CHAPTER THREE
PROCEDURE

The method of selection of subjects, data and analysis procedures are discussed in this chapter together with techniques used for normalization of the data.

3.1 Selection of dialects

The major dialects of Ewe include Aŋlɔ, Tɔŋu and Uedome but under the umbrella of these three dialects are other sub dialects which, even though are mutually intelligible to all the Ewe speakers across the region, are distinct in auditory terms. In all, five dialects, including the three mentioned major dialects were investigated. The dialects were selected, three from the southern part of the Ewe speaking region, and two from the northern part of the region. The selected dialects were chosen to ensure a representation all the three major dialects in the study. The Aŋlɔ data comprise of Avenor dialect and the dialect that is described as the indigenous Aŋlɔ (it is referred to as Aŋlɔ dialect throughout this research). The Aŋlɔ data was taken from Keta district at Atiavi and Anyako. The Avenor data was collected from the Akatsi district.The recording was done at Wute, a town of about 11 kilometers away from Akatsi, which is the district capital. The Mafi dialect spoken in Adidome in the North Tongu district was chosen for the Tɔŋu data. Ho and Kpando dialects were chosen from the Uedome group. The Ho data was collected from Ho-Bankoe, a suburb of Ho the capital of the Ho district and that of Kpando was from Kpando town itself, in an area believed to be inhabited by the indigenous speakers of the Kpando dialect. (see map in appendix A). The selection of the towns was based mainly on the level of the usage of their native languages in their day-to-day activities and also on the level of the penetration of other languages. Commercial areas or 'residential areas' were avoided because there is the possibility of their native language being influenced by other languages.

3.2 Speakers

In all, 44 speakers, 24 males and 20 females from the selected towns were recorded. They comprise of Aŋlɔ (10 speakers), Avenor (7 speakers), Ho (9 speakers), Kpando (8 speakers), and Tɔŋu (10 speakers). To ensure the subjects are 'native inhabitants', those who were born, raised and educated (at least elementary / basic levels) and are still living in the native areas were recorded. All subjects were between the ages of 20 and 60 years of age. Social and economic status or parameters were not taken into account.

The approach used was based on judgmental sampling that made use of the "snowball" technique. Anderson (2003) describes the judgment sample as a "procedure for which the researcher identifies particular type of speakers (based on demographic factors, for example) while planning a study and then attempts to locate and record such speakers during the fieldwork phase of the study". The judgment sample method was used to ensure that only monolinguals are

recorded. In case of this study, the targeted group was people who have no or minimal formal education. The researcher used interviews and the snowball method to select the participants. Milroy and Gordon (2003) says the snowball technique is the situation where the researcher asks some of the randomly selected people if they can recommend others who might be willing to participate in the study. After recording some randomly selected speakers, the researcher asked the participants to recommend friends and family who could help with the study and then followed up by contacting the recommended people. These leads were then contacted and some of them recorded. As Milroy and Gordon noted, this procedure reduces the chances of the interviewer being rejected by potential participants. Some of these recommended people agreed to be recorded after the researcher explained the project to them and told them who recommended them.

3.3 Data

Two groups of words, one for the oral vowels and the other for the nasalized vowels were prepared and the words with the vowels were put into the carrier frame: Gblɔ… pɛpɛpɛ - "say…exactly". The first list comprises of monosyllabic words with the structure CV which have the vowels placed after a voiced bilabial plosive /b/. The second list, which was used for the nasalized vowels, is made up of combination VCV and CV structured words. The mixture became necessary because it was difficult to get only monosyllabic words and words with the same consonantal environment for the nasalized vowels. These consonants were chosen because they have so little influence on the following vowels. The two list of words used for the oral vowels and the nasal vowels are presented in tables one and two as follows:

Table 3.3.1

Vowel	***Words in isolation***	***Gloss***
I	bi – [bi]	burn
e	be - [be]	hide
ɛ	bɛ - [bɛ]	Cheat him/her
a	ba - [ba]	mud
u	bu – [bu]	respect
o	bo – [bo]	farm
ɔ	bɔ – [bɔ]	bend
ə	eve - [əvə]	two

Table 3.3.2

Vowel	***Words in isolation***	***Gloss***
ĩ	hĩ – [hĩ]	Last syllable of the word "ɖewohĩ" (maybe)
ẽ	dzẽ - [dzẽ]	Red
0	ɛhɛ̃ - [ɛhɛ̃]	that's it
ã	ahã - [ahã]	that's it
ũ	ahũ - [ahũ]	Dew
õ	lõ - [lõ]	take off fire
ɔ	bɔ̃ - [bɔ̃]	Scorpion
ə	hẽ - [hə̃]	Red

