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# Executives' speech expressiveness: analysis of perceptive and acoustic aspects of vocal dynamics

## *Expressividade da fala de executivos: análise de aspectos perceptivos e acústicos da dinâmica vocal*

### ABSTRACT

**Purpose:** To analyze speech expressiveness in a group of executives based on perceptive and acoustic aspects of vocal dynamics. **Methods:** Four male subjects participated in the research study (S1, S2, S3, and S4). The assessments included the Kingdomality test to obtain the keywords of communicative attitudes; perceptive-auditory assessment to characterize vocal quality and dynamics, performed by three judges who are speech language pathologists; perceptive-auditory assessment to judge the chosen keywords; speech acoustics to assess prosodic elements (Praat software); and a statistical analysis. **Results:** According to the perceptive-auditory analysis of vocal dynamics, S1, S2, S3, and S4 did not show vocal alterations and all of them were considered with lowered habitual pitch. S1: pointed out as insecure, nonobjective, nonempathetic, and unconvincing with inappropriate use of pauses that are mainly formed by hesitations; inadequate separation of prosodic groups with breaking of syntagmatic constituents. S2: regular use of pauses for respiratory reload, organization of sentences, and emphasis, which is considered secure, little objective, empathetic, and convincing. S3: pointed out as secure, objective, empathetic, and convincing with regular use of pauses for respiratory reload and organization of sentences and hesitations. S4: the most secure, objective, empathetic, and convincing, with proper use of pauses for respiratory reload, planning, and emphasis; prosodic groups agreed with the statement, without separating the syntagmatic constituents. **Conclusion:** The speech characteristics and communicative attitudes were highlighted in two subjects in a different manner, in such a way that the slow rate of speech and breaks of the prosodic groups transmitted insecurity, little objectivity, and nonpersuasion.

### RESUMO

**Objetivo:** Analisar a expressividade da fala de um grupo de executivos a partir de dados perceptivos e acústicos da dinâmica vocal. **Métodos:** Participaram quatro sujeitos (S1, S2, S3 e S4), do gênero masculino. Realizou-se aplicação do teste *Kingdomality* para obtenção dos descritores de atitudes comunicativas; avaliações: perceptivo-auditiva da qualidade e da dinâmica vocal, realizada por três fonoaudiólogos juízes; perceptivo-auditiva para julgamento dos descritores; acústica da fala para avaliação de elementos prosódicos (*software Praat*) e análise estatística. **Resultados:** Segundo análise perceptivo-auditiva da dinâmica da voz, S1, S2, S3 e S4 não apresentaram alterações vocais e todos foram considerados com *pitch* habitual abaixado. S1: apontado como inseguro, não objetivo, não empático e não convincente, com uso inadequado de pausas, formadas principalmente por hesitações; separação inadequada dos grupos prosódicos, com quebra de constituintes sintagmáticos. S2: uso regular de pausas para recarga respiratória, organização de frases e ênfase; considerado seguro, pouco objetivo, empático e convincente. S3: apontado como seguro, objetivo, empático e convincente, com uso de pausas regulares para recarga respiratória e organização de frases e hesitações. S4: o mais seguro, objetivo, empático e convincente, com uso adequado das pausas para recarga respiratória, planejamento e ênfase; os grupos prosódicos coincidiram com o enunciado, sem separar os constituintes sintagmáticos. **Conclusão:** As características de fala e as atitudes comunicativas se destacaram em dois sujeitos de forma contraposta, de modo que a taxa de elocução lenta e as quebras dos grupos prosódicos transmitiram insegurança, pouca objetividade e não convencimento.

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## INTRODUCTION

With regard to executive professionals, organizations have invested in the improvement of their collaborators' speech expressiveness. This action has been considered a strategic factor to achieve competitive differential, credibility, and positive reputation. Such an investment includes not only the opening of new communication channels, but also the collaborators' training, especially executives, whose speeches will represent the identity of a company<sup>(1)</sup>.

As the present investigation comprises aspects related to executives' speech expressiveness, it is important to point out some concepts about this role. Executives work inside an organization with the role of planning, organizing, managing, and distributing tasks that are performed by other employees. They establish a formal leadership and clarify to the collaborators about what is expected from them<sup>(2,3)</sup>.

On the basis of the definition of expressiveness as a level of information in the communication process<sup>(4)</sup>, speech expressiveness is built from interactions between segmental (vowels and consonants) and prosodic (rhythm, intonation, voice quality, elocution rate (ER), pauses, and stress) elements and between sound and meaning. Perception of the resources used in speech expressiveness happens in the interaction of what is the speaker's intention and what is the listener's interpretation<sup>(5)</sup>.

Prosody and constituting elements mold the enunciation; therefore a "manner of speaking" is printed to what has been speaking, which may be intentionally or not intentionally and listener-directed. With regard to the communicative role, there is a reference to a hearable aspect of the prosodic elements. In the expressiveness plan, there is a distinction between the prosodic roles, comprising expression of attitude, interpersonal posture, and kind of elocution; the affection roles, such as sadness, joy, anger, and affections such as humor; and indicial roles, which are signs of gender, social origin, and dialect<sup>(6)</sup>.

According to speech language pathologists' practice regarding speech expressiveness of radio professionals, the term speech expressiveness refers to the transmission of emotions and intentions in the message<sup>(7)</sup>.

