

A S P E C T S
of K O N O P H O N O L O G Y

by
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A B S T R A C T

This work is a descriptive analysis of the Kono sound system. Kono is a Sierra Leonean language belonging to the Mande family of languages.

The work is divided into two parts. The first part consists of three chapters, and deals mainly with non-tonal phonology. Chapter 1 discusses possible social and historical factors that may have affected the development of the culture and the language of the Kono people, the classification and possible origin of Kono particularly, and the Mande languages generally, a brief survey of previous work on Kono, and the theoretical framework upon which this work is based. This is followed in the next two chapters by a discussion of various sound segments with a view to establishing a phoneme inventory of the language. Problems of phonemic interpretation relating to the establishment of such an inventory are discussed. The vowel-consonant dichotomy is discussed in Chapter 2. So also are the problems relating to vowel length, dissimilar vowels in sequence, and vowel nasalisation. Chapter 3 deals with problems posed by the distribution of consonant segments, particularly those relating to palatalisation, labialisation, prenasalisation, and nasalisation.

Part Two deals with tone, and starts with a general review of studies in tonal phonology in Chapter 4. Syllable structure is considered in Chapter 5, with particular consideration of how such a structure may be affected by its relationship with tone. The lexical and grammatical functions of tone form the basis of the discussion in Chapter 6. Finally in this part, there is in Chapter 7 an acoustic analysis of fundamental frequency in relation to tone in Kono. This analysis was carried out with the object of providing additional data to supplement our auditory analysis.

TO THE MEMORY OF
S A T T A N J A B U M A N Y E H
MY MOTHER.

A C K N O W L E D G E M E N T S

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PART ONE

NON-TONAL PHONOLOGY

CHAPTER 1

INTRODUCTION

1.1 Kono is a language spoken in eastern Sierra Leone by the Kono. It is also spoken by a small percentage of Kissi who are native inhabitants of Kono district. Welmers (1971:117) reports that it is also spoken in western Ivory Coast. The language is known variously as *kɔnɔkwɛ* or, colloquially, as *kɔnɔbai* by native speakers, and the people as *kɔnɔmwɛ nu* or *kɔnwɛ nu* (*kɔnɔmwɛ* or *kɔnwɛ* refers to a single Kono person). Kono here will refer to the language, the people, the tribe, and the land.

A recent survey by Fyle (1975:8) suggests that the language is spoken by about 104,000 speakers. This figure appears to reflect the 1963 census figures¹ (see Table 1), which makes the Kono the fourth largest ethnic group in Sierra Leone (Harvey, 1969: 39).

TABLE 1

Ethnic Composition of the Sierra Leone Population (1963)

(per cent)

Creole	1.9	Loko	2.9
Fula	3.1	Madingo	2.3
Gallinas	0.1	Mende	30.9
Gola	0.2	Sherbro	3.4
Kissi	2.3	Susu	3.1
KONO	4.8	Temne	29.8
Koranko	3.7	Vai	0.3
Krim	0.4	Yalunka	0.7
Kru	0.2	No Tribe	1.3
Limba	8.4	Others	0.2

¹ The most recent census figures (1974) were officially withheld because of suspected inaccuracies.

Kono covers an area of approximately 2,178 square miles, and constitutes one administrative district. The fourteen chiefdoms in the district have an average area of 156 square miles (Clarke, 1969:32). It is ironic that although Kono is the only district in Sierra Leone named after a tribal group, native inhabitants are today actually outnumbered in mining areas by 'strangers'¹. In 1970, only 52% of the population of Kono was estimated to be Kono by tribe (King, 1975:52). In Yengema where the author grew up, only 19% of the people at this time were Kono. This state of affairs is the direct result of the presence of diamonds in the district.

Over the years, migration into Kono by strangers for economic gain through legal or illegal mining operations for diamonds has been on a massive scale. Inevitably, the presence of strangers in such large numbers has put a lot of pressure on Kono values, beliefs, traditions and institutions. Conteh (1973:53), on sacred institutions in Kono observes:

We have here a case of the transformation of institutions whose original *raison d'être* was essentially sociological into institutions whose *raison d'être* has become economic gain. Furthermore, since these institutions serve a religious function, their transformation into instruments of economic gain and advantage necessarily involves their secularization, desecration, profanation and desacralization.

The 'secret' societies perhaps have fared worst, as secret society bushes are desecrated by intensive

1. 'Strangers' is the official label for non-Konos, Sierra Leoneans or otherwise, who have migrated into Kono.

mining operations. It ought to be mentioned that members of these societies do not themselves refer to them as 'secret', although they in fact conduct most of their affairs in bushes set aside for such purposes, away from the gaze of non-members. They prefer to call them by their proper names, the most common of them being the 'Poro' for the men, and the 'Bondo' for the women. Sooner or later every member of the community is expected to be initiated into one society or the other, or risk becoming a social outcast. Enormous mystique surrounds the bushes set aside for members, and they are considered very sacred. In the case of Kono, mining activities have very often involved the progressive and systematic destruction of these bushes, with financial compensation offered. Many older Konos have usually complained that mere financial compensation is not enough for something they regard to be spiritually potent. One can see their argument when one considers what these societies represent in Kono society, indeed in the Sierra Leone society generally. Young people are trained in secret societies to be responsible men and women, responsible husbands and wives. Elder citizens organise and supervise the activities of the young ones, transmitting local customs, mores, religious and social beliefs, and guiding them to observe the norms of their society. On the linguistic level, training in rhetoric and traditional poetry is provided. But that was in the past. Today, economic independence and geographic mobility has meant that a growing number of young people

are either totally divorced from these societies, or often scorn some of the training they offer. Economic independence has meant increasing social differentiation, especially as more and more children now train for life through a formal education system that is based on the English model, with English texts and syllabuses. Schools in fact have proved a very fertile ground for breeding cultural mulattoes, with increasing geographic mobility permitting greater exposure to more and more foreign cultures. Traditional and formal education systems are two quite distinct systems, and children who have been through one system have often found it difficult to adjust to the other. Most have ended up as cultural fence sitters, and some simply cannot be bothered with going back to their roots. The greatest linguistic damage is the growing number of Kono children who speak English, but not Kono. Parents and grandparents these days are often heard lamenting the fact that their children or grandchildren either do not speak their language at all, or they do not speak it the way they (parents and grandparents) know it.

Perhaps the greatest cultural influence on the Kono, especially those Kono who have been through the traditional training system is Mende culture. This is evidenced by the fact that the Bondo, the most widespread female secret society in Kono, exists under the Mende name 'Sande'. Many Mende songs are sung in Kono during secret initiation ceremonies, be they male or female initiations.

But the widespread use of Mende as a second language in many Kono homes, particularly in those chiefdoms that share a common boundary with the Mende, is the clearest testimony of Mende influence on Kono. This author's own chiefdom, Gorama Kono, is perhaps the best example of this. The author knows of no one who has grown up in any part of this chiefdom who does not speak Mende as fluently as he speaks Kono. In fact, people from Gorama Kono are often referred to by other Konos as Mende-speaking Konos. The inter-tribal wars are often used to explain this strong Mende influence on Kono. Much of Kono, the southern half particularly, was invaded and 'colonised' by more powerful Mende warriors, notably Chief Nyagua. The Gorama region was particularly vulnerable, since Chief Nyagua lived next door in what is today known as Goramo Mende. The survival in Kono today of such names as Mendefayi - 'Mende killing stream', or of typical Mende names like Ngombu-Gboli ; 'Red Fire', Nyandebo - 'The Handsome One', or Ngongou - 'The Toothy One', or, of Kono names like Yendewa - 'Big Axe!', in Mende country, is evidence of the inter-tribal wars and the considerable cultural intermixture, including inter-marriage that took place between conqueror and conquered. Even after these wars, some Kono still migrated into Mende country, this time, for academic reasons. As late as 1960, there was still no secondary school in the whole of Kono district. The nearest secondary schools were located in Mende country, the best known of these being

the famous Bo School.

Also, the severely limited labour market in Kono at the time meant that Kono students who finished school often worked in Mende areas, married Mende wives, and raised 'Mende' children. Some among these spoke Mende, but not Kono. There are more of these today, and one can well understand why some older Konos fear the loss not only of cultural identity, but also of a tribe, the Kono tribe. The author's fear is the danger posed by such a loss to a language, his native language.

1.2 Welmers (1971: 115-117) classifies Kono as a northern Mande language (see Table 2). The Mande language family is a sub-group of Greenberg's larger Niger-Congo family.

On the question of the classification of African languages generally, Greenberg's (1963) classification appears for now to enjoy general acceptance by Africanists. Schachter (1971:30) describes it as the most significant recent work concerned with the overall classification of African languages, with only a few matters of significant scholarly controversy. Greenberg's failure to specify precise sound correspondences for his putative cognates for the languages for which he claims genetic relationships is often cited as the major flaw in his work. Critics argue that such proof is vital in standard comparative linguistic practice, and, until such proof is forthcoming, his claims are no more than speculations.

Scholars who have taken a closer look at the genetic relationship claimed by Greenberg between the Bantu languages and some languages of West Africa see some substance in these arguments. We are however not particularly concerned with such arguments here. It is enough to note for our purposes that no one has so far objected to the classification of Kono as a Mande language. Welmers (1971:115) reminds us that except for Bobo-fing or Sya in Upper Volta,

the sub-classification of the Mande languages seems finally to be well established.

He claims that no one has raised any significant objection to his own proposed overall scheme (Table 2) which Greenberg approves. We must note here that until recently, a well known 'Mande-tan' and 'Mande-fu' distinction first proposed by Delafosse in 1901 was recognised. This was a distinction made on the basis of the two roots of the numeral 'ten'; a northern group had 'tan' or similar forms for the numeral, and a southern group had 'fu', or similar forms. This distinction is now questioned, and Welmers (1971:114), readily dismisses it as 'demonstrably invalid'. This dismissal hinges chiefly on lexicostatistical evidence provided by Welmers' (1953) reassessment of Mande sub-classification. He (Welmers, 1971:115) reports that

The lexicostatistical evidence led to completely unambiguous results, and no evidence of any other kind contradicted it. The major surprise resulting from this investigation was that the southwestern 'Mande-fu' language (in Liberia, Sierra Leone, and Guinea) are more closely related to the northern 'Mande-tan' language than either is to Prost's 'Southeastern Mande'.

Welmers reports that earlier, Prost (1950, 1955) had defined a 'Southeastern Mande' group which he (Prost) suggested might have closer affinities with the 'Mandetan' group. On the basis of his own investigation, Welmers (1971: 115-116) classifies Mande languages as in Table 2; hyphenation in the table indicates apparent co-dialects of the same language; parentheses indicate alternative names; speech forms believed to be very closely related and perhaps mutually intelligible are indicated by a comma, and extra spacing between lines indicates major divisions within a branch.

TABLE 2

The Mande Languages

1. Northern-Western Division
 - 1.1 Northern
Susu-Yalunka

Soninke

Hnela-Numu, Ligbi

Vai, Kono
Khasonke
Maninka-Bambara-Dyula
 - 1.2 Southwestern
Mende-Bandi
Loko

Kpelle
2. Southern-Eastern Division
 - 2.1 Southern
Mano
Dan (Gio)
Tura
Mwa
Nwa
Gan
Kweni (Guro)
 - 2.2 Eastern
Southern Samo
Northern Samo
Bisa
Busa

The Mande group of languages is probably the most important in that part of Africa known as the Western Sudan, with about twenty million speakers in Senegal, Mali, Guinea, Portuguese Guinea, Gambia, Upper Volta, Ghana, Sierra Leone, Liberia, Niger, and Mauritania (see Alexandre, 1972:54). In Sierra Leone the Northern Mande group is represented by Kono, Vai, Susu, Yalunka, and Koranko, and the Southern Mande is represented by Mende and Loko. Speakers of these languages represent about 50% of the Sierra Leone population (Fyle, 1975:8).

The name 'Mande' as today applied by Europeans and others to all tribes speaking Mande languages was primarily used to refer only to the people commonly known as 'Malinke', and their speech (Westermann and Bryan, 1970:31). Other similar forms exist. The Fulani for instance refer to Mande people variously as 'mɛli', 'mali', or 'malel', and the Berbers call them 'mel' or 'melit'. A term widely used in Sierra Leone is 'Madingo'. That the same language family is known by so many different names is a measure of the complex nature of the family. It may be the case that these different terms for 'Mande' are the result of differences in dialects of the same language group. This may explain why an often reported characteristic of Mande languages is the significant number of lexical items shared among them, a characteristic not usually associated with other branches of the Niger-Congo family. In the case of Kono, Vai is the language usually associated with it in this regard,

others being Koranko and Madingo. This author has never heard Vai spoken, but another native speaker of Kono (Mondeh, private communication) reports that Kono and Vai are mutually intelligible. Mondeh claims that on a visit to Liberia where the Vai today have their ethnic core, he was able to carry on a conversation with a native Vai speaker, each of them speaking his native tongue. Lexical similarity between Kono, Koranko, and Madingo is especially noticeable in the northern half of Kono, where they all share a common boundary. It has been reported that the Konos often sought refuge in Koranko country during the inter-tribal wars when they ran away from marauding Mendes. As with the Mende-speaking Konos of Gorama Kono, Konos in this part of the district are often referred to as 'Koranko-Konos'.

No one can say with certainty what the Mande or Kono origins are, but there appears to be some relationship between the two. Welmers (1971:119-120) speculates that an original Mande homeland was the general vicinity of the Upper Nile Valley from where a westward migration may have started some 5,000 years ago. Ancestors of the present Northern-Western Mande people probably pushed farther west from northern Dahomey, finally reaching their present home in the grasslands and forests of West Africa. He cites the presence and striking similarity of a breed of dogs, the Basenji, in all of the Sudan belt of Africa from the Nile Valley to the Liberian forest to lend credence to his reconstruction. It would appear that

the Mande people originally took their Basenji with them on their westward migration. This westward movement seems to tally with McCulloch's (1950) account of the Kono origin. According to him, the Kono originally were part of a powerful nation in the north of Central Africa, or possibly further east, the offshoots of a Mandinka tribe of the Sagan and Sulima sections of Guinea. They are thought to have migrated westward into Sierra Leone together with the Vai, possibly as one tribe, some three centuries ago. Matturi (1973: 39-40) and Rodney (1970: 14) also report that the Kono and the Vai were the same people when they first arrived in Sierra Leone. According to Matturi, this was about three centuries ago, at the time of the fall of the Mali Empire. Abraham (1973: 43) however says the Mali Empire fell some 450 years ago, in the late 15th century. The Kono migration was in stages, the first wave of wanderers settling along the Meli Valley. Some moved on after a while, and this was the pattern until present day Sierra Leone was reached. Salt is the reason given by both Matturi and Rodney for the separation of the Konos and the Vais. According to Rodney, when they arrived in Sierra Leone,

...the Konos and the Vais were the same people. They were in search of salt, which they had heard was plentiful along the coast, but when the Konos saw that there was plenty of game and good farming land on the savannahs they decided to stop, while the Vais went to the sea.

Matturi's account is that while the tribe was moving down to Kono, a group broke off from the main body, promising

that they would return later. The group that broke off are now known as the Vai, and, Matturi (p.30) adds,

It is known that these Vai people came down to the sea coast for salt, which among the Kono people is highly prized.

According to Kono folklore, the Konos in Sierra Leone are still waiting for the return of their Vai brothers, most of whom in fact crossed the Mano river into neighbouring Liberia. Hence, possibly by folk etymology, the name 'Kono', possibly derived from the Madingo 'ma kono', meaning 'wait for us'. We have already noted that all of these languages display considerable lexical similarities. The Kono today are separated from the few Vai in Sierra Leone by their southern neighbours, the Mende, who were more successful in the inter-tribal wars and annexed a lot of Kono land.

1.3 There is no record of any dialect survey of Kono in the literature. During the course of this work however, the author was able to check a 600-item list of Kono words with another native speaker from central Kono, and there was only a 3% disagreement in their pronunciations. About 70% of the disagreement involved words with [k] and [kp̄] in the author's speech, but [c] and [gb̄] in the other speaker's speech. A tenable explanation can be found in the different backgrounds of the two speakers involved. Having come from Gorama Kono (cf. 1.1, pp. 4-6) the author, it would seem, uses more Mende in his social activities than the other speaker.

A look at some of the words involved, with their Mende equivalents will help us here. In the following examples, Speaker 1 is the author, and Speaker 2 is the other native speaker:

Speaker 1	Speaker 2	Mende	English
kisi	cisi	kisi	kitchen
keenɛ	ceenɛ	kele	wooden musical instrument
bɛki	bɛci	bɛki	sack, bag
wiki	wici	wiki	week
keete	ceete	kete	snail/millet
$\overline{\text{kpako}}$	$\overline{\text{gbako}}$	$\overline{\text{kpako}}$	older, elder person

Note that in nearly all of these examples, the velar stops in the speech of Speaker 1 are followed by either [i], or [e], close enough to the palate for ease of articulation to be the reason for the [c] in the speech of Speaker 2. It would seem that Speaker 1's Mende speaking habit makes him more resistant to this particular type of economy of effort. While one would need more evidence than is available in this work to be able to make any definite pronouncements on the question of dialects in Kono, a tentative statement would be that there are no radical dialect variations in the language. Some differences in pronunciation as in the above examples may exist, and some lexical differences do exist. Konos in the north for instance would say [samaa] for 'shoes', but all other Konos would say [kɔa]. Such differences however do not, in the author's opinion, occur in significant enough proportions to warrant different

dialect classifications. Every Kono speaking person the author has met has been able to communicate freely with any other Kono speaker.

1.4 Kono has been much less studied than some other Sierra Leonean languages such as Mende or Temne. Even worse, from the research point, is the fact that Kono has a rather short and very poor literary history. As yet, there has been no general description of either Kono phonology, or Kono grammar. This literary barrenness may not be unconnected with the late start of formal education in Kono. The first primary school was established only in 1910 in Nimikor Chiefdom, and the first secondary school, also in Nimikor, in 1960. It is not surprising, in the circumstances, that some of the most highly trained Kono intellectuals to date have come from this chiefdom.

Koelle's POLYGLOTTA AFRICANA (1854), regarded by many as one of the greatest achievements in African linguistics, is still a valuable source of documentation of several West African languages. And if Hair (1963: 13), in his historical introduction to the POLYGLOTTA is to be believed, then one can consider the vocabularies therein to be, on the whole,

...as accurate as could have been obtained
anywhere at that period.

One must mention however that Koelle himself warns, in the Preface to his work, that he is

...convinced that this Polyglot contains
instances of incorrectness, and actual
mistakes. p. iv

Kono is one of the languages documented in the POLYGLOTTA, with some 300 items of vocabulary listed. From a purely diachronic point of view, this work can be regarded as useful. One notices for instance, that some of the long vowels of modern Kono are the result of the complete loss of [r], as in the following examples:

Koelle	Modern Kono	English
koro kaima	[kɔ̄ kaimà]	elder brother
kuru	[kūù]	bone
warā	[wāâ]	mat

Similarly, some dissimilar vowels in sequence are the result of similar losses:

Koelle	Modern Kono	English
kumbāli	[kūmbāi]	knee
kalī	[kaî]	scabies
karu	[kāù]	moon

From the point of view of modern Kono phonology, one has to regard Koelle's work as inadequate, as we have seen from the above examples. We shall be referring to this work again later in this study.

Migeod's THE LANGUAGES OF WEST AFRICA has some of the defects of Koelle's work as far as present day Kono is concerned. Let us look at some of his Konno (his spelling) examples:

Konno	English
1. Kofi na kura ni	'This is Kofi's cloth'.

As we have already indicated, the [r] in his transcription does not exist in modern Kono. The above sentence in modern Kono would be

[kofi a kwa a nɛ]

Kofi his cloth is this

2. Musu a nyimpa 'These good women'.

We have here a clear case of mistranslation, not to mention an inaccurate transcription. The modern Kono equivalent of his English translation would be

[musu cɛndɛ cɛ nu]

Wom good these en

One suspects that what Migeod actually wanted to transcribe was

[musu ŋ niŋ kpa]

'What nice/pretty women'

wom en nice/pretty what

It would seem that his transcription does not take into account the [kp̄] sound in Kono. He gives about 100 such examples, and nearly all of them are either wrongly transcribed or wrongly translated into English. Koelle's work is much more accurate, and linguistically more sophisticated than Migeod's, which is in two volumes. The first of these was published in 1911, and the second in 1913. This work's usefulness is, in Migeod's own words, as

a guide to further more detailed work. p.3

Apart from the works discussed so far, most of the published material has been religious literature, dealing

1

with such things as translating hymns, biblical stories, the Bible, and Kono proverbs. In 1948, NJAYAMA GBOO, the Laubach Primer in Kono, was published. This seems to have been one of the very few pedagogical materials printed. Unfortunately, the total absence of any tone markings limits the use of this book to people already familiar with the language and the author's impressionistic transcription. Kono has no accepted orthography. In 1953 and 1954, Laubach had two more readers published. These were biblical stories about Jesus, published in two volumes, Tai Asi Jisosi Ma, 1 and 2. The problem with these is that an accumulation of inaccurate transcriptions makes them difficult to read. For instance, he has [kʊsɛ] for [kwisɔ], and ['kokɛndɛma] for ['kocɛndɛma] .

There seems to have been very little work done since the missionary efforts of the late 1940s and the early 1950s. Innes's "Genitival Phrases in Mande Languages" was published in 1967. This was a discussion of 'alienable' and 'inalienable' nominal possessives in Mende, Loko, Bandi, and Kono, leading to the conclusion that phrases consisting of object pronoun and verb are structurally identical to genitival phrases consisting of possessive pronoun and noun. This is work we shall refer to in more detail in our discussion of tones in Kono. In 1963, Ladefoged looked at labial velar stops in Kono in his A PHONETIC STUDY OF WEST AFRICAN LANGUAGES. Finally, what appears to be the most recent publication on Kono is a 50-word list by Heydorn (1971) in his "Grammar of the Loma Language with some kono Words in the Vocabulary".

1.5 The study of African languages takes place at two levels, according to Alexandre (1972: 22-23). The two levels are:

1. The scientific investigation of the structure of a single language. While such studies may not necessarily amount to grammars permitting foreigners to learn the language their findings could nevertheless be profitably employed on a wider plane. They form the basis from which grammars, for instance, can be written, and dictionaries compiled. This would permit foreigners to learn the language, and it would also serve the speakers of the language.

2. Study on this level permits typological groupings and the formulation of hypotheses about the relationship between languages. Studies of this kind often involve the composing of descriptions of not-necessarily related languages, often by different linguists. The results of such studies are useful both for the classification of languages, and for the recreation of their origins.

We have already indicated that research on the second level is outside the scope of this work. Our aim in this thesis will be to attempt a scientific description of the Kono sound system. What are the distinctive sounds of Kono? How are they produced? How do they combine with other sounds in the language to permit communication? What rules govern these combinations? We shall be attempting to find answers to these questions. In short, we shall be attempting a description and analysis of the phonology of the Kono language.

All human beings belong to some social group or community, using language for their day-to-day communication. Most of this communication is verbal, and is possible only if the speakers are familiar with the sound system of the language used.

What this means in effect is that one should be familiar with the rules governing the production, perception, and distribution of the distinctive sounds of the language concerned. In other words, one should be familiar with the phonology of the language one wishes to speak. The many languages of the world are different because they all have different phonological structures, even though they may have several sounds in common. As Sapir (1925: 13-21) points out, two languages can have the same inventory of sounds, but have a different phonology. The task of phonology then, is

...the description of the systems and patterns of sounds that occur in a language. It involves studying a language to determine its distinctive sounds and to establish a set of rules that describe the set of changes that take place in these sounds when they occur in different relationships with other sounds (Ladefoged, 1975: 23).

Linguists describing the sound systems of languages often make a distinction between phonetics and phonology:

A phonetic study tells how the sounds of a language are made and what their acoustic properties are. A phonological study tells how these sounds are used to convey meaning. (Hyman, 1975: 2).

Beyond agreeing that it is necessary to recognise phonetic and phonological levels in the description of the sound systems of languages, the relationship between phonetic and phonological studies has often, particularly in the past, been the subject of great controversy. Arguments in favour of, or against the many competing viewpoints are well documented, and we shall not here get involved with the details. We recognise that there is great interdependence between the two, and this relationship is summed up by Anderson (1978: 133) thus:

According to current views of phonological structure, the task of constructing descriptions of the sound patterns of natural languages can be divided into three parts: (a) providing a set of phonetic representations for utterances on the basis of the principles of a general phonetic theory, (b) providing a set of phonological representations for utterances in terms of the grammar of a particular language, (c) determining the properties of the rules which establish a correspondence between these two levels of representation.

For our purposes here, the use of PHONOLOGY is very elastic, covering all descriptions of linguistically significant speech sounds of the language. No conscious effort will be made to divorce phonetics from phonology, no independent levels will be established.

Phonologists are always reminded that "every phonological analysis is dependent on theory" (Fromkin, 1975: v). In this regard we are obliged to say that this analysis of Kono is based on the theory of the phoneme, hence our analysis is a phonemic one. A logical step in this development would be to define the phoneme. Unfortunately, this is not an easy thing to do. As with the relationship

between phonetics and phonology, the diverse viewpoints associated with the phoneme defy adequate summary in a work of this kind. We therefore will not go into detailed treatment of the arguments. We will assume that the theory is a tenable one, noting, as Lyons (1972: 275-6) does, that

There is a common core of doctrine upon which all phonemicists are agreed and which sets them apart from non-phonemicists: this is expressed in their aim to describe language-utterances, on the phonological level, as a unidimensional sequence of discrete units, every one of which is in opposition with every other of the inventory in at least one pair of distinct utterances of the language.

The phoneme inventory in this study has been established as far as possible by the discovery of minimal pairs. This method, according to Jones (1967: 39) is the fastest and safest method of establishing the phonemes of a language:

The fact that phonemes are the chief linguistic elements differentiating one word from another generally furnishes us with the quickest and surest method of ascertaining the phonemes of languages. When an investigator desires to find out whether two sounds of a language belong to separate phonemes or not, he should try to find a pair of words distinguished solely by means of those two sounds. The discovery of such a pair of words is conclusive proof that the sounds belong to separate phonemes.

As we shall see later, it is not always possible to find minimal pairs, or near-minimal pairs, and this naturally, presents problems of analysis.

It has been judged prudent to present a general outline of Kono phonology since no such thing exists at the moment. The choice of those aspects of Kono phonology to be described has not been entirely arbitrary. We have

been guided in our choice by what we have considered to be the goal of phonology, that is, describing contrasting speech sounds that permit communication, and describing any rules that may be associated with these contrasts. For ease of reference, the work has been divided into two parts. The first part we have called non-tonal phonology, and the second part tonal phonology. Part 1 deals mainly with the phoneme inventory of the language, while Part 2 deals with a general review of studies in tonal phonology, and tones as they function in Kono. A chapter on the acoustic analysis of fundamental frequency in relation to Kono tone is included in the hope that it will make available measurements that would be useful for comparative purposes in future research work.

The bulk of the data on which this work is based has been the author's own speech. This has been due entirely to the absence of any other native speakers but himself. This is considered a limitation. While analysis of an idiolect may be considered desirable from the point of view of consistency, an ideal situation would be collecting data from more than one source, comparing notes, and collating results. Perception is essentially subjective, and this makes auditory analysis, especially of one's own speech susceptible to subjectiveness. We are aware however that even at the individual level, speech at a particular point in time is always subject to a variety of conditions obtaining at that time, so that strictly speaking, no one can really claim to describe the speech of an entire community.

Most of the data was recorded in a sound proof studio. Items recorded included stories and isolated words. These were then transcribed, and the transcriptions checked with two experienced linguists, the supervisors of this work. This checking, happily, reduced any subjectiveness that may have crept into the work. We also had the good fortune of running into the odd Kono speaking native whom we would interview with a view to reducing the subjectiveness of the data-gathering. Three adult native speakers were interviewed this way. It was even possible to check a 600-item word list with one of them. Like the author, all three native speakers interviewed also spoke Mende and English. All of them had been to institutions of higher education. Tape recordings of close relatives in Sierra Leone, with identical background to the author were also received. As far as could be judged, neither the author, nor any of the other native speakers interviewed, or the relatives, had any recognised speech defects. Some variations have been noted as a result of these contacts with other native speakers. Where alternative rules have been necessitated because of these variations, they have been made. Some problems have not been resolved, and these must await further research.

1.6 The symbols here used in the transcriptions are those of the International Phonetic Alphabet (IPA). Any deviations from the IPA will be indicated.

Tones will be marked according to the Daniel Jones system, as reported in Westermann and Ward (1933: 145):

ā	represents a high level tone
a	represents a low level tone
â	represents a rising tone
à	represents a high-falling tone
ḁ	represents a low-falling tone
â	represents a rising-falling tone
ǎ	represents a falling-rising tone

The a in this case represents any tone-bearing unit.

CHAPTER 2

THE VOWELS

2.1 Jones (1918: 23) tells us that

Every speech sound belongs to one or other of the two main classes known as Vowels and Consonants.

And he defines the classes thus:

A vowel (in normal speech) is defined as a voiced sound in forming which the air issues in a continuous stream through the pharynx and mouth, there being no obstruction and no narrowing such as would cause audible friction.

All other sounds (in normal speech) are called consonants.

Jones tells us that the distinction between vowels and consonants is based on acoustic considerations. Some other phonetic definitions of vowels and consonants have used articulatory criteria. But, as is now well known, a classification of speech sounds, based solely on phonetic considerations is unsatisfactory. Phonetic criteria do not always coincide with the phonological criteria in many languages, and this dichotomy poses one of the commonest problems of phonemic analysis. As Pike (1948: 78-79) sees it,

No other phonetic dichotomy entails as many difficulties as consonant.- vowel divisions; articulatory and acoustic criteria are there so thoroughly entwined with contextual and structural function and problems of segmentation that only a rigid descriptive order will separate them.

Once granted this order, however, further criteria fit the pattern quite readily for the remainder of phonetic classifications; lacking it, difficulties initiating at this point carry through a system.

Difficulties arise because of the ambivalent nature of certain segments when defined in strictly phonetic terms. One soon finds instances where phonetic properties alone are not sufficient to make the consonant-vowel distinction. Consider for instance the Kono words

	[jḕ]	'baldness'
and	[wḕ]	'remnant'

Phonetically, the [j] and [w] at the beginning of the two words sound much like the vowels [i] and [u], in whose production there is practically an unimpeded flow of air, with no closure, and no frictional noise due to narrowing. The words could in fact be [iḕ] and [uḕ]. Functionally however, both [j] and [w] are grouped with consonants because they are syllable marginals.

There have been various attempts to define the vowel-consonant dichotomy. To this end, labels like 'semivowels', 'semiconsonants', and 'syllabic' have been introduced to describe segments like [j] and [w], or [i] and [u] above. The most successful solution so far is that proposed by Pike. This is a solution based on the rigorous definition of two terms, VOCOID, and NON-VOCOID or CONTOID, which Pike (1943: 78) coined. He defines the terms in his work

PHONEMICS (1947):

VOCOID: A sound during which the air escapes from the mouth over the center of the tongue without friction in the mouth, i.e., a central resonant oral (friction elsewhere than in the mouth does not prevent a sound from being a vocoid; syllabic function or phonemic interpretation of a segment does not affect its interpretation as a vocoid or non-vocoid. p.253

NON-VOCOID: Any sound which is not a vocoid; that is, one which is not a central resonant oral; non-vocoids comprise stops, nasals, laterals, and all sounds with friction in the mouth; a contoid. p.244

This is a strictly phonetic definition which makes possible the description of isolated sounds without reference to phonological function. To keep phonetic and phonological categories separate, he introduces another term 'SYLLABIC'. Vocoids are described as syllabic if they are syllable elements, but non-syllabic if they are not. Similarly, contoids are syllabic or non-syllabic, depending on their function in the syllable. Thus, in the Kono words [jē̄] and [wē̄], [j] and [w] are both non-syllabic vocoids, and [ē̄] syllabic vocoids. The [i] and [u] of [ī̄] and [ū̄] are non-syllabic vocoids, and [ŋ] as in [ŋ dē̄] is a syllabic contoid. Pike (1943: 78) suggests that

Vowels and consonants are then categories of sounds, not as determined by their own phonetic nature, but according to their grouping in specific syllable contextual junctions.

In other words, Pike is suggesting that vowels and consonants, as traditionally used by Jones and others, will be the equivalents of his own syllabic vocoids and non-syllabic contoids. It is in this sense that we shall use the labels

VOWELS and CONSONANTS.

The traditional description of vowels is based on a two-dimensional chart which recognises:

A. Tongue Position: this is vital to the production of different vowel sounds. The part of the tongue used, and how close it approaches the palate determines whether a vowel is

(i) front, central, or back. For such vowels, the tongue moves in a general horizontal direction, assuming one of the three positions;

(ii) close, half-close, half-open, or open. In this case, the tongue moves in the vertical axis. The closer it is to the palate, the higher it is.

B. Lip Shape: This is a third dimension also used in vowel descriptions. The lips are capable of considerable movement, thus altering the shape of the orifice of the oral cavity. The lips can be spread, neutral, or rounded.

The description of the different vowel phonemes here will be based on the traditional criteria described, although modern phonetics does not consider them entirely satisfactory. It is now believed that it takes more than just lip shape and tongue position to give a vowel its characteristic quality. The shape of the vocal tract as a whole needs to be considered. Instrumental studies have shown that the so-called close vowels do not have the same tongue height for different speakers, that back vowels vary considerably in their degree

of backness, and that the two-dimensional descriptive chart does not take into account the fact that the width of the pharynx varies considerably, and to some extent, independently, of the height of the tongue, in different vowels (Ladefoged, 1975: 13). Be that as it may, traditional ways of classifying vowel quality are still regarded as fairly adequate. What one has to remember is that the terms used are simply labels or cover terms to categorise the sound of one vowel in relation to another. Tongue height and lip shape do not give absolute positions, only general directions (see Ladefoged, 1975: 66).

2.2. The vowel phonemes will first be described in isolation. Variations will be described in terms of articulatory quality (in the generally understood sense of tongue height, tongue frontness or backness, and lip rounding), length, and nasality.

Kono has a seven-vowel system, a system that would be described as symmetrical by Guthrie (1948: 12). According to him, symmetrical vowel systems have an odd number of vowels, including one low central vowel and an equal number of front (unrounded) and back (rounded) vowels, and are a characteristic of Bantu languages. They have however been widely reported among the Niger-Congo language family of West Africa to which Kono belongs. The Kono system consists of the following oral vowels:

i	u
e	o
ɛ	ɔ

a

All the vowels may occur short, or long. The short vowels will be written with a single vowel symbol, and the long variety with double, identical, symbols. Illustrations of the vowels occurring both short and long are:

b _i	'today'	b _e	'give'
b _i ^ː	'circumcised person'	b _e ^ː	'secret society ceremony'
s _ɛ	'climb'	s _i	'sit'
s _ɛ ^ː	'type of musical instrument'	s _i ^ː	'witness'
d _u	'share', 'divide'	d _o	'put on', 'wear'
d _u ^ː	'town'	d _o ^ː	'chameleon'
^ˆ kpa	'different from'	^ˆ kp _o	'bear' (of fruits)
^ˆ kp _a ^ː	'to dry'	^ˆ kp _o ^ː	'stunted growth'

The articulatory qualities of the vowels in isolation will be described in terms of the Daniel Jones Cardinal Vowel System (CVS).

/i/ = [i] This is slightly more retracted and open than cardinal one (C1).

/e/ = [e] Between C1 and C2, but nearer to C2.

/ɛ/ = [ɛ] Between C1 and C3, but nearer to C3.

/a/ = [a] More central than C4.

/ɔ/ = [ɔ] Nearer C6 than C5, with lips rounded. It is slightly advanced from C6.

/o/ = [o] Closer than for C7, with lips more rounded than for /ɔ/

/u/ = [u] Advanced from C8, with progressively more lip rounding than for the other back vowels.

2.3 The phonemic interpretation of long vowels is one of the problem areas of many West African tone languages. After an instrumental survey of sixty-one West African languages, including Kono, Ladefoged (1968: 33), had this to say:

Discussion of vowel length is always complicated by the interaction of the phonological analysis of length and tone.

Siertsema (1959: 43) gives a fairly comprehensive summary of the problems involved when she asks:

...What is to be considered a long vowel in a tone language? Should it have one and the same level tone throughout or can it have a gliding tone? Should it be in one syllable or can it be spread out over two syllables? If it can cover two syllables, should these two syllables be within one word or can we still speak of a "long vowel" when its second part belongs to the next word in the text examined?

Various solutions have been suggested to the vowel length problem, and it appears that over the years, some conventional solutions have developed. Ladefoged (1968: 33) observes that:

In general it would seem that when, as in many Kwa languages, perceptually long vowels can be on one pitch or involve a change of pitch, and when these vowels can occur in the same phonological structure as sequences of different vowels, then it is preferable to regard them as being sequences of two vowels. But when, as in Fula and Hausa (with certain minor qualifications), perceptually long vowels always have a relatively constant pitch, and occur in different circumstances to sequences of vowels which may or may not have the same tone, then we may conveniently speak of the language as having long and short vowels.

This sounds like a particularly complex solution with unknown

variables. Ladefoged for instance does not say what minor qualifications need to be made in the case of Fula and Hausa. The trend however seems to be that wherever long and short vowels occur in contrast, it is often possible to analyse the long vowels as a co-occurrence of the same single vowel. We shall examine some instances in Kono when long vowels may occur.

1. Within Words: Some words are perceived as inherently long, and can be contrasted with short ones:

tā	'go'	fē	'blow'
tā̀	'cup'	fḕ	'winnowing basket'

The questions to be considered here are whether the 'long' vowels should be regarded as unit phonemes, and how such phonemes should be represented. Observe however that while the double vowels occur with tone glides, the single ones do not. This is in fact the case in the majority of instances where long and short vowels are contrasted in Kono. There are not many instances where vowel length alone would be adequate to make the distinction between short and long vowels. It would seem then, that one would need to consider tone patterns as well in making this distinction. The tone glides on the long vowels can of course be interpreted as sequences of tones. In [fḕ] for instance, we have a glide from low to high to low. This sequence of tone glides is the same as in [tā̀], which is clearly bisyllabic. On the basis of this parallel relationship [fḕ] also would be bisyllabic, of the nature CVV, where C = consonant, and V = vowel. Note however that we have two short vowels in [tā̀], and that the single vowel

in [fē] has no glides.

In another instance, a phonetically long vowel occurs when intervocalic /l/ is dropped:

dūlū,	dūū,	'five'
wōlō,	wōō,	'six'

Although the dropping of intervocalic /l/ is optional, it is hardly ever used in speech these days. The writer was made aware of it only through discussions with other native speakers who agreed with him that most native speakers today have dropped this segment from their speech. The long term effect of such a development is the occurrence of long vowels when intervocalic /l/ is finally lost. More immediately, it emphasises the instability of long vowels. With /l/ in the examples cited, we have, unquestionably, two syllables. When it is dropped, we have phonetically long vowels which we can logically interpret as two short vowels. Note again the parallel tone patterns in all cases, although there are no glides this time. In the following example, however, we see how the interaction of tonal glides affects vowel length. 'The monkey' is kwā̀ , and 'the sheep' is sà . Now consider the following two phrases:

(a) nā kwā̀ dɔ̀mà	'my little monkey'
(b) nā sā̀ dɔ̀mà	'my little sheep'

We have lost low tones in both examples, which would seem to correlate with the lost syllables. This is an indication that there is a relationship between tonal structure, syllable structure, and vowel length, a relationship which

again underlines the instability of the long vowel in Kono.

2. Across Boundaries: Phonetically long vowels do occur in several instances across grammatical boundaries, generally in one of two cases:

(i) When the final vowel of a final syllable is elided and replaced by the initial vowel of the following syllable:

(a) $d\bar{u}n\bar{a}$ $c\varepsilon$ \bar{o} → $d\bar{u}n\bar{a}$ $c\bar{o}$, 'in this world'
 world this in

(b) $t\bar{e}\bar{e}$ $c\varepsilon$ \bar{a} → $t\bar{e}\bar{e}$ $c\bar{a}$ 'on this day'
 day this/that on

(ii) Sometimes the final vowel of the final syllable in a word is followed immediately by an identical vowel of the following syllable:

(a) $s\bar{a}\bar{a}$ \bar{a} $k\bar{a}\bar{a}$ $f\bar{a}\bar{a}$ 'Saa has killed the snake'
 'Saa has snake killed

(b) $m\bar{b}\bar{i}$ \bar{i} $t\bar{a}$ $s\bar{i}\bar{n}\bar{a}$ 'I will not go tomorrow'
 I will not go tomorrow

3. Unusually long vowels do occur, usually as ideophones.

$w\bar{a}\bar{a}\bar{a}$ (describing rain falling)

$\bar{o}\bar{o}\bar{o}$ (when expressing admiration)

Long vowels are sometimes lengthened for emphasis, as in

$p\bar{o}\bar{o}\bar{o}$ indicating far away

$b\bar{o}\bar{o}\bar{o}$ showing contempt

The discussion of long vowels shows that

(1) In the majority of cases where long vowels are contrasted with short ones, the long vowels tend to occur with tone glides. These tone glides are often

interpreted as sequences of tone which are parallel with non-suspect bisyllabic patterns elsewhere in the language, occurring with two short vowels. No comparable glides occur with the short vowels.

(2) The interaction of tones can affect the syllable structure and vowel length in words.

(3) Long vowels within a word can be unstable, both synchronically and diachronically. In some cases at least, these vowels can be interpreted as short vowels.

(4) Phonetically long vowels are more common than phonemically long ones.

The arguments, as summarised, appear to be in favour of the phonemic interpretation of long vowels as two short vowels, which is what has been done here. This interpretation also has the advantage of observing the important linguistic principles of simplicity and economy. The introduction of long vowel phonemes would have doubled the vowel phoneme inventory. Finally, the interpretation conforms to what can be regarded as the general trend in Niger-Congo languages. According to Welmers (1971: 24):

Contrasts between short and long vowels are common among Niger-Congo languages. Phonemically long vocalic segments can in every known case, be readily interpreted as double vowels. In innumerable instances, this is demonstrably the best analysis.

2.4 Instances of sequences of two consecutive dissimilar vowels in one word have been recorded. These, and the double, identical vowels just discussed are set out in

Table 3 below.

TABLE 3

Sequences of Two Consecutive Vowels (Within One Word)

ii	ee	εε	aa	ɔɔ	oo	uu
			ia		io	
			ea			
εi						
ai	ae				ao	au
ɔi		ɔε	ɔa		ɔo	ɔu
	oe		oa			
ui		uε	ua	uɔ	uo	

Illustrations of two dissimilar consecutive vowels occurring are:

[εi] as in [fε̄i] 'pray', [wē̄i] , 'work'

[ai] as in [kpā̄i] 'trap', [kā̄i] 'hoe'

[ɔi] as in [fɔ̄bɔ̄i] , name of person

[ui] as in [būi] , 'running' [bū̄i] 'medicine'

[ae] as in [ā̄e] , in rapid speech, with question intonation meaning 'right?'

[oe] as in [fə̄ā̄bō̄è] 'parrot'. One suspects that fə̄ā̄bō̄i above is an anglicised version of this example. The writer knows of only one family with that name, living in a chiefdom that borders on a Mende one. Both Mende and Kono have the same word for 'parrot', and the fact that [ɔi] and [oe]

rarely occur within one word in Kono suggests that they may not have been part of Kono phonology originally.

