Primary Stress Assignment in Brazilian Portuguese

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1. Introduction

1.1 The problem

Brazilians display a great interest in the prosody of their own language. Much classroom time is spent counting syllables, enumerating detailed rules for stress assignment and memorizing rules of diacritics used in the orthography (e.g., Cegalla 1991). Stress assignment and its rules are one of the topics covered on the vestibular, the nationwide university entrance exam (Savioli 1991:131ff). Students in elementary schools study syllable structure and division. Even by the second grade they know such words as paroxítono ‘a word whose stress falls on the next to last syllable’ and antepenúltimo ‘antepenultimate’. The problem is that many of the rules taught seem arbitrary and unrelated to each other.

1.2 A linguistic solution

A linguistic account of stress in Brazilian Portuguese (BP) can bring greater understanding and simplicity to the description of BP prosody. This could be of help to native speakers themselves as well as to those attempting to learn BP as a second language. Once primary stress is determined, secondary stress, phonotactic constraints, and various phonological processes can be derived by rule (Major 1985). Metrical phonology provides a useful framework for explaining the linguistic facts as well as for predicting stress assignment and the use of some diacritics in the BP orthography.

2. Stress placement

Stress in BP is contrastive as can be seen in (1):

(1)  a. /du.vi.da/ dúvida ‘doubt (noun)’
    b. /du.vi.da/ duvida ‘he doubts’
Stress can occur on any of the last three syllables of a word, as seen in (2).

(2) a. /a.bo.bo.ra/ abóbora ‘pumpkin’
b. /a.ba.tu.do/ abatido ‘exhausted’
c. /a.bo.rre.ser/ aborrecer ‘to bore’

However, antepenultimate stress, (1a) and (2a), can be considered somewhat marginal in Portuguese. According to Camara (1972:25), examples such as these are the result of borrowings from Latin, latinized Greek words, Classical Greek, and Italian. The present paper deals only with the more commonly attested patterns of penultimate and ultimate stress, as in (2b) and (2c).

3. Syllable shapes

There are six possible syllable shapes in Portuguese. These are shown in (3).

(3) V CV VC CVC CCV CCVC

Those consonant clusters which may appear syllable initially are shown in (4).

(4) pr pl tr kr kl
    br bl dr gr gl
    fr fl

Those consonants which may appear in coda position are listed in (5). Though not listed, /b/ can also appear in a coda, word medially. But usually this is a result of a prefix such as ab- or sub- in ab.ju.rar ‘renounce’ and sub.nuтри.do ‘undernourished’.

(5) s z l r

In BP, /l/ and /r/ in syllable final position tend to be reduced. The consonant /l/ can weaken to an offglide [u]; and /r/, pronounced [x], can weaken to [h].

3.1 Nasals

Syllable final nasals are marked orthographically with a tilde over the vowel or by a final nasal consonant letter. Both of these represent a “syllable-closing nasalization that cannot be distinguished from the vowel itself” (Camara 1972:50). I do not here argue for a particular underlying representation. In this paper I will simply show a syllable final nasal by a tilde over its preceding vowel.

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1 Diphthongs are discussed in §3.2.
3.2 Diphthongs

The nucleus of a syllable may be filled by a single vowel or a diphthong (branching rhyme). A diphthong, like a single vowel, is associated with a single timing slot of the syllable tier, as in (6).

(6) /dou.ra.do/ ‘golden’

\[
\begin{array}{c|c|c}
\sigma & \sigma & \sigma \\
\end{array}
\]

It is important to note that some combinations of vowels do not form a branching rhyme and thus are syllabified in different syllables. An example is ca.ri.ó.ca ‘a person from Rio de Janeiro’.

4. Stress assignment

4.1 Penultimate stress

Penultimate stress is the dominant pattern (Camara:24-5).

(7) a. /ter.nu.ra/ ternura ‘kindness’
    b. /i.igre.3a/ igreja ‘church’
    c. /3ei.to/ jeito ‘way’
    d. /ã.mê/ homen ‘man’
    e. /ko.ra.3ê/ coragem ‘courage’
    f. /a.po.zê.ta.do.ri.a/ aposentadoria ‘retirement’

BP is not fully quantity sensitive, as seen in (7a). Here a light penultimate is stressed even though there is another syllable with a coda (the antepenultimate). Note, too, that in all these forms the ultimate syllable is light; it does not contain a coda. Even the final nasals, (7d) and (7e), pattern with the light syllables.

4.2 Ultimate stress

While the majority of words show penultimate stress, there are many cases in which the ultimate syllable is stressed. These cannot be ignored in an account of BP stress.