The study<sup>(8)</sup> about persuasive effects of voice quality and dynamics in advertising broadcasters demonstrated that the assessed speakers with the most convincing, enthusiastic, and pleasant speech presented lower pitch, strategic demarcation of pauses, accurate articulation, and average ER. However, speakers considered as little convincing and pleasant had higher pitch and fast ER.

The variation in parameters constituting vocal dynamics and effective indication of frontiers between enunciations allow the comprehension of the enunciation and favor the listener/speaker's attention focus<sup>(9)</sup>.

The study with teachers<sup>(10)</sup> was carried out applying the speech expressiveness assessment in pedagogy students, using, in order of preference, classifications such as motivating, pleasant, catch the attention, and transmits solidity and hesitation. Speech language pathologists evaluated the use of pauses and duration of enunciations, ER, articulation, intonation, and occurrence of melodic standard repetition. The teacher, whose

speech expressiveness was positive, presented accurate articulation, ER with average variation, and pitch variability, and his or her speech seemed objective and secure. The teacher, whose speech expressiveness was negative, presented inaccurate articulation, slow ER, and little pitch variability, with a speech that seemed insecure for the listeners.

With the aim of studying emotion effects on the voice, speech, and fluency when speaking in front of an audience, a study<sup>(11)</sup> analyzed the speech of four subjects in the following situations: seminar/lecture; interview; moments before the lecture and interview; right after the lecture. The perceptive-auditory assessment for the analysis of voice and speech fluency parameters and discourse analysis was done. In conclusion, the changed emotional status interfered in the pneumo-phonarticulatory coordination, in the production of vices of the language, in speech intelligibility, in the appearance of hesitations, repetitions, extensions, and filling sounds.

With regard to essential frequency, deeper voices are considered more pleasant<sup>(12)</sup> and transmit more safety, authority, and credibility<sup>(13)</sup>. The ER can be classified as slow, average, or fast and is directly related to temporal standards. Its variations affect not only the duration but also the quality of segments<sup>(14,15)</sup>.

The articulation rate (AR) is the proportion between the speech total time (including filled pauses, syllable extensions, and silent pauses) and the number of phonetic syllables per second. The AR can be considered as slow, average, or fast, in which 3.7–4.8 syllables per second is average and 4.6–6.3 syllables per second is fast<sup>(16)</sup>.

Pause is a prosodic element that helps constructing and comprehending the discourse meaning, favors the change of shifts between speakers, and enables message processing, as it delimitates the prosodic continuity. Pauses coincide with synthetic frontiers, which, in general, mark frontiers between sentences. Their use is indicated for the movement of synthetic elements and for signaling a change in the semantic content. Unexpectedly, the use of pauses may represent a hesitation that reveals speech reorganization. Furthermore, it can be used as a resource for emphasis, to call the attention to what will be said<sup>(17)</sup>.

According to some authors<sup>(8,18-20)</sup>, pauses can be studied regarding their structure, role, distribution, and time. With regard to structure, pauses can be silent when there is actually a silence that can be used for different purposes; filled, when they happen in nonlinguistic content productions, such as extension of some parts of a word, in sounds like [m] and breathing in with a hearable noise; or signalized, when there is f<sub>0</sub> variation or break in the speech flow. Pauses can be divided based on their role into discursive pauses of planning to demarcate the constituents of sentences (words, groups of words or sentences and they are used to organize parts of the discourse, such as the beginning and end of a report); expressive pauses have the role of highlighting words that the speaker wants to emphasize, thus producing a certain effect; and respiratory pauses happen due to a physiological reason. Pauses may happen between or in the enunciations, with different roles according to the speaker's intention and needs, and they can be brief or long regarding their temporal classification<sup>(21)</sup>.

In the study<sup>(22)</sup> about the use of pauses in different television styles, pauses were classified into delimitative for the planning and structure of the discourse; and planning to arrange speech continuity and discursive structuration, which organizes parts of the discourse. Speech samples from two journalists in five television shows were chosen. The measures were taken by means of the acoustic analysis, with segmentation of the narration times and silent pauses in milliseconds (ms). Brief silent pauses presented measures between 50 and 250 ms and a plosive element together with the pause; pauses were those above 200 ms. Long silent pauses showed more than 250 ms. The results point out changes when using pauses due to the kind of narrative. In conclusion, pauses, in the style of television interactive shows, are meant to build speech shifts and, among other prosodic elements, their appropriate use is essential to build speech expressiveness as they perform a delimitative and signaling role of meaning effects.

The objective of this research was to analyze the speech expressiveness in a group of executives based on perceptive and acoustic data of vocal dynamics.

## METHODS

The Ethics Committee from Pontifícia Universidade Católica de São Paulo (PUC-SP) approved this study, using the protocol number 423/2011.

The research included four executives (S1, S2, S3, and S4), who signed the informed consent.

The Kingdomality test<sup>(23)</sup>, which was created for a job placement program, was used with the aim of characterizing subjects regarding the corporative styles. Based on them, semantic keywords corresponding to communicative aspects used in the analysis of perceptive-auditory impressions about subjects' speech expressiveness were chosen. The program comprises four groups of corporative styles, namely supporters, challengers, maintainers, and explorers. In the Kingdomality test, the authors mention terms related to speech expressiveness and communicative skills to describe the corporative style of each group, such as being a good listener, empathetic, objective, convincing, polite, and secure, among others.

For speech sample collection, the speech was recorded and it was characterized through reports with suggestions of investment products. It ended with a persuasive sentence about the products presented in the advisory service.

