CHILD FIRST LANGUAGE ACQUISITION OF PHONOLOGY:A CASE STUDY OF DHOLUO

JUDITH AKINYI OBIERO, B.A. (Hons) (E U)

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DECLARATION OF AUTHORSHIP

This thesis is my original work and has not, wholly or in parts, been presented for the award of a degree in any other University. All the sources have been acknowledged.

SIGNED: _____ DATE: 31/10/95

JUDITH AKINYI OBIERO.

This thesis has been submitted with my approval as the university supervisor.

SIGNED: _____ DATE: 31/10/95

DR. KIMANI NJOROGE.

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ABSTRACT

This study centers around the acquisition of language. Specifically, it attempts to utilize markedness theory to trace the acquisition of phonology by children acquiring Dholuo as their first language (L1).

The research was carried out in Kisumu District, Nyanza Province, Kenya. The data were collected from natural conversational settings and audio-recorded.

Chapter one introduces the language of study and provides the background information of the study area relevant to the subject of investigation. These include, a statement of the problem being studied, objectives of the study, the research hypotheses, significance, scope and limitations, a statement of the theoretical framework and methodology. The basic objective of the study is to establish whether markedness theory can be used to explain L1 acquisition of phonology.

Chapter two reviews the pertinent literature on child language studies, markedness theory, phonological acquisition, phonological processes and Dholuo phonology. The literature on Dholuo phonology is presented with a view to providing the phonemic inventory of the target language of acquisition.

Chapters three and four discuss the findings based on analysis of the data collected from 16 children. Chapter three provides a description of various stages of phonological development. These are discussed by focusing on children of various age groups between the ages 1 year and five years. Chapter four focuses on phonological processes found in the speech of young children. These are discussed by describing the phonological patterns found in the words used

by children. Chapter five which summarizes the findings in chapters three and four also gives the conclusions. The research findings demonstrate that unmarked sounds are acquired earlier than marked sounds, thus confirming the strength of markedness theory as a model of phonological acquisition. It also shows that children use such phonological processes as a substitution, deletion and assimilation to simplify adult speech. These findings provide positive evidence for the initial hypotheses namely (i) the order of acquisition of Dholuo sounds will proceed from unmarked to marked sounds; (ii) a child's phonological system is systematic and follows a developmental continuum; (iii) markedness theory can be used to explain L1 acquisition of phonology and (iv) children make use of certain phonological processes in the acquisition of language.

Finally a statement of the theoretical and practical implications of the findings, plus recommendations for further research closes this study.

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Finally, thanks are extended to Elisha Otieno, Stephen Otuchi and Washington Ochola who typed the manuscript in its various stages.

J.A.O

DEDICATION

In memory of Claris Kojo and Zaddock Ojal

who filled our lives with joy and humour.

To my parents , Robert and Alice who have given me a past

of which I am proud.

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SYMBOLS AND ABBREVIATIONS

A	Afya
C	Cliff
E	Erick
L	Lina
CV	Consonant, Vowel
CVC	Consonant, Vowel, Consonant
C_1VVC_2V	1st Consonant, Vowel, Vowel, 2nd Consonant, Vowel
IPA	Iternational Phonetic Alphabet
LI	First Language
OR	Orthographic Representation
SOC	Suppliance in Obligatory Context

CHAPTER ONE

INTRODUCTION

This chapter gives a general background to Dholuo, which is the target language of acquisition. It also provides information relevant to the subject of investigation, stating the research problem, objectives, hypotheses, significance of the study, research methodology and limitations of the study.

1.1 The Language of Study

Dholuo is a western Nilotic language spoken by the Luo of Kenya who are 'part of the Nilotes' collectively referred to as Lwo (Okoth. 1982). The Luo are found in the Lake region (Nyanza Province) of Kenya in Siaya and Kisumu Districts (formerly known collectively as Central Nyanza) and in Homabay and Migori Districts (formerly known collectively as South Nyanza).

According to the latest(1989) population census, the total number of the Luo of Kenya, who live in the four districts of Kisumu, Siaya, Homabay and Migori is two million seven hundred thousand (2,700,000).

This figure however, does not include Dholuo speakers found in other parts of Kenya and East Africa. These include the Luo emigrants who live in the various urban centers of Kenya and in Northern Tanzania. All these people together with the original Bantu-speaking communities in Kenya who have adopted Dholuo as their main language constitute the total number of Dholuo speakers. Such people include the Luo-Abasuba of Migori District of Kenya (Ayot 1979) and the Abasamia of Busia District of Kenya, among others. Languages closely

related to Dholuo are Dinka, Nuer, Shilluk etc (in the Sudan) and Acholi, Alur, Lang'o, Padhola (in Uganda) (Greenberg 1955).

Two scholars (Stafford (1967), Adhiambo (1990)) have attempted to identify the regional varieties (dialects) of Dholuo. According to these scholars, there are two major varieties namely the "Trans Yala" varieties (Stafford 1967) or "Boro-Ukwala" (Adhiambo 1990) varieties spoken in Ugenya, Alego, Yimbo and parts of Gem location; and "South Nyanza"variety (Stafford 1967) or 'Kisumu-South Nyanza' (Adhiambo 1990) variety. This variety is spoken in various locations of Homabay and Migori Districts (formally known collectively as South Nyanza District) plus Kisumu and some parts of Siaya District not included in the "Trans- Yala/"Boro-Ukwala" group. These dialects, though mutually intelligible have their accent distinct enough to enable one to identify where a given speaker comes from.

There is no variety officially recognized as the "standard Dholuo". However, probably because it is spoken in a wide geographical area, the "Kisumu-South Nyanza" variety is the one used in print, radio broadcast and as medium of instruction in schools. For that reason, it is the one chosen for this study, and any use of the term Dholuo shall be referring only to this variety.

1.2 The Nature of the Study

1.2.1 Statement of the Problem

There is considerable evidence in first language acquisition research (L1) to show that children's early speech is characterized by several types of pronunciation errors (de Villiers and de Villiers, 1979; Ingram, 1976; Smith, 1973; Velten, 1943). The errors vis-a-vis the adult system show clear evidence of forms that are not part of the adult phonological system.

The challenge of this study therefore, is to account for the phonological development in children acquiring Dholuo, and consequently to assess the validity of four claims made in linguistic theory concerning L1 acquisition of phonology.

Central to our problem is whether or not the acquisition process, in particular that of phonology can be predictable in markedness terms.

The problem that this study sets out to investigate can therefore be summarised in question form as follows:

Can the acquisition of phonology be explained in markedness terms?

1.2.2 Objectives of the Study

This study proposes to do the following:

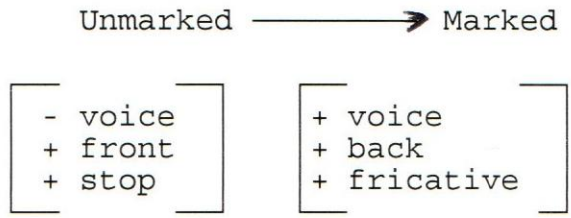
1. Identify what is considered to be the acquisition pattern of Dholuo phonology.
2. Establish whether or not phonological acquisition follows a developmental continuum.
3. Determine the reliability of the theory of markedness as a tool in the explication of the early child acquisition of phonology.
4. Identify some of the phonological processes that children employ in the acquisition of language.

1.2.3 Hypotheses

With the above objectives in mind, we formulate certain hypotheses that this study intends to test.

We therefore hypothesize that:

1. The order of acquisition of Dholuo sounds will be:



2. A child's phonological system is systematic and follows a developmental continuum.
3. Markedness Theory can be used to explain L1 acquisition of phonology.
4. Children use certain phonological processes in the acquisition of language.

1.2.4 Scope and Limitations of the Study

Our study restricts itself to the acquisition of the segmental features of Dholuo. It however, only addresses itself to the order of acquisition of Dholuo consonants, but gives attention to vowels where necessary. This is for the practical reason that given the time limit, it would be impossible to effectively carry out a study involving the acquisition of both segmental and supra-segmental features of the language.

1.2.5 Significance of the Study

The generalizations which have been made on first language acquisition have been to a large extent based on the studies of the speakers of languages like Chinese, Japanese, English,

Russian and other European languages. There are very few studies on Child language in Kenya that have concerned themselves with African languages. Pertinent here are works such as Blount (1969) and Njage (1982). However, no study to date has primarily concerned itself with child acquisition of Dholuo phonology. Even Blount's study is mainly concerned with grammatical development viz-a-viz the child's social setting.

Because the scholars who have conducted such studies have claimed that some of their conclusions have universal validity, it is necessary that languages other than English be studied in order to verify the validity of their findings.

It is our hope that this study on the acquisition of Dholuo phonology will contribute additional evidence to first language acquisition studies. Consequently, this area of study has been chosen because of the need to replicate studies in order that Universal generalizations can be made.

This study, we hope, will reveal facts about child acquisition of Dholuo phonology which will be of use to students of theoretical linguistics in general, and particularly to those interested in the theory of markedness and L1 acquisition.

The study is also likely to stimulate further research into other important and related areas of language acquisition.

1.2.6 Theoretical Framework

This study was carried out using the notion of markedness as the theoretical model. The concept of markedness was first developed by linguists of the Prague School (Trubetzkoy, Jakobson etc) in the 1930s and has been taken up more widely by other scholars such as Greenberg (1966) and

Chomsky and Halle (1968). It is one of the theories of language acquisition whose development has arisen from a general feeling among language scholars that other theories of language acquisition needed an alternative approach in order to constructively expose their theoretical misconceptions and practical shortcomings. In particular, it is in opposition to the Behaviourist accounts of L1 learning which held the view that children were able to master their mother-tongue by imitating utterances produced by adults and having their efforts at using language either rewarded or corrected[1]. Nevertheless, the general observation that a large number of utterances produced by children bore no resemblance to the kind of utterances modelled by an adult, provided a strong argument for rejecting Behaviourist accounts of L1 acquisition on empirical grounds. It was therefore inadequate to argue that L1 acquisition consisted of stimulus-response connections learnt through imitations and reinforcement. Consequently, a general feeling arose among language scholars (Jakobson 1941; Chomsky 1959; Locke 1983) that the explanations for language acquisition must lie in the internal processing that takes place[2]. Jakobson (1941), for example, sees phonological acquisition as the result of the interaction of the child's internal structure and the linguistic environment. The child actively imposes structure on the linguistic input, then alters this structure in response to the input. The child's system at any given point in time, then, is the result of his internal organization of the linguistic input and the adaptation to that input.

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[1] Skinner, B. (1957). Verbal Behaviour. New York: Appleton Century Crofts.

[2] For attacks on behaviourist accounts of language learning see Chomsky's (1959) review of Skinner's "Verbal Behaviour".

Central to the theory of markedness is the view that in the languages of the world, certain linguistic elements are more basic, natural and frequent than others. The linguistic elements that are more basic and frequent in world languages are considered as unmarked while the less frequent ones are considered as marked. The theory further hypothesizes that the unmarked forms are acquired earlier than the marked forms.

The notion of markedness has however been elaborated and applied in a number of ways. To Praguans, markedness is defined in a language specific way. To generative phonologists, markedness values are universal and innate. Voiceless stops, as suggested by the implicational Universals of Jakobson (1941), are universally less marked than voiced stops and voiceless fricatives. Thus, markedness is no longer seen as a property of the phonologies of individual languages, but rather as part of general phonological theory, which aims to capture the linguistically significant generalizations characterizing sound systems. It derives its support from studies of universals in language acquisition, linguistic typologies, and linguistic change. Unmarked sounds are said to be generally acquired earlier than marked sounds by children. They are also generally required in the inventory of sounds of a language before marked sounds can be added. In language change, sounds are seen as changing from marked to unmarked.

The theory of markedness is also related to Chomsky's (1965) Theory of Universal Grammar[3] in that both lay emphasis on the effect of linguistic universals on language acquisition. Chomsky's theoretical position is that the Universal Grammar is comprised of core rules which form the unmarked structures in a language. He also claims that there are marked

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[3] Cook, (1985), defines Universal Grammer as "the properties inherent in the human mind". Universal Grammer consists of a set of priciples that apply to all languages than to specific languages.

linguistic structures in a language which are not part of the Universal Grammar, and form the peripheral rules. Core rules are unmarked because they accord with the general tendencies of language. Peripheral rules are marked in that they are exceptional in some way. According to Chomsky (Ibid), children acquire the core rules (unmarked structures) before the non-core rules (marked structures). Consequently, the process of language acquisition is viewed as stretching from the unmarked rules to the marked ones. Where the acquisition of phonology is concerned, the sounds or phonological features that are more basic, natural and frequent in the languages of the world form the core rules (or the unmarked sounds) and are bound to be acquired earlier than the less basic, and the less frequent sounds which form the peripheral rules (marked sounds). It is in this connection, therefore, that the theory of markedness can be seen as having the strongest possible explanatory and descriptive powers. Apart from being a theory whose tenets are clear, and hence easy to apply in the description of language acquisition process, it has principles that affect every linguistic aspect of language acquisition, namely, phonology, morphology, syntax and semantics.

Given the subject and objectives of our study, it is our contention that this theory of language acquisition would be most useful as an explanatory tool. The only way we can assess the validity of its claims, one of our objectives, is by using it in the description of real language data.

1.2.7 Methodology

1.2.7.1 Subjects

In this study we adopted a cross-sectional approach of data collection because it is less time consuming. A sample of 16 children between the ages 1:0 (1 year) and 5:0 years was randomly selected using two criteria, namely age and sex:

Table 1.1 Distribution of Subjects by Sex and Age.

AGE (YRS)	MALE	FEMALE	TOTAL
1:0 - 2 2:1 - 3 3:1 - 4 4:1 - 5	2 2 2 2	2 2 2 2	4 4 4 4
Total Number of Subjects	8	8	16

1.2.7.2 Location of Study

The study was carried out in Central Seme location in Kisumu District, Nyanza Province of Kenya.

1.2.7.3 Data Elicitation Procedures

To realise the aims of our research study, we used a method of data collection which would affect the children's spontaneous speech with others as little as possible, but which would enable us to collect a large number of utterances by the children. Consequently the research methodology that we used to collect data was that of direct observation. We collected

spontaneous verbal material from the children by tape-recording of mother-child discourse. We also recorded children's speech in play situations. Besides tape recording of the children's speech, we occasionally chose to note down their utterances in writing.

In addition to the 'naturalistic' data collected, we also attempted to elicit speech from children. The elicitation tasks included:

a) imitation:

The child was asked to imitate sounds or words containing sounds of our interest (c.f. appendix). This is because a young child may never spontaneously produce say, a /f/ sound in his own speech but it may be that he never had occasion to do so. If he can be induced to attempt to imitate, say, the word 'frog', 'fish', and 'five' his imitation will answer the question of whether he has a /f/ in his repertoire.

b) Asking the child to name various objects.

1.2.7.4 Data Analysis

The procedure that we followed in the analysis of our data involved identifying the 'obligatory context' for each sound in the speech corpus. An 'obligatory context' as defined by Dulay and Burt (1973), is one in which use of the item under consideration is obligatory, in correct native - speaker speech. In our case, we considered whether or not the sound under consideration was correctly pronounced where required in a word. An accuracy score of its total use by all the children in a given age - group in the study was then calculated. We then ranked all the sounds in order of their accuracy scores. This produced an 'accuracy order' which we

equated with acquisition order on the assumption that the more accurately a sound was pronounced, the earlier it was acquired.

We elicited consonant sounds in all word positions i.e. prevocalic, intervocalic and post-vocalic positions. Following the procedures recommended by Prather et al(1975), responses were recorded as: (i) phoneme correctly produced (ii) phoneme omitted and (iii) phoneme replaced by another phoneme (in which case the substituted sound was recorded). We did this in order to determine the percentage of suppliance in obligatory context (hereafter SOC) for all the phonemes of Dholuo. Individual SOC scores were computed, then an average score was determined for each group of subjects representing the four age groups. SOC analysis was conducted according to guidelines from Brown (1973) and Dulay and Burt (1974). If a subject produces a phoneme correctly in an obligatory context, then he scores 2 points. If the context calls for a phoneme to be produced but it is omitted, the subject scores 0 (zero) points. If a phoneme is replaced by another phoneme (i.e. a phoneme is supplied, but in an incorrect form) a score of 1 (one) is given. After each context has been scored, the score values are added and the percentage of suppliance in obligatory context for each phoneme is computed. Group phoneme scores obtained through SOC analysis were used in determining rank order of phoneme accuracy acquisition. A group score was obtained by computing a ratio whose denominator is the sum of the expected scores for each obligatory occasion across all members in the group, and whose numerator is the sum of the actual scores across all the members mulitplied by 100.

A subject or group was regarded as having acquired a given phoneme if he (or it) supplied it correctly in 75% of obligatory context. All the data collected are given in the appendix.

1.3 Definition of technical terms

1.3.1 Phonology - is the study of the organization of the units of the sounds of speech into syllables and other larger units (Verma and Krishnaswamy, 1994). The phonology of a language is therefore a description of the systems and patterns of sounds that occur in that language.

1.3.2 Phoneme - is the smallest unit at the level of sound. Phonemes are significant sounds in specific languages hence there are no universal phonemes. The sound [p], for example, is a voiceless, unaspirated bilabial plosive regardless of the language it is used in. However, [p] in certain languages such as Hindi and Thai is a significant sound since it has a constrastive value relative to [p^h] which is aspirated. On the other hand it may not be significant in English or Dholuo, where it does not matter whether one uses [p] or [p^h] as it does in Hindi and Thai.

1.3.3. Morphology - is the study of the smallest meaningful units of language, and of their formation into words. It thus shows the word-structure in terms of classes of morphemes (a minimal unit of speech that is recurrent and meaningful (Verma and Krishnaswamy, 1994)). For example, a morphological analysis of a word like 'unfriendly' would show that it is made up of two classes of morphemes - a free morpheme ('friend') plus bound morphemes ('un' and 'ly'). A free morpheme is that which can stand alone as an independent word, while a bound morpheme cannot be used by itself.