From the above list of words, the following set of sentences generated were presented to the subjects for recording:

1.Gblɔ bi pɛpɛpɛ – say burn exactly

Gblɔ be pɛpɛpɛ – say hide exactly

Gblɔ bɛ pɛpɛpɛ – say cheat him/her exactly

Gblɔ ba pɛpɛpɛ - say mud exactly

Gblɔ bu pɛpɛpɛ –say respect exactly

Gblɔ bo pɛpɛpɛ –say farm exactly

Gblɔ bɔ pɛpɛpɛ – say bend exactly

Gblɔ eve pɛpɛpɛ –say two exactly

2. Gblɔ hĩ pɛpɛpɛ – say 'expresion' exactly

Gblɔ dzẽ pɛpɛpɛ – say red exactly

Gblɔ ɛhɛ̃ pɛpɛpɛ – say that's it exactly

Gblɔ ahã pɛpɛpɛ - say that's it exactly

Gblɔ ahũ pɛpɛpɛ –say dew exactly

Gblɔ lõ pɛpɛpɛ –say take of fire exactly

Gblɔ ahɔ̃ pɛpɛpɛ – say scorpion exactly

Gblɔ hẽ pɛpɛpɛ –say redish exactly

3.4 Recordings

The recording was done by the use of Sony DPC V.O.R IC Recorder ICD-MS525. Care was taken during the recording to ensure best acoustics environment as possible. As speakers generally tend to take more articulatory care when speaking in formal environments than in informal ones, the recording was done in the local areas of the subjects in a relaxed and an informal atmosphere to ensure that the subjects stay close to their everyday language. A person who speaks the same dialect as the subjects gave all the instructions during the recording. This is because the different dialect speakers (especially educated speakers) tend to change over from their local language to that of the standard Ewe most of the time when conversing with someone who does not speak their native dialect. Noisy environments such as markets, schools etc were avoided. The volume of the recorder was reduced to about 40% to reduce the capture of unwanted noise. Those speakers could read simple words were then asked to read each carrier sentences as naturally as possible, each in three repetitions.

3.5 Analysis

Recordings were acquired and analyzed by the use of the Kay Elemetric Computerized Speech Lab (CSL) model 4500. The CSL is an instrument that analyzes speech sounds into sound waves. By means of an electrical filter of variable frequency response, the CSL produces a graphic display of a speech sample, which is conventionally referred to as the spectrogram (See figure 3.5.1). Time is shown along the horizontal axis and the frequency (Hz) along the vertical axis. The amplitude of the frequency at any point is indicated by the intensity of darkness at that particular point and is indicated in Hertz (Hz) on the vertical axis. To specify the vowel sounds of a language, it is important to state at least the frequencies of some of the formants. There have been a number of ways of measuring the formant frequencies. One way is to sketch an envelope over the most darkened areas of the various harmonics and take the formant values at the middle of the envelope (Akpanglo-Nartey, personal communication). This method however has certain pitfalls. In the first place, one needs to print out a chunk of spectrograms in order to do the measurement. It also depends largely on the skill of the researcher because the envelope curves may not be always symmetrical and that would mean the exact center of that harmonics would not be measured. The envelope curves of different people for the same vowel may also be different (Dunn 1961).

Abramson (1960) cited in Wells (1962), describes a method based on broadband spectrograms where a line is drawn by hand on the spectrogram down the middle of a formant as the eye judges it. The height of the line is measured and then converted into cycles per second (cps). This method is also somehow tedious because one needs to draw the line several times in order to get the exact middle of the spectrogram. However, as Wells explains, this technique, in evaluating the formant frequencies at a particular point, takes into account the

preceding and following values. It appears that best results can be achieved by the use of this method since at this point in time, that is, at the middle, the influence of the preceding consonant might have faded out and that of the subsequent one is yet to set in.

