

PHONOLOGICAL ANALYSIS OF ASSAMESE VOWEL

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Abstract : The North-East India has often been described as a precious store-house of data for linguistic research. A large number of languages of this region belonging to three major language-families of the world, viz., Indo-Aryan, Sino-Tibetan and Austric. Assamese is a state language of Assam spoken by the Assamese people. Assamese language has three distinct dialects which are Eastern Assamese dialect, Kamrupi dialect and Goalpariya dialect. Assamese language has own Script Known as Assamese Script was developed from Brahmi script. This research paper studies the Phonological Analysis of the vowels of Assamese Language, the frequency of the vowels, length of the vowels, formant, pitch, intensity of the Assamese vowels.

Index Terms - Assamese, Vowel, Acoustic & Phonology.

I. INTRODUCTION

The North-East India has often been described as a precious store-house of data for linguistic research. A large number of languages of this region belonging to three major language-families of the world, viz., Indo-Aryan, Sino-Tibetan and Austric. Assamese is an Eastern Indo-Aryan language spoken mainly in the Indian state of Assam, where it is an official language. It is the easternmost Indo-European language, spoken by over 15 million speakers and serves as a lingua franca in the region. It has its own identity with special characteristics for thousand of years. Its formative period begins from the tenth century AD and written records in verse date back to the late Fourteen century AD, 'Prahlaad Charita' by Hema Saraswati being the earliest one. Its Script has developed from Brahmi script. Assamese language has three distinct dialects which are Eastern Assamese dialect, Kamrupi dialect and Goalpariya dialect. The Assamese standard colloquial represents more or less currently spoken in Upper Assam, mainly spoken by Sivasagarian People. Assamese is a powerful language of North-East-India region. Assamese language has been working as a Lingua-Franca for the people of all linguistic tribe of Assam, Arunachal Pradesh and Nagaland. Nefamese is an Assamese-based pidgin used in Arunachal Pradesh and Nagamese, an Assamese-based Creole language is widely used in Nagaland.

This research paper studies the Phonological Analysis of the vowels of Assamese Language. the frequency of the vowels, length of the vowels, formant, pitch, intensity.

II. PURPOSE AND SIGNIFICATION OF THE STUDY

- Introduce Assamese language and its characteristics
- Identify the Vowel in Assamese Language.
- To Analyze the vowel frequency, length of the vowels, formant, pitch and intensity of Assamese Vowels.
- To Classification of Assamese vowels.

III. RESEARCH METHODOLOGY

In this research, as far as the methodology is concerned, the most popular method of field linguistics, that is the interview method was adopted to collect the data. The speakers of Assamese language was interviewed and accumulated the necessary data for the study. The field study was conducted basically in Sivasagar and Jorhat District. Data were collected from different informants which categorized in different age groups. While taking interviews, Sony MP3 recorder was also used to record the data. The collected data was analyzed through Experimental, Historical, Analytical & Acoustic method. And data were acoustically analyzed in the language lab of Dibrugarh University which connected with a Kay Pentax Computerized Speech Lab(CSL, model 4500, software version 5.03).