1.3.4 Syntax - is a branch of linguistics that deals with the combination and arrangement of words into phrases, clauses and sentences.

1.3.5 Semantics - is the study of meaning in all its aspects, including the relation between language, thought and behaviour (Pei, 1966).

1.3.6 Obstruent - a term used to refer to a consonant whose production is characterized by an obstraction of the flow of air either partially or completely. Such sounds as [f, s, v; p, b, d] which are fricatives ad stops respectively, belong to the larger class of OBSTRUENTS.

1.3.7 Consonant - a class of speech sounds whose production are characterized by constriction accompanied by some measure of friction, or closure followed by release. Consonants are classified according to the point of articulation (bilabials [p, b]; labio-dentals [f, v], dentals [θ ð]; alveolars [t,d,s]; palatals [ʃ ʒ]; velars [k,g]; glottals [h], etc.) and the manner of articulation (stops or plosives [p, t, k]; fricatives [f, s,]; affricates [t , d]; nasals [m, n,ŋ]; laterals [l], etc.).

1.3.8 Vowel - is a sound produced by unobstracted passage of the air stream through the oral cavity, without the oral cavity being constricted enough to cause audible friction. Such sounds include [a, e, ɛ, i, o, u, etc.].

1.3.9 International Phonetic Alphabet (IPA) - This is an alphabet or a set of symbols devised for the purpose of representing graphically the spoken language sounds. The oppisite of IPA symbols are **orthographic symbols** used to represent the sounds as they are written.

1.4.0 Segmental features - Vowels and consonants of a particular language.

1.4.1 Suprasegmental features - are units which extend over more than one sound in an utterance such as stress, tone and duration. Stress, tone and duration are often claimed to be properties of suprasegmental units such as the syllable or word (Hyman 1975).

1.4.2 First language acquisition - processes by which people develop proficiency in their mother tongue or the language acquired first.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is dedicated to a review of the literature relevant to our study. Pertinent here are claims made in theoretical linguistics on phonological acquisition. Also relevant are the early case studies on child language, including the methodological criticisms levelled against them. Literature on the phonological processes employed by children as they acquire language is also presented. Finally the chapter focuses on literature on Dholuo phonology since this is the target language of acquisition. Consequently, the chapter is divided into the following sections:

(1) The history of child language studies

(2) Markedness Theory

(3) Child Acquisition of Phonology

(4) Phonological Processes

(5) Dholuo Phonology

2.2 The History of Child Language Studies

The field of child language acquisition is one that has gone through several changes over the years in both the methods and theoretical orientation used. An understanding of the field requires an initial exposure to its history. In this section, therefore, we present a historical overview of current methods. To do this, the focus will be on the major case studies, including

their methodological approaches with a view to highlighting their strengths and weaknesses. This will also shed light on how language scholars have improved on the methodologies they employ to conduct research into language acquisition.

Ingram (1989), identifies three major periods of child language studies, each being identified by the dominant method in it. They are:

1. The period of diary studies (1876 - 1926)
2. The period of large sample studies (1926 - 1957)
3. The period of longitudinal studies (1957 - present)

2.2.1 The Period of Diary Studies (1876 - 1926)

During this period, a parent who was either a linguist or a psychologist, would observe and keep diaries of his child's spontaneous speech over some period of time. Such studies were conducted by Taine (1876), Preyer (1889), among others. Other diary studies (Leopold, 1939; Velten, 1943; Weir, 1962; Smith, 1973) have been conducted since 1926. The most cited is Leopold's (1939 - 49) study of his daughter Hildegard's acquisition of English and German.

Diary studies have certain strengths and weaknesses. One major limitation of this approach lies in the fact that the diaries are usually recorded by parent observers. For this reason diaries have been criticized for being biased in that the parent observer will only record what he sees to be an important development, while other important behaviours may go unnoticed. Secondly many diary studies are full of gaps which result from the absence of either the parent or child for various reasons. Data on development during this period is therefore lost.

It is also important to note that during this period of diary studies the goal of the majority of these works was descriptive. That is, most of the researches were mainly concerned with plotting the facts of language acquisition, with little concern for theory construction. The result was an enormously descriptive rather than explanatory literature on language acquisition.

Despite these problems, diary studies have the advantage of being longitudinal in nature so that the process of one child's learning becomes evident. Moreover, the observer knows the child well so that the behaviours he notes are never idiosyncratic, but presumably either common ones that mark a new development. In language acquisition, for example, major changes may occur in a matter of days. The parent observer will be able to spot these and note their characteristics.

2.2.2 The Period of Large Sample Studies (1926 - 1951)

The period of large sample studies involved cross-sectional studies, ie., studies of different children at distinct ages. The assumption was that if enough subjects were selected for each age - group, typical behaviour was observed. Inferences could then be made about the change of behaviour over time without actually observing only one child change its behaviour. Besides the focus on large samples, this period was characterized by the systematic observation of behaviour. All subjects would be studied for the same amount of time for a particular behaviour. Further, the study differed from the previous diary studies in the way in which the data were analyzed. The study laid much emphasis on "measurement" in that they made use of quantified results. Such studies were conducted by, among others, Smith (1926), Mc Carthy (1930), and Templin (1957).

This method of data collection has certain limitations which need to be emphasized since their results may be inappropriately used both for theoretical and practical purposes. One weakness is that grouped data are used for analysis instead of focusing on patterns of individual children. This is a limitation since language functions as a system of rules or units that interact with each other. This kind of interaction is not easily captured in grouped data. For example, norms of sound acquisition do not reveal how the individual acquires a system of phonological rules. This fact is stated by Ingram (op. cit:366):

> "We are never talking about the language of a single child, so we can never be sure whether the general pattern is reflected in individual children".

A second weakness is a methodological one. Most of these studies were done without the aid of modern recording equipment such as tape - recorders. Instead, most language samples were done by note - taking of the children's utterances. The problem with data gathered in this way arises particularly during Phonetic Transcription. Templin (1957), for example, transcribed her data without the use of a tape recorder.

Lastly, most of these studies sought to describe rather than explain language acquisition.

2.2.3 The Period of Longitudinal Studies (1957 - present)

The third method used in collecting data on language acquisition is what Ingram (op. cit) calls "longitudinal language sampling". In this case the researchers combine both longitudinal and cross - sectional approaches of data collection. It can be seen as a combination of the two earlier methods, in that studies are conducted not on one child, but on several children and their speech recorded at regular intervals for a predetermined length of time. This approach differs,

however, from the previous ones in that diary studies for example are longitudinal, but they usually consist of notes rather than complete language samples. Large sample studies took very short language samples while the longitudinal studies took much larger samples in order to obtain a more representative sample of the child's general language ability. Longitudinal studies also differ from diary studies in that the subjects are usually not the offspring of the researchers. Instead they are children who are selected because they meet predetermined criteria. The fact that more than one child is studied enables one to determine general features of acquisition. Furthermore, in these studies all sessions are tape-recorded for later transcriptions. In addition, many of the previous diary studies were not only descriptive, but often looked at only superficial issues, such as when particular features appeared in the child's speech. In the longitudinal studies, however,interest was on the emergence of rules, and how to describe the child's developing grammar. That is, these studies seek to explain rather than describe child language. Such studies have been conducted by Braine (1963a), Brown (1973) and Bloom (1970).

Our present study, being an explanatory one, also adopts a method of data collection similar to the one used during the period of longitudinal language sampling.

2.3 Markedness Theory

Markedness is a term used to refer to the extent to which a phenomenon is normal in language systems (Goodluck 1991). While the linguistic elements which are more basic, natural and frequent in world languages are considered as unmarked, their less frequent counterparts are considered as marked.

A number of claims (Jakobson, 1941; Velten, 1943; Schvakin, 1973[4]) have appeared to the effect that children acquire certain sounds long before others. This phenomenon has been explained in terms of "markedness". As Jakobson (1941) observes, there seems to be a regular distribution of speech sounds cross-linguistically, and the order in which they are acquired. From a number of observational studies of child language, Jakobson (Ibid) proposed that those sounds that are found in virtually all languages of the world (unmarked) are acquired before the less frequent ones (marked sounds). The following are some of his observations:

1. Front voiceless stops [p,t], nasals [m,n] and the vowel [a] are found in virtually all languages. They are therefore among the first sounds to be acquired by children.

2. Back velar stops [k,g] are less frequent than front stops [p,b]; a language may have front stops without back stops but not vice versa; back velar stops are therefore marked while front stops are unmarked. The acquisition order, therefore is [+front] > [+back].

3. Fricatives are less frequent than stops; a language may have stops without fricatives and not vice versa. Fricatives are therefore marked while stops are unmarked. The order of acquisition therefore, is [+stop] —> [+fricative].

4. Many languages will only have a single liquid (usually [l]. The acquisition of a second liquid

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[4] Schvachkin, (1973). 'The Development of Phonemic speech perception in early childhood. In Ferguson C.A. and Slobin D.I. pp. 91-127.

occurs much later. Consequently liquids are generally considered as marked and that their acquisition is late.

Markedness Theory, according to Jakobson (Ibid), can therefore be used to explain child phonology. The key to Jakobson's theory is that phonological development follows an invariant, universal order. He begins with a theory of phonological features and according to this theory, the phonemes of a language can be divided into a universal set of distinctive features.These features can be seen as part of the child's innate linguistic capabilities. The child's acquisition of a phonological system consists of his acquiring these features in a consistent and predictable sequence.

Jakobson distinguished two stages of phonological development. During the first, all children will sound the same. He states:

> "the child possesses in the beginning only those sounds which are common to all the languages of the world, while those phonemes which distinguish the Mother-tongue from the other languages of the world appear only later" (Ibid:50).

After these initial developments that are said to occur in all languages subsequent changes follow what Jakobson (Ibid) calls the "laws of irreversible solidarity". These are claims about the distribution of phonological features among the world's languages. Such laws are used to make predictions about the child's acquisition in the second stage, that is, the acquisition of specific languages. These laws state that in the unmarked or normal state, certain relations exist between phonological features within a language. These are 'implicational laws' which state that the occurrence of one feature (or class of sounds) implies the occurrence of another. For example, the law of irreversible solidarity for observation that all languages had front consonants but not all had back consonant (e.g. haiti) is that; the presence of back consonants presupposes the

existence of front consonants. Other laws of irreversible solidarity are:

1. The existence of voiced stops e.g. [b] implies the existence of voiceless stops e.g. [p].
2. The existence of fricatives implies the existence of stops.
3. The existence of affricates implies the existence of fricatives.

Jakobson (Ibid) proposed that the laws of irreversible solidarity can be seen as making predictions about the order of acquisition of speech sounds. The laws state that the presence of certain sounds in a child's speech imply the previous development of other sounds, for example:

1. voiceless stops presuppose voiced stops
2. back consonants presuppose front consonants (ie. labials and dental consonants).
3. fricatives presuppose stops.
4. affricates presuppose fricatives.

These laws therefore indicate features (or phonemes) that are more basic (or unmarked) and which, therefore are acquired earlier.

According to Rutherford (1982), paired items that bear markedness relationships can be identified from all areas of linguistic knowledge, namely phonology, morphology, syntax and semantics. He provides a number of examples of marked and unmarked forms in phonology. He states that any given segment becomes marked by the addition of features such as voicing, aspiration, nasalization etc; their unmarked counterparts are characterized by the absence of these features. Our present study also considers as 'marked' those sounds that have other features added to them. Such features include voicing, aspiration, nasalization etc.

2.4 Phonological Acquisition Studies.

Interest in phonological acquisition has a fairly long history (Wellman et al 1931; Poole, 1934). This section focuses on some of the early studies of phonological development. It also examines more recent studies on child phonology in relation to the theory of markedness.

2.4.1 The Early Studies of Phonological Development.

Three major studies form the core of what is now known about speech-sound development in children. These include studies by Wellman,(Ibid); Poole,(Ibid); and Templin, (1957). These investigations attempted to determine the ages at which specific phonemes were acquired during the course of normal speech sound development. These studies, according to Weiner and Wacker (1982) 'form the traditional measures of speech sound development' (in Lass, 1982:51).

Many criticisms have been levelled against these early studies, thus weakening the validity of their results. As Ingram (1989) observes, such studies are 'articulation studies' not linguistic ones. That is, their results tell us something about the degree of difficulty of certain sounds, but relatively little about the phonological systems of children.

Another major criticism of these studies relates to the tasting of each sound in only one word. For example, in all these three studies target phonemes were elicited in all position of words i.e word-initial, word-medial and word-final. However, each phoneme was elicited only once in each position. Allowing only a single trial on a particular sound ignores the concept of variability in sound production (either due to phonetic context or developmental skill). It may well be that a child will do better with a given sound in one word but fail to pronounce it in

another. For example, a child may produce the word 'dog' as [gɔg]. The assumption would be that [d] was not yet acquired. However, if /d/ -> /g/ was the result of attraction by the final /g/, then the child may well have been able to produce /d/ in a word like 'doll'. Thus, these studies did not take assimilation into account. Discussions about the acquisition of a sound tested in a specific word may have led into incorrect assumptions about acquisition if assimilation was possible within that specific word. Such a possibility has been referred to as 'lexical variability' (Ingram, op. cit:366). Despite Templin's claims to the contrary, evidence exists (Ingram, 1976:83-5) which suggests that such lexical variation is due to the influence of syllabic complexity and adjacent sounds. A child may, for example, fail to pronounce [v] in 'vacuum cleaner' but will pronounce it correctly in another word such as 'vase'. This factor alone could influence greatly conclusions about the age of acquisition of a sound when just one word is used for testing. In addition the ability to trace the gradual learning, use and mastery of a particular phoneme is eliminated. It is due to such limitations inherent in the earlier acquisition studies, that our present study concerns itself with the establishment of the phonological processes in children's speech. This we have done with a view to controlling for variation in speech sounds which may occur as a result of the phonetic context in which a particular sound occurs.

The scoring procedure used in all the three studies has been criticized because it also ignored the concept of variability in sound production and eliminated the ability to analyze the errors that were made. All responses were scored as correct or incorrect, and no phonetic (or phonemic) transcriptions were made. The use of this type of binary scoring does not reflect variation in the production of a phoneme.

Another criticism of the earlier phonological studies is that they did not test small discrete age groupings. That is, those studies mainly focussed on children aged 3 years and above, thus ignoring those aged between 1 and 2 years. Templin (op. cit.), for example investigated 180 children ranging in age from 3 to 8 years. Poole's (op. cit.) sample included 204 subjects between the ages of 1½ to 8½ years. Such data do not effectively yield information on the gradual development of phoneme acquisition.

The many criticisms of the traditional studies of speech sound development led to attempts to refine these measures and develop measures which would reflect variability of production as well as gradual development of phoneme acquisition. Prather et al, (1975), elicited Target Phonemes by using selected items from the 'photo Articulation Test' (Pendergast et al, 1969). Consonant sounds were elicited only once in the pre-vocalic and post-vocalic positions of words. Responses were recorded as phonemes correctly produced; phonemes distorted and phonemes replaced by another phoneme (in which case the substituted phoneme was recorded). In this study a sound was assigned to an age level when it was correctly produced in both the initial and final positions by 75% of the children tested. The results of this study indicated that children produce more sounds correctly at earlier ages than the traditional studies had led us to believe. In addition, the results of this investigation revealed developmental trends which may have been obscured by the studies which did not test small, discrete age groupings. That is, the data indicated that reversals occurred on some sounds in that certain sounds were produced correctly by 75% of the children at an early age, and then not maintained at later ages.

Our present study also adopts a scoring system similar to that of Prather (op. cit.) since it allows for a much more specific analysis of errors than was possible with the data collected from earlier studies. In addition, our analysis also includes a determination of a child's phonetic inventory, a concept which was ignored in the early studies of phonological development. The information about what the child has and he/she does with what he/she has is extremely important in the analysis of a child's phonological system. This fact is also supported by Weiner and Wacker (1982):

> The determination of a child's phonetic inventory is a useful means by which analyses can be made regarding sounds that the child does not produce in any context; sounds the child produces, but not in the correct contexts; and sounds that the child overuses in certain contexts (in Lass Op cit: 61).

We therefore provide the children's phonetic inventory which allows us to analyze all the speech sounds that a child has in his expressive repertoire. The binary scoring system used by the studies of Wellman(op. cit.), Poole (op. cit.) and Templin (op. cit.) did not allow for an analysis or listing of speech sounds actually produced by the children. As we have already seen, the possibility that, although misproduced in the target word, a sound could have been produced correctly in some other word (either as a correct production or a substitution for another phoneme) was not taken into consideration. The scoring system used by Prather (op. cit.), which required the recording of the sound substituted for the target, allowed for the listing of speech sounds in the children's repertoires. However, such an analysis was not performed.

2.4.2 Other Phonological Acquisition Studies and the theory of Markedness

Several studies (Stampe, 1969; Velten, 1943) lend support to Jakobson's claims on phonological development. Stampe (op. cit: 446) reported a child saying [ta] instead of [kar], and [ta t] instead of [ka t] (in Binnick et al 1969). It appears from this observation that alveolar consonants are learned before velar consonants. This phenomenon can be explained using the theory of markedness, since the front (alveolar) consonants are unmarked and are therefore more likely to be acquired before the back (velar) consonants which are marked.

In her study on the acquisition of phonology by four Kikuyu speaking children, Njage (1982) discredits the theory of markedness as a model of phonological acquisition. This is because in her findings fricatives occurred in the children's utterances long before the stops. Moreover, while the least marked plosive system is characterized as consisting of voiceless bilabial, alveolar and velar stops - [p,t,k,], her study reveals that both voiced and voiceless stops are acquired simultaneously.

Thus looking at these observations of child phonology, it is evident that the study of the acquisition of phonology raises many interesting and controversial issues which are of theoretical and practical importance to the linguist. To this extent our study is significant because it can weaken or strengthen the hypotheses that the theory of markedness advances.

