

## **Exploring sound symbolism in the investigation of speech expressivity**

Sandra Madureira<sup>1</sup>, Zuleica Antonia de Camargo<sup>1,2</sup>

<sup>1</sup>Integrated Acoustic Analysis and Cognition Laboratory-LIAAC- Catholic University of Sao Paulo, São Palo, Brazil

<sup>2</sup>Voice and Speech Laboratory- Cefac Institute, Sao Paulo, São Paulo, Brazil

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### **Abstract**

The objective of this paper is to examine specific uses of sound symbolism concerning segmental and prosodic properties. The typology developed by Hilton et al (2004) is taken as reference. The corpus of this work is a poem recorded by a professional actor. A research methodology comprising prosodic perceptual analysis, prosodic acoustic analysis and affective states evaluation tests is proposed. The results indicate the speaking strategies used by the actor have been found to make use of three types of sound symbolism (synesthetic, imitative and metalinguistic). Correlations among acoustic properties, perceived affective states and text meaning production demonstrate productive use of sound symbolism and corroborate the discussion on the direct links between sound and meaning.

Key words: speech expressivity, sound symbolism, acoustic and perceptual cues

### **Introduction**

Our current understanding of the processes involved in speech expressivity is rather limited. One of the reasons for that, being the lack of understanding of how sound symbolism, the direct link between sound and sense (Chuenwattanapranithi, 2008).

The objective of this paper is to examine specific uses of sound symbolism concerning segmental and prosodic properties in the recording of a poem by a professional actor. The actor interprets the poem and it is his production of meaning that is taken into account. His acting task is not restricted to saying a sentence with various kinds of feelings as explored in some expressive speech studies, but it is rather meaning production oriented.

### **Methods**

The corpus of this work is a poem<sup>1</sup>, written in the nineteenth century by the Brazilian poet Casimiro de Abreu (1837-1860). The poem was recorded by a professional actor. The recording is available in a commercial CD entitled “Quatro Séculos de Poesia Brasileira” which was released in 2002.

The poetic narrative takes into account the narrator's feelings towards his beloved one and his love rival while watching them dance. The poem has twenty three-syllable verses structured in eleven-line stanzas. One of

the stanzas is repeated five times throughout the poem and although the syntactic and lexical items are the same, the affective states reported in the poem change throughout the text and affects their interpretation.

A research methodology comprising text analysis, prosodic perceptual analysis, prosodic acoustic analysis and affective states evaluation tests is proposed. For the perceptual evaluation of prosodic aspects (voice quality settings and voice dynamics), the VPAS, the scheme adapted by Camargo, Madureira (2008) has been used. For the acoustic analysis, based on PRAAT, manual and automatic measures (SG detector and SG Expressive Evaluator developed by Barbosa to analyse speech expressivity (Barbosa, 2009) have been taken into account. Statistically measures concerning f0 in Hz, VV duration in ms, Long Term Average Spectra, relative intensity and spectral tilt have been considered. For the perceptual evaluation of the expressive uses of prosodic aspects, a group of 30 college students, aged from 20 to 30 years old, have answered a semantic differential scale questionnaire with the following descriptors (activation: calm/activated; valence: pleasant/unpleasant). They have also been asked to identify affective states (joy, sadness, anger and exasperation) and speech acts (advice, admonition, order and plea). Repeated verses throughout the text were the object of the evaluation.

## Results

The results indicate the speaking strategies used by the actor have been found to make use of three types of sound symbolism (synesthetic, imitative and metalinguistic).

The poet makes use of sound symbolism to indicate both the dynamics of the dance as well as the dynamics of the observer's conflicting affective states. The use of imitative kind of symbolism has been found in the production of the very first verse of the poem. The rising intonation pattern, the lengthening of the vowel (753 ms) of the first word and the gliding transition to the following vowel segment in the production of the first verse (1411 ms) of the poem *Tu ontem* (You yesterday) are thought to be effective in representing the compass of the dance and the dancer's movements. It sounds like music. It contrasts with the *Tu* (70 ms) in the verse *Tu davas* (795 ms) which occurs in a stanza in which the poet expresses his anger. Figure 1 shows these two productions of *Tu* followed by words which exhibit the same number of syllables and stress pattern.

