SOCIOLINGUISTICS OF PHONOLOGICAL INTERFERENCE

IN YORUBA - ENGLISH

by

RAPHAEL OLUWATOSIN ATOYE

Vol II

Thesis submitted in partial fulfilment of the requirements
for the
degree of Doctor of Philosophy

Department of English Language,
University of Sheffield.

February, 1980.

CHAPTER FOUR

LINGUISTIC STUDY

4.1 INTRODUCTION

The present chapter contains reports of the linguistic aspects of the research. Four major linguistic issues, all already discussed in the introductory chapter, are examined in the light of quantitative evidence from the research. These include the predictive power of contrastive analysis, the nature of L2 speech, L2 speech in relation to variable rules, and the relevance of the dynamic paradigm in a quantitative study. In the first, the degree of accuracy achieved in the prediction of first-language interference carried out in the last chapter is examined. This is done by comparing predicted interference with actual interference. In the second the hypotheses, formulated from Gatbonton (1975), that L2 speech is a mixture of source- and target-language sounds are investigated at various levels. It is concluded that the null hypothesis can only be accepted at certain, less important levels, but not at more crucial others. The third section examines the relevance of the notion of variable rules to L2 speech. It is concluded that the distinction between variable and categorical rules disappears at certain levels. The relevance of the dynamic paradigm in a quantitative paradigm-based study is examined in the last section. The evidence derived from quantitative data strongly suggests that a dynamic analysis is possible only after careful processing of quantitative data. The chapter, therefore, attempts to answer general theoretical questions from the specific evidence.

4.2 THE PREDICTIVE POWER OF CONTRASTIVE ANALYSIS

4.2.1 Introduction

The need for evaluation of the predictive power of the analysis arises from doubts expressed by anti-contrastive linguists (see Chapter One) about the efficacy of such analyses in general and analyses based on the generative model in particular. As any contrastive analysis is only as good as the grammatical model on which it is based an evaluation of a contrastive analysis is, to a great extent, an evaluation of the grammatical model that underlies it; to a great extent, because certain other factors intervene between the grammatical model, the analysis and the prediction which emerges therefrom as the final product. Such factors include the linguist's knowledge of the grammatical model and the language systems he analyses, as well as the care with which he handles all data from the foregoing. In other words, while a high predictive-power rating indicates a high degree of analytical efficacy for the model, a low rating does not necessarily indicate the converse since a good model may prove no better than a poor one when put to a poor use. The first task to perform when a poor rating is reported is, therefore, to re-examine the linguist's use of his theory and the available data.

In evaluating the predictive power of the analysis carried out in the present research (see last chapter) the method adopted was the logical one of comparing the actually occurring (actualised) with predicted interference. That comparison was easily done by quantifying both types of interference. Independently of what each of the two values might be, a predictive power rating of seventy-five percent was set such that any rating below that level would be admitted as an indication of weakness on the part of the analysis. Two hypotheses were then formulated as follows:-

Null Hypothesis:- The predictive power rating of the contrastive analysis is not less than seventy-five percent.

Alternative Hypothesis:- The predictive power rating of the contrastive analysis is less than seventy-five percent.

Both the predicted and actual interference were then examined.

4.2.2 Prediction

The twenty predictions investigated are presented in Table 4.

TABLE 4: PREDICTED PHONOLOGICAL INTERFERENCE IN YORUBA-ENGLISH

1.	Conseg 1:	/θ/	⟶	/t/	
2.	Conseg 2:	/ʒ/	⟶	/š/	
3.	Conseg 3:	/č/	⟶	/ǰ/	
4.	Conseg 4:	/v/	⟶	/f/	
5.	Conseg 5:	/ð/	⟶	/d/	
6.	Conseg 6:	/p/	⟶	/kp/	
7.	Conseg 7:	/z/	⟶	/s/	
8.	Conclus 1:	[Ø]	⟶	[V]	/ # C - C
9.	Conclus 2:	[Ø]	⟶	[V]	/ # CC - C
10.	Conclus 3:	[Ø]	⟶	[V]	/ C - C #
11.	Conclus 4:	[Ø]	⟶	[V]	/ C - C^2 (where C^2 is both ± cons and ± syll, while the double hatch (#) indicates syllable boundary.

TABLE 4 Continued

12.	Orvow 1:	/æ, a:/	⟶	/a/
13.	Orvow 2:	/I, i:/	⟶	/i/
14.	Orvow 3:	/ɔ/, ɔ:/	⟶	/ɔ/
15.	Orvow 4:	/ʌ/	⟶	/ɔ/
16.	Nasvow 1:	/I/	⟶	/ĩ/
17.	Nasvow 2:	/ʌ/	⟶	/ɔ̃/
18.	Nasvow 3:	/ʊ/	⟶	/ũ/
19.	Nasvow 4:	/ɛ/	⟶	/ɛ̃/
20.	Nasvow 5:	/æ/	⟶	/ã/

The abbreviations in the second column are to be read as follows:-

conseg = Consonant segment
conclus = Consonant cluster
orvow = oral vowel
nasvow = nasal vowel

4.2.3 Actual Interference

The actual interference observed for each of the twenty sound segments tested is presented in Table 4,1. To avoid repetition and make comparison easy the predicted interference is entered in the second column, while the actual interference is entered in the third. An asterisk after a particular entry in the third column indicates that there was a difference between the predicted and the actual interference. A dash in that same column indicates that no interference was observed for the sound segment in the whole of the analysis.

TABLE 4, 1: COMPARISON OF PREDICTED AND ACTUAL INTERFERENCE

Segment	Prediction	Actual
Conseg 1:	/t/	/t/
Conseg 2:	/š/	/š/
Conseg 3:	/ɣ/	/š/ *
Conseg 4:	/f/	/f/
Conseg 5:	/d/	/d/
Conseg 6:	/kp/	-
Conseg 7:	/s/	/s/
Conclus 1:	[+V]	[+V]
Conclus 2:	[+V]	[+V]
Conclus 3:	[+V]	[+V]
Conclus 4:	[+V]	[+V]
Orvow 1:	/a/	/a/
Orvow 2:	/i/	/i/
Orvow 3:	/ɔ/	/ɔ/
Orvow 4:	/ɔ/	/ɔ/
Nasvow 1:	/ɔ̃/	/ɔ̃/
Nasvow 2:	/ɔ̃/	-
Nasvow 3:	/ũ/	-
Nasvow 4:	/ã/	/ã/
Nasvow 5:	/ĩ/	/ĩ/

4.2.4 Predictive Power

In order to evaluate the predictive power of the analysis it was necessary to count the number of total predictions as well as the number of those predictions that were proved right when compared with the actual interference. The number ofright predictions was expressed as a proportion of the total number of predictions. This was then multiplied by a hundred in order to arrive at a predictive power rating for the analysis. The details entered in Table 4, 1 are based on the assumption that a prediction is proved positively right if actual interference matches predicted interference, even only once, in the speech of only one of the fifty informants. By representing total prediction as z, wrong predictions as Y and predictive rating as PR, the formula for deriving predictive power rating can be expressed as:-

$$\text{P.R.} = \frac{Z - Y}{Z} \times 100$$

It was assumed in this formula that Z-Y would yield P, that is, right predictions. Since a dash in Table 4, 1 does not indicate a wrong prediction it is necessary to define the terms right and wrong prediction in the sense in which they are employed here to indicate that non-occurrence does not indicate incorrectness. A wrong prediction is one in respect of which some sound(s) other than the standard R.P., or its predicted source-language replacement, was actually realised. In other words, a prediction cannot be said to be wrong only because the standard R.P. was realised instead of the predicted source-language replacement. In such a case one only says that the prediction did not materialise, for obvious reasons, which is different from saying that it was wrong. Nonactualisation, in this sense, is no proof of incorrect prediction. Thus, if it was predicted that an English R.P. sound a[1] would be replaced by a

Yoruba sound a^2, but was actually replaced by another Yoruba or English sound C^1 or C^2, one would say that the prediction was wrong. If, on the other hand, either of the sounds a^1 or a^2 was realised all of the time, the prediction would be deemed correct. A single instance of a^2 is sufficient to confirm the prediction as proved. Conversely, if all realisations by all informants were a^1 the prediction would be regarded as correct but not proved. The definition of 'wrong prediction' is not as liberal as it may appear. It means, in effect, that if in the analogical illustration above, there is only one instance of C^1 or C^2 and all the other instances are a^1, the prediction will still be categorised as wrong.

Applying those definitions, it was observed that a wrong prediction was proved only in one out of the twenty cases tested. In Conseg 3 it was predicted that /č/ would be realised as /ǰ/, but in no single case was this prediction proved true. Instead all of the informants pronounced the sound either in the correct target-language form as /č/, or as /š/ which is present in the systems of both languages but is not the phonologically predicted interference sound. In all the other nineteen cases the sounds were pronounced either as the standard R.P. forms or as the predicted source-language substitutions by all the informants taken together.

Using the formula already explained, the predictive power of the contrastive analysis and the grammatical model underlying it was arrived at as follows:-

$$P.R. = \frac{20 - 1}{20} \times \frac{100}{1} = 95\%$$

A score of 95% rating for the predictive power of the contrastive analysis indicates that it is a highly reliable analysis. It also indicates that the grammatical model, that is generative phonology, on which the analysis was based is equally dependable for the analysis of natural languages. It is to be preferred, therefore, to other grammatical models which, as was demonstrated in the first chapter, are not capable of making the discrete distinctions that enable predictions to be so precise. The null hypothesis was therefore accepted, that is the rating of 95% was higher than 75%.

4.2.5 Wrong Prediction

The high rating achieved in the predictive power of the analysis logically led to a re-examination of the only instance of wrong prediction. It was examined whether the error in prediction in that segment arose from inadequacy of the theoretical model in handling that segment or from the researcher's own use of that model. Again, it was necessary to compare the predicted interference with the actual interference for that segment. The prediction was indexed as SL3 in Chapter Three.

Predicted Interference: /č/ ⟶ /ǰ/

Actual Interference: /č/ ⟶ /š/

Employing distinctive-feature specifications, these facts are restated as follows:-

Predicted Interference:

$$\begin{bmatrix} +\text{ del rel} \\ -\text{ voice} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{ voice} \end{bmatrix}$$

Actual Interference:

$$\begin{bmatrix} +\text{ del rel} \\ -\text{ voice} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{ del rel} \end{bmatrix}$$

Closer observation of the matrices revealed that the sound substituted by the informants also differs from the English sound in one other respect. The English sound is [- cont] while the substitution is [+ cont] . It was, in fact, observed that the [+ del rel] sounds in both languages are [- cont] .

It appears from the above observations that while source-language interference occurred as predicted the distinctive-feature specification of the substitution differed from the one in the prediction in a distinct manner. Instead of replacing [- voice] with [+ voice] as predicted, the [voice] feature was not involved in the operation. It was the [release] feature that was involved. The informants seem to have replaced [+ del rel] with [- del rel] , which is a higher-order feature in respect of which a co-efficient of the distinctive feature [continuant] has to be selected. The informants appear to have selected [+ cont] at that level. The process becomes quite clear if one remembers that the feature [release] describes three stages of what, in autonomous phonology, used to be characterised as three different features of plosive, fricative and affricate. The complete segment simplification strategy employed is therefore described fully as:-

$$\begin{bmatrix} + \text{ del rel} \\ - \text{ cont} \\ - \text{ voice} \end{bmatrix} \longrightarrow \begin{bmatrix} - \text{ del rel} \\ + \text{ cont} \end{bmatrix}$$

The [voice] quality was still preserved as [- voice] . It should be pointed out however that since the predicted simplification strategy appears to be simpler than the one adopted, no definite explanation can be given here as to why the chosen strategy was preferred. One can only say that the feature [release] may have been higher in the speakers' distinctive-feature hierarchy than [voice] .

4.2.6 Unpredicted Interference

The evaluation system adopted in the last section may be questioned for a number of reasons. One of them has to do with the incidence of unpredicted interference. It may be argued that the number of unpredicted interferences ought to be regarded as instances of wrong prediction. The argument would be tenable if it was proved that such interference ought to have been predicted and that failure to do so diminishes the rating of the predictive power of the analysis. It is explained here why the only case of unpredicted interference was neither taken into account in evaluating the predictive power of the analysis nor included in the results of the research.

The only case of unpredicted interference observed in the data is the use of the Yoruba sound /g͡b/ in a particular environment by most of the informants. The sound was used in the second syllable of the word 'rugby', /rʌgbI/, which occurred in the questionnaire. The Yoruba sound /g͡b/ has no cognate in English for which it could be expected to substitute and there was accordingly no prediction of its occurrence in Yoruba-English. Yet, as explained, it occurred. An examination of the phonological environment in which the Yoruba native speakers used /g͡b/ revealed that it was used in substitution for a consonant cluster of the type $\# C\ C$ — for which, as for all other types of consonant cluster, the prediction of phonological interference was by vowel insertion. The prediction, stated as SL9, was proved right in respect of similar syllable structures.

SL9:

$$[\emptyset] \longrightarrow [V] \; / \; \# \, C - C$$

The correct simplification method for that consonant cluster should therefore be by vowel insertion. Instead, a different strategy seems to have been employed in this single case. The strategy is describable in various forms as follows:-

Actual Interference

(a) $\# \; C^1 \, C^2 \longrightarrow C^3$

provided that C^1 = /g/, C^2 = /b/ and C^3 = /$\widehat{gb}$/

In other words, the actual interference is as in (b).

(b) /g/ + /b/ $\longrightarrow$ /$\widehat{gb}$/

The simplification stategy employed in this segment cluster is certainly a form of cluster synchronisation, by which a sequence of two consonant clusters was realised as one single consonant. What is of interest here is why this strategy was employed for the particular consonant cluster but not for any other consonant cluster of the same structure and environment but of different consonant sounds. Since there was no clue from phonological analysis other aspects of the two languages had to be examined. Through one's familiarity with the writing system of Yoruba one knows that the sound symbolised as /$\widehat{gb}$/ is written in that language as a cluster of the two consonants involved in the word /rʌgbI/. This observation is very important in view of the fact that many phonological analyses often confuse phonological facts with orthographical shapes. It is revealed in the present analysis that though Yoruba phonology does not, in its underlying form, permit consonant clusters the orthography permits their occurrence. The present case is even more special because it arises from the representation of a single phonological sound by two clustering consonant shapes in the orthography. The source-language influence that was at work was the pronunciation of the consonant cluster as if it was the sound normally written in that orthographical shape in the source-language. In effect a cluster simplification strategy known as synchronisation was adopted. Thus, though the end-product of that strategy emerged at the phonological level the strategy itself was obviously orthographically motivated and could not, for that reason, have been predicted from purely phonological facts.

But suppose that one agrees for one moment that the case under consideration was a failure of analytical precision and consequently of predictive capacity. One would then say that there were two errors of prediction while there ought to have been twenty-one predictions. The predictive power rating would then be 90•48; still sufficiently high to uphold the null hypothesis. One important point that is re-emphasised here is the one, admitted in the first chapter, that a phonological analysis is only capable of accounting for phonologically motivated interference either by prediction or explanation. This underlines the inescapable fact that any contrastive analysis, if it is to be complete, needs to examine all aspects of the language systems being studied.

4.2.7 Non-occurring Prediction

As a final step one other possible criticism of the evaluation system was considered. This concerns the interpretation of wrong and right in relation to the predictions. In 4.2.3 a wrong prediction was interpreted as one in respect of which sounds other than the ones predicted or the standard R.P. cognates were actually used by informants. It may be argued that a prediction that was not positively proved right should have been interpreted as wrong. In other words, a prediction should have been interpreted as wrong if the predicted substitution was not used even though the R.P. cognate was used. The appropriate answer to this argument was considered in Chapter One, namely that predictions, by their very nature, describe potentials. The fact that a particular potential was not subsequently realised is no indication that the potential did not exist in the first place. A number of factors, both linguistic and non-linguistic, could have been responsible for the non-realisation of a potential. Such factors could include mastery of the target-language form by the informants as a result of phonetic training, high level of education and a fairly long period of sojourn in a country where the target-language is a native tongue. Whether these factors have any significant influence on the performance of the informants in the target-language is investigated in the next chapter. If they are shown not to have had any such influence on performance it could be suggested that the distinctive-feature differences on which such interference was based were not . generally difficult for the English speaking Yoruba to learn.

Even then, it was decided not to dismiss this criticism by mere force of argument. The predictive power rating of the analysis was examined in the light of the suggested re-interpretations, namely that a wrong prediction is one in which any difference occurred between the predicted sound and the actually occurring ones. All the predictions in Table 4, 1 against which a dash was scored were interpreted as wrong, that is conseg 6, nasvow 2 and nasvow 3. Added to these was the one, conseg 3, proved positively wrong. The predictive power rating, considering four wrong out of twenty predictions, then dropped to 80%. When one added the unpredicted one to make five wrong out of twenty-one predictions, the predictive power rating was 76•19%. In both cases the rating was still high enough to support the acceptance of the null hypothesis and the rejection of the alternative.

4.2.8 Conclusion

The predictive power rating of the analysis was primarily calculated as 95%. Since that rating was well above the lower limit of 75% as pre-set in the hypothesis (see 4.1.1), the null hypothesis was accepted and the alternative was rejected. Alternative calculations were then made in the light of three other plausible interpretations of a wrong prediction. The ratings based on those alternative interpretations were 90•48, 80•00 and 76•19. It was observed that, though in varying degrees, the rating in each case was still higher than the 75% limit. The null hypothesis was therefore accepted in each of the four cases and the alternative hypothesis was rejected in each case. The acceptance of the null hypothesis suggests that the phonological analysis on which the predictions were based was highly successful in revealing the differences between the phonological aspects of the two languages examined. That, in turn, was accepted as positive proof that the grammatical model, that is generative phonology, within whose frame-work that analysis was carried out was a good model for such analyses.