2.5 Phonological Processes

Traditional analyses of speech sound development in children have treated phonemes as separate, individual entities in terms of acquisition. However, Ingram (1976:29) revealed that this was not necessarily a valid course of action: in fact there seem to be "very general

simplifying processes" which are in operation during children's incorrect productions that affect entire classes of sounds, rather than one particular phoneme. In other words, children are not haphazard in their mispronunciations of words they are in fact, quite systematic.

The establishment of various phonological processes in the speech of young children has been the goal of much recent research (Ingram, Ibid; Smith, 1973; Stampe op. cit.). Stampe (Ibid), for instance, sees these processes as consisting of a universal set of hierarchically ordered procedures used by children to simplify speech (in Binnick et al, op cit). They are universal to the extent that every child is born with the facility to simplify speech in a consistent fashion. They are hierarchical in that certain processes are more basic than others. Ingram (op. cit) divided these simplifying processes into three main categories:

(i) Substitution processes

(ii) Assimilation processes

(iii) Syllable structure processes

Each of these main categories contain strategies by which the processes can be accomplished.

2.5.1 Substitution Processes

The first set of phonological processes, substitution processes are general processes which affect entire classes of sounds. These processes include:

(1) Stopping

(2) Fronting

(3) Gliding

Stopping involves replacing a fricative with a stop as in pronouncing 'sea' as [ti] or 'sing' as [tiŋ] (Smith, op. cit.). Fronting occurs when a consonant made towards the back of the mouth such as [k] is replaced by one made towards the front. For example in English 'coat' which begins with a /k/, may become [dut] in the child's pronunciation (Velten, op. cit.); and 'car' may be pronounced as [ta] (Stampe, op. cit.). Gliding involves the substitution of [w] or [j] for a liquid as in pronouncing 'leg' as [jek]; and 'ready' as [wedi] (Ingram, op. cit.).

2.5.2 Assimilatory Processes

Assimilatory processes constitute the second category of processes. These processes are in effect when a sound is influenced by, or becomes similar to an adjacent sound. This process tends to change the place, manner, and/or voicing characteristics of one sound to make it more similar to the characteristics of another sound in the word. These processes include:

(1) Voicing

(2) Consonant harmony

Voicing involves prevocalic voicing of consonants, ie., a consonant is voiced when it precedes a vowel and devoiced at the end of a syllable. For example, voicing occurs when a child pronounces 'paper' as [be:ba] (Smith, op. cit.); and 'pig' as [bik] (Ingram, op. cit.).

Consonant harmony results from assimilation of consonants in words with the structure CVC as in pronouncing 'tub' as [bʌb] (Menn 1975), 'duck' as [gʌk] (Smith), op. cit.); and 'doggy' as [goggi] (de Villiers and de Villiers, 1973).

2.5.3 Syllable Structure Processes

The third category of processes are syllable structure processes. These processes operate to simplify the structure of syllables and tend to reduce words to basic CV syllables. This may be accomplished by:

(1) deleting final consonants

(2) reducing consonant clusters

(3) deleting unstressed syllables

(4) reduplication

Final consonant deletion occurs when a CVC syllable is reduced to CV by deleting the final consonant as in saying [bi] instead of 'bib' (Ingram op. cit.).

Cluster reduction involves reducing a consonant cluster into a single consonant. It occurs, for example, when a child pronounces 'train' as [ten], and 'play' as [pe] Adams (1972). In these examples initial double consonants become single consonants.

Reduplication occurs when the initial CV syllable is repeated in a multi-syllable word. Examples of reduplication are: pronouncing 'cookie' as [gege] Adams (Ibid) and 'water' as [wawa] (Ingram, op. cit.).

An unstressed syllable is deleted especially when it precedes a stressed syllable as in pronouncing 'banana' as [nə-na] and 'potato' as [dedo] (Ingram Ibid).

Phonological development is seen as a gradual loss of these simplifying processes until the child's words finally match their adult models. That is, as the child's phonological system matures the use of these processes also decreases. Ingram (Ibid) points out that, as a simplifying process, final consonant deletion is lost between the ages of 1½ and 3 years; and deletion of

unstressed syllables functions upto age 4 and beyond.

The preceding set of observations on the phonological processes in the speech of young children raises some questions that can be explained within the theory of markedness. We need, for example, to account for the observation that fricatives are substituted with stops and back consonants are replaced with front ones in children's speech as shown in the studies of Smith (1973) and Stampe (1969) respectively. The answer may lie in theory of markedness which hypothesizes that the front consonants which are unmarked are acquired earlier than the back consonants which are marked. In addition, our task is to determine which aspects of the range of phonological processes employed by children to simplify speech are indeed universal; That is, can these processes be observed in the early speech of Dholuo speaking children? Lastly, we need to establish whether or not these processes are developmental in nature.

2.6 The Phonological System of Dholuo

It has been argued (Jakobson 1977), that an essential component of a speaker's linguistic competence is his mastery of the phonological system of his language, particularly its repertoire of phonemes (cited in Ferguson 1977). A fluent speaker's command over the phonology of his language, however involves, yet another component: the rules that govern the distribution and actualization of a given phoneme (Halle 1976)(cited in Ferguson 1977). This kind of information must therefore be explicitly included in the phonological description of any language. Consequently, it is necessary to give a short survey of Dholuo phonology since this is the target language of acquisition. In this section however, we only provide its phonemic inventory, that is, we only look at the segmental elements i.e. consonants and vowels of Dholuo.

2.6.1 The Consonants

In a study entitled "Dholuo morphophonemics in a generative framework", Okoth (1982) observes that Dholuo has 21 consonants including two semi-vowels. It also has five nasal compounds which, though may be considered as clusters in their underlying representations, always function as unit phonemes in Dholuo. Table 2.1 shows the consonants of Dholuo in their orthographic forms and the corresponding IPA equivalents. It also provides examples of words whose initial consonants contain the relevant phonemes. Our present study makes use of the corespondence between Orthographic representations and IPA symbols as shown.

Table 2.2 provides a summary of Dholuo phonemes according to manner and place of articulation. In cases of voice - voiceless contrasts, the voiced segment is placed under its voiceless counterpart.

It is said that the palatal obstruents in Dholuo /c/ and /ɟ/ are actually neither pure obstruents nor stops. Consequently, these two sounds which we have represented here as stops could as well be represented as affricates.

Table 2.1 (The consonants of Dholuo, adopted from Okoth (1982) and examples of words with the relevant consonants in their initial positions)

Orthographic Forms	IPA symbol	as in:	Gloss
p	p	[pap]	'field'
b	b	[buk]	'a book'
w	w	[waŋ]	'an eye'
m	m	[mo]	'oil'
f	f	[fulu]	'a kind of fish'
th	θ	[θum]	'music'
dh	ð	[ðako]	'a woman'
t	t	[tado]	'a roof'
d	d	[dum]	'to jump'
r	r	[rao]	'hippo'
l	l	[lum]	'grass'
s	s	[san]	'plate
n	n	[nam]	'lake'
ch	c	[cak]	'milk'
j	ɟ	[ɟowi]	'buffallo'
y	j	[jamo]	'wind'
ny	ɲ	[ɲako]	'a girl'
k	k	[kom]	'a chair'
g	g	[guok]	'dog'
n'g	ŋ	[ŋato]	'a person'
h	h	[hawi]	'luck'
mb	^{m}b	[^{m}baka]	'conversation'
ndh	^{n}ð	[^{n}ð aðu]	'flavour'
nd	^{n}d	[^{n}diga]	'bicycle'
nj	ɲɟ	[ɲɟaga]	'bhang'
ng	ŋg	[ŋgudi]	'stinginess'

Table 2.2 Consonant Chart

	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Glottal
Stop	p b ^{m}b			t d ^{n}d	c ɟ ʃɟ	k g ŋg	
fricative		f	θ ð	s			h
nasal	m			n			
liquid				l r	ʃ	ŋ	
glide	w				j		

Source: Okoth(Ibid)

2.6.2 The Vowels

The vowel system of Dholuo has four pairs of vowels, each containing a [+ Advanced Tongue Root] and its [- Advanced Tongue Root] (or retracted tongue root) counterpart, and a single vowel (Okoth Ibid).

The following table shows the vowels of Dholuo in both their orthographic (OR) and corresponding IPA representations.

Table 2.3 Vowels of Dholuo, adopted from Okoth (Ibid)

OR	IPA SYMBOL
a	a
e	e, ɛ
i	i, ɪ
o	o, ɔ
u	u, ʊ

The table below provides a summary of Dholuo vowels according to vertical height and horizontal positions of the tongue.

Table 2.4 Dholuo vowels

	Front	Back
High	i	u
	ɪ	ʊ
Mid-high	e	o
Mid-low	ɛ	ɔ
Low	a	

CHAPTER THREE

DATA ANALYSIS

3.1 Introduction

The present chapter is devoted to the description of various stages of phonological development. For purposes of analysis, the chapter is subdivided into four sections, each section focusing on a particular stage of phonological development as follows:

(1) Early phonology (as represented by children between 1:0-2 years of age)

(2) Phonological development between 2:1-3 years

(3) Phonological development between 3:1-4 years

(4) Phonological development between 4:1-5 years

3.2 Early Phonology

The subjects who represent the first stage of phonological development are four children ranging in age between 1 year 1 month (1;1) and 2 years (2;0). They are two girls and two boys. The youngest child is Ivet (1;1), followed by Frank (1;4), Pauline (1;8) and Ken (2;0).

3.2.1 Background Information

These children had ample opportunities to communicate with other members of their families. If both the parents worked, there was usually a grandmother , a household helper or other children at home with the subjects. These children were acquiring Dholuo as spoken in most parts of Kisumu District, Nyanza Province of Kenya. The children's speech were recorded

in weekly two-hour sessions for a period of four months between July and November 1993.

IVET

Is a female, 2nd born child. The mother is a nursery school teacher and the father a medical doctor. In the home, the child was taken care of by her grandmother and other members of the extended family, all of whom are fluent speakers of Dholuo. She was 1 year and 1 month at the beginning of data collection.

FRANK

Is a male, first born and the only child. The mother is a primary school teacher and the father a peasant farmer. When we began to observe him, he was 1 year 4 months old and had been exposed to Dholuo only. While the parents were away the child was taken care of by a baby sitter who is a native speaker of Dholuo.

PAULINE

Is an only child whose mother is unemployed and the father a school teacher. In the home besides the mother, the child was taken care of by the grandmother, who is a fluent speaker of Dholuo. We started observing her when she was 1 year 8 months.

KEN

Is a last born male child in a family of seven children. The mother is a business-woman and the father a peasant farmer. While the parents were away the child was taken care of by an aunt and a househelper, who are native speakers of Dholuo. He was 2 years old when data collection began.

3.2.2 Consonant Production at 1:0 - 2:0 years

Table 3.1 presents mean SOC scores for children between 1:0 - 2:0 years of age.

The table indicates that the sounds [p], [b], [t], [d], [k], [c], [m], [n], [w], [j̇] met the criterion for acquisition i.e. they were correctly supplied in at least 75% of obligatory context.

Table 3.1 Rank order of phoneme SOC percentage scores for 1:0 - 2:0 year old subjects

	Subjects and SOC % score					
Phoneme	**Ivet**	**Frank**	**Pauline**	**Ken**	**Group scores%**	**Rank**
p	75	75	100	100	88	2
b	75	75	100	75	84	3
t	100	100	100	100	100	1
d	75	75	100	88	84	3
k	63	50	88	100	75	5
g	63	63	38	50	53	7
f	25	25	38	38	31.3	14
θ	63	63	25	50	50	8
ð	50	50	38	63	50	8
s	38	38	38	50	41	11
h	50	38	50	25	43	10
c	75	75	75	75	75	5
ɟ	38	63	50	75	56.2	6
m	75	100	75	100	88	2
n	100	100	100	100	100	1
ʃ	38	50	50	50	47	9
ʒ	38	63	75	50	56.2	6
l	50	38	50	50	47	9
r	25	25	38	25	28.1	15
w	75	75	75	100	81	4
j	100	100	75	75	88	2
ᵐb	25	38	38	50	38	12
ⁿð	13	38	38	50	34.3	13
nd	25	25	63	50	41.3	11
ʃɟ	13	25	25	25	21.2	15
ʒg	25	25	50	763	41	11

It appears from our data that the following sounds had been acquired by children between 1 - 2 years of age:

1. Stops	- voice	+ voice
bilabial	[p]	[b]
alveolar	[t]	[d]
palatal	[c]	
velar	[k]	
2. Nasal		
bilabial	[m]	
alveolar	[n]	
3. Glide		
bilabial	[w]	
alveolar	[j̇]	

The table also indicates that the following sounds did not reach the criterion for acquisition:

Stops	- voice	+ voice
palatal		[ɟ]
velar		[g]
Fricatives		
labial-dental	[f]	
dental	[θ]	[ð]

alveolar [s]

glottal [h]

Nasal

Palatal [ɲ]

Velar [ŋ]

Liquid

alveolar [r]

[l]

Nasal stop compounds

bilabial [^{m}b]

dental [^{n}ð]

alveolar [^{n}d]

palatal [^{ɲ}ʄ]

velar [^{ŋ}g]

The above sounds are therefore regarded as not having been acquired by these children. Where they occurred they were either deleted, or substituted with other sounds. For example, the voiced velar stop [g] was constantly replaced with its voiceless counterpart [k] or deleted as follows:

	Adult word	Child pronunciation	Gloss
P	[guok]	[ko:k]	'dog'
K	[gweno]	[weno]	'hen'
K	[gwok]	[wok]	'dog'
F	[ogujo]	[kujo]	'butterfly'

(where P - Pauline K - Ken F - Frank I - Ivet)

Fricatives were either replaced with stops or deleted as follows:

	Adult word	Child pronunciation	Gloss
P	[fulu]	[puju]	'a kind of fish'
K	[βum]	[tum]	'music'
K	[soda]	[doda]	'soda'
K	[suna]	[cuna]	'mosquito'
F	[sa:n]	[ca:n]	'a plate'
P	[soda]	[cada]	'soda'
K	[homa]	[oma]	'flu'
K	[hawi]	[awi]	'luck'
I	[soda]	[dada]	'soda'

The liquids [l] and [r] were constantly replaced by the glides [w] and [j] or deleted as follows:

	Adult word	Child pronunciation	Gloss
F	[law]	[ja:]	'dress'
F	[lo:r]	[jo:j]	'to climb down'
K	[lak]	[jak]	'tooth'
K	[lawi]	[jawi]	'your dress'
P	[lak]	[jak]	'tooth'
K	[redio]	[edio]	'radio'
P	[fulu]	[puju]	'a kind of fish'
I	[rao]	[wao]	' hippopotamus'

3.2.2 The Order of Acquisition of Phonemes

To establish the order in which various phonemes were acquired, we applied implicational scaling analysis (Andersen 1978) to phoneme suppliance in obligatory contexts. Taking acquisition point to be 75% SOC, a particular phoneme was given 1 if it met criterion and 0 if it had not been acquired. The subjects are ordered along the vertical axis according to the number of phonemes that met criterion in their speech (Table 3.2). The phonemes are ordered along the horizontal axis with the one that was most accurately supplied across the subjects occupying the left-most position. This means that the presence of one phoneme implies the presence of another. The phonemes are rank ordered according to Table 1 which shows that the sounds were acquired in the following order: [t n] > [p m j] > [d] > [b w] > [k c] > [ɟ ɲ] > [g] > [θ ʃ] > [ɾ] > [h l] > [ⁿd ɲg] > [ᵐb s] > [ŋ] > [r f] > [ᵑ ɦ]. This order was based on the assumption that the more accurately a sound was produced, the earlier it was acquired.

Table 3.2 Implicational scale-ordering of 1:0 - 2 year old subjects

Phonemes

Subjects	t	n	p	m	j	d	b	w	c	k	ɟ	ŋ	g	θ	ð	ɲ	h	l	ⁿd	ŋg	ᵐb	s	ⁿð	r	f	ɲʃ
Ken	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pauline	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Frank	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ivet	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3.2 above shows that certain sounds had been acquired by all the subjects in the present age-group while others had not been acquired at all. Like Table 1, the above table indicates that the easiest sounds were: 1. stops [t], [p], [d], [b], [c], [k] 2. nasals [m], [n] and 3. the glides [w], [j]. These were followed by the stop [ɟ] and the nasal [ŋ]. The rest of the sounds had not been acquired.

Our observation about the order of acquisition of sounds suggests that front consonants [p, b, t, d, n, m,] are acquired earlier than the back ones e.g. [k, g,ɲ ,ŋ]. This is particularly true when we look at the front-back oppositions within certain classes of phonemes. For example, among the stops, the bilabial [p, b] and alveolar [t, d] stops occurred earlier than the palatal [c, ɟ] and the back velar stops [k, g]. As concerns the nasals, the bilabial [m] and the alveolar [n] appeared earlier than the palatal nasal [ɲ] and the back velar nasal [ŋ].

It appears from our data that in cases of voice - voiceless contrasts, the [- voice] phonemes occurred earlier than their [+voice] counterparts. For example the - voice bilabial

stop [p] occurred earlier than its + voice counterpart [b]. Among the alveolar stops, the - voice [t] occurred before its + voice counterpart [d]; and the - velar stop [k] occurred earlier than the + voice velar stop [g]. Similarly, the - voice palatal stop [c] occurred before its + voice counterpart [ɟ].

Table 3.2 also shows that all the stops of Dholuo were acquired earlier than fricatives [θð f h s]. These observations are in line with Jakobson's (op. cit.) claims that: (i) sounds produced in the front region of the oral cavity are acquired earlier than those produced in the back (ii) voiceless sounds are acquired earlier than their voiced counterparts (iii) stops are acquired earlier than fricatives.

