Vowels, Tones and Tonogenesis in Braj Bhasha
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The aim of our study is (a) to first acoustically plot the vowel space of the understudied language Braj which is a great research gap, as vowels are the TBUs; and then (b) to examine the tone and tonogenesis in the language. Braj, or Brij, or Brajghasha, (Skt. Vraja or Antarbāḍi), was a prestigious language in northcentral India in medieval times [1], but its influence declined by the 18th century, replaced by Khadi-Boli Hindi. Currently, it is only limited to the Braj region [2][3].

We first plot 10 vowels from a corpus of paradigmatic words (33 tokens/vowel) using Lobanov normalization method of formants’ analysis (figure 1). It was crucial as Braj vowels were never acoustically explored in any earlier study. Figure 1 shows 7 tense and 3 lax vowels, with a phonetic conditioning that the 3 lax vowels are always shorter in duration while the 7 tense vowels are always longer, such that, an average tense-vowel is approximately twice the duration compared to an average lax-vowel (confirmed by a t-test).

Then, for the first time in Braj, our study shows that Braj, despite being considered a variety in the Hindi continuum, patterns with the North West IA languages in attesting a low tone due to the F0 perturbation created by the loss of breathy voiced fricative [4][5][6]. Our study shows a tonogenetic basis created by the loss of [h] or [ɦ] at coda positions (also intervocally) leading to lexical tonal contrasts. A small corpus of 9 pairs of monosyllabic Braj words (6 with monophthongs and 3 with diphthongs as nuclei) with 594 tokens (speakers x words x iterations = 11x18x3) was used for our study. Table 1 has only few examples for lack of space in this abstract. The ANOVA conducted on the F0 information to test the existence of tonal contrast in our hypothesized tonal pairs from Braj speech showed a significant difference of F0 values (F-value 12.47, p-value 0.00958). The predictor variable “f0_neutral” had 1 degree of freedom and sum of squares of 172.19. The residuals had 7 and 96.64 respectively, and a mean square of 13.81. The results showed that the words labelled ‘T’ (our hypothesized truth-value for the words from pairs with the hypothesized ‘presence’ of low-tone from field experience) really had lower F0 means (figure 2). The tonogenetic origins suggest that the loss of breathy glottal fricative at coda positions of NIA (New Indo-Aryan) cognates phonologically caused a low tone in Braj. Further analysis of the normalized contours (figure 3, figure 4) also showed a contour-contrast between monophthongs (phonetically falling contour) and diphthongs (phonetically falling-rising contours). The NIA cognates of the latter are generally found to have [h] or [ɦ] intervocally.

![Figure 1: Braj Bhasha Vowel Space](image)

Table 1: Monosyllabic Tonal Pairs Classified as per Thong_ID, Mora_ID, Pair_ID and Low Tone

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Thong_ID</th>
<th>Mora_ID</th>
<th>Pair_ID</th>
<th>Low Tone</th>
<th>Words</th>
<th>Gloses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Monophthongs</td>
<td>Bimoraic</td>
<td>gaː- ɣaː</td>
<td>F</td>
<td>gaː</td>
<td>‘sing’</td>
</tr>
<tr>
<td>2.</td>
<td>Monophthongs</td>
<td>Bimoraic</td>
<td>T</td>
<td>gaː</td>
<td>‘give’</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Trimoraic</td>
<td>kɔːʔ- kɔːʔ</td>
<td>F</td>
<td>kɔːʔ</td>
<td>‘bite’</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Trimoraic</td>
<td>T</td>
<td>kɔːʔ</td>
<td>‘mist’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Diphthongs</td>
<td>Tetramoraic</td>
<td>kaːiː- kɔːiː</td>
<td>F</td>
<td>kaːiː</td>
<td>‘algae’</td>
</tr>
<tr>
<td>6.</td>
<td>Diphthongs</td>
<td>Tetramoraic</td>
<td>T</td>
<td>kɔːiː</td>
<td>‘what was’</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2: Contrastive f0 means in the Tonal Pairs of all Monosyllabic Words

Figure 3: Results of Normalized F0 Contour Analysis as grouped by individual Pair_ID

Figure 4: Results of Normalized F0 Contour Analysis as grouped by Thong_ID

References