[ɔɛ] as in mɔ̄tɔ̄ɛ , 'motor car', pɔ̄pɔ̄ɛ , 'a type of tree'. [uɛ] as in fuɛ , 'ghost'. (This example is from one of the informants. The writer and another informant said fuɟɛ).

[ia] as in bīa , 'catch', cīâ , 'road'

[io] as in kīō , 'Creole'

[ea] as in dēâ , 'lizard', fēa , 'two'

[ɔa] as in kɔ̄a , 'shoe'

[oa] as in kōkō̄a , 'tale', 'story'

[uâ] as in dūâ , 'bless', dūâ 'hernia'

[uɔ] as in kūō , 'talk', kūōfō , 'forever'

[aɔ] as in āɔ , cry of Poro men (male society)

[ɔo] as in nɔ̄o , Sande (female society) official, name of person

[uo] as in ūo , expression of surprise

[au] as in kāù , 'moon', maù 'shame'

[ɔu] as in dōu , 'duck', kōu 'wooden box'

The dissimilar vowel sequences illustrated suggest that it is at least possible to analyse Kono in a way that includes the setting up of diphthongs. In so far as a diphthong consists of two vowels of different qualities, Kono has diphthongs. However, diphthongs demand more than a glide from one vowel to a different one. According to Jones (1918: 58),

A diphthong must necessarily consist of one syllable.

In this sense then, we cannot set up diphthongs in Kono. The interaction of tone and syllable would not appear to justify this if one defines syllables in terms of tones. Every syllabic segment, and these are usually vocalic, would be expected to carry tone. The examples show a lot of tonal glides which can be interpreted as sequences. As was shown in the discussion of vowel length, these glides can be interpreted as sequences of tone which are parallel to non-suspect syllabic patterns elsewhere in the language. We should therefore look on the dissimilar vowel sequences as a combination of two pure vowels, belonging to two different syllables. Again, this way, we are observing the principle of economy.

A look at Table 3 shows that the following theoretically possible sequences are missing:

	ie	iε	io		iu
ei		eε	eɔ	eo	eu
	εe		εa	εɔ	εo
		aε	aɔ		
	ɔe				
oi		oε	oɔ		ou
	ue				

While we do not claim that Table 3 is exhaustive, it must be noted that the data available does not reveal any one single word with any of the above theoretical sequences. One would need to look at interconsonantal positions and across word boundaries for the full range of theoretical possibilities.

This will be done when we look at syllable structure in a subsequent chapter.

A problem often associated with dissimilar vowels in sequence is whether some of them should be interpreted as VV, or CV. This is a problem we have already mentioned in our discussion of descriptive criteria (cf. pp. 26-28), when we considered the examples [jḕè̀], or [ī̀ḕ] and [wḕè̀] or [ū̀ḕ]. The problem is usually considered in terms of the overall pattern of vowel occurrences within the language. Having established a VV pattern, it seems preferable to interpret them thus. An alternative, already suggested, is to analyse them as CV. We shall consider this possibility when we look at the consonant phonemes. For now they should be regarded as VV.

2.5 Nasalised counterparts of all the seven oral vowels described have been recorded. The problem to be resolved here is the phonemic status of these nasalised vowels. Are we to represent them as simple nasalised vowel phonemes, or as a sequence of vowel plus nasal consonant? We will begin by examining the argument for nasalised vowel phonemes.

It is reported in Ladefoged (1964: 23) that

In order to show that there is a distinction in certain languages between oral and nasal vowels, and between the members of one of these pairs, it is necessary to find contrasts between at least three out of the four phonetic items CV-CV̄-NV-NV̄ (where C stands for the oral consonant in the suspicious pair ..., N for the corresponding nasal or nasalized consonant, and V for one of the vowels of the language).

On this basis, there are five nasalised vowel phonemes

in Kono, /ĩ,ẽ,ã,õ,ũ/, as the following examples show:

di 'sweet'	dĩ 'press, squeeze'	ni 'if'
(ŋ) de 'mother'	dẽ 'child'	
sɛ 'to climb'	sẽ 'to sharpen'	nɛ 'here'
sa 'to lie down'	sã 'to buy'	na 'my'
bɔ 'to take off, get out'	bõ 'to spill, scatter'	mõ 'to stop crying'
bo 'excrement'	bõ 'to stone'	
bu 'stomach'	bũ 'to overturn'	mũ 'turn'

The pattern of nasalisation here identified is reportedly common in many African languages. Welmers (1973: 32) for instance reports it for Kpelle, the Senufo languages, and Bariba, languages not considered to be closely related. He observes that:

Where such a pattern of distributionally restricted nasalisation is found, it is also likely that vowels not subject to nasalisation (/e,o/ in the above and apparently very commonly) also do not occur, or occur only rarely after nasal consonants.

This seems to be the case here as our examples show. Note however that there is a distinction between di and dĩ, and between dĩ and dẽ. There is also a distinction between bo and bõ, and between bõ and bũ. Since we have not been able in this study to find an explanation for the occurrence of /ẽ/ and /õ/, do we not recognise them as phonemes? Siertsema (1957:356) notes that

To establish the number of nasalised vowel phonemes it is not enough to find minimal

pairs in which an oral vowel is contrasted with its nasalised variety; the point is to find minimal pairs with mutually contrastive nasalised vowels.

On the basis of mutually contrastive nasalised vowels, /ẽ/, and /õ/ should be recognised as nasalised vowel phonemes. We now have a situation where we can either recognise five nasalised vowel phonemes, or seven. It should be noted that by observing the ranges of tongue movement of Yoruba native speakers, Siertsema is able to reduce the number of Yoruba nasalised vowel phonemes to three, grouped as

1. a more - or less - close front unrounded one,
2. a more - or less - close back rounded one,
3. a more - or less - front (or back) open one.

Such an analysis is commendable, particularly from the point of view of detail. It is not impossible however that with further statistical information and some more qualifications, the number of Yoruba nasalised vowel phonemes could be further reduced. Such information is unfortunately not available to us in our study of Kono here.

There is, then, clear evidence in Kono of linguistic distinctions being dependent on the distinction between nasalised and non-nasalised vowels, and the existence of phonemic nasalised vowels is attested in a number of West African languages. These facts are, however, not conclusive, and we must examine another possible phonological interpretation of vowel nasality in Kono. The crucial evidence is the fact that Kono is one of the many Niger-Congo languages where the only consonant to occur in final

position is the velar nasal /ŋ/. In our case, always, in this position, /ŋ/ is immediately preceded by a vowel which is phonetically nasalised. If in addition to this we were to find that nasalised vowels are always followed by a nasal consonant, then it would be obvious that a phonological solution that represented both vowel nasality and syllable-final nasal consonants would be redundant, since one must be predictable from the other. This is in fact the case, so that for the phonetic representation given in the left-hand column of the following data, two possible phonological representations, columns A and B, are potentially acceptable, while the transcriptions in column C are redundant:

	A	B	C
[dãŋ] 'to count'	dã	daŋ	dãŋ
[dĩŋ] 'to press, squeeze'	dĩ	diŋ	dĩŋ
[dẽŋ] 'child'	dẽ	deŋ	dẽŋ
[fẽŋ] 'to look'	fẽ	feŋ	fẽŋ
[sõŋ] 'to know'	sõ	soŋ	sõŋ
[bõŋ] 'to stone'	bõ	boŋ	bõŋ
[bũŋ] 'to overturn, cover'	bũ	buŋ	bũŋ

If the representations of column A are accepted, it is necessary to say the [ŋ] in the phonetic representation is conditioned by the vowel nasality. That is,

(1) a nasalised vowel phoneme / \tilde{v} /, is realised phonetically as [$\tilde{v}\eta$]. If the representations of column B are accepted, one must say that the vowel nasality is conditioned by

the presence of a nasal consonant. Consequently:

(2) a vowel phoneme is realised as a phonetically nasalised vowel when it immediately precedes a nasal consonant.

The choice between the interpretations is not easy, but one must try to avoid making a purely arbitrary choice. The deciding factor is something that is to be explained in a later chapter when we will propose that syllable-final consonants can be tone bearing. It is highly improbable that a purely phonetically determined nasal consonant as found in (1) above could be the bearer of phonologically distinctive tone. We therefore prefer the analysis that implies (2) above. As a linguistic analysis, our interpretation here seems to be preferable, particularly from the point of view of simplicity. All we have done is to utilise, structurally, the vowel phonemes we have in our vowel phoneme repertoire, with no loss of linguistic information. Nasalisation as here interpreted is predictable, so we do not need to show it in our transcriptions. Another advantage of this kind of analysis is that it makes possible the interpretation of prenasalised consonants so that syllable division does not fall in the middle of a phoneme. We shall consider this a little more in our discussion of prenasalised consonants. Finally, in support of this analysis, it should be remembered that phonemic nasalisation is rare in Kono. Welmers (1976: 26) reports a similar situation for Vai:

Phonemically nasalised vowels are not at all

common, and are not clearly part of the inherited phonology of Vai, which, however displays a structural counterpart in stem-final /ŋ/.

The same could be said for Kono.

CHAPTER 3

THE CONSONANTS

3.1 Our description of the vowel phonemes in the last chapter was based on traditional criteria. The same pattern will be observed in our description of the consonant phonemes in this chapter.

The traditional classification of consonants is usually referred to as classification by place and manner. Thus, a conventional consonant chart has a horizontal axis showing the place of articulation, and a vertical axis showing the manner of articulation. The classification is usually based on the following factors:

- (i) Place of Articulation - we consider which point or points of the speech organs are used; for example, the lips.
- (ii) Manner of Articulation - we consider how the articulators are used, noting those that are active, and those that are passive.
- (iii) State of the Vocal Folds - we consider whether they are vibrating as for voiced sounds, or not vibrating, as for voiceless sounds.
- (iv) State of the Soft Palate - we consider whether it is raised to close the nasal cavity as for oral sounds, or lowered, as for nasal sounds.
- (v) Air-Stream Mechanism - we need to be aware of which air-stream mechanism is involved, and whether

the air stream is ingressive or egressive.

These factors will form the basis of our description of the consonant phonemes. We are aware of course, that the descriptions could be more detailed. Gimson (1970: 29) notes for instance, that:

a more detailed description would include additional information concerning for instance, the shape of the remainder of the tongue, the relative position of the jaws, the lip position etc.

For a long time now however, the above factors have been considered adequate, convenient, and economical, in the description and classification of consonants. Often, three-term labels referring to the state of the vocal folds, the place of articulation, and the manner of articulation are enough for descriptions.

As with vowels, traditional classifications of consonants make some assumptions, but this fact does not invalidate the classifications. One such assumption is that we can classify speech sounds as discrete units. It would seem that such an assumption is necessary for practical reasons. Abercrombie (1967: 42) reminds us that:

Although the organs of speech are in continuous movement all the while we are talking, we describe syllable-segments as if they were produced by postures of the organs. Speech is not really a succession of discrete postures, but the only practicable way to describe it is as if it were.

3.2 Description of the consonant phonemes will be in

two stages. The first stage will be devoted to the description, in isolation, of consonant phonemes that have been established by the discovery of minimal pairs. Problem areas in the analysis of Kono consonant phonemes will be considered in stage two, particularly noting how their interpretation affects the phoneme inventory and the language's phonological structure. Some of the problems encountered are reportedly common to many languages in West Africa. In such cases, we shall look at the different ways in which the problems have been solved, to help us resolve our own problems. It is well known of course, that some solutions have been rather arbitrary for reasons of convenience. Ladefoged (1964: 1) reports for instance, that in many West African languages,

The decision as to whether to regard the members of a particular sequence of consonants as single phonemic units or as clusters is, of course, often arbitrary.

The lack of adequate information in some cases will mean that only tentative solutions will be offered for some problems. Such problems will be described, and alternative solutions considered.

The following non-suspicious phonemes have been established by the discovery of minimal pairs:

p	b	m		f	w
t	d	n	l	s	
c		ɲ			j
k		ŋ			
(kp)	(gb)				

Evidence for the phonemic status of the above seventeen

phonemes can be found in the following minimal pairs:¹

pạà	'scar'	n̄	'there'
tạà	'drinking vessel'	f̄	'to say'
kạà	'snake'	d̄ulū	'five'
mạà	'plantain'	d̄usù	'fibre'
fạà	'heart'	kāmā	'shoulder'
sạà	'sheep'	sāmā	'miss'
wāà	'mat'	māpā	'ant'
jạà	'lion'	kāpā	'bilharzia'
kạsà	'rust'	k̄pāpā	'plier'
k̄pāsà	'head-tie'		
b̄ɛŋɛ̣i	'bench'		
ḡb̄ɛŋɛ̣i	'type of pot'		
s̄ō	'horse'		
ḡbōo	'padlock'		
c̄ɛ̄	'war'		
f̄ɛ̄	'winnowing basket'		
n̄ɛ̄	'fish'		
j̄ɛ̄	'baldness'		
b̄ōndi	'bundle'		
ŋ̄ōndi	'to snore'		
kạkāà	'box'		
ŋ̄āŋ̄āà	'a type of bird'		

We shall now describe the consonant phonemes as if they occur in isolation.

/p/ = [p^h] Voiceless bilabial plosive. Plosives are pro-

¹ All the nouns in these examples are definite forms.

duced when at least two articulators inter-act to form a firm closure. Pressure builds up behind this closure as the flow of air from the lungs is obstructed. The sudden opening of the firm closure releases the built-up air, which escapes with force if the pressure is still high. There is no vibration of the vocal folds for $[p^h]$ so it is voiceless, the soft palate is raised, making it an oral sound, and it is produced with the pulmonic egressive air-stream mechanism, as are all Kono consonants, except $/\widehat{kp}/$ and $/\widehat{gb}/$. The lower lip is the active articulator, forming a firm closure with the upper lip which is also capable of some movement. Some aspiration usually accompanies the release of the air in the articulation of the voiceless plosives in the subject's speech. The presence or absence of aspiration is however not linguistically significant. It was shown in a 1978 exercise¹ that the opposition between Kono voiceless and voiced plosives was due more to a voicing lag-voicing lead contrast. The considerable voicing lead that accompanied the voiced plosives was absent in the case of their voiceless cognates.

$/b/ = [b]$ Voiced bilabial plosive. Articulated in the same place as $[p^h]$, but with the vocal folds vibrating. It would seem that the vocal folds begin to vibrate or continue to from the moment the lips close, and continue during the whole time the lips are closed.

$/t/ = [t^h]$ Voiceless alveolar plosive. The tongue is the

1. This was a post-graduate diploma class exercise designed to compare the voice onset times for the plosives of Kono.

active articulator, its blade moving up to form a firm closure with the alveolar ridge. The vocal folds do not vibrate, the soft palate is raised, and it is accompanied by some aspiration.

/d/ = [d] Voiced alveolar plosive. The vocal folds vibrate, the soft palate is raised.

/c/ = [c] Voiceless palatal plosive. The tongue is the active articulator. The front of the tongue moves upwards to articulate with the hard palate and form an obstruction. There is usually some affrication accompanying this sound in the subject's speech. The release stage is however more sudden than is normally associated with affricates such as in British English. It may be that in the speech of some other native speakers there is enough affrication to justify its classification as a palato-alveolar affricate. Both [c] and [tʃ] may well occur as free variants. The vocal folds do not vibrate, and the soft palate is raised.

/k/ = [k^h] Voiceless velar plosive. The tongue is the active articulator. The back of the tongue rises to form a firm closure with the velum, thus obstructing the flow of air. The vocal folds do not vibrate, the soft palate is raised, and it is accompanied by some aspiration.

/k̄p/ = [k̄p] 'Voiceless' labial-velar plosive, so called because its production involves both labial and velar articulations taking place simultaneously. Although described as 'voiceless', it ought to be mentioned that some voicing does in fact accompany the articulation of [k̄p]. The author was first made aware of this by Shirt (personal

communication) when she observed that she perceived as [gb̄] what he had transcribed as [kp̄]. Voicing in [kp̄] was later confirmed by the exercise referred to earlier in this chapter (see page 49). It was observed then that [kp̄] had a voicing lead of approximately - 10 m secs. This contrasted with a voicing lead of - 70 msec for [gb̄], the voiced counterpart. Voicing in [kp̄] is however not an unusual phenomenon in West Africa languages. Ladefoged (1964: 9) reports it for Idoma and Isoko, where

...all three airstream mechanisms are involved. After the two closures have been made there is a backward movement of the tongue as in the Itsekiri kp̄; and during the latter part of the sound there is also a downward movement of the vibrating glottis. Thus, despite the orthography these sounds are in part voiced.

Without the benefit of Ladefoged's instrumental techniques, it is difficult to say with certainty that this is the case in Kono. One can however detect proprioceptively some suction in the oral cavity during the closure, suggesting some ingressive air-stream action, and the plosive release can be associated with the pulmonic egressive air-stream mechanism. The author accepts, for now, Ladefoged's view on the matter. He reports that he is

...fairly sure that Kono and some of the other languages counted as having partly voiced [kp̄] also use the three mechanisms simultaneously. p.11

The three mechanisms he is referring to are an ingressive glottalic mechanism, the ingressive velaric, and egressive

pulmonic mechanisms.

/g̃b/ = [g̃b] Voiced labial-velar plosive. The vocal folds vibrate, and the soft palate is raised.

/m/ = [m] Voiced bilabial nasal. The soft palate is lowered in the articulation of all nasal sounds. With the soft palate lowered, air escapes through the nose mainly. For [m] the lips form a closure, and with the soft palate lowered, air escapes through the nose. The vocal folds vibrate.

/n/ = [n] Voiced alveolar nasal. The tongue tip articulates with the teeth ridge which is the passive articulator. The tongue is grooved around the centre as the sides make contact with the palate.

/ɲ/ = [ɲ] Voiced palatal nasal. The front of the tongue forms a closure with the hard palate.

/ŋ/ = [ŋ] Voiced velar nasal. The back of the tongue makes firm contact with the lowered soft palate.

/l/ = [l] Voiced alveolar lateral. Lateral consonants are characterised by the fact that lung air escapes not through the centre of the mouth, but by the side, or sides, as the case may be. This lateral escape is the result of closure due to contact of articulators at some point in the centre of the vocal tract. The escape is sometimes accompanied by friction. Such a closure is formed in our case when the tongue blade is placed against the alveolar ridge, thereby creating an obstruction to the escape of air through the centre of the mouth. Escape of air is on both sides of the closure. There is no audible friction, and the sound can be described as a continuant. The soft palate is raised,

and the vocal folds vibrate.

/f/ = [f] Voiceless labio-dental fricative. Fricatives are sounds produced with friction. An active articulator moves towards a passive one to form a narrow passage through which air passes with friction. The lower lip is the active articulator for [f], moving upwards to articulate with the upper teeth. Turbulence is created by air passing through the narrowed passage between the lower lip and the upper teeth, thus creating friction.

/s/ = [s] Voiceless alveolar fricative. The tongue is the active articulator, its blade forming a narrow channel with the alveolar ridge. Friction is created as air passes through the channel. The soft palate is raised. There are no voiced counterparts for the fricatives just described, but this is not unusual for Niger-Congo languages.

/w/ = [w] Voiced labial-velar approximant. Approximants are produced when an active articulator moves towards a passive one, leaving a gap that allows air to pass through without causing friction. We have already discussed the problems posed by the ambivalent nature of the approximants [w] and [j] (see Chapter 2). The articulation of [w] takes place in two places simultaneously, at the lips, and at the velum, hence the name labial-velar. The lips are rounded at the same time as the back of the tongue is raised towards the velum, giving the sound an [u] resonance. The vocal folds vibrate, and the soft palate is raised.

/j/ = [j] Voiced palatal approximant. The tongue is the active articulator, with the front rising to about the same

height as [i]. The sides of the tongue make some contact with the hard palate, but not as firm as for plosives for instance. The vocal folds vibrate, and the soft palate is raised.

3.3 Let us now consider some phonemic interpretation problems posed by the consonants. We shall start by looking at the relationship between the plosive sounds [c], [ɟ], [k], and [g]. Notice first of all that the voiced palatal sound [ɟ] and the voiced velar sound [g] are missing from our phonemic inventory. On the basis of minimal pairs, it is difficult to assign phonemic status to either of these sounds. Considering its distribution however, we could readily analyse [ɟ] as an allophone of the /c/ phoneme. The two are in complementary distribution. When [ɟ] occurs within a stem, it is always after a nasal, to the exclusion of [c]. In stem initial position however, we have [c], to the exclusion of [ɟ]. Examples of such occurrences are:

b̄ɛ̄ŋɟ̄i	'the bench'	c̄ɛ̄	'this'
ḡb̄ɛ̄ŋɟ̄i	'a type of pot'	c̄ɛ̄n̄ɛ̄	'the house'
s̄im̄iŋɟ̄i	'the ginger'	c̄ɛ̄ɛ̄	'the war'

For the above pattern to be maintained after morpheme boundaries, some restrictions have to be observed. When the definite noun is followed by the demonstrative c̄ɛ̄, [c] becomes [ɟ], as in the following examples:

k̄ɔ̄n̄ɛ̄	c̄ɛ̄	becomes	k̄ɔ̄ŋɟ̄ɛ̄	'this tree'
the tree	this			

sōn̄ɛ	c̄ɛ	becomes	sōŋɛ̄	'this hole'
the hole	this			
kāmīn̄ɛ	c̄ɛ		kāmīŋɛ̄	'this man'
the man	this			
fēn̄ɛ	c̄ɛ		fēŋɛ̄	'this thing'
the thing	this			

We are still observing a pattern where we have [c] in stem initial and [ɛ̄] after a nasal. The pattern however alters when the definite noun changes to the indefinite and is followed by an adjective with [c] in initial position. [c] in this position remains unaltered even though the indefinite may end with a nasal. Thus we have

kɔ̄n̄ɛ̂	c̄in̄am̄à	'the big/large tree'
the tree	big/large	
kɔ̄ŋ	c̄in̄am̄à	'a big/large tree'
a tree	big/large	
sōn̄ɛ̂	c̄in̄am̄à	'the big/large hole'
the hole	big/large	
sōŋ	c̄in̄am̄à	'a big/large hole'
a hole	big/large	
kāmīn̄ɛ̂	c̄in̄am̄à	'the big/large man'
the man	big/large	
kāmīŋ	c̄in̄am̄à	'a big/large man'
a man	big/large	

[c] also remains unaltered after pronouns, verbs, or monetary units ending with a nasal

āŋ	c̄ēē	'their husband'
their	husband	

sī	ŋ	cīnē	mā	'sit on my foot/lap'
sit	my	foot/lap	on	
ḁ	sīŋ	cε	mā	'rub it on this (one)'
it	rub	this	on	
bḁŋ		cε	ō	'refuse/reject this one'
refuse/reject	this	one		
pōŋ	cεmā	dōndō		'one hundred pounds'
pounds	hundred	one		
sīŋ	cεmā	wōŋfēḁ		'seven hundred shillings'
shillings	hundred	seven		

Having thus delimited the environments in which [c] and [ɟ] occur, we can safely analyse [ɟ] as an allophone of /c/, with which it occurs in complementary distribution.

The relationship between [k] and [g] is not as readily analysable as that between [c] and [ɟ]. As with [ɟ], [g] does not occur freely. It occurs after nasals, such as in *taŋgḁ* 'cassava', or *fḁŋgḁ*, 'heavy'. Unlike [c] and [ɟ], [k] and [g] can occur in the same environment after nasals, as in the following examples:

sḁŋkō	'name of person'	sḁŋgḁ	'death'
būŋkumā	'a type of dish'	bōŋgḁ	'a type of fish'
bōŋkwē	'special type of dish'	bēŋgḁ	'spoon'
būŋkwḁ	'a covering'	kḁŋgḁ	'thief'

A closer look at our examples will show however that it is possible to analyse the environment in which [k] and [g] occur as different, making it possible to analyse the two as occurring in complementary distribution. In all instances

where [k] occurs after a nasal, there is a morpheme boundary between them. [g] occurs after the nasal within a morpheme. Let us examine them individually:

(1) saḡkō = 'name of a person'. At least three tribes in Sierra Leone have this name, and in each of them, it could be broken down into at least two morphological units. In Kono sā = 'to lay' ḡ = 'my' kōō = 'in front of', 'beneath', 'under'. Thus sāḡkō would mean "lay in front of/beneath/under my/me". Going back to slave times, it is not difficult to see how such a name may have originated. This is probably a reference to slaves who were constantly required to

saa	tīca	Saa	The Teacher
tamba	tēlɔ	Tamba	The Tailor
komba	dēēba	Komba	The Driver

for people, and the following for some tribes:

kpεε	sε	mwε	'a palm tree climbing person'.
wine	climbing/	person	'This is a reference to the Limba tribe who are famous for tapping palm wine.
kɔɔ	tε	mwε	'rice cutting person', reference to Mende who are recognised rice farmers.
rice	cutting/	person	
taḡga	twi	dāūḡ	mwε
cassava	rotten eating	per-	'rotten cassava eating person' meaning a Krio, well-known for eating 'foo foo', made by pounding fermented cassava.
son			

In the light of this, one can well imagine saḡkō being

a reference to 'those who prostrate themselves'. Alternatively, it could be a reference to the master himself, (by the slaves) who is always ordering slaves to prostrate themselves. This alternative explanation is supported by Lamin Sankoh (personal communication) who is a Temne. According to him, in Temne,

sâŋ = 'to bend' kɔ̄ = 'him, her'

In Temne then, sâŋkɔ̄ would mean 'bend him/her'.

In Mandingo, saŋkɔ̄ means the same as in Kono:

sā = 'lay', ŋ = 'my', kɔ̄rɔ̄ = 'in front of', 'beneath', 'under'. It is significant here that saŋkɔ̄ when broken down into different morphological units in three different languages means the same. It is suggestive of a common origin.

(2) b̄ŋkum̄à = b̄ŋ 'cover' + kum̄à 'on top'. For this dish, particular types of leaves are used to cover the cooking rice at some stage.

(3) b̄ŋkw̄à = b̄ŋ 'cover' + kw̄à 'cloth = 'cloth for covering'. This serves as a kind of blanket.

(4) b̄ŋkw̄ɛ̄ = b̄ŋ 'scatter' + kw̄ɛ̄ 'rice' = 'rice for scattering'. This is rice associated with a particular ceremony.

The examples cited above represent the entire list of words recorded in the corpus with [k] immediately following [ŋ]. Broken down the way we have, we could say that when [k] occurs after [ŋ], it is across morpheme boundaries. Such division is however not possible in the case of [g] occurring after nasals. When it occurs, it does so within one indivisible

morphological unit. In this regard then, [k] and [g] can be said to be in complementary distribution, and would therefore be said to be allophones of the /k/ phoneme. We must recognise however that in two instances, this pattern alters. These two instances are

wīŋ	g <u>u</u> a	'good evening' (plural)
īŋ	g <u>ɔ</u> i	'thank you' (singular)

In both cases, we see [g] occurring after the nasal across morpheme boundaries. One might indeed wonder why we have not classified /g/ as a phoneme since gua for instance contrasts with sua, 'witch' as minimal pairs. One reason we have not done so is because gua and gɔi are the only two words in our corpus with initial [g]. More importantly however, whenever either gua or gɔi occurs, it is always preceded by a pronoun. Neither ever occurs alone. This means then, that although gua and gɔi appear grammatically as two morphological units with the preceding pronoun, they are in fact occurring phonologically as one unit. Such a distribution therefore still allows us to interpret [k] and [g] as allophones of the /k/ phoneme, occurring in complementary distribution. Whereas [k] occurs stem initially and after [ŋ] only across morpheme boundaries, [g] occurs only after [ŋ] within the same morpheme, and never stem initially. Welmers (1976: 4) reports a merger of proto-Northern-Mande[k] and [g] as modern Vai /k/ and a similar development for Mandekan. It would seem that in Kono too, such a merger has taken place.

Evidence for the independent occurrence of /g/ will be provided later in this section.

It is possible to interpret [ɟ] and [g] as allophones of the same phoneme. Although both occur only after [ŋ], the following examples show that there is a difference in the environments in which they occur:

p <u>u</u> g <u>a</u>	'to scramble for'	cīŋɟī	'sweet'
t <u>a</u> g <u>a</u>	'cassava'	bēŋɟī	'bench'
kāŋgō	'back of neck'	gbɛŋɟī	'type of pot'
kɔŋgɔ	'hill'	sīmīŋɟī	'spice'
kōŋgō	'village'	bɛŋɟā	'greediness'
k <u>u</u> g <u>a</u>	'to redeem'	kāmīŋɟā	'manhood'
gbɛŋg <u>u</u>	'to lean against'	jɛŋɟɛ	'to and fro movement'
bēŋgā	'spoon'		
nīŋgī	'cow'		
nīŋgīn <u>a</u> ŋg <u>a</u> t <u>u</u>	'rainbow'		
s <u>a</u> ŋgē	'now'		
jɛŋgēēŋɛ	'rope bridge'		

One observes from the examples cited that [g] is usually followed either by the central vowel [a], or by a back vowel. In all the cases where it is followed immediately by a front vowel, there was disagreement in pronunciation between the subject and Johnny (informant). In Johnny's speech, one hears nīŋɟī, saŋɟē, and jɛŋɟēēŋɛ. Koelle in 1854 however records nīŋgī for 'cow', just as the subject does today. This is evidence of linguistic change, complete in the case of Johnny, but not in the case of the subject (see

introductory chapter). Let us now note that [ɟ̚] is always followed by a front vowel, notably [i]. The two instances where it is followed by [a] are predictable. One form of the noun morpheme is [ja]. When this morpheme is immediately preceded by [ŋ], [j] becomes [ɟ̚].

Thus we have

kāmīŋ 'a man' and kāmīŋɟ̚à 'manhood'
 bɛŋ 'to be greedy' and bɛŋɟ̚à 'greediness'

In a similar circumstance [ɟ̚], can also be followed by [u]. Such an occurrence, as in the above instances, is phonetically conditioned, as can be seen in:

kāŋ + ju = kāŋɟ̚u 'neck rope'
 neck rope

Our examples show that the environments in which [g] and [ɟ̚] occur after [ŋ] can be delimited. [g] is always followed by [a] and the back vowels. The phonologic occurrence of [g] + back vowel is sometimes phonetically realised as labialisation, such as in

kɔŋgɔ 'hill', but kɔŋgwɛ 'the hill'

When [ɟ̚] occurs, it is always followed by a front vowel, notably [i]. Circumstances in which it is followed by [a] or a back vowel are predictable. We could thus say that [ɟ̚] and [g] are in complementary distribution, and therefore allophones of the same phoneme. But what phoneme? We have already described both [ɟ̚] and [g] as allophones of the /c/ and /k/ phonemes respectively. Could [ç], [ɟ̚], [k] and [g], all be allophones of a single phoneme? An examination of

the data shows that this does not call for an excessive stretch of the imagination, particularly when one recognises that the relationship between [c] and [k] parallels that between [ɟ] and [g] . When [c] occurs, it is followed by the front vowels [i, e, ε]. It is never followed by [a], except for borrowed words such as *cānsi* , 'chance', or place names such as *cāŋjādū* , and it is not followed by back vowels, except for two words in our corpus. The two words are

coō 'tortoise', 'dream'

and

coma 'witch doctor'

Some diachronic analysis could be useful here. Koelle's POLYGLOTTA AFRICANA contains only three instances where *ds* (*tʃ*, equivalent to our *c*), occurs. These three instances are (transcription and translation are Koelle's):

ndṣōla 'I dream'

kōndṣāwa 'camwood'

ndṣele nda 'I laugh'

It is significant that even at this time, the only word where *ds* is followed by a back vowel is *dsō* , 'dream'. In the other two examples, it is followed by [á] and [é] . A few things become obvious when we realise that all of Koelle's examples are in fact phonetic contractions of different phonological items:

ndṣōla = *ṅ cōō a* 'I dreamt'
 I dream t

kōndsāwa = kɔŋ jāwà = 'red tree'/'camwood'
 a tree red

ndséle nda = ŋ jêŋ da = 'I laughed'
 I laugh ed

A minor criticism here is that although Koelle transcribes the utterances with the past marker [a], he translates them in the present. What matters to us at the moment however is the occurrence of [dʂ]. Notice that in two cases where it occurs, it is phonetically conditioned, the result of separate grammatical units coming together. Is it not possible therefore that [cɔ̀] and [cɔ̄] could have developed phonetically in similar circumstances? It is significant in this respect that in Vai, we have the same word [kêù], for 'dream', and [kêú] for 'tortoise', just as Kono has the same word, [cɔ̀], for both. Could cɔ̀ have developed from [kêù]? A possible development in such a change would be [k] becoming [c] by a process of palatalisation. One has to note in this regard that [i] and [e] are sometimes used interchangeably, when not contrastive, in the speech of some Kono, the writer being one of them. We should also remember that in our inventory of dissimilar vowels in sequence, we do not have /eu/, the [o] following [c] would then be a compromise in the articulation of [eu]. We have seen in our discussion of long vowels of course, that it is possible for a front vowel, followed by a back vowel, to be realised phonetically as a co-occurrence of two back vowels. An example of this would be

kōngō cɛ ɔ̄ = kōngō cɔ̄ɔ̄ = 'in this village'
 village this in

There does not appear to be a seemingly plausible explanation for the origin of [c_om_a]. What may be considered an extreme explanation may be ventured however. One function of the witch doctor is interpreting dreams and predicting future occurrences. He is usually generously rewarded for preventing any evil he may have predicted from interpreting the dream. One might well imagine him telling his clients that their dreams are in fact a foreboding of things to come, and not a dream. One form of the negative marker in Kono is [ma]. We would thus have the witch doctor telling his clients.

c_o m_a 'it is not a dream'

[c_om_a] as a rather cynical reference by the clients to the witch-doctor would then not be far-fetched. That this is not mere speculation is reflected in the fact that the witch-doctor's assistant never publicly refers to him as [c_om_a]. He calls him [s_u m_an_sā]
witch Chief/King

We have been speculating on what the possible sources are of [c_oô] and [c_om_a], in an effort to explain the occurrence of a back vowel following [c]. With the exception of two words, we have shown that it is possible to interpret [c] and [k] as allophones of the /k/ phoneme. [c] occurs only with the front vowels [i], [e], and [ɛ] to the exclusion of [k], and with [a] in loanwords and place names. When it occurs with a back vowel, it is a phonetically conditioned realisation of two phonological units. [k] on the other hand occurs only with [a] and the back vowels to the exclusion

of [c], so that [c] and [k] could be said to be in complementary distribution. Such an analysis makes it possible for us to interpret [c], [ɟ], and [g] as allophones of the /k/ phoneme. The fact of the matter however is that we can not ignore the occurrence of [c_{oo}] and [c_{oma}]. On the basis of minimal pairs alone, we need to recognise the phonemic status of /c/ and /k/. Such a recognition is heightened by the changing nature of the language. What seems obvious is that [c] developed from [k] by a process of palatalisation. Support for this observation can be found by comparing some lexical items with [k] followed by close or half-close front vowels as recorded by Koelle in 1854 and those same items as they occur in modern Kono.

KOELLE	MODERN KONO	ENGLISH
n.kelen	ɲjelen	one (when counting)
kên.e	cēnɛ	foot
turo-kéla	tōō cīa (writer) cēa (informants)	ear-ring
kīli	kīî (writer) cīî (informants)	egg'
akīmāle	a cīmā	the wet/cold one
fērēké-tina	fēē cē tīna	the market place
kēnē-dala	cēnɛ dāā	the doorway

Linguistic change of this nature may have started between the publication of Koelle's work in 1854 and the publication of the first of Migeod's two volumes in 1911. Migeod (p.262)

gives the following for his 'Kono' specimen No. 17:

17 Khinoi (or) Chinui Sleep Sleeping Place

Migeod's use of '(or)' would suggest either that he was not sure of what he heard, or that either form was optionally acceptable. In either case, the relationship between 'Kh!..' and 'Ch!..' is obvious. In modern Kono, we would have

cṑnwɛ 'sleep', cṑnɔ̃ tṑnà 'sleeping place'

Migeod gives the following as his Kono specimen No. 15:

15 Wegemoi Wegemoinu Woodcutter, Woodcutters
 (Wechemoi)

We again have the possibility that either [g] or [ch] would be acceptable, in which case, [g] and [ch] would be in free variation, and therefore allophones of the same phoneme. Migeod's examples provide strong evidence that [c], [k] and [g] must have, at some time in the past, belonged to the same family. As we have already indicated however, we shall here recognise the phonemic status of /c/ and /k/ on the basis of current usage. [ṑ] and [g] will be treated as allophones respectively of /c/ and /k/.

3.4 The next series of interpretation problems we shall consider are reportedly common to many West African languages. These have to do with the analysis of consonants with palatal or bilabial release. Any solutions arrived at would depend on the answers to a number of questions:

- (1) Does one regard such a release as a vowel or a consonant?

- (2) If it is a vowel, is it a pure vowel or a diphthong?
- (3) If it is a consonant, do we regard it as a consonant cluster with the consonant immediately preceding it, or do we regard the two as a unit phoneme?

Different analysts have wrestled with these questions in their own different ways, and as can be expected, the answers have not always been the same. The phonological structures of individual languages have sometimes provided simple answers, but in other cases, there have been no easy solutions. As we have already mentioned, some solutions have been arbitrary. What seems to be emerging as a pattern is that solutions in many languages have been based on considerations of the syllabic and tonal nature of the segments concerned. Bendor-Samuel (1965:87) for instance observes that

In most languages there are phonetic reasons against regarding labialization and palatalization as vowels; they are non-syllabic and do not carry separate tone. (Bendor-Samuel, 1966:87).

Welmers (1973:55) also observes that

Considerations of superficially apparent syllabicity may sometimes provide an immediate answer:

Further down the page, he adds

Considerations of tone, however, -
... will often provide a solution.

In some of the examples with palatal release that he cites, he says that where there is no superficially apparent syllabicity, the palatal segment should be considered a

vowel if it has contrastive tone in its own right. Contrasts such as *biá* with *bíá* or *bià* are considered as having contrastive tone in their own right. In such cases, the palatal segment should be interpreted as a vowel, [i].

What Bendor-Samuel and Welmers are in fact saying is that when the labialised or palatalised segment is syllabic and carries tone, it should be regarded as a vowel. On the strength of such argument, we can readily interpret the palatal releases immediately following consonants as vowels, as the following examples illustrate:

<i>bi_̣à</i>	'to catch'	<i>bi_̣à</i>	'catching'
<i>ti_̣à</i>	'truth'	<i>ti_̣à</i>	'the truth', 'true'
<i>ci_̣à</i>	'(the) ring'	<i>ci_̣à</i>	'(the) road', '(the) path'

We have already illustrated the occurrence of a CVV pattern elsewhere in the language (see Chapter 2), so such an analysis would not be considered atypical. Such an analysis would in fact reinforce our earlier interpretations of two dissimilar vowels in sequence as two simple vowels that are syllabic, and carry separate tone. Support for this interpretation is also provided by Johnny (informant). One can clearly perceive a rise-fall pattern when he says *ti_̣à*, with two distinct syllables, so that we can actually transcribe what he says as *tijà*. While Johnny's case may provide support for our analysis, it actually poses another problem, that of the presence or absence of [j] in words such as *ti_̣à* or *bi_̣à*. Do we recognise it, or do we not recognise it? From a purely functional point of view, we

could ignore it, because its presence or absence is not linguistically significant. For reasons of consistency in an orthography however, perhaps it is prudent to make a decision. The author's personal opinion is that we do not need to recognise it even in an orthography. Phonetically, the glide from [i] to [a] produces a sound that is not very dissimilar from [j]. Finally, in support of this analysis, we can mention the voicing that one can detect in the palatal segment after the consonant which may itself be voiceless. The presence or absence of voicing of the palatal segment after a voiceless consonant happens to be one criterion also used in determining whether or not the palatal segment is a vowel. The palatal segment is considered a vowel if it is voiced. While voicing may not always be present in our case, it usually is.

3.5 Since the same criteria are often used in the analysis of palatalised and labialised segments in parallel environments, one would expect the same kind of interpretation. This is however not always the case, and some analysts have wondered why this should be so. Sharp (1960: 46) commenting on such a situation in Kikuyu observes that

...it seems asymmetrical to write w
for ū but not y for ī, in structurally
parallel cases.

Logical as this observation may be, there have been reports of asymmetry in a number of languages. Bendor-Samuel (1965: 86) reports for instance, that in Kasem (Grusi), although there are no palatalised consonants, all consonants

(except w), may be labialised preceding non-back vowels. In Akan, Welmers (1973:56) reports that /kw, gw, hw/ are best interpreted as unit phonemes, but adds that there are no comparable palatalised unit phonemes or clusters of the type /Cy/. What is the situation in Kono? Having already discussed the occurrence of palatalised consonants, we shall now look at the occurrence of labialised segments and see if there is any symmetry with the occurrence of palatalised segments.

Labialisation in Kono can be considered to occur in two general cases. For reasons of convenience, we shall here refer to the two cases as acquired labialisation and inherent labialisation. Examples of the former would be instances where labialisation is the phonetic manifestation, across morpheme boundaries, of the phonological structure. What we should remember here is that

...the units of the phonological level do not necessarily stand in any kind of one-to-one relationship with the units of the phonetic analysis. Hence what is a sequence in the phonetic transcription may be interpreted non-sequentially at the phonological level and, conversely, discrete entities on the phonological level may on occasion have joint manifestation in one phonetic unit. (Kelly, 1974: 99).