Each subject was individually recorded for 10 min, in a silent room, using a Sony digital recorder, model ICD-PX312/PX312F, attached to a head microphone that was positioned at 10 cm from the left oral rhyme. Recording was done through the acoustic analysis software from Vocalgrama program. Digital representation and edition of data were performed through the Sony Sound Organizer program, version 1.1, installed in a laptop computer from Dell Inspiron.

In the perceptive-auditory analysis of vocal quality, some aspects of vocal production were considered for the assessment, such as presence or absence of vocal quality alteration; balance or imbalance of the resonance system, and accuracy

or inaccuracy in articulation (speaking comprehension or unintelligibility).

The perceptive-auditory analysis of the voice dynamics had as aim the assessment of voice dynamic aspects, such as pitch variation, loudness variation, speech continuity, ER, and respiratory support. The voice dynamic fragment of the instrument Vocal Profile Analysis Scheme (VPAS) was used for this purpose<sup>(24)</sup>. Three speech language pathologists, acting as judges, took part in the analyses. They are graduated in phonetics and specialized specifically in assessment under phonetic perspective (VPAS-PB). They received via e-mail the recordings with the persuasion sentence of the four subjects and the assessment instrument.

For surveying the impressions caused by executives' speech expressiveness, related to communicative attitudes, four qualitative keywords described in the Kingdomality test were chosen, namely secure, empathetic, objective, and convincing. A semantic questionnaire was prepared to evaluate 30 judges, who are considered here as probable investors of several occupations and different ages, and they performed the judgment together with the recordings.

The Praat program, version 5.2.21 ([www.praat.org](http://www.praat.org)), was used for the acoustic analysis — this software is freely distributed for acoustic phonetic research. The following measurements were achieved through the acoustic analysis: measures of essential frequency —  $f_0$  (minimum  $f_0$ , maximum  $f_0$ , and  $f_0$  extension in Hertz, Hz), which were taken in all the sentence extension by writing the minimum and maximum  $f_0$  values, and extracting extension measures of  $f_0$ ; measures of duration — vowel-to-vowel unit measure (VV unit), which comprises the extension of a vowel until the beginning of the following vowel. In every sentence, the unities of produced enunciations were delimited and segmented by each of the four subjects. After eliminating the unities, division of the number of VV unities by the duration of sentence time was done. Thereunto, the Z-score statistic test was applied to these measures to obtain a mitigation of the VV unities duration contour, which facilitated verifying the highlighted duration peaks through separation of the prosodic groups. The results considered as the most important or significant peaks those that surpassed that red upper line of the graphics 5, 6, 7, and 8 for the subjects 1, 2, 3, and 4 respectively. The ER measurement of the enunciation was calculated as the number of syllables per second; whereas the AR of the enunciation measurement was obtained through the division of phonetic syllable number by second; pauses were perceptively marked with support in the inspection of sound wave and of the wideband spectrogram.

Pauses were classified regarding their structure into silent, filled, and signaled pauses. With regard to their role, they were divided into respiratory, discursive, and expressive pauses, and also, as to time characteristics, into long or short lengths and in regular or irregular intervals.

In this study, the pause classification model<sup>(21)</sup> was used (Chart 1).

Data descriptive analysis was performed through absolute and relative frequencies, central (mean and median) and dispersion (standard deviation, minimum, and maximum) tendency

measurements. The 95% confidence interval (95%CI) was calculated as estimation per interval to verify the difference between proportions.

To evaluate similarity among the research subjects, the multivariate analysis of hierarchical agglomerative cluster was used applying the technique of closest neighbor and Euclidian distance dissimilarity, through simple connection. The graphic representation was presented in a dendrogram. In such process, all variables were standardized, namely

- a) nominal variable, simple transformation of alpha-numerical to numerical character;
- b) ordinal variable, transformation through equation (real value (value above scale 1); and
- c) continuous variable, transformation through equation ((real value – mean)/standard deviation).

For values regarding the division of VV unities number by the sentence time duration, for each subject, the Z-score test and mitigation of the curve through mobile mean were performed. The subjects were compared using the Kruskal–Wallis test. Nonparametric tests were used because the continuous variables did not present a normal distribution in the Kolmogorov–Smirnov test.

A 5% descriptive level for statistical significance was considered. The statistical analyses were done in the statistical program Statistical Package for the Social Sciences (SPSS) software for Windows, version 17.0, and in EstatCamp.

**RESULTS**

The characterization of subjects shows that they were especially male; there were two administrators, and two economists working as managers. With regard to the Kingdomality

corporative style, two of them were challengers and the other two were helpers.

Emissions of subjects were described in speech fragments and pause moments (indicated with a slash –/–, the parentheses indicated the kind regarding structure; role; time had its length signalized between # and in ms) and are found in Appendix 1.

**Perceptive-auditory analyses**

With regard to quality and dynamics of the voice and impressions about speech expressiveness related to semantic keywords and acoustic analysis, the conclusions were seen as follows.