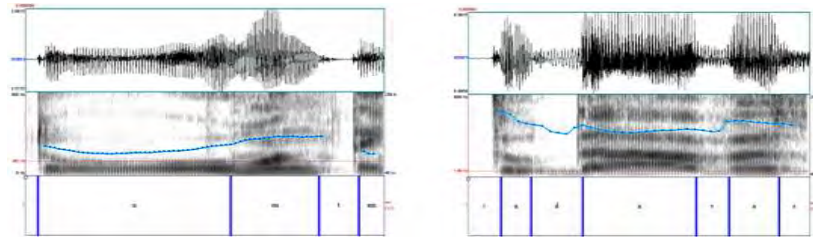


Figure 1. Waveform, wideband spectrogram, f0 contour and orthographic transcription of the segments in the verses Tu ontem (You yesterday) and Tu davas (You give).

The synesthetic kind of symbolism has been used to express the dynamics of the dance which starts fast and gets slower towards the end. Comparison among the stanza repetitions shows that changes in speech rate, rhythm and intonation are introduced by the actor to represent changes related to the dynamics of the dance. Lengthening of fricative sounds and nasalized vowels have also been used in that context. Measurement of the VV units in ms indicated the fifth repetition has longer VV units than the others. Oneway Anova showed that it differs statistically from the first, the second and the third repetitions ( $p= 0.000$ ) as well as from the fourth ( $p=0.001$ ). Figure 1 contrasts the duration of VV units of the utterances in the five repetitions of the stanza.

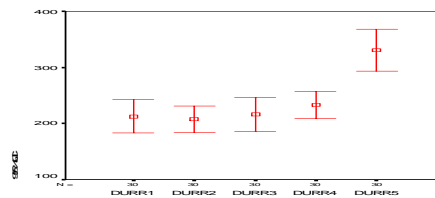


Figure 2. Graphic showing the median values and the standard deviation of the duration in ms of the VV units in the five repetitions of a stanza.

The fifth repetition, which was found to differ from the others in relation to f0 (median, 99,5 quantil, skewness and its first derivate mean, standard-deviation and skewness), occurs after the act of dancing ceases and follows the stanza in which the poet's beloved is described as *batida, caída, sem vida, no chão* (beaten, fallen lifelessly onto the ground). The ceasing of the dance is expressed by changes in speech rate, rhythm and intonation. The actor creates a sound metaphor, speaking at a lower speech rate, producing a lowered larynx voice quality setting and introducing silent pauses.

Instances of metalinguistic symbolism comprised the use of intonation patterns, pitch range and voice quality to signal affective states and

communicative functions. The verse *Não mintas* (Do not lie) was produced with varied intonation patterns, pitch ranges and voice qualities throughout the text. There were also differences in F0 alignment and duration. The judges reported higher degrees of activation for the second, third and fourth repetitions which were produced with hyperfunction and close jaw voice qualities and higher degrees of pleasantness for the fifth repetition which was produced with expanded pharynx. The second, the third and the fourth repetitions were correlated with the expression of admonition, anger and exasperation, the first to request and the fifth to advice and plea (Figure 3).

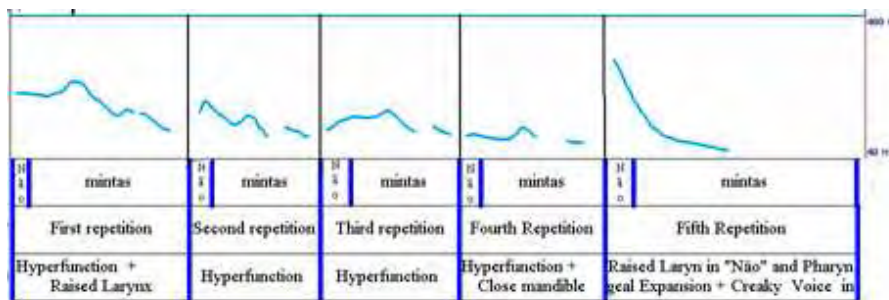


Figure 3. The waveform, the f0 contour, and tiers of annotation for the five repetitions of the utterance *Não mintas* (Do not lie). The first indicates the limits between the two words, the second refers to the number of the repetition and the third identifies the kind of voice quality setting.

## Conclusions

Correlations between production characteristics, acoustic properties, perceived affective states and text meaning production demonstrate productive use of sound symbolism and corroborate the discussion on the direct links between sound and meaning.

## References

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