4.3 NATURE OF SECOND-LANGUAGE SPEECH

4.3.1 Introduction

Afolayan (1968) observes that in speaking English the Yoruba L1 user will replace certain English sounds which are not familiar to him with Yoruba sounds which resemble those English sounds. That opinion is in line with what appears to be the general thinking among linguists about inter-lingual interference, namely that the user of a second language will substitute sounds from his first language for unfamiliar sounds in the L2. In what appears to be a more refined statement on the nature of L2 speech Gatbonton (1975) and Segalowitz and Gatbonton (1978) suggest that L2 speech is a mixture of "well-formed" and "not well-formed" sounds, that is, a mixture of target- and source-language sounds. The last two seemed to represent an advance on previous studies which created the impression that the substitution of source-language for target-language sounds occurs every time the potential for such substitution exists. In the view of those earlier studies phonological interference is therefore an "all or none" feature of L2 speech. It occurs when the speaker does not master the target-language sound and does not occur at all when mastery of that sound has been achieved. In this sense the study of second-language speech lags behind the current views on variability expounded by Labov (1969). Labov (ibid) proposes variable rules to describe variation in monolingual language use and argues that a quantitative method provides the possibility of comparing the number of cases that a particular rule applies to the total number of cases in which it could possibly apply. In terms of the study of interference in

L2 speech this kind of highly refined analysis of variability demands that the number of cases in which a particular source-language form is actually used be examined and compared to the number of cases in which it could have been used. The analysis in the present section is an attempt in a sense, to bring the study of source-language interference into parity with the study of monolingual variability proposed by Labov. Gatbonton (1975) makes a similar attempt but her reliance on the dynamic paradigm which obscures some of the crucial quantitative facts about L2 speech, renders her analysis defective. For example, it was not possible for her to investigate the particular phenomenon in question in this section. Her assertion that L2 speech is a mixture of well-formed and not well-formed sounds therefore remains intuitive and, for that reason, suspect until it is proved. Secondly, the assertion is too generalised since it is capable of a number of interpretations some of which, it is feared, may not survive quantitative investigation. Each of these possible interpretations is examined in this section in the light of the data provided in the study. The analysis in this section therefore focuses on Gatbonton's suggestion and its unexpressed opposite. Both were reduced to a pair of opposing hypotheses to guide the analysis here.

<u>Null Hypothesis</u>:- L2 speech is a mixture of source- and target-language forms.

<u>Alternative Hypothesis</u>:- L2 speech is not a mixture of source- and target-language forms.

The interpretations of L2 speech examined here in relation to the hypotheses stated above are the entire second-language speech of all or one informant(s) as recorded in the interviews and second-language speech in respect of sound segments and segment types. At each of these levels and their various permutations it was examined whether, or not, L2 speech was a mixture of source- and target-language forms. This was necessary because the working hypothesis, to which Gatbonton's suggestion was reduced, failed to indicate which of these levels is meant by L2 speech.

4.3.2 L2 as the Speech of All Informants

4.3.2.1 In All Segments

L2 speech as the speech of all informants in all sound segments refers to the entire speech corpus of the fifty informants in all the sound segments investigated. At this level the null hypothesis was interpreted to mean that the speech corpus of all those informants was a mixture of "well-formed" and "not well-formed" sounds. Since a single instance of the occurrence of source-language forms in the speech of just one of the fifty informants is sufficient to characterise the entire speech of all those informants as a mixture there was little doubt that the null hypothesis would be accepted at this level. If, however, there was no single occurrence of source- or target-language forms in the whole speech corpus, that is, if source-language interference was zero or a hundred percent in the expected environments, then it was considered proved that L2 speech was, at that level, not a mixture.

In that case interference would have been proved to be an "all or none" feature of L2 speech.

In order to discover whether the speech of all fifty informants, taken together, contained both source- and target-language forms of the sound segments investigated it was possible to look at Table 4, 4 (below) and observe that there was no informant with a source-language frequency of either zero (indicating undiluted use of target-language sounds) or the maximum of 2,000 that was possible (indicating undiluted use of source-language forms). If each informant's speech was a mixture it could be reasonably concluded that the entire speech corpus was a mixture. It was not possible, however, by using that method to calculate the proportion of the occurrence of either source-language or target-language forms to the possible maximum occurrence of these forms. The sum of the actually occurring interference frequency was needed to derive the desired proportions. If, for example, the total number of the frequency of source-language forms was the same as the maximum possible then the ratio would be 1:1, indicating that such forms occurred on every occasion that there was a possibility of their occurrence. Conversely, if the frequency was zero it would mean that there was no single occurrence of source-language forms. The first step was to calculate the total number of times that source-language forms could possibly have occurred - termed hereafter as Potential Frequency. Then the sum of actually occurring source-language forms was calculated - referred to hereafter as Actual Frequency. After that the proportion of the actual to potential frequency was calculated as a percentage - also termed hereafter as the Frequency Rate. From the frequency rate decisions concerning the two hypotheses were then made.

Actual Frequency

In order to derive the sum of actual frequency of source-language interference any of two alternative methods could have been adopted. One was to add up the amount of interference recorded for each of the twenty segments for all the informants. The other was to multiply the mean for all informants by the number of informants involved in the study. The second alternative was the more economical. In addition, it was easily verifiable since the mean was provided in the computerised data sheet while the actual sum was recorded in the "breakdown" section of the line printer sheet (p. 10). The mean of actual frequency for informants was 874•760, that is, after the possible frequency for each sound segment had been reckoned as a hundred. Since the number of cases was fifty, the total frequency for all cases was therefore 874•760 multiplied by 50. The sum was 43738•000, which agreed with the sum printed in the "breakdown" section referred to above.

Potential Frequency

The number of times that it was possible for the source-language interference to occur in the speech of all the fifty informants was derived by the number of possible occurrence for each sound segment, in this case a hundred, multiplied by the number of sound segments, which was twenty. This was further multiplied by the number of informants, that is, fifty. In other words, potential frequency was derived by multiplying the number of segments (S), by the number of potential maximum occurrence per segment (M), and by the number of cases (N). The formula for this derivation could therefore be expressed in general terms as:-

$$PF = S \times M \times N$$

Similarly, the derivation of actual frequency could be formally stated as:-

$$AF = TM \times N$$

where TM denotes total mean, and N the number of cases.

Frequency Rate

The frequency rate of source-language interference in the speech of all informants taken to represent L2 speech was derived by expressing the actual frequency as a ratio of the potential frequency. This is what Labov (1969) means when he says that the number of cases where a particular rule applies ought to be compared to the number of cases in which it could possibly have applied. To reduce the derived ratio to a percentage it was then multiplied by a hundred. The derivation of frequency rate can therefore be summarised in the following formula, using RF as a shorthand for frequency rate:

$$RF = \frac{AF}{PF} \times 100$$

In the case of the present study these component factors have calculated values as follows:-

AF = TM x N = 874•760 x 50

PF = S x M N = 20 x 100 x 50

Therefore -

RF = PF ÷ (AF x 100)

$$= \frac{874 \cdot 760 \times 50 \times 100}{20 \times 100 \times 50}$$

= 43•738%

Conclusion

A frequency rate of 43•738% indicates that in every one hundred cases in which a source-language form could possibly have occurred it actually occurred in 43•738 cases. This shows that the L2 speech of the informants was a mixture containing large amounts of source- and target-language forms, the latter being a little greater than the former. The null hypothesis was therefore accepted. But, since L2 speech was defined as the entire speech corpus of all those informants it was necessary to examine results obtained from some alternative interpretations.

4.3.2.2 In Each Segment Type

L2 speech was next considered as the entire speech corpus of the informants in respect of each of the segment types investigated, namely consonant segments, consonant clusters, oral vowels and nasal vowels. It was therefore examined whether the speech of the informants was a mixture of "well-formed" and "not well-formed" sounds in each of those segment types.

In other words, it was examined whether the null or the alternative hypothesis would be accepted in respect of any of these segment types and to see how far the conclusion here would agree with that reached in 4.3.2.1. Employing the same formula as in 4.3.2.1, the actual frequency of source-language or "not well-formed" sounds was expressed as a percentage of the maximum possible or potential frequency of such sounds to derive the frequency rate. A frequency rate of zero in any segment type indicated that there was no single instance of actual occurrence of source-language forms and therefore no mixture of "well-formed" and "not well-formed" sounds. Similarly, a frequency rate of one hundred indicated that the speech of the informants contained no single instance of "well-formed" sounds in that segment type. As in the last case, this indicated that their speech was not a mixture, being made up of source-language forms only. Conversely, a frequency rate of between zero and one hundred indicated the presence of both source- and target-language forms in that segment type.

4.3.2.2.1 Consonant Segments

The seven consonant segments tested were indexed conseg 1 - 7 (see 4.2.2). The various calculations for this class of sound segments were obtained by using the following formulae.

Actual Frequency

The actual frequency of source-language forms for consonant segments was derived by multiplying the mean for the informants in the segment type by the number of cases. By the formula AF = M x N the actual figures were derived as 193•360 x 50. This figure was checked against the sum entered in the consegt column on the computer line printer sheet to ascertain its correctness.

Potential Frequency

The potential frequency was the number of potential frequency for each consonant segment, multiplied by the number of cases and then multiplied by the number of consonant segments. The formula S x P x N therefore gives 100 x 50 x 7.

Frequency Rate

The frequency rate for consonant segments was therefore calculated as PF x (AF x 100) as follows:-

$$RF = \frac{193{\cdot}360 \times 50 \times 100}{100 \times 50 \times 7} = 27{\cdot}623\%$$

This indicates that for consonant segments the ratio of source- to target-language forms was 27•623 to 72•377, thus confirming that both forms were present in the speech of informants in respect of that class of sound segments.

4.3.2.2.2 Consonant Clusters

Four environments for potential consonant cluster simplification, as predicted in SL9 (see Chapter Two), were tested.

Actual Frequency

Using the same formula as for consonant segments the actually occurring frequency of source-language forms in this segment type was calculated as 1053·000 x 50, and checked correct in the 'sum' column of the line printer sheet.

Potential Frequency

A similar formula to that used in consonant segments was adopted. The potential frequency by that formula yielded 100 x 50 x 4, which represents the total number of source-language interference that could possibly occur in this segment type in the speech of all informants.

Frequency Rate

The frequency rate for consonant clusters was, as for consonant segments, calculated as PF ÷ (AF x 100) as follows:-

$$RF = \frac{105{\cdot}300 \times 50}{4 \times 100 \times 50} = 26{\cdot}325\%$$

The frequency rate of 26·325% of nontarget-language forms indicates that the ratio between source-language and target-language forms in respect of this segment type was 26•325 to 73•675. Thoughthe proportion of target-language forms was considerably greater the null hypothesis that both forms were present, was still accepted.

4.3.2.2.3 Oral Vowels

Actual Frequency

The number of actually occurring source-language forms for oral vowels was calculated by the same formula as for consonant segments and consonant clusters. By that formula the actual frequency for oral vowels was calculated as 322•000 x 50 and equally checked correct in the computed line-printer 'sum' column.

Potential Frequency

The potential frquency, being the number of cases in which a source-language form could have possibly occurred, was calculated by the usual formula, that is, the number of segments multiplied by the maximum potential frequency per segment and then by the number of cases. For the present segment type this yielded a potential frequency of 4 x 100 x 50.

Frequency Rate

The frequency rate derived by the usual formula (PF ÷ (AF x 100) was, as usual, the proportion of actual frequency to potential frequency calculated as a percentage. In the case of oral vowels this worked out as follows:-

$$RF = \frac{322 \cdot 00 \times 50}{4 \times 100 \times 50} \times 100 = 80 \cdot 500\%$$

The ratio of the frequency of occurrence of source-language forms to that of target-language forms was therefore indicated as 80•5 to 19•5. Unlike in the two earlier cases, of consonant segments and consonant clusters, the amount of source-language forms in oral vowels was considerably greater than that of target-language forms, thus indicating that the English L2 speech of the fifty informants deviated more from standard RP in the area of oral vowels than in consonant segments generally. The relatively high amount of source-language elements present notwithstanding, the indication was that the speech of the informants was still a mixture of "well-formed" and "not well-formed" sounds in respect of oral vowels. The null hypothesis was therefore still favoured in respect of that segment type.

4.3.2.2.4 Nasal Vowels

Actual Frequency

Using the same formula as in the three preceding cases, the calculated number of actual occurrence of source-language forms for nasal vowels was 254•100 x 50, also verified from the relevant column on the line-printer sheet.

Potential Frequency

The number of cases in which a source-language form could possibly have occurred was calculated as in the three former cases. The sum derived from the calculations for nasal vowels was 5 x 100 x 50, since there were five segments each with a maximum potential of one hundred occurrences, and fifty cases in all.

Frequency Rate

The frequency rate per hundred was derived by dividing (5 x 100 x 50) by (254•100 x 50) x 100. The rate was therefore as follows:-

$$FR = \frac{254{\cdot}100 \times 50}{5 \times 100 \times 50} \times 100 = 50{\cdot}82\%$$

The calculated frequency rate of 50•82% for source-language or "not well-formed" forms indicates that the speech of informants in respect of this segment type contained both source- and target-language forms in the ratio of 50•82 to 49•18, indicating that almost equal amounts of both forms were present in the speech corpus in respect of that sound segment type alone.

A case for the null hypothesis was therefore also made in respect of that sound segment type and it was, for that reason, accepted.

4.3.2.2.5 Conclusion

It was observed that in each of the four segment types just considered the L2 speech of the informants was again, proved to be a mixture of source- and target-language forms. It is of interest to note that in one segment type, that is oral vowels, the frequency of occurrence of source-language or "not well-formed" forms was considerably greater than that of target-language forms, the ratio being 80•5 to 19•5. Also, though to a much smaller degree, there were more occurrences of source-language forms in nasal vowels than target-language forms. This was contrary to the picture in the consonant types where the ratio was 27•851 to 72•149 and 26•325 to 73•675 for consonant segments and consonant clusters respectively. The conclusion drawn from these observations was that the frequency of occurrence of source-language forms was higher in vowel-segment types than in consonant segment types in the speech of the informants, the average rate of the frequency of source-language or "not well-formed" forms being 27•088 percent for consonants and 65•66 percent for vowels. Alternatively, if consonants were taken as one class, which indeed they are, the actual frequency rate obtained from the eleven units (seven segments and four consonant clusters) for such forms was 27•296, that is a little higher than the average for the two subclasses. A corresponding actual rate of frequency for vowels was 64•011 percent, a little less than the general average. The great difference between the frequency rates for vowels and consonants could be very significant. It suggests, for instance, that the informants deviated more from standard R.P. in their pronunciation of vowel segments than in consonant segments. This in turn implies that they had greater difficulty in learning R.P. vowels than in learning R.P. consonants. It also suggests that Yoruba has greater similarity to English in consonant sounds than in vowel sounds, especially if one takes the view that there is a correspondence between similarity of source- and target-language sounds and learning difficulty. Lastly, from the functional view of English as an L2 for Yorubas in Britain it is suggested that communication problems between Yoruba immigrants and native English speakers in England arise more from the immigrants' deviant pronunciation of English vowel sounds than from their 'incorrect' pronunciation of English consonant sounds.

In conclusion, the frequency rates of occurrence of source-language variants in each of the four sound segment types indicated that the L2 speech of the informants, considered as a homogenous group, was a mixture of target- and nontarget-language forms of the sounds tested. It was observed that the frequency rate of nontarget-language forms in vowel sounds was considerably higher than it was for consonant sounds and that this might have significant causes and implications for the systems of the two languages and the informants. Since there was no single case in which the speech of the informants was shown to consist entirely of target- or nontarget-language forms, it was considered that the evidence supported the null hypothesis and it was therefore accepted. The two hypotheses were then examined at the individual sound-segment level.

4.3.2.3 In Individual Segments

An examination of the nature of L2 speech in relation to the two hypotheses in 4.3.1 was considered necessary in respect of each sound segment tested. It appeared that if L2 speech could be interpreted to mean the entire speech corpus of the informants in sound segment types a similar intepretation in respect of specific sounds was equally justifiable. In fact, the latter interpretation was considered to be more plausible in relation to the hypotheses being investigated because it was believed that whether the speech of informants contained a mixture of source- and target-language forms, or not, could be more profitably examined in respect of each particular sound rather than in respect of widely differing sounds. As in the case of segment types, frequency rates of the occurrence of each variant were calculated.

Actual Frequency

Actual frequency refers to the total number of times that the source-language form occurred in the speech of all the fifty informants in respect of each sound segment throughout the recorded text. Table 4, 2 contains these frequencies for all the twenty segments.

TABLE 4, 2: SOURCE-LANGUAGE ELEMENT ACTUAL FREQUENCY FOR INDIVIDUAL SEGMENTS

SEGMENT	ACTUAL FREQUENCY	SEGMENT	ACTUAL FREQUENCY
Conseg 1	2180	Conclus 4	4914
Conseg 2	3491	Orvow 1	4950
Conseg 3	1180	Orvow 2	4350
Conseg 4	190	Orvow 3	4950
Conseg 5	2452	Orvow 4	1850
Conseg 6	0	Nasvow 1	4967
Conseg 7	175	Nasvow 2	0
Conclus 1	8	Nasvow 3	0
Conclus 2	258	Nasvow 4	2738
Conclus 3	85	Nasvow 5	5000

Potential Frequency

The sum of the times that it was possible for any one informant to use source-language forms in any segment was rounded up to one hundred. The sum of such occasions for all the fifty informants for any one segment was therefore 5,000.

Frequency Rate

By the usual formula the frequency rate for each sound segment was derived by dividing actual frequency, multiplied by a hundred and then by the potential frequency. The results obtained for each sound segment via this formula are presented in Table 4, 3.

