

The roles of pause in speech expression

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Abstract

To study the behavior of the pause within the temporal structure of the speech, the combination of perceptual and acoustic-phonetic analysis is used for the delineation and measurement of the interruption of the audible flow of a theatrical interpretation performed by a single actor. Pauses were classified according to structural, functional, distributional and temporal criteria. The relevance of pause in structuring the oral discourse and in expressing emotions and attitudes is discussed.

1. Introduction

The metric planning of the speech is implemented by means of the segmentation of the spoken text into pauses, by illocutionary and articulatory rates and rhythm [1]. Pauses not only divide the stream of speech but also structure a speaker's monologue or an interaction between two or more speakers. The structure of the dialogue is marked by turn exchanges among the participants and the use of the pause is the most common way to signal such exchanges. However, they do not necessarily take place in a systematic way and they can either introduce a rupture or, if suppressed, overlapping between interactants. [2].

Pauses, as a manifestation of the physiological need to resume breathing, are controlled by the speakers and occur more frequently in turn exchanges and at the end of intonational groups [3,4].

Pauses, as grammar facts, are possible only within the speech of a single speaker calculated and deliberated by him in his own speech turn. Pauses mark the boundaries of intonation groups and coincide, in a general way, with syntactic boundaries, within and between sentences [3]. However, when the pause falls internally in a sentence and breaks the coherence of the intonational structure, the speech is interrupted, making it not fluent or hesitant [4].

From the structural point of view, pauses can be silent, filled or cued by acoustic-phonetic properties such as lengthening, changes in voice quality and f0 variation. The filled pause is the one that presents a non-linguistic content, such as, lengthening of part of a word, most frequently a vowel (type [a:], [o:]) or filled with sounds such as [m:] [3,4].

From the functional point of view, pauses can be classified into respiratory (taking breath), discursive (planning the discourse and structuring parts of the discourse) or expressive (expressing attitudes and emotions) and. Subcategories of expressive pauses include, among others, dramatic and emphatic uses.

From the distributional point of view pauses can occur within or between sentences and other morpho-syntactic constituents.

From the temporal point of view, pauses can be short or long; According to [4], the silent pause is any silence with the minimum duration of 200 ms. Acoustic hints, such as the

abrupt increase of F0, alteration of voice quality at the end of enunciations and longer syllabic duration, mainly in plosive [5] sounds signal perceptively a pause.

According to [5], in both poetic and non-poetic uses of language, syntactic and lexical ambiguity is irreducible. In a poem, the metric structure of the verses demands a pause at the end of each verse, although the linguistic structure may create syntactic and semantic links among the verses, in such a way that the use of a pause is not allowed. In such cases, the speaker will have to decide between the discursive structure of the verses or the syntactic and semantic restrictions depending on his interpretative intentions.

The objective of this work is to describe and analyze the behavior of the pause as a discursive and expressive fact.

2. Methodology

The research corpus is constituted by the poem "I-Juca Pirama", interpreted by a professional actor, in Theatrical Act format recorded on CD (a 21,33 minute recording) in a professional studio. The actor interprets three characters (a Tupi warrior, the warrior's father and a Timbira tribe chief) who interact with each other and the narrator (a fourth character). The poem "I-Juca Pirama" is an old story about an indian who was imprisoned by the Timbiras, a cannibal tribe, and although he was not afraid of being sacrificed, he asked to be set free because he had to help his feeble, old and blind father. The Timbiras set him free because they judged him coward. However, the warrior's father happened to know what had taken place and decided to take his son to be sacrificed. As a dramatic-epic genre, written in 1851, the poem presents indigenous and erudite vocabulary. It is an interpretation with no scenic resources, the presence of other actors and audience to interact with, given it was recorded in studio conditions. For the analysis of the research data, the qualitative approach is used, paralleling sound (phonic material) and sense (utterance meaning) The first procedure comprised listening to the recording in order to select parts to be analyzed.

The criteria used to classify silent pauses was the interruption of the audible flow by a longer or equal time to 200 ms. In cases where the silent pauses were followed by an unvoiced stop consonant sound, the silent interval corresponding to the pause was added to the one derived from the obstruction of the articulators.