We can demonstrate the aptness of this observation by looking at a specific instance of labialisation. We have labialisation occurring when the definite marker /ɛ/ is added on to the indefinite stem. Many instances of these are illustrated in the following examples:

Indefinite Stem	Stem + è	
1. p <u>u</u> m̄	p <u>u</u> m̄wè	'(the) whiteman'
2. t̄ōmgb̄	t̄ōmgbwè	'(the) palm tree'
3. t̄ɔ̄ŋḡ	t̄ɔ̄ŋgwè	'(the) bucket'
4. k̄āŋḡ	k̄āŋgwè	'(the) back of the neck'
5. k̄ānd̄	k̄āndwè	'(the) north, above'
6. k̄ɔ̄k̄	k̄ɔ̄kwè	'(the) type of plant'
7. k̄ɔ̄ŋk̄p̄	k̄ɔ̄ŋk̄pwè	'(the) fruit'
8. k̄	kwè	'(the) rice'
9. k̄p̄s̄	k̄p̄swè	'(the) task'
10. c̄in̄	c̄inwè	'(the) sleep'
11. c̄ɛb̄	c̄ɛbwè	'(the) uncircumcised penis'
12. b̄ɔ̄nd̄	b̄ɔ̄ndwè	'(the) okra'
13. b̄ɔ̄ŋ̄	b̄ɔ̄ŋwè	'(the) look-alike/resemblance'
14. n̄īm̄	n̄īm̄wè	'(the) younger in-law'
15. f̄	fwè	'(the) scrotum'
16. ŋ̄ɔ̄ŋ̄(nɛ)	ŋ̄ɔ̄ŋwè	'(the) hunch-back'
17. ŋ̄ant̄	ŋ̄antwè	'(the) rich one'
18. k̄ɔ̄p̄	k̄ɔ̄pwè	'(the) money'
19. j̄	jwè	'(the) tse-tse fly'
20. t̄	twè	'(the) name'
21. d̄	dwè	'(the) period/time'
22. b̄	bwè	'(the) partner, mate'
23. m̄	mwè	'(the) one/person'
24. ŋ̄	ŋwè	'(the) corn'
25. s̄ɔ̄	swè	'(the) bean'

We see from the examples that except for [c, ʃ, ɹ] all the

consonant sounds we have previously described can occur labialised. Labialisation in this case however is the phonetic realisation of a glide from one phonologically discrete entity to another in sequence, with the labialised segment 'replacing' one of the discrete entities. This confirms Kelly's observation. It also strengthens his argument about the value of 'deeper' analysis:

All too often a 'phonological statement' is little more than a list of 'phonemes' with no information on the way in which these items take on different patternings as one moves about the language and little in the way of elucidation of the structure which 'stands behind' the overt phenomena. One's reaction all too often is 'Can these bones live?' p.97

Our knowledge of the structure 'behind' labialisation in this case makes it possible for us to say that there is no labialisation. Although it is present in the phonetic structure, what we actually have are two vowels in sequence, a half-open back vowel followed by a half-open front vowel. We could therefore justifiably write $b_{\underline{d}}n\bar{d}\bar{e}$ for instance instead of $b_{\underline{d}}ndw\bar{e}$. The former would be more representative from the point of view of phonological structure, but the latter would be phonetically more acceptable, particularly in the writer's speech. The glide from the back to the front vowel is rather rapid, with the front vowel sounding longer and more noticeable, so that the writer prefers to link the glide with the preceding consonant. He speaks slowly, and considers assigning equal emphasis or prominence to the two vowels unsatisfactory, because then, the back

vowel would sound exaggerated. It would seem that quite early in the articulation, in anticipation of the transition from [ɔ] to [ɛ], he starts the glide. For phonetic reasons therefore, he prefers $b_{\underline{n}}d_{\underline{w}}\epsilon$ to $b_{\underline{n}}d_{\underline{\bar{o}}}\underline{\epsilon}$. Such a preference however poses the problem of how to interpret the labialised segment. Do we consider it a consonant cluster with the consonant immediately preceding, or do we consider them together as a unit phoneme? To interpret it as a consonant cluster is an attractive option, particularly since labialisation in the examples cited is not distinctive. This is in fact the solution usually recommended in such circumstances, particularly if the labialisation occurs with so many consonants, as in our case (see Ladefoged, 1964: 1). Such an analysis here would however be ignoring the phonological structure that we know to be the case. Besides, a CCV syllable structure is very rare in the language. If on the other hand we chose to represent labialisation as a unit phoneme with the preceding consonant, then we could very easily almost double the number of consonants in our inventory. Such an analysis would not be economical, particularly since the only difference between the phonemes would be the feature of labialisation, which we know to be a joint manifestation of phonological events. However, economy of phonemes cannot always be an overriding factor, especially since, as in this case, such an interpretation has the benefit of the more familiar CV syllable pattern. There are however two other options to be considered when we have looked at other cases of

labialisation.

Labialisation is acquired across morpheme boundaries when a final syllable ending in a back vowel is followed immediately by /a/, functioning either as a past marker, or as a pronoun in rapid speech:

aŋ b̄ à ambwâ 'they have gone out'
they go out have ne

aŋ tamu à antamwâ 'they own it'
they own it

These examples can be compared with previous ones where labialisation is the phonetic manifestation of two discrete entities in sequence that are realised rapidly. We can also contrast them with similar sequences occurring within a single morpheme. In these cases however, the tones can be contrastive:

tūā,	twāā	'rat'	tūâ	twââ	'the rat'
duā	dwāā	'hernia'	duâ	dwââ	'the hernia'
dūā	dwāā	'to bless'	dūâ	dwââ	'blessing'
toā	twāā	'forked tree'	toâ	twââ	'the forked tree'
koā	kwāā	'monkey'	koâ	kwââ	'the monkey'

On the basis of contrastive tone alone, we would have to interpret these examples as two dissimilar vowels in sequence, particularly if we want a symmetrical analysis. It was for the same reason that we interpreted palatalised segments as vowels in sequence. Support for this can be found by comparing the definite forms for 'rat' and 'forked-

tree', and those of 'hernia' and 'blessing'. In the case of the former, the tone moves from non-low to low for 'the rat' but starts from low to non-low to low for 'the forked-tree'. The labialised segment is contrastive in this case. Similarly, the labialisation in [dwaal] is distinctive. There is a low to non-low to low for 'the hernia', and a non-low to low tone pattern for 'the blessing'. We can also mention, in support of interpreting these examples as bisyllabic that Koelle recorded two of them as clearly bisyllabic:

túlā	'rat'
kólā	'monkey'

The /l/ in these two words is absent in the speech of the writer and all other native speakers he has listened to; evidence of the disappearance of [l]. Our immediate concern however is that it serves here to show that the examples should be regarded as bisyllabic. In contrast to labialisation occurring across morpheme boundaries, there is greater lip protrusion in the examples with contrastive tone within the same morpheme. It should be mentioned in this regard however that labialisation of the velar stop /k/, even with contrastive tone within the same morpheme is phonetically similar to labialisation across morpheme boundaries. It would seem that in the writer's speech, the lip rounding starts before the consonant, about the same time as it is getting ready for the articulation of the front or central vowel. The effect of this is the rapid, almost simultaneous release of the velar sound and the glide, almost as if they were one. This is very clearly demonstrated

in the following examples:

/kūī̄ε/	kwī̄ε	'the voice, sound'
/kūī̄ε̄/	kwī̄ε̄	'the salt'
/kūī̄ε̄̄/	kwī̄ε̄̄	'the debt'
/kūī̄̄/	kwī̄̄	'the leopard'

It should be noted that [ε] is part of the same morpheme in these examples, and not just a definite marker. The indefinite forms would be

kwī̄ε̄̄	'voice, sound'
kwī̄ε̄̄̄	'salt'
kwī̄ε̄̄̄̄	'debt'
kwī̄̄̄̄̄̄̄	'leopard'

With these examples, this native speaker's intuition is that there are two syllables, not three. Also, a CVVV syllable pattern within the same morpheme is unusual in the language. One would therefore be better advised to consider the labialisation in these examples either as a cluster with the preceding consonant, or both together as a unit phoneme. If we confined ourselves only to the labialised segment and the vowel immediately following, we could argue that the tone of the labialised segment is conditioned in the first three examples. Note in each case that the tone of the labialised segment is the same as that of the vowel immediately following. The occurrence of tones in this fashion usually suggests, if we cannot find any contrasts, that the preceding segment has no tone of its own, just like a consonant. Its

tone is then said to be conditioned by the tone of the following vowel. Consonants do not normally carry tone, but vowels do. According to Welmers (1973: 53) this is usually good enough reason to consider the labialised (or palatalised) segment as non-vocalic, and therefore non-syllabic. A similar situation obtains in the following examples:

pūīŋ	pwīŋ	'to come/put down'
tūīŋ	twīŋ	'to lose/disappear'
būīŋ	bwīŋ	'to wring'
dūīŋ	dwīŋ	'hook'
kūīŋ	kwīŋ	'basin (container for food)'
fūīŋ	fwīŋ	'to beg, to pinch'
sūīŋ	swīŋ	'to rest'

The labialisation in these examples, as in the previous four are instances of what we have here called inherent labialisation. We note here again that the tone of the labialised segment is conditioned by the tone of the following vowel. In all of these cases, labialisation is not contrastive. Again, we could interpret labialisation as non-vocalic and non-syllabic, in which case we would have to consider whether to interpret it as a consonant cluster or as a unit phoneme.

In our discussion so far, we have looked at different problems associated with labialisation and the possible solutions to consider. To recapitulate, we have argued, for phonetic reasons, not to regard some labialised segments as vowels. In other cases, because of the tonal pattern we have considered interpreting some labialised segments as

vowels. For reasons of economy, we have decided not to increase our phoneme inventory by introducing unit phonemes with labialisation. And for reasons of 'deep' phonology and the general syllable structure of the language, we have not introduced consonant clusters. What other options do we have left? Some investigators, Bendor-Samuel (1965: 87) and Ladefoged (1969: 1) for instance, suggest that labialisation (and palatalisation) could be treated as prosodic features of a larger unit. Since our analysis is basically phonemic however, we have decided against this option. Another option suggested by Bendor-Samuel (cf above) is rather abstract. It involves the setting up of a third (sub-) unit (c), and not assigning labialisation or palatalisation to either the consonant or the vowel systems:

The pre-nuclear margin of the syllable may then be said to consist of C or Cc. C may be any of the consonants, simple (p, t, k, m, n, w, y, etc.) or complex (ph, tʃ, etc.) c may be w or y. There may be certain co-occurrence restrictions to be stated, where w and y cannot follow every consonant. p.87.

I have found this option attractive, mainly because it presents a much more representative picture of the language's structure, both at the surface and at the deep level. Support for abstract solutions in African linguistics is provided by Kelly (1974: pp. 97-109) in his discussion of some aspect of Fang phonology. By setting up a sub-unit U in the set of vowels, he is able to analyse the phonetic sequence of consonant sound plus /f/, /v/ plus a as being phonologically consonant plus U, where U represents all the

qualities of the /u/ vowel sound, but occurring sequentially, not simultaneously. This way, the language's phonetic structure is not removed, and another vowel /u/ is not added to the set of vowel sounds. In our case we shall also introduce a sub-unit W in the set of semi-vowels which we shall not assign either to a consonant or a vowel. This unit will be similar to the labial-velar approximant /w/ in that they are both non-syllabic and do not carry tone. It is different from it because W never occurs in stem initial position, or in intervocalic position. It is always preceded by a consonant with which it forms a pre-nuclear margin of the syllable of which it is a part, and followed immediately only by a front or central vowel. It is similar to the vowel /u/ because it occurs with labialisation and velarisation, but different from it because it is non-syllabic, and does not carry its own tone. It is similar to /u/ because it is sometimes part of a sequence of two pure vowels, such as when it is followed by the definite marker /ɛ/. By the setting up of this third unit W that we have not assigned either to a consonant or to a vowel, we are able to maintain the presence of the structure of two successive consonants, which is a more representative picture of the language's syllable structure. Also, we have managed to maintain economy without great loss either to the phonetic, or the phonological structure.

3.6 The occurrence of what are generally referred to as prenasalised consonants poses one of the commonest, and

oldest, interpretation problems in African linguistics. It involves the interpretation of combinations of nasal consonants followed immediately by oral consonants, the components of the sequence usually occurring homorganically. Do we regard such combinations as unit phonemes, or as clusters?

Traditional analysis has often interpreted prenasalised consonants which are not morphologically complex as unit phonemes if they are homorganic and belong to the same syllable. They belong to the same syllable if there is no contrast in tone between the nasal component and the following vowel. Duration and sonority of the nasal component have also featured in the traditional analysis of prenasalised consonants. According to Westermann and Ward (1933: 68),

...in...nasal and plosive, the nasal can be syllabic or not syllabic; if it is very short and the main breath force seems to come on the plosive, it may be considered as non-syllabic, while if it is at all long, and if it bears any stress, it is syllabic. The syllabic or non-syllabic character of nasal consonants must be considered with the tones of tone languages. Because of its sonorous character, a nasal consonant can and often does bear a tone: if it bears a tone it is usually considered to be syllabic. Thus if in the combinations mp, mb, nt, nd, etc., the nasal consonant has a different tone from that of the following vowel it is syllabic.

Analysis of prenasalised consonants based on these criteria has implications for syllable division. Westermann and Ward (pp. 111-113) are aware of this, and caution that where nasal-plus-plosive sequence occur in word-medial positions,

...it should be noted whether the syllable division is before the nasal or between the nasal and the plosive. For example, the word kanga can be considered as consisting of two syllables divided kaŋ-ga but it can also be divided ka-ŋga. In such a case the ŋ is very short. In African languages this latter method is almost always the rule, especially where the word-roots are built up on the principle of consonant + vowel.

More recent analysts do not seem to have observed this 'rule'. We have already mentioned the case of Williamson (1965) in the last chapter. In her analysis of Ijọ she treats prenasalisation as nasalisation of the preceding vowel occurring homorganically with the following plosive. She accordingly defines the syllable as

...a tone-bearing entity whose nucleus is either a single vowel or nasalization realized as a nasal homorganic with a following plosive... p.11

Her treatment of prenasalisation makes possible the division of anda, 'wrestle', into two syllables, an-da, without having to worry about dividing a phoneme. Some analysts are concerned that interpretations involving homorganicity would need to answer the question of which nasal should be represented before consonants with more than one articulation. /k^hp, g^hb, / readily come to mind. Does one for instance recognise /mkp/ or /ŋkp/, /mgb/ or /ŋgb/ ? This problem is solved if we note that contrasts between nasals that are otherwise phonemic are neutralised when they occur with following consonants. In the circumstance, it does not matter if we recognised mkp or ŋkp. (Our preference here

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will be for ŋkp, ŋgb). One could even introduce an archiphoneme N. Such a phoneme would have all the characteristics of the nasalised component in the sequence, but different from it in that it is always immediately followed by an oral consonant.

Herbert (1975: 105-123), argues that for Luganda and many other languages prenasalised consonants should be analysed always as clusters. Syllabification and timing are crucial to his argument, defining the syllable as

...An abstract unit of organization which underlies the timing system of the language. (p.110).

Support for his case is based on the theory that speech is programmed at some unit higher than individual segments, a theory which he claims has been demonstrated by Lehiste (1970), and others. His thesis is that

If speech is programmed at a level higher than single segments, we expect negative correlations (temporal compensations) between the subparts: if one part is longer than average, another will be shorter than average. Temporal compensation at the level of the syllable in Luganda forces us to regard prenasalized consonants as consonant clusters which superficially present the combined length only slightly greater than units, but, at all times, the nasal and non-nasal components maintain their individual integrities. .p.110 .

It is interesting to note that although Herbert recognises only clusters in his analysis of prenasalised sequence; in Luganda, Cole (1967) as reported in Welmers (1971: 73) recognises both clusters and unit phonemes. In initial position, the nasal is syllabic and bears tone. In post-

vocalic position, syllable division precedes the nasal, the nasal is non-syllabic, and the nasal-plus-consonant sequence functions as a unit phoneme, a prenasalised consonant. We see again how analysts, using different criteria, can arrive at different conclusions for the same language.

Let us now consider prenasalised consonants as they occur in Kono. The following prenasalised sounds have been recorded: [mb, nt, nd, ŋɛ, ŋk, ŋg, ŋgb, mf, ns].

Illustrations of these are

mbɛ	'then'	sɔŋkɔ̄	'name of person'
tamba	'name of second son'	ŋgɔ̄ŋgɔ̄y	'name of person'
kunti	'boss, head'	dɔŋgbɔ̄	'filth'
ndɛndɛ	'boat'	bɔmfwɔ̄	'hat'
kundi	'hair on head'	mɔnsɔ̄	'chief, king'

Prenasalisation is either inherent or it is acquired. Inherent prenasalisation in initial position is very rare. The following is a full list of prenasalised consonants in initial position recorded in the data:

mbī	'I'	ndɛndɛ̄	'mouse'
mbɛ	'then'	ndɛndɛ	'boat'
mbawà	'name of person'	ŋgɔ̄ŋgɔ̄y	'name of person'

The nasal components in these examples sound slightly more sonorous and longer than the oral ones. They however carry no tone of their own. In each case, their tone is conditioned by the tone of the following vowel, and they are therefore not syllabic. The entire sequence of nasal-plus-consonant-plus-following vowel thus belongs to one syllable. On the basis

of tonal and syllable structure then, the prenasalised consonants /mb, nd, ŋg/ should be regarded as unit phonemes. Note however that in this position, one cannot find a minimal pair for [ŋg]. This can be explained by the fact that the only word in which it occurs here, ŋgōŋgōy, is a loanword from Mende. We have therefore decided to recognise only /mb/ and /nd/ as unit phonemes in initial position. Prenasalisation in initial position in all other known cases is across morpheme boundaries, as in the following examples:

ŋ	bōð	m̄bōð	'my hand'
	my hand		
ŋ	dē	n̄dē	'my mother'
ŋ	tā ā	n̄tāā	'we have gone'
ŋ	kɔ̄ɔ̄	ŋkɔ̄ɔ̄	'beneath us'
ŋ	kpāa	ŋkpāa	'behind my back'
ŋ	gbɛ̄ɛ̄	ŋgbɛ̄ɛ̄	'all of us'
ŋ	fāa	ŋfāa	'my heart'
ŋ	sɔ̄ɔ̄	n̄sɔ̄ɔ̄	'inject us'

The occurrence of syllabic nasals as pronouns before nouns and verbal stems is reportedly common in Niger-Congo languages. We shall look at these with special reference to tonal behaviour in a later chapter.

In contrast with prenasalised consonants in initial position, prenasalised consonants in post-vocalic position are very common, as the following examples show

pimbi	'night'	kajga	'steal'
tɔ̄mbɔ̄	'play'	sajga	'death'
kāmbā	'grave'	ɔ̄tajga	'cassava'

pāndē	'there'	gbɛŋɛi	'type of pot'
fandē	'cotton'	bɛŋɛi	'bench'
tensa	'sister'	tɔŋgbɔ	'palaver hut'
mansa	'chief'	būŋkwa	'cloth for covering'
tɔŋfɛ	'beside'	kɔŋkpɔ	'fruit'
dāŋfāi	'chief's deputy'	kunti	'head, boss'

It would seem logical to interpret prenasalised consonants in any environment as either consonant clusters, or as unit phonemes. There is evidence in the literature however that this is not always the case, especially when tonal and syllable structure form the basis for the interpretation. We have already reported the case of Luganda as interpreted by Cole (see p.95). Prenasalised consonants are interpreted as clusters in initial position, but as unit phonemes in intervocalic position. In his analysis of Vai, Welmers (1976) interprets prenasalised consonants in initial position as unit phonemes. In intervocalic position however, he leaves the choice open. After a discussion of the various ways in which prenasalised consonants occur in intervocalic position, he observes that

The only conclusion that can be drawn is that, although different derivations may have to be recognised at a deeper morphological level of structure, there is only one set of nasal-oral sequences in the surface phonology, and whether they are labelled units or cluster is immaterial.⁶ p.12

In the last chapter, we analysed nasalised vowels as /V/ + /ŋ/, with /V/ becoming [Ṽ] as a result of the following [ŋ]. We have seen already that when /ŋ/ is followed immediately

by a plosive or fricative, phonetically prenasalised consonant clusters occur, with the nasal component occurring homorganically with the following oral consonant. In view of this, we have here found it convenient to interpret intervocalic nasal-oral sequences as a nasality feature of the preceding nasal, which occurs homorganically with the following oral consonant. A number of factors seem to favour this interpretation. One of these is the low functional load of /ŋ/. Evidence for its phonemic status, based on minimal pairs, is severely limited. In initial position, within one morpheme, only one case is recorded.

ŋɔ̃ndi 'to snore'

bɔ̃ndi 'bundle'

Even in this case, 'ŋɔ̃ndi' appears to be a loanword from Mende, where 'snore' is 'ŋgɔ̃ndi'. Another factor, from the point of view of syllable structure based on sonority and duration, is that a word like kaŋga, 'to steal', would be divided syllabically as kaŋ - ga in the writer's speech. The nasal component sounds more sonorous, and longer in duration, than the oral component. If we interpreted the nasal-oral sequence as a unit phoneme, syllable division in this case would fall in the middle of the phoneme. We would have to recognise a CCV syllable structure if we interpreted the sequence as clusters. As we shall see when we discuss syllable structure, a CVC syllable pattern as in kaŋ - ga is a more common feature of the language than a CCV pattern. In some cases, syllable-final /ŋ/ carries its own tone. Finally, the advantage of such an analysis is that we would

not have to introduce any new phonemes, thus maintaining economy. As in the case of the vowels, we would only be utilising what we already have in our consonant phoneme inventory.

Let us conclude our discussion of the consonant sounds of Kono by mentioning two sounds [h] and [ʔ], each of which was recorded only once, in the following utterances:

hāāān an intensifier suggesting 'so far', 'so much'
 'so many'

aʔā 'no'

The first utterance is borrowed from the Mende, where the glottal fricative and a following vowel are automatically nasalised (see Welmers, 1973: 32). Turbulence is heard as air passes through the open glottis. In the production of the glottal stop in the second utterance, compression is caused by the glottis closing briefly, and opening to release the compressed air. Both sounds are produced with the pulmonic air-stream mechanism. We have not here found any minimal pairs to establish them as phonemes, so we will only note that they occur in the language.

PART TWO

TONAL PHONOLOGY

CHAPTER 4

REVIEW OF TONAL LITERATURE

It is now widely recognised that tone is a vital part of many languages of the world, notably in Africa, Asia and the Americas, hence the attention it has received in recent years. Welmers (1971:121) makes the point that

...certainly in all Mande languages, tone is as essential a part of the phonology as are consonants and vowels, and as essential a part of the grammar as are prefixes, suffixes or morphophonemic alternations.

Such a realisation demands an examination of tone and the role it plays when one attempts an analysis of a tone language. This is our aim in this and the following chapters in this second part of our analysis. We shall, in this chapter, attempt to summarise the issues discussed in the study of tone languages. A full account of all the issues debated is of course not possible in the space of one short chapter, so we have had to be selective and brief.

It seems logical at this stage to ask: What is a tone language? What are its characteristics? How are these characteristics represented in the languages in which they occur? And what rules, if any, govern them? These are some of the questions tonologists attempt to answer when they discuss tone, and the very wide-ranging answers they have proposed is a measure of the complexity of this linguistic phenomenon. More recently, with the progress made by instru-

mental phonetics, even more questions have been asked: What are the physiological and perceptual correlates of tone? What is the relationship between tonal and non-tonal features? This intellectual and academic onslaught notwithstanding, the issues are still far from settled. The search for the defining characteristics of a tone language is still going on.

Pike's (1948: 3) definition of a tone language has provoked a lot of discussion. He defines as tonal any language

having lexically significant, contrastive, but relative pitch on each syllable.

Relative pitch is crucial to Pike's definition. As he says,

Tone languages have a major characteristic in common: it is the relative height of their tonemes, not their actual pitch, which is pertinent to their linguistic analysis. It is immaterial to know the number of vibrations per second of a certain syllable. The important feature is the relative height of a syllable in relation to preceding and following syllables. p.4

The theory that tones are relative and not absolute has gained such acceptance, that it is now considered by most as a truism (see Crystal, 1975: 74). That is not to say however that it is without its critics. Welmers (1973: 80) for instance considers Pike's use of "relative pitch" too imprecise, although he accepts that it is

the pitch of a given segment relative to the pitch of neighboring segments that is

linguistically significant, ...

He argues that more than mere pitch relationship is usually involved:

That more than mere relative pitch is involved, ... is clear from the fact that, more often than not, an isolated monosyllabic utterance can be identified as low or other than low; in most languages, low tone, especially in isolation or in final position, is characterized by relaxation, often a progressive relaxation accompanied by a slight downward glide of pitch.

Crystal (cf above) is also of the opinion that more than mere relative pitch is involved, and suggests two ways to make the relativity hypothesis work:

We can make the range of conditioning factors absolutely explicit - that is, clearly answer the question 'relative to what?' - and/or we can postulate an absolutely defined pitch level (or more than one), to which pitch variations can be related independent of context. In the present state of the science, the former solution seems unlikely; not all the factors are known, few of the ones which are have been empirically investigated, and there is no 'socio-psycho-linguistic theory' capable of integrating them. Pitch relativity is usually discussed in relation to the overall voice-range of the speaker, or his physiologically-determined voice-type...: but there are clear indications that other factors affect pitch-range norms and variations. For instance, there is the nature of the participation situation in which a speaker is involved (whether monologue or dialogue, and if the latter, how many people are involved); ... p.79.

Areas of tonal overlap within a language have been reported, so that it is not impossible that in two words presumably differing in tone, one finds that the fundamental frequency differences may be minimal, while accompanying

features such as intensity, quantity, or segmental quality may carry the chief distinctive burden (see Lehiste 1970, pp. 79-80). Examples of such languages can be found in African languages with downdrift, where a high tone occurring late in an utterance may be nearly as low, or lower, phonetically speaking, than a previously occurring low tone. Such a situation would seem to support the claim that more than relative pitch is essential in the identification of linguistically significant pitch. One has to remember however that instrumental studies have indicated that as many as five factors may be associated with the physiological correlate of tone, factors which may be responsible for other speech qualities. Lehiste (1970: 54-55) reports that

The physiological correlate of the features of tone and intonation is the vibration of the vocal folds in phonation... The rate of the vibration depends on a number of interdependent factors: (1) the mass of the vibrating part of the vocal folds; (2) the tension in the vibrating part of the vocal folds; (3) the area of the glottis during the cycle, which determines the effective resistance of the glottis and the value of the Bernoulli effect in the glottis; (4) the value of the subglottal pressure; and (5) the damping of the vocal cords.

Where this is the case, one can understand that other factors may be responsible for linguistically significant pitch.

We note from Lehiste's report that we have the same physiological source for tone and intonation, creating problems for linguists concerned with determining the features of tone, as distinct from those of intonation. Such problems have sometimes been solved by the restricted use of terminology.

Lehiste (1970: 54) for instance suggests that tonal and intonational features be kept apart by the size of the linguistic unit. She uses "tone" when pitch functions at the word level, and "intonation" when it functions at the sentence level. It would seem that some more information is needed about the relationship between speech and physiological functions. Some scholars have for instance tried to explain the phenomenon of downdrift in terms of physiological action. Maeda (1975) cited in Ohala (1978: 31) suggests that in downdrift

the larynx progressively lowers during a single breath group as a result of its linkage to the sternum which should lower as lung volume decreases, and that given the correlation between larynx height and pitch, this movement should cause a gradual lowering of pitch.

The problem with this theory however is that Ewan (1976), also cited in Ohala (cf. above), has shown that the larynx normally moves upwards during expiration (on which speech is superimposed), not downwards. Whatever else may be responsible for contrastive pitch, it is significant, for now, that fundamental frequency variation has been identified as the overriding cue for the perception of tones. This has been demonstrated experimentally, using synthetic speech, for Thai, Mandarin Chinese and Yoruba, among others. The Thai case was demonstrated by Abramson (1961, 1962), cited in Lehiste (1970: 79-80). Testing synthetic tones in Thai, Abramson is reported to have found that the tones were identifiable in isolated monosyllables:

Highly intelligible tones could be synthesized using the average pitch contours that

emerged from measurements of real speech. In the perception of tones, pitch convincingly overrode the effects of concomitant phonetic features observed in the utterances, such as variations in intensity, vowel quality, and duration. The fundamental frequency differences that produced a change in listener judgements were of the order of 5 Hz within a frequency range of 120 to 150 Hz.

Do we always have a one-to-one correspondence between relative pitch and syllable as Pike's definition suggests? The answer to this question has implications for the assignment of tone to phonological units, as well as for features of tonal systems. Both of these aspects of tone are closely connected, and have been subjects of a lot of debate. We shall consider the question of the domain of tone first. Leben (1978: 177) sums up the situation thus:

The literature, including broad surveys of tone systems and detailed treatments of particular tone languages, manifests virtually every imaginable position that could be taken on the phonological representation of tone. For various languages, linguists have regarded the domain of tone as the phonological word (Edmondson and Bendor-Samuel 1966, Rowlands 1959), the morpheme (Welmers 1962), the syllable (Pike 1948, McCawley 1964, 1970, Wang 1967), the mora (Trubetzkoy 1939, Jakobson 1937), and the segment (Schachter and Fromkin 1968, Woo 1969, Maddieson 1971). The difficulty of separating the points of view that are warranted by fact from those that seem to be reflections of taste arises as much from the quality of the argumentation offered as from the complexity of the tonal phenomena described.

Some Africanists are of the opinion that tones should be associated with morphemes or words, rather than with syllables. Welmers (1971: 129-130) suggests that it would be worthwhile to look at any Mande language with the idea (in mind) that tone has a morphemic rather than a syllabic scope. He

notes, in this connection, the fact that minimal contrasts in tone are rare or non-existent among verb stems, but common among noun stems in those Mande languages for which there is available evidence. Welmers (1973: 79-80) considers Pike's definition of one contrastive pitch per syllable too strong. He argues that some syllables must be analysed as "toneless" even in the most widely known tonal languages such as Mandarin Chinese. In instances such as these, it is the preceding tone that conditions such syllables. This is a well known argument often cited against Pike. "Toneless" syllables have been recorded as occurring in African languages as well. The occurrence of such syllables forms the basis of one of the arguments advanced by Williamson (1967: 861-864) for describing tone as a morphemic or word feature rather than as a syllabic one. She reports the case of Sukúma, where, according to Richardson (SOAS, London, 1959), an underlying high tone associated with a particular morpheme may be realised, under certain conditions, on the second syllable of the following nominal. There is for instance the word 'balimi!', 'cultivators', with no inherent high tone which acquires one as the result of following 'akabona', 'he saw': *akabona balími*, 'he saw cultivators'. Williamson associates the high tone here with the verb, and not the noun, and concludes that

It is therefore to be assigned by a rule, and the rule must specify that the morpheme responsible for the realised high tone has the potentiality of causing a high tone in a certain environment. It is hard to see how this can be done without the use of morphemic or word features.

Another familiar argument which Welmers cites against the Pike definition of one contrastive pitch per syllable is that there are some African languages where a single tone may be assigned to a scope of two or more syllables; conversely, sequences of two or more tones may be assigned to a single syllable. On the strength of these reports then, it would seem that Pike's definition would need to be modified. Welmers does in fact offer what he regards as an adequate definition:

A tone language is a language in which both pitch phonemes and segmental phonemes enter into the composition of at least some morphemes. p.80

Welmers says that the distinctive characteristic of a tone language is that

...some of the morphemes - usually nearly all of them - contain both segmental phonemes and pitch phonemes.

This definition, like Pike's, excludes intonational languages like English where morphemes may be composed of segmental phonemes without pitch phonemes, and some intonational morphemes may be composed of pitch phonemes without segmental phonemes; there are however no morphemes with both segmental and pitch phonemes occurring together. One needs to mention, in fairness to Pike, that he does modify his definition, taking into account the fact that tone languages do not always have one contrastive tone per syllable:

As defined here, each syllable of a tone language carries at least one significant pitch unit. Most frequently there is a one-to-one correlation between the number

of syllables and the number of tonemes in any specific utterance. Mixteco tends to be of this type; ...In some languages, however, a syllable may have more than one toneme. Mazateco⁶ frequently has syllables with two tonemes: ... p.4

A major area of debate among generative phonologists is whether tone should be considered a segmental or supra-segmental phenomenon (Hyman, 1975: 214). The debate is two-pronged: (1) Is the syllable the best phonological unit for representing tone, or the syllabic segment? (2) Can tone be assigned to underlying grammatical units?

The first of these questions is easily resolved as soon as one accepts that syllables are defined in terms of segments, so that one could talk about syllables by referring to the segments which define them (cf. Hyman, above). Hyman gives as an example the Nupe word /bá/. The argument here is that it would not matter if the high tone of [bá] was assigned either to the syllable /ba/, or the syllabic segment /a/. The same picture of Nupe tonal structure would emerge. Tone in this case is assigned to a phonological unit. Lehiste (1970: 54, 84) recognised the possibility that

A tone may be realised over a single element in syllables containing just one voiced syllabic sound - a vowel preceded and followed by a voiceless consonant. p.54

She reports that Wang (1967) argued persuasively that the proper domain of tone is a syllable, and concludes that

The smallest possible domain of tone is a single syllable. p.84

Generative phonologists who are suprasegmentalists and argue that the domain of tone is the grammatical unit, have sometimes used the same arguments as Africanists who associate tone with the morpheme or the word. Leben (1978: 178) for instance reiterates

the more familiar arguments that support the phonological independence of tones from segments, such as the facts that when a syllable is lost, its tone can linger on, and that just as tone languages can have toneless morphemes, with just a segmental composition, so they can have segmentless morphemes, with a purely tonal composition.

Previously, Leben (1971b), reported in Hyman (1975: 215), had stated that

One fact about Mende [compare Dwyer, 1971] which points to the appropriateness of suprasegmental representation is that a constraint must be stated to rule out the sequence HLH on all morphemes. The following sequences, for example, are impermissible: *CV; *CVCV; *CVCVCV. If the sequence of tones is represented as a feature on the morpheme [or word], a single statement of the constraint will cover all morphemes regardless of the number of their syllables; such a general statement might not be formulable if we took tone as a segmental feature.
p.197.

The basic difference between suprasegmentalists who are generativists and the Africanists who are not is that analysis by the former is based on a binary feature system, and that by the latter is multidimensional. The non-binary analysis is more common in the description of African languages, where nouns or verbs may be divided into a number of tone classes. Williamson (cf. above) looks at the

same data from Igbo analysed in both ways. She reports a description of Igbo by Green and Igwe (1963) where VCV nouns are divided into four classes on the basis of their tone patterns in isolation:

high-high	ánú	'meat'
low-high	ùbhé	'pear'
high-low	áẓù	'fish'
low-low	ùdò	'rope'

She then considers this same data as a binary system, consisting of a complex of features, with the tone pattern as an indivisible whole. The tone classes would then be the result of the various combinations of the simple features. The binary features she uses are (initial high) and (final high), and interprets the data thus:

(+ initial high)	(+ final high)	ánú	'meat'
(- initial high)	(+ final high)	ùbhé	'pear'
(+ initial high)	(- final high)	áẓù	'fish'
(- initial high)	(- final high)	ùdò	'rope'

Williamson reports that the same tone classes are arrived at in this analysis as in the non-binary one. Tone Group 1 in the non-binary system is the same class as the (+ final high) classes in the binary analysis, because they all undergo morphotonemic changes at the same places in the grammar. Similarly, Tone Group 11 in the non-binary analysis is the same as the (- initial high) classes in the binary analysis. This is illustrated in the following examples, where the

imperative forms of the nouns with (+ final high) undergo a change, whereas those with (- final high) remain unchanged:

nyè	ánụ	'give meat!'	(tone of noun unchanged)
nyé	ubhé	'give pears!'	(tone of noun changed)
nyè	áẓù	'give fish!'	(no change in tone of noun)
nyé	ùdò	'give some rope!'	(no change in tone of noun)

Note, in the binary analysis, that one observes that the tone of the verb is low before a (+ initial high) noun, but high before a (- initial high noun), a fact that is missed in the non-binary analysis. This, according to Williamson, is an argument in favour of a binary, word or morphemic analysis for tone languages, instead of the multidimensional, syllabic analysis so common in African languages. On the question of binary systems in the analysis of tone languages however, it should be noted that no one of the competing systems in the literature is considered entirely satisfactory. After a survey of six proposals for binary analysis, Anderson (1978: 173) concludes that at least four of the proposals, those of Wang (1967), Sampson (1969), Woo (1969) and Maddieson (1970, 1972) are

equally (un)satisfactory.

He reports that

some have felt that any attempt to describe tone levels in terms of a set of features with binary values is misguided. p. 171.

Ladefoged (1971), and more recently Stahlke (1977) are reported to have reached the same conclusion. Stahlke reportedly established the need for a single, multivalued feature system for tone languages instead of a cross-classifying binary feature system after considering examples from Nupe, Igede, and Mixtecan. Stahlke cites a case from Nupe where a raised-low tone appears to be more highly marked than any of the other three which he believes supports Woo's system over Wang's system. An example from Igede however cannot, he claims, be satisfactorily described in any of the proposed systems of binary tone features.

Let us now consider McCawley's (1964, 1978) view of what is a tone language. His emphasis is on the typological dichotomy that distinguishes a pitch-accent system such as Japanese from a true tonal system such as Mandarin Chinese. He rejects the dichotomy

as a way of dichotomizing languages,
though retaining it as part of a more
comprehensive typology of tonal
phenomena. (1978: 113)

He argues that those pitch-accent languages such as Japanese that are often grouped with tone languages could, on phonological grounds, be more easily identified with certain non-tone languages. He differentiates between tone and pitch-accent languages by suggesting that tone languages are those in which the suprasegmental information marked in dictionary entries involves the features of individual vowels, whereas the accent in pitch-accent languages, whether free, partially free or bound, is marked

as a morphemic feature (see Williamson, cf. above).

McCawley (1964) says that

What is basic to the role of pitch
in a tone language is not its contrast-
iveness, but its lexicalness.

Williamson (cf. above) argues that McCawley's differentiation will not work if one accepts her own arguments for treating tone as a morphemic or word feature. It would appear, if her arguments are accepted, that languages like Chinese and Yoruba are traditionally associated with syllables because most morphemes in these languages are only one syllable long, so that there is no valid ground for choosing between the syllabic or morphemic treatment of tones. Where this is in fact the case, Williamson argues that there cannot be any real difference between tone and pitch-accent languages. Rather, one should consider a pitch-accent language as a particularly simple form of a tone language. She notes that

It is perhaps significant that among linguists working on African languages it is not customary to make such a distinction [between tone and pitch-accent languages] at all, but to call a language tonal as soon as contrastive pitch levels are found in it.

Following from her observations on tone as a syllable or grammatical feature, and of McCawley's distinction between tone and pitch-accent languages, she concludes that

It appears... that no watertight basis for a clear distinction between the two [tone and pitch accent] types of system has yet been

found, and it is possible that there is none. ... It would, in fact, be more likely that there is no hard and fast line between them, or else it is hard to see how a language could change from one type to the other, as is attested historically. If, however, a tone language is regarded as a language with a rather complicated set of prosodic morphemic features, reasons can be sought for the complication.

On the strength of these observations, she defines a tone language as

a language whose prosodic morphemic features are unusually complex.

Our survey of the literature so far has failed to provide a single, straightforward definition of a tone language. We find Pike's definition attractive because it seems so comprehensive, but perhaps it is saying too much when it says that a tone language has one tone per syllable. He admits as much himself in his references to Mazateco. Welmers' definition is an improvement on Pike's in this regard, but perhaps it is too rigid if one insists that pitch phonemes and segmental phonemes should belong to the morpheme. The morpheme usually is made up of pitch and segmental phonemes in tone languages as Welmers himself recognises, so it seems redundant to make such requirements the defining characteristic. If we accept that the segment and the syllable are translatable into each other because the one is defined in terms of the other, then we could stretch this argument to cover the relationship between pitch phonemes, segmental phonemes, and the morpheme. It is precisely this argument that Williamson offers in rejecting McCawley's distinction between tone languages and pitch-

accent languages. One cannot help noticing however, that in spite of the fact that Williamson, in rejecting McCawley's distinction, recognises that there is no valid ground for choosing between the two possible treatments of tone as a feature either of the syllable or the grammatical unit, she prefers the latter treatment which she thinks yields more information about a language's tonal structure.

The view that tone has both lexical and grammatical functions calls forth least disagreement in the literature.

Either explicitly or implicitly, the definitions here surveyed seem to accept that tone can function to make lexical and grammatical differences in those languages in which they occur. Welmers (1973: 116) observes that

It is inherent in every proposed definition of a tone language that at least one of the functions of tone is to participate in distinguishing different lexical items... .

Wang (1967: 93) notes that

...tones are almost exclusively used lexically, with no correlation with the syntactic or morphological aspects of the language.

in the Sino-Tibetan family of languages, together with many neighbouring languages of Southeast Asia. However, he admits 'minor' and 'marginal' use of tone in these languages to condition grammatical change. Pike (1948 : 22) also recognises the grammatical use of pitch in a tone language:

the toneme of a syllable may be replaced so as to change the grammatical meaning of the word.

He equates tonemes here with phonemes:

The contrastive, lexical units of sound
are PHONEMES, or, in tonal analysis,
TONEMES, pp. 3-4

For the purposes of this study therefore, we will accept as a tone language those languages where tone functions to affect lexical and grammatical change. In this regard, we accept the Westermann and Ward (1933:134) definition of a tone language:

A tone language is one which makes a particular use of pitch as an element of speech. This special use consists in the employment of pitch for two purposes, viz.

- (1) to indicate meaning (semantic or etymological tone);
- (2) to show grammatical relationships (grammatical or syntactic tones).

We recognise, as Williamson (cf. above) does, that tone is very complex, and that it is difficult to differentiate between tone languages and non-tone languages. Our definition however will exclude languages generally regarded as intonational languages, where pitch is associated with phrases and sentences. Pitch is here used as the non-linguistic, perceptual correlate of fundamental frequency, which in turn is the acoustic correlate of pitch. Tone refers to pitch when it functions linguistically, but not at the phrase or sentence level. The relationship between tone, pitch and fundamental frequency will be discussed in greater detail in Chapter Seven. The domain of tone will be the syllable, with the syllable nucleus, the vowel segment, carrying the main part of the tone. This decision is based

on the argument that the syllable, the morpheme or the word may validly be the unit of tone. We recognise that the morpheme or the word as the unit of tone may sometimes provide more insight into a language's tonal structure. We hope to be able to show, by our definition of a tone language, that Kono is a tone language.

Having discussed some of the problems associated with the definition of tone languages, let us now consider some of those associated with their classification. Welmers (1973: 80) hints at the need for such a classification:

The kinds of pitch phenomena that enter into phonemic contrasts in tone languages are varied; and the recurrence of similar contrasts in restricted areas, such as Southeast Asia or West Africa, suggests that a typological classification of tone languages may be useful.

One would have to go back to Pike (1948) for what is probably the most widely recognised example of such a classification. But if Pike's classification has enjoyed widespread recognition, it has also provided the greatest debating issue in the typology of tone languages: What should be the features of such a typology? According to Pike, tone languages belong to one of two large groups of families. Either they are REGISTER tone languages, or they are CONTOUR tone languages. The distinction between the two lies in the dominant tone patterns of each family. Tonal contrasts in a pure register system consist of different levels of steady pitch heights. Perceptually, tones neither rise nor fall in their production. Nupe and Igbo are reportedly

register tone languages, as is illustrated in the following examples (see Hyman, 1975: 213-214):

Nupe:	high:	[bá]	'to be sour'
	mid:	[bā]	'to cut'
	low:	[bà]	'to count'
Igbo	high-high:	[ák wá]	'crying'
	high-low:	[ák wà]	'cloth'
	low-high:	[àk wá]	'egg'
	low-low:	[àk wà]	'bed'

A pure contour tone language, as distinct from a pure register one, is one in which each contrastive pitch unit is a glide. There are no level tonemes. Mandarin Chinese is an example of such a language, as the following examples show (after Hyman 1975: 215):

	high:	[mā]	'mother'
	high-rising:	[má]	'hemp'
dipping/falling-rising:		[mǎ]	'horse'
	high-falling:	[mà]	'scold'

Pike sums up the difference between the two systems as follows:

Contour systems differ from register systems in a number of points: (1) The basic tonemic unit is gliding instead of level. (2) The unitary contour glide cannot be interrupted by morpheme boundaries as can nonphonemic compounded types of a register system. (3) The beginning and ending points of the glides of a contour system cannot be equated with level tonemes in the same system, whereas all glides of a register system are to be interpreted phonemically in terms of their

end points. (4) In the printed material examined contour systems had only one toneme per syllable, whereas some of the register-tone languages, like the Mazateco, may have two or more tonemes per syllable. In a pure contour system, then, the glides are phonologically unitary, morphologically simple, and not structurally related to a system of level tonemes; the glides are minimum structural units of length in words and syllables.¹³ p.8

Pike's classification has been challenged on the grounds that such a neat division into register and contour tone groups is not true for every tone language in the world. There are reports in the literature of tone languages that do not fit completely either the register system, or the contour one. There are cases where there is an overlap of systems, and some investigators think that such combinatory types are more common:

Actually, such "combinatory types" appear to be far more common than unadulterated "register" or "contour" types; a striking example is Cantonese, with four level tones and four glides. (Welmers, 1973: 80)

In fairness to Pike however, it must be stated that he is himself aware of combinatory type systems, and advises investigators to be alert to their existence:

Linguistic classifications are seldom clear-cut. Usually some troublesome overlapping occurs. The dichotomy between register-tone languages and contour-tone types is no exception. Tone languages exist which fit completely neither the register-tone class, nor the contour-tone class, even though most of their data may be handled under the one or the other of these classes. The investigators should be alert to recognise combinatory types whether or not they are precisely the ones described here. p.12

Welmers in fact recognises that Pike is "unquestionably correct" in recognising that there is an important difference between the tonal systems of many Asian languages, generally of the contour class, and many Amerindian and African languages, generally of the register class. He however believes that Pike's classification could benefit from a refined definition of his labels. In this regard, he re-defines a contour tone language as

...one in which at least one unit toneme must be described in terms of two distinct components: the direction of pitch change, and also the position of the entire glide within the pitch range of the environment. p.81

He cites as an example the case of Vietnamese which has unit tonemes that must be described as "high-rising" and "low rising". There is on the other hand the case of Thai which is not a contour language. It has one "rising" and one "falling" tone, along with three level tones. The position of the glides within the environmental pitch range however is apparently not significant.