The phonetic inventory of an average 2 year old Luo child is presented on table 3.3

Table 3.3 Phonetic Inventory at 2;0 years

	bilabial	alveolar	palatal	velar
stop	p b	t d	c	k
nasal	m	n		
glide	w		j	

3.3 Phonological Development between 2:1 - 3 years

This section attempts to examine the phonological system of children between 2:1 - 3 years of age. We will therefore describe the consonant system of four of our subjects; Cliff (2;3), Afya (2;6), Erick (2;9) and Lina (3;0).

3.3.1 Background Information

Cliff is an only child whose mother is unemployed and the father a businessman. Both of his parents are native speakers of Dholuo. When data collection began he was 2 years and 3 months.

Afya is a female, first born and the only child. The mother is a business woman and the father a laboratory technician. While the parents were away the child was taken care of by her grandmother, who is a native speaker of Dholuo. She was 2 years and 6 months when data collection began.

Erick is a last born male child in a family of five children. The mother is unemployed and the father a primary school teacher. While the parents were away the child was taken care of by his aunt who is a native speaker of Dholuo. We started observing him at the age of 2 years and 9 months.

Lina is a female, second born child whose mother is a primary school teacher and the father a peasant farmer. Apart from the parents, the child was taken care of by her grandmother and older cousins, all of whom are fluent speakers of Dholuo. She was 3 years old when data collection began.

3.3.2 Production of Phonemes

Table 3.4 presents mean SOC scores for children between 2:1 - 3 years of age. It shows that the following sounds met the critrion
for acquisition (ie. they were correctly supplied in at least 75% of obligatory contexts).

1. stops - [p].[b],[t],[d],[k],[g],[c],[ɟ]
2. nasals - [m],[n],[ɲ], [ŋ]
3. glides - [w], [j̇]
4. nasal-stop compounds - [^{m}b],[^{n}d],[g]

It appears that certain sounds which had not been acquired at age 2;0 had been fully acquired at this stage. These include the voiced velar stop [g], the voiced palatal stop [ɟ], the voiceless dental fricative [θ], the palatal nasal [ɲ], and the velar nasal [ŋ]. Some nasal compounds had also emerged at this stage. These include the bilabial [^{m}b], alveolar [^{n}d], and velar [ŋg].

Table 3.4 Rank order of phoneme SOC percentage scores for 2:1 - 3:0 year old subjects

	Subjects and SOC % scores				Group Score%	Rank
Phoneme	**Cliff**	**Afya**	**Erick**	**Lina**		
p	100	100	100	100	100	1
b	75	100	100	100	84	3
t	100	100	100	100	100	1
d	100	100	100	100	100	1
k	75	100	100	100	94	3
g	63	75	75	100	78.1	7
f	38	50	50	63	50	12
θ	63	63	100	75	75	8
ð	50	50	75	75	63	9
s	50	50	50	50	50	12
h	50	50	50	75	56.2	10
c	100	100	100	100	100	1
ʄ	75	100	75	100	88	4
m	100	100	100	100	100	1
n	88	100	100	100	97	2
ɲ	63	75	75	100	78.1	7
ɟ	100	63	75	100	84.4	5
l	50	50	50	75	56.2	10
r	38	38	50	38	40.3	13
w	100	100	100	100	100	1
j	100	100	100	100	100	1
^{m}b	63	63	100	100	81.2	6
^{n}ð	38	38	38	38	38	14
^{n}d	75	75	88	88	81.2	6
ɲʄ	25	38	50	100	53	11
ŋg	63	63	88	88	75	8

The data also indicate that these children had acquired all the stops of Dholuo. As concerns the fricatives, none of them had been fully acquired apart from the voiceless dental fricative [θ]. These fricatives were either deleted or replaced by stops as shown in table 3.5 (where A = Afya, C = Cliff, E = Erick, L = Lina)

Table 3.5 Production of fricatives in obligatory context for subjects aged 2:1 -3:0

Phoneme	Subject	Adult word	Child form	Gloss
/f/	A	[afija]	[apija]	'the subject's name'
	A	[ʃof]	[ʃo]	'nonsense word'
	C	[ofafa]	[opapa]	'a name'
	C	[baf]	[ba:]	'nonsense word'
/ð/				
	A	[aði]	[adi]	'I am going'
	C	[ðiaŋ]	[diaŋ]	'a cow'
	C	[ðoðo]	[dodo]	'to suckle'
/s/				
	A	[suna]	[cuna]	'mosquito'

Phoneme	Subject	Adult word	Child form	Gloss
	A	[pesa]	[peca]	'money'
	C	[seⁿde]	[ceⁿde]	'plates'
	E	[sabun]	[cabun]	'soap'
	E	[dis]	[dic]	'dish'
	L	[soda]	[coda]	'soda'
/h/				
	A	[ohaðo]	[oado]	'he is eating greedily'
	E	[ohala]	[oala]	'business'
	C	[hojo]	[ojo]	'to console'

All the nasals and glides of Dholuo had been fully acquired at this stage. As table 3.4 indicates all the nasals [m, n,ɲ,ŋ] and the glides [w,j] met the criterion for acquisition.

As concerns the liquids [l, r] none of them had been acquired by these subjects. They were either deleted or replaced by the glide [j]. The liquid [l] for example was constantly replaced with the glide [j] as the following examples show:

	Adult word	Child pronunciation	Gloss
A	[lada]	[jada]	'rubber shoe'
E	[lwaŋni]	[jwaŋni]	'a fly'
C	[liet]	[jiet]	'it is hot'
C	[mulo]	[mujo]	'to touch'
L	[law]	[jaw]	'a dress'
E	[bel]	[bej]	'sorghum'

The liquid [r] was also deleted or replaced with other sounds as follows:

	Adult word	**Child pronunciation**	**Gloss**
A	[renbo]	[enbo]	'the name of a nearby school'
A	[abiro]	[abijo]	'I am coming'
A	[mar]	[maj]	'for'(possession marker)
C	[rao]	[jao]	'hippopotamus'
C	[buru]	[buju]	'dust'
C	[bur]	[buj]	'a hole'
E	[rao]	[jao]	'hippopotamus'
E	[oɲer]	[oɲej]	'monkey'
E	[arijo]	[ajijo]	'two'
A	[mara]	[mala]	'mine'
E	[otamre]	[otamle]	'it has refused'
E	[mar]	[mal]	'for'(possession marker)
C	[owiɲre]	[owiɲle]	'it is rotating'

It is interesting to note that the subjects in this age group were not only replacing the liquid [r] with the glide [j̇] but also with its counterpart [l].

The data also indicate that all the nasal stop compounds [ᵐb], [ⁿd], and [ŋg] had been acquired at this stage with the exception of [ⁿð] and [ɲɟ] which are dental and palatal sounds respectively.

3.3.3 The Order of Acquisition

Looking at table 3.4 we can establish the order in which the sounds which were acquired between 2:1 -3:0 years emerged. The table shows that the sounds were acquired in the following order:

[p t d c m w j̇] > [n] > [b k] > [ɲ] > [ɲ] > [ⁿd] > [ᵐb] > [ŋg] > [θ] > [ɲɟ] > [ð] > [h] > [l] > [ɲɟ] > [f] > [s] > [r] > [ⁿð].

Based on the above order, table 3.6 below provides an implicational scaling analysis of phoneme suppliance in obligatory context for 2:1 - 3:0 year subjects.

Table 3.6 Implicational scale ordering of 2:1 - 3:0 year old subjects

	Phonemes																												
Subjects	t	n	p	m	j	d	b	w	c	k	ɲ	ŋ	^{n}d	^{m}b	ʃ	g	θ	ŋg	ð	h	l	ʃɲ	f	s	r	^{n}ð			
Lina	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0			
Erick	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0			
Afya	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0			
Cliff	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0			

Table 3.6 above shows that the most difficult sounds are:

(i) fricatives [h f s]

(ii) liquids [l,r]

(iii) nasal stop compounds [ʃɲ, ^{n}ð]

It also indicates that all the stops [p b t d c k g] were acquired before fricatives.

Looking at the nasal stop compounds, the data indicate that the front bilabial [^{m}b] and the alveolar [^{n}d] were acquired earlier than the back palatal [ʃɲ] and velar [ŋg]. As concerns the fricatives the voiceless dental fricative [θ] was acquired earlier than the voiced dental fricative [ð].

We can therefore conclude that between 2:1 and 3:0 years all the sounds of Dholuo had been acquired except for 1. fricatives 2. liquids and 3. nasal stop compounds [^{n}ð,ʃɲ].

The Phonetic Inventory of an average 3 year old Luo child is presented below:

Table 3.7 Phonetic Inventory at 3:0

	bilabial	dental	alveolar	palatal	velar
stop	p, b, ^{m}b		t, d, ^{n}d	c, ɟ	k, g, ŋg
fricative		θ			
nasal	m		n		
glide	w			j	

3.4 Phonological Development between 3:1 - 4:0 years

In this section we only discuss the production of sounds which had not been acquired by age 3;0. As we have seen in the previous section, these sounds include fricatives [f, ð, s, h], liquids [l, r] and some nasal compounds [ɲɟ, ^{n}ʤ]. We shall therefore examine data from 4 subjects ranging in age from 3:1 - 4:0 years.

3.4.1 Subjects

The subjects are four children, two boys and two girls. The first child is Osodo (3;3), the second is Okech (3;6), the third is Maurine (3;10) and the fourth Fred (4;0 years).

1. Osodo

Is a female, last born child. The mother is a businesswoman and the father a retired soldier. In the home the child was taken care of by the older siblings. Most of the time she played with other children. When data collection began she was 3 years and 4 months old.

2. Okech

Is a male, 9th born child. Both of his parents are businessmen. While the parents were away he was taken care of by

his elder sisters who are fluent speakers of Dholuo. Most of the time he played with other children who also are native speakers of Dholuo. We began to observe him when he was 3 years and 6 months.

3. Maurine

Is a female first born child. Her mother is a primary school teacher and the father unemployed. In the home, the child was taken care of by her grandmother who is a native speaker of Dholuo. She also had ample opportunities to communicate with other children while playing. We begun to observe her when she was 3 years and 8 months old.

4. Fred

Is a male, first born child. His parents, both of whom are native speakers of Dholuo are peasant farmers. He was four years old when we begun to observe him.

3.4.2 Production of phonemes

Table 3.8 which provides SOC scores for the subjects between 3:1 - 4:0 years shows that by age 4;0 all the sounds of Dholuo had been acquired except for the voiceless alveolar fricative [s] and the liquid [r]. This is because they are the only sounds which did not meet the criterion of suppliance in 75% of obligatory contexts. The sound [s] was only supplied in 69% of obligatory contexts while [r] was supplied in 47% of obligatory contexts.

Table 3.8 SOC percentage scores for 3:1 -4:0 year old subjects

Subjects and soc % scores

Phoneme	Osodo	Oketch	Maurine	Fred	Group score%
p	100	100	100	100	100
b	100	100	100	100	100
t	100	100	100	100	100
d	100	100	100	100	100
k	100	100	100	100	100
g	100	100	100	100	100
f	100	100	100	100	100
θ	100	100	100	100	100
ð	100	100	100	100	100
s	50	50	100	75	69
h	100	100	100	100	100
c	100	100	100	100	100
ɟ	100	100	100	100	100
m	100	100	100	100	100
n	100	100	100	100	100
ɲ	100	100	100	100	100
ŋ	100	100	100	100	100
l	88	88	100	100	94
r	50	38	50	50	47
w	100	100	100	100	100
j	100	100	100	100	100
^{m}b	100	100	100	100	100
^{n}ð	100	100	100	100	100
^{n}d	100	100	100	100	100
ɲɟ	100	100	100	100	100
ŋg	100	100	100	100	100

The table also indicates that certain sounds which had not been acquired at age 3;0 had been fully acquired at this stage.

These sounds include:

1. fricatives [f] [θ] [h]

2. liquid [l]

3. nasal compounds [ɲɟ], [^{n}ð].

As already mentioned, the sounds [s] and [r] are the only sounds which had not been acquired by these subjects. Where these sounds occurred, they were either deleted or replaced by other sounds. The voiceless alveolar fricative [s] was replaced with the voiceless palatal stop [c] as the following examples show:

Table 3.9 Use of the fricative [s] in obligatory context by 3:1 - 4:0 year old subjects

Subject	Adult word	Child pronunciation	Gloss
Osodo	[sa:]	[ca:]	'clock'
Osodo	[pesa]	[peca]	'money'
Osodo	[ma^{n}das]	[ma^{n}dac]	'mandazi'
Oketch	[soksi]	[coci]	'a pair of socks'
Oketch	[soda]	[coda]	'soda'
Oketch	[dis]	[dic]	'dish'
Fred	[osera]	[ocela]	'a kind of basket'
Fred	[asembo]	[ace^{m}bo]	'name of a place'

The liquid [r] was either replaced by the palatal glide [j] or by the liquid [l], as the following examples in table 3.10 show:

Table 3.10 Production of the liquid [r] in obligatory contexts by 3:1 - 4:0 year old subjects

Subject	Adult word	Child pronunciation	Gloss
Osodo	[rabwon]	[jabwon]	'potatoes'
Osodo	[rec]	[jec]	'fish'
Osodo	[moro]	[mojo]	'another one'
Osodo	[maber]	[mabej]	'the good one'
Oketch	[rec]	[lec]	'fish'
Oketch	[baraŋget]	[bajaŋget]	'blanket'
Oketch	[arijo]	[ajijo]	'two'
Maurine	[riŋo]	[liŋo]	'meat'
Maurine	[arijo]	[alijo]	'two'
Maurine	[rabolo]	[jabolo]	'banana'
Fred	[aber]	[abej]	'I am good'
Fred	[raŋgo]	[jaŋgo]	'to see'

The implicational table below provides a continuum of development of Dholuo sounds for children between 3;1 - 4;0 years.

Table 3.11 Implicational scale ordering of 3:1 - 4:0 year old subjects on phoneme soc.

	Phonemes																										
Subjects	t	n	p	m	j	d	b	w	c	k	ɟ	ɲ	ⁿd	ᵐb	ʃ	g	θ	ŋg	ð	h	ɲɟ	ⁿɟ	f	l	s	r	
Pauline	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Fred	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Osodo	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Okech	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

The phonetic inventory of an average 4 year old Luo child is presented below:

Table 3.12: Phonetic Inventory at 4;0 years

	bilabial	labio-dental	dental	alveolar	palatal	velar	glottal
stop	p, b, ᵐb			t, d, ⁿd	c, ɟ	k,g	
fricative		f	θ ð				h
nasal	m			n			
liquid				l			
glide	w				j		

3.5 Phonological Development between 4:1 - 5:0 years

In the previous sections we observed that between 1:0 - 4:0 years all the sounds of Dholuo had been acquired apart from the voiceless alveolar fricative[s] and the liquid[r]. In this section we examine the use of these two sounds [s] and [r] by children ranging in age from 4:1 - 5:0 years. Our aim is to determine whether or not these sounds have been acquired by age 5. Since, as we have already observed, all the other sounds had been acquired by age 4:0 we shall not consider them in this section.

3.5.1 Subjects

The subjects are four children between 4:1 - 5.0 years of age. They are: two males and two females namely: Junia(4:4); Edwin(4:5); Scola(4:8) and Victoria(5:0).

Junia

Is male, first born and the only child. His mother is a school-teacher and the father a mechanical engineer. While the parents were away the child was taken care of by his aunt who is a native - speaker of Dholuo. He also played with other children most of the time. When data collection began he was 4 years and 2 months old.

Edwin

Is a male, third born child in a family of six siblings. Both of his parents are unemployed; but they do some small-scale farming. Apart from his parents, this child was taken care of by his grandmother and played with other children who were also native speakers of

Dholuo. He was 4 years and 5 months old when data collection began.

Scola

Is a female, last born child. Her father is a teacher and the mother is unemployed. Besides the mother, this child was taken care of by a house-helper who is a native speaker of Dholuo. She also played with other children. We began to observe her when she was 4 years and 8 months old.

Victoria

Is a female first born child in a family of three siblings. Both of her parents are school teachers. While the parents were away, this child was taken care of by a female relative of theirs who was a fluent speaker of Dholuo. She also played with other children. When data collection began she was 5 years old.

3.5.2 Production of the consonants [s] and [r]

We tested the pronunciation of the sounds [s] and [r] in all word positions. Table 3.13 below presents SOC scores for these two sounds for children between 4:1 - 5:0 years.

Table 3.13 SOC percentage scores of [s] and [r] for 4:1 - 5:0 year old subjects

	Subjects and SOC %				
Phoneme	**Junia**	**Edwin**	**Scola**	**Victoria**	**Group score %**
[s]	100	100	100	100	100
[r]	100	75	100	100	94

The table indicates that the voiceless alveolar fricative [s] had been fully acquired by age 5:0. This sound was correctly produced without any deletions or substitutions in obligatory context by all the subjects in this age group (see appendix 3).

The liquid [r] also met the criterion for acquisition as it scored 94% SOC. However, one of the subjects Edwin still replaced it with its counterpart [l]. We can therefore conclude that the acquisition of fricatives and liquids is complete by age 5;0.

Conclusion

Table 3.14 below provides the actual order in which the phonemes of Dholuo are acquired as it displays an implicational scale ordering of phonemes according to age-group SOC scores. We shall refer to age-group 4:1 - 5:0 as group 1, 3:1 - 4:0 as group 2, 2:1 - 3:0 as group 3 and 1:0 - 2:0 as group 4.

Table 3.14 Implicational scale - ordering of four age-groups on phoneme SOC

Phonemes

Group	t	n	p	m	j	d	b	w	c	k	ɟ	ɲ	^{n}d	^{m}b	ʃ	g	θ	ŋ	ʤ	h	l	ʃ	ɟ	ŋ	f	s	r
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

From table 3.14 above, we can conclude that certain sounds are acquired earlier than others and in a definite order. Stops, nasals and glides are amongst the first sounds to be acquired. Fricatives and liquids are the last sounds to be acquired. Front consonants are acquired earlier than back consonants; for example front stops [p],[b],[t],[d] are acquired earlier than the back ones e.g. [c],[k],[g]; front nasals [m],[n] are acquired earlier than the back ones e.g. [ɲ],[ŋ]; front nasal-stop compounds [^{m}b],[^{n}d] are acquired earlier than their back counterparts [ɲʄ], [ŋg].