S1 presented appropriate vocal quality, precise articulation, and laryngopharyngeal resonance; lowered habitual pitch, pitch with decreased extension, decreased variability of pitch, increased habitual loudness, neutral extension of loudness, decreased variability of loudness, interrupted continuity, slow ER, and inappropriate respiratory support. S1 was also more rejected because the subject was pointed out as insecure, non-objective, nonempathetic, and nonconvincing. There were also lower values of elocution and ARs; four moments of pause, in which one was a respiratory pause that lasted 143 ms and the others were characterized by hesitations, i.e., signalized pause, with long syllabic duration in plosive sound (586 ms); filled, breathing in with hearable noise (378 ms); and filled, characterized by hesitation and total obstruction of articulators in the production of plosives (1,688 ms). Intervals between pauses were irregular because the pauses were used with breakings of prosodic groups and separation of syntagmatic constituters.

S2 presented appropriate vocal quality, precise articulation, and balanced resonance; neutral habitual pitch, decreased extension of pitch, decreased variability of pitch, neutral habitual

**Chart 1.** Classification of pauses

Division	1. Speech flow 2. Speaker's structure	Sentence emission
Physiological	Respiratory	
Grammar fact	Inside the speech	1. It marks the frontier of the intonation group 2. It coincides with synthetic frontiers 2.1. Inside and between sentences 2.2. Sentence breaking; fluency or hesitation
Structural	1. Silent	
	2. Filled	2.1. Lengthening of word parts 2.2. Sounds like [m], [am], [né] 2.3. Breathing in with a hearable uproar
	3. Signalized by phonetic-acoustic proprieties	3.1. Lengthening: long syllabic duration, especially in plosive sounds 3.2. Change of vocal quality: change in voice quality of the end of the enunciation
Functional	1. Respiratory 2. Discursive: speech planning or structure of parts 3. Expressive: emphatic	
Temporal	1. Length: short or long 2. Intervals: regular or irregular	



loudness, neutral extension of loudness, increased variability of loudness, interrupted continuity, quick ER, and appropriate respiratory support. S2 was considered secure, very little objective, empathetic, and convincing. The subject showed a representative value with higher variation of f0; average values for the ER and AR; nine moments of pause, in which one was respiratory (190 ms); one was silent and characterized by interruption at time of speaking (250 ms); four were filled, with extension of word parts (1,070, 597, 370, and 250 ms); one was expressive as a resource of emphasis (563 ms); and two were discursive for planning and organization (437 and 358 ms). Intervals were more regular in comparison to the ones from S1, because S2 used a pause for respiratory reload and structuring and emphasis pauses at speaking, even though some moments of hesitation were also seen. S3 had an appropriate vocal quality, precise articulation, and laryngopharyngeal resonance; lower habitual pitch, decreased extension of pitch, increased variability of pitch, neutral habitual loudness, neutral extension of loudness, increased variability of loudness, uninterrupted continuity, quick ER, and inappropriate respiratory support. S3 was considered secure, objective, empathetic, and convincing; values were considered means for ER and AR; five moments of pause, two respiratory (115 and 340 ms), two filled with extension of word parts (421 and 1856 ms), and an expressive one as a resource of emphasis (384 ms).

In comparison with S1, S3 presented intervals more regularly, used pauses of respiratory reload, and emphasis pauses at speaking, even though S3 had some hesitation moments similarly to S2. S4 showed appropriate vocal quality, precise articulation, and balanced resonance; lowered habitual pitch, decreased extension of pitch, decreased variability of pitch, neutral habitual loudness, neutral extension of loudness, decreased variability of loudness, uninterrupted continuity, quick ER, and appropriate respiratory support. S4 received higher score, being assessed as the most secure, objective, empathetic, and convincing; values indicated lower variation of f0; values were considered average for ER and AR; there were five moments of pause, three discursive, for planning and structuring of speech (991, 532, and 208 ms), and two expressive ones, characterized as a resource of word emphasis. Intervals between pauses were regular, did not present hesitation, and prosodic groups coincided with the enunciation without separating the syntagmatic constituters.

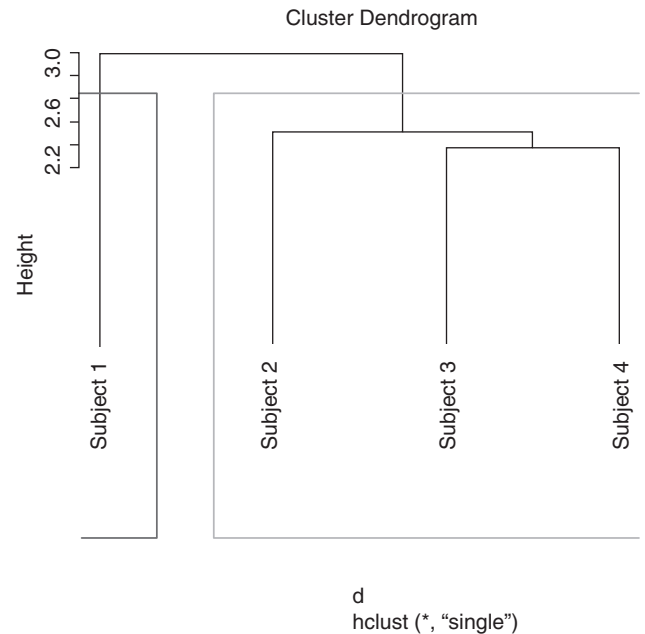
Using the distribution of subjects, according to the assessment of three speech language pathologists working as judges, the closeness matrix was calculated (Chart 2). Based on such data, we verified a formation in which S3 and S4 are close, creating a group with S2 that is a little farther (Figure 1).

With regard to impressions caused by executives' speech expressiveness, associated with communicative attitudes, the calculation of number and percentage of research subjects was done based on the characteristics of impressions on speech expressiveness related to semantic keywords, which were attributed by 30 laymen (Table 1).