(8) a. /al.mo.sar/ almoçar ‘to eat lunch’
    b. /de.pois/ depois ‘later’
    c. /per.gû.tou/ perguntou ‘he asked’
All these forms contain one of three things in the ultimate syllable:

\[(9)\]

\[
\begin{align*}
\text{a. } & \text{ a coda} \\
\text{b. } & \text{ a branching rhyme (diphthong)} \\
\text{c. } & \text{ a [+high] vowel.}
\end{align*}
\]

Recall that a light syllable can be stressed even if a word has a heavy syllable (one with a coda). However, (9a) would seem to indicate that while BP is not completely quantity sensitive, a heavy syllable in \textit{ultimate} position attracts stress. Note that a diphthong behaves in the same manner as the syllables with codas. When found in the ultimate syllable, both syllables with codas (9a) and syllables with diphthongs (9b) receive word-level stress. What (9a) and (9b) have in common is a branching rhyme. This is shown in (10).

\[(10)\]

\[
\begin{align*}
\text{syllable} & \quad \text{syllable} \\
\text{onset} & \quad \text{onset} \\
\text{rhyme} & \quad \text{rhyme} \\
\text{C} & \quad \text{C} \\
\text{V} & \quad \text{V} \\
\text{V} & \quad \text{V}
\end{align*}
\]

As described above, when in the ultimate syllable, diphthongs receive stress, acting like heavy syllables. This is a productive pattern visible in the adoption of loan words which are stressed so that the stress falls on any word-final syllable containing a diphthong: \textit{cow.boy}, \textit{play.ground}, \textit{hand.out}.

This pattern of penultimate and ultimate stress can be accounted for by using a metrical grid as described in Goldsmith (1990:190ff). I posit three rules, shown in (11).

\[(11)\]

\[
\begin{align*}
\text{a. } & \text{ Any [-high] vowel in word final position is extrametrical.} \\
\text{b. } & \text{ End Rule (final, foot) / Perfect Grid (peak)} \\
\text{c. } & \text{ End Rule (final, word)}
\end{align*}
\]

On the syllable level, each nucleus is assigned an ‘X’. Rule (11a) makes certain syllables extrametrical. That is, they are not ‘seen’ when stress is being assigned. Their extrametricality is indicated by the use of parentheses. This captures the generalization in (9c).

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\textsuperscript{2} I would like to thank David Silva for helpful comments concerning the stress placement rules.
Rule (11b) describes stress assignment at the foot level. Stress is assigned from right to left. An ‘x’ is assigned to the rightmost (final) syllable. Perfect Grid indicates that ‘x’-assignment will continue leftward on every other syllable. Goldsmith calls this marking of “the odd-numbered positions in [the] direction of scan” peak first assignment (1990:194). The marked foot which does not receive word-level stress (primary), receives secondary stress. While BP appears to show secondary stress (Dukes 1993:24), more research needs to be done. If it is shown not to have secondary stress, perfect grid would not apply. In that case, the only assignment at the foot level would be to the rightmost syllable.

Rule (11c) assigns stress at the word level. Again the rightmost ‘x’ (of the foot level) is assigned an ‘x’. This syllable is the one which will receive word-level stress.

4.3 Derivations

The application of the rules in (11) above is illustrated in the following derivations:

(12) At the syllable row, each nucleus is assigned an ‘x’. (The [-high] vowel in final position is extrametrical.)

\[
\begin{array}{cccccccc}
  & x & x & x & x & x & x & x \\
 cu.pim & u.mil.da.d5e & per.gun.tou & a.li \\
\end{array}
\]

(13) At the foot row, perfect grid applies, scanning from right to left, peak first, blind to extrametrical x’s.

\[
\begin{array}{cccccccc}
  x & x & x & x & x & x \\
 cu.pim & u.mil.da.d5e & per.gun.tou & a.li \\
\end{array}
\]

(14) At the word row, the x is assigned to the rightmost x from the row beneath it.

\[
\begin{array}{cccccccc}
  x & x & x & x & x \\
 cu.pim & u.mil.da.d5e & per.gun.tou & a.li \\
\end{array}
\]

---

3 Dukes (1993:27) asserts that secondary stress is assigned to every other unstressed syllable that precedes the primary stress. Major, however, calls this alternating strong/weak pattern a “tendency” which may be overridden (1985:280).
The word-level stress has been accounted for. Also, secondary stress is shown, falling on the first syllable of ‘u.mil.da.dʒe’ ‘humility’ and ‘per. gun. tou’ ‘(s)he asked’. This is seen by the metrical foot (a stack of 2 ‘x’s).

