THE STOPS IN CODA POSITION IN BRAZILIAN PORTUGUESE

José Olimpio de Magalhães

Federal University of Minas Gerais and CNPq, Brazil

ABSTRACT

Brazilian Portuguese (BP) is said to have words like “ca[p]tar” (to catch) and “aspe[k]to” (aspect) with a stop in coda position, and words such as “ca[pi]tal” (capital) and “sé[ki]to” (retinue) with a stop in onset position. However, phonetically, BP does not have stops in coda position because speakers put an epenthetic [i] after the stop. There is, thus, no melodic difference between graphical sequences like -gm- and -guim-, in words such as “se[g]mento” (segment) and “se[gi]mento” (continuation), both pronounced se[gi]mento. This raises many questions: Should BP have two kinds of [i] after stops, lexical and epenthetic, if these have identical phonetic realization? Should native speakers/hearers perceive a difference between a lexical and an epenthetic [i]?

What should be the underlying form in each case be? How much does the speakers’ perception support the theoretical propositions of Phonology? Our hypothesis is that, phonologically, there are no stop closing syllables in BP.

1. INTRODUCTION

With the emergence and the development of phonological theory, in the 20's and 30's, there arose a concern as to the division of tasks between phonologists and phoneticians. Due to the interdependence of the two areas of study, it was not easy to reach an agreement. The research approach of Experimental Phonology [1 and 2] seeks to examine the two areas as integrated, rather than interfacing areas of interest. Working towards this objective, this paper conducts a phonetic experiment in order to relate the results to the principles and parameters defined by Phonological Theory. More specifically, the goal of this experiment is to verify the behavior of stop consonants, which seem to occupy a coda position in (BP). The results of the experiment give us evidence about the characteristics of the coda position in BP and have brought some important conclusions about the phonological processing of the acoustic information.

2. METHODOLOGY

The data. In our research for material to aid us in the examination of the behavior of stop consonants in coda position, and inspired by two pieces of research by Huggins [3 and 4], about the perception of temporary phenomena in speech, we proposed to see how naive speakers/hearers of BP perceive manipulations to the two types of /i/ (lexical and epenthetic), and to relate this perception to what Phonological Theory says. To this end we recorded a corpus composed of ten words or expressions, isolated and in phrases, in the random order below:

Words or expressions: 1. séquito(retinue) 2. sabe negar (be able to say no) 3. prosseguimento (continuation) 4. Bagdá(Baghdad) 5. abnegar (renounce) 6. capital(capital) 7. segmento (segment / stratum) 8. açougue dá (butchers makes) 9. captar (pick up) 10. aspecto (appearance)


Following this, using the Kay Computerized Speech Lab (CSL) acoustic analysis program, the data was manipulated, isolating in the first case one or two central ‘pitch’ periods of the /i/s. The isolated period was then added another five times to the center of the acoustic pattern of the vowel, in both the epenthetic and lexical cases, causing lengthening. Only the two periods where the vowel was longer were used, so that, when lengthened with one period, there would be no alteration in its quality (“buzzy effect”). In this case, the number of times extra ones were added remained the same, i.e. five. In this way, for example, if the adjacent periods A and B were isolated, the addition in the middle of the acoustic pattern of the vowel would be A+A+A+B+B.

The second manipulation entailed cutting the acoustic pattern of the /i/s on the oscilogram, however long this may be,
in an attempt to retain the release of the consonant preceding the /i/, where there was one. Following this, the manipulations on the Kay Computerized Speech Lab (CSL) were recorded onto audio tape.

2.2. The perception test. The next step was to pass these recordings to the informants. The resulting three types of phrases and words ((A) normal, (B) with the [i] cut, (C) with the [i] elongated) repeated in random fashion, were presented to the informants, who, with no knowledge of the aims of this research, nor of the way the sounds had been manipulated, had to say which sounded “artificial” to them. After this, they were asked to point out where the phrases, words or expressions had been "lengthened" or "shortened", and finally, when they already knew the aim of the research, where the phrases and words or expressions sounded “normal”.

The informants were 14 (fourteen) students of the final year of the Modern Languages Degree Course at UFU (Federal University of Uberlândia, MG, Brazil), aged between 21 and 31. The tests were applied in the Language Laboratory of the Modern Languages Department, in individual booths, with head-phones, in sessions of 1 hour and 30 minutes, monitored by us at the central control desk.