A fundamental issue arising from Pike's classification that is debated is whether there is any need for recognising contour tones. Some scholars, Gruber (1964) and Wang (1967), among them (both cited in Anderson 1978) have argued that there is such a need. Woo (1969), also cited in Anderson (1978) however argues that it is not at all necessary to recognise contour tones. Her thesis is that the universal system of tone features includes only level tone elements assigned to segments. All phonetic contour tones should

therefore be analysed as underlying sequences of level tones. For example, a fall (F) from high to low can be represented as a sequence of level tones, in this case, HL. The proposals by both Gruber and Wang were originally designed for the languages of Asia, especially the Sino-Tibetan languages. They both hold the view that tone is a property of the syllable; since these languages apparently have one toneme per syllable (cf. Pike's fourth point, p.21 above), they agree with Pike that the contours in these languages should be treated as unitary tonal elements, and not as sequences of level tones. Anderson (1978: 147) however argues that one does not necessarily treat a tone as a phonological contour just because it is not phonetically level. He cites the case of the low tone in Yoruba, (reported by Lavelle, 1974) which is generally realised at the end of an utterance after another low, not as a level low tone, but rather as a fall from low to extra low. This fall is non-distinctive according to Anderson, and should not be treated as a phonological contour. The major criticism against Gruber and Wang is that they are not explicit enough about the principles which should determine contour tones, and do not provide any clear evidence to support their claim that it is necessary to recognise contour tones. After a detailed examination of Wang's system, Woo (1969) concludes that contour tones should be treated as units. Rather, for some languages, there were clear arguments for treating them as sequences of levels (cf. Anderson, above, p.148). Woo's claim, essentially, is that the more complex

a tonal contour, the more segments would be required for its realisation. In contrast to Gruber and Wang, she argues that tonal elements should be assigned to segmental units (moras). Hyman (1975: 218-219) cites examples from Thai and Mandarin, reported by Leben (1973a: 123-125) and Chang (1973: 44) respectively, that appear to support part of Woo's claim. Evidence from Thai presented by Leben suggests not only that Thai has segmental tone, but also that its contour tones must be analysed as sequences of level tones, that is, LH and HL (where L = low, H = high), and not as rise (R) or fall (F). Chang reports the following tonal assimilation in Mandarin:

In fast conversational speech, a second tone becomes first when preceded by first or second tone and followed by any tone other than the neutral tone.

This rule can be formalised as follows, using Chao's (1965: 33) notation:

$$35 \rightarrow 55 / \begin{matrix} 55 \\ 35 \end{matrix} \quad T \text{ (where } T = \text{ any tone except neutral)}$$

We have a 35 tone going up to 55 (level H Tone) when preceded by a tone which ends in H (5) tone.

This rule is stated using indivisible contours as follows:

$$R \rightarrow H / \begin{matrix} H \\ R \end{matrix} \quad T$$

There are a few questions which this second representation of the same rule does not answer. Firstly, why does R become H after H rather than before H? Why does R become H after R? The answer in both cases is that assimilation

takes place, but this is not evident in the rule when indivisible contours are used. We note however with the Chao notations that tone 3 (which is a slight fall from a 2 level to a 1 level) rises to a 5 level when it occurs between two 5 levels:

535 → 555

A similar assimilatory process involving tone copying in Mende is cited by Anderson (1978: 149). According to this rule, the last tone element of the first member of the compound is copied on to the beginning of the second member. Anderson notes that

The interesting feature of this rule is that it copies a falling tone as a low, and a rising tone as a high. This fact follows directly if one assumes that a rise is represented as the sequence low-high, and a fall as high-low: In that case, it is precisely that last tonal element which is copied, regardless of whether this is part of a contour or not.

The conclusion Anderson draws from this is that

Wherever the register of a tone is relevant for the operation of an assimilatory rule, contour tones do not behave in the way predicted by Wang's description. They do not, that is, behave as if they had a unitary and homogeneous characterization in terms of register, but, rather, when "seen from the left" (in anticipatory rules), they behave as if their register were determined by their beginning point, while when "seen from the right" (in perseverative processes), their register appears to be determined by their endpoint. pp. 149-50 .

While there may be arguments in favour of the division of contour tones, we should note that Anderson (1978) reports

that a detailed examination by Leben (1973) and subsequent authors of Woo's claim suggests that in some respects, it is inconsistent with the facts of some tone systems, particularly in Africa. A variety of examples reportedly show that contrastive contour tones can be carried by syllables containing only one vowel mora. This would appear to support the claim that tone patterns should be associated with the syllable, not the segment, so that there is no reason to decompose contours into unit level tones. A case where one would have to recognise a contour tone is cited by Hyman (1975: 217). There is a rising tone in the Kru dialect reported on by Elimelech (1973) which begins at the level of a H and rises to a "super-high" (S) level, and there is a falling tone which begins at this S level and falls to L. The S however does not exist as an independent tone, so that the contours here encountered could be the true contour tones referred to in Pike's third point (cf. p.21). It would appear from our discussion of level tones and contour tones that one does not necessarily always have to interpret contour tones as sequences of level tones as advocated by Anderson (1978), or Woo (1969). Anderson's argument is that there is really no evidence that points clearly to the necessity of representing contour tones as units in any language. But one needs to mention also that there is not always positive evidence for analysing gliding tones as level tones. It would seem that the only justification for the choice of one system and not the other is the investigator's bias.

Let us now consider tone typology as it particularly relates to West Africa. Generally, it is acknowledged that most West African languages, if not all, belong to Pike's register system. Meussen (1970: 266) notes that

A cursory examination of recent descriptive studies proved to be a sufficient starting point in prospecting the tactics of tone typology in the field of West African languages. As could be expected, the West African languages proved to belong to the register type (Pike, 1948), although in Grebo there seem to be contour features (Innes, 1960).

Meussen goes on to say that there is perhaps more than one possibility of tone typology, and each can have its own importance. There are probably as many typologies as there are approaches to tonal analysis. Meussen lists at least seven approaches, each apparently different from the other, although overlapping is not unknown. There is, for instance, the tonological approach, which Meussen describes as intermediate between a phonetic and a morphophonological level. The main criterion in this particular approach is

not phonetic identity, nor distribution, nor system symmetry, nor adaptability to higher level characteristics, but distinctiveness. p.267

It is of course debatable that one can talk about 'distinctiveness' to the exclusion of either phonetic identity or distribution. Meussen seems to be aware of this and says that

several questions must be examined here: the

degree of distinctiveness, the number of levels, the relationship between accentual unit and syllable, and the possible existence of additional features.

One conclusion, among others, that Meussen reaches on tone typology in West African languages is that the main division would depend on whether or not one bases typology on generative accounts of language.

A particular type of typological distinction not based on a generative account that has gained wide currency in African linguistics is the Welmers (1959, 1973) distinction between "discrete level" and "terraced level" languages. The basis of this distinction lies in the presence or absence in some African languages of certain contextual constraints imposed on the tonal contrasts that obtain in these languages. The effect of these constraints, where they exist, is a terraced level pattern (Welmers, 1969, 1973), or key lowering (Stewart, 1971). As with most linguistic theories, there does not seem to be any general consensus on what the defining characteristics of a terraced level system should be, or whether in fact such a system exists. Welmers for instance reports that Stewart (1965) describes terraced level languages simply as straightforward examples of Pike's register languages with the addition of a phonemic "downstep" suggesting that too much of an issue has been made of distinguishing discrete level and terraced level languages. We shall return to this and other views on terraced level languages in subsequent paragraphs.

According to Welmers (1973: 81) there are many languages in West and Central Africa in which

...each level tone is restricted to a relatively narrow range of absolute pitch (absolute for a given speaker under given environmental conditions) within a phrase, and these tonemic ranges are discrete - never over-lapping, and separated by pitch ranges which are not used - throughout the phrase, though they all tilt downward at the very end of the phrase in a brief final contour.

Given a three-tone language with H, mid (M), and L, a H near the end of a phrase has virtually the same absolute pitch as a H at the beginning of the phrase, and will be higher than any M in the phrase. Similarly, a M will be higher than any L anywhere in the phrase. Welmers gives the following Jukun (Diyĩ) sentence to illustrate this phenomenon:

áku	pèrè	ní	zè	budyi	à	syi	ní	bi	kéré
-		-					-		- -
	-			- -		-		-	
		- -		-		-			

'That person brought this food here'

We see here every possible sequence of two successive tones, and in every case they are the same, and never overlapping (the M is unmarked). This type of language, according to Welmers, is a discrete level language.

Pitch relationships in terraced level systems are quite distinct from those obtaining in discrete level systems. Whereas it is the absolute pitch that is important in discrete

level languages, the significant thing in terraced level systems is the relationship obtained between the pitches of nonlow syllables, a relationship that is dependent on the contextual restrictions imposed on the tonal contrasts of the language. In such a language, there is a two-way contrast after low, and a three-way contrast after high:

After a low tone at any point in a phrase, there are only two possibilities: the next syllable may have the same pitch and thus also have low tone, or it may have a nonlow pitch; if there was a nonlow pitch earlier in the phrase, this one will be a little lower. [An exception in ShiTswa is reported]. After a nonlow pitch at any point in a phrase, there are three possibilities: the next syllable may be low, or it may have the same nonlow pitch, or it may have a slightly lower nonlow pitch. p.82

In such a system, the first nonlow pitch will always be the highest, and Welmers says there could never be a return from a lower pitch to the same level as a preceding nonlow. Such an arrangement would give the sequence of nonlow pitches in a phrase a pattern similar to a series of terraces or a set of steps, hence the label "terraced level". Welmers gives the following Igbo sentence to illustrate his point:

ɔwa nne m na onye ɔkuzi ya byara ɔlɔ anyị
a a b b z c c c c d z z e f g g

'My brother and his teacher came to our house'

L is represented by z beneath a low pitch, and the successively lower nonlow pitches are represented by the letters a, b, c, It is this successive lowering of pitches that Stewart (1971) calls key lowering. Two kinds of key

lowering occur in terraced level languages, and this only further compounds the problems of establishing the defining characteristics of a terraced level language. There is what Winston (1960) reported by Welmers (1973), calls "downstep". Winston in his interpretation of successive nonlow tones as they occur in terraced level languages, has two tonemes, H and L, and a phoneme "downstep" which accounts for any nonlow tone being slightly lower than an immediate preceding nonlow tone. As defined by Welmers, downstep is

...a phoneme conditioning a lowering of the pitch of high tone. It applies to a sequence of syllables in one utterance. p.89

"Downdrift" is the other manifestation of key lowering, and it is the non-phonemic lowering of high tone after low. Hyman (1975: 226-227) reports that whereas downdrift is automatic, downstep is not:

The relationship between downdrift, representing an automatic lowering process, and downstep, representing a nonautomatic phonemic tone, is now generally acknowledged (see Stewart, 1967, 1971).

By automatic is meant that a nonlow tone occurring after a low tone in a terraced level language is always lower than the preceding one. In downstep however, the lowered H receives phonemic status when the L conditioning downdrift is lost either through deletion, or through assimilation. This example from Twi, reported by Fromkin (1952: 57), and cited by Hyman illustrates the point:

	/mí	òbú	/	'my stone'
pitch-assignment:	3	1	3	
downdrift	:		2	
vowel deletion	:		∅	
		[mí	'bú]	

The integers 3 and 1 are first assigned to H and L respectively. The 3 of the second H is however lowered by downdrift to 2, at which point a rule of vowel deletion deletes /ò/, and the result is a 3 - 2 sequence, that is, a H followed by a downstepped H. We now have on the surface a phonetic contrast between H-H, H-L, and H-'H, and a new toneme which now comes into existence. What this example suggests is that downstep is the phonemic product of a once non-phonemic downdrift. This would seem to make downdrift the defining characteristic of terraced level languages. This is in fact Stewart's (1971) argument. His view is that downstep is secondary to downdrift in defining terraced level languages. Schachter (1971) appears to be sharing this view when he acknowledges that downdrift is found in all terraced level languages, even suggesting that terraced level languages are

characterised by an intonational phenomenon
which may be called 'downdrift'.

Exactly four sentences later however, he says downdrift is not in itself the defining characteristic of a terraced level system:

What is distinctive about terraced level systems is the further phenomenon of a special kind of contextual restriction on tonal contrast in certain tonal contexts, a three-way tonal contrast in others.

Schachter's view now echoes that of Welmers which favours downstep as the primary feature of terraced level languages. His reference to downdrift as an intonational phenomenon would seem to suggest that any definition of a tone language that excludes intonation cannot have downdrift as the defining characteristic of a terraced level system. Consequently, the presence of downdrift in a language does not automatically make that language a terraced level language. He cites Hausa as a language that has downdrift but is not a terraced level language. Welmers (1973, 93) also reports that Bandi has downdrift, but is not a terraced level language. Welmers even cautions that it is not safe to assume that downdrift is universal, noting that the literature is of little help here. Stewart however maintains that the fact that there is no terraced level language without downdrift means that the two are related. It will be recalled that Schachter notes that downdrift is found in all terraced level languages. Welmers also observes that downstep does not seem to occur in a language without downdrift. On the basis of this, Stewart concludes:

...non-distinctive keylowering [downdrift] is typologically more fundamental than distinctive [downstep] key lowering and Welmers' typological distinction between 'discrete level languages' and 'terraced level languages', based as it is on distinctive key lowering, is unsatisfactory; p.195

He adds

It might be mentioned that a common result of the widespread, and of course perfectly understandable, preoccupation with the distinctive key lowering has been a failure to

recognise its relationship to the non-distinctive key lowering, which is commonly dismissed as a completely independent phenomenon of 'downdrift', although nobody has ever shown that any language with distinctive key lowering has any 'downdrift' that cannot be interpreted as non-distinctive key lowering.

The basic difference between Stewart and Welmers appears to be their different approaches. Stewart's analysis is at the deep level, while Welmers' is largely surface phonology. Analysis at the sub-surface level hints at the possibility that downstep may be, historically or morphophonemically, the result of a low tone that is either assimilated, or lost between two high tones. This was amply demonstrated by the Twi example reported by Fromkin (cf. pp. 32-33 above). A similar case in the Bandi dialect of Mende is reported by Welmers (1973: 87). The situation here is that a sequence [H 'H H] (a-b-b) occurs only in rapid speech as an alternate of [HLH] (a-z-b), which is also commonly heard. The assimilation in rapid speech, he says, takes place only with a single syllable which is otherwise low, never more than one syllable. While Welmers agrees that this kind of interpretation is unquestionably valid in some languages, he notes that it seems arbitrary to posit untraceable low tones between the two syllables of a rather small number of nouns in which downstep precedes the second syllable as in the Twi example above. There are in fact languages, argues Welmers, where such reconstruction, whether historically or at the sub-surface level, has no motivation. He cites Igbo as an example of such a language. Consider the following:

úlò 'house'; àtò 'three': úlò àtò 'three houses'
 úlò 'house'; ànyí (1 pl.): ú'lo 'ányí 'our house'

Note the difference in the tones of the first phrase and those of the second. Welmers says this difference can be accounted for only by recognising a different grammatical relationship between noun and numeral on the one hand, and noun and noun (possessor) on the other. An additional morpheme must be posited between the nouns in the latter. This, presumably was once a syllable with a tone that was most probably H.

Then */HLHLH/ (a-z-b-z̄-c) underwent two assimilations yielding a second stage */H'HH'HH/ (a-b-b-c-c-) each low syllable was assimilated to the level of the following high. Finally, the middle syllable was lost, leaving the present tones /H'H'HH/ (a-b-c-c). p.88

If Welmers' reconstruction is correct, then we have here a case of a downstep developing from a H, and not from a lost L. Welmers concludes from this that

...historically or morphophonemically, downstep may have different ultimate explanations in different languages, or even in different environments in the same language. The fact remains that, at the level of surface phonology, there are a lot of strikingly similar terraced level languages in Africa. p.88

Support for Welmers' position that downdrift may not necessarily be the only explanation has been provided by Voorhoeve (1971) and more recently, by Tadadjeu (1974). Hyman (1975: 227) reports that these two studies have shown that downdrift is not a necessary prerequisite for downstep.

He observes however, that most cases of downstep do in fact derive from downdrift. Assuming that downstep is, either historically or morphophonemically derived from a low tone, it seems logical to conclude that terraced level languages consist of only two tones, a H and a L. That, according to Hyman (1975: 227-228) is in fact largely the case:

Virtually all tone languages exhibiting automatic downdrift have only two tones, H and L.

It is not always the case however that any two-tone language would be a terraced level language. It is reported that there are two-tone languages such as Loma and Bandi that are not terraced level languages. On the other hand, there are three-tone languages like Ga'anda and Yala (Ikom) with terracing (see Anderson, 1978: 139). We have already mentioned the case of Hausa which has downdrift but is not a terraced level language. It would seem then, that one cannot categorically say what the defining characteristics are of a terraced level language. Welmers (1973: 93) suggests that

The term "terraced-level" ...would not be restricted to those systems which include a phonemic, contrastive lowering of nonlow tone (downstep), but would be extended to include all systems characterised by successively lower nonlow levels, or downdrift.

This extended definition will provide the basis for our discussion of terracing as it may occur in Kono.

Finally in this chapter, we shall consider briefly some arguments relating to the nature of tone rules, particularly the controversy surrounding the relationship between consonant

types and tone. We shall be looking at some more aspects of this relationship when we discuss the acoustic properties of tone in Chapter Seven.

The generalisation that consonants affect tone but tone does not affect consonants by Hyman (1973) and Hyman and Schuh (1974) has provoked some lively debate between Hyman (1976) and Maddieson (1974, 1976). Maddieson's (1974: 18) view is that a number of cases exist which show this generalisation to be false. His argument is that it is just as natural for tones to affect consonants as it is for consonants to affect tone. Hyman (1976: 90), in defence of this generalisation says:

The linguistic literature abounds with examples where a contrast in basic consonant type (e.g. voiced or voiceless etc.) plays a role in the tone system of a language (synchronically and/or diachronically). Many tonal contrasts owe their existence to earlier consonant contrasts (see, for example Matisoff 1973 for a general survey of "tonegenesis" in Southeast Asia); in African languages, the subject of Schuh's and my work, tone rules often make explicit reference to the voicing state of consonants; finally, it is interesting to note that Pike (1974), whose expertise in Mexican tone languages is unequalled, concurs with the Hyman and Schuh generalization.

Hyman recognises the existence of occasional reported phenomena that may contradict their generalisation, but argues that much of the evidence is biased in their favour:

Although I have made no count, I know that the bias in favour of (1) [the generalisation] holds for African languages, and specialists have expressed the same view to me (in personal communications) about Oriental and Amerindian

languages. Even admitting the validity of all Maddieson's counter-examples, it is still a fact that consonants affecting tone is vastly more frequent than is the contrary. p.9

Let us now consider two specific counter-examples by Maddieson. The first of Maddieson's six counter-arguments is the observation by Schachter and Fromkin (1968), cited by Maddieson (1974: 18), that

the pitch of voiced consonants is frequently determined by the tone of neighbouring tone-bearing segments.

Hyman (1976: 91-92) readily dismisses this argument, giving as his reason for doing so the fact that the "copying" of pitch from a vowel onto a neighbouring consonant does not alter the consonant type in any way other than in pitch.

Since what we are interested in is cases where a tone possibly affects the segmental characteristics of a consonant, this example is irrelevant. Only if some dialect of Akan devoiced [b] when followed by high tone, for instance, would Hyman and Schuh have to yield on this point. (Hyman, 1976: 92)

Another of Maddieson's counter-examples is that the Ohũhũ dialect of Igbo has glottal fricatives that appear to be partially voiced before low tones. Hyman apparently has no argument to counter this point. He is not sure what Maddieson's data is, because he has not seen the study. Could the data be instrumental? He notes however that if this observation is confirmed, then maybe glottal consonants can be affected by tone.

Maddieson (1976: 131) agrees with Hyman that there

is a predominance of examples in the linguistic literature in support of Hyman and Schuh's generalisation. He adds however that

...I am less impressed by this bias in the literature than Hyman is. Unlike him, I find the bias is not general but is mainly evident in the tone languages of Asia. And I believe a bias in reporting on tone languages contributes to the bias in the published literature. Because of this, cases where consonants influence tone are over-represented, particularly in historical phonology, and cases where tone influences consonants are under-represented. Nevertheless some well documented examples of consonant change resulting from tone changes have appeared. General physiological and psychological considerations lead to the expectation that such cases should occur with some frequency.

Maddieson challenges Hyman's appeal to the widespread nature of the evidence biased in favour of their claim. He denies that the bias exists in any significant fashion in either Africa or the Americas. He argues that only a handful of languages from Africa and the Americas would support the Hyman and Schuh generalisation, and in some cases, more than consonant influence on tone is revealed. As an example of this, he cites the case of Nupe (cf. George, 1970) reported by Hyman, where a rising 'allotone' of H appears after a low tone if the intervening consonant is voiced. Maddieson observes however that what is exemplified here is a natural assimilation involving the tone levels. He notes that Hyman himself makes a similar observation, and says that such a rule is not a case of consonant influence on tone. After a survey of the literature for Africa and the Americas, Maddieson concludes that

Hyman's attempts to deny the validity of the counter-examples to the generalization that

(1) Consonants affect tone but tone does not affect consonants are not successful. The modifications and exceptions he proposed do not really rescue a generalization that is basically unsound.

The impression of an overwhelming number of cases of consonant influence on tone is not supported by a review of the literature on tone languages in at least two of the three main linguistic areas concerned.

One suspects that this debate will go on for some time. We do not of course have the opportunity of investigating most of the claims made in this review. Our reports of those we may be able to investigate will reflect our bias.

CHAPTER 5

SYLLABLE STRUCTURE

5.1 The syllable in Kono can be considered as consisting of a permissible sequence of phonemes and tonemes. But what, one might ask, is a syllable?

Despite its widespread use and long literary history, the syllable still remains one of the most elusive linguistic concepts. Even when its importance is accepted, linguists are not agreed that the syllable is best considered either as a phonetic entity, or a phonological one, or both. Bell and Hooper (1978: 4) note:

The numerous attempts to give the syllable a rigorous phonetic/or phonological definition (Stetson, 1951; Hjelmslev, 1939; Haugen, 1956; Hala, 1961; Rosetti, 1962; O'Connor and Trim, 1953; Pulgram, 1970) have not been entirely successful in accounting for the wide range of data associated with the syllable. The relationships among the phenomena in question are too complex to admit of explanation by simple schemes, which has sometimes led phonologists to ignore or avoid the problem altogether and not recognize any unit of organization between the segment and the word, e.g. Chomsky and Halle (1968).

Among the questions commonly asked in the search for a "definition" of the syllable are:

- (i) how does one define the syllable? what should be its physical defining characteristics?
- (ii) how does one define syllable boundaries?

(iii) is the syllable a necessary concept?

Let us consider the last question. Some linguists are reportedly reluctant to accept the syllable as a necessary concept in the development of phonology. One such linguist, as reported by Fudge (1969: 253), is Kohler. He is quoted as saying that

... it can be demonstrated that the syllable is either an UNNECESSARY concept, because the division of the speech chain into such units is known for other reasons, or an IMPOSSIBLE one, as any division would be arbitrary, or even a HARMFUL one, because it clashes with grammatical formatives (1966a: 207, 1966b: 346).

Fudge does not agree with Kohler's views, and cites Anderson (1969) and Haugen (1967: 806-808) as having provided sufficient arguments to counter these claims. He is himself of the opinion that the syllable is a phonological universal. O'Connor and Trim (1963: 240) are also of the view that the syllable has phonological value. Commenting on such a value for the vowel, the consonant, and the syllable, they say that

Their past, and continuing, usefulness to phonology is not in question, for they have, from the earliest times, been employed in the anatomy of words, whilst the syllable has also been used as the basic unit in the description of the prosodic systems of languages and in verse forms based on prosodic patterns.

The trend now it would seem

... appears to be toward general acceptance of the syllable as a phonological unit,
(Hyman, 1975:p.193)

Hyman reports that even among generative phonologists, who, hitherto,

largely worked under the assumption that the syllable is unnecessary in phonology. p.192

arguments are now being presented for the incorporation of the syllable into generative phonology. He cites Hooper (1972), and Vennemann (1973) as the advocates of such a view. Vennemann (1972a) is quoted as saying that

All phonological processes which can be stated in a general way with the use of syllable boundaries can also be stated without them, simply by including the environments of the syllabification rules in the formula. My contention is ... that in numerous cases such a formulation would miss the point, would obscure the motivation of the process rather than reveal it (p.2 .

The following example from Modern Icelandic is cited to support this view: a vowel is lengthened when followed by a CV sequence as in (a) below, but not when followed by a CCV sequence as in (b):

- (a) hatur [ha :tʰyɾ] 'hatred'
 (b) ofsi [ɔf :si] 'violence'

We see in (c) however that certain consonant sequences would seem to allow the vowel to be lengthened:

- (c) titra [tʰi :tʰra] 'shiver'

Such sequences consist of /p,t,k,s/ in the first position, followed by /r,j,v/ in the second, with all other sequences of two consonants blocking vowel lengthening. Vennemann formulates a rule of vowel lengthening based on this:

$$[+ \text{ stress }] \rightarrow [+ \text{ long }] / \text{ ______ } C_1(C_2)V$$

Condition: $C_2 = r, j, v$; if present

$C_1 = p, t, k, s$

A much simpler rule however would be

$$[+ \text{ stress }] \rightarrow [+ \text{ long }] / \underline{\$}$$

v

The simpler rule does not involve a condition on consonant sequences, it involves syllabification. An underlying /VCCV/ sequence will be syllabified either VC\$CV, or V\$CCV, depending on the identity of the consonants concerned, so that ofsi will be syllabified as of\$si and titra ti\$tra hence the simpler rule.

We have here assumed the general trend that the syllable is best regarded as a phonological unit which facilitates the organisation of the speech sounds of a given language into a permissible sequence.

Hyman (1975: 189) reports that

The basic assumption in phonological approaches to the syllable is that there is an intimate relationship between word structure and syllable structure. Thus, ideally, the same sequential constraints which operate at the beginning of a word should be operative at the beginning of a syllable, even if this syllable is word-internal. Similarly, the same sequential constraints which operate at the end of a word should be operative at the end of a syllable.

One has to note that syllable structure and word structure do not always coincide. Thus in Kono, although /l/ can occur syllable initially as in /dulu/, it does not occur as a word initial. This raises the question of how best the syllable can be defined, and perhaps explains why some linguists have attempted purely phonetic definitions of the syllable. Ladefoged (1975: 218) observes that it is possible that different people may do different things in identifying the syllable, so that some people may pay more attention to the phonological structure of words than others. He suggests that

In looking for an adequate definition of a syllable we need to do two things. We must account for the words in which there is agreement on the number of syllables, and we must also explain why there is disagreement on some other words. One way of trying to do this is by defining the syllable in terms of the inherent sonority of each sound. p.219

One might say in this regard that the syllable has been defined phonetically in terms of 'prominence', and in terms of Stetson's motor theory, where each syllable is seen to correlate with a chest pulse. All of these attempts have problems associated with them. For a discussion of these, see Ladefoged (1975: 218-222). Ladefoged acknowledges that

... there is no agreed phonetic definition of a syllable. p.217

and concludes that

In summary, we can say that there are two types of theories attempting to define syllables. First, there are those in which the definitions are in terms of properties of sounds, such as sonority (acoustic energy) or prominence (some combination of sonority, length, stress and pitch). Second, there are theories based on definitions that are in terms of activities of the speaker, such as producing chest pulses or organizing the components of utterances. But as yet none of these theories is entirely satisfactory. p.222

To the extent that we accept the syllable as a phonological unit, we can attempt a working definition, aware that no definition of it is universally acceptable. For our purposes here, the syllable will be the minimal permissible sequence of phonemes and tonemes, with either a single vowel sound as nucleus, or a nasal which is realised homorganically with a following consonant. We are using tonemes here in the sense used by Pike (see page 104). A succession of

syllables may occur within a word, in which case, one would have to consider how to determine syllable boundaries, since syllable patterns may vary. Malmberg (1963: 129), reported in Hyman (1975: 188) notes that:

A syllable consisting of a consonant plus a vowel represents the most primitive, and without doubt historically the oldest, of all syllable types, the only one which is general in all languages.

In the combination described above, the consonant is known variously as the onset, the premargin, or simply as a syllable marginal. The vowel sound following the consonant is the syllable peak or nucleus, and a consonant following this vowel sound is known as a coda, or post-margin, or a syllable marginal. A combination of peak and coda is referred to as a core. It is in this sense that these terms will here be used. It should be noted however that nasals following vowel sounds may be syllabic and will therefore be regarded as syllable peaks. Such nasals are represented by (N). In determining syllable boundaries, we shall be aided by the distribution of phonemes and tonemes within a word, the frequency of such distribution, and any sequential constraints that may be imposed on them. Word here is used to refer to the phonological word, the level above the syllable in the phonological hierarchy. The word may consist of monosyllables or polysyllables with their distinctive tone patterns. While the phonological word may coincide with the grammatical one, this is not always so, as we saw in the case of /wɪŋ ɡua/ (see page 59).

5.2 Let us now look at specific instances of permissible sequences of phonemes and tonemes in Kono. The discussion here of such occurrences is based on the examination of a word list of items as they occur in citation form mainly. Data of this nature does not of course provide satisfactory answers to the problem of the domain of tone, nor to the problem of whether contour tones should be considered as unitary tones, or as sequences of level tones. It is a well documented fact that tones in citation form often vary, frequently changing when they occur in larger sequences. We shall therefore consider these problems in greater detail in the next chapter when we discuss tone sandhi and any rules that may be associated with this phenomenon. What we must do now however is to report that the question of citation forms is not as clear cut in Kono as it is in other languages. In English for instance, and in many other languages, citation forms would be "intonationally neutral", and the indefinite form of words would usually satisfy such a condition. In Kono however, no words exist for either the definite or the indefinite article as we know it in English. This distinction is usually the function of tone, and native speakers reaction when words in isolation are cited in the indefinite form is that of someone expecting something more to follow. In other words, citation words in the indefinite form would be considered incomplete by native speakers, and their natural reaction to a question that would require an answer in the indefinite form would be to answer in the definite. If one pointed to the picture of a house in a book and asked a native speaker

/ f_eŋ mbī n_ɛ / 'what is this?'

his reply would be

/ cēn_ɛ / 'the house'.

This same speaker however would say

/cēŋ mā cē ā / 'this is not a house'

if the object one is pointing to is indeed not a house. The situation becomes even more complex when one realises that /cēŋ/ can also be an indefinite form in some instances, as in the following example:

/cēŋ ā nē /.

This sentence could validly be translated in one of two ways, depending on the circumstances:

- (1) This is a house
- (2) This is the house.

(1) could be the answer to a question where one is not initially sure that the object of your interest is a house. In (2), one is emphatic, as when you are for instance proudly showing off a prized possession. One would of course have to rely on context as a guide in such circumstances. It would seem from our examples that if one relied on native speaker response alone, the definite form would be more suitable as the citation form. We now know however that the definite form can be ambiguous. More significantly however, the indefinite is the form generally considered as the citation form, and this is primarily the reason we have selected it here. By surveying such a form in our word list, the following permissible sequences of phonemes and tonemes were identified:

V	<u>a</u>	'he, she, it'
CV	cē	'to reach, to be able'
CVCV	kāmā	'shoulder'
CVV	kāā	'to sew'
CVCVV	tēk <u>uu</u>	'spine'
CVVCV	s <u>u</u> m <u>a</u>	'morning'
CVCVCV	bōkānā	'wrist'
CVCVCVCV	sēkēsēkē	'antelope'
CVVCVV	dāōf <u>aa</u>	'to waste one's breath'
CVCVCVCVCV	tētēmākō <u>ŋ</u>	'odd piece, remainder'
CVNCV	bē <u>ŋ</u> ā ¹	'spoon'
CVNCVV	dā <u>ŋ</u> fāī	'speaker'/'deputy , chief'
CVCVN <u>C</u> V	kōnī <u>ŋ</u> g <u>a</u>	'a type of musical instrument'
CVNCVCV	d <u>u</u> ndū <u>ŋ</u>	'a type of drum'
CVVCVN <u>C</u> V	dīā <u>ŋ</u> ō <u>ŋ</u> ā	'friendship'
CVCVN <u>C</u> V <u>C</u> V	m <u>o</u> b <u>a</u> nd <u>a</u> īā	'shamelessness'
CVCVCVN <u>C</u> V	pōpōj <u>a</u> m <u>b</u> a	'a type of loaf'
CVNCVCVN <u>C</u> V <u>C</u> V	n <u>i</u> ŋ <u>i</u> n <u>a</u> ŋ <u>a</u> tō	'rainbow'

¹The absence of a tone mark on /ŋ/ in this and similar examples is explained on pp. 158

CVCVCVNVCVCVCV	kōtākṗāndāmājā	'destitution'
VN	ḁṅ	'they'
CVN	pāṅ	'there'
CVVN	kaūṅ	'to swallow'
CVCVN	koṣāṅ	'to know how to'
CVNVCVN	bēmbēṅ	'to gad about'

These syllable structures do not include the labialisation structures which we have already discussed in some detail in Chapter 3. Besides the danger of duplication by including such forms, labialisation patterns are largely definite forms. We are confident however that any syllable patterns they may take in their indefinite form are represented in the patterns above. The CVCV syllable pattern was found to be the most frequently occurring pattern, followed by the CVV, the CVNVCV, the CV, and the CVN. These patterns show that the majority of syllables in Kono can be considered as consisting of sequences of CV, CVV, or CVN, with a V or N segment forming the nucleus. We can demonstrate this by looking at some of our examples above. In /kōtākṗāndāmājā /, we have a succession of morphemes linking together to be realised as one word. We can break it down as follows:

/kō/ 'thing', 'bother'; /tākṗā/ 'to become difficult';
 /ṅ/ 'my'; /dā/ 'mouth'; /mā/ 'on'; /jā/ 'a noun marker'

Broken down this way, we immediately recognise a series of CV patterns. The occurrence of syllables consisting only of nasals and tone, especially

indicating possession, is not unusual in Kono, as will be demonstrated later. Often, when this happens, /ŋ/ is realised homorganically with the consonant immediately following. The raising of the low tones in /tākpa/ to high tones could be due to the effect of neighbouring tones. Note that they are all high. We could similarly break down /pōpōjamba/ and /dāōfaa/:

/pōpō/ 'a type of tree'; /jamba/ 'leaf'

Again, we see a series of CV patterns. In /jamba/ we have a CVN•CV pattern. /mba/ in initial position is unusual, but /ŋ/ in final position is not, so the [m] in the word can be regarded as /ŋ/ occurring homorganically with the following plosive. Finally, we could break down /dāōfaa/ as follows:

/dā/ 'mouth'; /ō/ 'inside', 'in'; /faa/ 'to kill', 'to tire

(when preceded by /ɔ/). We have in this case two short vowels coming together in the first CVV structure, and an inherent CVV in the other structure. Other patterns have of course been recorded. The occurrence of syllables consisting only of nasals and tone has already been mentioned. Another example is the absence of consonants in initial position, so that only the nucleus as a core occurs. Generally however, the predominant syllable patterns are CV, CVV and CVN, and most of the discussion in this chapter will be based on these patterns.

5.3 For ease of discussion, we have divided the words into two large groups, monosyllables and polysyllables. Monosyllables will consist of a single nucleus, and polysyllables will consist of two or more nuclei. We shall first look at monosyllables. The CV structure is the most frequently

occurring in this group. Illustrations of this pattern are:

f _a	'father'	fā	'to fill'
n _a	'to come'	nā	'my'
c _e	'this'	cē	'to reach something , to arrive'
k _o	'to scoop'	kō	'to give, to share with'
t _y	'to pound, to beat'	tū	'oil'
d _i	'cry'	dī	'sweet'
b _e	'to give'	fē	'to blow air'
k _o	'big, to wash'	tō	'to stop behind'

The illustrations show that two tones, the high-level, and the low-level are distinctive. Except in one case, all the examples in this category occurred with one of these two tones. It should be noted however that the tones always seemed to be falling, the high tone falling more slowly than the low tone, and therefore perceived as more level. The falling pattern in either case is to be expected of course, since tones in utterance-final positions tend to fall. The one exception that did not have either a high or a low tone was /wà/, 'very'. We cannot however justifiably posit a falling tone as distinctive at this stage, since we could find no minimal pairs that contrasted with this example. We note for now that a falling tone has been recorded, and its status will be discussed in greater detail in the next chapter.

Restrictions imposed on the distribution of phonemes in a CV type syllable are shown in Table 4b, which we can compare with Table 4a which shows possible two phoneme sequences in word-initial position.

Note, in Table 4b, that / t, ɠ, ɡb, n, nd, l / do not occur as word initial in this type of syllable structure. The case of / ɡb / needs some special mention in this regard. We have already reported that some difference in the pronunciation of this phoneme between the author and other native speakers has been recorded (see p. 12). Utterances he has transcribed with / kɸ / in his own speech have been transcribed with / ɡb / for other speakers. This may explain the absence of / ɡb / in word initial position in this instance. The C with the highest frequency of occurrence is / t /, occurring with all the vowels. / b, d, f / also occur with all the vowels. / s / however does not occur with all the vowels, although it has the second highest frequency of occurrence. The C with the lowest frequency of occurrence is / mb /. The rare occurrence of / mb, nd / in initial position has already been noted (see Ch. 3). The general trend is that the most frequently occurring C items are plosives, then fricatives, then nasals. This is summarised as follows:

Plosives (P):	47
Fricatives (F):	19
Nasals (N):	12
Semivowels (SV):	9
Pre-Nasals (PN):	2

TABLE 4a POSSIBLE TWO-PHONEME SEQUENCES IN WORD-INITIAL POSITION

	p	t	c	k	kp	b	d	f	g	gb	m	n	ɲ	mb	nd	f	s	l	w	j	i	e	ɛ	a	ɔ	o	u
i	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
e	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
ɛ	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
a	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
ɔ	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
o	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
u	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
ŋ																											x

TABLE 4b PHONEME DISTRIBUTION IN CV SYLLABLE TYPE

	i	e	ɛ	a	ɔ	o	u		
PLOSIVES	p	1		1			1	3	
	t	2	2	2	2	2	1	2	13
	c	1	1	2					4
	k	1			2	2	1		6
	k ^h p			1	1	1			3
	b	1	1	1	2	2	1	1	9
	d	2	1	1	2	1	1	1	9
	g ^h b								
NASALS	m	1		1	1			4	
	n	1		1	2	1		5	
	ɲ	1		1		1		3	
	ŋ								
PRENASALS	mb	1		1				2	
	nd								
FRICATIVES	f	1	1	1	2	1	2	1	9
	s	2		1	2	2	1	2	10
LATERAL	l								
SEMI-VOWELS	w				1		1	1	3
	j	$\frac{1}{16}$	$\frac{0}{6}$	$\frac{1}{14}$	$\frac{1}{19}$	$\frac{2}{16}$	$\frac{0}{8}$	$\frac{1}{10}$	$\frac{6}{89}$

In the V slot, /a/ is the most frequently occurring item, followed closely by /i/ and /ɔ/, both with the same frequency. The half-close /e/ and /o/ are the least frequently occurring. The frequency of occurrence of /i/ and /e/ may have been affected by the fact that in the author's speech, the opposition between these two phonemes is sometimes neutralised. This has been observed in two contexts:

- (1) when they occur as pronouns, or with pronouns
- (2) when they occur before /ŋ/

Two examples of (1) have been observed when the author says [mbī] or [mbē] for the first person singular in 'I'-type pronouns, and [ī] or [ē] for the second person singular, although he transcribes these with

/i/. In both the cases cited, there is no loss of meaning. On those occasions when a distinction is necessary, this has been observed. This is particularly noticeable when they occur before /ŋ/. Two instances can be cited here. Both [cēŋ] and [cīŋ] have been recorded in the author's speech as indefinite forms for 'house'. But [cīŋ] also means 'bite', and the author is not aware that he has said [cēŋ] when he means [cīŋ], 'bite'. A similar situation has been observed for [sīŋ] and [sēŋ], 'stone', but always [sīŋ], 'to rub'. The tones may be different in this case, but the same vowel phonemes are involved. A few more examples like these have been observed, but there are not many of them. Sometimes in these circumstances, the quality of the vowel is neither /i/, nor /e/ as was described in our vowel phoneme inventory. What is perceived can be described as a more or less close, front, unrounded vowel, as in the Yoruba case reported by Siertsema (cf. p.41 Ch.2.). There is no easy explanation for this neutralisation taking place. It would be helpful if one had the opportunity of observing the speech

habits of other native speakers. The additional statistical information thus obtained could provide clues in the search for an answer that may be significant for the establishment of an orthography. In the absence of such information, we would have to rely on the evidence available, and represent the vowels we have been discussing by /i/. They occur in only a few cases, beyond which /i/ has a wider distribution. Remember also that there is no harm done phonologically, since the distinction between /i/ and /e/ is otherwise observed when demanded. Finally neutralisation of this type is not unusual. Commenting on it in relation to Vai where it is not a problem, Welmers (1976: 24) reports that he has frequently found it difficult, in some languages,

... to recognize contrasts between /i/ and /e/, or between /u/ and /o/, in closed syllables, and especially before /ŋ/.

A similar case as we have just described for /i/ and /e/ has not been observed for /o/ and /u/ in identical contexts. It has been observed however that /w̄/, the second person plural, becomes /ū/ or /ō/ in rapid speech when /w/ is elided. Again, as for /i/ and /e/, there is no obvious explanation, and the variation is not distinctive. In all other known cases, the distinction between /u/ and /o/ is easily observed.