TABLE 4, 3: NONTARGET-LANGUAGE ELEMENT FREQUENCY RATE % IN EACH SOUND SEGMENT

SEGMENT	FREQUENCY RATE	SEGMENT	FREQUENCY RATE
Conseg 1	43•600	Conclus 4	98•280
Conseg 2	69•820	Orvow 1	99•000
Conseg 3	23•600	Orvow 2	87•000
Conseg 4	3•800	Orvow 3	99•000
Conseg 5	49•040	Orvow 4	37•000
Conseg 6	0•000	Nasvow 1	99•340
Conseg 7	3•500	Nasvow 2	0•000
Conclus 1	0•160	Nasvow 3	0•000
Conclus 2	5•160	Nasvow 4	54•760
Conclus 3	1•700	Nasvow 5	100•000

Observation

In the table above a frequency rate of a hundred indicates non-mixture, all being source-language forms. A frequency rate of zero equally indicates non-mixture, but in this case all were target-language forms. Any rating between these two extremes indicates mixture of source- and target-language forms. An examination of the table reveals that no mixture was indicated in respect of four sound segments. In conseg 6, nasvow 2, and nasvow 3, the rate was zero in each case,indicating total absence or non-occurrence of a source-language form. In nasvow 5, on the other hand, the rate was a hundred, indicating the non-occurrence of a target-language form. These ratings suggest that the null hypothesis be rejected in respect of those four sound segments. In each of the sixteen other sound segments, however, the null hypothesis was favoured. In each case the frequency rate was neither zero nor a hundred but was something between those two extremes. A mixture of source- and target-language forms, though in widely differing proportions between segments, was indicated for each sound segment. In conclusion the null hypothesis was favoured in sixteen out of twenty sound segments while the alternative hypothesis was favoured only in four. On the strength of these facts, it is suggested that neither of the two hypotheses commanded unqualified support, but that the null hypothesis was favoured in a majority of cases. Each hypothesis was, therefore, partially accepted.

4.3.3 L2 as Speech of Individual Informants

In 4.3.2 the null and alternative hypotheses were examined in relation to second-language speech interpreted as group speech. The interpretation of L2 speech employed in that section could however be disputed. It could be argued that L2 speech should properly refer to the speech corpus of an individual user of the second language in question. One objection would be that the individuals in any group could differ significantly in their pronunciation of the L2 and such differences may so offset one another that the true nature of individual L2 speech is obscured. Another empirically valid objection is that people do not speak in groups but as individual speakers in those groups. For these reasons it was considered necessary to examine those same hypotheses in relation to the speech of each of the informants who took part in the survey. As was done for group speech the hypotheses were examined for individual speech in respect of all sound segments, segment types and individual segments. Since the system of calculating the various figures is by now familiar there is no need to explain it again to avoid repetition. For an explanation of the formulae employed in deriving the following figures the reader is, therefore, advised to refer to 4.3.2 above.

4.3.3.1 Entire Individual Speech

Actual Frequency

The actual frequency of source-language forms in the speech of individual speakers is presented in Table 4, 4.

TABLE 4, 4: NON-TARGET LANGUAGE ELEMENT FREQUENCY IN INDIVIDUAL SPEECH

Informant	Frequency	Informant	Frequency	Informant	Frequency
1	1101	18	943	35	844
2	808	19	727	36	917
3	658	20	930	37	976
4	821	21	1006	38	1275
5	846	22	956	39	1188
6	665	23	666	40	800
7	924	24	997	41	853
8	830	25	704	42	754
9	819	26	863	43	696
10	829	27	672	44	1047
11	979	28	722	45	748
12	993	29	1075	46	881
13	841	30	865	47	897
14	889	31	856	48	584
15	983	32	953	49	918
16	803	33	886	50	860
17	987	34	903		

Potential Frequency

For each informant the potential frequency of source-language forms was 2,000 derived from the potential frequency of one hundred per segment for twenty sound segments. The highest number of times that any single informant could possibly have used a source-language form in his speech during the recorded interview was, therefore, 2,000.

Frequency Rate

The frequency rate of occurrence of source-language forms per informant is presented in Table 4, 5.

TABLE 4, 5: NONTARGET-LANGUAGE ELEMENT FREQUENCY RATE PER INFORMANT

Informant	Rate	Informant	Rate	Informant	Rate
1	55•05	18	47•15	35	42•20
2	40•40	19	36•35	36	45•85
3	32•90	20	46•50	37	48•80
4	41•05	21	50•30	38	63•75
5	42•30	22	47•80	39	59•40
6	33•25	23	33•30	40	40•00
7	46•20	24	49•85	41	42•65
8	41•50	25	35•20	42	37•70
9	40•95	26	43•15	43	34•80
10	41•45	27	33•60	44	52•35
11	48•95	28	36•10	45	37•40
12	49•65	29	53•75	46	44•05
13	42•05	30	43•25	47	44•85
14	44•45	31	42•80	48	29•20
15	49•15	32	47•65	49	45•90
16	40•15	33	44•30	50	43•00
17	49•35	34	45•15		

Observation

It is observed from Table 4, 5, above, that for each and every one of the informants the frequency rate was neither a hundred nor zero, but was somewhere between those two extremes which serve as indicators of a no-mixture speech. The speech of each informant was therefore a mixture of target- and nontarget-language forms. The null hypothesis was therefore accepted in respect of the speech of each of the informants while the alternative hypothesis was accordingly rejected without any reservations.

4.3.3.2 Segment Types

As in 4.3.2 the speech of each informant was considered in respect of each of the four segment types investigated.

Actual Frequency

The actual frequency of occurrence of source-language forms in each informant's speech in each of the four segment types is presented in Table 4, 6 below.

Potential Frequency

The potential frequency for each segment was rounded up to one hundred because the potential frequency for segment types varied since the number of segments examined in each segment type varied. For each informant the potential frequency in each segment type was calculated as follows:-

Consonant Segments	=	700
Consonant Clusters	=	400
Oral Vowels	=	400
Nasal Vowels	=	500

These made up the potential frequency of 2,000 per informant as calculated in 4.3.3.1

TABLE 4, 6: NONTARGET-LANGUAGE ELEMENT FREQUENCY FOR EACH INFORMANT PER SEGMENT TYPE

Inf.	Conseg.	Conclus.	Urvow	Nasvow
1	384	100	350	267
2	141	100	300	267
3	125	100	200	233
4	121	117	350	233
5	179	100	300	267
6	32	100	300	233
7	207	100	350	267
8	113	100	350	267
9	102	100	350	267
10	99	113	350	267
11	308	88	350	233
12	276	100	350	267
13	124	100	350	267
14	172	100	350	267
15	236	113	400	234
16	85	101	350	267
17	304	100	350	233
18	163	113	400	267

Table 4, 6 continued/ . . . 162

TABLE 4, 6 Continued

Inf.	Conseg.	Conclus.	Orvow	Nasvow
19	160	100	200	267
20	284	113	300	233
21	239	100	400	267
22	159	130	400	267
23	99	100	200	267
24	280	100	350	267
25	87	100	250	267
26	196	100	300	267
27	164	75	200	233
28	89	100	300	233
29	392	100	350	233
30	282	100	250	233
31	173	100	350	233
32	236	100	350	267
33	253	100	300	233
34	232	138	300	233
35	127	100	350	267
36	187	113	350	267
37	343	100	300	233
38	525	133	350	267
39	441	130	350	267
40	117	100	350	233
41	157	113	350	233
42	87	100	300	267
43	36	93	300	267
44	267	113	400	267
45	115	100	300	233
46	201	113	300	267
47	117	113	400	267
48	67	100	150	267
49	188	113	350	267
50	197	130	300	233

Frequency Rate

The frequency rate for each informant in each of the segment types was calculated from the potential frequency and the actual frequency and is presented in Table 4, 7.

TABLE 4, 7: NONTARGET-LANGUAGE ELEMENT FREQUENCY RATE % PER SEGMENT TYPE TYPE PER INFORMANT

Inf.	Conseg.	Conclus.	Orvow	Nasvow
1	54•857	25•00	87•50	53•40
2	20•143	25•00	75•00	53•40
3	17•857	25•00	50•00	46•60
4	17•286	29•25	87•50	46•60
5	25•571	25•00	75•00	53•40
6	4•571	25•00	75•00	46•60
7	29•571	25•00	87•50	53•40
8	16•143	25•00	87•50	53•40
9	14•571	25•00	87•50	53•40
10	14•143	28•25	87•50	53•40
11	44•000	22•00	87•50	46•60
12	39•429	25•00	87•50	53•40
13	17•714	25•00	87•50	53•40
14	24•571	25•00	87•50	53•40
15	33•714	28•25	100•00	46•80
16	12•143	25•25	87•50	53•40
17	43•429	25•00	87•50	46•60
18	23•286	28•25	100•00	53•40
19	22•857	25•00	50•00	53•40
20	40•571	28•25	75•00	46•60
21	34•143	25•00	100•00	53•40
22	22•714	32•50	100•00	53•40
23	14•143	25•00	50•00	53•40
24	40•000	25•00	87•50	53•40
25	12•429	25•00	62•50	53•40

Table 4, 7/ . . . continued 164

TABLE 4, 7 Continued

Inf.	Conseg.	Conclus.	Orvow	Nasvow
26	28•000	25•00	75•00	53•40
27	23•429	18•75	50•00	46•60
28	12•714	25•00	75•00	46•60
29	56•000	25•00	87•50	46•60
30	40•286	25•00	62•50	46•60
31	24•714	25•00	87•50	46•60
32	33•714	25•00	87•50	53•40
33	36•143	25•00	75•00	46•60
34	33•143	34•50	75•00	46•60
35	18•143	25•00	87•50	53•40
36	26•714	28•25	87•50	53•40
37	49•000	25•00	75•00	46•60
38	75•000	33•25	87•50	53•40
39	63•000	32•50	87•50	53•40
40	16•714	25•00	87•50	46•60
41	22•429	28•25	87•50	46•60
42	12•429	25•00	75•00	53•40
43	5•143	23•25	75•00	53•40
44	38•143	28•25	100•00	53•40
45	16•429	25•00	75•00	46•60
46	28•714	28•25	75•00	53•40
47	16•714	28•25	100•00	53•40
48	9•571	25•00	37•50	53•40
49	26•857	28•25	87•50	53•40
50	28•143	32•50	87•50	46•60

Observation

Detailed observation of the entries in the frequency table above revealed a number of important facts. Firstly, there was no zero entry in any column in respect of any informant. This indicates that there is no informant who did not have some amount of source-language forms in any of the segment types. Secondly, no informant had a hundred percent frequency rate in respect of three of the four segment types, namely consonants, consonant clusters and nasal vowels. This indicates that there is no informant whose speech was made up of only source-language forms in these segment types. The speech of each informant, therefore, contained both source- and target-language forms in the three segment types. In one segment type, oral vowels, six informants (Numbers 15, 18, 21, 22, 44 and 47) each had a hundred percent frequency rate, indicating that the speech of each of them in respect of oral vowels was made up entirely of source-language forms. The speech of those six informants was, therefore, not a mixture of source- and target-language forms, but consisted entirely of source-language forms. In concluding, one should point out that the speech of all informants in respect of consonants, consonant clusters and nasal vowels favoured the null hypothesis since a mixture of both source- and target-language forms was indicated in the three segment types. In respect of oral vowels evidence from the speech of forty-four informants favoured the null hypothesis, but that from the speech of the remaining six informants supported the alternative hypothesis rather than the null hypothesis. The null hypothesis was supported not in all of the cases though; it was in the majority of them. Again, the conclusion drawn was that the null hypothesis was only partially supported.

4.3.3.3 In Each Sound Segment

An examination of the 'mixture' hypothesis at a finer level - individual sound segments - was considered the most appropriate. Here one was examining whether, or not, a particular speaker used a mixture of both source- and target-language variants of a single sound segment, that is, whether he used the "well-formed" variant at certain times and the "not well-formed" variant at others.

Actual Frequency

The actual frequency for each informant in each of the twenty sound segments was calculated as a percentage since the potential frequency in each case was a hundred. The frequency rate was therefore the same as the actual frequency in each case. Table 4, 8, below, displays the number of informants whose speech indicated a 'mixture' or 'no mixture' corpus in each sound segment.

Observation

In Table 4, 8 the number of sound segments in which every informant indicated a mixture was only one, namely nasvow 4. For that segment every informant used both source- and target-language forms or variants in his speech. The null hypothesis therefore scored undisputed acceptance in respect of that sound segment in the speech of each of the fifty informants. For four sound segments, namely conseg 6, nasvow 2, nasvow 3 and nasvow 5, the speech of every informant indicated absolute support for the alternative.

In those sound segments each informant used, consistently, either source-language forms or target-language variants. In the case of the remaining fifteen sound segments, support for the null hypothesis ranged from 2%, that is, one out of fifty cases, to 92%. In eleven out of the fifteen sounds, however, majority of cases were in support of the alternative hypothesis. Only in three sound segments was the null hypothesis supported in a majority of the cases. Even then the majority was hardly a convincing one except in conseg 5, where it was ninety-two percent. In the two other sounds it was twenty-seven and twenty-six out of fifty. This contrasts with the majority support for the alternative hypothesis which was above forty in nine different sounds. In one sound, orvow 4, the decision was split between the two hypotheses, each enjoying the support of twenty-five informants. Taking a simple majority as the test for acceptance, it was observed that the null hypothesis could be accepted for all informants in respect of only four sound segments while the alternative could be accepted in respect of fifteen, with one split between them. Alternatively, when the support for each hypothesis was summed up the null had 242, while the alternative had 758, out of 1,000. It was clearly indicated that at the level of individual speech in each sound segment the null hypothesis could not be accepted for all the sound segments. In contrast, the null hypothesis could be accepted in the majority of sound segments for most informants.

TABLE 4, 8: INFORMANTS WITH MIXTURE/NO MIXTURE IN EACH SOUND

Sound Segment	No Mixture			Mixture
	0%	100%	Total	
Conseg 1	15	11	26	24
Conseg 2	2	21	23	27
Conseg 3	21	3	24	26
Conseg 4	45	1	46	4
Conseg 5	3	1	4	46
Conseg 6	50	-	50	-
Conseg 7	43	-	43	7
Conclus 1	49	-	49	1
Conclus 2	33	-	33	17
Conclus 3	45	-	45	5
Conclus 4	-	46	46	4
Orvow 1	-	49	49	1
Orvow 2	5	42	47	3
Orvow 3	-	49	49	1
Orvow 4	19	6	25	25
Nasvow 1	-	49	49	1
Nasvow 2	50	-	50	-
Nasvow 3	50	-	50	-
Nasvow 4	-	-	-	50
Nasvow 5	-	50	50	-

N.B. Informants with zero as well as those with a hundred percent scores both had no mixture of source- and target-language forms. For the former the speech was a hundred percent target-language while for the latter it was a hundred percent source-language forms.

4.3.4 Summary

The "mixture" hypotheses were examined at two major informant and three linguistic levels. The former included group level and individual level. The latter included overall speech, sound segment types and individual sound segments. In overall speech at both group and individual levels the null hypothesis was easily accepted. 'Overall speech' meant that all the sounds tested were reckoned as forming one whole corpus. The null hypothesis was also accepted in group speech when each segment type was examined separately. In each of these three cases the support for the null hypothesis was unanimous. When each informant's speech was examined at the level of segment type the null hypothesis was supported in an overwhelming majority of cases, 97% precisely. It was therefore accepted. In group speech at the level of individual sound segment the null hypothesis was equally accepted since it was supported in majority of the cases; sixteen out of twenty to be exact. The result of the examination of individual speech at the level of individual sound segments contrasted with that obtained for group speech. In the speech of individual informants the null hypothesis was supported only in the minority of cases when individual sound segments were the frame of reference; precisely 242 out of 1,000 cases. The evidence was therefore largely in support of the alternative hypothesis at that level.

The following general conclusions were drawn from the foregoing observations. At certain levels the null hypothesis was wholly supported by the evidence from the study and it was therefore accepted. At those levels the alternative hypothesis was rejected. Those levels were the overall speech of all informants and overall speech of individual informants, as well as the group speech of the informants in each segment type. At certain other levels considered more important for reasons given in 4.2.3 it had various levels of support, ranging from very strong to very weak. For example, in individual speech at segment type level it had a support of 97% while in overall speech at individual segment level the support was about 80%. It was therefore highly favoured at those levels. At the level of individual sound segments in each informant's speech, on the other hand, the support was very weak, amounting to about 24•2%, that is, 242 out of 1,000 cases. At every level the support for the null hypothesis was inversely proportional to that for the alternative hypothesis. It was also observed that the more specific the frame of reference became, either by informant unit or linguistic unit, the weaker the likelihood that the null hypothesis would be accepted became - in view of these observations it appeared that the suspicion, expressed in 4.2.1, that the null hypothesis was too generalised was borne out by the facts. In spite of these observations, however, it remains true that the null hypothesis was found acceptable in many cases and unacceptable in many others. It is suggested that a little modification, to limit its scope of reference, might make it more acceptable generally.

4.4 VARIABLE RULES IN L2 SPEECH

4.4.1 Introduction

Labov (1969) proposed variable rules to characterise variation in monolingual speech and argued that the notion of variable rules implies prior quantitative analysis. According to Labov and subsequent supporters of the quantitative paradigm it is necessary to count the occurrence of variant forms before a decision can be made as to what variant form is typical of a particular speech corpus. Only after that can appropriate variable rules be formulated or stated. The variable rules stated in the present section were formulated from the statistical analysis carried out and presented in 4.3. The objective was to examine how variable rules could be used to describe L2 speech, especially at the various levels described in that section. It was discovered that L2 speech provides the most illuminating material for the use of variable rules. In view of the discovery that certain so-called variable rules describe material that is not truly variable it is suggested that a redefinition of variable rules is called for.

4.4.2 General Variability

It was considered that the entire group speech, that is, the speech corpus of all informants, would provide the simplest material for the most elementary type of variable rules. Here the total potential of source-language forms was 100,000 (see 4.2.2.1) of which 43,738 actually occurred; target-language forms occurred 56,262 times. The occurrence of the two variants is separately described in R1 and R2 for source- and target-language forms respectively.