In the comparison performed applying the 95%CI, it was seen a statistically significant difference ( $p < 0.050$ ) among all

**Chart 2.** Closeness matrix according to the assessment of vocal quality and dynamics characteristics, performed by judges who are speech language pathologists for the four subjects

Subjects	1	2	3	4
1	0.000	12.104	10.157	10.691
2	12.104	0.000	6.293	6.698
3	10.157	6.293	0.000	5.641
4	10.691	6.698	5.641	0.000



**Figure 1.** Dendrogram based on cluster multivariate analysis according to the vocal quality and dynamics assessment performed by judges who are speech language pathologists for the four subjects

subjects when “secure” was assessed. There was no difference between S1 and S2 regarding “objective”. S3 and S4 presented a difference among themselves and with S1 and S2. In the presentation of “empathetic” and “convincing” features, it was seen a difference among all subjects ( $p < 0.005$ ; Figure 2).

**Acoustic analysis**

The distribution of absolute values for essential frequency measures (Table 2) and values associated with essential frequency measures for the four subjects (Figure 3) was seen.

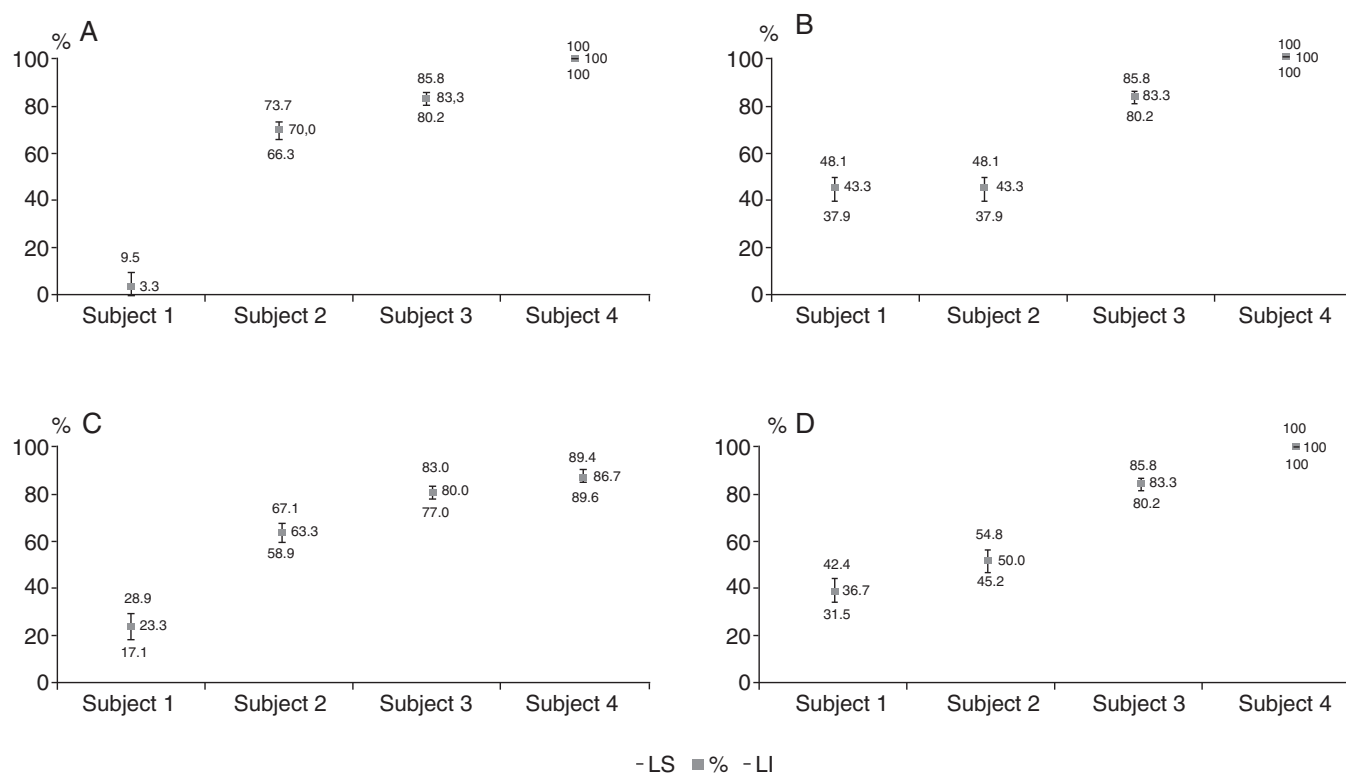
Using the absolute values of the analyzed measures of duration, S2, S3, and S4 were in a group and S1 in another (Table 3) in the division per groups.

There was no difference among subjects regarding the number of VV unities removed ( $p = 0.761$ ). However, when such variable was continuously analyzed based on the subjects, peaks of duration that marked important moments of pause use were seen, both for aspects considered negative at speaking, such as hesitations, and also for positives ones at speaking, such as sentence emphases and structures (Table 4 and Figure 4).