Respiratory pauses were identified by the friction noise present at higher frequencies in the broadband spectrogram and pauses signaled by acoustic cues were identified perceptually and by means of the inspection of spectral characteristics and f0 contour.

To analyse discursive pauses, such as the ones taking place at turn exchanges, dialogues between characters were chosen and two parts of the passage in which the father meditates

(dialogues with himself) about the events related to his son's imprisonment (parts VI and IX of the poem) were chosen. In the classification of discursive pauses, the maintenance or change of topics was taken into account.

Turn	Exchange from the chief to the warrior	Exchange from the warrior to the chief
T1	1180 ms	746 ms
T2	1176 ms	337 ms
T3	1103 ms	350 ms
T4	1521 ms	654 ms
T5	1550 ms	190 ms

poem) and the warrior and his father" (part VI of the poem) as well as the passage describing the battle between warrior and the Indians of the enemy tribe (part IX of the poem) and a long passage denominated "The Song of Death" (part IV of the poem (See Appendix, table 4) were used.

The speech utterances divided by the pauses were orthographically transcribed and their length was measured in milliseconds.

3. Results

The analysis of the distribution of pauses at final position in the verse, showed that the speaker not always placed a silent pause at the end of the verse as showed in Table 1. However, pauses signaled by acoustic cues tended to be used to mark the boundaries between the verses in the stanzas, whenever a silent pause was missing. This fact shows the importance of pause in signaling discursive structure.

Table 1: Text and reading divisions contrasted: written poem (first column) and reading (second column). The slant line (/) is used to indicate the distribution of the pauses signaled by the acoustic cues and the number refers to the length of the silent pauses in ms.

Written Text	Reading
Andei longes terras	Andei longes terras/
Lidei cruas guerras,	Lidei cruas guerras # 289 ms#
Vaguei pelas serras	Vaguei pelas serras Dos vis
Dos vis Aimorés;	Aimorés # 274 ms#
Vi lutas de bravos,	Vi lutas de bravos/
Vi fortes - escravos!	Vi fortes/
De estranhos ignavos	escravos # 307 ms#
Calcados aos pés.	De estranhos ignavos Calcados aos pés # 343 ms#

The second situation referred to the pauses that precede a stop sound. In that case the non audible sound is the length of duration of the silence of the pause added to the length of the duration of the obstruction of the articulators, which may vary according to expression intents.

The analysis of the pauses that indicate the turn exchanges between interactants showed that the length of the pauses varied according to the kind of informational content of the passage and to speaker status as shown in the exchange turns between the warrior and the chief in Table 2. The warrior's silent pauses are longer than the chief's because he needs arguments to make the chief change his mind. Another factor is the status of the interactants: the chief is viewed as a symbol

To investigate the respiratory, and expressive pauses, the interactions between the chief and the warrior (part V of the

of authority and besides that he is the winner while the warrior is the one who was imprisoned. The chief always responds faster than the warrior, that is to say, the warrior takes longer to take his turn, because he needs strong arguments to convince the chief that his requests are fair.

Table 2: The length of the silent pauses (in ms) which mark turn exchanges between the chief and the warrior.

Differences related to characters' awareness of facts (known and unknown information) were also found to affect the length of the pauses in turn exchanges. In table 3, the duration (in ms) of silent pauses in a dialogue between the warrior and his father are presented. That dialogue takes place when the warrior meets his father after having been imprisoned and finally released by his enemies. The warrior did not intend to tell his father what had happened to him but as he had taken much more time than the expected to reach his father, the latter became suspicious. As the warrior's father tried to get information about the facts that caused the delay, he asked questions. These were promptly answered by the warrior since he knew the information and was quite uneasy and anxious. The warrior provided only bits of information each time he was asked, what forced his father to wonder about what to ask after each answer. In table 3, longer pauses correspond to those passages where the warrior's father is wondering what to ask. There are only two instances (T5 and T7) in which the warrior's took more time to start his turn. His reluctance in taking the turn was caused by the fact that he noticed his father had become aware of his imprisonment by the enemy tribe.