IV. RESEARCH PROBLEM

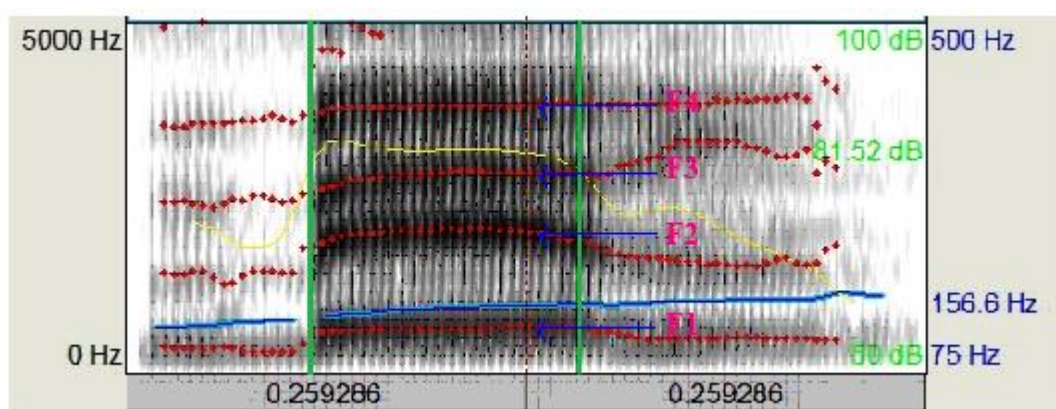
- Degrees of aggregate pronunciations of Assamese vowels and measuring verities of Assamese vowels are really a problematic task.
- To Classification of Assamese vowels.
- To Identify of vowel length for each pronouncing vowel of Assamese Language.

1.0 VOWEL OF THE ASSAMESE LANGUAGE

The Assamese Language has eight vowels. These are- /i, u, e, ɔ, ɛ, o, ɨ / and / a/. All vowels are use in initial, medial and final position. All vowels has more than two allophone.

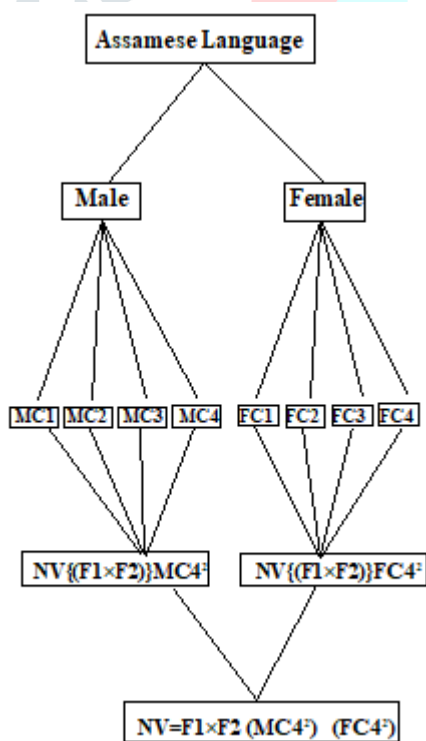
1.1 VOWEL NORMALIZATION

Vowel quality can be quantified with adequate precision and validity by measuring the Centre frequencies of the lower resonances in the acoustic signals. According to Lagedoged (2006), each vowel has three formants, i.e. three overtone pitches. The first formant (F1) is inversely related to vowel height. The second formant is related to the degree of backness of a vowel. Formants can be seen in a wideband spectrogram as dark bands. A Spectrogram picture of Assamese / ʌ̃ / vowel is given below-



In various experiments it is seen that the relationship between formant frequency of the vowel and identified vowel quality is not linear. In vowel pronunciation there are many variation because of the psychological differences among the speakers. Therefore vowel normalization is important in acoustic phonetics for vowel analysis. In this study is followed the Labanove Vowel normalization method, which is $F_n[v]N = (F_n[v] - MEAN_n) / S_n$. (Where $F_n[v]N$ is the normalizing value for $F_n[v]$, $MEAN_n$ is the mean value for formants and S_n is the standard deviation for formants).

1.2 NORMALIZATION DESIGN



MC-Male Category; FC-Female Category.

