Analyzing Vowel Variation in Densely Multilingual African Communities

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1. Introduction

Language variation researchers in sub-Saharan African face many challenges in the study of densely multilingual speech communities. Identifying methods and tools of language investigation appropriate for the study have been of principal concern. Some researchers have adapted theoretical approaches and empirical methods commonly used in the study of mono and bilingual communities, with varying outcomes, including, regrettably, generalized observations and conclusions. This paper discusses an attempt at adapting received notions in sociolinguistic and acoustic phonetic methodology in comparing English-vowel variations among Kenyan, Ghanaian, and Zimbabwean respondents.

2. Background to the Study

Language planners and educators in many post-colonial African states have continued to elevate the status of English, French, and Portuguese, at the expense of indigenous African languages. English, for instance, enjoys institutional support in most African countries that were under British colonial rule. Ngugi wa Thiong'o (1984:13) points out that in colonial and post-colonial eras, “English [in these countries] was the official vehicle and the magic formula to colonial [and neo-colonial] elitedom.” However, in spite of its dominant role as the official language of government communication and medium of instruction in schools, English remains a minority, in terms of numbers and frequency of use. Indigenous African languages are, by and large, the preferred code, both in informal interaction and cultural transmission. In addition, they constitute a significant index in identity formations, even among well-educated Africans.

Multilingual complexities in Africa are constantly redefined through group migrations, new settlements, intermarriages, and intra-regional trade. Urban centers, for instance, experience multiple language contact situations as diverse language groups, both indigenous and foreign, converge in search of education and employment opportunities. Similarly, in rural areas, dialect and language boundaries are constantly fluid and fuzzy as a result of the continued development in communication and market infrastructure that have enhanced broader linguistic interactions. Studies that fail to acknowledge such multilingual complexities are bound to arrive at erroneous conclusions.
Furthermore, language variation studies that have adapted, without modification, methods of investigation utilized in non-multilingual communities or assumed an impressionistic approach in analyzing multilingual Africa have most likely misrepresented the reality. For instance, a common generalization is the continued Eurocentric classification of the sub-Saharan Africa into English-speaking (Anglophone), French-speaking (Francophone) and Portuguese-speaking (Lusophone) Africa, instead of Bantu-speaking (Bantophone), Wolof-speaking, Hausa-speaking, or Kiswahili-speaking.

Adegbija (1994: 53) attributes such shortcomings in the study to flaws in methodology:

Deficiency in methodology appears to be the principal weakness of most language ... [variation] studies hitherto carried out in sub-Saharan Africa. Some of such studies... appear to be largely impressionistic in approach and sampling techniques and instruments, when indicated are often weak.

Adegbija’s observation echoes Schriewer’s (1989) earlier challenge to researchers (of English variation in Africa) to employ new approaches in data collection and analysis, in order to ensure that such studies provide a systematic empirical account. Both observations are most relevant particularly to the study of social and psychological factors that account for language change in the region.

3. Current Study

This paper accentuates the need to develop methods of data elicitation and analysis germane to the unique linguistic environment prevalent in a majority of African speech communities. Utilizing audio and computer technology that enables a researcher in the region to record, isolate, and analyze targeted features from large samples with narrowed precision may hardly suffice, as indicated in this study. Effort should also be made to appreciate and contend with the inherent social and linguistic diversity.

In the study of variant vowel systems of African English, for instance, a researcher has to take into account the linguistic complexities prevailing in many sub-Saharan countries where hundreds of diverse indigenous languages are spoken. English is acquired as a second or third language by a great majority of its speakers and it is commonly used in official settings.

Furthermore, one has to take into account complex patterns of influences and transfer of features from one language to another when speakers of different languages interact over a long period of time. Speakers of cognate languages, one may assume, have relatively similar patterns of perception and production of non-native sounds. However, social factors such as a speaker’s level of education, social status, network and motivation may also have an equally significant
influence. This study makes an effort at observing linguistic behavior of a relatively homogenous group in a densely heterogeneous population, by controlling the sample for gender, level of education, linguistic affiliation, and nationality.

4. Sampling and Data Collection

Cognizant of the foregoing observations, respondents, in this study, were identified using the ‘friend of a friend’ network method, as described in Milroy (1980). Data was elicited from sixty male and female students attending universities in Ghana, Kenya and Zimbabwe. Respondents spoke English as a second or third language, and all spoke a first language from the Kwa and Bantu language family groups. Specifically, Akan speakers in Ghana; Shona and Ndebele speakers in Zimbabwe; and Gikuyu, Kikamba, Lubukusu, and Ekegusii speakers in Kenya were targeted. Respondents age ranged from nineteen to forty-five years.

Subjects were requested to read a randomized list of 21 monosyllabic words that contained vowels and diphthongs relevant to this study. A reading passage specifically constructed to incorporate lexical items already presented in the word list was also presented to the subjects. The procedure allowed us to elicit both formal and casual stylistic levels of production for each vowel under investigation. Each interview was tape-recorded.