In one of the cases, the son's turn starts at the same time that of his father ends (T8, From father to son, Table 3). The fact that no silent pause is introduced reinforces the warrior's feelings at that moment of the conversation. He was extremely anxious.

Table 3: The length of the silent pauses (in ms) which mark turn exchanges between the warrior and his father.

Turns	From father to son	From son to father
T1	611	835
T2	841	1214
T3	834	1029
T4	593	1017
T5	1632	1040
T6	703	1190
T7	1792	2075
T8	0	1721
T9	102	2026
T10	866	2137
T11	1108	1590
T12	913	1156
T13	742	1150

The analysis of the dialogues between the chief and the warrior and between the warrior's father and his son showed that the length of the turn exchange pauses vary according to

the roles performed by the interactants, to the fact that information turn out to be shared or not and to the way characters feel.

The silent pauses which divided the utterances produced by a single character (intrapersonal) were found to have a respiratory or/and expressive function. The inhalation noise which can be seen in the broadband spectrogram of Fig. 2 had an expressive effect since it occurred in a context where anger and anxiety were expressed.

Respiratory pauses occurred in regular intervals (Fig. 3) and they varied from 221 and 293ms. This regularity externalizes the speaker's pneumo-phono-articulator coordination which is carried out with great muscle control. However, these same respiratory pauses also fulfill expressive functions, because they contribute to build up the rhythmical pattern necessary to expressing the meaning of the text: the pace in which the battle develops.

Expressive pauses were found to mark the boundaries of intonation groups, and in general, coincided with syntactic boundaries [3,4]. Their duration varied according to the kind of feeling conveyed by the utterance: it tended to be long in passages characterized by thoughtfulness, such as the passage where the warrior's father meditated about the imprisonment of his son (Fig. 4) and short in passages whose content concerned anxiety (Fig. 5).

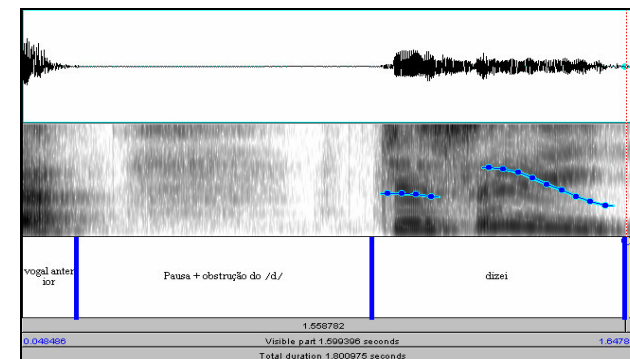


Figure 1: Waveform, f0 contour superimposed onto the wideband spectrogram and annotated tier where the utterance "Dizei" (Say it) is preceded by the silence corresponding to the obstruction interval of the stop consonant [k] and by a pause filled with inspiratory noise.

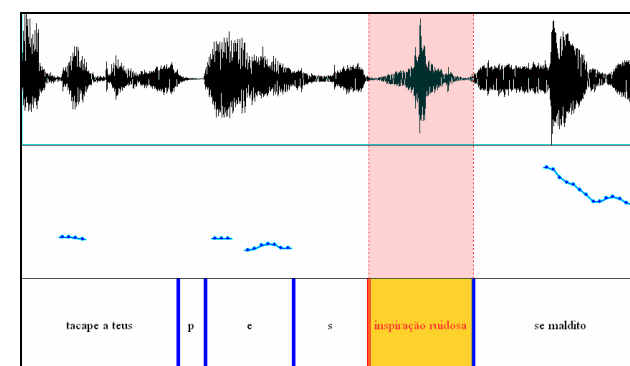


Figure 2: Waveform, f0 contour spectrogram and annotated

tier of the utterance "tacape a teus pés se maldito". The presence of audible inspiratory noise is highlighted.