R1: $\begin{bmatrix} + \text{target} \end{bmatrix} \longrightarrow \begin{bmatrix} - \text{target} \\ + \text{source} \end{bmatrix}$ (43,738 times)

R2: $\begin{bmatrix} + \text{target} \end{bmatrix} \longrightarrow \begin{bmatrix} + \text{target} \\ - \text{source} \end{bmatrix}$ (56,262 times)

R1 and R2 can be alternatively stated as R1a and R2a using x as a shorthand for target-language forms and y for source-language forms.

R1a: $[x] \longrightarrow [y]$

R2a: $[x] \longrightarrow [x]$

R1 indicates that any particular sound was pronounced as its source-language cognate and R2 indicates that it was pronounced "correctly" in its target-language standard form. As they stand, neither of these rules accurately describes the L2 speech of the informants which was shown to be a mixture of both forms. They are not variable rules, that is, neither of them describes any variation in the speech of informants. Each is, therefore, what is called a categorical rule, indicating no variation in usage.

For proper description of the entire speech of informants what is needed is a single rule that indicates that two alternative pronunciations were present in that speech corpus, that is, a variable rule. R3 does it to some extent.

$$\text{R3:}\quad [x] \longrightarrow \begin{Bmatrix} [y] \\ [x] \end{Bmatrix} \begin{matrix} \text{(a)} \\ \text{(b)} \end{matrix}$$

4.4.3 Systematic vs Erratic Variation

R3 states that a particular sound, x , was pronounced by informants both in its target-language and source-language forms. The description provided in R3 is incomplete as lots of vital information is obscured. It is not indicated whether or not each of the alternative pronunciations is characteristic of describable informant groups, that is, whether or not it is the case that one group favoured R3 (a) while another favoured R3 (b). Nor does R3 indicate whether each speaker adopted R3 (a) at one time and R3 (b) at another. Thirdly, it is incapable of revealing whether the informants used R3 (a) for certain sounds or types of sound while adopting R3 (b) for others. Finally, at the linguistic level R3 also fails to reveal whether there were specific phonological environments in which the informants preferred R3 (a) to R3 (b) and vice versa. In summary, one fails to deduce from R3 whether the variation being described is erratic or systematic bot linguistically and sociologically, these being the two axes at which variational patterning needs to be examined. Any variable rule of the structure of R3 creates the erroneous impression that the variation lacks pattern, erroneous of course, unless that is what is intended.

4.4.3.1 Sociologically-based Variation

It was first examined whether each of R3 (a) and (b) was characteristic of any subgroup of informants. If this was so a variable rule, to be adequate, would have to indicate that fact explicitly.

Conseg 1, the English sound /θ/, provided appropriate data from the informants, taking the presence or absence of phonetic training as the sociological variables. Table 4, 9 displays rule distribution between the two phonetic training subclasses.

TABLE 4, 9: /θ/ RULE DISTRIBUTION FOR PHONETIC TRAINING GROUPS

Group	R1	R2	R3	Total
+ Training	2	10	12	24
- Training	9	5	12	26

It was observed that though twelve informants in each phonetic training subgroup used R3, that is, they combined both R1 and R2 in this sound, it appears clear that more [+ training] group members used R2 while more of the [- training] group members used R1. In other words, informants with phonetic training tended to use R2, that is, they pronounced /θ/ correctly. Those without phonetic training tended to use R1, pronouncing that sound in the source-language form. This trend became much more pronounced when proportions, rather than absolute numbers were compared. Two out of twelve informants in the [+ training] group used R1 but nine out of fourteen in the [- training] group used that rule. If one concludes that R2 was characteristic of informants with phonetic training and R1 of those without, it means that a variable rule describing the speech of all the fifty informants in greater detail could be formulated as R4. It should be pointed out that any objection to the effect that some members of each subgroup used the non-characteristic rule is no deterrent to R4 since linguistic rules, like all natural laws, describe the usual or expected trends rather than clear-cut divisions.

$$\text{R4:} \quad [\theta] \longrightarrow \begin{Bmatrix} [t] \\ [\theta] \end{Bmatrix} \begin{matrix} \text{- Phonetic Training} \\ \text{+ Phonetic Training} \end{matrix}$$

R4 is certainly more detailed than R3 because it defines the sociological environment, as it were, in which each part of the variable rule applies. It shows, therefore, that the use of the source-language form of /θ/ was more characteristic of informants without prior phonetic training than it was of those with phonetic training. The number of entries under R3 in Table 4, 9 indicates that the twenty-four informants in both groups who used that rule in their pronunciation of /θ/ used both the target- and source-language forms, adopting one rule at certain times and the other rule at other times. The next important thing was to examine their speech to see whether the occasions on which they used any particular variant rule could be precisely defined.

4.4.3.2 Linguistically-based Variation

It was discovered in the last paragraph that there was a tendency among informants with phonetic training to use R3 (b) while those without such training used R3 (a). Next an attempt was made to find out whether the use of source-language forms, R3 (a), was determined or affected by the linguistic or phonetic environment in which the sound occurred. One was trying to find whether there was any tendency for informants to use source-language forms of the sound /θ/ in certain phonetic environments rather than in others. The problem was first examined for all informants and then for those informants who combined both source- and target-language forms. The second examination was necessary in order to isolate the influence of those informants who used either source- or target-language forms throughout the text. The results of the two analyses are summarised in Tables 4, 10a and 4, 10b.

TABLE 4, 10a: R3 DISTRIBUTION BY ENVIRONMENTAL CATEGORIES FOR ALL INFORMANTS

	E.C. 1	E.C. 2	E.C.3	E.C. 4	E.C. 5
R3a	18	19	29	20	23
R3b	32	31	21	30	27

TABLE 4, 10b: R3 DISTRIBUTION BY ENVIRONMENTAL CATEGORIES FOR THE TWENTY-FOUR RULE MIXERS ONLY

	E.C. 1	E.C. 2	E.C. 3	E.C. 4	E.C. 5
R3a	7	8	18	9	12
R3b	17	16	6	15	12

Table 4,10b shows the number of informants who used R3 (a) and R3 (b), that is source- and target-language forms respectively in each of the five environments in which /θ/ occurred in the text. The five environments are as explained below in table 4, 11. The transcription is typical Yoruba-English.

TABLE 4, 11: DESCRIPTION OF ENVIRONMENTAL CATEGORIES

E.C.	Word	E.C. Description
1	– iɔrɛtikali	#— + [v + round] + [syll] + [syll] + [syll]
2	–ɔ:t	#— + [v + round]
3	– atst	#— + [v – round]
4	– ru:	#— + [C] + [v + round]
5	–ɔ:zdi	//— + [v + round] + [C] + [syll]

A close examination of Table 4, 10a indicates that in EC 3 more informants used R3 (a) than in any other environment. In fact, E.C.3 is the only environment in which more informants used R3 (a) than R3 (b). There was thus a sharp contrast between that environment and the other four environment, in each of which more informants used R3 (b) than used R3 (a). Since Table 4, 10a includes all informants this means that all the informants who used R3 (a) throughout as well as those who used R3 (b) throughout were included and this may have affected the distribution. A similar rule distribution for only the informants who alternated between the two versions of that rule should actually indicate the precise environment in which they used each version most often. Table 4, 10b does just that for that subgroup of informants. In that table E.C. 3 also contrasted with each of the other four environments in being the only one in which the number of informants who used R3 (a) was greater than that of those who used R3 (b). Table 4, 10c contains a similar analysis for the thirty-five informants who used R3 (a) at all in the same sound.

TABLE 4, 10c: R3 DISTRIBUTION BY E.C. FOR INFORMANTS WHO EVER USED R3 (a)

	E.C. 1	E.C. 2	E.C. 3	E.C.4	E.C. 5
R3 (a)	18	19	29	20	23
R3 (b)	17	16	6	15	12

In Table 4, 10c the contrast became more pronounced. The influence of informants who did not use R3 (a) in that sound has been completely eliminated, leaving us with more authentic information to work with. It was observed that most of the informants who used R3 (a) did so in E.C. 3. Secondly, the proportion of those who used R3 (a) to those who used R3 (b) in that environment was the most significant, being 29:6. The percentage of R3 (a) users was accordingly the highest in E.C. 3; about 83% compared to 51, 54, 59 and 66 in each of the four other environments. The table indicates, therefore, that of those thirty-five informants who used R3 (a) in any environment only approximately 17% did not do so in E.C. 3. These figures indicate that there was a clear tendency among the informants to use R3 (a) in E.C. 3. A variable rule that describes that tendency is expressed as R5, indicating not an absolute division among the various environmental categories but a relative tendency.

R5:

$$[\theta] \longrightarrow \left\{ \begin{array}{l} [t] \\ [\theta] \end{array} \right\} \begin{array}{l} + \quad \text{E.C. 3} \\ - \quad \text{E.C. 3} \end{array}$$

In formal generative phonology language the details of R5 will be fully specified as in R5 (a).

R5 (a):

$$\begin{bmatrix} -\text{ voc} \\ +\text{ cons} \\ +\text{ anterior} \\ +\text{ coronal} \\ -\text{ voice} \end{bmatrix} \longrightarrow \left\{ \begin{array}{l} [-\text{ cont}] \\ [+\text{ cont}] \end{array} \right\} \Bigg/ \begin{array}{l} \_\_\_ \begin{bmatrix} +\text{ voc} \\ -\text{ cons} \\ -\text{ round} \end{bmatrix} \\ \_\_\_ \begin{bmatrix} +\text{ voc} \\ -\text{ cons} \\ +\text{ round} \end{bmatrix} \end{array}$$

The difference between E.C. 3 and the other environments, as observed both in Table 4, 11 and R5 is that in E.C. 3 /θ/ occurred before a [- round] vowel while it occurred in the other environments before a [+ round] vowel (see the distinctive-feature matrices for vowels).

4.4.4 Variable vs Categorical Rules

In the last section variable rules were used to describe the speech of the informants at various levels. It is argued in the present section that the distinction between categorical and variable rules is a marginal one.

4.4.4.1 Categorical Rules

A categorical rule, such as R1 and R2, describes the fact that there was no variation in the manner in which a speaker pronounced a particular sound or used a particular linguistic feature. Thus, the speech of informants who consistently used the source-language forms of /θ/ was described by R1, while that of those who consistently used the target-language form was described by R2. For example, if one was concerned with the speech of the two groups as separate groups, R1 and R2 would be two separate phonological rules expressed as R6 and R7 respectively.

R6:

$$\begin{bmatrix} -\text{ voc} \\ +\text{ cons} \\ +\text{ ant} \\ +\text{ coronal} \\ -\text{ voice} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{ cont} \end{bmatrix}$$

R7:

$$\begin{bmatrix} -\text{ voc} \\ +\text{ cons} \\ +\text{ ant} \\ +\text{ coronal} \\ -\text{ voice} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{ cont} \end{bmatrix}$$

R6 indicates that, in the environments considered for /θ/ there was no /θ/ in the speech of that group. Conversely, R7 indicates that in the same environments it was always /θ/ for the second group. For each group, the relevant rule was therefore invariant, or categorical.

<u>4.4.4.2 Variable Rules</u>

A variable rule describes the fact that the use of a sound or linguistic feature differs from time to time. For example, R3 indicates that the speakers whose speech was being described used /t/ at certain times and /θ/ at other times. R3 is therefore a variable rule, expressible as a combination of R6 and R7, as in R8.

R8:

$$\begin{bmatrix} -\text{voc} \\ +\text{cons} \\ +\text{ant} \\ +\text{coronal} \\ -\text{voice} \end{bmatrix} \longrightarrow \left\{ \begin{matrix} [-\text{cont}] \\ [+\text{cont}] \end{matrix} \right\}$$

4.4.4.3 Marginally Variable Rules

It should be observed that R8 differs from other rules such as R4 and R5 (a). While R8 simply states that two kinds of pronunciation were used, each of R4 and R5 goes further by indicating the environments, social or linguistic, in which each kind was used. The problem was whether one could rightly say that these two rules are variable rules. For example, R4 indicates that informants without phonetic training used /t/ instead of /θ/ while those with phonetic training did not. Considering the first group on its own, a separate rule, similar to R6, will be appropriate as is indicated in R9.

R9:

$$\begin{bmatrix} \theta \\ -\text{training} \end{bmatrix} \longrightarrow [\text{t}]$$

Now R9, like each of R6 and R7, is a categorical rule, though it forms part of what would normally be regarded as a variable rule. The question that arises from these observations is, 'Is a so-called variable rule actually variable when a definable environment, be it linguistic or sociological, is specified for the application of its constituent subrules?' It would appear that such a rule is at one level variable but categorical at another. The first level is the more general one and presents an inadequate description of the speech of the group or individual being studied. For most of the informants in the present study a variable rule such as R8 gives an incomplete picture, for it omits the important fact that the informant usually uses a particular variant of the sound concerned in a definable environment while his use of the other variant is largely - it could be totally in certain cases - restricted to another environment. In the same way, a variable rule, such as R3, is an incomplete description of the speech of all informants as a group because it obscures the salient fact that each of the variant pronunciations of that sound is characteristic of certain subgroups. Yet, it is possible that no such linguistic environments or population subgroups can be specified for characteristic use of any of the two variants involved. When this is the case, as it was in respect of certain sounds and informants in the research, rules such as R3 and R8 are both complete and truly variable since the choice of variants by the informants in such sounds is completely erratic. At the second level, however, certain so called variable rules, such as R3 and R8, do lose their variability. This happens when the use of each variant of the rule is capable of precise definition, either in terms of linguistic or sociological parameters. When a variant is definable in relation to linguistic environments, e.g. R5, what is admitted is that each variant of the general variable rule is more characteristic of certain linguistic positions. In that case a certain degree of variation may still be conceded within those environments in the speech corpus under consideration but the occurrence of the non-typical variant in a particular environment is then to be seen as an exception to the general trend. In other words, variability disappears at that level. In the same manner a sociologically-variable rule loses variability when a variant of that rule becomes typical of a definable subgroup of the original group as in R4. In both of the cases referred to each variant of R4 and R5 appeared to become a categorical rule on its own rather than being just a variant of a single variable rule. A situation thus developed in which invariance existed at the tertiary level while variation was observed at the secondary level of delicacy. Each variant of R4 and R5 in this sense is similar to any of R6, R7 and R9 in being categorical rather than variable.

4.4.5 Summary

Three types of phonological rules were distinguishable, as illustrated, from the data. Firstly, there was the truly categorical rule in which no variation, at least no systematic or sizeable variation, occurred. In that kind of situation a speaker pronounced the same sound in the same way in all its occurrences irrespective of changes in phonetic environments of that sound. In group speech, too, every member pronounced a sound just as every other member of the group did in the relevant environments. (These situations are actually unlikely in practice but are assumed when such variations as do occur are generally not observable.) Secondly, there was a truly variable rule which describes speech in which the pronunciation, by an individual, of a particular sound varied from time to time. In certain cases the environments either remained the same or no systematic association of any variant could be made with any particular linguistic environment. These, in the opinion of the present writer, were instances of free variation. Finally, there was a situation in which, though there was variation in a speaker's pronunciation of a certain sound, it was possible to associate, in a systematic manner, the occurrence of each variant pronunciation with a definable linguistic environment or some extralinguistic variable such as lack of previous phonetic training in English. William Labov (Labov, 1969, p. 739) cited examples of linguistically determined cases in Negro non-standard English and recognised the need for a formal means of expressing what he termed "the feature of invariance in a variable rule". Many of these rules now genuinely reckoned as variable rules may belong to this category. The problem is that one is, as yet, neither able to recognise nor describe the factors, both linguistic and extralinguistic, which cause them to become categorical. The evidence from the data analysed in the present research thus facilitated the making of two important observations with respect to rule variability. Apart from enabling one to observe the invariant-variance condition, it directed one's attention to the often overlooked fact that rule variability can be explained not only in terms of linguistically determined environments but also in terms of sociologically determined, extralinguistic ones.

4.5 QUANTITATIVE VS DYNAMIC PARADIGM

That a quantitative analysis must precede the formulation of variable rules was demonstrated in 4.3. It would not have been possible, for example, to state any of R1 to R5 without having first counted the occurrence of each variant pronunciation before comparing it with the potential occurrence. That a quantitative analysis would reveal dynamism, which many dynamic analysts claim is the exclusive preserve of the dynamic paradigm, is demonstrated in this section. It is shown that without a prior quantitative analysis the detection of such dynamism could be extremely difficult.

4.5.1 Development Phases

The major purpose of a dynamic analysis is to reveal development or acquisition phases of speakers of a language. Such development may be progressive, regressive or static. In other words, a dynamic analysis attempts to describe speakers at definable stages of language acquisition or loss. In 4.3, R1 to R3 describe three such stages among the informants in the present study. The facts are easily derivable from Table 4, 9. R1 describes the speech of a group of informants whose members used the target-language form of /θ/ throughout the interview. R2 describes that of another group whose members used the source-language form throughout. In between these was a third group whose members oscillated between R1 and R2. Their speech was described by R3 in that table. The distribution of informants in relation to the three stages, if stages they are, is presented in Table 4, 12.

TABLE 4, 12: A DYNAMIC PARADIGM DISTRIBUTION OF INFORMANTS ACCORDING TO /θ/ ACQUISITION PHASES

Phase 1: R1	Phase 2: R3	Phase 3: R2	Total
11	24	15	50

The table above shows that, of the fifty informants, eleven 'had not acquired' the relevant phonological rule, that is, the rule that would enable them to pronounce /θ/ in the R.P. form. Twenty-four had apparently acquired that rule but did not appear to have completely made it part of their linguistic competence. They, therefore, made use of it on certain occasions and did not do so on others. These informants in phase two, therefore, used R3 which is a combination of R1 and R2. In the apparently 'most advanced' group, phase three, there were fifteen informants. These appear to have so internalised the relevant rule that they used it on every relevant occasion in the text. The facts provided in the table above fit completely the view of the supporters of the dynamic paradigm, part of which must be quoted again for immediacy of effect. It was presented by Bickerton (1973): "Thus at any given point in time, the output of a speaker, A, (whom a given rule had not yet 'reached') would differ from that of a speaker, B, (whom the same rule had 'passed') with respect, at least to the operation of that rule, and would leave open the possibility of a third speaker, C, who the rule was just reaching, and who, in consequence, would sometimes produce A's output and sometimes B's." This, undoubtedly, is the pattern revealed among the informants in the three phases described in Table 4, 12. That such information is derived from a quantitative study as the present belies the claim that only a dynamic analysis is capable of revealing it.