The table also indicates that the voiceless sounds are acquired earlier than voiced sounds. For example among the stops [p] appears before [b]; [t] before [d]; [c] before [ɟ], and [k] before [g]. Among the fricatives [ɸ] occurs before [β]. As concerns the liquids [l] is acquired earlier than [r].

From the above observations we can conclude that phonological acquisition is developmental in nature. This means that a relationship exists between acquisition of sounds and age of the child.

CHAPTER FOUR

ANALYSIS OF PHONOLOGICAL PROCESSES

4.1 Introduction

As already observed in chapter 3, between the ages of 1;0 and 4;0 the young child undergoes considerable development in phonological ability. Starting with a small vocabulary of single-word utterances with very simple phonological form, the child proceeds to multi-word utterances that are relatively high in intelligibility. We also observed that the child's phonology at this stage is characterized by several errors. Some linguists (Stampe, op. cit; Ingram, op. cit.) have suggested that the child's mispronunciations result from his applying an innate phonological system which consists of a set of universal phonological processes which simplify the adult forms. This chapter will attempt to describe the phonological patterns found in the words used by children between 1:0 and 4:0 years through the establishment of phonological processes. It will begin by looking at the data from children between 1:0 - 2:0 followed by 2:1 - 3:0 and lastly 3:1 - 4:) years of age.

4.2 Phonological processes at age 1:0-2:0

For children between age 1:0-2:0 years the following processes were observed:

4.2.1 Substitution processes

This involves replacement of a sound by another sound. The substitution processes observed in the speech by our subjects include:

(a) **Stopping**

In this case a fricative was replaced with a stop consonant as the following examples show:

Subject	Adult word	Child Pronunciation	Gloss
Pauline	[fulu]	[puju]	'a kind of fish'
Pauline	[ʃɔf]	[nop]	'nonsense word'
Ivet	[san]	[can]	'someone's name'
Ivet	[soda]	[dada]	'soda'
Ken	[soda]	[doda]	'soda'
Ken	[suna]	[cuna]	'mosquito'
Frank	[fofo]	[popo]	'nonsense word'
Frank	[θuol]	[toi]	'a snake'
Frank	[ðano]	[dana]	'a human being'
Frank	[poðo]	[podo]	'to fall down'
Ivet	[soso]	[toto]	'nonsense word'
Pauline	[θen]	[ten]	'a kind of chair'

As observed in chapter 3, these children had not acquired the fricatives of Dholuo. They therefore replaced them with those sounds they had acquired, in this case, stops. This observation is consistent with Jakobson's (op. cit.) claim that the acquisition of fricatives presupposes the acquisition of stops. Stops are therefore acquired before fricatives.

(b) **Fronting**

This strategy involves replacing of back consonants (velar and palatal) with front ones (labial and alveolar). The following examples from our data show this.

Subject	Adult word	Child Pronunciation	Gloss
Ivet	[agwata]	[tata]	'calabash'
Ivet	[ɲaɲa]	[nana]	'tomotoes'
Frank	[agwata]	[bata]	'calabash'
Frank	[ɲoro]	[nojo]	'yesterday'
Pauline	[ŋado]	[nado]	'to cut'
Pauline	[gunda]	[duda]	'a deserted home'
Pauline	[ogona]	[dona]	'name of a school'
Pauline	[ɲako]	[nako]	'a girl'
Pauline	[ŋut]	[nut]	'neck'
Ken	[ɲaβi]	[nati]	'a child'
Ken	[waɲa]	[wana]	'my eye'
ken	[riŋo]	[ino]	'meat'

This observation confirms Jakobson's (Ibid) claim that the acquisition of back consonants implies the acquisition of front ones (see chapter 2). It appears that since the back consonants [g],[ɲ],[ŋ] had not been acquired at this stage they were constantly replaced with their front counterparts as follows: the back velar stop [g] was replaced with the labial stop [b] and the alveolar stops [t] and [d]. The velar nasal [ŋ] was replaced with the alveolar nasal [n]. Similarly, the palatal nasal [ɲ] was replaced with the alveolar nasal [n] which had already been acquired.

(c) **Gliding of liquids**

The glides [w] or [j] were replaced by a liquid sound ie. [l] or [r] as the following examples show:

Subject	Adult word	Child pronunciation	Gloss
Ivet	[rao]	[wao]	'hippopotomus'
Ivet	[lawa]	[ja:]	'a dress'
Ken	[lawi]	[jawi]	'your dress'
Ken	[lweta]	[jeta]	'my hand'
Ken	[rao]	[wao]	'hippopotomus'
Ken	[buru]	[buwu]	'dust'
Frank	[liec]	[jec]	'elephant'
Frank	[luja]	[waja]	'sweat'
Frank	[law]	[ja:]	'a dress'
Frank	[roja]	[joja]	'a calf'
Pauline	[bul]	[buj]	'a drum'
Pauline	[rabolo]	[bojo]	'bananas'
Pauline	[ber]	[bej]	'good'

4.2.2 Syllable structure processes

Our data suggest that there are specific phonological processes which are directly motivated by the tendency of young children to simplify syllable structure. For most children the direction is toward a basic CV syllable. Some of the more basic syllable structure processes we observed include the following:

(a) **Deletion of unstressed syllables**

This strategy which involves the deletion of unstressed syllables especially if it precedes a stressed syllable was observed in the children's speech as follows:

Subject	Adult word	Child pronunciation	Gloss
Ken	[kalam]	[ɟ́ám]	'a pen'
Ken	[mananas]	[nác]	'pinneapple'
Ken	[macuɲga]	[cúɲga]	'an orange'
Pauline	[rabolo]	[bójo]	'bananas'
Pauline	[kopojo]	[pójo]	'pawpaw'
Ivet	[gilak]	[ɟ́ák]	'someone's name'
Frank	[rabolo]	[bó]	'bananas'

(b) **Deletion of final consonants**

In this case a CVC syllable is reduced to a CV syllable by deleting the final consonants as follows:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Frank	[law]	[ja]	'a dress'
Frank	[ʒok]	[do]	'cows'
Frank	[ʃof]	[no]	'nonsense word'
Frank	[mul]	[mu]	'to touch'
Frank	[yier]	[yie]	'hair'
Ivet	[pap]	[pa]	'field'
Ivet	[lor]	[jo:]	'descend'
Pauline	[mos]	[mo]	'slowly'
Pauline	[kaw]	[ka]	'take'
Pauline	[nam]	[na]	'river'
Ken	[bob]	[bo]	'someone's name'

The above examples indicate that not only those consonants which had not been acquired at this stage were deleted in word final positions but also the ones which had been acquired [w,k,p,m,b]. We propose that final consonant deletion many times relate to syllable structure rather than any inherent difficulty in sound production. This process was therefore employed to simplify the structure of syllables.

(c) **Deletion of initial consonants**

The initial consonants were deleted as follows:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Ken	[cuma]	[ama]	'metal'
Ken	[redio]	[edio]	'radio'
Frank	[lac]	[ac]	'urine'
Frank	[hawi]	[awi]	'luck'
Frank	[hapa]	[apa]	'my luck'
Frank	[rem]	[em]	'pain'
Ivet	[rach]	[ac]	'bad'
Ivet	[mbaka]	[aka]	'conversation'
Pauline	[ho^{m}bo]	[o^{m}bo]	'to persuade'
Pauline	[homa]	[oma]	'flu'
Ken	[^{m}bita]	[ita]	'name of a place'

(d) **Cluster Reduction**

In this case a consonant cluster is reduced to a single consonant. The following are examples of cluster reduction that we observed:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Ken	[jamni]	[jani]	'animals'
Ken	[jamna]	[jama]	'a kind of fruit'
Ken	[pekni]	[peni]	'cats'
Ken	[lwaŋni]	[wani]	'a fly'
Ken	[gweno]	[weno]	'a hen'
Ken	[gwok]	[wok]	'a dog'
Ken	[ojwak]	[wak]	'it is crying'
Pauline	[adwa]	[ada]	'I want'
Pauline	[ojwak]	[jak]	'It is crying'

(e) **Reduplication**

This strategy involves repetition of a certain syllable in a multisyllable word. Our subjects employed this strategy as follows:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Ivet	[bedi]	[bebe]	'sit'
Ivet	[omena]	[nana]	'a kind of fish'
Frank	[ɲaroja]	[dada]	'a culf'
Frank	[wuoce]	[wawa]	'shoes'

(f) **Deletion of Initial syllables**

This process occurred in words which had diphthongs in their medial positions. The initial consonant and vowel was deleted, thus reducing a C_1VVC_2V sequence to a VCV. The following examples show this:

Subject	**Adult word**	**child pronunciation**	**Gloss**
Ken	[wuoce]	[oca]	'shoes'
Pauline	[kuejo]	[ejo]	'someone's name'

4.2.3 Assimilatory Processes

These processes are in effect when a sound is influenced by or becomes similar to another sound in a word, thus resulting in mismatches between the child's form and the adult model. We observed that even if a child had acquired a particular sound in some words, there were contexts where its production was altered. While detailed research is necessary on this topic, the following processes were found to be relatively common:

(a) **Consonant Harmony**

This was observed in the speech of our subjects as follows:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Ivet	[gwok]	[kok]	'a dog'
Ivet	[agwata]	[tata]	'calabash'
Ivet	[soda]	[dada]	'soda'
Ken	[soda]	[doda]	'soda'
Ken	[ola^{n}do]	[dado]	'a cane'
Frank	[^{n}dege]	[gege]	'aeroplane'

(b) **Vowel Harmony**

This process occurred in the following instances:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Ken	[cuma]	[a:ma]	'metal'
Pauline	[soda]	[cada]	'soda'
Ivet	[lweta]	[jata]	'my hand'

As can be seen in the above examples assimilatory processes tend to change the place, manner, and/or voicing characteristics of one sound to make it more similar to the characteristic of another sound in the word.

4.3 Phonological processes between 2;1 - 3;0 years

The following processes were observed in the speech of children between 2;1 - 3;0 years of age:

4.3.1 Substitution processes

(a) **Stopping**

This process was observed in the following examples where fricatives were replaced with stop consonants:

Subject	Adult word	Child pronunciation	Gloss
Cliff	[ðiaŋ]	[daŋ]	'a cow'
Cliff	[ofafa]	[papa]	'someone's name'
Cliff	[ðoʒo]	[dodo]	'to suckle'
Afya	[pesa]	[peca]	'money'
Afya	[aʒi]	[adi]	'I'm going'
Afya	[θum]	[tum]	'music'
Afya	[afija]	[apija]	'the subject's name'
Erick	[sabun]	[cabun]	'soap'
Erick	[dis]	[dic]	'dish'
Lina	[soda]	[coda]	'soda'

(b) **Fronting**

This process was observed in the following examples where velar and palatal consonants were replaced by alveolar consonants

Subject	Adult word	Child pronunciation	Gloss
Cliff	[got]	[dot]	'a hill'
Cliff	[agwata]	[tata]	'calabash'
Cliff	[kuon]	[ton]	'ugali'
Cliff	[moɲɟo]	[mo^{n}do]	'to invade'
Afya	[paɲ]	[pan]	'mortar'
Afya	[waŋ]	[wan]	'an eye'

(c) **Gliding of liquids**

This process was observed from the following examples from our data:

Subject	Adult word	Child pronunciation	Gloss
Cliff	[liet]	[jet]	'it's hot'
Cliff	[bur]	[buj]	'a hole'
Cliff	[buru]	[buwu]	'dust'
Cliff	[ro^{m}be]	[wo^{m}be]	'sheep'
Afya	[kul]	[kuj]	'cattle shed'
Afya	[mara]	[maja]	'mine'
Afya	[ro^{m}bo]	[jo^{m}bo]	'sheep'
Erick	[rao]	[jao]	'hippopotomus'
Erick	[mar]	[maj]	'for' (possession marker)
Erick	[oŋer]	[oŋej]	'a monkey'
Lina	[agulu]	[aguju]	'a pot'
Lina	[rabolo]	[jabojo]	'bananas'
Lina	[bor]	[boj]	'it is far'

4.3.2 Syllable structure processes

Some of the basic syllable structure processes we observed include the following:

(a) Deletion of unstressed syllable

This strategy was however not very common as it was only observed in the speech of one of the subjects in this age group as follows:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Cliff	[mapera]	[péja]	'guavas'
	[sabun]	[bún]	'soap'
	[rabolo]	[bójo]	'bananas'
	[macu ga]	[cú ga]	'oranges'
	[rabuon]	[búon]	'potatoes'

(b) **Deletion of final consonants**

Final consonants were deleted as can be seen in the following examples:

Subject	**Adult word**	**Child pronunciation**	**Gloss**
Cliff	[baf]	[ba]	'bathroom'
Cliff	[bob]	[bo]	'someone's name'
Afya	[ʃof]	[no]	'nonsense word'

(c) **Deletion of initial consonants**

The following examples from our data show cases of initial consonant deletion

Subject	Adult word	Child pronunciation	Gloss
Cliff	[riŋo]	[iŋo]	'meat'
Cliff	[hojo]	[ojo]	'to console'
Cliff	[hoᵐbo]	[oᵐbo]	'to persuade'
Cliff	[ɲʃugu]	[ugu]	'groundnuts'
Afya	[renbo]	[enbo]	'name of a local school'
Afya	[mapera]	[apea]	'guavas'

(d) **Cluster Reduction**

This process was not very common in the speech of the present age group. We however observed a few occurrences in the speech of our youngest subject in this age group, Cliff:

Adult word	Child pronunciation	Gloss
[ʃamna]	[ʃaɲa]	'a kind of fruit'
[ʃamni]	[ʃaɲi]	'animals'
[pekni]	[peni]	'cats'
[peⁿdni]	[peni]	'knives'
[mtoka]	[toka]	'a car'

4.3.3 Assimilatory Processes

The only assimilatory process observed in the speech of the subjects in this age-group is consonant harmony. The following examples from our data show this:

Subject	Adultword	Child pronunciation	Gloss
Cliff	[kuco]	[cico]	'there'
	[agwata]	[tata]	'calabash'
	[ithaga]	[tada]	'you're disturbing me'
	[olaha]	[jaja]	'gills'
	[got]	[dot]	'a hill'

4.4 Phonological processes between 3:1-4:0

Data from this age-group showed fewer phonological processes, thus indicating a maturation of the child's phonological system. For this age-group we only observed substitution processes which include:

(a) **Stopping**

In this case the alveolar fricative [s] which as already seen in chapter 3 had not been acquired at this stage was replaced with the stop [c] as follows:

Subject	Adultword	Child pronunciation	Gloss
Osodo	[sa]	[ca]	'time'
Osodo	[mos]	[moc]	'sorry'
Osodo	[san]	[can]	'aplate'
Osodo	[mandas]	[mandac]	'mandazi'
Okech	[soksi]	[chochi]	'a pair of socks'
Okech	[soda]	[coda]	'soda'
Okech	[pusi]	[puci]	'a cat'
Okech	[msuŋgu]	[mcuŋgu]	'someone's name'
Fred	[osera]	[ocela]	'a kind of basket'
Fred	[asembo]	[acembo]	'name of a place'

b) **Gliding of liquids**

This process was observed in the speech of the subjects in this age-group as follows:

Subject	Adultword	Child pronunciation	Gloss
Osodo	[rec]	[jec]	'fish'
Osodo	[moro]	[mojo]	'another one'
Osodo	[maber]	[mabej]	'the good one'
Osodo	[okelo]	[okejo]	'someone's one'
Osodo	[rabwon]	[jabwon]	'potato'
Okech	[arijo]	[ajijo]	'two'
Okech	[alot]	[ajot]	'vegetables'
Okech	[mari]	[maji]	'yours'
Fred	[redio]	[jedio]	'radio'

4.5 Phonological processes between 4:1-5:0

Data from this age - group showed no phonological processes at all. As we have already seen in chapter 3, these subjects had acquired all the sounds of Dholuo. Since phonological processes are a device used to simplify adult forms, they are not operative when the adult phonological system has been fully mastered.

Conclusion

It appears that children employ certain phonological processes to simplify pronunciation. These processes include deletion, substitution and assimilation. As the child's phonological system matures, the use of these processes also decreases. The most common processes across

subjects are gliding of liquids and substitution of fricatives for stops. As simplifying processes, these two strategies function upto age 4. Syllable structure processes such as unstressed syllable deletion, final consonant deletion, reduplication etc. are lost between the ages of 1 and 3 years. Similarly, assimilation processes such as consonant harmony and vowel harmony function upto age 3.

It also appears that pronunciation errors are not only a result of difficulty in sound production, but are also a result of the phonetic contexts in which the sounds occur. For example final consonant omissions many times relate to syllable structure rather than to inherent difficulty in sound production. Counting final consonants as not acquired, as was performed in many of the traditional acquisition studies, may have been inappropriate. The problem here occurs when the focus of speech sound development is restricted to the specific sound and does not take into account other phonological information.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

5.1 Introduction

The main objective of this study was to trace the acquisition of Dholuo phonology. More specifically, it set out to verify the validity of some claims made in linguistic theory concerning L1 acquisition of phonology. For example, it is claimed that markedness theory can be used to explain phonological acquisition, and that phonological acquisition follows a developmental continuum. The study also intended to identify some of the phonological processes that children employ in the acquisition of language. The present chapter presents the major findings concerning early phonological acquisition.