**Table 1.** Number and percentage of research subjects according to the characteristics of the impressions regarding the speech expressiveness related to semantic keywords, attributed by 30 non-expert judges

Variable	S1	S2	S3	S4
	n (%)	n (%)	n (%)	n (%)
Secure	1 (3.3)	21 (70.0)	25 (83.3)	30 (100.0)
Insecure	29 (96.7)	5 (16.7)	2 (6.7)	0 (0.0)
Neutral	0 (0.0)	4 (13.3)	3 (10.0)	0 (0.0)
Objective	13 (43.3)	13 (43.3)	25 (83.4)	30 (100.0)
Nonobjective	13 (43.3)	8 (26.7)	4 (13.3)	0 (0.0)
Neutral	4 (13.4)	9 (30.0)	1 (3.3)	0 (0.0)
Empathetic	7 (23.3)	19 (63.4)	24 (80.0)	26 (86.8)
Nonempathetic	14 (46.7)	7 (23.3)	2 (6.7)	2 (6.6)
Neutral	9 (30.0)	4 (13.3)	4 (13.3)	2 (6.6)
Convincing	11 (36.7)	15 (50.0)	25 (83.4)	30 (100.0)
Nonconvincing	16 (53.3)	9 (30.0)	4 (13.3)	0 (0.0)
Neutral	3 (10.0)	6 (20.0)	1 (3.3)	0 (0.0)
Total of subjects	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)

**Caption:** S = subject



**Caption:** LS = superior limit; LI = inferior limit

**Figure 2.** Rate and 95% confidence interval (95%CI) for the four research subjects for the categories (A) secure, (B) objective, (C) empathetic, and (D) convincing

**DISCUSSION**

With regard to the perceptive-auditory analysis of voice dynamics through the assessment of the majority of judges, S1, S2, S3, and S4 showed lowered habitual pitch. This characteristic may be associated with the fact that they were all men with f0 values, which is in agreement with what

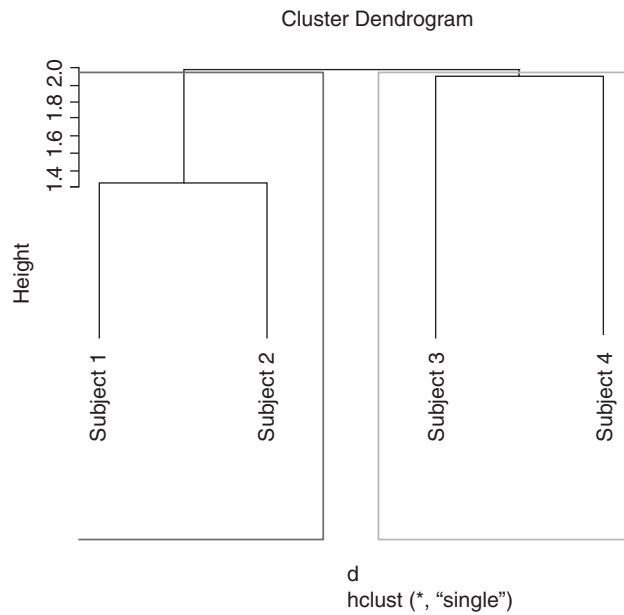
was found in the literature related to the male gender and vocal alteration<sup>(12)</sup>.

With the exception of S1, the other subjects had positive results as to speaking. One of the acceptance factors may be associated with lower pitch, since some studies showed that a deeper voice is more pleasant and creates a higher sensation of safety to the listeners<sup>(8,9,13)</sup>.

**Table 2.** Absolute frequency of the essential frequency measures for the four subjects

Measures (Hz)	Subjects			
	1	2	3	4
Minimum f0	76	80	92	80
Maximum f0	173	214	200	150
f0 Extension	97	134	108	70

**Caption:** f0 = essential frequency



**Figure 3.** Dendrogram based on cluster multivariate analysis for the assessment of essential frequency measures

**Table 3.** Absolute frequency of duration measures for the four subjects

Measures	Subjects			
	1	2	3	4
Sentence duration in seconds	15	19	19	22
VV total of unities	42	67	86	96
Elocution rate in syllables (s)	2.8	3.5	4.5	4.6
Articulation rate in syllables (s)	3.8	4.4	5.5	5.7

**Caption:** VV = vowel to vowel

As to ER values, both in the perceptive-auditory and acoustic analyses, S1 had a quite slow ER, while S2, S3, and S4 showed a quick ER in the perceptive-auditory assessment performed by the speech language pathologist judges, and mean ER in the acoustic assessment. Subjects with mean ER had higher acceptance with regard to speaking by judges, while the slow ER of a speaker may distract the listener and transmit insecurity<sup>(8,10)</sup>.

We have seen that S1 had a slow AR, S2 had a mean AR, and S3 and S4 had a quicker AR; these results are similar to those mentioned in another research<sup>(19)</sup>.

Based on results from the removal of VV unities through sentence time duration, which were demonstrated in the statistical analysis, it was possible to see duration peaks that happened in the emissions of enunciations of every subject concerning separation of prosodic groups, and which were marked when subjects used pauses.

In S1’s speech, duration peaks that characterize hesitation and disfluency at speaking can cause the listener a feeling of insecurity, impression of lack of expertise on the content and comprehension difficulty, through the inappropriate separation of prosodic groups with breaking of syntagmatic constituents<sup>(9,17,18)</sup>.

In S4’s speech, duration peaks happened to organize the word formation to finish sentences and emphasize words. Such data demonstrate the efficient use to separate prosodic groups and favor the message comprehension with lower possibility of ambiguity<sup>(9,17,18)</sup>.