These rules account for the vast majority of Portuguese words. However, there are exceptions. There are some forms that violate these rules, forms for which stress seems to be marked in the lexicon. Because these are arbitrary, not rule-governed, we might expect that these cases would require orthographic differentiation. This is precisely the case. BP uses the following diacritics to show arbitrary stress: ´, ~, and ^.

5. Diacritics in written BP

An understanding of stress assignment sheds light on the use of diacritics in written BP. Consider the examples in (15). For all of these, according to the rules in (11), penultimate stress is expected. Because they are exceptions, however, stress must be assigned lexically. BP diacritics simultaneously mark the stressed syllable and indicate that normal stress assignment rules have been overridden.

(15) a. /tri.po/ tripó ‘three legged stool’  
b. /ti.tu.lo/ título ‘title’  
c. /glase/ glacê ‘icing’  
d. /ar.ma.z̃/ armazém ‘warehouse’  
e. /i rmâ/ irmã ‘sister’

Conversely, the examples in (16) all have penultimate stress. However, according to the rules posited in (11), ultimate stress is expected. Therefore, these are also exceptions and must be marked in the lexicon, also reflected by a diacritic.

(16) a. /mu.ta.vel/ mutável ‘changeable’  
b. /le.gua/ légua ‘league (distance)’  
c. /i.ris/ íris ‘iris’  
d. /i.nu.til/ inútil ‘useless’

6. Rule ordering

6.1 Vowel raising

Another stress-related phenomenon in BP is vowel raising in post-tonic position (i.e., after word stress). Word-final vowels (e,o) are raised to high vowels (i,u). Because the [high] feature figures into the stress rules, these two rules must be ordered. Stress assignment (SA) happens before vowel raising (VR). Stress cannot be assigned, or reassigned, after vowel raising.

(17a)*

<table>
<thead>
<tr>
<th></th>
<th>UR</th>
<th>VR</th>
<th>SA</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>lei.to</td>
<td>lei.tu</td>
<td>lei.tu</td>
<td>*lei.tu</td>
</tr>
<tr>
<td>VR</td>
<td>lei.to</td>
<td>lei.tu</td>
<td>lei.tu</td>
<td>*lei.tu</td>
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</table>

(17b)

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<th>SA</th>
<th>VR</th>
<th>PR</th>
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</thead>
<tbody>
<tr>
<td>UR</td>
<td>lei.to</td>
<td>lei.to</td>
<td>lei.tu</td>
<td>lei.tu</td>
</tr>
</tbody>
</table>

6.2 Affixation

Stress assignment must also be ordered with some morphological rules. Note the order of Stress Assignment (SA) and Affixation (AF) in (18):

(18a)*

<table>
<thead>
<tr>
<th></th>
<th>UR</th>
<th>SA</th>
<th>AF</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>bo.ka</td>
<td>bo.ka</td>
<td>bo.ki,na</td>
<td>*bo.ki,na</td>
</tr>
<tr>
<td>SA</td>
<td>bo.ka</td>
<td>bo.ka</td>
<td>bo.ki,na</td>
<td>*bo.ki,na</td>
</tr>
<tr>
<td>AF</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>*bo.ki,na</td>
</tr>
<tr>
<td>PR</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
</tr>
</tbody>
</table>

(18b)

<table>
<thead>
<tr>
<th></th>
<th>UR</th>
<th>AF</th>
<th>SA</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>bo.ka</td>
<td>bo.ka</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
</tr>
<tr>
<td>AF</td>
<td>bo.ka</td>
<td>bo.ka</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
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<tr>
<td>SA</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
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<td>bo.ki,na</td>
<td>bo.ki,na</td>
<td>bo.ki,na</td>
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7. Conclusion

A metrical grid can capture the dominant stress patterns in BP simply and elegantly. It is a significant accomplishment that a metrical approach requires

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4 Major demonstrates how this rule can apply in other environments, according to the “style” of speech (1985:266).
only three rules to account for nearly all the data. The exceptions must be lexically marked. BP orthography reflects this by using diacritics. Thus, by knowing these few rules of stress assignment, one can predict stress assignment and the need for a diacritic in the orthography.

Phonological stress at the word level influences a great part of the phonology of BP. Major (1985:278) has shown that phonotactics and phonological processes (diphthongization, vowel raising, monophthongization, and syllabicity shifts) in BP are organized according to a rhythmic hierarchy which can only be determined once primary stress is assigned. The stress assignment rules presented here account for this first, important step. Finally, the evidence from vowel-raising and affixation supports lexical phonology’s claim (Goldsmith 1990) that phonological and morphological rules are ordered in different strata.

Susan Gary Walters received her M.A. in Linguistics from the University of Texas at Arlington in May 1992.
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