5. Acoustic Measurement

The collected data was subjected to two kinds of analysis: quantitative and qualitative. Vowels were extracted from the recorded lexical items and frequencies of the first two formants (F1 and F2) calculated using a computer program (SIGNALYZE version 3.12) designed for acoustic analysis. Formant measurements were calculated by locating the cursor at an appropriate point of a waveform, using linear predictive coding (LPC). The F1 frequencies are inversely associated with the height dimension, and the F2 frequencies are associated with the front-back dimension.

A data file for each respondent was subsequently prepared showing F1, F2 scores, vowel class, stress and word. These scores were subsequently loaded into a computer program (PLOTNIK (version 04)), a vowel system analysis program developed by William Labov for plotting vowel systems from formant measurements. The data was recoded, a procedure that reads the orthography of the word and adds phonetic information of the vowel, indicating, in code form, the manner, place of articulation, and voicing of preceding segments and following sequences.
A preliminary accuracy evaluation task was performed after tokens were plotted on a PLOTNIK vowel chart. When formant values of the same vowel and subject showed wide variation, they were double-checked by listening to and comparing the spectrograms of the tokens. In cases where a respondent clearly misread a word (e.g. read the word *bout* as *boot*; *made* as *mad*; or *sod* as *sad*) on the word list, the correct word was extracted from the reading passage and measurements of the correctly read vowel replaced the misread one. After data from each group and region is recoded, a group mean is calculated, and all files are normalized. Labov (1998:23) explains the need to normalize data:

[Normalization transforms] all measurements into a single reference grid which will show vowels which sound the same with the same formant values. Ideally, this would duplicate the normalizing process of the human ear and neural network...it has proven to be more successful than others in eliminating effects due to differences in vocal tract length, while preserving those social differences of age and sex that are inherent characteristics of the speech community.

Having reduced linguistically irrelevant differences in the production of speech signals through normalization, the resultant acoustic vowel chart becomes an accurate representation of the linguistic aspects of the vowels, facilitating both across-speaker and across-language comparison as B.G. Yang, (1996) demonstrates in his comparative study of American English and Korean vowels.

The Plotnik vowel chart in Figure 1 illustrates the front-back (horizontal axis) and high-low dimensions in an individual respondents production of vowels. Based on acoustic measurements of F1 and F2 frequencies, Mukami (a 21 year old Kenyan female living in an urban area), produces the English vowels under investigation as follows: Vowels contained in the tokens *bead* and *hid*, *hue* and *here* are realized as [ai]; *made*, *hair*, *bed* are produced as [e]; *hard*, *bird*, *bad*, *buy*, *mud*, and *bout* are realized as [a]; while *saw*, *nod*, *boy*, and *boat* are pronounced as [o] and *good*, *mood*, *tour*, and *sure* are produced as [u]. Note, however, how close some of the “o” (or mid-back) tokens are to the “low” set (e.g. nod, hard).
Figure 1- Mukami’s Vowel System

Plotnik also allow for group analysis allowing for gender, ethnic, national, and regional comparisons. For instance, in this study acoustic measurements of all male and female respondents in each country were mapped onto the Plotnik vowel chart separately to compare gender vowel productions in each or all countries. Likewise, F1 and F2 scores of all respondents from each country were combined, mapped and compared with the rest to determine features, if any, that were distinct to each sample.

However, in order to analyze African languages, a researcher has to apply necessary modifications to the Signalize and Plotnik programs to suit the data. Observation and conclusions drawn from such a study of well-educated, Kwa and Bantu language speakers, can only be considered to represent just that particular sample. Whether the results represent the broader
population of Kwa and Bantu speakers, or national varieties (Kenyan, Ghanaian, Zimbabwean Englishes), will be determined after similar studies have been conducted covering other social, ethnic and language groups not represented in this study.

6. Conclusion

In a nutshell, although this study found both geographical and gender distinction in vowel production, there were some broad similarities that reflected the common linguistic background of the sample. The study poses many questions that beg for answers in order to language variation in Africa. For instance, what are the social factors that account for these gender distinctions? Is the distinction indicative of a general trend in society irrespective of language? In other words, do men and women speak African languages differently? A much broader question is whether there are distinct speech behavioral patterns between gender, ethnic, and social groups in the production of first languages, lingua franca, and foreign languages? What, if any, are the differences? In replicating this study, would the non-educated, non-Bantu, older or younger respondents exhibit different features? These, and similar concerns face a researcher in multilingual Africa.

In conclusion, the study of language variation and behavior in densely multilingual sub-Saharan Africa should adapt methods and tools of language investigation used in the study of different speech communities while avoiding the pitfalls of generalization. Technology provides for precision in data analysis, not to mention the ease of analyzing huge and diverse amounts of data that may help in defining and entangling the complexities of language interactions and influences in these speech communities. African linguists should, if only in small steps but simultaneously, reexamine and redefine issues that have failed to represent the accurate linguistic image of Africa.
References