Respiratory reload and hesitations formed the pause moments done by S1. Intervals between pauses were irregular, because they were used with breakings of prosodic groups and separation of syntagmatic constituents. This speech formation reinforces the impression pointed out by judges of insecure, very little objective, and nonconvincing speech, because breaking of prosodic groups did not coincide with intervals of word groups. Use of pauses in some speech fragments was inappropriate, resulting in the loss of discourse meaning and difficulty of comprehension of the message by the listener, also causing negative impressions regarding speech expressiveness<sup>(8,9,14,18-22)</sup>.

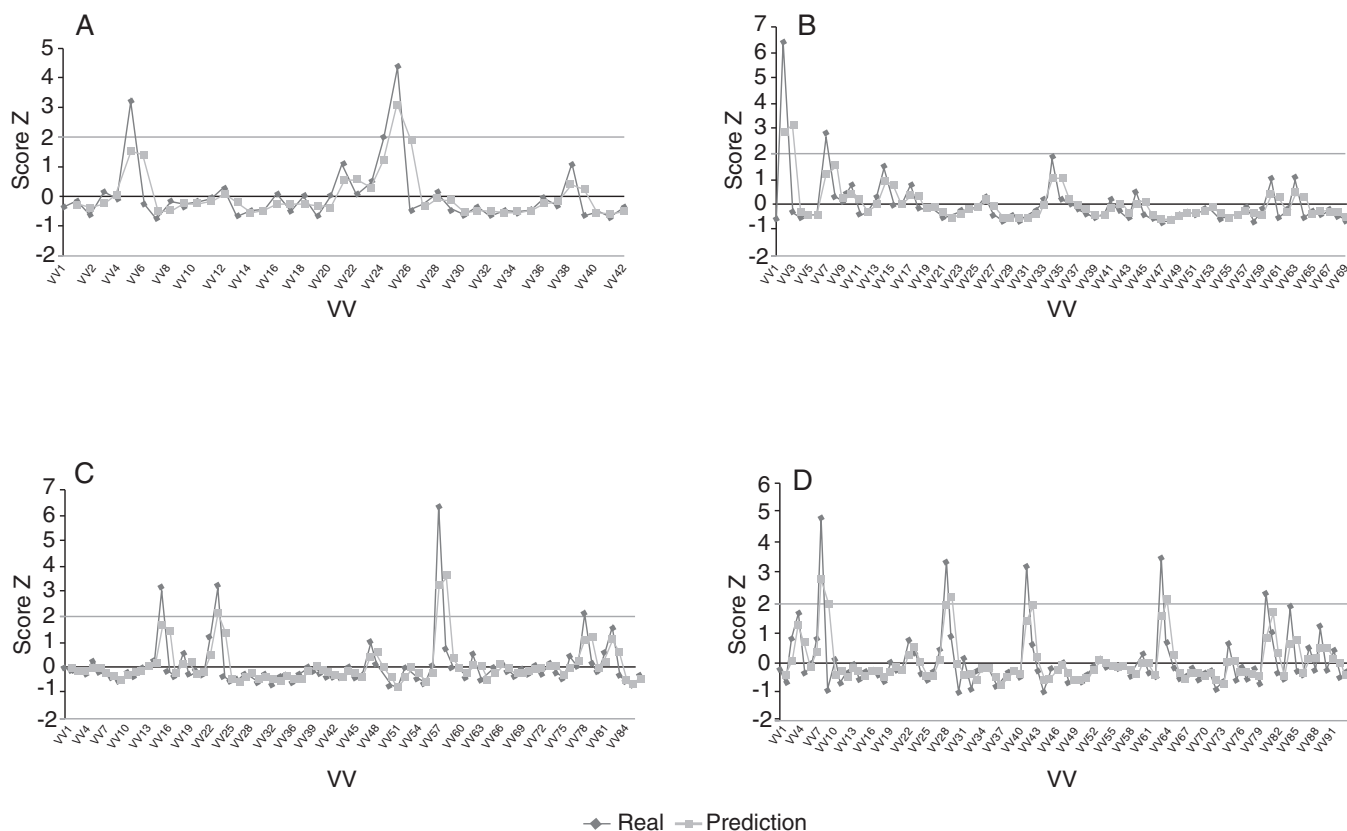
S2 had several pause moments with some hesitations. Intervals happened more regularly if compared to those from S1, because S2 used pauses for respiratory reload and for structure and organization of sentences and emphasis in the speech. These speech characteristics from S2 received more acceptance because they enabled a better comprehension of the message and transmitted positive impressions, such as convincing, empathetic, and secure. Hesitation moments may be responsible for the impression of being considered as very little objective<sup>(8,9,14,18-22)</sup>. Like S2, S3 presented good use of pauses with more regular intervals, used respiratory reload and speech emphasis pauses, even though it had some hesitation moments. The way as S3 made use of pauses enabled a better comprehension of the message and collaborated for being the second one best ranked as positive impressions, i.e., convincing, empathetic, secure, and objective<sup>(8,9,14,18-22)</sup>.