Zero consonant monosyllables occur. One case of this has just been described in the last paragraph. Generally, they occur as pronouns such as we have in the following examples:

ī	nā	'you come' - habitual action
ī	tā	'your own'
a	fa	'his, her father'

a faa 'kill it'

ε taa 'he, she, it creeps'

ɔ tãŋ 'straighten it'

(w)ū/ō māma 'your grandparent'

In the last example, /w/ may be elided as in rapid speech, and then either /ū/ or /ō/ may be realised. We see from these examples that all the vowel sounds except /e/, may occur as zero consonant monosyllables, although /u/ and /o/ have a very restricted distribution. The occurrence of /i/ and /e/ in neutralisable contexts in the author's speech explains the absence of /e/ in the examples. But it is not only pronouns that occur as zero consonant monosyllables. The negative marker /ī/, the past marker /ā/ and the possessive marker /a/ may all occur as zero consonant monosyllables:

ε ī nō 'he, she, it is not there'

he, she, it is not there

tamba ī dōŋ 'Tamba will not agree'

Tamba will not agree

saa tā ā 'Saa has gone'

Saa go has ne

sāta wēē tā ā 'Satta also has gone'

Satta also go has ne

a de ī na 'His, her mother will not come'

his, her mother will not come

<u>a</u>	<u>m</u> ama	miata	'His, her grandmother Meatta'
his,her grandmother		Meatta	

Sometimes nasals in initial preconsonantal position are syllabic. In such positions, they function as pronouns, usually possessive, and are realised homorganically with the following consonant:

<u>m̄</u>	bēŋ	'my uncle'
<u>m</u>	bēŋ	'our uncle'
<u>n̄</u>	dē	'my mother'
<u>n</u>	dē	'our mother'
<u>ŋ̄</u>	kō	'my (elder) brother or sister'
<u>ŋ</u>	kō	'our (elder) brother or sister'

Note again that tone is distinctive in these examples, indicating that the nasal sequence is first person singular, or plural.

Of the polysyllables, the disyllables occur most frequently. The CVCV type has the highest frequency of occurrence in this group. Indeed it has the highest frequency of occurrence in the entire word list. Other syllable types in this category include the CVV structure with similar and dissimilar vowels, and the CVN structure. We shall consider the CVCV type syllables first, since they have the highest frequency of occurrence. Also, this gives us an opportunity to look at consonant distribution. The following are examples of a CVCV syllable type:

k <u>a</u> m <u>a</u>	'elephant'	kā <u>m</u> ā	'shoulder'
dī <u>k</u> p <u>a</u>	'Sande Official'	dī <u>k</u> pā	'to compress' - a wound
d <u>e</u> m <u>a</u>	'help'	dē <u>m</u> ā	'palm wine'
k <u>a</u> w <u>a</u>	'leprosy'	kā <u>w</u> ā	'to admire'
n <u>i</u> n <u>a</u>	'forget'	nī <u>n</u> ā	'monster'
s <u>a</u> m <u>a</u>	'rainy season'	sā <u>m</u> ā	'to miss' - one's way
b <u>a</u> f <u>a</u>	'baft'	kā <u>f</u> ā	'cheat, to cheat'
f <u>i</u> s <u>a</u>	'better, improved'	sī <u>s</u> ā	'fly'
k <u>p</u> ā <u>n</u> a	'plier'	kā <u>p</u> ā	'bilharzia, gonorrhoea'

Our examples show a contrast between a high-high tone pattern and a low-low pattern. If we considered loanwords, then two more tone patterns could be introduced:

pā <u>a</u>	'parlour'	pē <u>i</u>	'page'
mā <u>p</u> i	'map'	mā <u>c</u> i	'march, to march'
k <u>i</u> k <u>i</u>	'cake'	k <u>i</u> s <u>i</u>	'kitchen, kiss'
cē <u>k</u> i	'cheque, to check'	pā <u>p</u> a	'father'

In at least one case in the above examples, there is a contrast between a high-low and a high-high:

kisi 'kitchen'; kisi 'to be protected from/against'.

As with the CV pattern, the high-high and low-low tones fall towards

the end, and are therefore phonetically not exactly level. The pattern of the fall is similar to the fall in the CV structure, gentle for the high-high, but not so gentle for the low-low. The effect of this is that the high-high is perceived as more level than the low-low.

Table 5 shows possible combinations of consonants in a CVCV type word¹. C₁ represents the first C in the structure, and C₂ the second C. We notice the absence, in the C₁ slot, of /ɹ, ɣ, ŋ, mb, nd, l/. This list is nearly the same as in the CV structure, except that it is now increased by the addition of /mb/, suggesting that the prenasals, /nd/ and /mb/, do not occur as word initials in a CVCV structure. Notice also that although /l/ does not occur as a C₁, it does occur as a C₂. What this shows is that /l/ may occur as a syllable initial, but not as a word initial, not in a CVCV type word. In fact there is no word in our entire word list that begins with /l/. We show in Table 6 the total number of occurrences of each consonant in both C₁ and C₂ positions. It is worth noting now that although /d/ and /b/ have a high frequency in word initial position, they occur only rarely in word medial position. The nasals on the other hand, /m/ and /n/ especially, occur more frequently in word medial position than in word initial position. This fact may be significant when one is considering syllable division in words with a nasal-plus-oral consonant sequence. In the circumstances, is it not worth considering such a sequence as two morphemes linked together?

¹Figures represent sequences as they occur in word list.

TABLE 5 CONSONANT DISTRIBUTION IN CVCV WORD TYPE

		PLOSIVES										NASALS				PRE-NASALS		FRICATIVES			SEMI-VOWELS		
		p	t	c	k	kp	b	d	ɟ	g	gb	m	n	ɲ	ŋ	mb	nd	f	s	l	w	j	C ₁
PLOSIVES	p	1	1		1						1							1				5	
	t	1	1		2		2	1			1	1						1	1		1	12	
	c	1	1	1							1											4	
	k	1	1	2	3	2	1	1			1								1		1	1	15
	kp		1			2	1	3				1							1			1	10
	b		1	1			1	1															4
	d			1																			1
	ɟ	1																					1
NASALS	m	1	3	3	3	1	1	5			2	1	1					1			1	23	
	n	2	3	1	4	1	2			1	1		2				1	2				20	
	ɲ			1	2	1	2	1			1											8	
	ŋ																						
PRE-NASALS	mb																						
	nd																						
FRICATIVES	f		1		2	1	1	1													1	7	
	s	1	2	1	3	4	2	2			2							2			2	23	
LATERAL	l	1	1					1												2		5	
SEMI-VOWELS	w	1	1	1	2			1										1		1	1	9	
	j		1		1		1	1													1	5	
C ₂		11	18	12	23	12	14	18			3	10	2	3				4	8		6	9	153

L
A
T
E
R
A
L

TABLE 6 FREQUENCY OF OCCURRENCE OF C₁ AND C₂ IN CVCV TYPE WORD

C ₁		C ₂		C ₁ + C ₂	
k	23	m	23	k	38
t	18	s	23	m	33
d	18	n	21	s	31
b	14	k	15	t	30
c	12	t	12	(kp)	22
(kp)	12	(kp)	10	n	22
p	11	w	9	d	19
m	10	ɲ	8	b	18
j	9	f	7	c	16
s	8	p	5	p	16
w	6	l	5	w	15
f	4	j	5	j	14
(gb)	4	c	4	f	11
ɲ	3	b	4	ɲ	11
n	1	d	1	l	5
		ʃ	1	gb	4
153		153			

Let us now consider the possible combinations of the different consonant types as they may occur in a CVCV type word in Table 7. The following notations will be used:

Plosives	(P)
Nasals	(N)
Pre-Nasals	(PN)
Fricatives	(F)
Laterals	(L)
Semi-Vowels	(SV)

TABLE 7

		C ₁						Total
		P	N	PN	F	L	SV	
C ₂	P	39	4	-	5	-	4	52
	N	39	8	-	4	-	1	52
	PN	-	-	-	-	-	-	
	F	21	2	-	2	-	5	30
	L	3	-	-	-	-	2	5
	SV	10	-	-	1	-	3	14
Total		112	14	-	12	-	15	153

That certain consonant sequences occur more frequently than others is clearly illustrated in Table 7. In this case, the plosives are the most frequently occurring, both as C₁ and C₂. Plosives combining with plosives rank highest, followed closely by plosives combining with

nasals. There is also a fairly high frequency of plosives combining with fricatives. There are no pre-nasals in this type of word structure, and although laterals do occur as syllable initials in a C_2 position, they do not occur as word initials in this or any other word type.

In our discussion of dissimilar vowels in sequence (cf. Ch. 2 pp. 35 - 39), we hinted at the theoretical possibility of certain sequences that were absent occurring interconsonantly. Such a possibility is tested in Table 8. The gaps in this Table correspond to the absent sequences referred to above, except in a few cases. We see that / $\epsilon a, \epsilon \sigma, a\epsilon, a\sigma, o\epsilon, ou$ / occur interconsonantly. / $ei, e\sigma, oi$ / also occur, but only in loanwords, placed in brackets in the Table. One would now have to look across morpheme boundaries for the remaining theoretically possible sequences.

The occurrence of CVV type words has already received attention. We considered vowel length and the occurrence of consecutive sequences of similar and dissimilar vowels in Chapter 2. In both cases, we analysed the consecutive sequences as two short vowels, each with a separate tone, and therefore described the sequences as disyllabic, with a CVV pattern. When we discussed palatal releases in Chapter 3, it was decided that the palatal releases be analysed as a sequence of two consecutive vowels. In some of these discussions however, we had to recognise falling tones in cases where we were not dealing with citation forms. In other instances we had to consider occurrences across morpheme boundaries, not necessarily occurring in citation forms, and with more than a CVV type word involved. Since the discussion in this chapter is concerned primarily with citation forms, it becomes necessary that we consider such forms. The following are examples of CVV type words as they occur in citation form:

bīī	'termite'	bīī	'newly circumcised male'
kōō	'to mature'	kōō	'rice'
kōō	'elder brother/sister'	kōōō	'to overcook rice'
tāī	'fast'	tāī	'story'
tāī	'to be in someone's protection'	pāī	'deep end of lake'
wēī	'work'	wēī	'a type of game'
wēī	'thorn'	sēī	'play'
dūā	'bless'	dūā	'hernia'
cīā	'road, path'	cīā	'ring'
būī	'medicine'	būī	'run'

Our examples show that a CVV type word occurs with a high-high or low-low, a low-high, and a high-low tone pattern, and that each of these patterns can be distinctive. The distribution of the vowel sound in this word type is shown in Table 9. Note again the high frequency of occurrence of /a/. It occurs as V₁ with all the consonants except /ɸ, g, gb, mb, nd / . /e/ also occurs nearly as frequently as /a/ in the V₁ slot. It occurs with every consonant that /a/ occurs with, except /ɸ/ and /ŋ/, in addition to those that /a/ does not occur with. We note here that /ŋ/ is occurring as a syllable and word initial. This example is in fact a loanword from Mende. Some decision needed to be made about including /mbīī/ in this category of word types. This is the first person plural as in the 'I'-type of personal pronouns:

TABLE 8 (C)VCV DISTRIBUTION IN CVCV TYPE WORDS

	i	e	ε	a	o	u
$\begin{matrix} V_1 \rightarrow \\ \leftarrow V_2 \end{matrix}$						
i i	s, k, n(b,)			s, \overline{kp} , n, f, m		
e	(\overline{t} , p)	\overline{kp} , s		m, n, s, (l)		
a	w, (k,)		s, t, \overline{t} , \overline{kp} , n, m, w,	m,	b,	t,
o	s, j, n, (c, k, d, t, p,)	j	c,	n, m, f, w, \overline{t} , s, \overline{kp} (l, t, p)	f, k,	k, f,
u	(c, t,)		\overline{kp} , s,	s, m, l	f, n, s, \overline{t} , b, k, (p, b)	m, \overline{kp} ,
	(t, k)	s,	ε,	\overline{kp} , n, l, j, \overline{t} , s, m,	k	m, l
	s,		m, n, \overline{t} ,	m, \overline{t} , n, s,		n, s, t, (p)

TABLE 9 DISTRIBUTION OF VOWELS IN CVV TYPE WORD

V ₁	i	e	ɛ	a	ɔ	o	u
C							
P			ɛɛ				
t	ia		ɛɛ	ai, aa		oo, oa	
c	ia	ee	ɛɛ				
k			ɛɛ	aa, ai, au	ɔɔ	oo	uu
(kp)	ii	ee	ɛɛ	aa, ai	ɔɔ	oo	uu
b	ii, ia	ee	ɛɛ	ae, ai		oo	uu, ui,
d	ii	ee, ea	ɛɛ	ai	ɔɔ		ua, uu, ua
ɟ							
g					ɔi		ua
(gb)						oo	
m			ɛɛ	aa, ai, au	ɔɔ, ɔu		
n	ii			aa, ai	ɔɔ		
ɲ				ai			
ŋ				aɔ			
mb	ii						
nd							
f	ii, ia	ea	ɛɛ, ɛi	aa, ai		oo	
s			ɛɛ, ɛi	aa	ɔɔ		
l							
w	ii	ee	ɛɛ, ɛi	aa, ai		oo	uu
j			ɛɛ, ɛi	aa, ai			

mbī	tā	'I go'
ī	tā	'you go'
ε	tā	'he', 'she', 'it' goes'
mbīī	tā	'we go'
wīī	tā	'you go'
ambi	tā	'they go'

Let us remember that the /i/ in these examples could well be /e/ in the speech of other native speakers, and sometimes in the author's speech as well. We have here an illustration of the neutralisation in the author's speech referred to earlier (cf. p. 142). Note that the difference between the first person singular and the first person plural is a function of tone, high-level in the former case, and rising in the latter. Depending on one's theoretical bias, one could either posit a unitary, rising, contour tone, or a sequence of high and low level tones on a single syllable to indicate the rising contour. We have however not done either of these. The rising contour here is rather long, and one would seem justified, phonetically, in regarding it as a sequence of two level tones, a low-level, followed by a high level, which is what we have done. A CVV word type is not unusual in the language, there is no loss of linguistic information, and this type of analysis has the advantage of being economical and simple. We have neither introduced a new toneme, nor a complex rise-fall pattern on a single syllable which sounds longer than the normal single syllable. One might make it sound shorter in rapid speech, but the rising contours would still be there. By the same reasoning, we prefer the transcriptions in Column C to those in either Column A, or B:

A	B	C	
mánε	mânε	maānε	'the left hand'
jéma	jêma	jεēma	'evening, in the evening'
ɲánε	ɲânε	ɲaānε	'riches, richness'
ɲánaà	ɲânaà	ɲaānaà	'a type of bird'
kénε	kênε	keēnε	'a type of musical instrument'
míci	mîci	miīci	'needle'

This list could be longer. On the basis of syllable patterning alone, one is tempted to consider either Column A or B in preference to C, because the CVCV pattern is the prevalent one in the language. This fact by itself is however not conclusive. Although each of our examples consists of one phonological word, most of them in fact consist of at least two morphemes, one of which may be regarded as consisting of more than a CV type syllable, as in these cases:

maānε	→	maɲ + ε	(definite marker)
ɲaānε	→	ɲaɲ + ε	
keēnε	→	keɲ + ε	
jεēma	→	jεε + ma	

We have not been able to break down /ɲaānaà/ nor /miīci/ because we are not certain of their origins. One suspects that they are loanwords, possibly from Mende but this needs to be confirmed. It is still arguable whether breaking down our examples into their component morphemes

is enough justification for our transcription. /iεε/ for instance cannot be said to mean anything on its own. There is no single word for 'evening'. Times of the day are however described by reference to the sun. Thus, /iεε/, 'the return', could be referring to the return of the sun. /iεεma/ therefore would be 'on the return' (of the sun), when it would be either evening or night. But 'the night' is /pimbi/, literally 'the dark'. Similarly, we have /sɔuma/ 'morning, in the morning', which we could literally translate to mean 'on the standing' (possibly of the sun?), and /tēē(j)a/, literally 'in the sun', meaning 'during the day' or 'in the afternoon'. If such a reconstruction is accepted, then it becomes difficult to see how the transcription in either A or B above can be accepted for 'evening'. No such reconstruction is however possible for the other cases with /ŋ/ occurring finally in the indefinite form. Note that /ŋ/ becomes /n/ in the definite form in these examples. /a/ and /ɔ/ are the only vowels that occur immediately after /ŋ/. With only a single vowel sound nucleus, one might argue here that there is only one syllable. Let us remember however that we have defined the syllable as occurring with either a single vowel sound or a nasal as nucleus, which leads us to our next word type, the CVN, as in the following examples:

tāŋ	'to straighten'	kūŋ	'to groan'
tā <u>ŋ</u>	'ten'	ku <u>ŋ</u>	'head'
ta <u>ŋ</u>	'meet'	sūŋ	'nose'
sōŋ	'to know'	su <u>ŋ</u>	'give birth'
s <u>ɔ</u> ŋ	'get'	bāŋ	'to finish'
s <u>ɔ</u> ŋ	'character'	baŋ	'to refuse'

kā̄ŋ	'to meet, to be equal'	fē̄ŋ	'to look'
kā̄ŋ	'like that', 'learn'	fē̄ŋ	'sow'
ŋā̄ŋ	'to scratch'	pē̄ŋ	'first'
ŋā̄ŋ	'to make, become rich'	pē̄ŋ	'to call attention by pulling at someone'

Note that we have, for the first time, assigned tone to a nasal that is not initial. The convention here used is that the unmarked condition is for the final consonant to carry the same tone as that immediately preceding it. Tone on the final consonant is indicated only when it differs from the tone immediately preceding, such as in a falling or rising contour. Using this convention the following tone patterns can be identified: high-high; low-low; high-low; low-high. In some cases, these tones are distinctive. Evidence from acoustic data (to be discussed in Ch. 7) supports the assigning of tone to final consonants. One can observe differing tone patterns in some cases, often taking about the same length of time as word types that are clearly bisyllabic. This is especially noticeable when the final nasal occurs between a vowel and a pause. More immediately however, recognition of the fact that CVN type words are sometimes contractions of CVVN type words would seem to justify assigning tone to the final N of a CVN type word. The following examples illustrate this:

dā̄ūŋ → dō̄ŋ	'eat'
bā̄ūŋ → bō̄ŋ	'get well'
kā̄ūŋ → kō̄ŋ	'swallow'
(m̄)bā̄īŋ → (m̄)bē̄ŋ	'(my) uncle'

The scope of the nasalisation in these examples extends over both the vowels preceding the final nasal. In fact /nāūŋ/ is sometimes heard as a variant of /dāūŋ/. /mbāiŋ/ belongs to the class of inalienable nouns that always "depend" on a pronoun preceding them. We note that except for /kaūŋ/, the tones in the other examples are all the same, suggesting that they may be conditioned, and therefore carry no tone of their own. In the circumstances, it is reasonable to suggest that the tones have been conditioned by the final nasal whose scope extends over them. This would justify our recognition of nasals as syllable nuclei and therefore able to carry tone, and would also further support our earlier analysis of vowel nasalisation in Chapter 2 (pp. 39-44).

Nasals may occur in larger sequences such as in a CVNCV pattern illustrated in the following examples:

ŋɔ̄ndi	'snore'	bō̄ndi	'bundle'
ndɛ̄ndē	'a type of rat'	bɛ̄ndɛ	'baft'
dā̄ŋgā	'to curse someone'	dā̄ŋgā	'stop'
kā̄mbā	'grave'	tō̄mbō	'old village site'
mā̄nsa	'chief'	jā̄nsa	'tall'

The convention introduced (see p.158) for marking tone will apply to these sequences as well, so that a nasal between a pause and a consonant will be syllabic. It should be noted the scope of nasalisation in these circumstances is not progressive, it extends backwards. Syllabification of preconsonantal nasals has been reported for at least one other African language. Welmers (1973: 102-103) reports it for Bariba where there are no nonsyllabic final consonants.

Let us now go back to our transcriptions on p. 156

Nasals in prevocalic position as in the definite forms are not syllabic. We can now however regard the indefinite forms with final /ŋ/ as bisyllabic, in which case, our preference for the transcription in Column C cannot be regarded as entirely arbitrary.

Table 10 illustrates the distribution of phonemes in a CVN type word. All the consonants and all the vowel sounds occur, except /ʒ, ɣ, ɣb, ŋ, mb, nd /. The last three of these consonants do however occur as word initial in the CVNCV word type referred to above. The vowel with the highest frequency of occurrence is, once again, /a/. It occurs with all the consonants that could possibly occur in this word type.

We have now described the most frequently occurring word patterns. It is essentially these types that combine to form large sequences as we showed in the case of /kōtākpāndāmāiā /, /pōpōjambā /, and /āōfāā /. We have however only considered citation forms. How these sequences of phonemes and tonemes combine in levels higher than the phonological word will be considered in the next chapter.

TABLE 10 DISTRIBUTION OF PHONEMES IN CVN TYPE WORDS

C	V	V
p	ɛ a ɔ	ɔ
t	i, ɛ, a, ɔ, u	ɔ
c	i, e	ɔ
k	e, a, u, ɔ	ɔ
\overline{kp}	i, e, ɛ, a, ɔ, o, u	ɔ
b	i, e, ɛ, a, ɔ, o, u	ɔ
d	i, e, ɛ, a, ɔ, o	ɔ
ɸ		
g		
\overline{gb}		
m	i, ɛ, a, ɔ, u	ɔ
n	u	ɔ
\tilde{n}	i, ɛ, a, ɔ	ɔ
ŋ		
mb		
nd		
f	i, e, ɛ, a	ɔ
s	i, e, ɛ, a, ɔ, o, u	ɔ
l		
j	e, ɛ, a, ɔ, o	ɔ
w	i, e, a, ɔ	ɔ

CHAPTER 6

TONES

6.1 The discussion in this chapter is based on our definition of a tone language (cf p. 104). We hope to be able to show that as well as functioning lexically, tone also has a grammatical function, with differences in tonal patterns producing differences in certain grammatical features.

For ease of reference, the chapter is divided into two main sections, each of which is further subdivided. We shall discuss lexically significant tone in the first of the two main sections. Tonemes will be considered here. The possibility of grouping such tonemes into various classes will also be discussed. Finally in this section, we shall consider the question of typology in relation to any observations we may have made in our discussion of tonemes. The second main section will be concerned mainly with the relationship between tone and grammar. The discussion of this relationship cannot be regarded as exhaustive, because we are not here writing a grammar of the language. Only some features of tonal change as they may relate to certain grammatical features have been discussed. In this regard, verbs and nouns are the two word classes forming the basis of our discussion. This is because these are the major word classes to be distinguished in the Mande languages:

It is probably true that in most, if not all Mande languages two major word classes are to be distinguished, one consisting of words which correspond roughly to nouns in English, and the other of words corresponding to what Whorf has called bare lexemes, to which either verbation or stativation may be applied at will.

On this major twofold division there is probably a large measure of agreement among workers in the Mande languages. (Innes, 1967: 160-161).

Some verbal constructions will be considered, as well as the possession and pluralisation of nouns. Implications such constructions may have for the relationship between tone and grammar will be noted. We shall also note any implications such a relationship may have for tonal typology.

SECTION A: LEXICALLY SIGNIFICANT TONE

Tonemes

6.2 There is already evidence to support the claim that tone functions lexically. In the last chapter, two distinctive tones, the low level and the high level were identified. These were assigned to syllable nuclei which were either single vowel sounds, or nasals. Monosyllabic word-types occurred with one of these two tones, and every possible sequence of the two tones occurred with disyllabic word-types: low-low, high-high, low-high, high-low. For word types with more than two syllables, it was shown that these could be broken down so that the different syllables of the word consisted of the various tone patterns already identified as occurring with monosyllabic and disyllabic word types. As a single word however, there was no defined system to the tonal sequences such words could have. Morphemically complex forms like /kɔ̄pɔ̄mɔ̄nā̄ŋ/ and /tɛ̄tɛ̄mākō̄ŋ/ illustrate this. Each of these two words could be broken down into syllables of the CV type with either a high tone, or a low tone. As single words however, they each consist of tonal sequences of the form low-low-high-low, and high-high-high-high-low, respectively.

6.3 For the tonal sequences described for the disyllabic word-types, a phonetic falling tone was observed when a high tone was followed by a low tone on different syllable nuclei. A phonetic falling tone was also observed for syllable nuclei with adjacent low tones. A low tone followed by a high tone on different syllable nuclei resulted in a phonetic rising tone. It should be recalled at this stage that a falling tone was recorded on a single syllable in /wà/. No falling tone was posited however, because no minimal pairs could justify this. We can now further investigate the possibility of recognising a falling tone in addition to the two distinctive tones already recognised. We should remember here that it is the view of some scholars that any tone language can be analysed as consisting of level tones only, so that it is not at all necessary to recognise contour tones (see pp.108/9). The evidence for such a claim however is inconclusive, so that often, decisions about whether or not contour tones should be recognised reflect theoretical bias. The evidence in our case is similarly not conclusive. There is only a short list of utterances occurring with only a falling tone. Such utterances are usually definite forms, with the falling tone functioning as a definite suffix, as in the following examples:

tā	'fire'	tà	'the fire'
bū	'stomach'	bù	'the stomach'
bā	'parent'	bà	'the parent'
dā	'mouth'	dà	'the mouth'.

More often than not when a falling tone occurs, it does so in consonance with a level tone which could be either high or low. In such cases, it usually functions as a definite suffix:

k <u>u</u> nd <u>u</u>	'iron'	k <u>u</u> nd <u>ù</u>	'the iron'
kāndī	'spice'	kāndì	'the spice'
k <u>a</u> m <u>a</u>	'elephant'	k <u>a</u> m <u>à</u>	'the elephant'
s <u>a</u> m <u>b</u> a	'gift'	s <u>a</u> m <u>b</u> à	'the gift'
k <u>o</u> ŋ	'tree'	k <u>o</u> ŋè	'the tree'
b <u>o</u> s <u>a</u>	'whip'	b <u>o</u> s <u>à</u>	'the whip'.

Pairs of words differing in tone and vowel length have been recorded, with the definite suffix and its falling tone providing the difference:

du	'town'	dù	'the town'
tē	'day , sun'	tḕ	'the day , the sun'
dā	'pot'	dā̀	'the pot'
dī	'cry'	dī̀	'the cry'

The forms on the left with the single vowel sounds would normally occur in adjectival phrases such as:

du nāmā	'new town'
tē kāinē	'day-break'
dā kōmā	'old pot'
dī cē mō	'one who cries'

All vowels, except /ɔ/, can occur as the definite suffix of nouns.

/i/ occurs after /i, ε, a, u/, /e/ after /e, a/, /ε/ after /ε, e, n/, /a/ after /a, i, e, j/, /o/ after /o/, and /u/ after /u, a, ɔ/.

The following examples illustrate some of these instances:

sɛ̄ĩ	'urine'	sɛ̄ĩ	'the urine'
tai	'story'	tai	'the story'
bu(1)i	'anus'	bu(1)ĩ	'the anus'
bāē	'matchet'	bāè	'the matchet'
fɛ̄ɛ	'winnowing basket'	fɛ̄è	'the winnowing- basket'
dēŋ	'child'	dē(n)è	'the child'
tia	'true'	tia	'the truth'
dea	'lizard'	deà	'the lizard'
dānājā	'belief, trust'	dānājà	'the belief, trust'
bōō	'hand'	bōò	'the hand'
kāū	'moon'	kāù	'the moon'

The /l/ in /buli/ is very often elided, and the /n/ in /dēŋ/ is sometimes elided. The definite suffix of nouns ending in /ŋ/ is /nè/, and the noun marker /jà/, with a falling tone, indicates a definite form. Nouns ending in /ɔ/ are followed by /ɛ/ in the definite form. In such cases, /ɔ/ is usually labialised (see p.71). Similarly, /à/ as a definite suffix after /o,u/ is often realised with /o/ and /u/ labialised. In the instances where these were recorded, labialisation occurred rather rapidly, and /a/ was perceived as longer in duration than a single syllable. This was represented as two short vowels co-occurring as in

tōā, [tWāā]	'rat'	tōà, [tWāà]	'the rat'
d <u>u</u> ā, [dWāā]	'hernia'	d <u>u</u> à, [dWāà]	'the hernia'

(See p. 74 for more examples). In the two cases where /u/ was recorded after /ɔ/, they were both loanwords.

In all instances where the falling tone has occurred, it has occurred as a final syllable, indicating the definite suffix. Occurring this way, with such a limited distribution, it does not seem unreasonable to regard Kono as consisting essentially of two level tones. If we argue, in the circumstances, that the glide itself is not important, then we would have only the start and end points of the glide to consider. In this case, it would be either high, or low, because there is no mid tone. The possibility of such an analysis is suggested by Pike (1948: 6):

In a register-tone system glides sometimes occur. These glides are often analyzable in terms of their end points. When this is so, the starting point of the glide is a toneme constituted of one of the level pitches; the ending point of the glide is a toneme of one of the other levels;

Welmers (1976: 30) analyses Vai this way, describing a falling tone as a compressed sequence of a high-level and a low-level tone, and a rising tone as a compressed sequence of a low-level and a high-level tone. The case for such an analysis is strengthened by the observation that a contour tone is more likely to develop in a system with a low or high tone, but no mid:

In tone, the greater the interval between two tones, the more likely a contour tone will be created by tone spreading. (Hyman and Schuh, 1974: 89)

Hyman and Schuh further observe that there is

apparently no implicational relationship between spreading from a lower to a higher syllable to give rising tones and spreading from a higher to a lower syllable to give falling tones. p.89

This would explain the presence of a falling tone in a language without that same language necessarily having a rising tone, or a rising tone but not a falling tone. Aboh Igbo is cited as an example of the former case, and Nupe the latter. The basic principle of "spreading" is that

if two contiguous syllables differ in tone, a natural process would be for the tone of the first syllable to "spread" into the second syllable. That is, tones spread to the right.
(Hyman and Schuh, 1974: pp.87-88)

The case being made here is that tone spreading is progressive, and is more likely to occur, as we have already noted, where the interval between two tones is greatest. One would have to posit a hypothetical underlying form to illustrate this. Let us consider the following two utterances /tɛ̀ɛ̀/ 'the chicken', and /jā̀/ 'the groundnut'. Suppose, initially, these were /tɛ̀ɛ̀/ and /jā̀/. By the principle of spreading from left to right, we would have /tɛ̀ɛ̀/ and /jā̀/, or [tɛ̀ɛ̀] and [jā̀]. While there is no evidence of a low-rise tone sequence, several instances of a high-fall have been recorded:

kā̀	'the gun'	jāsì	'the sacrifice'
jā̀	'the groundnut'	dēmà	'the palm wine'
fā̀ngà	'the crowd'	fētù	'the pineapple'
dā̀ngà	'the curse'	jīfà	'the pocket'
wṑ	'the leg'	bḕnà	'the horn'

Our hypothetical underlying forms and the process of spreading here described would seem to account for the prevalence of a high-falling tone sequence over a low-rising one. It however seems incapable of accounting for a low-fall sequence which also occurs freely:

kàà	'the snake'	tɔ̀sà	'the bat'
jàà	'the lion'	kamà	'the elephant'
dangà	'the end'	bosà	'the whip'
wòò	'the baboon/kola nut'	foò	'the goitre'

Note that some of the examples with the low-fall sequence contrast with some of those with the high-fall sequence. The occurrence of a low-fall sequence could be explained by "absorption", a subtype of spreading, which

... involves a contour tone followed by a tone identical to the end point of the preceding contour.
 ... The result is that the second component of the contour, by virtue of its identity with the following tone, is absorbed into the next syllable.

(Hyman & Schuh, 1974: 90)

Consider the following hypothetical underlying forms:

/tɛ́ɛ̄/; /káā/; /músū/;

if absorption were to occur, the corresponding phonetic forms expected would be

[tɛ̄ɛ̄], [kɑ̄ɑ̄] , and [mɯ̄sū]

These forms, especially in adjectival phrases, are not uncommon. A few representative examples are:

tɛ̄ɛ̀ dɔ̀mà	'the little chicken'
kāā cɪ̀nà	'the big snake'
mūsū nɪ̀mà	'the beautiful woman'
kɔ̀nɛ̄ jansamà	'the tall tree'

Note that the final syllables of the nouns in these examples all have high tones, and that the first syllables of the adjectives immediately following all have low tones, identical with the end point of a falling tone. Absorption rules have been reported for Mende, Kikuyu and Hausa among others (cf. Hyman & Schuh, above). Absorption and spreading are both assimilatory processes. A tonal assimilation

can be either anticipatory or perseverative. In addition, tonal assimilations group themselves according to whether the assimilation is vertical or horizontal. In a vertical assimilation, tones are raised or lowered in the environment of a higher or lower tone. In an anticipatory vertical assimilation, a tone is typically raised before a higher tone ... In a perseverative vertical assimilation, a tone is typically lowered after a lower tone. (Hyman, 1975: 221)

Vertical assimilation rules are formalised thus:

(a) L → M/ ___ H

(b) H → M/ L ___

Vertical assimilation rule (a) is anticipatory, and (b) is perseverative, where L is low tone, M is mid tone, and H is high tone.

A horizontal assimilation is either partial, or complete, usually resulting from

a nonsynchrony between the tones and the segments (syllables) over which they have domain. In a partial horizontal assimilation, a contour tone, either rising or falling, results, ... (Hyman, 1975: 222)

The following are partial horizontal assimilation rules:

LH → LLH

HL → HHL

In complete horizontal assimilation

there is no remaining phonetic trace of the underlying tone of the syllable onto which spreading has occurred (Hyman 1975: 222)

Complete horizontal assimilation rules are formalised as follows:

(a) LHH → LLH

(b) HLL → HHL

(a) occurs only when the H immediately following the L is in turn followed by another H. A similar situation obtains in (b). Note, in the assimilatory processes described that a falling tone is copied as a low tone by the syllable immediately following, and a rising tone is similarly copied as a high tone. Some scholars have argued that this is sufficient proof that contour tones should be decomposed into unit level tones, since it is the end points that are significant. Contour tones therefore need not be recognised, they can be represented by their end points: a fall as high-low, and a rise as low-high. A tone is not necessarily regarded as a phonological contour just because it is not phonetically level (cf. Anderson, p. 109 above). On the strength

of such arguments, we need recognise only two tones, a high-level and a low-level. There appears to be enough evidence here, as we have seen, to make this an attractive proposition. We however cannot ignore the fact that the falling tone is phonologically significant. Acoustic evidence to be discussed in the next chapter shows also that the falling tone is not phonetically level. It is perhaps most significant that we can multiply the number of minimal pairs if we recognise the definite suffix which is a function of the falling tone. Minimal pairs were crucial in the establishment of phonemes, and it would therefore be inconsistent if we ignored their significance in establishing tonemes.

The recognition of contour tones is crucial in the analysis of certain types of tone systems if we are to capture all and only the consistent characteristics in the phonological structure. If it turns out that FALLING is the only relevant feature for a particular tone, then over-differentiation would only lead to chaos when we try to mark what pitch level the tone falls from or what pitch level it falls to. (Wang, 1967: 97)

The following minimal pairs illustrate the phonological significance of the falling tone:

(1)	f <u>an</u> g <u>a</u>	'heavy'	fāngà	'the crowd'
(2)	kp <u>a</u> s <u>a</u>	'strong'	kpāsà	'the head scarf'
(3)	wū	'short'	w <u>u</u>	'the dog'
(4)	tā	'fire'	tà	'the fire'
(5)	f <u>a</u>	'heart'	f <u>a</u>	'the heart'
(6)	jāà	'the groundnut'	jàà	'the lion/hammock'

(7)	kūnē	'(to) wake up'	kūnè	'waking up, the head'
(8)	bui	'(to) run away, anus'	bui	'the anus, running away'
(9)	kāṅgā	'to steal'	kāṅgà	'stealing, the thief'
(10)	kpāṅdi	'(to) become ill'	kpāṅdì	'(the) illness'
(11)	dāṅgā	'(to) curse'	dāṅgà	'the curse'
(12)	dāṅgā	'(to) stop/end'	dāṅgà	'the end'

The following tonal contrasts can be identified from the above examples:

(a) LL vs. HF

(b) LL vs. LF

(c) HH vs. LF

(d) H vs. F

(e) HF vs. LF

(f) HH vs. HF

Two possible combinations, a fall followed by either a high or a low tone are missing. There is also no evidence of a falling tone followed immediately by another falling tone within the same morpheme.

The examples also show that the falling tone not only functions lexically as in (1), (2) and (3), it also functions grammatically as in the rest of the examples. We now have evidence, both phonological and phonetic, to persuade us to recognise a F, which is what we have

done here. This decision might appear to contradict our declared support for the principle of economy. But we have also argued in favour of simplicity, and it seems phonetically simpler to represent a falling tone on a single syllable as falling, and not as a complex, compressed sequence of two level tones if our analysis is to reflect a more representative phonetic structure. It could also be argued that it is illogical to recognise a unit falling tone and not a unit rising tone. The crucial deciding factor here is the environments in which they occur. Whereas the falling tone usually occurs finally after a low or high level tone within the same morpheme, the rising tone is usually not preceded by another in a similar environment. We could thus represent the phonetic rising tone as a sequence of a low level tone followed by a high level tone, especially since the rising tone sounds longer in duration than a single syllable. The rising contour can then be regarded as an allotone of the high tone when preceded by a low tone. This situation parallels that which obtains when a final low tone occurs after a previously occurring low tone on an adjacent syllable. The final low tone will be lower, and a phonetic falling tone results. We could similarly represent a falling tone as a disyllabic high-low sequence. Thus /t̄a/ could be represented as /t̄āā/. Such a representation would not be amiss because phonetically, [t̄āā] in slow speech such as the author's is quite possible. From the point of view of syllable structure in other word-types however, it becomes difficult to justify such an analysis. We could not justifiably represent /k̄ā/ or /k̄ā/ as /k̄āā/ or /k̄āā/. A CVVV type word as a single morpheme would be most unusual phonologically, although [k̄āā] or [k̄āā] is possible in deliberately slow speech. Analysis of this sort provides support for regarding tone as a property of the word. The phonological word however is defined in terms of syllables in the phonological hierarchy, so in this regard, the analysis would be justified.

A rising tone is often employed stylistically for attitudinal purposes. Thus [saá], 'Saa-first son', or [iátá] are often heard. Phonemically, these could be represented as /saā/ and /jātā/.

6.4 Although we have recognised a contour tone, Kono is essentially a register tone language, because the dominant tonemic units are two level tones, a high and a low. The contour tone we have recognised has a very limited distribution. Also, although the falling contour is often realised on a single syllable, we have seen that the glide could sometimes be interrupted. This, according to Pike, (cf. pp.106 - 107), is not a property of pure contour tone languages.

Tone Classes

6.5 A common practice in African linguistics is to describe tonal behaviour in terms of tone classes. To this end, nouns and verbs are normally classed according to their tonal patterns in citation form. Following such a practice, CVCV type nouns belong to one of the following classes: low-low (LL) high-high (HH), low-high (LH) and high-low (HL). Illustrations of these various classes are:

LL		HH	
kama	'elephant'	kāmā	'shoulder'
mansa	'chief'	mānsā	'type of disease'
musu	'wife, woman'	sīsā	'fly'
ka _s a	'rust'	dēmā	'palm wine'

	LL		HH
d <u>o</u> m <u>a</u>	'shirt'	jīfā	'pocket'
s <u>u</u> n <u>a</u>	'rain'	fētū	'pineapple'
	LH		HL
c <u>ɛ</u> k <u>ɔ̄</u>	'nickname for m <u>o</u> nkey'	c <u>ɔ̄</u> c <u>i</u>	'church'
p <u>a</u> p <u>ā</u>	'father'	m <u>ā</u> p <u>i</u>	'map'

The wide membership of the LL and HH classes contrasts sharply with the restricted membership of the LH and HL classes in citation form. In fact, all cases of HL observed in this form are loanwords, and only two instances of LH are recorded, and at least one of them, possibly both, appear to be loanwords.

6.6 The tonal patterns in citation alter in different environments.

A look at tonal patterns of citation words in initial and non-initial position confirms this:

- (A) kama 'elephant'
- (1) kama dɔ̄ndɔ̄ 'one elephant'
elephant one
- (2) kama cīnama 'big elephant'
elephant big
- (3) nā kāmā cīnāmā 'my big elephant'
my elephant big

- (B) fētū 'pineapple'
- (1) fētū sāwā 'three pineapples'
 pineapples three
- (2) fētū cε dī 'this pineapple is sweet'
 pineapple this is sweet
- (3) nā fētū saŋ 'buy my pineapple'
 my pineapple buy

Note in the examples in (A), that the LL pattern of the citation form still obtains in (1) and (2), and that the tone on the syllable immediately following the final L of /kama/ is H. This pattern however alters in (3), where a HL pattern replaces the LL of the citation form. In (B), the HH of the citation form remains essentially the same in all cases. The general pattern is that a LL in initial position will remain unchanged irrespective of any tonal sequences that may follow. Except in a few cases, the first syllable of such a sequence, especially of adjectives and adjectival phrases, will always be H, even though it may be L in isolation. /dōndɔ/ in (1) is /dɔndɔ/ in isolation. Similarly, /kōnōntɔ/ 'nine', /jānsa/, 'tall', /niŋ/, 'nice/beautiful', all citation forms, alter their tonal patterns when they occur immediately after a LL in initial position:

- kāa kōnōntɔ 'nine snakes'
 snakes nine
- kāi jānsama 'a tall man'
 man tall a
- musu ni mā 'a nice/beautiful woman'
 woman nice a

After a possessive pronoun of the 'my'-type, a LL becomes a HL, as in the following examples:

nā mūsu 'my wife'

my wife

jā bōsa 'your whip'

your whip

aa sāwa 'his law'

his law

As with the LL a HH in initial position remains essentially unchanged by subsequent tonal sequences, and adjectives immediately following alter their tone patterns:

kāā kōnonto 'nine guns'

guns nine

kpākū jānsama 'a long bridge'

bridge long a

bōkpā nimā 'nice/beautiful handiwork'

Low tone verbs occurring immediately after HH nouns in initial position also change their citation form tones in verbal nominalisation constructions:

dēmā mīn mo 'a palm wine drinker'

palm wine drinks person (who)

fētū san mo 'a pineapple buyer'

pineapple buyer person (who)

kānā fāā mō 'an iguana killer'
 iguana killer person (who)

/mīn/, /sān/, and /fāā/ in the above examples all occur with low tones in citation form.

A HH in non-initial position behaves differently from a LL in a similar position; it is essentially unaltered after possessive pronouns:

nā	kāā	'my gun'
my	gun	
jā	jīfā	'your pocket'
your	pocket	
ana	dēmā	'their palm wine'

6.7 The trend identified for the behaviour of the HH and LL of other disyllabic word types is similar to that of the CVCV word types in the same environment. A HH or LL in initial position remains essentially unchanged when followed by other tonal sequences, especially if they are sequences of adjectives and adjectival phrases. The first syllable of such adjectival sequences will always be H, irrespective of their citation form tonal patterns. The following examples of CVV and CVN type words illustrate this:

(a)	wōō	dōndō	'one leg'	wōō	dōndō	'one kola nut'
	leg	one		kola nut	one	
	kāā	sāwā	'three guns'	kāā	sāwā	'three snakes'
	guns	three		snakes	three	

kūū cīnāmā 'big bone' kuū cīnāmā 'big buttocks'
bone big buttocks big

cīā nāmā 'new road' cīā nāmā 'new ring'

kāā kōnōntō sāŋ 'buy nine guns'
guns nine buy

kaa kōnōntō fāā 'kill nine snakes'
snakes nine kill

(B) cēŋ kōōmā 'old house' kōŋ kōōmā 'old tree'
house old tree old

dēŋ sāwā 'three children' saŋ sāwā 'three years'
children three years three

sūŋ cīnāmā kuŋ cīnāmā
nose big head big

bīŋ sāwā nāŋ 'make three beds'
beds three make

jōŋ tāŋ cēē 'call ten slaves'
slaves ten call

In non-initial position, a HH will remain basically the same when preceded by a possessive pronoun, but becomes a ¹HH when preceded by a complete action marker with high tone:

¹A vertical stroke before a H indicates a downstep in tone, with the 'H sounding lower than the H preceding it.

nā k̄āā nāma saŋ 'Buy my new gun'
 my gun new buy

nā 'k̄āā nāma saŋ 'I have bought a new gun'
 I have gun a new bought

nā cēŋ nāma so 'build my new house'
 my house new build

nā 'cēŋ nāma so 'I have built a new house'
 I have house a new built

A LL in non-initial position will become a HL after a possessive pronoun, but LH after a complete action marker:

nā k̄pōo kaŋ 'read my book'
 my book read

nā k̄pōo kaŋ 'I have read a book'
 I have a book read

For CVN type words however, there is no appreciable glide either from H to L, or from L to H as the case may be. They are basically HH after possessive pronouns, and LL after the complete action markers:

ŋ k̄uŋ cīnāma wā 'my very big head'

nā k̄uŋ cīnāma wā saŋ 'I have bought a very big head'
 I have a head big very bought

As with the CVCV type words, there is a very restricted membership of the HL and LH class of CVV and CVN type nouns in citation form.