4.5.2 Grading Environmental Categories

Supporters of the dynamic paradigm generally assume that E.C.'s can be pre-graded for difficulty level by merely comparing the sounds that are adjacent to the one being studied in the various environments. Thus, it would be claimed that English /θ/ would present greater difficulty to the informants in the present study in E.C. 4 than in any other, because in that E.C. the sound occurred as one of two sounds in a consonant cluster. Since Yoruba, which is the informants' L1, does not permit such clusters and does not contain the actual sound in question, the informants were obviously faced with two difficulty units - those of a strange sound in a strange environment. From such grading of E.C.'s according to difficulty levels a scale of implicational relationship would be established such that one E.C. would imply the one immediately below it in the scale of difficulty. The implication then would be that informants who indicated mastery of the sound in E.C. 5 must have done so in E.C. 4 and all the other E.C.s lower than it in the level of difficulty. Conversely, informants who had not mastered it in E.C. 3, for example, would not have mastered it in E.C. 4 and E.C. 5. Since this is not usually confirmed by linguistic data it would be said that the informant had skipped one rule, or some other excuses are put forward. It is shown below that such excuses are not necessary since quantitative data reveal the difficulty levels of E.C.s quite clearly.

E.C.s in the present study were easily graded for difficulty level from the informants' performance as observed from Tables 10a - 10c. It was considered that the E.C. in which most informants used the target-language form of /θ/ was the one in which they had the least difficulty. Conversely, the E.C. in which most of them used source-language forms was considered to present the greatest difficulty. In other words, the amount of difficulty was reckoned to be inversely proportional to the success of informants in each E.C. The scheme of difficulty level which emerged is presented in Table 4, 13.

TABLE 4, 13: RELATIVE DIFFICULTY LEVEL FOR E.C.S

Diff. Level	1	2	3	4	5
E.C. No.	E.C. 1	E.C. 2	E.C. 4	E.C. 5	E.C. 3
Amt. of Diff.	51%	54%	59%	66%	83%

The amount of difficulty was derived from Table 4, 10c, for thirty-five informants by expressing the number of informants who had difficulty in each E.C. as a percentage of thirty-five. If one based the calculations on fifty informants or the twenty-four rule mixers (Tables 4, 10a and b, respectively) the relative amount would change but the relative level would remain the same. It is clear from Table 4, 13 that E.C. 3 was the most difficult for the informants while E.C. 1 was the least difficult. Secondly, a close examination of the scores did not indicate any implicational relationship among the E.C.s, for there were many informants who got the sound 'right' in E.C. 3 but not in E.C. 1. It is clear from Table 4, 13 that the scale of difficulty for any group of speakers is best constructed from the performance of those same speakers. It is much easier, more accurate and more realistic than a pre-determined level.

From the facts presented above it becomes quite obvious that a quantitative analysis reveals all the salient facts which, many believe, could only be revealed through a dynamic analysis. Handled with great care and perceptive observation, quantitative analysis not only revealed these facts, but did so in a less dubious way by avoiding the unnecessary resort to the establishment of percentage thresholds and the ascription of irregularities to rule skipping on the part of informants. This is because, in the quantitative analysis, decisions were based on quantified data. The suggestion then is that if what was done in 4.4 is what is known as dynamic analysis then the only way of arriving at such analysis is through quantitative data.

4.5.3 Rule Change

Supporters of the dynamic paradigm (see 1.4) claim that it is only through that method of linguistic analysis that the mechanics of rule change can be uncovered. This, as they explain, is one of the reasons for its supposed superiority over the quantitative method. It was demonstrated in 4.4 that that claim is false and that dynamism or rule change is more accurately and more easily explained through a quantitative method than through a dynamic analysis. In the following paragraphs it is reported that, apart from explaining rule change, the quantitative paradigm enabled one to indicate, in a plausible manner, the direction of that change.

One obvious, yet erroneous, assumption of supporters of the dynamic paradigm concerning directional analysis of rule change is that such change is inone direction, namely progress from non-acquisition and non-use through partial or occasional use to full competence and complete use of a particular rule. This assumption, observable in Bickerton (1973) (see the passage quoted in 1.4) is expressly stated by Gatbonton (in Gatbonton, 1975) who, fortunately, made use of second-language data. The data in the present study did not support that view when viewed more critically. What it did indicate is that change occurred. But as to whether that change was in the direction of greater acquisition and more frequent use to complete use, or in the reverse direction of rule loss by way of less and less frequent use to complete non-use - a situation which seemed to have been lost on the dynamic analysts - there is no ready way of knowing, especially in the case of second-language speakers. It was strongly suspected that a second-language user may have passed through the dual process of rule acquisition and rule loss in that order. There was the danger, then, of mistaking a process of rule loss for one of rule acquisition when the speaker was in the intermediate stage of the process. One faultless method of obviating this danger is through a real-time study of a second-language user over a life-time to note these processes in their sequence. In the absence of that kind of study a look at the data from the apparent-time study carried out in the present research may serve to highlight the expressed suspicions. The variable phonetic training was made use of in the following analysis because it had the highest significance level (that is, 0·027; see 5.4) among the sociological variables. It was also the one most directly linked with the pronunciation of English in Nigeria since it represents conscious efforts to properly and systematically teach English pronunciation to the informants and most Yoruba learners of English in Nigeria.

4.5.3.1 Evidence of Change

An examination of the informants' speech in respect of /θ/ (see 4.4) indicated that three (development?) phases could be described as shown in Table 4, 12, which is reproduced here.

TABLE 4, 12: A DYNAMIC DISTRIBUTION OF INFORMANTS BY /θ/ (ACQUISITION) PHASES

Phase 1: R1	Phase 2: R3	Phase 3: R2	Total
11	24	15	50

It was explained in 4.4 that R1 indicates the use of source-language forms of the sound in question. R3 indicates a combination of both source- and target-language forms while R2 indicates the use of target-language forms alone. The table was therefore interpreted to mean that the eleven informants in the first phase had not acquired R2 and could therefore not use the target-language form of the sound. In Bickerton's words (Bickerton, 1973) they represent those speakers whom the "given rule had not reached". The fifteen informants in the third phase would then represent those "whom the same rule had passed" and who in consequence used the target-language form at all times, at least during the interview. Finally, the twenty-four informants in the second phase would ideally represent those "whom the rule was just reaching" and who, therefore, made use of it at (un)certain times and made use of the older rule, R1, at other uncertain times. The picture presented is thus in keeping with Bickerton's ideal of rule change, but that is not all the story.

An examination of the informants in respect of phonetic training gives greater credibility to Bickerton's ideal. As pointed out in 4.3.3 a distribution of the informants by both rules and phonetic training indicated that most of those who used R1 had had no phonetic training while most of those who used R2 had had phonetic training in English. These facts are again presented in Table 4, 13 with slight rearrangement.

TABLE 4, 13: /θ/ RULE DISTRIBUTION BY PHONETIC TRAINING GROUPS

Group	Phase 1: R1	Phase 2: R3	Phase 3: R2	Total
+ Training	2	12	10	24
- Training	9	12	5	26

It was also observed that of the twenty-four informants who combined both source- and target-language forms (that is, R3) twelve belonged to each phonetic grouping. The conclusion that could be drawn from these facts is that there was evidence of rule change and in an observable direction. It is however a temporary conclusion.

4.5.3.2 Direction of Change

On the strength of the evidence from the table above one could postulate that the change was in the direction of rule acquisition. In that case one would say that the informants generally were passing through the observed stages in the order one to three, and that, at a later time, there would be none of them in either of phases one and two since all of them would have, by that time, completely replaced R1 by R2. As pointed out earlier on, only a real-time longitudinal study of those informants could unequivocally verify that proposition. Even then, there are valid empirical reasons why the proposition cannot be assumed to be correct in respect of the data just described. The proposition, neat as it may appear, ignores the nature of the variable which enabled one to categorise the informants into these acquisition phases, namely, phonetic training. To propose that all informants would, at a later time, arrive at the final third phase is to assume that the same informants would also continue the phonetic training scheme that obviously (see 5.4) enabled them to acquire and use R2. But this is not true since the phonetic training scheme is a course which an informant had or had not undergone before the interview. The variable was therefore static. Any thought of an informant improving or even changing his status in respect of that variable is, therefore, unacceptable. If that is not going to happen then there is no reason to suggest that the performance of the informants in respect of the two rules will change in the direction proposed.

Secondly, it was observed from Table 4, 13 that, though more members of the + phonetic training group used R2 than used R1 while more of the - phonetic training group used R1 than used R2, some members of each group did use the rule more characteristic of the members of the other group. In addition, twelve members each of the two groups combined both R1 and R2. Considering the + phonetic training group with respect to these rules it could not be argued that they used R1 and R3 because the rule, R2, which would have enabled them to realise the target-language form had not 'reached' or 'passed' them. In other words, they had acquired the basic competence which should have enabled them to use that form. Their failure to do so was, therefore, not explainable in terms of lack of competence but of deficient performance - in the sense that performance fell short of competence. This is a usual situation in language if one views competence as the speaker's knowledge of the language (see Chomsky, 1957). Since the informants in this group were not just undergoing, but had undergone, the relevant phonetic training courses any argument that R2 was "just reaching" or had not "reached" them must be rejected. The suggestion, therefore, is that they had acquired that rule but did not make use of it at all in the case of the two informants in the first phase and only used it occasionally in the case of the twelve in phase two. If they had acquired the rule and had not used it permanently in the interview there seems no reason to suppose that they will do so at a later date under similar conditions.

Finally, it is possible to suggest that, instead of the progressive dynamism suggested by both Bickerton (1973) and Gatbonton (1975), a process of regressive dynamism could have been operating. There are arguments to support this latter hypothesis. The suggestion is that, having acquired R2 and probably having used it for some time after the acquisition, the informants could have reverted to their old and more natural pronunciation of English sounds. One piece of evidence in support of that opinion is that more of the informants in the + phonetic training group used a combination of R1 and R2 than used either of R1 or R2 alone. The relevant figures were twelve for R3 (R1 + R2) and two and ten each for R1 and R2. Had the direction of change been towards R2 through R3 more informants ought to have used R2 than R3 and more R3 than R1 in the given circumstances. Instead, R3 appeared to be the focal point in the distribution pattern. It is therefore possible that those who used R2 alone would soon begin to combine that rule with R1. A parallel suggestion would be that those who used R2 and those who used R3 would, at a later date, revert to R1 only. In that case rule change in second-language speech could be seen as a sequence of two processes including one of progressive acquisition followed by one of progressive loss of the second-language rule.

There is another reason which, though it does not fully support the progressive loss theory, completely falsifies the progressive acquisition theory. It has to do both with the figures in Table 4, 13 and the interview situation. This final suggestion is based on the fact that the data on which those calculations in Table 4, 13 were based might have been greatly distorted for reasons of the observer paradox explained in 2.2.2. For example, since the informant was aware that his speech was being recorded during the interview it is very likely that he did, in any manner open to him within his basic competence in the language, upgrade his performance. Since those who had had phonetic training courses would be most able to do that by drawing on their latent knowledge of the phonology of English it is natural that the scores in Table 4, 13 would be in their favour. It is significant, in that sense, that only two of them used R1 alone throughout. It is therefore to be doubted whether results similar to those in that table would have been obtained had the recording been carried out surreptitiously. One could suggest that, had it been possible to obtain more natural speech samples from those informants than were here analysed, more of those + phonetic group members who used R2 only would probably have used R3 or even R1 alone. Had that happened, it would have been seen clearly that the progressive acquisition theory was not applicable in respect of the data. One of two suggestions would become plausible then. Firstly, it would be suggested that the progressive loss process was actually at work, depending on the number of informants from the respective groups in each phase. Secondly, and this would be more intuitively plausible, it would be suggested that a great majority of the informants (more than the twenty-four indicated in Table 4, 13) actually used a combination of R1 and R2. It would be hypothesised from either of the two situations that a Yoruba second-language speaker of English does not use R2 in his natural English speech, his natural speech being entirely either R1 or R3. Whichever he uses, or in whatever proportions he combines the R3 variants, will depend on how natural the speech sample actually is. Whether he uses R1 or R3 the progressive acquisition theory of the dynamic analysts will not be supported just as it was not supported by the data in the present study. Thus, while the data in the present study provides no conclusive evidence in support of either the progressive rule-loss hypothesis or the progressive rule-acquisition hypothesis it suggests that the acquisition hypothesis is not the only possibility and that it cannot therefore be always assumed, especially in second-language speech. There is also no indication from the data, as presented, that a speaker, especially a second-language speaker, lacks the mental capacity (see 1.5.3) to maintain two competing - whether variable or categorical - rules over long periods of time. Judging by the number of informants (Table 4, 13) who used R3 in the pronunciation of /ẹ/, it would appear that many of the informants (twenty-four) were able to retain both R1 and R2 side by side and that they did use both as alternatives in their speech. To that extent R3 is a variable rule to that group of speakers.

4.5.4 Summary

The findings from the analysis of the available data suggest that the quantitative method was more useful in practical analysis that the dynamic method. It appeared that the former was the only practically applicable method in discovering certain failures of variable linguistic behaviour. The streaming of informants into developmental stages was clearly carried out without undue fuss. It was revealed that the grading of environmental categories was easily undertaken in relation to the amount of difficulty indicated in the performance of informants rather than in relation to distinctive-feature counting, which is only a theoretical proposition. Finally, while the evidence indicated rule change it did not automatically indicate the direction of that change. It was, however, suggested that adult L2 users were probably more subject to rule loss than to rule acquisition in the L2. It was concluded that a dynamic analysis was better based upon a prior quantitative analysis of data if misleading conclusions are to be avoided. The two methods were therefore seen as complementary to, rather than competitive with each other.

CHAPTER FIVE

SOCIOLOGICAL STUDY

5.1 INTRODUCTION

The relationship between linguistic performance in respect of the phonological units examined and certain sociological factors, as investigated, is reported on in this last chapter. The term sociological is here used to refer to those factors in the wider sense that they are not linguistic environmental factors like the ones described in 4.3. It has been repeatedly shown (see, for example, Labov, 1969; Wolfram, 1969; and Trudgil, 1973 and 1974), that sociological or non-linguistic factors seem often to correlate with linguistic performance, though not necessarily with linguistic competence, of informants(see Mathews, 1979, however). It is suggested that a speaker's non-linguistic parameters (e.g., sex, age, class) can be incorporated in the input probability of his linguistic behaviour. Cedergren and Sankoff (1974) point out that by so doing one could arrive at the relative loading of particular linguistic features in the speech of the informant. The suggestion, therefore, is that informants who belong to different sociological classes in respect of one or a number of variables would exhibit corresponding differences in their linguistic behaviour in respect of specified linguistic items or features. It might be possible therefrom to analyse the speech of certain speakers and predict their sociological classes, or vice versa, whether the classes are social or geographical, that is, as Higgins does in G. B. Shaw'S "Pygmalion" (Shaw, 1912).

Apart from mere theoretical interest there are also practical reasons for investigating the sociological factors chosen in the present research, for, as explained in 2.1.2, some of them have been linked to linguistic performance especially in second-language teaching policies and practice, while some are the bases of assumptions strongly held and expressed by many well-informed people in Nigeria. What was investigated in the aspect of the research about to be reported on, then, is the relationship between the named sociological variables, (i.e., sex, education, phonetic training, and sojourn) and linguistic performance in respect of the distribution of two variants of a general variable rule of the form:-

$$[N] \longrightarrow \begin{Bmatrix} [n^1] \\ [n^2] \end{Bmatrix}$$

where N is any of the phonological items in the investigation and n^1 is its target-language realisation and n^2 its source-language realisation. The objective was to decide whether any pattern of relationship or correlation could be detected between linguistic performance among informants as analysed in 4.2.5, and each of the sociological factors, and what kind of general statements could be made from any observed patterns. In each sociological variable the investigation was carried out both for entire speech and for consonants and vowels separately.

5.2 STATISTICS

Decisions reported in the present chapter on the relationship between linguistic performance and certain sociological variables were taken on the strength of statistical processing of the quantitative data discussed in Chapter Four. The sum of the frequency of occurrence of source- or nontarget-language forms ($N \longrightarrow n^2$) in the speech of individual and all informants was used to calculate the frequency means for all or any subgroup of informants as desired. The next problem was to define and isolate the required subgroups in relation to each sociological variable without overlapping, that is to ensure independence of each variable. For example, if one divided informants into two groups in respect of phonetic training (one with previous phonetic training and another without it) one would obtain results that would not be statistically and empirically valid because the effects of other variables not being examined would obscure the true relationships. Some of the informants in the plus-phonetic training group, for example, would differ from some in the other group in having had long periods of sojourn in England, or in having high levels of education. In that case one would be measuring not only the effect of phonetic training but also those of the other factors. Results obtained from such tests would be empirically neither true nor statistically acceptable. To overcome that problem a simple but statistically sophisticated method, that of controlling for the other variables (see Blalock, 1972, p. 303) was adopted. By this method each of the other variables was held constant as required, just as in a laboratory experiment, so that the true relationship between the variable being examined and linguistic performance could be revealed. An example of a programme, using the SPSS (Statistical Package for the Social Sciences) would be written as in Table 5, 1, together with the instruction to the computer to carry out a t - test.