S4 used pauses for speech planning and structuring and as a word emphasis resource. Intervals between pauses were regular, did not present hesitation, and prosodic groups coincided with the enunciation, without separating the syntagmatic components. Pauses that were performed by S4 may be considered strategic ones, because speech was articulated and created unanimity among judges when they evaluated speech expressiveness of this subject as positive, therefore as convincing, secure, empathetic, and objective<sup>(8,9,14,18-22)</sup>. In addition to the reference of pause uses, the discursive pauses applied by S2 and S4 revealed

**Table 4.** Description of the number of vowel-to-vowel unities removed for four subjects

Subjects	VV unities	Mean (SD)	Median	Minimum	Maximum	p-value
1	43	272.4 (241.4)	202	91	1.319	0.761
2	69	268.7 (295.7)	188	72	2.177	
3	84	263.6 (285.0)	191.5	15	2.110	
4	93	232.1 (179.9)	181	53	1.106	

**Caption:** VV = vowel to vowel; SD: standard deviation



**Caption:** VV = vowel to vowel

**Figure 4.** Analysis of duration time — mitigation of duration contour of vowel-to-vowel unities, occurrence of duration peaks that separate the prosodic groups — in milliseconds through the score Z for (A) Subject 1, (B) Subject 2, (C) Subject 3 and (D) Subject 4

these executives' ability to identify relevant parts of the speech context and sensitivity in highlighting them to the listener, making the message process easier<sup>(8,9,14,15,18-22,25,26)</sup>.

The expressive pause, according to literature<sup>(19)</sup>, can be considered as emphatic, because it has the aim of emphasizing the provided information. Expressive pauses used by S2, S3, and S4 showed subjects' ability to use the emphasis resource when marking certain words, and showed the intention of reinforcing the transmitted ideas.

With regard to the executive professional<sup>(2,3)</sup>, it is expected that this professional is a secure, convincing, and objective person, which are characteristics of persuasion. Based on this, it is important to emphasize that S4 was distinguished due to positive aspects, whereas S1 showed up due to negative ones, associated with communication resources.

Results from perceptive-auditory and acoustic analyses performed in this investigation may contribute for the work of speech language pathologists regarding expressiveness, mainly from executives. In the customized guidance performance, we suggest comprehending individual characteristics and what existent skills may be improved, although we also consider the expected style due to the occupation and due to what the company offers. The mentioned findings may help the speech language pathologist better understand the voice dynamics and resources to be worked to impress and create meaning. Special attention may be given to the use of pauses, in a way that the prosodic groups may coincide with the enunciation, without the separation of syntagma constituents, a characteristic that is quite evident in this study.



## CONCLUSION

Based on the achieved results, the conclusion was that the characteristics of speech expressiveness used by a group of executives were associated with adjustments and variations performed in the production of vocal quality and voice dynamics. With regard to vocal dynamics, two subjects were distinguished: one, positively, because when the individual used the prosodic resources properly, he/she transmitted security and was considered objective, empathetic, and convincing. The other subject showed up negatively because the resources were not efficient, and with the breaking of prosodic groups, he/she did not transmit security and was pointed out as a very little objective, nonempathetic, and nonconvincing person.

*\*DMSSM was in charge of the project, study design, data collection and tabulation, data analysis, and manuscript writing; IV was responsible for the study design and review of the manuscript writing; ACAMG was in charge of the manuscript writing and review; SM was responsible for the study design, collaborated with data analysis, and manuscript writing and review; LPF was in charge of the project and study design, supervised data collection, and helped in data analysis and review of the manuscript.*

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**Appendix 1.** Description of the emission of subjects with fragments of the speech and pause moments (the type is marked with a slash - / - and in parentheses, according to its structure; role; time, with length signaled between # and in ms).

S1	“Seu dinheiro vai estar em mãos de / (sinalizada – duração silábica longa em som plosivo; #586ms# ) profissionais responsáveis, qualificados / (respiratória; #143ms#) e que vão estar / (preenchida – inspiração com ruído audível; #378ms#) dispostos / (preenchida; longa #1.688ms# – hesitação – ãm a e obstrução total dos articuladores na produção de plosivas) proporcionar um melhor resultado possível às suas aplicações.”
S2	“Seria uma / (preenchida – aaa – alongamento de partes da palavra; #1070ms#), cesta de produtos / (expressiva; #563ms#) que possuem na verdade / (discursiva; #437ms#) o conjunto / (silenciosa – interrupção da fala; #250ms#) de estar em todos os mercados / (respiratória; #190ms#) e te remunerando mais / (preenchida – ééé – alongamento de partes da palavra; #597ms#) condizentemente com a taxa de / (preenchida – eee; #370ms#) rentabilidade que a gente verifica hoje nesse / (discursiva; #358ms#) cenário econômico / (preenchida – inspiração com ruído audível; #250ms#) brasileiro.”
S3	“Duas coisas, acho que, / (respiratória; #115ms#) a instituição que você tá aplicando, né / (expressiva; #384ms#) transparência e tudo mais. / (preenchida – ééé – alongamento de partes da palavra; #421ms#) e a recomendação de investimento, utilizando a estrutura da consultoria / (respiratória; #340ms#) sempre, acho que não é neste momento / (preenchida – ééé – alongamento de partes da palavra; #1856ms#) só. A gente tem que fazer esta avaliação sempre, reavaliar uma vez a cada ano.”
S4	“Eu diria que / (discursiva; #991ms#) a melhor opção hoje, / (expressiva; #173ms#) pra que você aplique esse dinheiro é dividindo esse dinheiro em três / (expressiva; #467ms#) parte pra te deixar tranquila no curto prazo, / (discursiva; #532ms#) parte pra te deixar tranquila no longo prazo e até suprir essa questão de família / (discursiva; #208ms#) e parte pra aproveitar essas oportunidades que o mercado oferece, porque hoje os patamares de juros não são mais o que eram antigamente.”