According to the age, samples are divided into four categories, as 15 to 24 (category 1), 26-39 (category-2), 40-59 (Category-3) and 60+ (Category-4)

1.3 STEPS OF VOWEL NORMALIZATION

The normalizing of vowel formulas are used as follows-

$$\text{Step 1} \text{--- } M = \frac{\sum X}{N}$$

$$\text{Step 2} \text{--- } s = \sqrt{\frac{\sum(x - x^-)^2}{n - 1}}$$

$$\text{Step 3} \text{--- } F_n[v]N = (F_n[v] - MEAN_n)/S_r$$

1.4 NORMALIZED VOWELS OF ASSAMESE LANGUAGE

Normalized vowel corpus of four categories of Assamese Language shown in the tabular from below---

F1

Vowels	$(F_n[v]N)C1$	$(F_n[v]N)C2$	$(F_n[v]N)C3$	$(F_n[v]N)C4$
i	287.539	294.465	289.643	293.734
e	421.176	419.665	416.437	413.836
ε	591.29	593.506	598.57	599.06
a	888.67	893.118	895.78	887.89
ɒ	643.75	651.371	646.4	645.84
ɔ	486.36	488.7	493.19	490.66
o	416.43	422.183	418.347	421.272
u	382.251	387.451	384.661	391.107

F2

Vowels	$(F_n[v]N)C1$	$(F_n[v]N)C2$	$(F_n[v]N)C3$	$(F_n[v]N)C4$
i	2365.335	2370.174	2369.212	2363.836
e	2216.915	2220.52	2223.117	2217.034
ε	2157.281	2160.11	2154.628	2152.828
a	1723.592	1726.183	1727.128	1720.939
ɒ	1262.116	1265.319	1259.478	1257.485
ɔ	1155.717	1161.126	1158.138	1152.48
o	986.18	993.183	991.347	987.297
u	956.286	961.88	958.382	954.39

Now, the F2 values of all the vowels found in all four categories are further normalized to make the vowel utterances in one frame as follows----

F1

/i/

$$M = \frac{1165.381}{4}$$

$$M = 291.095$$

$$S = \sqrt{\frac{\sum(x - x^-)^2}{n - 1}}$$

$$S = 3.320375$$

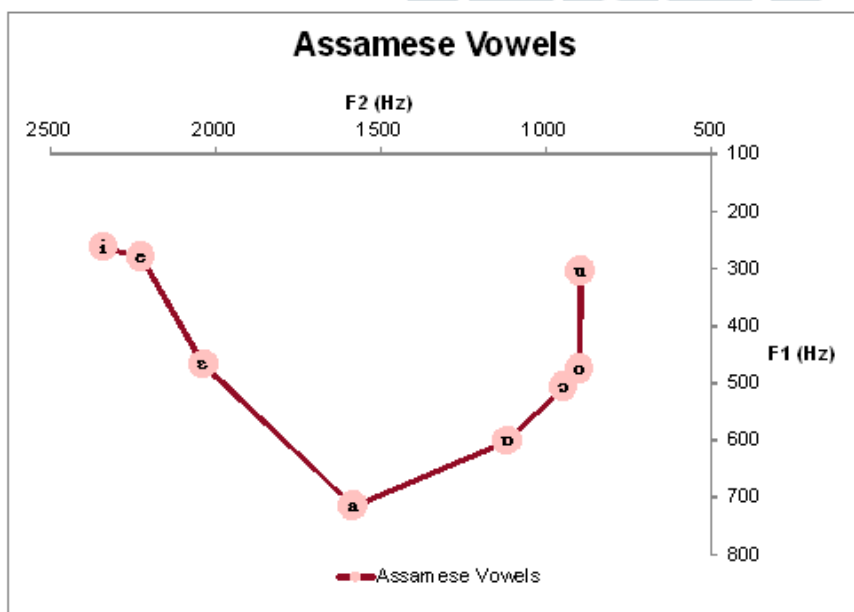
$$F_n[v]N = (F_n[v] - MEAN_n) / S_n$$

$$F_n[v]N = 263.3095$$

Using this vowel normalization theory of Lebanove all vowels are normalized. Normalized F1 and F2 values of the Assamese vowels is presented in the following table.

vowels	F1	F2
i	263.3095	2338.187
e	381.1145	2225.852
ɛ	467.6672	2035.488
a	715.5009	1582.289
ɔ	601.0402	1115.107
o	506.3714	946.6501
u	474.8381	897.0589

The tongue position of vowel utterances of the Assamese Language are shown in the figure below-



1.5 CLASSIFICATION OF ASSAMESE VOWELS

The vowels of Assamese can be categorized in terms of place of articulation and in terms of manners of articulation. Front, Central, Back-vowels are categorized in terms of place of articulation and High, High-Mid, Mid, Low-mid and Low-vowels are categorized according to the manners of articulation. These vowels of the Assamese Language can be shown in a table according to the place of articulation and the manners of articulation.