5.2 Summary

The results of the present study reveal that voiceless consonants are acquired earlier than voiced consonants. For example, among the stops [p] is acquired before [b]; [t] before [d], [k] before [g] and [c] before [ɟ]. As concerns the fricatives, the voiceless [θ] was acquired earlier than the voiced [ð]. Front consonants are acquired earlier than back consonants. For example, among the stops, the sounds [p],[b],[t],[d] were acquired earlier than the sounds [c],[ɟ],[k],[g]. Among the nasals the bilabial [m] and the alveolar [n] were acquired earlier than the palatal [ɲ] and the back velar [ŋ].

The study also reveals that Dholuo stops are acquired earlier than fricatives. All the stops [p],[b],[t],[d],[c],[ɟ],[k]and [g] were acquired earlier than the fricatives of Dholuo i.e. [f],[θ],[ð],[s] and [h].

Generally, the stops, nasals and glides are among the first sounds to be acquired, while fricatives and liquids are the last sounds to be acquired.

The study has also shown that the young child begins acquisition with a small phonetic inventory and as he matures, his phonetic inventory also expands gradually until the adult phonological system is fully acquired. This observation, coupled with the fact that certain sounds are acquired earlier than others, is an indication that the acquisition of phonology is developmental in nature.

We further observed that as the child begins to expand his inventory of speech sounds, he employs certain simplifying processes that result in incorrect pronunciation of the adult forms. Such 'phonological processes' (Stampe op cit) persist until age 4 when phonological acquisition is almost complete (in Binnick et al, op cit). Following Ingram (1976) we divided these simplifying processes into three main categories, each category containing strategies by which the processes can be accomplished. As already seen, the main strategies used include:

(a) substitution of sounds not yet acquired with those already acquired; For example replacing of fricatives with stops; replacing of back consonants with front ones; and substitution of the glides [w] or [j] for a liquid sound i.e. [l] or [r].

(b) deletion of sounds not yet acquired.

(c) reduction of consonant clusters to single consonants.

(d) reduplication of the first syllable of a multisyllable word.

(e) the process of assimilation where the place, manner, and/or voicing characteristics of a sound is maintained for all the vowels or consonants in a given word.

Consequently the phonological processes of substitution, deletion and assimilation can be

seen as playing a major role in the acquisition of phonology. It appears that there is considerable variation in the difficulty that each phoneme presents to the child depending on the neighbouring sounds in the word in which it occurs. Our observation on the phonological processes reveals that even if a child had acquired a particular adult sound in some words, there may be certain contexts where its production may be altered due to assimilation, either as a result of consonant harmony or vowel harmony. This observation suggests that pronunciation errors are not only a result of difficulty in sound production, but are also a result of the phonetic contexts in which the sounds occur.

The data on 'phonological processes' has clearly indicated that at any one time, the child's linguistic behaviour is consistent and that he maintains this consistency over time. Thus, the child's acquisition of phonology can also be seen to be systematic.

We also observed that at any given point in language development a surprisingly high correspondence is exhibited between the child's form and the adult model. This shows that the child's phonological system is essentially adult-like; i.e. perceptual development is far in advance of production, such that the child has an accurate phonological representation of the adult surface forms of words. This argument is consistent with Stampe's (op cit:446) view that the child's reduced productions result from his applying an innate phonological system which simplifies phonological representation (in Binnick et.al, op cit).

5.3 Conclusions

The results of the present study on phonological acquisition permit us to make a number of conclusions. We shall do this by returning to the four major questions that represent the hypotheses of the present study (cf. 1.2.3). The first of these concerned the order of acquisition of Dholuo phonology. We had predicted that the order of acquisition of Dholuo phonology would stretch from the unmarked sounds to marked ones such that [-voice] sounds would be acquired before [+voice} ones; front consonants would be acquired before back ones and stops would be acquired before fricatives (see chapter 2.3). Our observation on the order of acquisition of Dholuo phonology provides positive evidence for this hypothesis. As already seen, all the [-voice] sounds were acquired before their [+voice] counterparts. Secondly, the front consonants were acquired earlier than their back counterparts. Finally, all the stops were acquired before the fricatives. Thus, unmarked sounds are acquired earlier than marked sounds.

The second question raised in chapter one was whether a child's phonological system is systematic and follows a developmental continuum. The fact that phonological acquisition follows a definite order and the children's consistent use of the phonological processes over time strongly supports our hypothesis that the child's phonological system is systematic. Moreover, our observation that some sounds are acquired earlier than others provides positive evidence for our hypothesis that the child's phonological system follows a developmental continuum (see chapter 3). As already seen, the young child begins with a small phonetic inventory which expands gradually as he matures until he attains adult proficiency. This also indicates that phonological acquisition is a function of age.

Thirdly, there was the question of whether there are phonological processes that children employ in the acquisition of language. This study has demonstrated that children make use of such phonological processes as substitution, deletion and assimilation in order to simplify adult speech.

Finally, there was the question concerning the reliability of the theory of markedness as a tool in the explication of child acquisition of phonology. It was hypothesized that markedness theory can be used to explain phonological acquisition. Our observation on the order of acquisition of Dholuo phonemes and the presence of phonological processes in the speech of young children leads to the conclusion that markedness theory can be used as a model of phonological acquisition. This is because as already seen in chapter 2, one of Jakobson's (op. cit.) implicational laws is that the existence of marked sounds in a language implies the existence of unmarked sounds. For example the existence of fricatives in a language implies the existence of stops. Consequently, the order of acquisition would proceed from stops to fricatives(c.f 2.3). The corresponding phonological process is 'stopping' ie. substitution of fricatives with stops. The child's performance can be accounted for in terms of markedness since the child's use of 'stopping' as a simplifying strategy conforms to the unmarked situation in which stops are acquired earlier than fricatives. Similarly, the child's application of fronting as a simplifying strategy is consistent with the notion of markedness; i.e. that the existence of back sounds in a language implies the existence of front sounds; front sounds are therefore acquired earlier than back sounds. Our study, therefore, has demonstrated that markedness theory can be used as a model of phonological acquisition.

5.4 Implications of the Study

In the following we shall explore some theoretical as well as practical implications of the most significant findings of this study.

5.4.1 Theoretical implications

The first significant finding of this study was that markedness theory can be used to explain L1 acquisition of phonology. The main implication of this finding is that it highlights the universal nature of language acquisition process. This is because it has shown that the sounds which are more basic, natural and frequent in languages of the world are acquired earlier than the less basic ones. Thus, this observation provides strong support for theories of language acquisition(nativist theories) which view the ability to acquire language as innate. These theories propose that since infants are born with the same set of universal principles they will be similar in their linguistic competence.

The proposal that linguistic universals are of great importance in the acquisition process is by no means new. Chomsky, (1965); White, (1981)[5]; and Cook, (1985) strongly emphasise the significant influence the universal properties of language have in L1 acquisition. Chomsky (Ibid.), for instance explores the relationship between linguistic universals and L1 acquisition in terms of Universal Grammar (c.f 1.2.6). He proposes that a child will find it easier to acquire patterns that conform to linguistic universals (ie. unmarked forms) than those that do not (ie. marked forms).

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[5] White L. (1981). 'The responsibility of Grammatical Theory of acquisitional data' in Hornstein, N. and Lightfoot, D. (1981).

A second finding of this study was that at any one time, the child acquiring his L1 behaves in a consistent manner, and he maintains that consistency over time. Since this systematic behaviour could not occur by chance, something significant is implied about what the child has in his/her mind. There must be an internal processing mechanism responsible for the child's systematic behaviour. This observation is consistent with the nativist theories of L1 acquisition which view the child as an active participant in the acquisition process.

5.4.2 Practical Implications

The importance of some of our findings should not only be limited to their theoretical implications. Some of these results could also be of great significance to speech therapists. Our results on the actual order of acquisition of phonemes might assist a speech therapist in determining the nature and extent of speech disorder in his patient. This can be achieved when the phonology of a normal child is compared with that of the abnormal one.

In addition, the knowledge that pronunciation errors not only result from articulatory limitations but also from the phonetic contexts in which sounds occur (c.f 4.2.1), should be of practical value to speech therapists and to researchers of children considered to be phonologically deficient. The speech therapist should not always view all the cases of mispronunciation as 'erroneous'. The non-target performance should be viewed, first as a necessary part of the language acquisition process; and secondly, as important information about the nature of the child's changing language system. The therapist should understand that this change in phonology is not only systematic but also gradual, and hence not consider all L1 learners abnormal when their pronunciation is not made as quickly as expected.

5.5 Recommendations

What we have observed in the course of this study enables us to make some recommendations for further research in the area of L1 acquisition. As already seen, the present study has highlighted the universal nature of language acquisition. In particular, it has supported the orderly and universal development of phonology as suggested by earlier researchers (Jakobson 1968, Velten 1973). However, there are certain issues of theoretical concern that a universal model of phonological acquisition such as markedness theory does not seem to account for. We for instance observed that pronunciation of phonemes vary greatly according to the phonetic context in which they occur (see chapter. 4); that even if a sound had been acquired its pronunciation was sometimes altered depending on the consonants and vowels adjacent to it. A theory of phonological acquisition which simply assumes that unmarked sounds will be acquired before marked ones fails to take into account the concept of variability in sound production. An adequate model of phonological acquisition must be broad-based and integrative enough to account for this variability. How this theory can be modified to cope with variability be could the subject of future research.

Secondly, our observation that unmarked sounds are acquired earlier than their marked counterparts is not enough. It leads to another question: why are the unmarked sounds easier to acquire than the marked sounds? Future researchers should try to determine whether this phenomenon results from the articulatory or acoustic characteristic of the sounds in question. In so doing, they might also answer the question as to why certain sounds are found in virtually all the languages of the world while others are rare.

We further recommend that in order to make valid universal generalizations on

phonological acquisition, the task for future researchers appears to be two-fold: one is to determine the relationship between perception and production of phonological units. Such a study would answer the question of whether pronunciation errors either result from the child's inability to produce the sounds correctly or to perceive them correctly. Such studies may lead us to attribute certain pronunciation errors to perceptual limitations and not articulatory ones. Such a study would also address another closely related issue of theoretical concern; the relation between the child's performance as evidenced in spontaneous speech, to its actual competence. Since our results were based on the assumption that the child's performance reflects his competence, such studies may refute our claims on establishing that the child's competence is much better than indicated by his performance. Perhaps in conducting such a study the question of what kind of data (ie. perception or production) are to be considered as a reliable indication of the child's linguistic ability would be answered.

The second task might be a replication of this study using longitudinal data and/or another approach. The present study dealt with the corpus of a cross-section of children of varying ages. Subsequent researchers should conduct a number of concurrent longitudinal studies involving collection of data on one subject at periodic intervals over a span of time. Such a method, although time consuming, would most likely reflect the actual acquisition process.

APPENDIX

The following tables provide a list of phonetically transcribed words produced by the subjects of the present study. The tables also include the conventional Dholuo forms, with a question mark in the phonetic brackets indicating that the word is not conventional. The non-conventional forms are those that a child may either have used idiosyncratically to refer to certain objects or produce spontaneously even though they don't exist in Dholuo language. A 'nonsense word' is used here to refer, either to those words that were coined by the researcher for purposes of elicitation, those that exist in Dholuo but without specific meanings, or those meaningless words that a child may have produced spontaniously. English translations are based on the meaning of the word in colloquial Dholuo.

Appendix 1: Phonetic Transcription of the data from 1:0 - 2:0 year old subjects.

Table 1(a). Data for Ivet (1;1)

Child's Word	Conventional Form	English Translation
[baba]	[baba]	'father'
[bai]	[bai]	'bye bye'
[bo]	[bob]	'a name'
[papa]	[papa]	'a nick name'
[poi]	[poipoi]	'pawpaw'
[puk]	[opuk]	'a tortoise'

Table 1a cont.

[pa]	[pap]	'field'
[toto]	[toto]	'a baby'
[tata]	[agwata]	'calabash'
[it]	[it]	'an ear'
[jata]	[lweta]	'my hand'
[dada]	[soda]	'soda'
[[dede]	[dede]	'grasshopper'
[dadi]	[dadi]	'father'
[bebe]	[bedi] (imitated)	'sit' (imperative)
[koko]	[koko]	'nonsense word'
[aka]	[ᵐbaka]	'conversation'
[ɟak]	[gilak]	'a name'
[gogo]	[gogo] (imitated)	'nonsense word'
[goje]	[abogoi]	'i will beat you'
[fofo]	[popo] (imitated)	'nonsense word'
[wok]	[gwok]	'a dog'
[θeθe]	[?]	'used to refer to her baby-seater'
[e?θe]	[?]	'she produced when playing'
[tene]	[θen]	'a type of a stool'
[um]	[θum]	'radio'
[dok]	[ɗok]	'cows'
[koko]	[ʔako] (imitated)	'a woman'
[owa]	[aʒola] (imitated)	'a wound'
[ɗeʒe]	[?]	'used to refer to her

Table 1a cont.

		mother'
[can]	[san]	'a name'
[mo]	[mos]	'sorry'
[toto]	[soso] (imitated)	'nonsense word'
[hoho]	[hoho] (imitated	'a well'
[awi]	[hawi] (imitated)	'luck'
[apa]	[hapa] (imitated)	'my luck'
[huma]	[huma] (imitated)	'a wonder'
[chak]	[cak]	'milk'
[caca]	[caca] (imitated)	'my tea'
[waci]	[wac] (imitated)	'a topic'
[dudu]	[ʄuʄu]	'nonsense word'
[ʄaki]	[ʄaki]	'a name'
[mama]	[mama]	'mother'
[na]	[nam] (imitated)	'a lake'
[nene]	[nene] (imitated)	'see it' (imperative)
[ne]	[ne] (imitated)	'see' (imperative)
[nana]	[ɲaɲa]	'tomatoes'
[nono]	[ɲoɲo]	'used to refer to her mum's breast'
[aŋo]	[aŋo]	'said this when she wanted something'
[ŋo]	[?]	?
[j ej e]	[olele]	'a wall gecko'

Table 1(a) cont.

[jo]	[lor]	'she produced while trying to descend from a chair'
[ja]	[law]	'a dress'
[wao]	[rao] (imitated)	'hippopotomus'
[ac]	[rac]	'bad'
[be]	[ber]	'good'
[jec]	[rec]	'fish'
[ja]	[j aw]	'open' (imperative)
[we]	[we]	'leave' (imperative)
[wewe]	[?] (imitated)	'nonsense word'
[jejo]	[ojiejo]	'a rat'
[baja]	[^{m}bala]	'a scar'
[bebe]	[^{m}bero]	'a type of stool'
[ugu]	[^{m}bugru]	'a jerrican'
[ɲuʒu]	[^{n}ɲa^{n}ʒu]	'flavour'
[duma]	[^{n}duma]	'arrowroots'
[dede]	[bu^{n}de]	'a gun'
[gege]	[^{n}dege]	'a plane'
[ugu]	[ʃʃugu]	'groundnuts'
[gege]	[ŋgege]	'a kind of fish'

Table 1(b): Data for Frank [1;4]

Child's word	**Conventional form**	**English Translation**
[popo]	[popo]	'paw paw'
[pap]	[pap]	'field'

Table 1(b) cont.

[i:]	[ip]	'a tail'
[pat]	[apat] (imitated)	'a slap'
[baba]	[baba]	'father'
[boi]	[boi]	'a name'
[babu]	[babu]	'a name'
[pat]	[bat] (imitated)	'an arm'
[toto]	[toto]	'a baby'
[o:t]	[ɓo:t]	'a door'
[yit]	[it]	'ears'
[taja]	[taja]	'a lamp'
[dadi]	[dadi]	'father'
[dede]	[dede]	'grasshopper'
[gat]	[gad]	'a name'
[koko]	[koko]	'noise'
[kom]	[kom]	'a chair'
[do]	[ɓok]	'mouth'
[ko:]	[gwok]	'a dog'
[kujo]	[ogujo]	'a butterfly'
[bata]	[agwata]	'calabash'
[weno]	[gweno]	'a hen'
[gaga]	[ŋɠaga]	'bhang'
[ege]	[ŋgege]	'a kind of fish'
[wuwu]	[fulu]	'a kind of fish'
[no:]	[ɲof]	'said in relation to a disgusting thing'

Table 1(b) cont.

[ujo]	[fulo]	'to report'
[popo]	[fofo] (imitated)	'nonsense word'
[tol]	[θol]	'a string'
[θaθa]	[?]	'said while playing'
[tum]	[θum]	'music/radio'
[toi]	[θuol]	'a snake'
[ɲoɲo]	[ɲoɲo]	'he used to refer to the mother's breasts'
[dana]	[ɲano]	'a human being'
[podo]	[poɲo]	'to fall down'
[mo]	[mos]	'slowly'
[como]	[somo] (imitated)	'to read'
[tuto]	[suso]	'separate maize seeds from ~~cob~~ cob'
[ojo]	[hojo]	'to console'
[awi]	[hawi]	'luck'
[hoho]	[hoho] (imitated)	'a well'
[apa]	[hapa] (imitated)	'my luck'
[cuja]	[cula] (imitated)	'an island'
[cijo]	[ciro]	'market'
[puc]	[puc]	'warts'
[meo]	[meco]	'to rob'
[mac]	[mac]	'fire'
[ʃuma]	[ʃuma]	'a name'
[ʃaki]	[ʃaki]	'a name'

Table 1(b) cont.

[dudu]	[ɟudi]	'a name'
[maɟa]	[maɟa]	'my fire'
[maj]	[maj] (imitated)	'nonsense word'
[mama]	[mama]	'mother'
[cam]	[cam]	'he said while feeding'
[ne]	[ne]	'see' (imperative)
[en]	[en]	'pronoun (third person singular)
[can]	[san]	'a plate'
[nojo]	[ɲoro]	'yesterday'
[jojo]	[ɲojo]	'a kind of food'
[nana]	[ɲaɲa]	'tomatoes'
[ɲojo]	[ɲolo]	'to cut'
[gaga]	[ɲoɲa]	'a name'
[nato]	[ɲato]	'a person'
[aɲo]	[aɲo]	'what?'
[ja w]	[law]	'a dress'
[jec]	[liec]	'an elephant'
[waja]	[luja]	'sweat'
[mu:]	[mul]	'to touch' (imperative)
[em]	[rem]	'pain'
[joja]	[roja]	'a calf'
[jie]	[jier]	'hair'
[bei]	[ber]	'good'
[pujo]	[puro]	'to dig'
[we]	[we]	'leave' (imperative)

Table 1(b) cont.