There is no evidence of this in the CVV class, and only /tāy/ has been recorded for the CVN class.

6.8 Monosyllabic nouns behave in a way similar to the CVN type words. They remain L or H in initial position:

tū	nāma	'new oil'	ba	dū(1)ū	'five goats'
oil	new		goats	five	
bū	dōma	'small stomach'	sa	wō(1)ō	'six sheep'
stomach	small		sheep	six	
sī	wā	'big witness'	fa	dē	'father's mother'
witness	big		father's	mother	

In non-initial position they are H after possessive pronouns, and L after the complete action marker:

ṁ	fā	jansamā	'my tall father'
my	father	tall	
nā	fa	jēṅ	'I have seen father'
I	have	father	seen

SECTION B: GRAMMATICAL TONE

Verbal Constructions.

6.9 Although

There is no useful or adequate definition of the VERB. (Hornby, 1975: 1)

our use of it here will include words or phrases expressing action, a process, or the state or condition or mode of being of someone or something (see Pei & Gaynor, 1980: 227). Also included in such phrases will be what are traditionally known as pronouns, where pronouns would be words used to replace nouns in noun phrases (cf. Pei & Gaynor, 1977).

This is because

The tonal pattern of any verbal construction [in West African languages] is made up of the pitch of the stem of the verb together with that of any affixes: it is generally useful to link the subject pronoun, with its tone, to the pattern. (Ward, 1948: 831)

The value of this observation will shortly be illustrated when we consider the different forms of pronouns and their tonal patterns as they combine with the verb stem in various verbal constructions.

6.10 Verbs, like nouns, have no initial vowels, and occur similarly either as monosyllabic word types, or as polysyllabic word types:

t _e	'(to) break'	b _e	'to give'	tā	'(to) go'
t _{aa}	'(to) creep'	dū _u	'to bend'	k _{ai}	'to confess'
kū _ŋ	'(to) groan'	s _{oŋ}	'to get, have'	m _{iŋ}	'to drink'
tācē	'(to) walk'	dūmē	'(to) ache'	tākpa	'(to) become difficult'

Verbs with a LL are less common than HH verbs. They occurred most in the CVN class, and least in the CVCV class where only two were recorded. One of these, /pawā/ appears to be a loanword. Generally, LH and HL verbs occurred least. /dūu/ was the only recorded member of the HL class.

6.11 The tonal patterns of the verbs are the same as those identified for the nouns. A comparison of verbal tone contrasts with those of nouns shows however that there is greater restriction on verbal tone contrasts. Only a small list of minimal pairs has been recorded for the verbs:

tā̄ŋ	'to straighten'	tā̄ŋ	'to meet'
kā̄ī	'to pick'	kā̄ī	'to confess'
sō̄ŋ	'to know, gather, pick up'	sō̄̄ŋ	'to get, have'

The rarity of verb stem contrasts, in some cases its total absence, has long since been reported for the Mande languages (see Welmers 1971: 12).

6.12 Verbs may be reduplicated, leading to a multiplication of tone sequences. Often, this is done to emphasise or reiterate an idea. The following examples demonstrate this:

tō̄ŋ	'to lock, close'
tō̄n.tō̄ŋ	'to lock, lock' (as in locking all the doors of a house)
bē̄ŋ	'to pass'
bēm.bē̄ŋ	'to pass pass' (as in gadding about)

sōŋ	'to gather, pick up'
sōn.sōŋ	'to gather gather' (as in gathering or picking up everything')
kāī	'to break, pick (fruits)'
kāī.kāī	'to break break (as in breaking into pieces - usually of plants)
dū	'to share among'
dū.dū	'to share share among' (as in sharing among a large number)
tē	'to break'
tē.tē	'to break break' (as in breaking into pieces - usually of glass)
dūy	'to bend'
dūy.dūy	'to bend bend' (as in bending or twisting many times)

Some of these examples show how nasal-oral sequences may sometimes occur.

6.13 Note that the tonal patterns of the reduplicated verbs can be assigned to one of the word types already discussed if broken down. As is to be expected, because they reiterate or reinforce ideas, their tonal structure is affected by attitude. This is illustrated in the following examples:

(1) m̄m̄m̄ c̄ ɔ̄ t̄e.t̄e '(you) break that mirror (into bits)'

mirror that in break break

(2) m̄m̄m̄ c̄ ɔ̄ t̄ē.t̄e '(you) break that mirror (into bits)'

(3) n̄ ā 'c̄ēn̄ ɔ̄ t̄ōn.t̄ōn 'I have closed the house (all round)'

I have the house it closed closed

(4) n̄ ā 'c̄ēn̄ ɔ̄ t̄ōn!t̄ōn 'I have closed the house (all round)'

A threat is implied in (1) and (2). It is a calm threat in (1) and a more aggressive one in (2) where the H of the reduplicated verb is stressed. We can interpret (3) as showing some form of disapproval or a state of excitement. The reduplicated verb will be stressed, and depending on how quickly we say it, the [a] preceding [t̄ōnt̄ōn] will sound phonetically higher in pitch than its counterpart in (4). We can regard (4) as being more polite or less excitable. This effect is achieved by the downstepped tone of the reduplicated verb.

6.13 In (1) to (4) above the verbs are all preceded by pronouns. This is an illustration of our earlier observation that pronouns with their tone are very much a part of the verbal structure. There is a variety of forms of the pronoun that the verbal structure may require, and this makes it complex. The following personal pronouns with tone are some of the pronoun forms the verb may require:

I - type

Me - type

$\bar{\eta}$	mbī	$\bar{\eta} + f\bar{a}\eta$ [$\bar{\eta}f\bar{a}\eta$]
\bar{i}	\bar{i}	$\bar{i} + w\bar{a}\eta$ [$\bar{i}w\bar{a}\eta$]
\underline{a}	$\underline{\epsilon}$	$\underline{a} + w\bar{a}\eta$ [$\underline{a}w\bar{a}\eta$]
$\underline{\eta}$	mbī	$\underline{\eta} + fa\bar{\eta}$ [$\underline{\eta}fa\bar{\eta}$]
wū	wī	wū + wāη [wūwāη]
$\underline{a}\eta$	$\underline{a}mbi$	$\underline{a}\eta + f\bar{a}\eta$ [$\underline{a}\eta f\bar{a}\eta$]

Mine-type

My-type

$\bar{\eta} + t\bar{a}$ [$\bar{\eta}t\bar{a}$]	$\bar{\eta} + a$ [$n\bar{a}$]
I + own	
$\bar{i} + t\bar{a}$ [$\bar{i}t\bar{a}$]	$\bar{i} + a$ [$j\bar{a}$]
$\underline{a} + t\bar{a}$ [$\underline{a}t\bar{a}$]	$\underline{a} + a$ [$\underline{a}a$]
$\underline{\eta} + t\bar{a}$ [$\underline{\eta}t\bar{a}$]	$\underline{\eta} + a$ [$na\bar{a}$]
wū + tā [wūtā]	wū + a [wūā]
$\underline{a}\eta + t\bar{a}$ [$\underline{a}\eta t\bar{a}$]	$\underline{a}\eta + a$ [$\underline{a}\eta a$]

In all cases, the distinction between the first person singular and the first person plural is a function of tone. Whereas the former always has a H, the latter always starts with a L on its first syllable. In the case of the I-type with / $\bar{\eta}$ / as first person singular, this is the only distinction. A LH pattern is observed for the first person plural when the pronoun has more than one syllable. / η / loses its syllabicity when it is immediately followed by a vowel, as when it combines with the

possessive marker /a/ in the My-type of pronoun. In this case, the velar nasal changes its place of articulation, and is realised as an alveolar nasal instead. This is because /ŋ/ in initial position in a CV structure is not permissible. The velar nasal also changes its place of articulation when it occurs before consonants that may be homorganic with other nasals. This is observed in the Me-type pronouns where it becomes [ɱ] before [f] which is [w] in other cases. It is realised as [n] before [t] in the Mine-type pronoun group. The third persons singular and plural always start as low tones. This may be monosyllabic as in /ŋ/ of the I-type pronouns, or polysyllabic as in all other cases.

6.14 Some forms of the verbal structure will show more clearly the relationship between the verb stem and the pronoun. The verb stem remains largely the same, but the pronoun forms occurring with it vary, suggesting the relationship between verb and pronoun is an important one. Consider the case of /tō/, 'to like, want, love', and /nā/, '(to) come'.

(A) n̄ tō mū	(B) mbī tō	(C) mbī nā
ī tō mū	ī tō	ī nā
a tō mū	ε tō	ε nā
n̄ tō mū	mbiī tō	mbiī nā
wū tō mū	wī tō	wī nā
an̄ tō mū	ambi tō	ambi nā

The difference in the form of the pronoun for the third person singular from /a/ in the /n/ type verbs to /ε/ in the /mbi/ type should

be noted. On the surface, this difference is difficult to explain. It is not unreasonable to suggest however that this may be due to changes in the language over a period of time. A possible explanation would be that /ɛ/ is the product of the fusion of /a/ and /i/. There is evidence that /a/ frequently occurs in this position:

a t̄a 'his own'
his own

a t̄a 'ā 'he/she/it has gone'
he/she/it has gone

a n̄a ā 'he/she/it has come'
he/she/it come has

The third person plural form of /ɛ/ is /ambi/. Similarly, the second person plural form is /wī/. Thus, /a/ + /i/ may have become /ɛ/. It should be remembered that [i] may be open enough sometimes to be [e]. This has been observed in the speech of the author and some other native speakers.

6.15 Whether or not a verb takes the /ŋ/ form as in (A) or the /mbi/ form as in (B) and (C) depends on the nature of the verb. Verbs expressing a feeling or desire, a mode of being, or the state or condition someone is in would take the form in (A). The structure of such verbs is PRONOUN (P) + VERB (Vb) + m̄u. Verbs of the form in (B) and (C) are those that express action, usually habitual, or a process indicating what someone or something is doing. The examples in (A) and (B) demonstrate the distinction between the /ŋ/ and /mbi/ forms of the verb. Note in (C) that although /n̄a/ has a L in isolation, it is H in all other

cases when it occurs after the personal pronoun, except after the third person singular and plural. The only difference between this pattern and that obtaining with /tō/, with a H in isolation, is that after the third person, both singular and plural, /tō/ is H. This is the general pattern of verbs occurring in this environment. High tone verbs will be H in all cases. Because the third persons singular and plural are always *low*, there will be tonal polarity. Low tone verbs on the other hand will be low after the third person singular or plural, but high in all other cases. The significance of observing these tone patterns in the verbal structure can be illustrated. Consider the following examples:

(a) mbiī nā 'we come' (habitual action)

(b) mbiī ī nā 'we will not come'.

In (a) /nā/ has a H, as it would in this environment, when it is preceded immediately by a personal pronoun. In (b) however, when it is preceded immediately by the negative marker, it changes from a H to a L. The negative construction demands it.

6.16 Some verbs may occur without pronouns in some constructions. No regular pattern has been identified for these, but most of those recorded have been verbs of motion:

tā	'go'	na	'come'
sī	'sit'	sō	'stand'
tāa	'creep'	tācē	'walk'
bui	'run away'	but	bui cē 'run'

The simple form of these verbs will also function as the infinitive, since there is no separate word for it, as in English for instance. Thus /tā/ could mean 'go', or 'to go', /sō/ '(to) stand', /tāa/ '(to) creep':

mbī tā	mbī sō	mbī tāa
ī tā	ī sō	ī tāa
ε tā	ε sō	ε tāa
mbiī tā	mbiī sō	mbiī tāa
wī tā	wī sō	wī tāa
ambi tā	ambi sō	ambi tāa

There are not many verbs that may occur independently in the simple form. Most verbs occur as compounds with a helping verb, the most common of these being /cē/ 'to do':

tāwā 'cē	'cook'	cēē 'cē	'call'
dāūngε 'cē	'eat'	kaṅqā 'cē	'steal'
tombwē doṅ	'dance'	sīī 'sā	'sing'

6.17 Other forms of the verb recorded include the 's-form', the preterite, the perfect, and the 'ing-form' for both simple and compound verbs:

na	'(to) come'	simple/infinitive
ε na	'he/she/it comes'	s-form
a na ā 'wā	'he/she/it came'	preterite

a na ā	'he has come'	perfect
ε na tīnā	'he is coming'	-ing form
nà	'coming'	verbal nominalisation
tāwā 'cē	'(to) cook'	simple/infinitive
ε tāwā 'cē	'he/she/it cooks'	s-form
a ā tāwā 'cē wā	'he/she/it cooked'	preterite
a ā tāwā 'cē	'he/she/it has cooked'	perfect
ε tāwā 'cē tīnā	'he/she/it is cooking'	-ing form
tāwā cēε	'cooking'	verbal nominalisation

The contrast between the following sentences is another illustration of the significance of pronouns in the verbal structure:

a na ā'wā	'he/she/it came'
ε na ā'wā	'he/she/it will come'
a ā tāwā 'cē wā	'he/she/it cooked'
ε tāwā 'cē ā wā	'he/she/it will cook'

The distinction between the preterite form and the future is provided by the different forms of the pronoun, as in /na/ for instance. As well as this difference however, there is in the case of the compound verb a change in the position of /ā/. Instead of coming immediately after the pronoun as in the preterite, it comes after /cē/. It is significant

that this change is observed as the following examples show:

ε	tāwā	'cē	wā	'he/she/it can cook'		
ε	a	tāwā	'cē	wā	'he/she/it can do his/her cooking'	
ε	tāwā	'cē	ā	wā	'he/she/it will cook'	
ε	a	tāwā	'cē	ā	wā	'he/she/it will do his/her cooking'

6.18 Compound verbs may occur without helping verbs. In such cases, they will occur with pronouns:

	a	tāwā	'cook it'		
mbī	a	tāwā	'I cook it'		
ε	a	tāwā	'he/she/it cooks it'		
a	ā	na	a	tāwā	'he/she/it cooked it'
a	ā	a	tāwā	'he/she/it <cooked it' < has	
ε	a	tāwā	tīnā	'he/she/it is cooking it'	
ε	a	tā	'wā	wā	'he/she/it will cook it'

Although the non-observance of these tonal forms may only lead to phonetic distortion in many cases, they are phonologically significant in some:

ε	a	tāwā	wā	'he/she/it can cook it'	
ε	a	tā	'wā	wā	'he/she/it will cook it'
a	ā	na	ā	fīi	'he/she/it tricked us'
a	ā	na	a	fīi	'he/she/it tricked him/her/it'

6.19 In other verbal constructions, the preposition /ma/, 'on', is a part of the construction, coming between the pronoun and the verb which is often of the CVN word type:

mbī m̄ mā fēŋ	'I look at myself'
I me on look	
ī ī mā fēŋ	'you look at yourself'
ε a mā fēŋ	'he/she/it looks at himself'
mbiī m̄ maā fēŋ	'we look at ourselves'
wī wū mā fēŋ	'you look at yourselves'
ambi am mā fēŋ	'they look at themselves'

6.20 Note the gemination that has occurred across morpheme boundaries in the first person singular, the first person plural, and the third person plural in the examples above. Gemination also occurs in the verbal nominalisation of CVN type verbs with high tones, in this case, in one morpheme:

ʃōŋ	'spoil, poor'	ʃōnnε	'spoiling, poverty'
sōŋ	'know, pick'	sōnnε	'knowing, picking'
tōŋ	'lock, close'	tōnnε	'locking, closing'
sīŋ	'rub'	sīnnε	'rubbing'

6.21 Prepositions other than /ma/ may also occur in verbal constructions. Several Mande languages reportedly have what some writers have called 'postpositions'. These are a set of morphemes that correspond in their function to what in English would be called 'prepositions', words such as 'in', 'under', 'above', etc. (Welmers, 1971:130).

Most postpositions in Kono are locative, and some are derived from body parts:

Body Part	Postposition
kun̄ 'head' + mā, 'on'	kumā 'on top, above'
bū 'stomach', + ɔ̄ 'in'	būɔ̄ 'in, inside'
jā 'eye', + tēnā 'towards, in the direction of'	jātēnā 'opposite'
ɔ̄ 'front' + ɔ̄ 'in'	ɔ̄ɔ̄ 'in front'
kpāà 'the back'	kpāà 'behind, in the absence of'

But there are also non-body postpositions:

mā	'on'
tè	'between, in the middle'
tēnā	'towards, in the direction of'
nè	'here'
pān̄	'there'
pāndē	'there' (emphatic)

tīnā	'place of/for', as sā tīnā 'place for sleeping, lying'
n̄ tīnā	'to me'.

Postpositions occur after nouns, pronouns, or verbs:

saa k̄pāa	'behind Saa'
tamba k̄uma	'above Tamba, on top of Tamba'
cēng b̄u	'inside the house'
n̄ tēnā	'towards me'
ī jātēnā	'opposite you'
wū j̄o	'in front of you'
a s̄ā n̄e	'lay it here'
a nuṅ p̄āṅ	'hide it there'

There is some disagreement about which grammatical category these "postpositions" belong to. Prost (cited in Welmers, 1971: 130), reportedly makes a distinction between postpositions and locative nouns for Bisa. Welmers (1971:130-31) reports that in Kpelle, postpositions are merely 'dependent nouns' comparable to body parts. In Mende, the distinguishing characteristic of body postpositions and some non-body postpositions is that

they have corresponding noun forms which take all nominal affixes and thus give them nominal distribution. (Pemagbi, 1978: 30)

In Kono certainly, some of what we have called postpositions may function differently from prepositions as we know them in English. When this happens, tone can be crucial in making the distinction:

(a) $\underline{\epsilon}$ t̄awā'cē t̄inā 'he/she/it is cooking'
 L H H 'H H L

(b) $\underline{\epsilon}$ t̄awā cē t̄inā ''he/she/it is in the cooking place'
 L H H H H L

Although /t̄inā/ in (a) may be homophonous with that in (b), they both in fact function differently. Following the 'H in (a), it functions as a verbal progressive suffix, whereas in (b), it functions as a place suffix, showing place of action or event. The distinction between progressive action and place of action in this case is a function of tone, with /t̄inā/ functioning both verbally and nominally. While (b) may be (a) such as in rapid speech, (a) could never be (b).

6.22 Past tense constructions are characterised by polarity between the past marker /ā/, and the verbs and pronouns in the verbal structure:

(1) \underline{a} ā \underline{a} kauŋ 'he has swallowed it'
 he has it swallowed

(2) sia t̄ā 'ā \underline{a} 'Sia has taken it away'
 Sia taken away has it

(3) fa nā 'ā \underline{a} 'father has brought it'
 father brought has it

- (4) nā dēnɛ n̄ tā 'ā 'my children have gone'
 my child ren gone have
- (5) n̄ ā kaā cɛ fāā 'I have killed that snake'
 I have snake that killed

Tonal polarity is less noticeable when the past marker occurs after a verb with H in isolation as in (2) and (4), especially in rapid speech. Often however, in slow speech, a stepping down in the tone of the past marker can be observed in this environment. This stepping down is more obvious when it occurs after a low tone verb that has been raised to H, as in (3). Remember that the first syllable occurring after a L or a LL in initial position is usually high.

When a CVN type verb is involved, the past marker becomes /dā/:

- n̄ bān 'dā 'I have refused'
 I refused have
- ā tīn 'dā 'he/she/it has jumped'
 he/she/it jumped has
- kāmbā d̄n 'dā 'Komba has agreed'
 Komba agreed has

All the verbs in these examples occur with a final /ŋ/ in isolation.

6.23 The negative can be formed in a variety of ways. What is common to every case however is that the negative marker will always have high tone. This is illustrated by the following examples;

mbī ī 'ta sīnā 'I will not go tomorrow'
 I will not go tomorrow

ε ī 'tā tīnā 'he/she/it is not going'
 he/she/it is not go ing

ea ī 'dōŋ 'Eya will not agree'

In the above examples, the negative marker is /ī/ with a H. It occurs after pronouns and nouns, but before verbs. Verbs occurring immediately after it are downstepped.

Sometimes, /mā/, with a H, is used to form the negative. This form is often used for requests and advice, and is considered to be more polite than /ī/:

m̄ mā 'tā sīnā 'Let me not go tomorrow'
 Let me not go tomorrow

saa mā 'tā bōndū tīnā 'Let Saa not go to Bondu'
 Let Saa not go Bondu to

kemā mā 'tō n̄ε 'Let Kema not stay here'
 Let Kema not stay here

As with /ī/, /mā/ occurs after pronouns and nouns, but before verbs. Verbs with high tone occurring immediately after it will be downstepped.

The past negative marker is indicated by /mā/ + /mī/, with /mā/ before the verb, and /nī/ after:

a mā 'tā nī 'he did not go'
 he did go did

fa mā na nī 'father did not come'
 father not come did

mani mā kā faa nī 'Mani did not kill the snake'
 Mani not the snake kill did

Once again it is significant that the relative pitch levels are observed in all the examples cited, although only phonetic distortion may result in some cases if they are not. But consider the following:

i mā tā 'move (yourself)'
 you on move

i mā 'tā 'do not go'

6.24 The declarative can be made into a question by the imposition of a question intonation. A rising tone pattern is observed on the final syllable of the utterance, rising to a pitch higher than elsewhere if the final syllable is high:

ε ni na sīn'ā 'Let him come tomorrow'
 him let come tomorrow

ε ni na sīn'á? 'May he come tomorrow?'
 he may come tomorrow

sīa mā tā bōndū tīna 'Let Sia not go to Bondu'
 Sia not go Bondu to

sīa mā tā bōndū tīn'á? 'Shouldn't Sia go to Bondu?'
 Sia should not go Bondu to

There is usually a lot of interplay between intonation and interrogation. Since our definition of tone excludes any other intonational features except pitch, we shall consider this interplay as outside the scope of this work.

Nouns

6.25 Two types of possessed nouns, 'free' or 'alienable', and 'dependent' or 'inalienable' have been recognised by Africanists for the Mande languages

It has been well known for a considerable time that Mande languages distinguish two types of genitival phrases, and these have usually been described in terms of 'alienable' and 'inalienable' possession. (Innes, 1967: 167)

Welmers (1971: 130) makes a similar observation:

Mention has been made of a distinction between alienably and inalienably possessed nouns in several Mande languages. Unique or irregular forms or usage for some such nouns, especially kinship terms are widely attested in the Niger-Congo language family, but the Mande languages show by all odds the most consistent development of this distinction.

Welmers (cf. above) defines a 'free' or 'alienable' noun as

one which may be used without an expressed possessor p.130 .

A 'dependent' or 'inalienable' noun on the other hand

recognises specification of a possessor. Further, the possessive constructions for these types of nouns 'free' and 'dependent' are frequently different in some way. p.130 .

Innes' (cf. above) views of this division appear to suggest that there

is no consensus on criteria for making the distinction:

The division of genitival phrases into these two types [alienable and inalienable] is correlated with a semantic difference, which is not easily formulated ... p.163

He however characterises the inalienable noun as being

intimately associated with the 'possessed' entity and does not have control over it ..., indeed it is rather the 'possessed' entity which has control of the 'possessor', ... p.163

and classifies them as 'Type 2'. Nouns classified as 'Type 1' on the other hand are, he says, characterised by the control of 'possessor' over 'possessed':

In type 1 phrases, ... the 'possessor' has control over the 'possessed' entity and can do as he pleases with it. p.163

Innes's examples to illustrate the distinction between his type 1 and type 2 phrases certainly support his observation that both types of phrases could be regarded as semantically distinct:

Type 1:	ń	á	musu	my wife ¹
Type 2:	ń	dé		my mother
Type 1:	ń	á	tóo	my ear (i.e. ear of an animal belonging to me)
Type 2:	ń	tóo		my ear (of my own body)
Type 1:	ń	á	kpóo	my book cf. kpóo skin, paper, book
Type 2:	ń	kpóo		my skin

¹All examples by Innes have been transcribed and translated exactly as he reports them.

Innes' primary aim in his discussion is to show that phrases traditionally described in Mande languages as consisting of object pronoun plus verb are structurally identical with those traditionally described as consisting of pronoun plus noun, that is, to either alienable nouns, or inalienable nouns. The distinction between these two types of nouns is however crucial to his thesis, and he seems to be suggesting that such a distinction could be made on the basis of semantic difference. While we are not especially concerned with challenging or defending his ultimate objective, we wish to submit that tone, as well as semantic difference is crucial in making the distinction between alienable and inalienable nouns in Kono. It is debatable, in his examples cited above, that the 'possessor' is either always 'intimately associated' with the 'possessed' entity, or always controls it. Any number of factors, including psychological, social, and physical factors, could influence the relationship between 'possessor' and 'possessed', so that 'control' could take place in both directions, and would therefore not, strictly speaking, be the property of any one person. Innes himself recognises that more than semantic difference is sometimes involved, and reports that in Mende for instance, type 1 and type 2 phrases are tonally distinguished. In fact, he gives three sets of distinguishing features which may be found singly or in combination in the phrases:

1. Two types of tone pattern
2. Two sets of pronouns
3. Presence or absence of a genitival link p.161 .

In the case of Kono, he says that

Genitival phrases are of two types:

1. Those with genitival link a:

n' á chéne my house

2. Those without genitival link:

n' dé my mother p.166 .

The occurrence of the two types of genitival phrases is summarised thus:

Nouns other than a short list all of whose members denote parts of the body and senior kin occur as 'possessed' word in type 1 phrases only, nouns denoting senior kin occur in type 2 only; nouns denoting parts of the body occur in both types of genitival phrase: ... p.166

Our own observations are very similar to Innes', except that we note that junior kin also occur as type 2 phrases. /ñ dō/, 'my younger brother/sister', is an example of this. Brothers and sisters are generally referred to as 'elder' or 'younger'. Context reveals whether 'brother' or 'sister' is meant. A more blanket term that covers this kind of kinship, whether one is younger or older is /tensa/, which also occurs as a type 2 phrase, /ñ tēsa/. We have recorded only one junior kinship term, /ñ ā dēñ/ occurring as a type 1 phrase.

6.26 An apparent incongruity in the defining characteristics of alienable and inalienable nouns as described by Innes and Welmers (cf. pp. 201-202) demonstrates the need for recognising tone as a significant part of the structure. Words like /fa/, /kɔ̄ / and /tensa/ would be alienable nouns by Welmers' definition because they could occur without a possessor indicated. /ñ dē/ and /ñ bēñ/ however would, by the same definition, be classified as inalienable nouns, because they always require a possessor. All of these words would however belong to Innes' type 2 phrases, because they all occur without a genitival link:

ḡ fā	'my father'
my father	
ḡ kōḡ	'my elder brother'
my elder brother	
ḡ tēnsa	'my brother/sister'
my brother/sister	
ḡ dē	'my mother'
my mother	
ḡ bēḡ	'my uncle'
my uncle	

Note in all of these examples that the tone of the first syllable of the noun is the same as that of the pronoun immediately preceding it. In all cases it is high. This is nearly always the case. A short list of exceptions have been recorded with the first syllable of the noun occurring with low tone, but only after the third person singular:

ḡ fā	'my father'	ḡ dē	'my mother'
ī fā	'your father'	ī dē	'your mother'
a fa	'his/her father'	a de	'his/her mother'
ḡ fā	'our father'	ḡ dē	'our mother'
wū fā	'your father'	wū dē	'your mother'
aḡ fā	'their father'	aḡ dē	'their mother'

The following is a complete list of the nouns recorded occurring with

low tone on their first syllables after the third person singular possessive pronoun:

<u>a</u> fa	'his/her father'	<u>a</u> b <u>o</u>	'his/her excrement'
<u>a</u> d <u>e</u>	'his/her mother'	<u>a</u> n <u>u</u> ŋ	'his/her gut/intestines'
<u>a</u> ɔ <u>ɛ</u> ɛ	'his penis'	<u>a</u> b <u>u</u> (l) <u>i</u>	'his/her anus'
<u>a</u> c <u>ɛ</u> s <u>ɛ</u>	'her vagina'		
<u>a</u> t <u>e</u> n <u>s</u> a	'his/her brother/sister'		
<u>a</u> k <u>ɔ</u> ɔ̄	'his/her brother/sister'		

Note that the list on the left has biological reproductive connotations and the one on the right has scatological connotations. Outside this list, all other nouns recorded occurring without possessive marker /a/ (genitival link in Innes' analysis) always had high tone on their first syllables. Contrast this structure with the one that obtains when the noun is linked with the pronoun by /a/:

(a)	<u>ŋ</u> ā m <u>ū</u> s <u>u</u>	→	[nā m <u>ū</u> s <u>u</u>]	'my wife'
	<u>i</u> ā m <u>ū</u> s <u>u</u>	→	[jā m <u>ū</u> s <u>u</u>]	'your wife'
	<u>a</u> ā m <u>ū</u> s <u>u</u>	→	[aā m <u>ū</u> s <u>u</u>]	'his wife'
	<u>ŋ</u> a ā m <u>ū</u> s <u>u</u>	→	[naā m <u>ū</u> s <u>u</u>]	'our wife'
	<u>w</u> ū ā m <u>ū</u> s <u>u</u>	→	[wūā m <u>ū</u> s <u>u</u>]	'your wife'
	<u>a</u> ŋ a m <u>ū</u> s <u>u</u>	→	[ana m <u>ū</u> s <u>u</u>]	'their wife'

(b)	\bar{n}	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[n\bar{a} d\bar{e}\bar{m}\bar{a}]$	'my palm wine'
	\bar{i}	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[j\bar{a} d\bar{e}\bar{m}\bar{a}]$	'your palm wine'
	\bar{a}	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[a\bar{a} d\bar{e}\bar{m}\bar{a}]$	'his palm wine'
	\bar{n}	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[na\bar{a} d\bar{e}\bar{m}\bar{a}]$	'our palm wine'
	$w\bar{u}$	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[w\bar{u}\bar{a} d\bar{e}\bar{m}\bar{a}]$	'your palm wine'
	$a\bar{n}$	\bar{a}	$d\bar{e}\bar{m}\bar{a}$	\rightarrow	$[ana\bar{a} d\bar{e}\bar{m}\bar{a}]$	'their palm wine'

Although / $\bar{m}\bar{u}\bar{s}\bar{u}$ / in (a) and / $d\bar{e}\bar{m}\bar{a}$ / in (b) have different tone patterns in citation, they both have a H on their first syllables when they occur immediately after the genitival link. It is the case that the first syllable of the noun occurring immediately after the possessive marker is always H, irrespective of its tone pattern in citation form. Because of this, and because the possessive marker occurring with the third persons singular and plural is always L, there will always be tonal polarity between these possessive pronouns and the nouns occurring immediately after them. This structure is distinct from that which obtains with possessed nouns that occur without genitival link (using Innes' phrase). With this knowledge, we can now re-classify possessed nouns in Kono. There are two types, those with genitival link / a /, and those without. Those with genitival link will always occur with high tone on their first syllable immediately after the genitival link, and there will always be tonal polarity between this syllable and the third person singular and plural possessive pronouns. Those without genitival link do not always have polarity in this environment. A small number of nouns will always have low tone when they occur in this position (see list on p.206). In all other cases, nouns in this class

will occur with a H on their first syllable immediately after the possessive pronoun. Nouns denoting kin and parts of the body belong to this class. All other possessed nouns will occur with genitival link /a/. While kinship nouns occur always without genitival link, (except / \bar{n} \bar{a} $\bar{d}\bar{e}\eta$ /), nouns denoting parts of the body can occur with genitival link. This is when semantic difference may be recognised, as in the Innes examples:

\acute{n} \acute{a} $t\acute{o}o$	my ear (i.e. ear of an animal belonging to me)
\acute{n} $t\acute{o}o$	my ear (of my own body)
\acute{n} \acute{a} $k\acute{p}\acute{o}o$	my book cf. $k\acute{p}oo$ skin, paper, book
$\acute{\eta}$ $k\acute{p}\acute{o}o$	my skin

It is worth noting in these examples that parts of the body actually belonging to one's own person occur without genitival link. Those with genitival link are however parts of someone or something else's body before being acquired. A more comprehensive generalisation therefore would state that possessed nouns denoting kin and parts of the body actually belonging to one's own person occur without genitival link. All other possessed nouns, including parts of the body belonging initially to someone or something else's body occur with genitival link /a/. The tonal structure described earlier as relating to these two classes still applies. What might be considered conclusive evidence for regarding tone as an essential part of the structure of possessed nouns is provided by the following examples:

- (1) \bar{n} \bar{a} $k\bar{a}m\bar{a}$ $\xi\bar{a}\eta$ 'buy my elephant'
 my elephant buy

- (2) \bar{n} \bar{a} $k\bar{a}m\bar{a}$ $s\bar{a}\eta$ 'I have bought an elephant'
 I have elephant bought
- (3) \bar{n} \bar{a} \bar{n} \bar{a} $k\bar{a}m\bar{a}$ $s\bar{a}\eta$ 'I have bought my elephant'
 I have my elephant bought
- (4) \underline{a} \underline{a} $\underline{d}\bar{o}m\bar{a}$ $k\underline{o}$ 'wash his shirt'
 his shirt wash
- (5) \underline{a} \bar{a} $\underline{d}\bar{o}m\bar{a}$ $k\underline{o}$ 'he has washed a shirt'
 he has shirt washed
- (6) \underline{a} \bar{a} \underline{a} \underline{a} $\underline{d}\bar{o}m\bar{a}$ $k\underline{o}$ 'he has washed his shirt'
 he has his shirt washed

In (1) and (3) / $k\bar{a}m\bar{a}$ / has a high tone on its first syllable, occurring immediately after the possessive pronoun as a possessed noun. It is the same in (4) and (6) where / $\underline{d}\bar{o}m\bar{a}$ / occurs as a possessed noun. In (2) and (5) where they are preceded immediately by a completed action marker, they have low tones on their first syllables. A noun or pronoun following a complete action marker as in this case will have a lower tone, the citation form notwithstanding. A LL noun in this environment will become LH. A possessive pronoun with high tone will start lower than the preceding completed action marker. This is demonstrated in (3) where the possessive pronoun / \bar{n} \bar{a} / starts at a height lower than that of the completed action morpheme. This is further illustrated in the following examples:

- [$\bar{n}\bar{a}$ 'n \bar{a} $k\bar{a}m\bar{a}$ $s\bar{a}\eta$] 'I have bought my elephant'
 I have my elephant bought

[nā 'nā dōmā kō] 'I have washed my shirt'

I have my shirt washed

[nā 'nā dēmā mīŋ] 'I have drunk my palm wine'

I have my palm wine drunk

[nā 'nā fētū cīŋ] 'I have planted my pineapple'

I have my pineapple planted

No nonlow following the 'H will be higher than it.

6.27 The possessive marker /a/ sometimes also combines with /mɔ/, the pronoun object form of 'we'. When this happens, tone is crucial in making the distinction between 'us', (dual), and 'us' (plural:

(a) mɔ + a mɔa 'our' (dual)

mɔa m̄usu¹ 'our wife'

(b) m̄ɔ + a m̄ɔa 'our' (plural)

m̄ɔa m̄usu 'our wife'

The possessive marker in (a) receives its tone through tone copying.

In tone copying, a syllable, often a grammatical morpheme such as a pronoun

is considered to have no underlying tone of its own, but rather receives its tone from a neighbouring syllable (normally from the left, since tone tends to move to the right). (Hyman & Schuh 1974: 95)

In (b) however, there is tonal polarity. Polarisation rules

¹When a husband dies, it is cultural practice among the Kono for the wife to choose as her next husband one of the deceased man's relatives. A woman is therefore regarded as belonging, potentially, to a family. This practice is not popular now.

assume a morpheme with no underlying tone. In this case, however, the morpheme is assigned a tone which is opposite to that of the neighbouring syllable from which it gets its tone.

(Hyman, 1975: 224)

A general polarisation rule is that polarised syllables will be L before H, but H before L.

In other constructions, /mɔ/ may function independently as a possessive pronoun. This is when it occurs with the /ŋ/ class of possessive pronouns:

mɔ	fā	'our father'	(dual)
mɔ̄	fā	'our father'	(plural)

6.28 In certain constructions involving nouns, the distinction between the indefinite and definite forms is sometimes a very fine one. This is especially evident in constructions involving the pluralisation of nouns. Consider the following sentence:

mānsā	ṅ	tā	'ā
chief	s	gone	have

This sentence could, with equal validity, be interpreted to mean:

- (1) Chiefs went
- (2) Chiefs have gone
- (3) The chiefs have gone
- (4) The chief and his party have gone.

There is no semantic problem if one is familiar with the context in which the sentence is made. Normally in pluralisation, the plural suffix /nu/

is suffixed to the noun. In connected speech, /nu/ becomes a syllabic nasal when followed by other morphemes. In the sentence above, there are two possible citation forms, /mansa/ 'chief', and /mansà/ 'the chief'. In the plural, these would be:

- (a) mansa 'chief' mansā nu 'chiefs'
 (b) mansà 'the chief' mansā nu 'the chiefs'

The choice of either (a) or (b) would have implications for any generalisations or phonological rules one might wish to make. If (a) is our choice, then we would have to modify our generalisation that a LL in initial position remains unchanged when followed by other tones. Such a modification would take note of the fact that a LL in initial position becomes a LH when followed by the plural morpheme. If on the other hand we chose (b), then we would need a generalisation or a rule that accounted for the levelling of a falling contour when followed immediately by the plural morpheme. Note in the example above that the plural morpheme has a low tone. The levelling of the falling contour could then be explained by the process of absorption, and we could then say that a low-fall (LF) becomes a LH when followed by a low tone as in the case above. The following examples provide evidence that a falling contour can in fact be levelled:

- (1) mansa mā na nī 'a chief did not come'
 a chief not come did
 (2) mansā 'mā na nī 'the chief did not come'
 the chief not come did
 (3) musu mā do nī nɔ̃ 'a woman did not enter there'
 a woman not enter did there

- (4) mysū 'mā do nī n̄ 'the woman did not enter there'
 the woman not enter did there

Note that the LH pattern of the nouns in (2) and (4) is the same as our earlier example where the noun is followed by the plural morpheme, so that our choice of (b) (cf. p.33 above) would be justified. This would then mean that our generalisation about LL in initial position remaining unaffected by following tonal sequences would still be observed. We have already indicated that a definite sometimes functions as an indefinite, and that one would be guided by context in such instances (cf. p.134). The situation in (a) above would be one such instance. Further support for this analysis is provided by recognising that generally in pluralisation, the plural morpheme is suffixed to the definite form, as in the following examples:

<u>m</u> ɔ̄	'one person'	mWē	<u>nu</u>	'people'
<u>b</u> a	'goat'	bāā	<u>nu</u>	'goats'
<u>s</u> a	'sheep'	sāā	<u>nu</u>	'sheep'

For CVN type words, the demonstrative /cɛ/ is often introduced in the plural construction:

<u>s</u> ɛŋ	<u>s</u> ɛnē	<u>c</u> ɛ	<u>nu</u>	[sɛ̄ŋɛ̄ nu]	'these farms'
farm	farm	<u>these</u>	<u>s</u>		
<u>k</u> uŋ	<u>k</u> unē	<u>c</u> ɛ	<u>nu</u>	[kūŋɛ̄ nu]	'these heads'
head	head	<u>these</u>	<u>s</u>		
<u>k</u> ɔ̄ŋ	<u>k</u> ɔ̄nē	<u>c</u> ɛ	<u>nu</u>	[kɔ̄ŋɛ̄ nu]	'these trees'
tree	tree	<u>these</u>	<u>s</u>		

The demonstrative sometimes also combines with /pāŋ/, 'there' in plural constructions, with /cɛ/ immediately preceding /nu/, and /pāŋ/ immediately following it:

mānsā cɛ 'this chief'

chief this

mānsā cɛ pāŋ 'that chief there'

chief that there

mānsā cɛ nu 'these chiefs'

chief these s

mānsā cɛ nu pāŋ 'those chiefs there'

chief those s there

Pluralisation of some nouns requires the possessive pronoun prefix.

These would be dependent nouns belonging to the class of possessed nouns that occurs without a genitival link:

n̄ dē nu 'my mothers'

n̄ dē nu 'our mothers'

m̄ bēŋ nu 'my uncles'

Free nouns in this class may be pluralised without employing the possessive pronoun although possession is implied:

fā nu 'fathers'

kɔ̄ nu 'brothers'

6.29 Our recognition of a contour tone being levelled has implications for typology, since one of the defining characteristics of a terraced-level language is a lost low tone. It has been argued that all downsteps in all languages are the result of a lost low tone, and that downdrift is automatic in all terraced level languages (cf. Hyman & Schuh above, Hyman, 1975). We have indicated a lost low tone in at least two instances, although these were not discussed. Consider the following sentences:

mansā	'mā	na	nī	'the chief did not come'
the chief	not	come	did	

mysū	'mā	na	nī	'the woman did not come'
the woman	not	come	did	

The stepping down in tone of the negative marker in these two examples could be accounted for by a lost tone, in this case, the L of the definite marker of the nouns. In slower speech, it is possible for these sentences to occur with a F on the final syllables of the nouns, so that simplification of a F before a nonlow tone cannot be regarded as automatic. Simplification here is used to mean the levelling of a F before a nonlow tone. In another instance where a stepping down in tone has been recorded, it has not been possible to trace a lost low tone. Consider the following examples:

- | | | | | |
|-----|----|------|------------------|---------------------------|
| (1) | n̄ | ā | cēŋ tē | 'break my house' |
| | my | | house break | |
| (2) | n̄ | ā | 'cēŋ tē | 'I have broken the house' |
| | I | have | the house broken | |
| (3) | n̄ | ā | 'n̄ ā cēŋ tē | 'I have broken my house' |
| | I | have | my house broken | |

In (1), the tone of the possessive pronoun and that of the following noun are both about the same. In (2) however, the tone of the noun is lower than that of the preceding morpheme, because the structure of the sentence demands it. When we combine both sentences in (3), we note that the possessive pronoun is a lower nonlow than the preceding one, the nonlow following it is not higher. This fits Welmers' (cf. ,p122) definition of the downstep phenomenon in a terraced level language. By this definition then, Kono is a terraced level language. Note however that there is no lost low tone at the surface level, and that we have not been able to trace one at the sub-surface level. We have also not been able to establish that downdrift, conditioned by a low tone between two high tones is automatic. Welmers (1976: 29) classifies Vai as a discrete level language because

Throughout a phrase or sentence, there is no appreciable downdrift conditioned by a low tone between two high tones.