In this study, the formant values of the vowels were measured on broadband spectrograms. The recordings were digitized into the Computerized Speech Lab (CSL) at a sampling rate of 11025 Hz for the three tokens. The waveforms of the vowels were then edited to remove long pauses between words. Broadband spectrograms were made out of the edited samples. Formant history, showing the various formants was then analyzed and for each vowel, a steady point was found near the midpoint of the broadband spectrograms and measured. Measurements were taken by positioning cursors at the center of the highest point of each harmonic and the formant value taken from the formant analysis menu. Some points were however measured slightly earlier or later than the midpoints if the formant structure of the midpoint is not well marked. This was done especially in case of the nasalized vowels. Figure 3.5.1 shows an example of manual placement of markers for three tokens of [a] as produced by a male speaker of Aŋlɔ. Waveforms and spectrograms of one speaker each of the dialects are presented in appendices II to VI. The formant values provided for the center time in the formant analysis menu was taken.

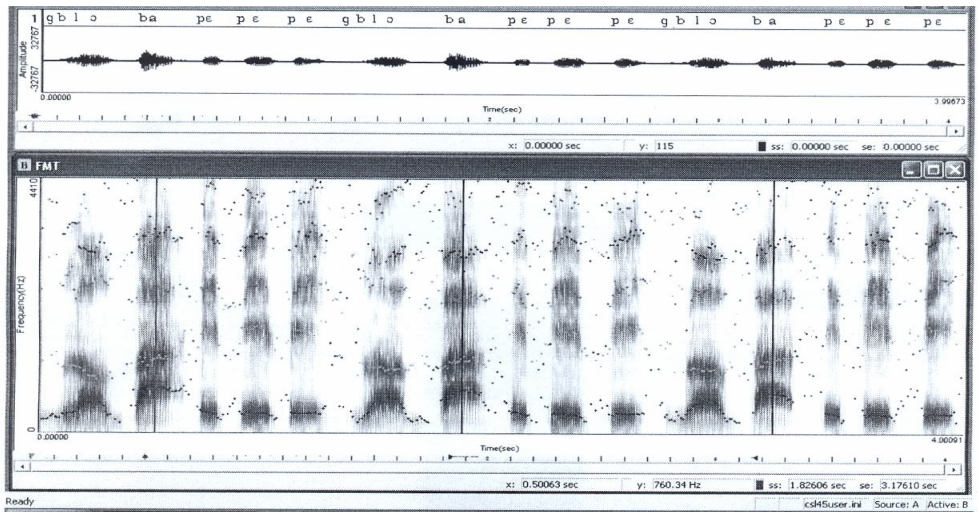

Figure 3.5.1 A spectrogram three token [a] by a male speaker of Avenor dialect aged 38.

F1 and F2 of all the vowels were noted and F2' (i.e F2- F1) was calculated manually and presented in tables. F1 was manually plotted against the F2', in an acoustic space with F1 on the ordinate (vertical axis) and the F2' on the abscissa (horizontal axis). The SPSS statistical package was used to reduce the numbers

to meaningful linguistics units (this process is usually referred to as normalization).

3.6 Statistical Techniques

The most commonly used method of data reduction is the averaging of the formant values of all speakers. That is, the means are calculated for all tokens of each vowel and presented as a single point. This method, as Disner (1980) explains, is a way of reducing a large amount of acoustic data to a linguistically useful form. She cited Lindau and Wood (1977) using it for Yuroba, Akan, and other Kwa languages as well as Peterson (1976) for Icelandic. It is also used in recent works such as Anderson (2003) and Marrero et al. (2003) to reduce a large volume of data to a useful form. This method was used in this study to reduce the three tokens of the vowels given by each speaker to a single point. However, averaging method is not enough to show speaker dependent variances in the vowels, therefore other methods needs to be applied. In order to normalize speaker related differences, extrinsic normalization was used. This approach positioned each vowel of an individual speaker relatively with respect to the other vowels in his system. One way to deal with this as Disner (1978) says, is to use "the analysis of variance or the t-test statistical procedures…both of these procedures compare the amount of difference between the languages to the amount of speaker-related difference within each language". The technique computes the overall mean of formant values of the individual speakers, the differences of the means, and their significant. The advantage of this method is that, it takes as input the raw formant data and calculates the overall mean of each language as well as the mean of each set of comparable vowels across languages. It is easier to determine overall and pattern differences and their significance from the distribution of the means by the use of this method. One-way analysis of variance (ANOVA) was used in this study to ascertain the level of the actual differences existing between the dialects. To find out to what extend one vowel overlaps the other the paired sample T-Test procedure was used. This procedure compares the means of two variables for a single group. It computes the differences between values of two variables for each case and tests whether the average differs from 0.