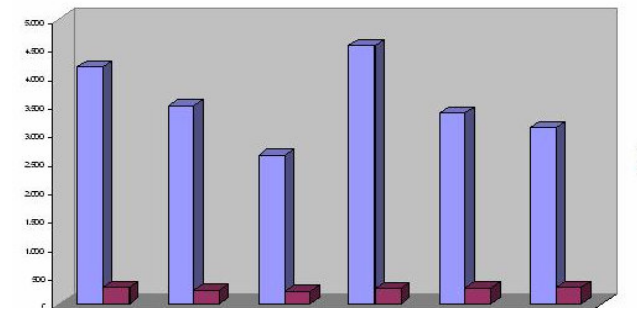


Figure 3: Demonstrative graph of the duration of utterances and respiratory pauses.

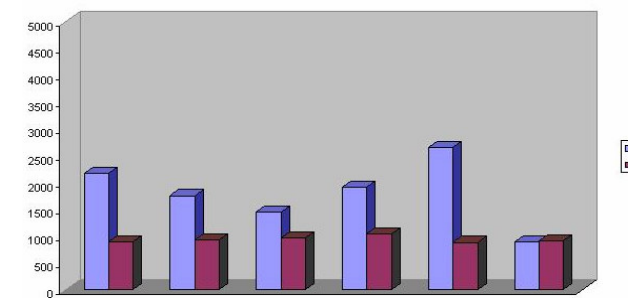


Figure 4: Demonstrative graph of the duration of utterances and respiratory pauses in the context conveying thoughtfulness.

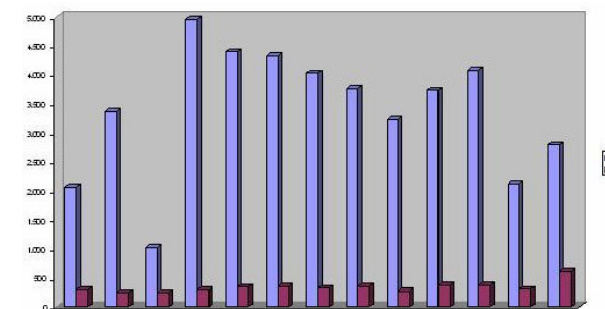


Figure 5: Demonstrative graph of the duration of utterances and respiratory pauses in the context conveying anxiety.

4. Conclusion

The distribution of the pauses in the corpus did not necessarily coincide with the versification of the poem. According to the speaker's expressive intents, syntactic and semantic bonds between the verses were created [5]. Besides the silent pause another kind of filled pause was found, the one filled by audible inspiratory noise and although it is not referred as a category in the literature [1,2,3,4] it is symbolically indicative of tiredness, anxiety and hurry [5].

According to the distribution of the pause in a phonemic sentence, its duration and type, a great number of functional roles can be performed: planning the discourse, segmenting syntactic constituents and expressing emotions and attitudes, among others. Since its functions are so varied, the investigation on speech expressivity must necessarily contemplate its analysis.

6. Bibliography

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Appendix

Table 4: Distribution, duration and functions of silent pauses in the reading of the “death chant”

IG	Dur IG ms	Dur P ms	SPF
Meu <u>canto</u> de morte/Guerreiros, ouvi	2653	1596	1c e 3
Sou <u>filho</u> das selvas /Nas selvas cresci	3089	1322	1c e 3
Guerreiros	1028	812	1a e 2
<u>descendo</u> da tribo tupi.	1497	1142	1b e 3
Da <u>tribo</u> pujante/ Que agora anda errante / Por fado inconstante /guerreiros nasci	5259	674	2 e 3
Sou bravo, sou <u>forte</u>	1958	576	2 e 3
Sou <u>filho</u> do Norte	1316	757	2 e 3
<u>Meu</u> canto de morte/ Guerreiros, ouvi	2382	1372	1c e 2
já <u>vi</u> cruas / <u>Brigas</u> De tribos imigas, E as duras fadigas Da guerra provei	4948	1053	1b
Nas ondas / <u>mendaces</u>	1743	314	1a
sentí pelas faces Os <u>silvos</u> / fugaces Dos ventos que amei	4262	1278	1c
Andei longes terras/ Lidei <u>cruas</u> guerras	2772	289	1b
Vaguei pelas serras Dos vis Aimoréis	2430	274	1b
<u>Vi</u> lutas de bravos / vi fortes / escravos	3258	307	1b e 2
De <u>estranhos</u> ignavos Calcados aos <u>pés</u>	2836	343	1b
E os campos / <u>talados</u> / e os arcos <u>quebrados</u>	2784	290	1b