[wewe]	[wewe] (imitated)	'nonsense word'
[jao]	[rao] (imitated)	'hippopotomus'
[bebe]	[ɸe^{m}be]	'a hoe'
[obo]	[ro^{m}bo]	'a lamb'
[beo]	[^{m}bero]	'a type of stool'
[boja]	[^{m}boja]	'a name'
[jo:]	[jo^{m}b]	'beat' (imperative)
[dino]	[ɲɲno]	'to touch with a hot iron bar'
[dadu]	[^{n}ɲaɲu]]	'flavour'
[dede]	[o^{n}ɲe^{n}ɲe]	'name of a river'
[iwa]	[^{n}ɲiwa]	'^{n} iwa' (name of a place'
[gege]	[^{n}dege]	'a plane'
[dui]	[a^{n}diu]	'a kind of a basket'
[duju]	[^{n}duru]	'^{n}duru (name of a place)
[ugu]	[ŋɸugu]	'groundnuts'
[puj]	[puoŋɸ]	'teaching'
[gano]	[ŋgano]	'wheat'
[nana]	[naŋga]	'a dress'
[gogo]	[aŋgolo]	'spectacles'

Table 1(c): Data for Pauline (1;8)

Child's word	**Conventional form**	**English Translation**
[pao]	[opao]	'a spade'
[pu^{n}da]	[p^{u}nda]	'a donkey'

Table 1(c) cont.

[popoi]	[poipoi]	'paw paw'
[ipi]	[ip]	'a tail'
[baba]	[baba]	'father'
[buk]	[buk]	'a book'
[bi]	[bi]	'come' (imperative)
[bojo]	[rabolo]	'bananas'
[toto]	[toto]	'a baby'
[tam]	[tamtam]	'sweets'
[tapa]	[tapa] (imitated)	'my dish'
[at]	[ot]	'a house'
[dadi]	[dadi]	'father'
[dani]	[dani]	'grandmother'
[dede]	[dede]	'grasshopper'
[puk]	[opuk]	'tortoise'
[jak]	[ojwak]	'it is crying'
[kok]	[gwok]	'a dog'
[cec]	[kec]	'hunger'
[kuwu]	[agulu]	'a pot'
[duda]	[gu^{n}da] (imitated)	'a deserted home'
[dona]	[ogona]	'name of a school'
[ano]	[gano]	'to tell a story'
[puju]	[fulu]	'a kind of fish'
[pok]	[fuok]	'a gap between teeth'
[puwo]	[fuwo]	'foolishness'
[no]	[ɲɔf]	'nonsense word'

Table 1(c): Cont.

[dado]	[ofwaɗo]	'a slasher'
[juθ]	[luθ]	'a walking stick'
[tut]	[θuθ]	'wee'
[en]	[θen]	'a type of stool'
[boi]	[boθ]	'tasteless'
[dao]	[ɗao] (imitated)	'to fight'
[doto]	[ɗo:t]	'a door'
[doti]	[ɗoθ]	'to suckle'
[mo:]	[moɗo]	'to drink'
[jada]	[jaɗa]	'my medicine'
[dede]	[seⁿde] (imitated)	'plates'
[cada]	[soda]	'soda'
[cuna]	[suna]	'a mosquito'
[nico]	[ɲiso] (imitated)	'to show'
[mo]	[mos]	'slowly'
[hoho]	[hoho] (imitated)	'a well'
[obo]	[hoᵐbo] (imitated)	'to persuade'
[oma]	[homa]	'a cold'
[aja]	[haja]	'a name'
[cijo]	[cilo]	'dirt'
[wado]	[cwado]	'to whip'
[cuθ]	[cut]	'for ever'
[ec]	[rec]	'fish'
[koco]	[kuco] (imitated)	'there'

Table 1 (c) Cont

[ʄowi]	[ʄowi] (imitated)	'buffalo'
[ʄaka]	[ʄakwo]	'a thief'
[im]	[ʄim]	'a name'
[duma]	[ʄuma]	'a name'
[ʄuʄu]	[ʄudi]	'a name'
[mama]	[mama]	'mother'
[ma]	[ma]	'this'
[an]	[an]	'I or me'
[nene]	[nene]	'see it'
[na]	[nam]	'a river'
[nut]	[ŋut]	'a neck'
[waŋa]	[waŋa]	'my eye'
[waŋ]	[waŋ]	'an eye'
[nado]	[ado]	'to cut'
[baŋo]	[baŋo] (imitated)	'to eat dry'
[nana]	[ɲaɲa]	'tomatoes'
[ɲa]	[ɲa] (imitated)	'nonsense word'
[jak]	[lak]	'teeth'
[buj]	[bul]	'a drum'
[bej]	[bel]	'sorghum'
[jao]	[rao]	'hippopotomus'
[buju]	[buru]	'dust'
[buj]	[bur]	'a hole'
[ka]	[kaw]	'take' (imperative)
[jaw]	[jaw]	'open' (imperative'

Table 1 (c) Cont.

[jaja]	[yaya] (imitated)	'nonsense word'
[jeme]	[ʄeᵐbe]	'a hoe'
[muju]	[oᵐbulu] (imitated)	'kind of seed'
[baka]	[ᵐbaka]	'conversation'
[buji]	[ᵐbuji]	'cobweb'
[jo:]	[lomb]	'amuse (imperative)
[diwa]	[ⁿɲiwa]	'a name of a place'
[adu]	[ⁿɲaɗu] (imitated)	'flavour'
[buⁿde]	[buⁿde]	'a gun'
[jaⁿdo]	[olaⁿdo]	'a cane'
[deⁿda]	[deⁿda]	'my body'
[ɯma]	[ⁿduma]	'arrow roots'
[jak]	[oɲʄak]	'type of fruits'
[ejo]	[oɲɲelo]	'a nickname'
[jeje]	[ɲʄugu]	'groundnuts'
[gege]	[ɲʄaga] (imitated)	'bhang'
[ŋgano]	[ŋgano]	'wheat'
[gojo]	[aŋgolo]	'spectacles'
[ŋi]	[oŋgili]	'sound of a bell'
[keke]	[ŋgege]	'a kind of fish'
[woŋg]	[lwo g]	'a call'

Table 1 (d): Data for Ken (2:0)

Child's Word	Conventional Form	English Translation
[pie]	[pielo]	'he said when he wanted to relieve himself'
[pi]	[pi]	'water'
[papa]	[papa]	'father'
[ip]	[ip]	'a tail'
[baba]	[baba]	'father'
[bada]	[bada]	'my arm'
[bojo]	[rabolo]	'bananas'
[be]	[be]	'also'
[bo]	[bob]	'a name'
[tic]	[otis]	'a name'
[tac]	[kalatas]	'a paper'
[tudo]	[atudo]	'a duck'
[mit]	[mit]	'sweet!'
[doda]	[soda]	'soda'
[dudu]	[dudu] imitated	'nonsense word'
[kat]	[kad]	'braid'
[cak]	[cak]	'milk'
[wak]	[ojwak]	'it is crying'
[koko]	[koko]	'nonsense word'
[kom]	[gweno]	'a hen'
[wok]	[gwok]	'a dog'

Table 1(d) cont.

[gita]	[gita]	'a guitar'
[gojo]	[golo]	'to remove'
[gigi]	[gigi]	'these things'
[ouko]	[ofuko]	'a bag'
[pic]	[ofis]	'an office'
[bap]	[baf]	'a bathroom'
[puko]	[fuko]	'a mole'
[tum]	[θum]	'music'
[koθ]	[koθ]	'rain'
[tuθ]	[θuθ]	'weevil'
[keo]	[keθo]	'to spoil'
[boθ]	[boθ]	'tasteless'
[dako]	[ɗako]	'a woman'
[dao]	[ɗao]	'to fight'
[odeu]	[oɗeru]	'a kind of tray'
[jaɗ]	[jaɗ]	'medicine' (possessive)
[haɗo]	[haɗo]	'to eat greedily'
[oma]	[homa]	'flu'
[awi]	[hawi]	'luck'
[hono]	[hono]	'miracle'
[jaja]	[ohala] (imitated)	'business'
[tic]	[tic]	'work'
[wic]	[wic]	'head'
[aca]	[acac]	'strange'
[ʄani]	[ʄamni]	'herds of cattle'

Table 1(d) cont.

[ʃama]	[ʃamna]	'a type of fruit'
[en]	[ʃen]	'a name'
[ʃiʃo]	[oʃiʃo]	'a name'
[um]	[um]	'a nose'
[im]	[im]	'a ram'
[mac]	[mac]	'fire'
[nati]	[nabi]	'a child'
[nako]	[nako]	'a girl'
[nana]	[nana]	'tomatoes'
[pa]	[paɲ]	'a mortar'
[ato]	[ɲato]	'a person'
[waɲ]	[waɲ]	'eyes'
[wana]	[waɲa]	'my eyes'
[ino]	[riɲo]	'meat'
[aɲo]	[aɲo]	'what'
[jawi]	[lawi]	'your dress'
[jak]	[lak]	'teeth'
[weta]	[lweta]	'my hand'
[edio]	[redio]	'radio'
[wao]	[rao]	'hippopotomus'
[buj]	[bur]	'a hole'
[jot]	[jot]	'easy'
[jojo]	[ojojo]	'a duck'
[ita]	[ᵐbita]	'(Mbita)' name of a place.
[bobe]	[bwoᵐbe]	'it's wings'

Table 1(d) cont.

[maɲa]	[ᵐbala]	'a scar'
[duju]	[ⁿduru]	'name of a place'
[deda]	[deⁿda]	'my body'
[ndo:]	[ⁿdowo]	'a bucket'
[bana]	[buⁿde]	'a gun'
[iga]	[ⁿdiga]	'a bicycle'
[cuŋga]	[macuŋga]	'oranges'
[ɟeɟe]	[ŋgege]	'a type of fish'
[ŋgano]	[ŋgano]	'wheat'
[naŋga]	[naŋga]	'a dress'

Appendix 2: Phonetic Transcription of Data from 2:1 - 3:0 year old subjects.

Table 2(a): Data for Cliff (2;3)

Child's word	**Conventional form**	**English Translation**
[peca]	[pesa]	'money'
[pala]	[paja]	'a knife'
[pap]	[pap]	'field'
[apaja]	[apaja]	'a road'
[pep]	[pep]	'all'
[boka]	[boka]	'a rod'
[baba]	[baba]	'father'
[bob]	[bob]	'a name'

Table 2(a) cont.

[ba^{n}do]	[ba^{n}do]	'maize'
[toka]	[mtoka]	'a car'
[taja]	[taja]	'a lamp'
[jiet]	[liet]	'hot'
[jot]	[jot]	'easy'
[jeta]	[lweta]	'my hand'
[dek]	[adek]	'three'
[jada]	[lada]	'rubber shoes'
[jod]	[od]	'house' (possessive)
[dadi]	[dadi]	'father'
[ton]	[kuon]	'ugali'
[jak]	[lak]	'teeth'
[cak]	[cak]	'milk'
[cico]	[kuco]	'there'
[dot]	[got]	'a hill'
[gita]	[gita]	'a guitar'
[tata]	[agwata]	'a calabash'
[bugo]	[bugo]	'a depression'
[ɟeno]	[gweno]	'a hen'
[puju]	[fulu]	'a kind of fish'
[apa]	[ofafa]	'a name'
[ba]	[baf]	'a bathroom'
[puko]	[fuko]	'a mole'
[tuno]	[θuno]	'breasts'

Table 2(a) cont.

[keθje]	[okeθre]	'it is getting spoilt'
[biθ]	[biθ]	'sharp'
[tada]	[iθaga]	'you're disturbing me'
[puθ]	[puθ]	'a disabled man'
[daŋ]	[ɗiaŋ]	'a cow'
[dodo]	[ɗoɗo] (imitated)	'to suckle'
[tedo]	[θeɗo]	'to make'
[ɗao]	[ɗao] (imitated)	'to fight'
[ce^{n}de]	[se^{n}de]	'plates'
[dic]	[dis]	'a dish'
[can]	[san]	'a plate'
[aja]	[haja] (imitated)	'a name'
[ojo]	[hojo] (imitated)	'to console'
[o^{m}bo]	[ho^{m}bo]	'to plead'
[jaja]	[olaha]	'gills'
[hoho]	[hoho]	'a well'
[mac]	[mac]	'fire'
[coŋga]	[coŋga]	'my knee'
[pica]	[pica]	'a picture'
[ɟuɟu]	[?]	'nonsense word'
[ɟowi]	[ɟowi]	'buffalo'
[awa]	[ajwa]	'a kind of game'
[ɟowo]	[ɟowo]	'to collect'
[mena]	[omena]	'a kind of fish'

Table 2(a) cont.

[uma]	[uma]	'a fork'
[um]	[um]	'a nose'
[momo]	[momo]	'a dumb person'
[nene]	[nene]	'see him'
[jaŋga]	[naŋga]	'a dress'
[ɲiɲo]	[ɲiɲo]	'leprosy'
[wiɲje]	[owiɲje]	'it is rotating'
[nao]	[ɲao]	'laziness'
[ki]	[kiɲ]	'tomorrow'
[ŋato]	[ŋato]	'a person'
[aŋo]	[aŋo]	'what?'
[jaŋo]	[olaŋo]	'safari ants'
[mujo]	[mulo]	'to touch'
[buj]	[bul]	'a drum'
[jao]	[rao]	'a hippopotomus'
[buwu]	[buru]	'dust'
[puj]	[pur]	'to dig'
[iŋgo]	[riŋgo]	'to run'
[jaw]	[law]	'a dress'
[jawa]	[jawa] (imitated)	'said in self-pity'
[jaw]	[jaw] (imitated]	'open'
[jao]	[jao] (imitated)	'to open'
[ojuma]	[ojuma]	'a joke'
[ojojo]	[ojojo]	'a duck'
[jo^{m}bo]	[jo^{m}bo]	'to defeat'

Table 2(a) cont.

[baja]	[ᵐbala]	'a scar'
[buta]	[mbuta]	'a nile-perch'
[woᵐbe]	[roᵐbe]	'sheep'
[biu]	[ᵐbiru]	'a kind of pot'
[diwa]	[ⁿɗiwa]	'a name of a place'
[dam dam]	[ⁿɗem ⁿɗem]	'luke-warm'
[uwe]	[huⁿɗuwe]	'a kind of bird'
[dino]	[ⁿɗino]	'to burn with a hot rod'
[ⁿdawa]	[ⁿdawa]	'cigarette'
[dada]	[ⁿdege]	'a plane'
[puda]	[puⁿda]	'a donkey'
[baⁿdo]	[buoɲʄo] (imitated)	'to smile'
[moⁿdo]	[moɲʄo] (imitated)	'to invade'
[ugu]	[ŋʄugu]	'groundnuts'
[ʄaga]	[ŋʄaga] (imitated)	'bhang'
[geo]	[ŋgero]	'a riddle'
[ŋgeŋge]	[ŋgege]	'a kind of fish'
[gujo]	[aŋguro]	'a pig'

Table 2(b): Data for Afya (2;6)

Child's word	**Conventional form**	**English Translation**
[pojo]	[polo]	'the sky'
[opek]	[opek]	'it's heavy'
[paka]	[paka]	'a cat'

Table 2(b) cont.

[nap]	[oɲap]	'he is lazy'
[peca]	[pesa]	'money'
[pap]	[pap]	'field'
[boi]	[boi]	'a nickname'
[abijo]	[abiro]	'I'm coming'
[bob]	[bob] (imitated)	'a name'
[tieⁿda]	[tieⁿda]	'my leg'
[betli]	[betri]	'battery'
[ot]	[ot]	'a house'
[dijo]	[dijo]	'to press'
[kidi]	[kidi]	'a stone'
[od]	[od]	'a house' (possessive)
[koka]	[koka]	'my nails'
[gilwa]	[girwa]	'our thing'
[ⁿdiga]	[ⁿdiga]	'a bicycle'
[apija]	[afija]	'a subject's name'
[pic]	[ofis]	'an office'
[ɲo]	[ɲof]	'a nonsense word'
[fuko]	[ofuko]	'a bag'
[koθ]	[okoθ]	'a name'
[jaθ]	[jaθ]	'a tree'
[tum]	[θum]	'musique'
[toj]	[θuol]	'a snake'
[ɲaθi]	[ɲaθi]	'a child'
[ɲako]	[ɲako]	'a woman'

Table 2(b) cont.

[adi]	[aʤi]	'I'm going'
[kodi]	[koʤi] (imitated)	'seeds'
[mudo]	[muʤo]	'darkness'
[dano]	[ʤano]	'a human being'
[cuna]	[suna]	'a mosquito'
[tit]	[swit]	'sweets'
[hono]	[hono] (imitated)	'a miracle'
[oado]	[ohaʤo]	'he's eating greedily'
[cai]	[cai]	'tea'
[cuja]	[cuja]	'an island'
[tic]	[tic] (imitated)	'work'
[taicon]	[taison]	'a name'
[ʃuma]	[ʃuma]	'a name'
[kuʃa]	[kuʃa]	'a name'
[maja]	[mara]	'mine'
[mama]	[mama]	'mother'
[nam]	[nam]	'a river'
[mano]	[mano]	'that one'
[an]	[an]	'me'
[ɲojo]	[ɲoro]	'yesterday'
[ɲaɲa]	[ɲaɲa]	'tomatoes'
[ʃoɲ]	[ʃoɲ]	'fatigue'
[pan]	[paɲ]	'a mortar'
[nato]	[ŋato]	'a person'

Table 2(b) cont.