Vowels	Front	Central	Back
High	/i/		/u/
High -Mid	/e/		/o/
Lower-Mid	/ɛ/		/ɔ/
Low		/a/	/ɔ̃/

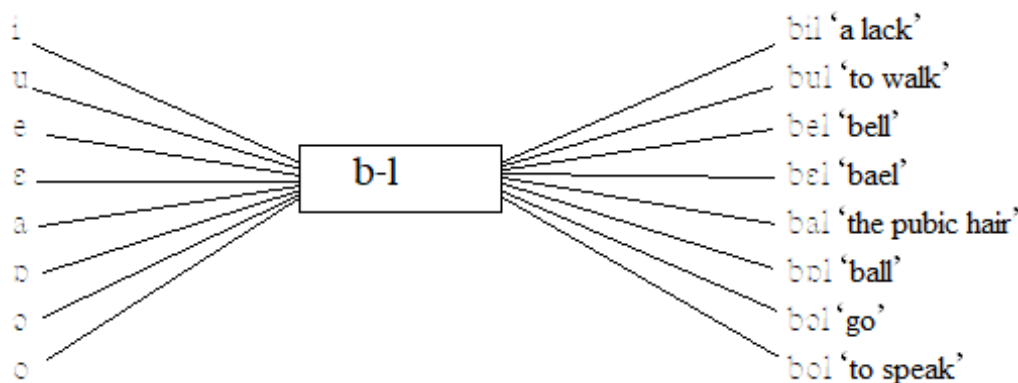
1.6 VOWEL CONTRASTS

When a vowel expresses different meanings in terms of different environment and different positions, this process is known as Vowel contrast. The environment of phoneme is of two kinds: Identical environment and Analogous environment. The phoneme or special phonemes are determined through contrasts analysis of sounds.

The vowels of Assamese language can be determined as ‘phoneme’ through Identical and Analogous environment. The vowel contrasts of Assamese in initial position can be illustrated as follows-

Vowel contrasts in medial position-

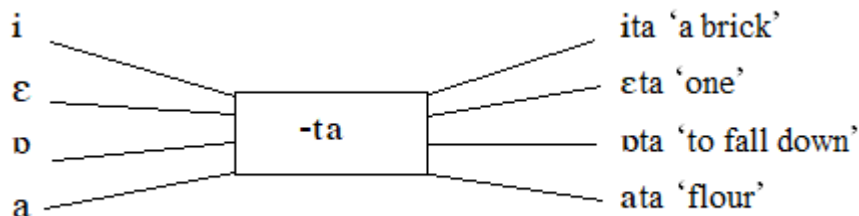
The vowels /i, u, e, ɔ, ɛ, o, ɔ̃ / and / a/ are contrasted in terms of identical environment in medial position.



The above /i, u, e, ɔ, ɛ, o, ɔ̃ / and / a/ sounds are determined as ‘phoneme’ or ‘special phone’ through contrast analysis in identical environment. Each of the above vowels is combined with ‘b-l’ identical environment and thus these form new words.

Vowel contrasts in initial position-

The vowels /i, ɛ, ɔ̃ / and / a/ are contrasted in terms of identical environment in medial position.



The above /i, u, e, ɔ, ɛ, o, ɔ̃ / and / a/ sounds are determined as ‘phoneme’ or ‘special phone’ through contrast analysis in identical environment. Each of the above vowels is combined with ‘-ta’ identical environment and thus these form new words.