It is the view of some linguists that

downdrift is unavoidable and that there will always be at least a slight lowering of pitch after a low tone, though perhaps imperceptible to most listeners.
(Hyman & Schuh, 1974: 85)

Our inability to be precise about the degree of downdrifting in Kono makes it difficult for us to use this particular linguistic phenomenon as a typological measure. Instrumental investigations might have been useful here. Unfortunately we have not been able to do this, and this seems an obvious area for further research.

6.30 We have in this chapter attempted to explain aspects of Kono tone using three tonal units, the high level, the low level, and the falling tone. We have also classified the language as the register type with phonemic downstep. The possibility of different analyses has also been considered, and this could lead to conclusions different from those arrived at here. The language and the discipline can only benefit from any discussions our conclusions might provoke.

CHAPTER 7

ACOUSTICAL ANALYSIS OF FUNDAMENTAL FREQUENCY IN
RELATION TO TONE IN KONO

7.1 The data described so far was analysed auditorily (more precisely, by the kinaesthetic/auditory method, in that when a speaker analyses his own speech, he is in a sense feeling what he is doing, as well as listening). This method of analysis depends on two feedback systems which

make possible the monitoring and control of speech by the insertion into their motor system of information concerning ongoing muscular, organic, aerodynamic, and acoustic events.

(Catford, 1977: 5)

Kinaesthetic feedback and auditory feedback are the two feedback systems here referred to. In the former, we experience proprioceptive and tactile sensations as sensory nerves in and on the surface of the muscles of the speech organs are stimulated both by muscle contraction and by contact and pressure. In the latter, when we listen to our own speech for instance, our hearing organs are stimulated by the sound wave that issues from our mouth and reaches our ear. This is made possible by both air conduction and bone conduction. Speaking and hearing become difficult if these feedback systems become impaired, but we are not normally aware of their existence in our day to day speech activities. Becoming aware of their existence is part of the phonetician's training. Abercrombie (1967: 23) refers to this awareness as analytic listening.

As we noted in the introductory chapter, perception is essentially subjective, and one listener's auditory interpretation of data is done internally, by means not accessible to other investigators. The subjectiveness of the analysis was lessened by checking most of the transcription with two experienced phoneticians, the supervisors of this thesis; checking was sometimes done individually and sometimes in a joint meeting. Nevertheless, it was felt that acoustic measurement of the data could add valuable information and produce a set of measurements that would be available for use for comparative purposes in future research work.

7.2 It is important to be aware at all times of the difference between pitch and fundamental frequency, although the two are in fact used interchangeably quite often. Denes and Pinson (1973: 110) make the following observation:

Just as loudness is the sensation most directly associated with the physical property of sound intensity, so pitch is the subjective quality primarily connected with frequency. Factors other than frequency, however, affect our judgment of pitch, just as factors other than intensity (frequency, for instance) affect judgments of loudness.

A more comprehensive summary however, one which we prefer, of the relationship between tone, pitch, and fundamental frequency is that made by Gandour (1978: 41):

It is generally assumed that the principal phonetic features of tone are found in the domain of pitch. The term "tone" (linguistic) refers to a particular way in which pitch is

utilized in language; the term "pitch" (non-linguistic, perceptual), on the other hand, refers to how a hearer places a sound on a scale going from low to high without considering the physical properties of the sound. Its primary acoustic correlate is fundamental frequency. The term "fundamental frequency" (acoustic) refers to the frequency of repetition of a sound wave of which, when analyzed into its component frequencies, the fundamental is the common factor of the component frequencies.

It is in this sense that the terms pitch and fundamental frequency will here be used. Let us remember here that we have already indicated (see p. 92) that it has been experimentally demonstrated, using synthetic speech, that fundamental frequency variation has been identified as the overriding cue for the perception of tones.

7.3 Various techniques are available for the analysis of fundamental frequency. Perhaps the commonest technique is spectrography, using the sound spectrograph to produce spectrograms. Painter (1979: 12-13) reports that

What the sound spectrograph essentially does is to carry out a frequency analysis across time of a speech sample and present it visually on paper with time on the horizontal and frequency on the vertical axis, ... Intensity is a third dimension realized as the darkness of the marks on the paper.

Although reliable information can be obtained with some degree of accuracy about fundamental frequency variations by this technique, it has the disadvantage of being very slow and laborious. Its use is limited to utterances of no more than 2.4 seconds in duration, so that data of any considerable size would require a lot of time.

The fact that segmentation of the different speech items of an utterance is often arbitrary makes the measuring of duration and frequency with consistent accuracy even more difficult.

Another technique offering high accuracy is cepstral analysis. The attraction of the cepstrum method is that

it provides a means for separating the periodic components (the fundamental frequency and its harmonics) from the nonperiodic components (the vocal tract characteristics).
(Wakita, 1976: 7)

Previous to this technique fundamental frequency extraction methods were

based on the idea of detecting the recurrent peaks in the speech waveform. A difficulty with this approach was that peaks related to the periodicity of the laryngeal voice source could not always be distinguished from peaks resulting from the resonance behaviour of the supra-glottal spaces. (Wakita, 1976: 7)

But the cepstrum technique also has its drawback. It is known that to compute the voice pitch by a digital computer takes a long time, since the computation involves taking the Fourier transform twice. Also, this and other related techniques can only be used when there is access to suitable computer facilities, offering analogue-to-digital conversion rates in excess of 10,000 samples per second, large-scale rapid-access storage and considerable processing power. Such facilities were not available for this study.

Many instruments have been produced (traditionally known by the misleading name 'pitchmeter') which extract the fundamental

frequency from pitch signals and give an output in which voltage is proportional to that frequency. This makes it suitable for use in conjunction with oscillographic recording on a device such as a Mingograph. As an alternative to extracting the fundamental frequency from the acoustic signal, some experimenters have used the waveform of glottal vibration derived from electrical measurement across the larynx; 'electroglottography' or 'laryngography' is described by Sawashima (1974: 2331-2333), and its use in fundamental frequency study by Fourcin and Abberton (1977: 313-315). The technique involves the placing of two plate electrodes on both sides of the outside of the neck for registering glottal vibratory movements by measuring changes in electrical resistance across the neck. Although the technique causes little discomfort to the subject as is experienced for instance in electromyography, problems have been associated with it. One problem noted by Van den Berg (1962), reported by Sawashima (cf. above), is that the signal is too small to be detected in a subject with a heavy neck. Sawashima also notes that

It is difficult to estimate to what extent the glottal condition contributes to the electric impedance variations between the electrodes, and a quantitative interpretation of electrical glottograms seems to be less direct than, for example, photo-electric glottograms. (p.2333)

Fourcin and Abberton (cf. above) report that their laryngograph

provides useful information about the nature of vocal-fold contact during phonation, without in any way impeding the process of speaking.
(p.313)

Two applications of their laryngograph which they report include its use in the study of the contrastive initial plosive triplets of

Korean (Abberton, 1972), and the study of pathological voice quality (Wechsler, 1976), and they claim the possibility of

an exceptionally accurate basis for the measurement of vocal-fold vibrational period and frequency, ... p.314.

Although Fourcin and Abberton have developed a portable laryngograph, we consider the use of electrodes in laryngography a disadvantage, since this makes it difficult to make recordings elsewhere than in the laboratory.

For the first attempts at measuring the fundamental frequency of the present data, the equipment used was a Frøjkaer-Jensen fundamental frequency meter, Type FFM 650, its output being recorded on a Mingo-graph. The output of the meter was calibrated so that the number of millimetres above the baseline could be converted into Hertz (Hz). It became apparent that to measure the fundamental frequency for a large corpus of items using this technique would take a very large amount of time, unless only one or two measurements per item were to be made, with a consequent loss of accuracy. It was therefore decided to use a computer, not as the primary means of fundamental frequency extraction but as an aid to presentation and measurement.

The data was recorded on tape in the department's recording studio, using a Ferrograph Logic 7 tape recorder, and was later played into the Frøjkaer-Jensen fundamental frequency meter. Instead of being connected to the Mingo-graph, however, the output of the fundamental frequency meter was connected to an analog-to-digital converter which is part of the Phonetics Laboratory's microcomputer system. This analog-to-digital converter sampled the output of the fundamen-

tal frequency meter at intervals of 10 msec (i.e. at a rate of 100 samples per second); the conversion was to 8-bit accuracy. The resulting data was first stored in the computer's random-access memory; when this was full (after approximately 4.5 minutes of recording), the data was transferred via an RS232 interface to the University's main computer (Amdahl 470 V-7a), and was first converted into output suitable for printing in graph form on one of the central line-printers.

The analog-to-digital converter operates with an input voltage of 0 to 2.5 volts, and it was necessary to convert the digital values provided by the converter into accurate Hz. values. The formula used for the conversion was:

$$N = (N \times 1.125) + 27.03 \text{ Hz}$$

where N = the value output by the analog-to-digital converter.

It was decided to display the fundamental frequency data as traces drawn by a computer graph-plotter in such a way that all the repetitions of a particular tone-pattern were superimposed on the one graph. This would enable the regularities to be clearly seen. These traces are included in the following pages as Figs. A1 to H1. The unevenness of the traces is due to three factors:

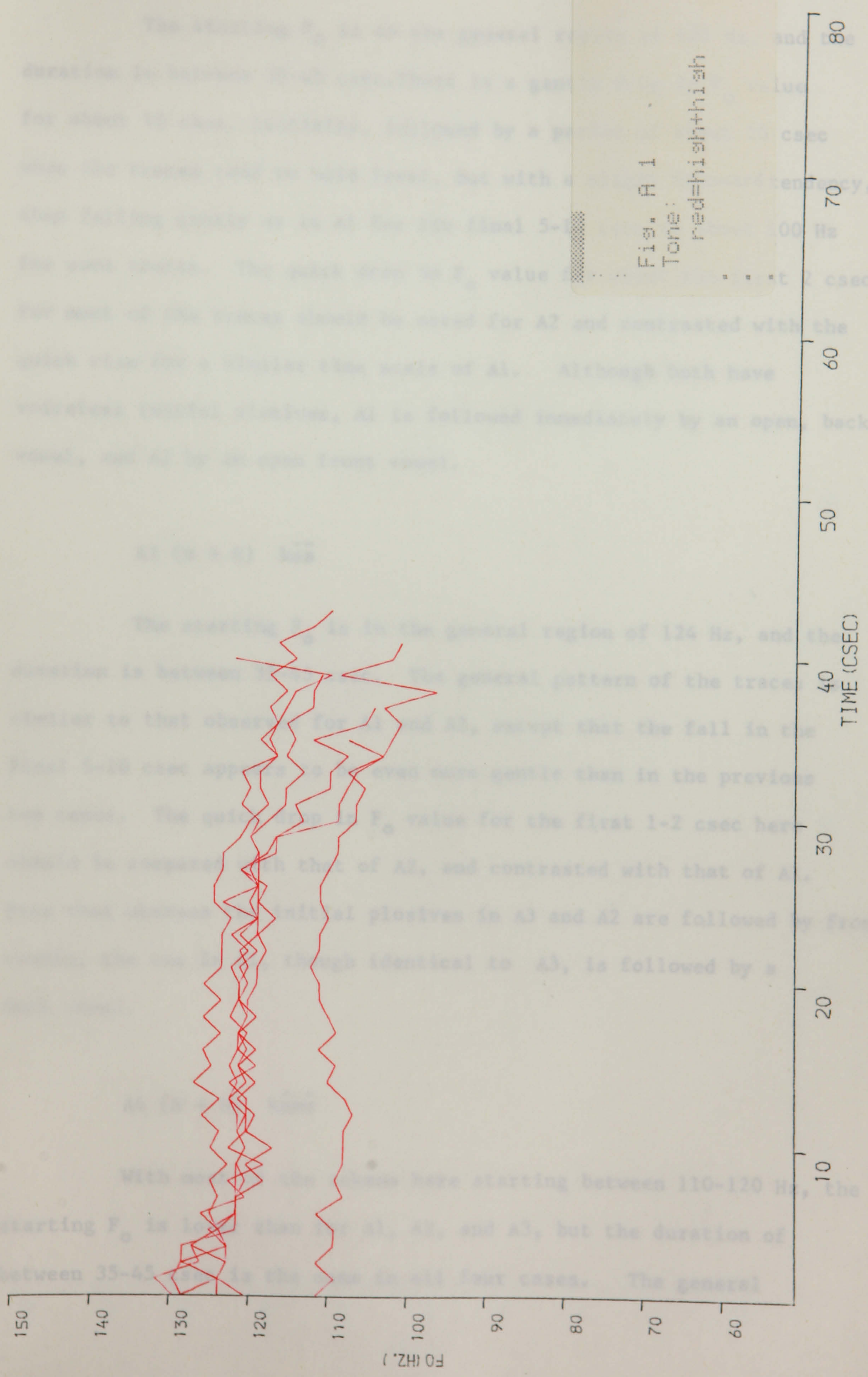
- (i) the tendency of the fundamental frequency meter to produce a 'stepped' trace at low frequencies,
- (ii) jumps from one value to another in the analog-to-digital converter's 8-bit range and
- (iii) the time intervals (10 msec) between samples.

These irregularities would probably have disappeared if the separate traces had been averaged; however, while this technique can produce an attractively 'clean' graph, much data is lost and there is the risk of introducing distortions. It was felt preferable to retain the traces in their 'raw' digitised form, except that the graph-plotter was programmed to draw straight lines from each data point to the next. When more than one tone is displayed on a graph, different colours are used to make it easier to distinguish the tones. A key to the identification of the different colours is included on each such graph. In the following section the graphs are described and the conclusions that can be drawn from them are presented.

Although in the earlier stages of this work averages were calculated for initial and terminal frequencies, it is now felt to be preferable to describe frequency characteristics in more general terms (e.g. 'begins in the region of 120 Hz. '), so that occasional 'freak' traces do not result in misleading averages.

7.4 A1 (H + H) k $\bar{5}\bar{5}$

The starting fundamental frequency (F_0) is in the general region of 123 Hz, and the duration is between 33-45 csec. Except for one trace which starts just above 110 Hz, all the others start between 120-130 Hz. We note however that they all tend to follow a generally identical pattern, suggesting that relative pitch, more than absolute pitch is significant. The traces all tend to fall gently for the first 10-12 csec, then appear to hold level, but with a slight downward tendency for the next 16-18 csec, falling gently for the final 5-10 csec to about 100 Hz for the lowest.



A2 (H + H) cēē

The starting F_0 is in the general region of 125 Hz, and the duration is between 35-45 csec. There is a gentle drop in F_0 value for about 10 csec. initially, followed by a period of about 20 csec when the traces tend to hold level, but with a slight downward tendency, then falling gently as in A1 for the final 5-10 csec to about 100 Hz for some traces. The quick drop in F_0 value for about the first 2 csec for most of the traces should be noted for A2 and contrasted with the quick rise for a similar time scale of A1. Although both have voiceless initial plosives, A1 is followed immediately by an open, back vowel, and A2 by an open front vowel.

A3 (H + H) kāā

The starting F_0 is in the general region of 124 Hz, and the duration is between 35-45 csec. The general pattern of the traces is similar to that observed for A1 and A2, except that the fall in the final 5-10 csec appears to be even more gentle than in the previous two cases. The quick drop in F_0 value for the first 1-2 csec here should be compared with that of A2, and contrasted with that of A1. Note that whereas the initial plosives in A3 and A2 are followed by front vowels, the one in A1, though identical to A3, is followed by a back vowel.

A4 (H + H) kāmā

With most of the tokens here starting between 110-120 Hz, the starting F_0 is lower than for A1, A2, and A3, but the duration of between 35-45 csec is the same in all four cases. The general

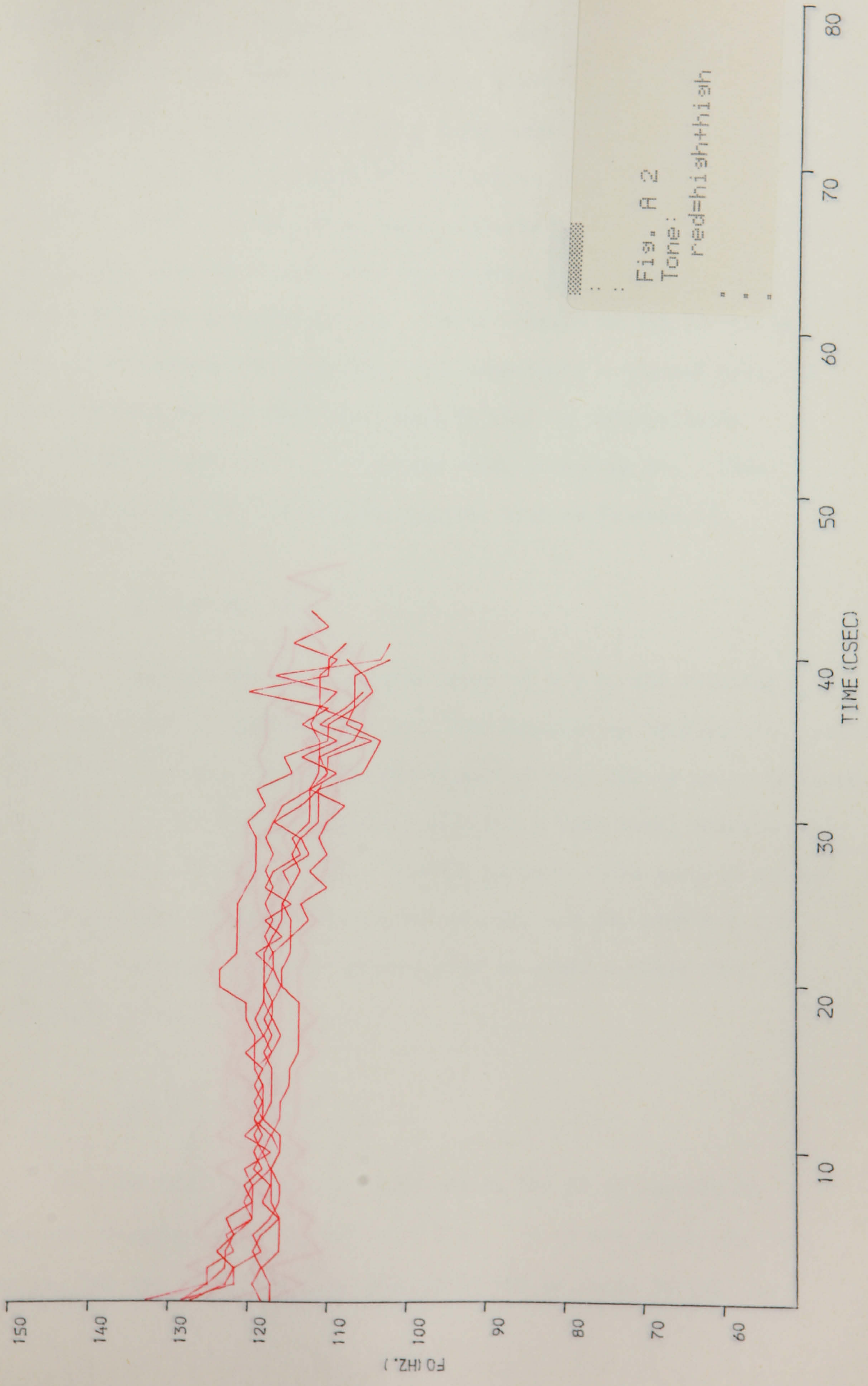
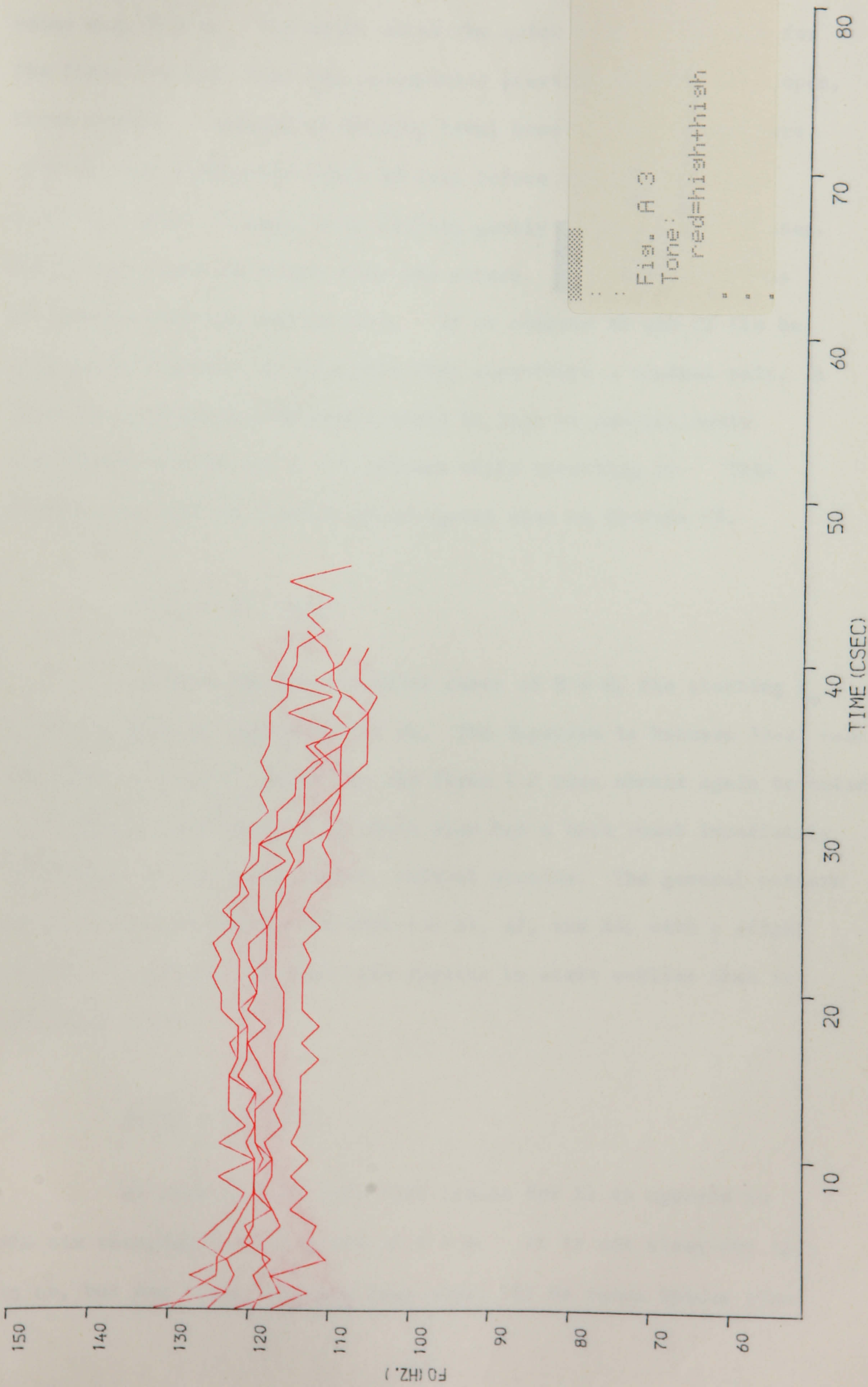


Fig. A 2
Tone: red=high+high



pattern of the traces contrasts with those of the other cases e.g. H + H. The still notes the quick the first 1-2 cases that has accompanied previous front vowels. Instead of holding level however it is more variable for about 10 msec before then falling gently but more rapidly than the others. If we compare A4 and C8 (to be noted) however, we note that they constitute a minimal pair. A possible explanation however would be that we unconsciously anticipated the H + H pattern while recording A4. This possibility will be further investigated when we discuss C8.

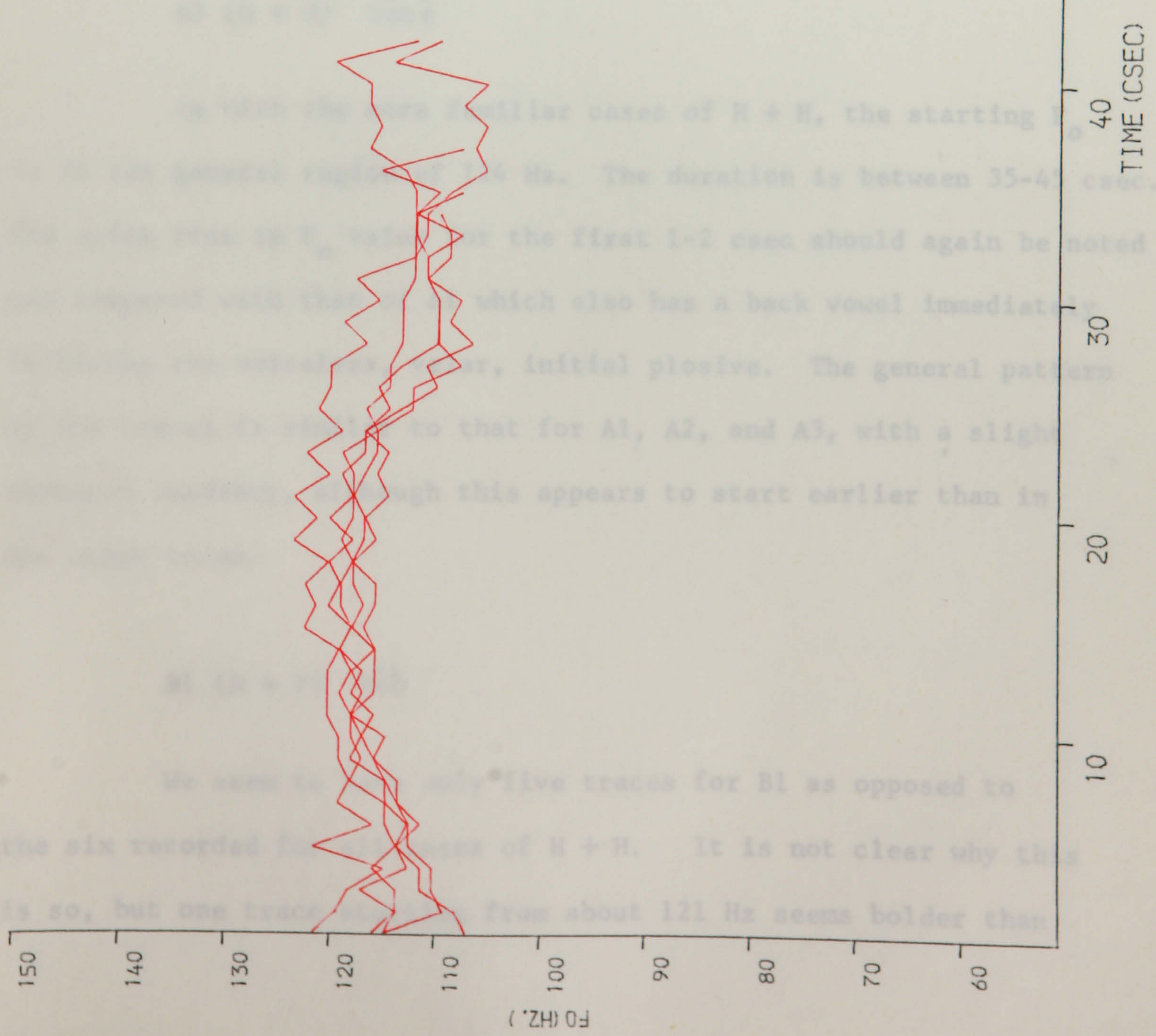


Fig. A 4
Tone: red=high+high

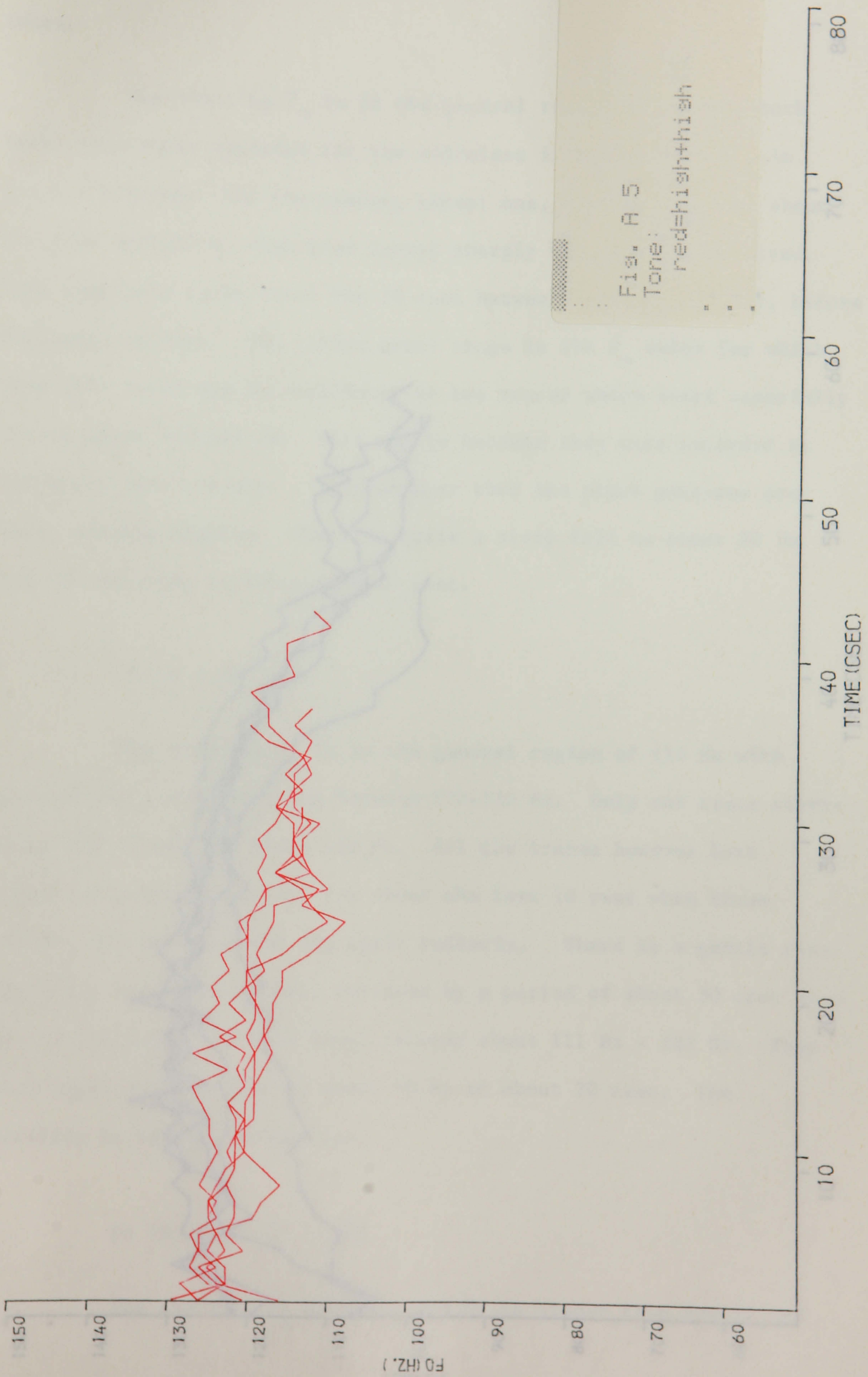
pattern of the traces contrasts with those of the previous three cases e.g. H + H. One still notes the quick drop in F_0 value for the first 1-2 csec that has accompanied previous examples with open, front vowels. Instead of holding level however, the traces here tend to rise subtly for about 10 csec before appearing to hold level for about 15 csec, then falling gently in the last 5-10 csec. Two traces continue longer than the others. There is no obvious explanation for the subtle rise. If we compare A4 and C8 (to be discussed) however, we note that they constitute a minimal pair. A possible explanation therefore would be that we unconsciously considered C8 with its L + F pattern while recording A4. This possibility will be further investigated when we discuss C8.

A5 (H + H) $k\bar{u}n\bar{\epsilon}$

As with the more familiar cases of H + H, the starting F_0 is in the general region of 124 Hz. The duration is between 35-45 csec. The quick rise in F_0 value for the first 1-2 csec should again be noted and compared with that of A1 which also has a back vowel immediately following the voiceless, velar, initial plosive. The general pattern of the traces is similar to that for A1, A2, and A3, with a slight downward tendency, although this appears to start earlier than in the other cases.

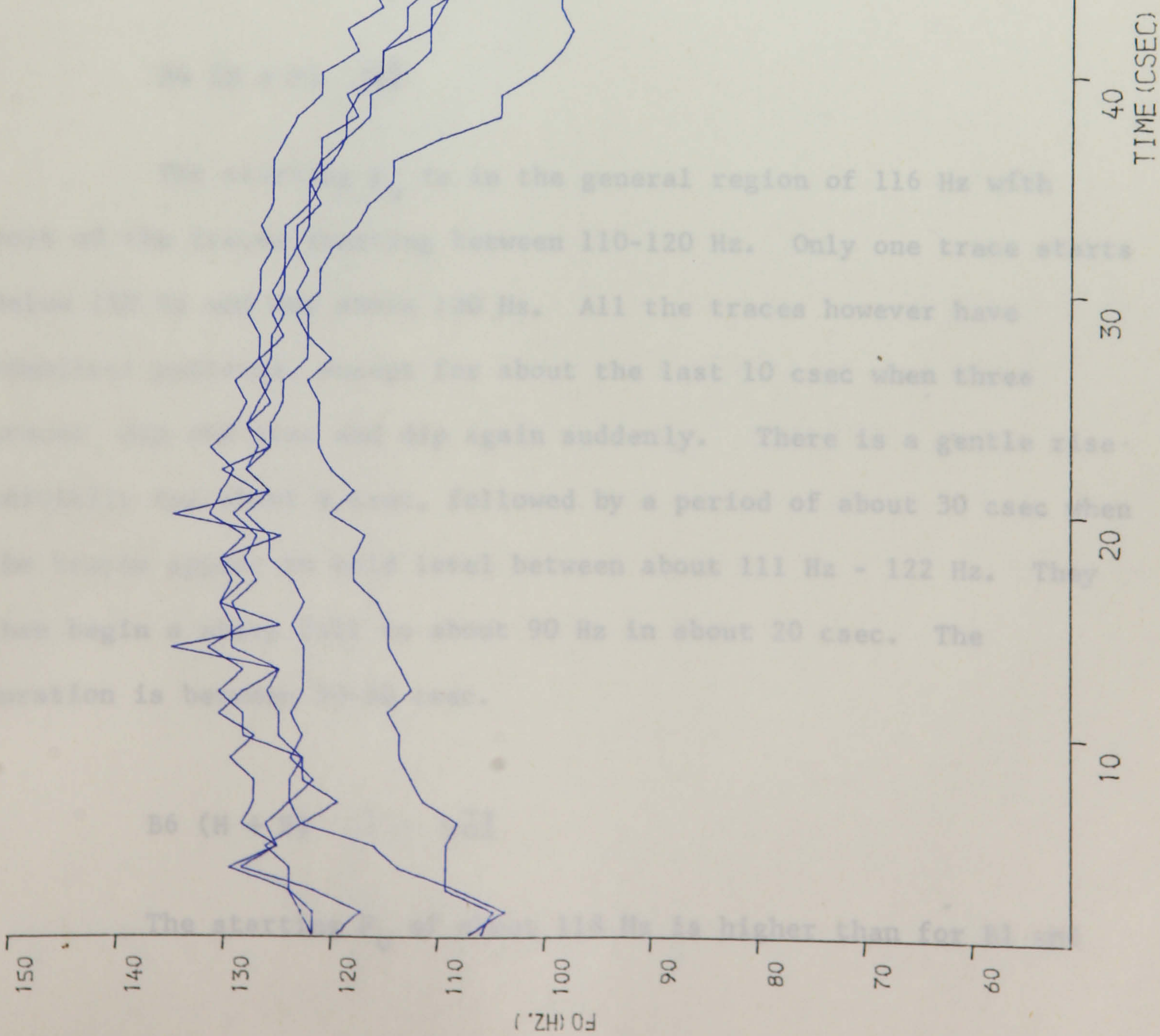
B1 (H + F) $b\bar{o}\bar{o}$

We seem to have only five traces for B1 as opposed to the six recorded for all cases of H + H. It is not clear why this is so, but one trace starting from about 121 Hz seems bolder than



the others. It may be the case that the same tone was produced twice.

The starting F_0 is in the general region of 116 Hz with lower than values recorded for the voiceless t in the $t + a$ group. All the traces, except one, rise very sharply from about 90 Hz in about 20 msec between 10 and 30 msec before beginning to fall. The great range in the F_0 value for which they start leads us to conclude that two traces which start especially low at about 90 Hz may be because they were recorded at a distance from the speaker. However that the pitch patterns are quite similar to those of t quite a steep fall to about 90 Hz and the duration is about 20 msec.



The starting F_0 of 114 Hz is higher than for B1

the others. It may be the case that the same trace was printed twice.

The starting F_0 is in the general region of 115 Hz, much lower than those recorded for the voiceless initial consonants in the H + H group. All the traces, except one, seem to drop for about 1-2 csec initially, then rise rather sharply for the next 6-7 csec. They then tend to be level for 20 csec between about 110-128 Hz, before beginning to fall. The rather great range in the F_0 value for which they hold level may be attributed to two traces which start especially low at about 107-108 Hz. This may be because they were recorded at different pitch levels. Note however that the pitch patterns are quite closely similar. There is quite a steep fall to about 90 Hz and the duration is between 50-60 csec.

B4 (H + F) $j\bar{a}^{\grave{a}}$

The starting F_0 is in the general region of 116 Hz with most of the traces starting between 110-120 Hz. Only one trace starts below 110 Hz and one above 120 Hz. All the traces however have identical patterns, except for about the last 10 csec when three traces dip and rise and dip again suddenly. There is a gentle rise initially for about 4 csec, followed by a period of about 30 csec when the traces appear to hold level between about 111 Hz - 122 Hz. They then begin a steep fall to about 90 Hz in about 20 csec. The duration is between 50-60 csec.

B6 (H + F) $b\bar{u}^{\grave{a}}$

The starting F_0 of about 118 Hz is higher than for B1 and

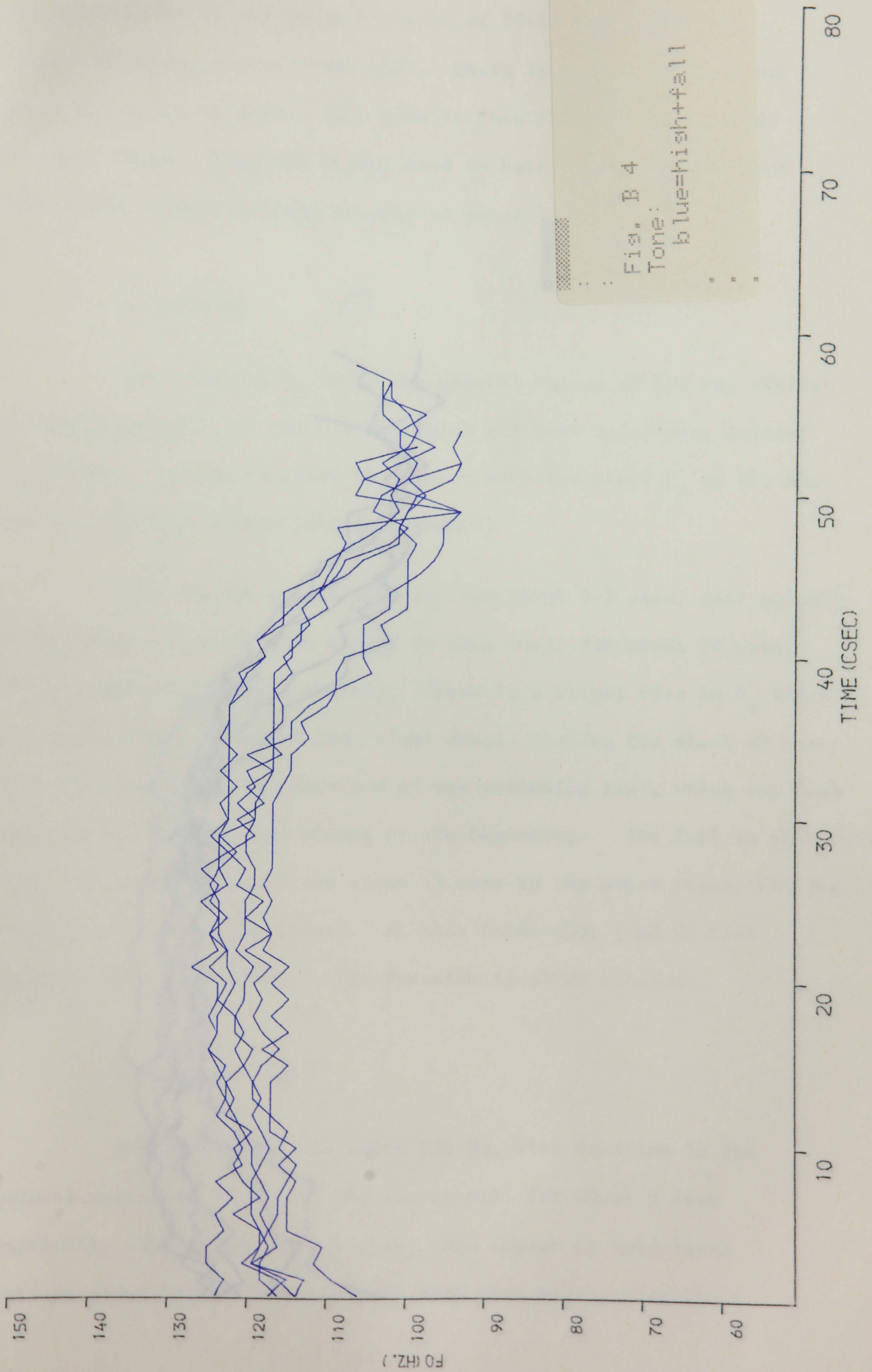


Fig. B 4
Tone:
blue=hish+fall

B4, where the initial segments in the utterance are produced. The duration is in the general region of 50-60 msec. The tokens following earlier than that. There is a slight rise for about the first 10 msec. This rise is then followed by a period of about 20 msec when the traces tend to hold level for about 20-30 Hz, before falling steeply to about 60 Hz.

The starting F_0 is in the general region of 127 Hz, similar to the starting F_0 of the other cases which all have voiceless, initial segments. In the contrast the value with the start F_0 of B1, B2, and B3, all with voiced initial segments.

Most of the traces for the first 2-3 msec, fall quickly to the next 2-3 msec, they tend to hold level for about 20 msec, before beginning to fall. There is a slight rise in F_0 value for three traces about 15 msec after onset, lasting for about 10 msec. This rise may be an anticipation of the following fall, which may have some stress at the beginning. The fall in the traces is about 10 msec, and about 13 msec in the other cases, falling to the lowest. At this point they tend to rise slightly for about 5 msec. The duration is about 50 msec.

The starting F_0 is about 126 Hz, with duration in the general region of 50 msec. The traces fall for about 5 msec initially, rise for about 5 msec, then appear to hold level for about 10 msec, then fall then begin to rise again.