[wan]	[waɲ]	'an eye'
[waɲa]	[waɲa]	'my eye'
[waɲo]	[waɲo]	'to burn'
[jada]	[lada]	'rubber shoes'
[mala]	[mara]	'mine'
[kul]	[kul]	'cattle-shed'
[enbo]	[renbo]	'name of a school'
[abijo]	[abiro]	'I'm coming'
[maj]	[mar]	'for' (possessive-marker)
[jaw]	[law]	'a dress'
[jaw]	[jaw]	'open' (imperative)
[ᵐbaka]	[ᵐbaka]	'conversation'
[joᵐbo]	[roᵐbo]	'a lamb'
[ᵐbuta]	[ᵐbuta]	'Nile-perch'
[biu]	[ᵐbiru]	'a kind of pot'
[nduno]	[ⁿɗuno]	'to pinch'
[ŋgato]	[ŋgato]	'sleepers'
[ŋgege]	[ŋgege]	'a kind of fish'
[nana]	[naŋga]	'a dress'

Table 2(c): Data for Erick (2;9)

Child's Word	**Conventional Form**	**English Translation**
[paja]	[pala]	'a knife'
[pijo]	[pilo]	'to peel'

Table 2(c) cont.

[pij]	[pil]	'peel' (imperative)
[opuk]	[opuk]	'a tortoise'
[pap]	[pap]	'field'
[buk]	[buk]	'a book'
[babji]	[babji]	'a nickname'
[bob]	[bob]	'a name'
[tic]	[tic]	'work'
[otamle]	[otamre]	'he has refused'
[jiet]	[liet]	'hot'
[dic]	[dis]	'dish'
[ogudu]	[ogudu]	'a hat'
[kijif]	[klif]	'a name'
[ocako]	[ocako]	'he has started'
[od]	[od]	'a house' (possessive)
[ejik]	[ejik]	'a name'
[goja]	[ogoja]	'he is beating me'
[gok]	[guok]	'a dog'
[doti]	[got]	'a hill'
[awata]	[agwata]	'calabash'
[bap]	[baf]	'a bathroom'
[uwu]	[fulu]	'a kind of fish'
[obuko]	[ofuko]	'a pocket'
[θum]	[θum]	'a radio'
[jaθ]	[jaθ]	'a tree'

Table 2(c) cont.

[ɲaθi]	[ɲaθi]	'a child'
[θuθ]	[θuθ]	'weevil'
[ɲako]	[ɲako]	'a woman'
[ɲano]	[ɲano]	'a human being'
[buɲo]	[buɲo]	'pumpkin'
[cabun]	[sabun]	'soap'
[hapa]	[hapa] (imitated	'my luck'
[oaja]	[ohala] (imitated)	'business'
[cwodo]	[cwodo]	'mud'
[cijo]	[ciro]	'market'
[cupa]	[cupa]	'a bottle'
[ʃiko]	[ʃiko]	'a kind of cooker'
[tiʃa]	[tiʃa]	'my job'
[meli]	[meli]	'a ship'
[omena]	[omena]	'a kind of fish (Dagaa)'
[nam]	[nam]	'a lake'
[can]	[san]	'a plate'
[mano]	[mano]	'that one'
[ɲamo]	[ɲamo]	'to chew'
[wiɲje]	[owiɲre]	'it's rotating'
[kwini]	[okwiɲi]	'she is teasing you'
[ɲijo]	[ɲijo]	'to stare at'
[oɲej]	[oɲer]	'a monkey'
[jwaɲni]	[lwaɲni]	'a fly'

Table 2(c) cont.

[otamle]	[otamre]	'it has refused'
[mal]	[mar]	'for/belonging to'
[wuok]	[lwok]	'to bathe'
[jawi]	[lawi]	'your dress'
[jaw]	[law]	'a dress'
[^{m}buji]	[^{m}buji]	'cob-web'
[olie^{m}bo]	[orie^{m}bo]	'he's driving'
[alie^{m}b]	[arie^{m}b]	'may I drive'
[ke^{n}do]	[ke^{n}do]	'fire place'
[diwa]	[^{n}diwa]	'name of a place'
[^{n}diga]	[^{n}diga]	'bicycle'
[ko^{n}deje]	[ko^{n}dele]	'name of a place'
[^{n}duma]	[^{n}duma]	'arrow roots'
[ɲɟugu]	[ɲɟugu]	'groundnuts'
[wiɲɟo]	[wiɲɟo]	'to hear'
[daga]	[ɲɟaga]	'bhang'
[ŋgejo]	[ŋgero]	'a riddle'
[oŋget]	[oŋget]	'a blanket'

Table 2(d): Data for Lina (3:0)

Child's Word	**Conventional Form**	**English Translation**
[pilu]	[pilu]	'pepper'
[pica]	[pica]	'a picture'
[pai]	[par]	'a sleeping mat'
[piɲ]	[piɲ]	'universe'

Table 2(d) cont.

[peke]	[peke]	'bottle-top'
[opuk]	[opuk]	'tortoise'
[pap]	[pap]	'field'
[buk]	[buk]	'a book'
[jabojo]	[rabolo]	'bananas'
[bob]	[bob]	'a name'
[bac]	[bas]	'a bus'
[boj]	[bor]	'it's far'
[tamtam]	[tamtam]	'sweets'
[ojiti]	[oriti]	'goodbye'
[dala]	[dala]	'home'
[adek]	[adek]	'three'
[ot]	[ɔt]	'a house'
[kwac]	[kwac]	'a leopard'
[koko]	[koko]	'noise'
[gino]	[gino]	'that thing'
[aguju]	[agulu]	'a pot'
[agwata]	[agwata]	'a calabash'
[gumo]	[gumo]	'to streak'
[uko]	[fuko]	'a mole'
[ofafa]	[ofafa]	'a name'
[pulu]	[fulu]	'a kind of fish'
[baf]	[baf]	'a bathroom'
[boθ]	[boθ]	'tasteless'

Table 2(d) cont.

[biθ]	[biθ]	'sharp'
[koθ]	[koθ]	'rain'
[tum]	[θum]	'radio'
[ten]	[θen]	'a kind of stool'
[dano]	[ðano]	'a human being'
[jaða]	[jaða]	'my medicine'
[dako]	[ðako]	'a woman'
[ʄiaŋ]	[ðiaŋ]	'a cow'
[coda]	[soda]	'soda'
[peca]	[pesa]	'money'
[dic]	[dis]	'a dish'
[hono]	[hono]	'a miracle'
[ohuko]	[ohuko]	'a bag'
[oma]	[homa]	'flu'
[kuco]	[kuco]	'there'
[cak]	[cak]	'milk'
[ʄajamogi]	[ʄaramogi]	'a name'
[oʄiko]	[oʄiko]	'a spoon'
[ʄowi]	[ʄowi]	'buffalo'
[mama]	[mama]	'mother'
[nam]	[nam]	'a river'
[jamo]	[jamo]	'wind'
[mabwon]	[rabwon]	'potatoes'
[ɲuka]	[ɲuka]	'porridge'

Table 2(d) cont.

[ɲiɲo]	[ɲiɲo] (imitated)	'leprosy'
[kuɲ]	[kuɲ]	'dig' (imperative)
[kiɲ]	[kiɲ]	'tomorrow'
[ɲani]	[ɲani]	'this person'
[oɲej]	[oɲer]	'a monkey'
[waɲ]	[waɲ]	'an eye'
[jaw]	[law]	'a dress'
[diel]	[diel]	'a goat'
[ajijo]	[arijo]	'two'
[^{m}baɲa]	[^{m}baɲa]	'a gap in the teeth'
[jo^{m}bo]	[ro^{m}bo]	'a lamb'
[diwa]	[^{n}ʒiwa] (imitated)	'name of a place'
[dudu]	[^{n}da^{n}ʒu]	'flavour'
[^{n}duma]	[^{n}duma]	'arrow roots'
[bu^{n}de]	[bu^{n}de]	'a gun'
[ɲʄaga]	[ɲʄaga] (imitated)	'bhang'
[piɲʄe]	[piɲʄe]	'countries'
[puoɲʄ]	[puoɲʄ]	'teachings'
[ɲgato]	[ŋgato]	'sleepers'
[oɲget]	[oŋget]	'a blanket'

Appendix 3: Phonetic Transcription of data from 3:1-4:0 year old subjects.

Table 3(a): Data for Osodo (3;3)

Child's Word	Conventional Form	English Translation
[peca]	[pesa]	'money'
[buk]	[buk]	'a book'
[buja]	[bura]	'a meeting'
[tado]	[tado]	'a roof'
[twojo]	[tworo]	'sisal'
[dwoɲo]	[dwoɲo]	'to knock'
[tedo]	[tedo]	'to cook'
[kado]	[kado]	'soup'
[keθo]	[keθo]	'to spoil'
[gweno]	[gweno]	'a hen'
[gwok]	[gwok]	'a dog'
[agulu]	[agulu]	'a pot'
[aŋgolo]	[aŋgolo]	'spectacles'
[ɣako]	[ɣako]	'a woman'
[kibuje]	[kibuje]	'kibuje' (a local market)
[kajat]	[karat]	'carrots'
[mamawa]	[mamawa]	'our mother'
[kiful]	[kiful]	'a pad-lock'
[kelo]	[kelo]	'to bring'
[ofuko]	[ofuko]	'a pocket'
[fulu]	[fulu]	'a kind of fish'

Table 3(a) cont.

[ojugis]	[ojugis]	'name of a place'
[θuno]	[θuno]	'breasts'
[θuⁿda]	[θuⁿda]	'my breasts'
[θuθ]	[θuθ]	'weevil'
[oʤeju]	[oʤeru]	'a king of tray'
[amoʤo]	[amoʤo]	'I am drinking'
[homa]	[homa]	'flu'
[hawi]	[hawi]	'luck'
[hoho]	[hoho]	'a well'
[cak]	[cak]	'milk'
[toc]	[toc]	'a torch'
[babawa]	[babawa]	'our father'
[ʤot]	[ʤot]	'a door'
[loco]	[loso]	'to speak to someone'
[ʧowi]	[ʧowi]	'a buffalo'
[ʧuma]	[ʧuma]	'a name'
[ɲuka]	[ɲuka]	'porridge'
[ɲako]	[ɲako]	'a girl'
[akiɲi]	[akiɲi]	'a name'
[niⁿdo]	[niⁿdo]	'sleep'
[oniⁿdo]	[oniⁿdo]	'he is asleep'
[ca]	[sa]	'a watch'
[koʤuc]	[koʤus]	'a name'
[waɲa]	[waɲa]	'my eye'

Table 3(a) cont.

[kojwa]	[korwa]	'our home'
[jabojo]	[rabolo]	'bananas'
[noβi]	[noβi]	'she went'
[ɲojo]	[ɲoro]	'yesterday'
[lit]	[lit]	'painful'
[ita]	[ita]	'my ears'
[majwa]	[marwa]	'ours'
[ocodo]	[osodo]	'the subject's name'
[magajita]	[magarita]	'a name'
[ɲiŋga]	[ɲiŋga]	'my name'
[kifuŋgu]	[kifuŋgu]	'a key'
[oŋge]	[oŋge]	'there isn't'
[owuojo]	[owuojo]	'he is talking'
[aŋejo]	[aŋejo]	'I know'
[jo^{m}be]	[ro^{m}be]	'sheep'
[^{m}buji]	[^{m}buji]	'soot'
[puoɲʧo]	[puoɲʧo]	'to teach'
[peɲʧ]	[peɲʧ]	'question'
[ma^{n}dac]	[ma^{n}das]	'mandazi'

Table 3(b): Data for Okech (3;6)

Child's Word	Conventional Form	English Translation
[bajaŋŋet]	[baraŋget]	'a blanket'
[buðo]	[buðo]	'pumpkin'
[pipa]	[pipa]	'dust-bin'
[apwojo]	[apwojo]	'a rabbit'
[opuk]	[opuk]	'tortoise'
[centa]	[senta]	'centre'
[dic]	[dis]	'a dish'
[agadi]	[magadi]	'name of a place'
[kaca]	[kaca]	'that a place'
[jot]	[ot]	'a house'
[mitoka]	[mtoka]	'a car'
[gijin]	[grin]	'green'
[otieno]	[otieno]	'a name'
[kogi]	[korgi]	'their place'
[fulu]	[fulu]	'a kind of fish'
[ofic]	[ofis]	'office'
[baf]	[baf]	'a bathroom'
[θuon]	[θuon]	'a cock'
[ði]	[ði]	'to go'
[oði]	[oði]	' he is going'
[mcuŋgu]	[msuŋgu]	'a name'
[wuok]	[wuok]	'to leave'
[adeᵐba]	[adeᵐba]	'a name'

Table 3(b) cont.

[mano]	[mano]	'that one'
[woce]	[wuoce]	'shoes'
[ʃakwo]	[ʃakwo]	'a thief'
[ʃaʃok]	[ʃaʃwok]	'a witch'
[ʃuma]	[ʃuma]	'a name'
[coci]	[soksi]	'socks'
[atrec]	[matres]	'a mattress'
[coda]	[soda]	'soda'
[muma]	[muma]	'bible'
[ɲgolo]	[aɲgolo]	'spectacles'
[piɲ]	[piɲ]	'ground'
[ɲaθi]	[ɲaθi]	'a child'
[waɲa]	[waɲa]	'my eyes'
[waɲ]	[waɲ]	'an eye'
[ɲato]	[ɲato]	'a person'
[oloje]	[olore]	'it is locked'
[ojawe]	[ojawe]	'it is open'
[ma]	[ma]	'this'
[ᵐbaka]	[ᵐbaka]	'conversation'
[ⁿdiga]	[ⁿdiga]	'a bicycle'
[ⁿdawa]	[ⁿdawa]	'tobacco'
[ʃʃugu]	[ʃʃugu]	'groundnuts'
[ɲʃaga]	[ɲʃaga]	'bhang'
[babatac]	[kalatas]	'a paper'
[boci]	[boksi]	'a box'

Table 3c: Data for Maurine (3;10)

Child's Word	Conventional Form	English Translation
[pu^{n}da]	[pu^{n}da]	'a donkey'
[pusi]	[pusi]	'a cat'
[msip]	[msip]	'a belt'
[kibjit]	[kibrit]	' a match stick'
[kiʃiko]	[kiʃiko]	'a spoon'
[san]	[san]	'a plate'
[labolo]	[rabolo]	'bananas'
[koɲo]	[koɲo]	'alcohol'
[laka]	[laka]	'my tooth'
[kubu]	[kube]	'a jerican'
[lao]	[rao]	'hippo'
[θum]	[θum]	'music'
[mano]	[mano]	'that one'
[alot]	[alot]	'vegetables'
[ocwade]	[ocwade]	'he is whipping it'
[laju]	[laru]	'veranda'
[^{m}belo]	[^{m}bero]	'a bench'
[ðiaɲ]	[ðiaɲ]	'a cow'
[puoðo]	[pwoðo]	'a garden'
[luθ]	[luθ]	'a walking stick'
[law]	[law]	'a dress'
[ɲʃugu]	[ɲʃugu]	'groundnuts'
[jembe]	[mae^{m}be]	'mangoes'

Table 3(c) cont.

[liŋo]	[riŋo]	'meat'
[alijo]	[arijo]	'two'

Table 3(d): Data for Fred (4;0)

Child's Word	**Conventional Form**	**English Translation**
[kopiyo]	[kopiyo]	'Opiyo's home'
[depe]	[depe]	'tins'
[abic]	[abic]	'five'
[peɲʧ]	[peɲʧ]	'exams'
[oŋge]	[oŋge]	'there isn't'
[ajijo]	[arijo]	'two'
[abej]	[aber]	'I'am good'
[maka]	[maka]	'charcoal'
[maliŋ]	[siliŋ]	'a shilling'
[kitaⁿda]	[kitaⁿda]	'a bed'
[ʧejemia]	[ʧeremia]	'a name'
[ocela]	[osera]	'a kind of basket'
[adek]	[adek]	'three'
[maⁿdas]	[maⁿdas]	'mandazi'
[aceᵐbo]	[aseᵐbo]	'name of a place'
[jaŋgo]	[raŋgo]	'to stare at'
[gunia]	[gunia]	'a sack'
[notiŋo]	[notiŋo]	'he carried'

Table 3(d) cont.

[ɲoca]	[ɲoca]	'recently'
[ok naðai]	[ok naðai]	'I didn't go'
[ociɲ]	[ociɲ]	'a name'
[opono]	[opono]	'he is picking'
[maᵐbe]	[maᵐbe]	'mangoes'
[sikul]	[sikul]	'school'
[ogona]	[ogona]	'name of a piece'
[boⁿdo]	[boⁿdo]	'name of a place'
[θuᵐbe]	[θuᵐbe]	'his radio'
[citul]	[situl]	'a stool'
[ilwoŋge]	[ilwoŋge]	'it is called'
[koke]	[koke]	'his nails'
[ocele]	[ocele]	'rice'
[oŋado]	[oŋado]	'he is cutting'
[omolo]	[omolo]	'a name'
[ŋa]	[ŋa]	'who'
[obilo]	[obiro]	'he is coming'
[fulu]	[fulu]	'a kind of fish'
[ojedo]	[oredo]	'a name'
[ŋato]	[ŋato]	'a person'
[oloje]	[olore]	'it is locked'
[ojawe]	[ojawe]	'it is open'

Table 3(d) cont.

[ma]	[ma]	'this'
[^{m}baka]	[^{m}baka]	'conversation'
[^{n}diga]	[^{n}diga]	'a bicycle'
[^{n}dawa]	[^{n}dawa]	'tobacco'
[ʃugu]	[ʃugu]	'groundnuts'
[ʃaga]	[ʃaga]	'bhang'
[babatac]	[kalatas]	'a paper'
[boci]	[boksi]	'a box'

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