TABLE 5, 1: SPSS PROGRAMME FOR CONTROLLING UNEXAMINED VARIABLES

```
Select if:  ((Sex eq. 1) and (educ. eq. 3) and (sojourn eq. 1))
T - Test:   Groups = Training (1, 2)/Variables = vowels
```

By using the above programme those of the informants with equal sex, equal education and equal length of sojourn (that is, factors which are capable of giving rise to bias in the result) were isolated. Their performances were then compared in respect of the only independent variable in which they differed, which is phonetic training in the example above. The method had the undesired effect of reducing the number of cases available for each test of comparison but it had the advantage of disengaging otherwise seemingly inseparably interwoven factors, thus enabling highly dependable statements to be made. Reports of the findings on the relationship between linguistic (phonological in this work) performance and the four sociological factors are presented below. For details of the mathematical formula for t-tests the reader is referred to Blalock (1972, Chapter 13); Kmietowicz and Yannoulis (1976) provide a t-test probability table for checking on t-values at various degrees of freedom and significance levels and Freund (1974, p. 475 and Chapter Ten) for t-distribution and statistical inferences from means respectively.

5.3 SEX

5.3.1 Introduction

As explained in 2.1.2, it is an often expressed belief among many people in Nigeria that members of the female sex are generally more capable than those of the male sex in the language arts. It was decided to test the acceptability of the assumption which underlies that belief in the light of the linguistic data available in the present research. If the assumption is correct, the frequency of occurrence of source-language forms in female speech should, on the average, be significantly lower than that in male speech. The performance of the members of the two sexes was compared to see whether or not that was the case. Two hypotheses were set up with one, the null hypothesis, expressing the assumption being tested and an alternative hypothesis expressing a denial of that assumption. The null and alternative hypotheses are hereafter referred to as H_o and H_1 respectively and stated as follows:

H_o: The mean frequency of source-language forms will be significantly higher in the speech sample of male informants than in the speech sample of female informants.

H_1: The mean frequency of source-language forms will not be significantly higher in the speech sample of male informants than in the speech sample of female informants.

In taking a decision on the test of significance for sex differences the one percent (0·01) level of significance was used since it was considered necessary that the significance should be very positive before it could be accepted. Besides, the 0·01 level is the standard level normally used in statistical tests requiring high degrees of thoroughness, though the 0·05 level is sometimes used, depending on the amount of risk the researcher is ready to take.

5.3.2 Entire Speech

By using the controlled-factors (see 5.2) method to reveal any necessary connection between sex differences and linguistic performance the following results, presented in Table 5, 2, were obtained from the lineprinter.

TABLE 5, 2: SUMMARY OF T-TEST RESULTS FOR THE SEX DIFFERENCES (Controlled Variables)

	D. F.	Mean	T. Value	2-T Probability
Male	12	815•8182	0•74	0•472
Female		762•6667		

The facts in the table above were obtained by selecting informants with equal education, equal phonetic training gradings and equal sojourn period gradings who differed only in respect of sex. The permutation which provided the highest number (both absolute and in distribution) was then chosen as the one most likely to provide results with the greatest degree of reliability. It was observed that the mean frequency for females in that group, as indicated in Table 5, 2, was lower (by 53•1515) than the mean frequency for males in the same group - the female frequency mean was 762•6667, the male frequency mean being 815•8182; each less than the general population frequency mean of 874•760. Ordinarily one would conclude from these observations that the female informants generally exhibited smaller amounts of source-language forms in their speech than did the male informants and that H_0 should therefore be accepted. Such a decision, however apparently logical it may seem, would be statistically naive because of the reasons given in 5.2. Given the observed difference in the frequency means for males and females the t-test was used to reveal whether or not that difference was, in fact, as a result of the sex differences of the informants or whether it could have been as a result of sampling errors, or just of chance. In other words, it would reveal whether sex differences had any significant effect on phonological performance.

As observed in Table 5, 2, the 2-tail probability obtained from a pooled variance estimate (see Nie et al., 1970; p. 265) for the two means at twelve degrees of freedom was 0·472. This was observed to be considerably greater than the chosen level of significance at one percent (see 5.3.1), thus indicating that the observed difference in frequency means did not reach the expected level of significance, and that the group variable, sex, did not exert a significant influence on the performance of the informants. The null hypothesis, that is H_0, was therefore rejected. It was concluded that though a difference existed in the performance of male versus female informants the different was not sufficiently large as to be statistically significant at the one percent level.

5.3.3 Consonants and Vowels

It was reported in 4.3 that the source-language form frequency for all informants was much higher in vowel segments than in consonant segments. It was suspected, therefore, that there could be a significant difference between male and female informants in vowel segments while a similar significant difference was not expected in consonant segments in which the frequency of source-language forms appeared to be generally low for all informants. To ascertain that suspicion tests identical to those described in 5.3.2 were carried out for consonants and vowels separately. The results obtained for each segment type are summarised in Tables 5, 3 and 5, 4 below.

TABLE 5, 3: SUMMARY OF T-TEST RESULTS FOR SEX DIFFERENCES IN CONSONANTS

	D.F.	MEAN	T VALUE	2-T PROBABILITY
Male	12	252•0909	0•45	0•661
Female		229•0000		

TABLE 5, 4: SUMMARY OF T-TEST RESULTS FOR SEX DIFFERENCES IN VOWELS

	D.F.	MEAN	T-VALUE	2-T PROBABILITY
Male	12	563•7273	0•63	0•541
Female		533•6667		

It was observed that the frequency means for each sex group was higher in vowel segments than in consonant segments - 563•7273 to 252•0909 for males and 533•6667 to 229•0000 for females. The fact that source-language forms were more often used in vowel segments than in consonant segments was therefore reflected in the group performance. Secondly, it was observed that in each segment type the frequency mean for males was higher than that for females. Again one could not take a decision on the original hypotheses solely on the basis of these absolute means. The two-tail probability for vowels was 0•541 while that for consonants was 0•661. These probability levels indicate that for neither of consonant and vowel segments was the effect of sex differences significant at the 0•01 level since both values exceeded that limit. H_0 could therefore not be accepted in either case. It was observed, however, that the probability value for vowels, at 0•541, was nearer the pre-set significance level than that for consonants which was 0•661. This means that H_0 would have been accepted for vowel segments but rejected for consonant segments, had a significance level of, say, 0•555 been chosen. Such a choice of significance level would however imply that one was willing to accept H_0 with more than a fifty percent risk of taking a wrong decision in favour of that hypothesis. An investigation would hardly be necessary if one was willing to undertake such a high level of risk.

5.4 PHONETIC TRAINING

5.4.1 Introduction

The reasons for examining the effect of phonetic training on performance were explained in some detail in 2.1.2. Briefly, many schools in Nigeria give special courses in English phonetics while, probably, many more do not. The assumption in the schools offering those courses could only be that their students would speak English better than those of other schools. The influence of phonetic training was therefore examined to see whether that assumption would be proved right or not. The other variables were again held constant and a t-test was carried out for the hypotheses formulated as follows:

H_0: The speech sample of informants who have had phonetic training will contain a significantly less amount of source-language forms than that of those who did not have such training.

H_1: The speech sample of informants who have had phonetic training will not contain a significantly less amount of source-language forms than that of those who did not have such such training.

It would be observed that in all the tests reported in the present chapter the hypotheses were formulated so that a rejection of H_0 implies an automatic acceptance of H_1. In each case H_0 is the non-equality hypothesis while H_1 is the corresponding equality hypothesis (though H_0 used to denote equality or 'null' the convention no more holds in statistical science).

5.4.2 Entire Speech

Applying the statistics described in 5.2 the following results were obtained when all other variables had been held constant to enable one to compare the performance of informants who differed in almost no other variable except phonetic training.

TABLE 5, 5: SUMMARY OF T-TEST RESULTS FOR PHONETIC TRAINING DIFFERENCES

	D.F.	MEAN	T.VALUE	2-T PROBABILITY
+ Phonetic Training	20	804•4286	- 2•38	0•027
- Phonetic Training		923•1250		

It was observed that the frequency mean for the +phonetic training group was 118•6964 less than that for the - phonetic training group. The 2-t probability was however 0•027 at the pooled variance estimate. Since it had been pre-decided that any probability above 0•01 would not be accepted as an indication of significance it was accordingly necessary to reject H_0 and accept H_1 because 0•027 is greater than, or outside, the 0•01 level. It was concluded, therefore, that the difference in the frequency means for the two groups did not reach significance and that the test did not show that the difference between the performance of members of the respective groups could be attributed to their difference in phonetic training but to chance. It was observed however that a probability level of 0•027 was not a very high one. For example, if the significance level had been fixed at 0•05 it would have been concluded that there was a significant difference and H_0 would have been accepted.

5.4.3 Consonants and Vowels

For the same reasons explained in 5.3.3 the statistical tests were conducted for consonant and vowel segments separately using the same controlled group. The results obtained are again summarised in Tables 5, 6 and 5, 7, all using twenty degrees of freedom.

TABLE 5, 6: SUMMARY OF T-TEST RESULTS FOR PHONETIC TRAINING IN CONSONANTS

	D.F.	MEAN	T.VALUE	2-T PROBABILITY
+ Phonetic Training	20	247•1429	- 1•72	0•102
- Phonetic Training		306•2500		

TABLE 5, 7: SUMMARY OF T-TEST RESULTS FOR PHONETIC TRAINING IN VOWELS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
+ Phonetic Training	20	557•2857	- 2•12	0•046
- Phonetic Training		616•8750		

From the two tables above it was calculated that the frequency mean for informants who had phonetic training was 59•1071 less than that for those who had no previous phonetic training for consonants and 59•5893 for vowels. No great difference in the frequency means for both segment types was indicated by those figures, though the actual frequency means for both classes were much higher for vowel segments than for consonant segments.

The previous observation, that most of the source-language interference occurred in vowel segments, was thus confirmed. It was however observed that the probability of the significance of phonetic training did not reach the set value of 0•01 in either case; it was 0•102 for consonants and 0•046 for vowels. It was however nearer to the significance level in vowel segments than in consonants. As in the case of sex differences, the difference for vowels would have reached the significance level had the 0•05 level been previously set as the acceptable level. Since the 2-t probability did not reach the significance level at 0•01 for either consonants or vowels, it was concluded that the speech of informants with previous phonetic training did not exhibit a significantly less frequency mean of source-language than that of those informants who had not had such training. H_0 was accordingly rejected and H_1, which was the alternative hypothesis, was accepted.

5.5 EDUCATION

5.5.1 Introduction

Since English is the language of instruction in Nigerian universities, secondary schools, polytechnics and other post-primary educational institutions as well as in the upper classes in the primary schools, it was naturally assumed that informants with higher educational attainment levels would have been exposed to that language for longer periods of time than those with lower educational attainment levels. If that assumption is true and it is equally true that exposure to any labguage is a major factor (see 2.1.2.3) in the learning of that language, it follows that informants from Nigeria who have attained higher educational levels should be expected to use less of source-language forms in English than those whose educational attainments were relatively low. In that case the amount of source-language forms in the speech of informants was expected to be inversely proportional to the level of education.

To investigate the effect of education on linguistic performance among the informants three educational categories were identified and the informants were assigned to these categories as follows:-

Level 1: $\leq$ Primary School Leaving Certificate

Level 2: $\leq$ Secondary or G.C.E. ('O' Level)

Level 3: $\geq$ University level

The last group included graduates from Trade Centres, Polytechnics, Universities, Military and other training whose entry qualification was the G.C.E. ('O' Level) and its equivalents. A fourth group comprising informants with post-university exposure to English was excluded because, as explained in 2.1.2.3 (see also Adekunle, 1972) Nigerians generally use as little

English as possible outside school: usually when an indigenous language or 'broken' English is considered inappropriate in the situation.

The hypotheses tested were stated as follows:-

H_0: The speech sample of informants with higher education will contain a significantly less amount of source-language forms than that of informants with lower education levels.

H_1: The speech sample of informants with higher education will not contain a significantly less amount of source-language forms than that of informants with lower education levels.

5.5.2 Entire Speech

A preliminary breakdown of the informants indicated that only the second and third groups were suitable for a t-test, that is after controlling for the other variables and selecting informants that differed only in education. The figures indicated that a majority of the informants were either of pre-university or university level education. The relevant procedures for controlling for the other variables and conducting a t-test were therefore undertaken for levels two and three. The results obtained from those tests are summarised in Table 5, 8.

TABLE 5, 8: SUMMARY OF T-TEST RESULTS FOR EDUCATION GROUPS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Education 2	10	913·7500	- 0·15	0·886
Education 3		923·1250		

It was observed that the frequency mean for informants with the higher educational level (Level three) was in fact higher than that for informants in Level Two. This may have resulted from the larger sample available in Level three. The difference in the means between the two groups was however very small; it was actually 9·3750. This difference was so small that one could almost conclude right away that there was no difference. That feeling was confirmed by the 2-t probability of 0·886 obtained from further tests, which was clearly miles away from the 0·01 level of significance. It was concluded, therefore, that there was no significant difference in the performance of the two educational groups. H_0 was accordingly rejected and H_1 was accepted. The implication of the decision was that informants who differed from other informants only in the sense that they had higher educational attainments did not pronounce the segments better generally than those with lower educational attainments.

5.5.3 Consonants and Vowels

As was done for each of the other variables, statistical tests were conducted to see whether the education level had significant effects on informants' performance in vowel and consonant segments separately. The results are summarised in Tables 5, 9 and 5, 10 for consonants and vowels respectively.

TABLE 5, 9: SUMMARY OF T-TEST RESULTS FOR EDUCATION LEVELS IN CONSONANTS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Education 2	10	326•2500	0•48	0•644
Education 3		306•2500		

TABLE 5, 10: SUMMARY OF T-TEST RESULTS FOR EDUCATION LEVELS IN VOWELS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Education 2	10	587•5000	-0•93	0•375
Education 3		616•8750		

From the results it was observed that the frequency mean for education level three was also higher than for education level two in vowel segments. In consonant segments, on the other hand, the mean frequency was lower for education level three than for education level two. This last fact reflected the expected pattern between the two groups, a pattern that was contradicted by the facts from overall speech and vowel segments. It is suggested on the strength of these patterns of relationship that education seemed to have no influence on performance in vowel segments but that it did have a certain degree of influence on performance in consonant segments. This may be a reflection of the fact that teachers of English in Nigeria, being mostly Nigerians, do not usually teach any differences between English vowels and Yoruba vowels, apparently because many of them do not see any differences between the two. This contrasts with the teaching of English consonants in which at least some amount of effort is made to bring differences between English and Yoruba consonants to the learner's awareness. As in all the cases reported in the present chapter, the frequency mean for vowel segments was higher than for consonant segments for each of the two education groups; averaging 316•25 for both groups in consonants and 602•1875 in vowels. This indicates that more source-language forms were used by the informants in vowel segments than in consonant segments thus confirming the suggestion, made above, that more attention is paid to differences between English and Yoruba consonants than to similar differences between English and Yoruba vowels.

Finally, it was observed from the results, as summarised in Tables 5, 9 and 5, 10, that the difference between the two education levels did not reach the significance level at one percent in either consonants or vowels, the probability being 0•664 for the former and 0•375 for the latter. It was concluded, therefore, that there was no significant difference caused by educational differences in the informants' linguistic performance. H_0 was accordingly rejected at that significance level and H_1 was accepted. H_0 was therefore rejected both for overall speech and each of the two segment types.

5.6 SOJOURN

5.6.1 Introduction

As pointed out in 2.1.2, the practice, in many educational institutions both in Nigeria and elsewhere, of sending learners of a foreign language on a year-abroad programme arises from the assumption that a period of sojourn in a country where the learners' L2 is the L1 will significantly increase their competence in that language. If this assumption is correct a learner's performance in the L2 should increase in proportion to the length of period that he has lived in the host country: the longer his period of sojourn the greater his mastery of that language should be. A longitudinal study employing real time differences would be the most appropriate method of measuring the relationship between the two variables of sojourn and linguistic competence. In the absence of such a study a synchronic study employing apparent time appears to be the next best alternative. It has the advantage that many informants can be involved, a situation that would be difficult to cope with in a longitudinal study. Finally, it has been suggested (see McCarthy, 1978) that any improvement in a learner's competence arising from sojourn in a host country will probably be in other aspects of language than segmental phonology. An examination of the relationship between sojourn and linguistic competence was carried out in the present research to provide an insight, in the area of segmental phonology, into the effect of sojourn on the performance of the informants involved in the research.

5.6.2 Entire Speech

For the purpose of the investigation the informants were divided by sojourn length into four categories on an interval scale as follows:-

Sojourn 1 = < 2 years

Sojourn 2 = 2 - 5 years

Sojourn 3 = > 5 - 10 years

Sojourn 4 = > 10 years

Secondly, sojourn in England was interpreted as sojourn in any country where English is the first-language. The hypotheses tested in respect of the sojourn variable were, again, stated as H_0 and H_1.

H_0: The speech sample of informants with a higher sojourn index will contain a significantly less amount of source-language forms than that of informants with a lower sojourn index.

H_1: The speech sample of informants with a higher sojourn index will not contain a significantly less amount of source-language forms than that of informants with a lower sojourn index.

An uncontrolled breakdown of the informants again indicated that more than half (twenty-eight, to be specific) of the fifty informants were in the lowest sojourn grouping while only nine, six and seven were in the second, third and fourth groups respectively. As indicated in Table 5, 11 one would conclude, not scientifically of course, that sojourn had no positive influence on the informants' speech: it appears negative, in fact.

TABLE 5, 11: MEAN FREQUENCIES FOR INFORMANTS BY SOJOURN GROUPS (Uncontrolled)

SOJOURN GROUP	POPULATION	MEAN FREQUENCY
1	28	854•679
2	9	867•667
3	6	897•167
4	7	945•000

A controlled population breakdown however indicated that only one group was suitable for the t-test. That was the group comprising informants with no previous phonetic training (Training 2) and with education Level three, but who differed only in belonging to sojourn groups one and two. An effort to select a similar group with previous phonetic training provided fourteen informants in sojourn group one but only two in group two. The number in the second group was considered too small compared to the number in the first. The results for this grouping were therefore ignored although the frequency means were 804•4286 for sojourn group one and 751•0000 for group two, while the probability value was 0•524; all not really different from the general pattern of the results. The results for the only grouping considered are presented in Table 5, 12.