e os/ <u>piagas</u> coitados Já <u>sem</u> maracás	2630	300	1b
E os meigos cantores/ Servindo a <u>senhores</u> / que <u>vinham</u> / <u>traidores</u> / Com mostras de paz	5814	625	1b
<u>Aos</u> golpes do imigo	1204	339	1b
Meu último amigo / Sem lar sem <u>abrigo</u> / <u>Caiu</u> junto a <u>mi</u>	3887	831	1b e 3
Com plácido <u>rosto</u>	1794	451	1b e 3
Sereno e composto	1794	321	1b e 3
O <u>acerbo</u> desgosto Comigo sofri	2463	1257	1c
Meu <u>pai</u> a meu lado	1291	728	1b e 2
Já <u>cego</u> e quebrado / De penas <u>ralado</u>	2488	413	1b
Firmava-se em mi	1237	897	1b
Nós <u>ambos</u> / <u>mesquinhos</u>	1817	312	1a e 2
Por <u>índios</u> caminhos Cobertos d'espinhos Chegamos aqui	3444	1301	1c
O velho no entanto / Sofrendo já tanto De fome e <u>quebranto</u> / Só qu'ria <u>morrer</u>	4928	929	1c e 2
Não mais me <u>contenho</u> / Nas matas me <u>embrenho</u> / Das frechas que <u>tenho</u> Me quero <u>valer</u>	4208	486	1b
então / <u>forasteiro</u>	1537	422	1a
<u>Cai</u> prisioneiro De um troço guerreiro Com que me encontrei	3317	1454	1c
O cru dessossêgo Do pai/ <u>fraco</u> / e <u>cego</u> Enquanto não chego/ Qual <u>seja</u> ?	5130	763	1c e 3
<u>dizei</u>	668	823	2 e 3
<u>Eu</u> era o seu guia Na noite sombria	2105	992	3
A só <u>alegria</u> Que Deus lhe <u>deixou</u>	1869	940	3
Em <u>mim</u> se apoiava / Em mim se <u>firmava</u>	2651	481	3
<u>Em</u> mim/ descansava Que filho lhe sou	3190	1420	1c e 2
Ao velho/ coitado/ de penas <u>ralado</u>	2776	316	1b
Já <u>cego</u> e quebrado <u>Que</u> resta?	2019	706	3
<u>morrer</u>	751	1085	2 e 3
<u>Enquanto</u> descreve O giro tão breve Da vida que teve	3585	1345	2 e 3
<u>Deixai</u> -me viver	1667	1400	1c e 2
<u>Não</u> vil	779	606	3
não ignavo	877	669	3
Mas <u>forte</u> / mas <u>bravo</u>	1645	741	3
<u>Serei</u> vosso escravo/ <u>Aqui</u> virei ter	2734	1382	1c e 2
<u>Guerreiros</u> ,	1165	416	1a e 2
<u>não</u> coro Do pranto que choro	2409	897	2 e 2

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Se a vida deploro,	1571	875	2 e 3
Também sei morrer	1484	591	2 e 3

In table 4, IG stands for the orthographic transcription of the intonational groups followed by a silent pause; Dur IG stands for the duration of the intonation groups and DurP stands for the duration of the silent pauses. SPF refers to the functions of silent pauses: 1) discursive pauses (1a occurs between constituents within sentences; 1b between sentences without a change of topic; 1c between sentences with a change of topic.); 2) emphatic pauses and 3) dramatic pauses. The slant line (/) is used to indicate the distribution of the pauses signaled by the acoustic cues. The underlining is used to indicate prominent syllables.