1.7 VOWEL LENGTH

The measures of the Assamese vowel length in initial, middle and final positions that are found through phonetic analysis in the CSL4500 software are like-

vowel	vowel length (milli second)			
	initial	middle	final	mean length
/i/	0.29	0.31	0.32	0.306
/e/	0.28	0.35	0.31	0.313
/ɛ/	0.30	0.33	0.34	0.323
/a/	0.38	0.41	0.43	0.406
/u/	0.32	0.34	0.36	0.34
/o/	0.29	0.33	0.35	0.356
/ɔ/	0.32	0.35	0.37	0.346
/ɔ̃ /	0.35	0.36	0.38	0.363

1.8 VOWEL CLUSTER

Assamese language has limited vowel clusters. Assamese Vowel clusters are classified as two vowels cluster, three vowels cluster, four vowels cluster.

1.8.1 TWO VOWELS CLUSTER : The dual vowel clusters of Assamese language are shown bellow-

	i	u	e	ɛ	o	ɔ	ɔ̃	a
i		✓	✓	✓	✓	✓	✓	✓
u	✓		✓				✓	✓
e	✓	✓	✓		✓	✓	✓	✓
ɛ		✓			✓			✓
o	✓			✓		✓		✓
ɔ	✓	✓						
ɔ̃	✓			✓	✓			
a	✓	✓		✓	✓	✓	✓	

- iu ɔ̃ iuɔ̃p ‘Europe’
- iɛ ɔ̃ ziɛk ‘daughter’
- iɔ ɔ̃ xiɔ̃ ‘he also’
- iɔ̃ ɔ̃ ziɔ̃ri ‘daughter’
- iɔ̃ɔ̃ ɔ̃ iɔ̃ɔ̃ ‘an exclamation of surprise’
- ia ɔ̃ siaɔ̃hi ‘ink’
- ui ɔ̃ zui ‘fire’
- uɛ ɔ̃ gɔ̃ɔ̃ruɛ “
- uɔ̃ ɔ̃ xuɔ̃ni ‘beautiful’
- ua ɔ̃ pɔ̃ɔ̃rua ‘Āant’
- ɛi ɔ̃ ɛi_‘thisĀ’

ꠘꠤ ꠢ	ꠘꠘꠤꠞꠤ	'a bamboo fence'
ꠘꠐ ꠢ	ꠘꠘꠐ	'he'
ꠘꠐ ꠢ	ꠘꠘꠐꠤꠞꠤ	'destitute'
ꠘꠞꠤ ꠢ	ꠘꠞꠤꠞꠤꠞꠤ	'a disciple'
ꠘꠤ ꠢ	ꠘꠘꠤ	'bad'
ꠘꠤ ꠢ	ꠘꠘꠤꠞꠤ	'father'
ꠘꠐ ꠢ	ꠘꠘꠐ	'he'
ꠐꠤ ꠢ	ꠘꠘꠐꠤ	'eat'
ꠐꠤ ꠢ	ꠘꠘꠐꠤ	'honey'
ꠞꠤ ꠢ	ꠘꠘꠤ	'IAA'

Assamese language has three vowel cluster and for vowel cluster.

2.0 CONCLUSION

- From the anthropological aspects the Assamese belong to Mongoloid and linguistic aspect it belongs to TibetoBurman of the Chino Tibetan Language Family.
- Assamese language include as a world Endanger language.
- Assamese language has eight vowel- /i, u, e, ꠐ, ꠘ, ꠐ, ꠞꠤ/ and / a/
- The vowels of Assamese language can be determined as 'phoneme' through Identical and Analogous environment.
- Among the Assamese vowels / a/vowel has maximum wave length.
- Among the Assamese vowels/ e/vowel has minimum wave length.
- Assamese Vowel clusters are classified as two vowels cluster, three vowels cluster, four vowels cluster.

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