TABLE 5, 12: SUMMARY OF T-TEST RESULTS FOR SOJOURN GROUPS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Sojourn 1	10	923•1250	0•00	0•996
Sojourn 2		922•7500		

It was observed, as can be seen in Table 5, 12, that though the population in the second group was just half that in the first the frequency mean for the two groups was about the same. The mean for group one was just 0•375 more than the mean for group two, an indication that there was hardly any difference between the two groups. This was again confirmed both by the t-value of zero and the 2-t probability at 0•996. The probability of 0•996 is far outside the one percent significance level being used. It was therefore concluded that there was no significant difference between the two groups. Consequently, H_0 was rejected and H_1 was accepted.

5.6.3 Consonants and Vowels

The same significance tests were carried out for the groups separately for each of consonant and vowel segments. The object was to see whether any difference existed between informants' performance in the two areas in respect of sojourn. The results are summarised in Tables 5, 13 and 5, 14, respectively, for consonants and vowels.

TABLE 5, 13: SUMMARY OF SIGNIFICANCE TESTS FOR SOJOURN GROUPS IN CONSONANTS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Sojourn 1	10	306•2500	- 0•27	0•795
Sojourn 2		322•7500		

It was observed that though the frequency means were only slightly different as between the two groups in both consonants and vowels, group one had a lower (by 16•5) mean than group two in consonants. On the other

TABLE 5, 14: SUMMARY OF SIGNIFICANCE TESTS FOR SOJOURN GROUPS IN VOWELS

	D.F.	MEAN	T. VALUE	2-T PROBABILITY
Sojourn 1	10	616•8750	0•72	0•488
Sojourn 2		600•0000		

hand, it was group two which had a lower (by 16•875) mean than group one in vowels. Secondly, the means for both groups were lower in consonant segments than in vowel segments. The trend, again, was that informants deviated more from standard R.P. in vowel segments than they did in consonant segments. Finally, the probability levels were 0•795 for consonants and 0•488 for vowels indicating that, though the probability was nearer significance in vowels than in consonants, in none of the two segment types did it reach the established significance level. It was concluded that the difference caused by sojourn between the two groups was not significant in either case. H_0 was therefore rejected while H_1 was accepted in both cases. In conclusion, it was noted that in all the three cases examined - overall speech, consonants and vowels - H_0 was rejected while H_1 was accepted without exception.

5.7 SUMMARY

In the investigation of possible correlation between linguistic performance and the sociological variables (sex, education, sojourn and phonetic training) it was discovered that the influence of each sociological variable on phonological performance did not reach significance at one percent. As a result, the null hypothesis, H_0 was not accepted in each case. The results obtained in respect of two of the sociological variables, namely sex and phonetic training, though not reaching significance at the set level, appeared, however, to agree with general intuitive prediction. For example, in the first, the mean frequency of non-target language forms was greater for male than for female informants; the actual figures being 815•8182 for males and 762•6667 for females. In phonetic training the corresponding frequencies were 804•4 and 923•1 for the plus- and minus-phonetic training groups respectively. It was therefore suspected that statistics based on data from a larger number of informants in their natural speech environment might, in fact, provide differences that would reach significance at the said level. The results obtained in respect of the two other variables (sojourn and education) were both below the significance level and at variance with intuitive expectation. In sojourn there was hardly any difference between the mean frequencies for the two groups examined. The means were 923•1 and 922•8. In education the facts were still more astonishing in that the informants who had attained higher education levels actually had a higher frequency mean than those who had lower education, the figures being 923•1 and 913•8 respectively for the two groups. It would seem, therefore, that neither education nor sojourn actually had any influence on the performance of the informants. The opinion of McCarthy (1978) that sojourn is not likely to benefit a second-language speaker in segmental phonology appears to have been thus vindicated. Any efforts to remedy non-target language segmental pronunciation, it appears, should be in terms of greater phonetic training, rather than in sending speakers 'abroad'.

It was observed that the significance level of one percent which was used in the statistical tests was a very high one. For example, the 0·027 probability value calculated in respect of phonetic training would have reached significance had a more permissive level, say 0·05, been used. The high level of significance chosen was, however, necessary to avoid reaching conclusions which subsequent data could easily refute, especially in view of the various limitations on the data, as explained in the final paragraph below.

In the separate tests for consonant and vowel segments none of the sociological variables appeared to have caused any differences that approached significance. H_0 was, again, therefore rejected in respect of each variable in both segment types. It was however observed that the difference among informants that could be attributed to the sociological variables was nearer significance generally in vowel than in consonant segments. Secondly, the frequency mean of source-language forms was in each case much higher in vowel than in consonant segments, thus confirming the suggestion (made in 4.3) that the informants deviated more from R.P. in vowel than in consonant segments. This, as suggested in 5.5.3, could be as a result of the fact that more emphasis is placed on the differences between English and Yoruba in consonant than in vowel segments in the teaching of English in Nigeria. It would appear, therefore, that more problems of communication between a Yoruba immigrant and a native speaker of English arise from the immigrant's pronunciation of English vowels than of consonants. The Yoruba immigrant may, therefore, be naturally indignant (see Hughes and Trudgill, 1979; p. 1) that while he is little understood by the native speaker the English that he,too,hears is hardly intelligible. One important factor in the communication problem may also be the fact, pointed out by Trudgill (1979) that only an estimated three percent of the population of the United Kingdom speak R.P.

Finally, it was recognised that, because of the essentially limited population covered by the present research, the results obtained from subsequent works based on much larger population samples and an equally expansive list of phonological items will be of immense value in confirming or refuting the findings from the present investigation. Secondly, the obvious limitations of the present investigation need to be avoided, as much as possible in such future endeavours. For example, it was pointed out (both in 2.2.1 and 4.4.3) that a number of unavoidable problems might have led to distortion of the data. Paramount amongst these problems was the observer paradox by which the observer who wants to collect authentic data causes that data to be distorted by his mere presence. The informant's awareness that his speech was being recorded and was to be used for certain analytic purposes must have caused many of them who were able, within their latent competence in English to do so, to try to approximate standard R.P. in their speech. This was certainly a serious defect in the data but the only way to obviate it was to resort to illegality, if not immorality, by recording informants' speech samples without their awareness and consent. Even if, and when, these problems are overcome, no conclusive definite statements will have been correctly made. The problem of suprasegmental phonology explained in 3.4.4 will have to be overcome to enable any reliable general statements on second-language phonology to be made. And if such statements are to be made about second-language speech as a whole similar investigations at the lexical, syntactic and discourse levels need to be carried out. One would then be in a position to make valid pronouncements on the various aspects of second-language speech investigated. In view of these very great problems the findings from the present investigation can only be both partial and tentative.

BIBLIOGRAPHY

ABE, I.
1972 "Tone-Intonation Relationships". In A. Rigault and R. Charbonneau (Eds.), Proceedings of the Seventh International Congress of Phonetic Sciences. Janua Linguarum Major, Series 57. The Hague: Mouton.

ADEKUNLE, M. A.
1972 "Sociolinguistic Problems in English Language Instruction in Nigeria". In D. M. Smith and R. W. Shuy (Eds) Sociolinguistics in Cross-cultural Analysis. Georgetown University Press

1976 National Language Planning and Policy. The Nigerian Situation. West Afr. Jnl. of Modern Languages, No. 1.

AFOLAYAN, A.
1968 The Linguistic Problems of Yoruba Learners and Users of English. Ph.D. Thesis, University of London.

1971 Contrastive Linguistics and the Teaching of English as a Second or Foreign Language. English Language Teaching 25 (3), 220 - 9.

1977 "Acceptability of English as a Second Language in Nigeria" In S. Greenbaum (Ed.) Acceptability in Language. The Hague: Mouton.

ANDERSON, S. R.
1972 On Nasalisation in Sudanese. Linguistic Inquiry 3, 257 - 68.

1974 The Organisation of Phonology. London: Academic Press.

1978 "Tone Features". In V. A. Fromkin (Ed.) Tone: A Linguistic Survey. London: Academic Press.

ANSHEN, F.
1973 "Some Data which do not fit some Models". In C. N. Bailey and R. W. Shuy (Eds.) New Ways of Analysing Variation in English. Washington: Georgetown University Press.

1978 Statistics for Linguistics. Rowley, Mass: Newbury House.

ANSRE, G.
1971 "The Influence of English on West African Languages" In J. Spencer (Ed.), The English Language in West Africa. London: Longman.

AWOBULUYI, A. O.
1964 The Phonology and Morphophonemics of Yoruba. M.A. Thesis, Columbia University, N.Y.

BADIA-MARGARIT, A. M.
1964 "Some Aspects of Bilingualism among Cultured People in Catalonia". In H. G. Lunt (Ed.) Proceedings of the Ninth International Congress of Linguistics. The Hague: Mouton.

BAILEY, C. N.
1973 Variation and Linguistic Theory. Washington: Centre for Applied Linguistics.

BAIRD, A.
1967 Contrastive Studies and the Language Teacher. English Language Teaching 21, 130 - 35.

BAMGBOSE, A.
1966 A Grammar of Yoruba. Cambridge University Press.

BARNATHY, B., TRAGER, E. C., and WADDLE, C. D.
1966 "The Use of Contrastive Data in Foreign Language Course Development". In A. Valdman (Ed.), Trends in Language Teaching. New York: McGraw-Hill.

BELL, R. T.
1976 Sociolinguistics: Goals, Approaches and Problems. London: Batsford.

BICKERTON, D.
1971 Inherent Variability and Variable Rules. Foundations of Language 7, 457 - 92

1972 The Structure of Polylectal Grammars. Georgetown Monograph 25. Georgetown University Press.

1973 "Quantitative vs Dynamic Paradigms: the case of Montreal 'que". In C. N. Bailey and R. W. Shuy (Eds) New Ways of Analysing Variation in English Georgetown University Press.

1973a The Nature of Creole Continuum. In Language 49, 640 - 69

BLALOCK, H. M.
1972 Social Statistics (Second Edition) McGraw-Hill International

BOULTON, L. F.
1976 The Problem of Equivalence in Contrastive Analysis. IRAL, 14 (2), 143 - 63

BRIÈRE, E.
1966 Quantity before Quality in Second Language Composition. Language Learning 16, 141 - 51.

CARNOCHAN, J. A.
1960 Vowel Harmony in Igbo. African Language Studies 1, 155 - 63.

CARROLL, J. B.
1968 "Contrastive Linguistics and Interference Theory". In J. E. Alatis (Ed.) Report of the Nineteenth Annual Round Table Meeting on Linguistics and Language Studies. Georgetown University Press.

CEDERGREN, H.
1973 "On the Nature of Variable Constraints" In C. N. Bailey and R. W. Shuy (Eds) New Ways of Analysing Variation in English. Georgetown University Press.

CEDERGREN, H., and SANKOFF, G.
1974 Variable Rules: Performance as a Statistical Reflection of Competence. Language 50, 333 - 55.

CHOMSKY, N.
1957 Syntactic Structures. The Hague: Mouton.

1965 Aspects of the Theory of Syntax. Cambridge: M.I.T. Press.

1966 "The Current Scene in Linguistics: Present Directions". In D. A. Reibel and S. A. Schane (Eds.) Modern Studies in English. Englewood Cliffs: Prentice-Hall.

CHOMSKY, N., and HALLE, M.
1965a Some Controversial Questions in Phonological Theory. Jnl. of Linguistics 1, 97 - 138.

1968 Sound Pattern of English. London: Harper and Row.

CLYNE, M. G.
1967 Transference and Triggering. The Hague: Martinus Nijhoff.

COHEN, A.
1952 The Phonemes of English. The Hague: Martinus Nijhoff.

CORDER, S. P.
1967 The Significance of Learners' Errors. IRAL 5, 161 - 70.

COURTENAY, K.
1968 A Generative Phonology of Yoruba. Ph.D. Thesis. University of California, Los Angeles.

CROTHERS, J., and SHIBATANI, M.
1975 "On some Fundamental Concepts in Phonology" In D. L. Goyvaerts and G. K. Pullum (Eds.) Essays on the Sound Pattern of English. Ghent: E. Story-Scientia. P.V.B.A.

DeCAMP, D.
1971 "Toward a Generative Analysis of a post-Creole Speech Continuum". In D. Hymes (Ed.) Pigdinisation and Creolisation of Languages. Cambridge University Press.

1973 "What do Implicational Rules Imply?" In C. N. Bailey and R. W. Shuy, New Ways of Analysing Variation in English. Georgetown University Press.

DeGAYE, J. A. and BEECROFT, W.
1957 Yoruba Grammar. London: Routledge and Kegan Paul.

DIEBOLD, A. R.
1964 "Incipient Bilingualism" In D. Hymes (Ed.) Language in Culture and Society. Harper and Row.

DINGWALL, W.
1964 Transformational Generative Grammar and Contrastive Analysis. Language Learning 14, 147 - 60

DiPIETRO, R. J.
1968 "Contrastive Analysis and the Notions of Deep and Surface Grammar". In J. E. Alatis (Ed.), Report of the Nineteenth Annual Round Table Meeting on Linguistics and Language Studies. Georgetown University Press.

1968a Phonemics, Generative Grammar and the Italian Sibilants Studia Linguistica 21, 96 - 106

1971/76 Language Structures in Contrast (Second Edition, 1976) Rowley, Mass: Newbury House.

DITTMAR, N.
1976 Sociolinguistics: A Critical Survey of Theory and Application. London: Edward Arnold.

DUŠKOVÁ, L.
1969 On Sources of Errors in Foreign Language Learning. IRAL 7 (1), 11 - 36.

ERVIN-TRIPP, S. M.
1964 "An Analysis of the Interaction of Language, Topic and Listener". In A. S. Oil (Ed.) (1973) Language Acquisition and Communicative Choice: essays by Susan M. Ervin-Tripp. Stanford University Press.

FANT, G.
1967 "The Nature of Distinctive Features". In V. B. Makkai (Ed.) (1972), Phonological Theory: Evolution and Current Practice. Holt, Rinehart and Winston.

1973 Speech Sounds and Features. Cambridge: M.I.T. Press.

FASOLD, R. W.
1970 Two Models of Socially Significant Linguistic Variation Language 46, 551 - 63.

1973 "The Concept of Earlier-Later: more or less correct". In C. N. Bailey and R. W. Shuy (eds.) New Ways of Analysing Variation in English. Georgetown University Press.

FERGUSON, C. A.
1959 Diglossia. Word 15, 325 - 40.

FIRTH, J. R.
1948 "Sounds and Prosodies". In F. R. Palmer (Ed.) (1970) Prosodic Analysis. Oxford University Press.

FISHMAN, J. A.
1968 "The Relationship between Micro and Macro Sociolinguistics in the Study of Who speaks What to Whom and When". In A. S. Dil (Ed.) (1972), Language in Sociocultural Change: essays by Joshua Fishman. Stanford University Press.

1968a "Societal Bilingualism: Stable and Transitional", In A. S. Dil (Ed.) (1972) Language in Sociocultural Change. Stanford University Press.

1968b Sociolinguistic Perspectives on the Study of Bilingualism. Linguistics 39, 21 - 46.

FISHMAN, J. A., and HERASIMCHUK, E.
1969 The Multiple Prediction of Phonological Variables in Bilingual Speech Community. American Anthropologist 71, 648 - 57

FREUND, J. E.
1974 Modern Elementary Statistics. London: Prentice-Hall.

FRIES, C. C.
1945 Teaching and Learning English as a Foreign Language. Ann Arbor: Michigan University Press (Reprinted, 1964).

FROMKIN, V. A.
1972 Tone Features and Tone Rules Studies in African Linguistics 3 (1), 47 - 76.

GATBONTON, E. S.
1975 Systematic Variation in Second Language Speech. Ph.D. Thesis. McGill University, Montreal, Canada.

GRACE, E. C.
1975 In Defence of Vocalic. Language Sciences 36, 1 - 16.

GREENBERG, J. H. (Ed.)
1963 Universals of Language. Cambridge, Mass: M.I.T. Press.

1978 Universals of Human Language (in 4 volumes). California: Stanford University Press.

GUMPERZ, J. J.
1964 Linguistic and Social Interaction in Two Communities American Anthropologist 66, (2), 37 - 53.

1966 "On the Ethnology of Linguistic Change" In W. Bright (Ed.) Sociolinguistics. The Hague: Mouton.

HALLE, M.
1959 Sound Pattern of Russian: A Linguistic and Accoustical Investigation. The Hague: Mouton.

1962 Phonology in Generative Grammar. Word 18, 54 - 72.

HALLE, M., and KEYSER, S. J.
1971 English Stress: Its Form, Its Growth and Its Role in Verse. New York: Harper and Row.

HAMMER, J. H., and RICE, F. A. (Eds.)
1965 A Bibliography of Contrastive Linguistics. Washington: Centre for Applied Linguistics.

HAMP, E. P.
1968 "What a Contrastive Grammar is Not, if it Is". In J. E. Alatis (Ed.) Report of the Nineteenth Annual Round Table Meeting on Linguistics and Language Studies. Georgetown University Press.

HARMS, R. T.
1968 Introduction to Phonological Theory Englewood Cliffs: Prentice-Hall

HARRIS, Z. S.
1954 Transfer Grammar. IJAL 20, 259 - 70.

HASSELMO, N.
1969 "How can we measure the effects one language may have on the other in the speech of bilinguals?" In L. G. Kelly (Ed.) Description and Measurement of Bilingualism. University of Toronto Press.

HAUGEN, E.
1949 Problems of Bilingualism. Lingua 2, 271 - 88

1969 The Norwegian Language in America: A Study in bilingual behaviour (Second Edition) Bloomington: Indiana University Press.

1970 "Linguistics and Dialinguistics" In A. S. Dil (Ed) The Ecology of Language: Essays by Einar Haugen. Stanford University Press.

HOARD, J. E.
1971 The New Phonological Paradigm. Glossa 5, 222 - 68

HOUSEHOLDER, F. W.
1965 On Some Recent Claims in Phonological Theory Jnl. of Linguistics 1, 1 - 34.