2.3. The results. In the first phase of the perception test, the informants had to mark the phrase, word or expression they found artificial. Here below, in tables 1 and 2 are the general averages of the results:

<table>
<thead>
<tr>
<th></th>
<th>A (%)</th>
<th>B (%)</th>
<th>C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General average</td>
<td>18.6%</td>
<td>30.05%</td>
<td>61.24%</td>
</tr>
<tr>
<td>Lexical /i/ average</td>
<td>18.16%</td>
<td>33.42%</td>
<td>56.06%</td>
</tr>
<tr>
<td>Epenthetic /i/ average</td>
<td>19.01%</td>
<td>26.68%</td>
<td>66.42%</td>
</tr>
</tbody>
</table>

Table 1 Perception test of the phrase as ARTIFICIAL
A = normal B = shortened C = lengthened

The results table above, of the perception of the phrase as artificial, showed a rising order of averages: the presence of an /i/, in A, lexical or epenthetic, sounds less artificial than the absence of either of the two; and in B, the lengthening of them is least accepted. The above results can be considered satisfactory, if we take into consideration the influence of variables not foreseen when setting up the corpus, which were only realized during the analysis of the informants’ perception.

<table>
<thead>
<tr>
<th></th>
<th>A (%)</th>
<th>B (%)</th>
<th>C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General average</td>
<td>22.23%</td>
<td>21.73%</td>
<td>71.24%</td>
</tr>
<tr>
<td>Lexical /i/ average</td>
<td>25.35%</td>
<td>28.47%</td>
<td>69.04%</td>
</tr>
<tr>
<td>Epenthetic /i/ average</td>
<td>19.11%</td>
<td>14.99%</td>
<td>73.44%</td>
</tr>
</tbody>
</table>

Table 2 Perception test of the word, phrase or expression as ARTIFICIAL: A = normal B = shortened C = lengthened

It can be seen in Table 2 that there is little difference between the averages in A and B, other than a slight tendency not to accept the cut of the lexical /i/ and the epenthesis of the /i/. In Table 1, within a phrasal construction, the tendency is to consider the presence of the /i/ natural in any form.

The shortening and lengthening in general were in general perceived well by our informants. However, when it was a question of classifying a phrase and word or expression as normal (neither shortened nor lengthened), there was some uncertainty. Let us look first at the results referring to phrases:

<table>
<thead>
<tr>
<th></th>
<th>A (%)</th>
<th>B (%)</th>
<th>C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General average</td>
<td>62.96%</td>
<td>29.95%</td>
<td>12.73%</td>
</tr>
<tr>
<td>Lexical /i/ average</td>
<td>63.65%</td>
<td>23.77%</td>
<td>14.68%</td>
</tr>
<tr>
<td>Epenthetic /i/ average</td>
<td>62.28%</td>
<td>36.13%</td>
<td>11.42%</td>
</tr>
</tbody>
</table>

Table 3 Perception test of the phrase as NEITHER SHORTENED NOT LENGTHENED:
A = normal B = shortened C = lengthened

It should be noted that, in the table above, there is a certain indecision in classifying the word as normal or as shortened, which tallies with the uncertainty shown in Table 3 for phrases.

3. CONCLUSION

If we take into consideration the above averages and the variables which influenced some of the results, according to the analysis of each pair of phrase and expression, or word, we can come to the conclusion that the informants, in general, did not notice, or did not differentiate the lexical from the epenthetic. This observation reinforces our hypothesis that native speakers/hearers of BP do not characterize the stop consonant as attached to the rhyme (syllabic coda), i.e., the phonetic characteristics of the stop consonants are purely alophonic. Whether the [i] exists or not in the phonetic form is not important. However, BP does possess the following parametric restriction with reference to the licensing of the coda.

(1) Restriction on the stop in coda position in PB rhyme

\[ \star \xrightarrow{P} \xrightarrow{O} \xrightarrow{\text{Root}} \xrightarrow{\text{Root}} \]

The restriction shown in the diagram above occurs because the BP speaker always “sees” a position of syllabic nucleus after stop consonants, a sub-specified position, which may or may not be realized phonetically.

Based on this data, we propose that, after a stop consonant, BP has the following underlying form, which will result in different surface forms, with a nucleus which could have melody or could be empty:
ACKNOWLEDGMENTS
We would like to thank the following people, who, in one form or another, contributed to this research: Eleonora C. Albano, John J. Ohala, João A. de Moraes and Thais C. Silva. However, any faults in the work, in any of its aspects, are our complete responsibility.

NOTES
1. This was taped in a sound-proof booth at the Experimental Phonology Laboratory at the University of Berkeley, USA, by the informant J.A.M, a Brazilian from Rio de Janeiro, a University teacher of 43 years old.
2. Due to lack of space, we will not present here the result of the perception test of each phrase or word. For more details, see Magalhães [5]
3. Of the unforeseen problems, we would like to cite the cut of the /i/ after the stop /b/ and before a nasal segment, as in "sa[b]ignar" and "s[a][b]ignar", which gave rise to a long /m/, perceived as artificial by the informants.
4. At this time, the informants already knew the aim of the research.
5. This parametric restriction does not apply, for example, to English, where the stops in position attached to rhyme have a predictable phonetic realization. A native speaker of BP, when pronouncing an English word like "aptitude", will generally apply the parametric restriction in (1), which sounds strange to the English native speaker. We are considering the possibility of applying the tests (only with words and expressions) to native speakers of English, to test how they perceive the cut in the lexical or epenthetic /i/.

REFERENCES