals). Furthermore it presented no difficulties to be produced.

Conclusions

The data reinforce the importance of the description of voice quality based on the phonetic model and the relevant role of some keyspeech segments in the corpus designed for voice quality evaluation.

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