HUGHES, A., and TRUDGILL, P.
1979 English Accents and Dialects. London: Edward Arnold.

HYMAN, L. M.
1975 Phonology: Theory and Analysis. London: Holt, Rinehart & Winston.

1975a "On the Change from SOV to SVO: Evidence from Niger-Congo. In C. N. Li (Ed.) Word Order and Word Order Change. University of Texas Press.

JACKSON, K. L.
1971 The Verification and Comparison of Contrastive Analysis. University of Hawaii Working Papers in Linguistics Vol. 3 (4), 201 - 10.

JAIN, M. P.
1974 "Error Analysis: Source, Cause and Significance". In J. C. Richards (Ed.) Error Analysis, London: Longman.

JAKOBSON, R., FANT, G., and HALLE, M.
1952 Preliminaries to Speech Analysis: The Distinctive Features and their Correlates. Cambridge: M.I.T. Press.

JAKOBSON, R., and HALLE, M.
1956 "Phonology and Phonetics". In V. B. Makkai (Ed.) (1972) Phonological Theory: Evolution and Current Practice. Holt, Rinehart and Winston.

JAMES, C.
1969 Deeper Contrastive Study.
IRAL 7 (2), 83 - 95.

1971 "The Exculpation of Contrastive Linguistics"
In G. Nickel (Ed.) Papers in Contrastive Linguistics.

JOHNSON, C. D.
1972 Formal Aspects of Phonological Description
The Hague: Mouton.

KISSEBERTH, C. A.
1970 On the Functional Unity of Phonological Rules.
Linguistic Inquiry 1, 291 - 306.

KLOSS, H.
1969 Core Problems and Marginal Problems.
Discussion of Types of Bilingualism, in
L. G. Kelly (Ed.) The Description and Measurement
of Bilingualism: An International Seminar.
University of Toronto Press (pp. 296 - 316).

KMIETOWICZ, Z. W., and YANNOULIS, Y.
1976 Mathematical, Statistical and Financial Tables for
the Social Sciences. Longman.

KOHLER, K.
1971 "On the adequacy of phonological theories in
Contrastive Studies". In G. Nickel (Ed.),
Papers in Contrastive Linguistics.

KRASHEN, S. D.
1976 Formal and Informal Linguistic Environment in
Language Acquisition and Language Learning.
TESOL Quarterly 10, 157 - 68.

KRASHEN, S. D., and JONES, C. M., and others.
1978 How Important is Instruction?
In English Language Teaching 32 (4), 257 - 61.

KURATH, H.
1939 Handbook of the Linguistic Geography of New England.
Providence, Rhode Island: Brown University Press.

LABOV, W.
1963 The Social Motivation of a Sound Change.
Word 19, 273 - 309.

1966 The Social Stratification of English in New York City.
Washington: Centre for Applied Linguistics.

1969 Contraction, Deletion and Inherent Variability of the
English Copula.
Language 45, 715 - 62.

LABOV, W.
1972 Language in the Inner City: Studies in the Black English Vernacular. Philadelphia: University of Pennsylvania Press.

1972a Some Principles of Linguistic Methodology. Language in Society 1, 97 - 120.

LADEFOGED, P.
1964 A Phonetic Study of West African Language. (Second Edition, 1968). Cambridge University Press.

1971 Preliminaries to Linguistic Phonetics. University of Chicago Press.

1972 Phonological Features and their Correlates. Jnl. of International Phonetic Association 2, 2 - 12.

LADO, R.
1956 A Comparison of the Sound Systems of English and Spanish.Hispania 39 (1), 26 - 29.

1957 Linguistics Across Cultures. Ann Arbour: University of Michigan Press.

1964 Language Teaching: A Scientific Approach. New York: McGraw-Hill.

1968 "Contrastive Linguistics in a Mentalistic Theory of Language Learning". In J. E. Alatis (Ed.) Report of the Nineteenth Annual Round Table Meeting on Linguistics and Language Studies. Georgetown University Press.

LASS, R.
1976 English Phonology and Phonological Theory. Vambridge University Press.

LEBEN, W. R.
1971 Suprasegmental and Segmental Representation of Tone,Studies in African Linguistics, Supplement 2, 183 - 200.

1971a Suprasegmental and Segmental Representation of Tone Ph.D. Thesis. M.I.T.

1978 "The Representation of Tone". In V. A. Fromkin (Ed.) Tone: A Linguistic Survey. London Academic Press.

LEE, W. R.
1968 "Thoughts on Contrastive Linguistics in the Context of Language Teaching". In J. E. Alatis (Ed.) Report of the Nineteenth Annual Round Table Meeting on Linguistics and Language Studies. Georgetown University Press.

LEHISTE, Ilse.
1970 Suprasegmentals. M.I.T. Press.

LENNEBERG, E.
1967 Biological Foundations of Language. New York: John Wiley.

LIGHTNER, T. M.
1973 "Against Morpheme Structure Conditions and Other Things". In M. J. Kenstowicz and C. W. Kisseberth (Eds.) Issues in Phonological Theory. The Hague: Mouton.

LILES, B.
1971 An Introduction to Transformational Grammar. Englewood Cliffs: Prentice-Hall.

LUELSDORF, P. A.
1975 A Segmental Phonology of Black English. (Janua Linguarum, Series Practica, 191) The Hague: Mouton.

MacCARTHY, Peter.
1978 The Teaching Of Pronunciation. Cambridge University Press.

MACKEY, W. F.
1965 Bilingual Interference: Its Analysis and Measurement. Jnl. of Communication 15, 239 - 49.

MADDEN, C., BAILEY, N., and others.
1978 "Beyond Statistics in Second Language Acquisition Research". In W. C. Ritchie (Ed.) Second Language Acquisition Research: Issues and Implications. London Academic Press.

MADDIESON, I.
1971 "The Inventory of Features". In Ian Maddieson (Ed.) Tone in Generative Phonology. Research Notes 3. Ibadan University - Nigeria.

1972 "Tone System Typology and Distinctive Features". In A. Rigault and R. Charbonneau (Eds.), Proceedings of the Seventh International Congress of Phonetic Sciences. The Hague: Mouton.

MALHERBE, E. G.
1969 Comments on Dr. R. M. Jones' paper in L. G. Kelly (Ed.) The Description and Measurement of Bilingualism: An International Seminar. University of Toronto Press.

MASON, C.
1971 The Relevance of Intensive Training in English as a Foreign Language for University Students. Language Learning 21, 197 - 204

MATHEWS, P. H.
1979 Generative Grammar and Linguistic Competence. London: George Allen and Unwin.

MEYES, L. S., and GROSSEN, N. E.
1978 Behavioural Research: Theory, Procedure and Design. (Second Edition). San Francisco: W. H. Freeman.

MITCHELL, T. F.
1975 Principles of Firthian Linguistics. London: Longman.

MILLER, G. A.
1966 "Language and Psychology". In E. H. Lenneberg (Ed.) New Directions in the Study of Language. M.I.T. Press. (First printed in 1964)

MORAVCSIK, E. A.
1978 "Universals of Language Contact". In J. H. Greenberg (Ed.) Universals of Human Language Volume I: Method and Theory. Stanford University Press.

MOSER, C. A.
1958 Survey Methods in Social Investigation. Heinemann.

NEMSER, W.
1971 Approximate Systems of Foreign Language Learners IRAL 9 (2), 115 - 123

NEWMARK, L., and REIBEL, D. A.
1968 Necessity and Sufficiency in Language Learning. IRAL 6, 145 - 64.

NICKEL, G.
1971 "Contrastive Linguistics and Foreign Language Teaching" In G. Nickel (Ed.) Papers in Contrastive Linguistics.

NICKEL, G., and WAGNER, K. H.
1968 Contrastive Linguistics and Language Teaching IRAL 6, 233 - 55.

NIE, N. H., HULL, C. H., and others.
1970 SPSS: Statistical Package for the Social Sciences. (Second Edition). New York: McGraw-Hill.

OKE, D. D.
1975 "Synchronic Linguistics and the Problem of Interlingual Influence". In R. W. Shuy and R. W. Fasold (Eds.) Analysing Variation in Language. Georgetown University Press.

POSTAL, P. M.
1964 "Underlying and Superficial Linguistic Structure", In D. A. Reibel and S. A. Schane (Eds.) (1969), Modern Studies in English. Englewood Cliffs: Prentice-Hall.

PULGRAM, E.
1970 Syllable, Word, Nexus, Cursus. The Hague: Mouton.

RICHARDS, J. C.
1971 A Non-Contrastive Approach to Error Analysis. English Language Teaching 25 (3), 204 - 19.

1974 "Error Analysis and Second Language Strategies". In J. H. Schumann and N. Stenson (Eds.) New Frontiers in Second Language Learning. Rowley, Mass: Newbury House.

RITCHIE, W. C.
1968 On the Explanation of Phonic Interference. Language Learning 18, 183 - 97

ROBINS, R. H.
1957 "Aspects of Prosodic Analysis". In F. R. Palmer (Ed.) (1970) Prosodic Analysis. Oxford University Press.

SACKEY, J. A.
1975 Bilingualism in Ghana. ASEMKA, No. 3. University of Cape Coast, Ghana.

SALAMI, A.
1969 Vowel and Consonant Harmony and Vowel Restriction in Assimilated English Loanwords in Yoruba. African Language Studies 13, 162 - 81.

SAMARIN, W. J.
1967 Field Linguistics: A Guide to Linguistic Fieldwork. New York: Holt, Rinehart and Winston.

SAMPSON, G.
1969 A Note on Wang's "Phonological Features of Tone". Int. Jnl. of American Ling. IJAL 35, 62 - 6.

1970 On the Need for a Phonological Base. Language 46, 586 - 626

SAMPSON, G. P., and RICHARDS, J. C.
1973 Language Learner Systems. Language Sciences 26, 18 - 25

SANDERS, C.
1976 Recent Developments in Contrastive Analysis and their Relevance to Language Teaching. IRAL 14 (1), 67 - 73.

SANKOFF, G.
1973 "Above and Beyond Phonology in Variable Rules". In C. N. Bailey and R. W. Shuy (Eds.) New Ways of Analysing Variation in English. Georgetown University Press.

1975 "A Quantitative Paradigm for the Study of Communication Competence". In R. Bauman and J. Sherzer (Eds.) Explorations in the Ethnology of Speaking. Cambridge University Press.

SCHACTER, P.
1965 Some Comments on J. M. Stewart's, "The Typology of the Twi Tone System". Bulletin of the Institute of African STudies 1, 28 - 42. Legon University Ghana.

SCHACTER, J., and CELCE-MURCIA, M.
1977 Some Reservations Concerning Error Analysis. TESOL Quarterly 11 (4), 441 - 51.

SCHANE, S. A.
1973 Generative Phonology. Englewood Cliffs: Prentice-Hall.

SCIARONE, A. G.
1970 Contrastive Analysis: Possibilities and Limitations. IRAL 8 (2), 115 - 29.

SEGALOWITZ, N., and GATBONTON, E.
1978 "Studies of the Non-fluent Bilingual". In P. A. Hornby (Ed.) Bilingualism: Psychological, Social and Educational Implications. New York: Academic Press.

SHARF, D. J., and BAEHR, T. J.
1969 Quantitative Analysis of Articulation Correspondences. Statistical Methods in Linguistics 5, 36 - 41.

SHEN, Yao.
1961 Sound Arrangements and Sound Sequences. Language Learning 11, 17 - 32.

SIERTSEMA, B.
1957a Nasalised Sounds in Yoruba Lingua 7, 536 - 66.

1957b Long Vowels in a Tone Language Lingua 8, 42 - 54.

1958 Some Notes on Yoruba Phonetics and Spelling. Bulletin de IFAN Series B, No. 3, 576 - 92.

1959 Three Yoruba Dictionaries. Bulletin de IFAN, Series B, No. 4.

SNOOK, R. L.
1971 "A Stratificational Approach to Contrastive Analysis" In G. Nickel (Ed.), Papers in Contrastive Linguistics.

SOMMERSTEIN, A.
1977 Modern Phonology. London: Edward Arnold.

STOCKWELL, R. P.
1968 "Contrastive Analysis and Lapsed Time". In J. E. Alatis (Ed.) Report of the Nineteenth Annual Round Table Meeting of Linguistics and Language STudies. Georgetown University Press.

STOCKWELL, R. P., and BOWEN, J. D.
1965 The Sounds of ENglish and Spanish. University of Chicago Press.

TAYLOR, L. L., CATFORD, J. C., and others.
1971 Psychological Variables and Ability to Pronounce in a Second Language. Language and SPeech 14, 146 - 51.

TRAN-THI-CHAU.
1975 Error Analysis, Contrastive Analysis and Students' Perception. IRAL 13 (2), 119 - 43.

TRUDGULL, P.
1973 "Phonological and Sociolinguistic Variation in Norwich English". In C. N. Bailey and R. W. Shuy (Eds.) New Ways of Analysing Variation in English. Georgetown University Press.

1974 The Social Differentiation of English in Norwich. Cambridge University Press.

1974a Sociolinguistics: An Introduction. Middlesex, England: Penguin.

TRUDGILL, P.
1978 Sociolinguistic Patterns in British English.
London: Edward Arnold.

1979 Standard and Non-standard Dialects of English in the United Kingdom: Problems and Policies.
Int. Jnl. of the Sociology of Language 21, 9 - 24.

UPSHUR, J.
1968 Four Experiments on the Relationship between Foreign Language Teaching and Learning.
Language Learning 18, 111 - 24.

VANDERSLICE, R., and PIERSON, L. S.
1967 Prosodic Features of Hawaiian English.
Quarterly Jnl. of Speech 53 (2).
Repr. in D. Bolinger (Ed.) (1972):
Intonation: Selected Readings, Penguin.

WANG, S-Y.
1967 The Phonological Features of Tone.
IJAL 33, 93 - 105.

WARD, Ida.
1952 An Introduction to the Yoruba Language.
Cambridge: Heffer and Sons.

WARDHAUGH, R.
1967 Some Current Problems in Second Language Teaching.
Language Learning 17, 21 - 26.

1970 The Contrastive Analysis Hypothesis.
TESOL Quarterly 4 (2), 123 - 130.

1974 Topics in Applied Linguistics.
Rowley, Mass: Newbury House.

WEINREICH, Uriel.
1953 Languages in Contact: Findings and Problems.
The Hague: Mouton.

WELLS, J. C.
1970 Local Accents in England and Wales
Jnl. of Linguistics 6, 231 - 52.

WHITMAN, R. L.
1970 Contrastive Analysis: Problems and Procedures.
Language Learning 20 (2), 191 - 7.

WILKINS, D. A.
1968 Review of D. A. Valdman's (Ed.)
Trends in Language Teaching. IRAL 6, 99 - 107.

WILSON, R. D.
1966 A Criticism of Distinctive Features.
Jnl. of Linguistics 2, 195 - 206

WOLFE, D. L.
1967 Some Theoretical Aspects of Language Learning
and Language Teaching.
Language Learning 17, 173 - 88

WOLFRAM, W. A.
1969 A Sociolinguistic Description of Detroit Negro Speech.
Washington: Centre for Applied Linguistics.

1973 "On What Basis Variable Rules?"
In C. N. Bailey and R. W. Shuy (Eds.)
New Ways of Analysing Variation in English.
Georgetown University Press.

1974 Sociolinguistic Aspects of Assimilation:
Puerto Rican English in New York.
Arlington.

WOLFRAM, W. A., and FASOLD, R. W.
1970 The Study of Social Dialects in American English.
Englewood Cliffs: Prentice-Hall.

WOO, N.
1969 Prosodic Phonology.
Ph.D. Thesis, M.I.T.

APPENDIX

APPLICATION OF QUESTIONNAIRE

The following is a brief guide for administering the questionnaire. It is to be strictly followed during each interview to ensure uniformity and reduce to the barest minimum the incidence of interviewer influence. Record all the interview, including any digressions. There should be no break in the recording.

Procedure:

After establishing necessary rapport with the subject, proceed as follows:-

1. Section A: Personal details:-

Ask the questions in the order in which they are written on the sheet. In effect this amounts to a discussion the whole of which should be recorded. Needless to say that it should be wholly in English.

2. Section B: Passage for reading:-

The passage, which is on a separate sheet, should be given to the subject.

3. Section C: Individual words:-

The words to be said aloud are printed, one on a card. The cards are numbered with the sole aim of avoiding the possible effects of context. The cards should therefore be presented in serial order and only one at a time.

QUESTIONNAIRE

Section A: Personal details

1. Name: Mr/Ms
2. Home-town and district:
3. First language and dialects:
4. (a) Highest academic qualifications:

   (b) Present occupation:
5. Language of instruction for 4 (a):
6. Other languages habitually used:
7. Place and period of domicile outside Yorubaland:

Section B: Passage for reading

Kindly read aloud this passage:-

It is now over nine years since television was introduced to the people in the rural areas of Nigeria, particularly in Yorubaland. It is therefore high time we tried to measure the impact of that civilising channel on education on the outlook of the people in those areas. For this purpose we might divide the areas concerned into small zones, though this is only a theoretically expedient measure. It should not be thought that human beings could be divided into discrete units or teams for this purpose as for a game of rugby with two clear teams. Secondly, we should be prepared to go into the thatched huts of the poor people in the outskirts of town to chat to them on the topic. Of course, this means that we shall need to switch between various dialects of the Yoruba language - a feat which many villagers perform, often with amazing smoothness and ease. Let us say that we shall spend five days on a sample survey. On Sunday we do the preliminary paperwork and conduct the interview proper on Monday through Thursday, barring heavy rains or the blazing sun.

Section C: Individual words:- each on a card

i. Cart, bard, cat, bad,

ii. bid, ship, sheep, bead,

iii. shed, shirt, bird, firm,

iv. court, bought, cot, cut,

v. full, foot, fool, rude.

Section D: Phonetic training:- Discuss as in Section A.