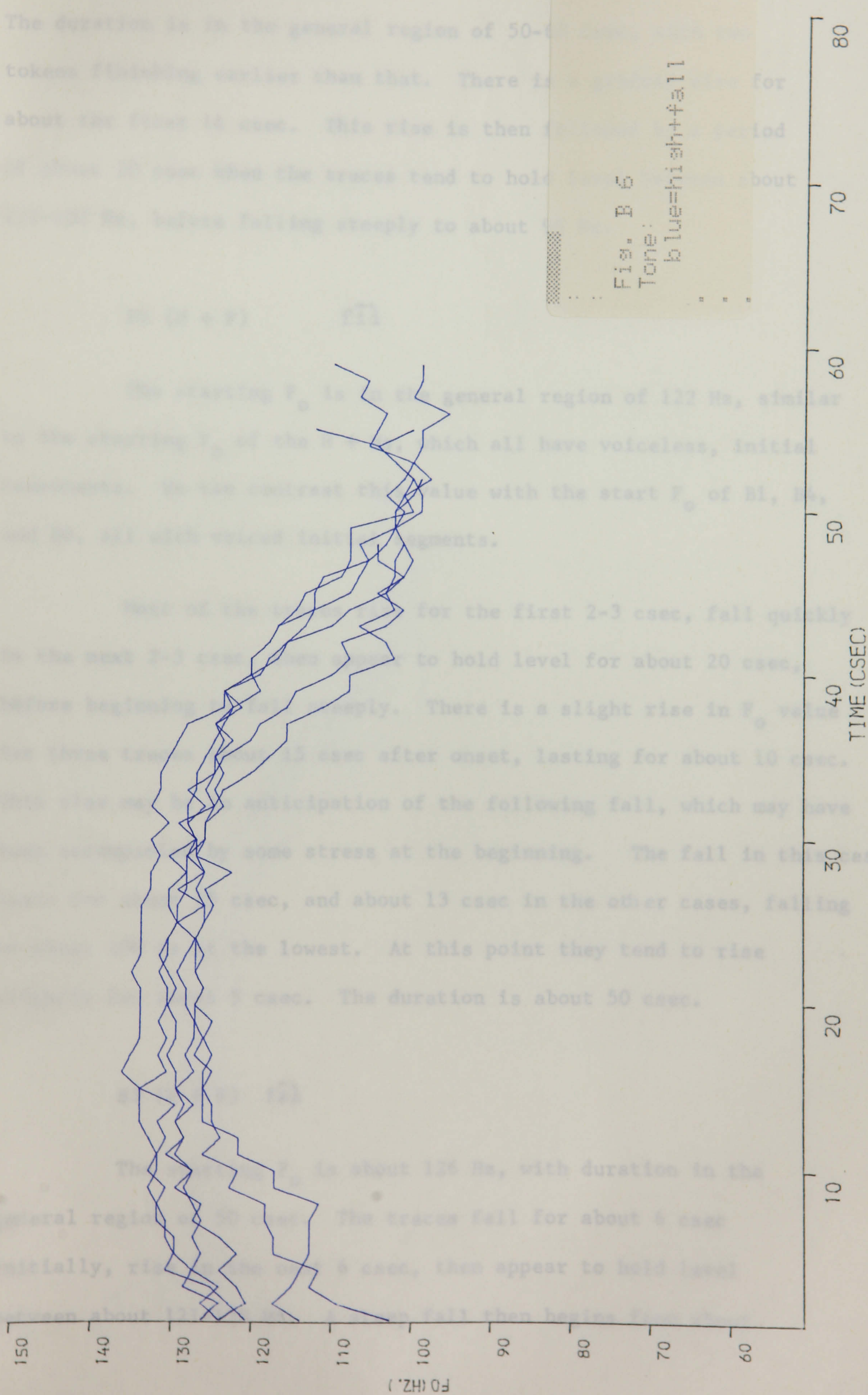


Fig. B 6
 Tone: blue=high+fall

B4, where the initial segments in the utterances are also voiced. The duration is in the general region of 50-60 csec, with two tokens finishing earlier than that. There is a gradual rise for about the first 14 csec. This rise is then followed by a period of about 20 csec when the traces tend to hold level between about 122-132 Hz, before falling steeply to about 98 Hz.

B2 (H + F) $f\bar{i}\grave{i}$

The starting F_0 is in the general region of 122 Hz, similar to the starting F_0 of the H + Hs, which all have voiceless, initial consonants. We can contrast this value with the start F_0 of B1, B4, and B6, all with voiced initial segments.

Most of the traces rise for the first 2-3 csec, fall quickly in the next 2-3 csec, then appear to hold level for about 20 csec, before beginning to fall steeply. There is a slight rise in F_0 value for three traces about 15 csec after onset, lasting for about 10 csec. This rise may be in anticipation of the following fall, which may have been accompanied by some stress at the beginning. The fall in this case lasts for about 15 csec, and about 13 csec in the other cases, falling to about 100 Hz at the lowest. At this point they tend to rise slightly for about 5 csec. The duration is about 50 csec.

B3 (H + F) $f\bar{a}\grave{a}$

The starting F_0 is about 126 Hz, with duration in the general region of 50 csec. The traces fall for about 6 csec initially, rise in the next 6 csec, then appear to hold level between about 121-128 Hz. A steep fall then begins from about

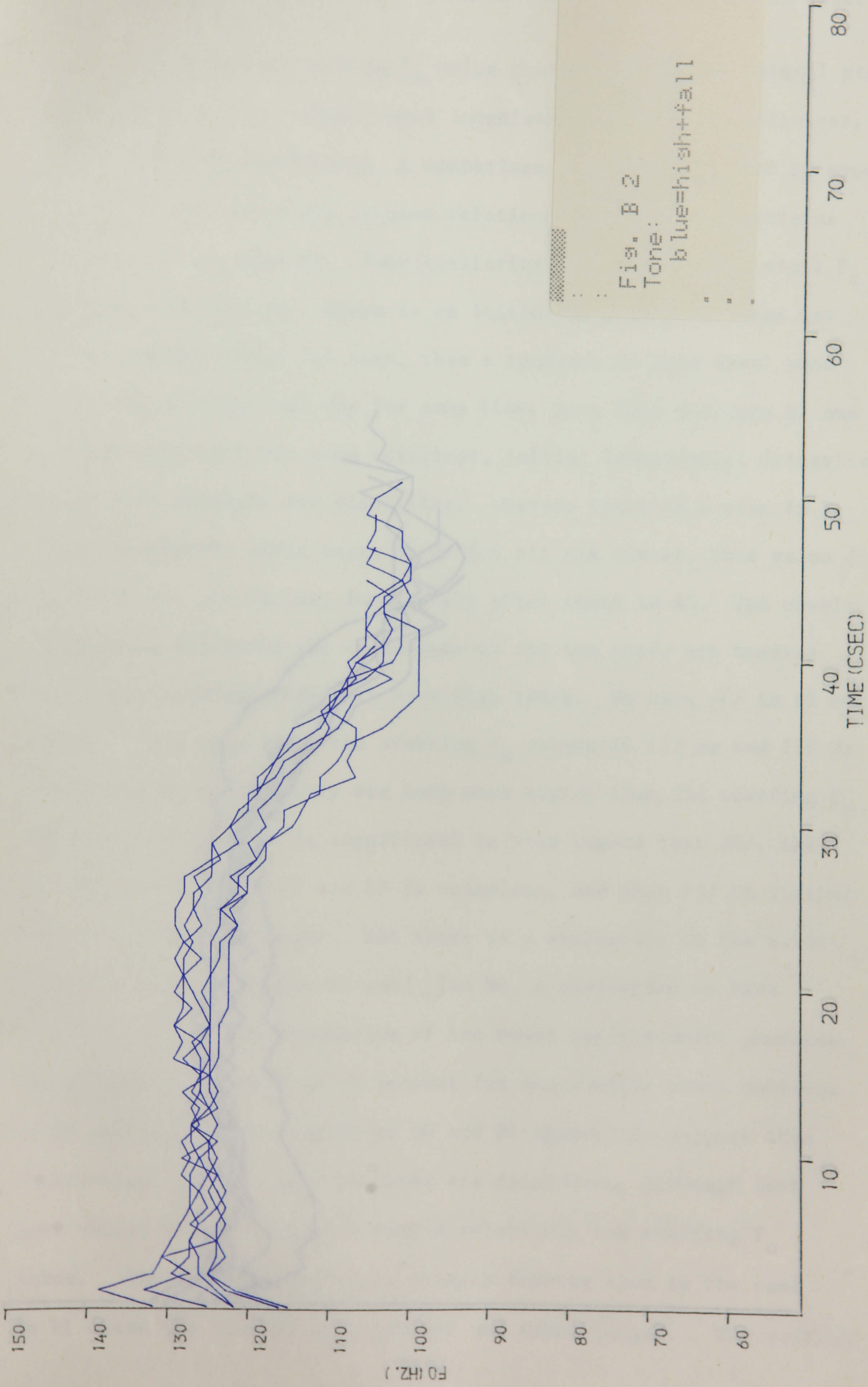


Fig. B 2
Tone:
blue=high+fall

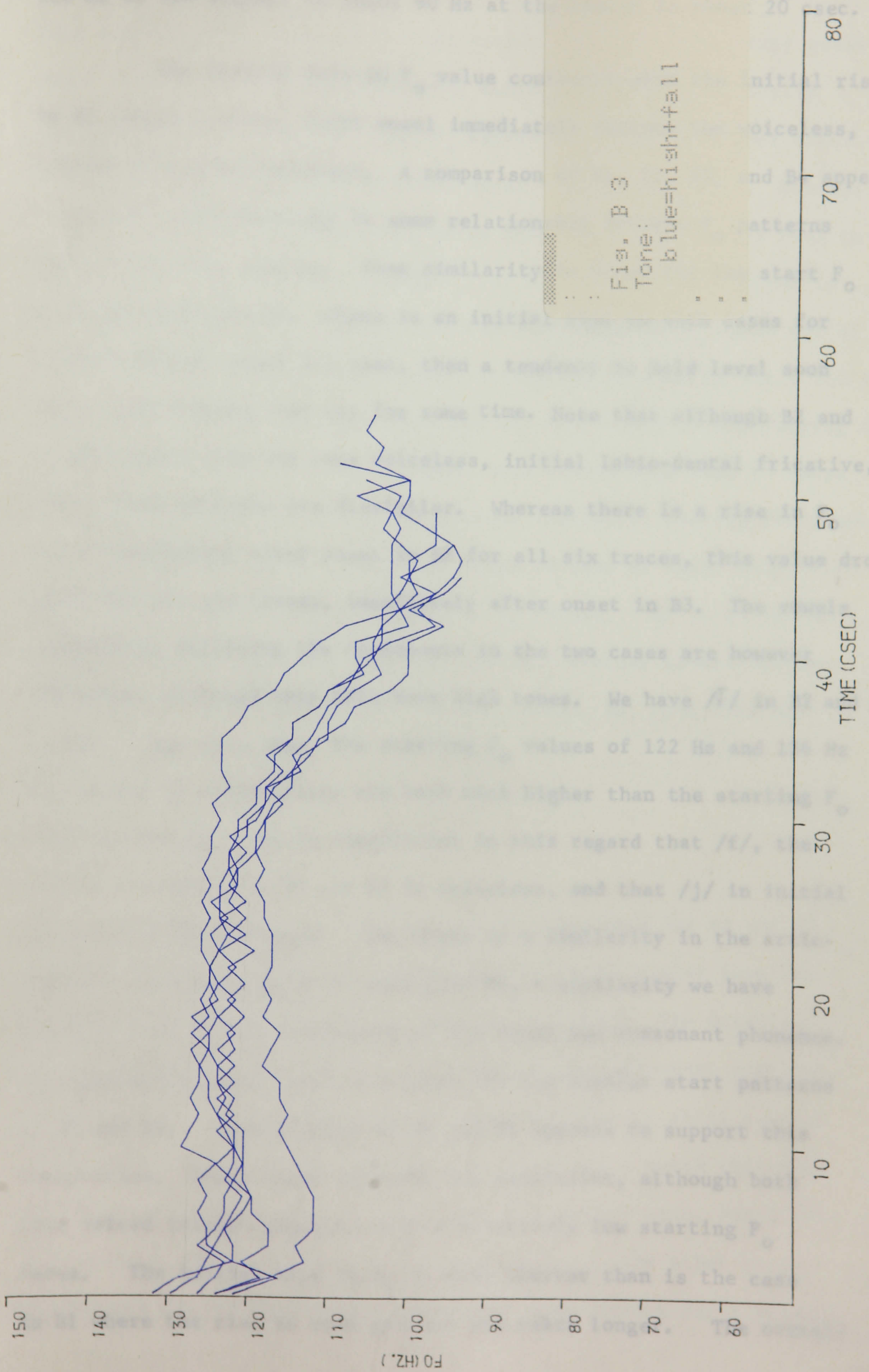


Fig. B 3

Tone: blue=high+fall

128 Hz at the highest to about 90 Hz at the lowest in about 20 csec.

The initial fall in F_0 value contrasts with the initial rise in B2, where a close, front vowel immediately follows the voiceless, initial fricative consonant. A comparison of B1, B2, B3, and B4 appears to suggest that there may be some relationship between F_0 patterns and articulatory quality. Some similarity is noted for the start F_0 patterns of B2 and B4. There is an initial rise in both cases for a short period, about 2-3 csec, then a tendency to hold level soon after, and staying that way for some time. Note that although B2 and B3 both start with the same voiceless, initial labio-dental fricative, their start patterns are dissimilar. Whereas there is a rise in F_0 value immediately after onset in B2 for all six traces, this value drops, again for all six traces, immediately after onset in B3. The vowels immediately following the consonants in the two cases are however different, although they both have high tones. We have / \bar{i} / in B2 and / \bar{a} / in B3. But note that the starting F_0 values of 122 Hz and 126 Hz for B2 and B3 respectively are both much higher than the starting F_0 observed for B4. It is significant in this regard that /f/, the initial consonant in B2 and B3 is voiceless, and that /j/ in initial position in B4 is voiced. But there is a similarity in the articulatory quality of [\bar{i}] in B2 and [j] in B4, a similarity we have already noted in our discussion of the vowel and consonant phonemes. The similarity would seem to account for the similar start patterns of B2 and B4. A comparison of B4 and B1 appears to support this observation. Their start patterns are dissimilar, although both have voiced initial segments with a relatively low starting F_0 value. The initial rise in B₄ is much shorter than is the case in B1 where the rise is more gradual and takes longer. The overall

effect is that B₄ appears to stay level longer than B₁. All of this suggests that there is a relationship between articulatory quality and F₀ contours, a relationship that could provide linguistically significant cues. Specifically, F₀ values appear to be higher after voiceless consonants, than they are after voiced consonants. Whereas close vowels tend to increase F₀ value initially, open vowels tend to reduce them. The higher starting F₀ for B₃ over B₂ would appear to contradict this. Note however the rapid increase in F₀ value for B₂ soon after onset for all the traces, rising in one case to about 140 Hz. This contrasts with the quick fall for all the traces in B₃, falling to as low as 110 Hz in one case. Open, back vowels also tend to raise F₀ value, but only for very short periods initially, lasting for about 1-2 csec. Over a longer period of about 10 csec or more, they, like open, front vowels would tend to lower F₀ values. A₁ to A₅ in the H + H category demonstrate this, and this fits our broader generalisation that close vowels would tend to raise F₀ value, but open ones tend to lower them.

B5 (H + F) k̄ā̀

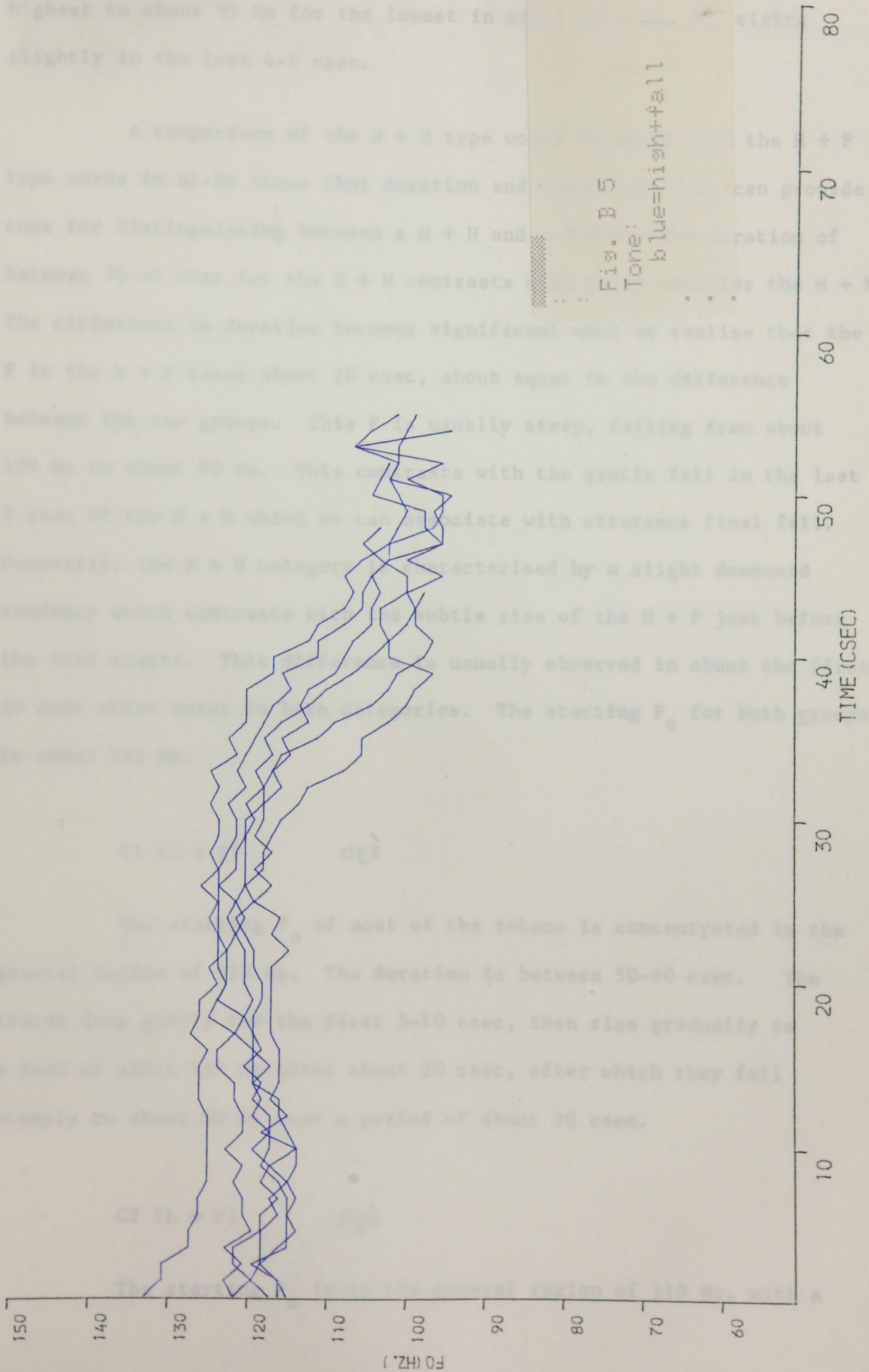
The starting F₀ is about 120 Hz, less than for B₂ and B₃ which also have voiceless, initial consonants, but higher than for any voiced, initial consonant in the same category. The duration is between 50-60 csec. Except for three traces, the start pattern is similar to B₃. For those three tokens that do not start exactly this way, there is no great difference. There is a quick rise for the first 2-3 csec, then a fall lasting for about 5 csec, and a rise of similar duration, a pattern that is similar to the other three. All the six traces are fairly level after this, except for a slight

rise just before a steep fall begins. They are highest to about 75 Hz for the lowest in all slightly in the last 4-6 cases.

A comparison of the H + H type words with the H + F type words in H1-20 shows that duration and cues for discriminating between a H + H and between H + F cues for the H + H contrasts.

The difference in duration becomes significant when we realize that the F in the H + F takes about 20 msec, about equal to the difference between the two groups. This is usually steep, falling from about 125 Hz to about 70 Hz. This contrasts with the gentle fall in the last 5 msec of the H + H which we can associate with utterance final fall. Generally, the H + H category is characterized by a slight downward tendency which contrasts with the subtle rise of the H + F just before the fall starts. This is usually observed in about the last 20 msec after onset of the series. The starting F_0 for both groups is about 125 Hz.

The starting F_0 of most of the tokens is concentrated in the general region of 125 Hz. The duration is between 50-60 msec. The tokens rise gradually in the first 5-10 msec, then rise gradually to a peak at about 20 msec, after which they fall steeply to about 70 Hz for a period of about 20 msec.



rise just before a steep fall begins. They fall from about 128 Hz for the highest to about 93 Hz for the lowest in about 20 csec, but rising slightly in the last 4-6 csec.

A comparison of the H + H type words in A1-A5 with the H + F type words in B1-B6 shows that duration and direction of F_0 can provide cues for distinguishing between a H + H and a H + F. The duration of between 35-45 csec for the H + H contrasts with 50-60 csec for the H + F. The difference in duration becomes significant when we realise that the F in the H + F takes about 20 csec, about equal to the difference between the two groups. This F is usually steep, falling from about 128 Hz to about 90 Hz. This contrasts with the gentle fall in the last 5 csec of the H + H which we can associate with utterance final fall. Generally, the H + H category is characterised by a slight downward tendency which contrasts with the subtle rise of the H + F just before the fall starts. This difference is usually observed in about the first 30 csec after onset in both categories. The starting F_0 for both groups is about 122 Hz.

C1 (L + F) cε̄ε̄

The starting F_0 of most of the tokens is concentrated in the general region of 118 Hz. The duration is between 50-60 csec. The traces drop gently for the first 5-10 csec, then rise gradually to a peak of about 127 Hz after about 20 csec, after which they fall steeply to about 90 Hz over a period of about 20 csec.

C2 (L + F) fāā

The starting F_0 is in the general region of 110 Hz, with a

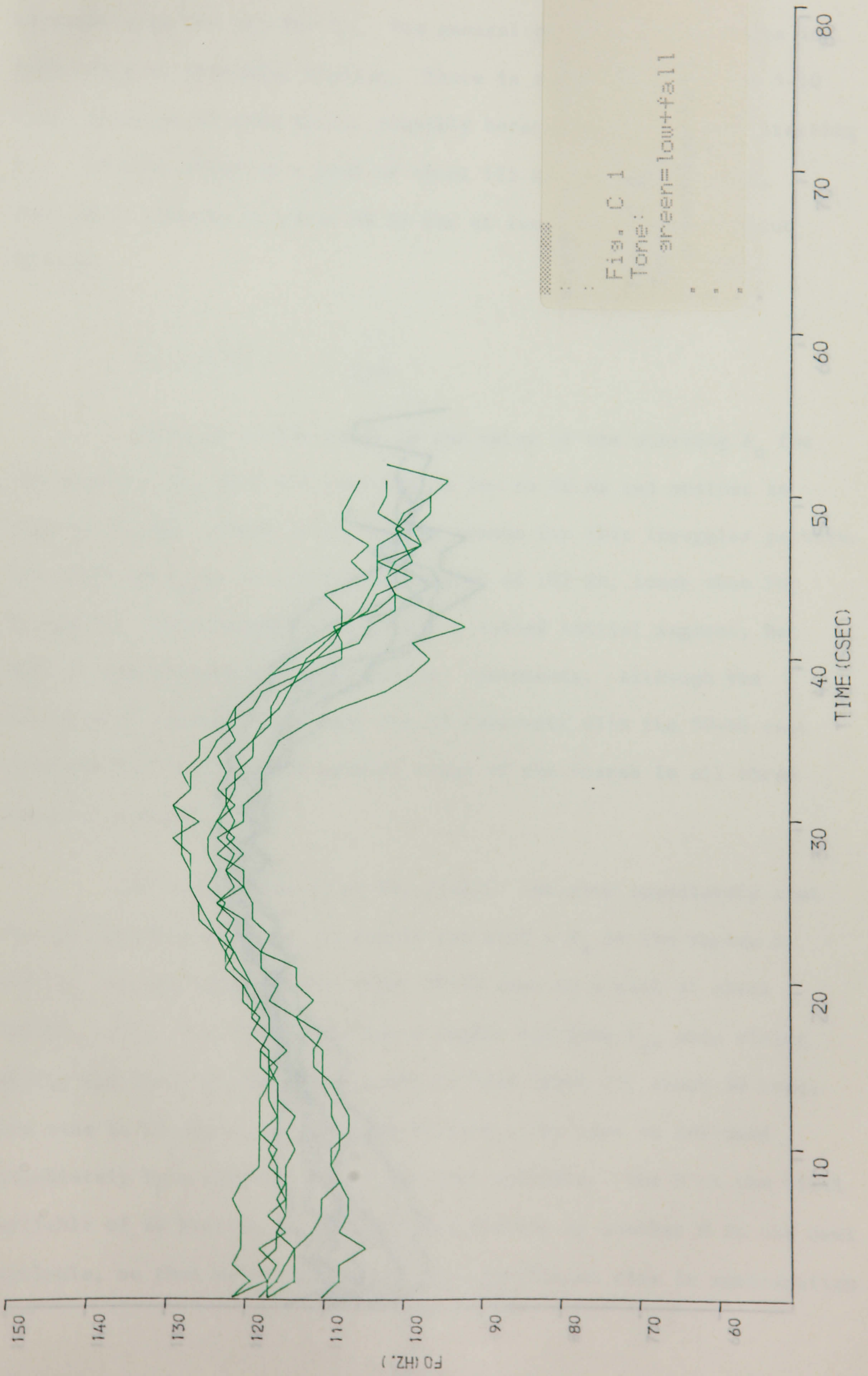


Fig. C 1
Tone: green=low+fall

duration between 30-50 msec. The starting F_0 is lower than for C1. The general pattern of the two traces is otherwise similar. There is a peak in F_0 for C2, lower than C1 than in C1, possibly because of the starting F_0 . C2 also rises to a peak of about 125 Hz then falls sharply to about 85 Hz for at least 20 msec.

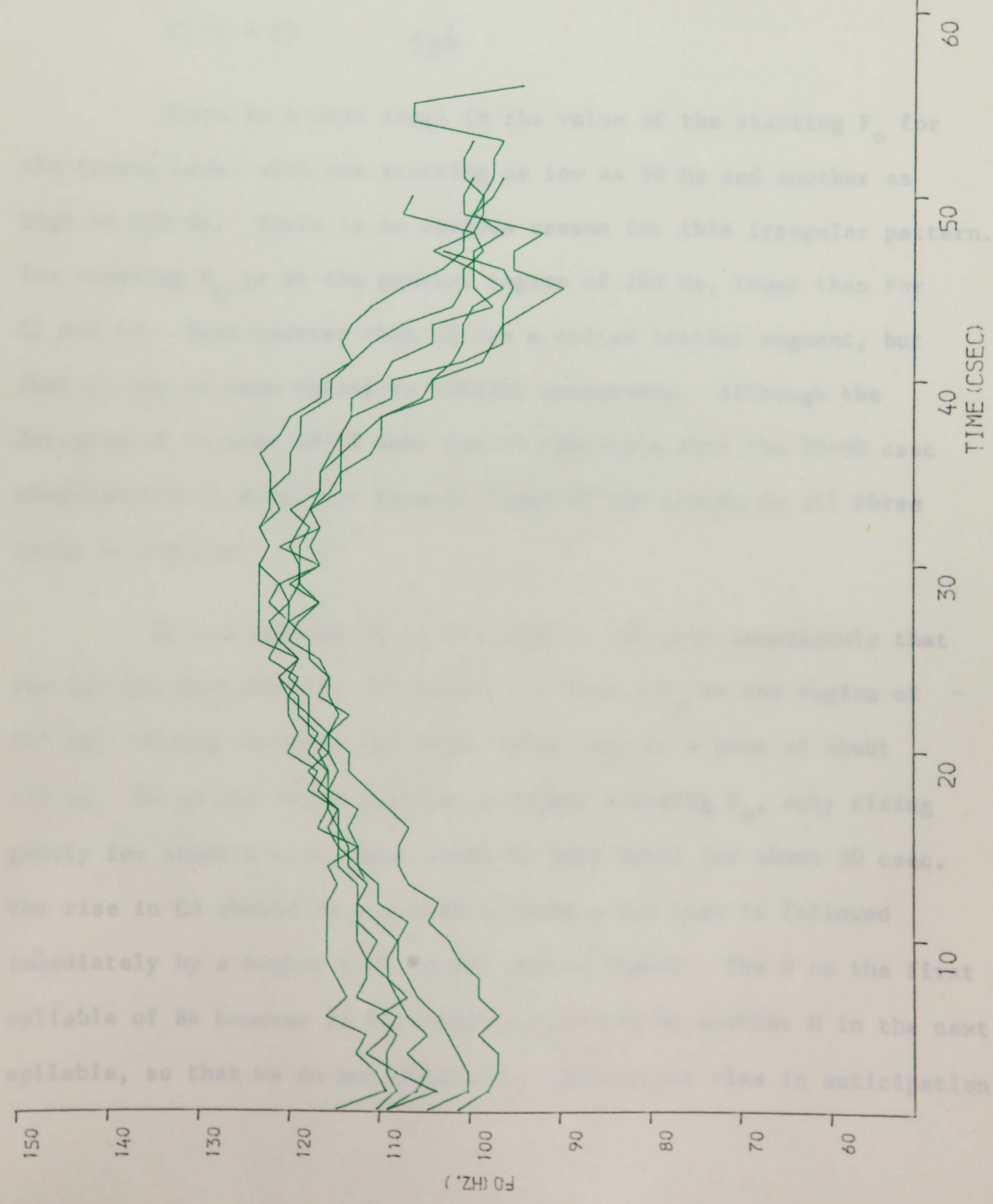


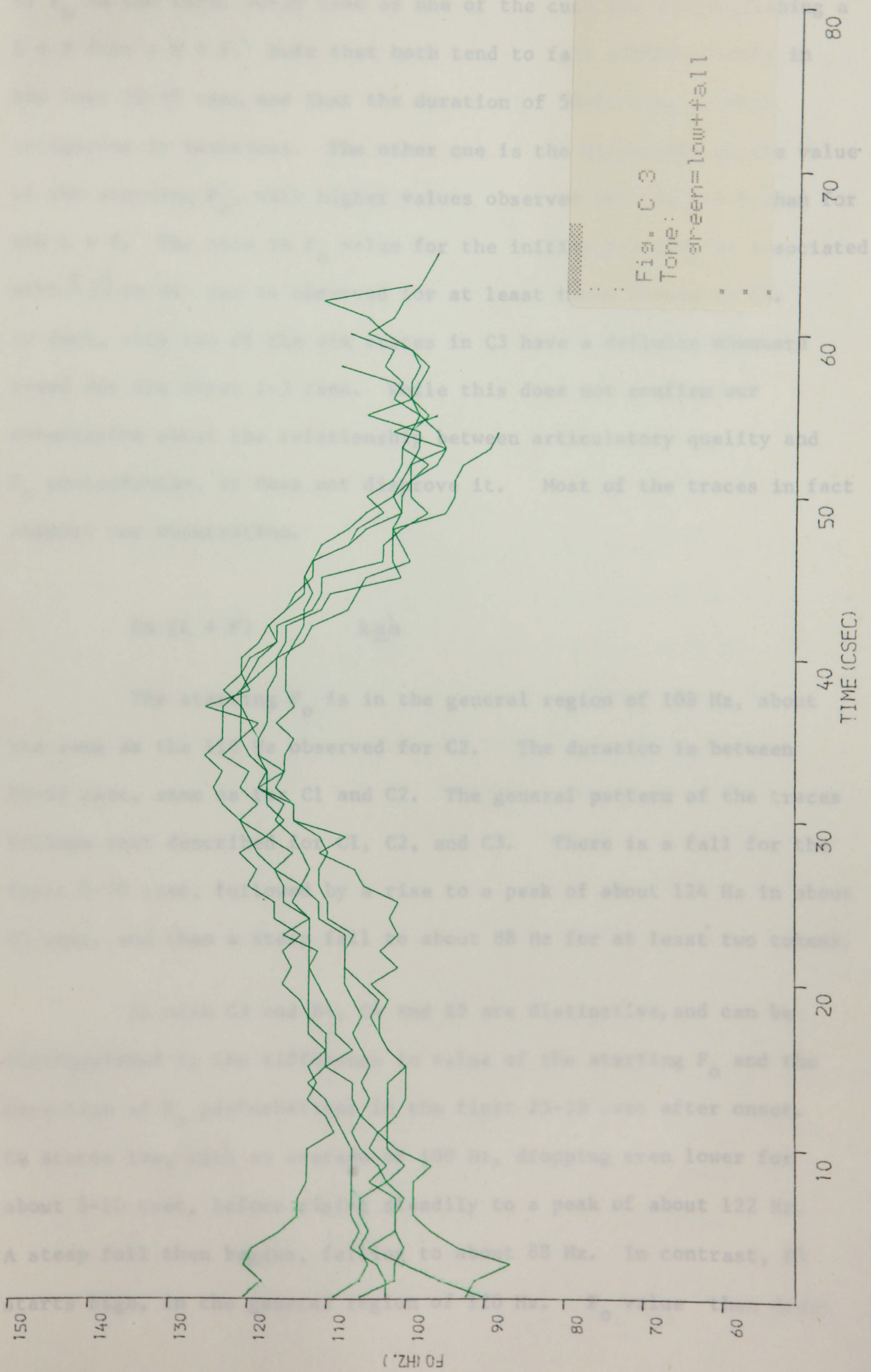
Fig. C 2
Tone: green=low+fall

duration between 50-60 csec. The starting F_0 of C2 is in sharp contrast with the one for C1. The general pattern of the traces in both cases is otherwise similar. There is a fall in the first 5-10 csec, lower in C2 than in C1, possibly because C2 has a lower starting F_0 . C2 then rises to a peak of about 125 Hz in about 20 csec, then falls sharply to about 88 Hz for at least one token in about 20 csec.

C3 (L + F) j_{aa}

There is a wide range in the value of the starting F_0 for the traces here, with one starting as low as 90 Hz and another as high as 120 Hz. There is no obvious reason for this irregular pattern. The starting F_0 is in the general region of 103 Hz, lower than for C1 and C2. Note however that C3 has a voiced initial segment, but that C1 and C2 have voiceless initial consonants. Although the duration of between 60-70 csec for C3 contrasts with the 50-60 csec observed for C1 + C2, the general trend of the traces in all three cases is similar.

We can compare C3 to B4, /j_{aa}/. We note immediately that the two are distinctive. C3 starts low with a F_0 in the region of 103 Hz, rising steadily for about 30-35 csec to a peak of about 122 Hz. B4 on the other hand has a higher starting F_0 , only rising gently for about 4 csec, then tends to hold level for about 30 csec. The rise in C3 should be expected because a low tone is followed immediately by a higher tone on the next syllable. The H on the first syllable of B4 however is followed immediately by another H in the next syllable, so that we do not expect any significant rise in anticipation



of the following tone as happens to C3. We can see the action of F_0 in the first 25-30 msec as one of the cues (1-2 msec) and note that both tend to fall. The first 25-30 msec, and that the duration of 50 msec is approximately constant. The other cue is the value of F_0 at the start, with higher values observed at 10-15 msec. The rate of F_0 value for the initial 25-30 msec is not to be taken as at least 100 Hz. The rate of the F_0 in C3 have a definite downward trend for the first 25-30 msec. This does not matter for the relationship between articulatory quality and F_0 value, as this does not move it. Most of the traces in fact show the same downward trend.

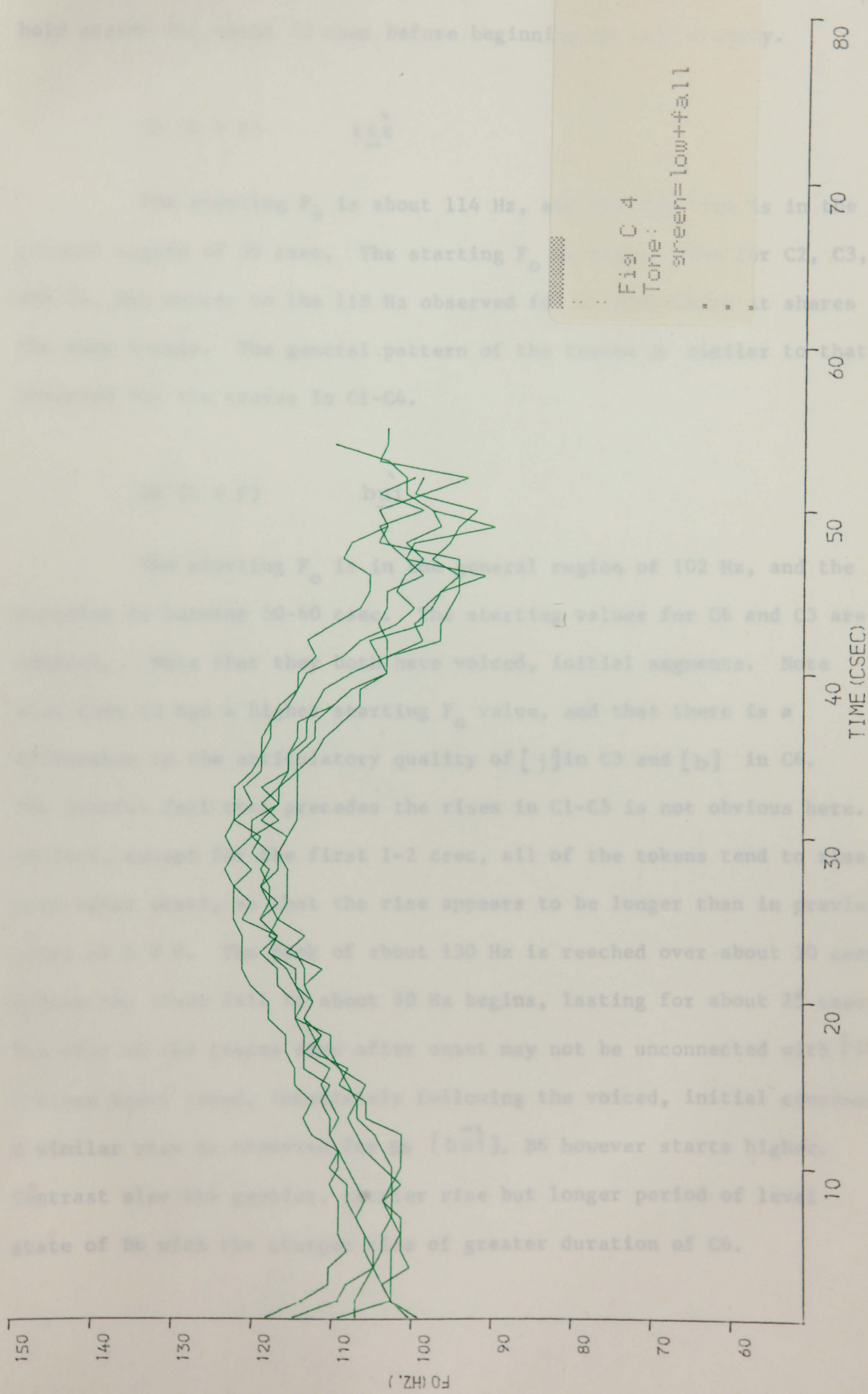
The F_0 is in the general region of 100 Hz, about the same as the value observed for C2. The duration is between 25-30 msec, and is similar to C1 and C2. The general pattern of the traces is similar to that of C1, C2, and C3. There is a fall for 10-15 msec, followed by a rise to a peak of about 114 Hz in about 25-30 msec, and then a fall to about 88 Hz for at least two traces. The first 25-30 msec are distinctive, and can be distinguished by the value of the starting F_0 and the duration of F_0 at the first 25-30 msec after onset. The traces are similar to C1, C2, and C3, stopping even lower for about 5-10 msec, before rising to a peak of about 122 Hz. A steep fall then follows, falling to about 88 Hz. In contrast,

of the following tone as happens in C3. We can thus regard direction of F_0 in the first 30-35 csec as one of the cues for distinguishing a L + F from a H + F. Note that both tend to fall rather steeply in the last 20-30 csec, and that the duration of 50-60 csec in both categories is identical. The other cue is the difference in the value of the starting F_0 , with higher values observed for the H + F than for the L + F. The rise in F_0 value for the initial 2-3 csec we associated with [j] in B4 can be observed for at least three traces in C3. In fact, only two of the six traces in C3 have a definite downward trend for the first 2-3 csec. While this does not confirm our observation about the relationship between articulatory quality and F_0 perturbation, it does not disprove it. Most of the traces in fact support our observation.

C4 (L + F) kaà

The starting F_0 is in the general region of 108 Hz, about the same as the 110 Hz observed for C2. The duration is between 50-60 csec, same as for C1 and C2. The general pattern of the traces follows that described for C1, C2, and C3. There is a fall for the first 5-10 csec, followed by a rise to a peak of about 124 Hz in about 25 csec, and then a steep fall to about 88 Hz for at least two tokens.

As with C3 and B4, C4 and B5 are distinctive, and can be distinguished by the difference in value of the starting F_0 and the direction of F_0 perturbations in the first 25-35 csec after onset. C4 starts low, with an average of 108 Hz, dropping even lower for about 5-10 csec, before rising steadily to a peak of about 122 Hz. A steep fall then begins, falling to about 88 Hz. In contrast, B5 starts high, in the general region of 120 Hz. F_0 value then drops



for about 5 csec after which for a similar ... to
 held steady for about 10 csec before beginning ...

The starting F_0 is about 114 Hz, ...
 ... The starting F_0 ...
 ... the 118 Hz observed ...
 ... The general pattern of the traces is similar to that
 ... in C1-C4.

The starting F_0 is in a general region of 102 Hz, and the
 ... starting values for C6 and C7 are
 ... have voiced, initial segments. Note
 ... starting F_0 value, and that there is a
 ... quality of [j] in C3 and [b] in C6.
 ... the rises in C1-C5 is not obvious here.

... first 1-2 csec, all of the tokens tend to
 ... the rise appears to be longer than in previous
 ... of about 130 Hz is reached over about 10 csec
 ... about 90 Hz begins, lasting for about 20 csec.
 ... after onset may not be unconnected with
 ... following the voiced, initial segments
 ... [b]. B6 however starts high
 ... rise but longer period of level
 ... of greater duration of C6.

for about 6 csec, rises again for a similar period, then tends to hold steady for about 20 csec before beginning to fall steeply.

C5 (L + F) tεε̃

The starting F_0 is about 114 Hz, and the duration is in the general region of 50 csec. The starting F_0 is higher than for C2, C3, and C4, but nearer to the 118 Hz observed for C1 with which it shares the same vowels. The general pattern of the traces is similar to that observed for the traces in C1-C4.

C6 (L + F) bui

The starting F_0 is in the general region of 102 Hz, and the duration is between 50-60 csec. The starting values for C6 and C3 are similar. Note that they both have voiced, initial segments. Note also that C3 has a higher starting F_0 value, and that there is a difference in the articulatory quality of [j] in C3 and [b] in C6. The initial fall that precedes the rises in C1-C5 is not obvious here. In fact, except for the first 1-2 csec, all of the tokens tend to rise soon after onset, so that the rise appears to be longer than in previous cases of L + F. The peak of about 130 Hz is reached over about 30 csec before the steep fall to about 90 Hz begins, lasting for about 25 csec. The rise of the traces soon after onset may not be unconnected with [u] a close vowel sound, immediately following the voiced, initial consonant. A similar rise is observed for B6 [būi]. B6 however starts higher. Contrast also the gentler, shorter rise but longer period of level state of B6 with the steeper rise of greater duration of C6.

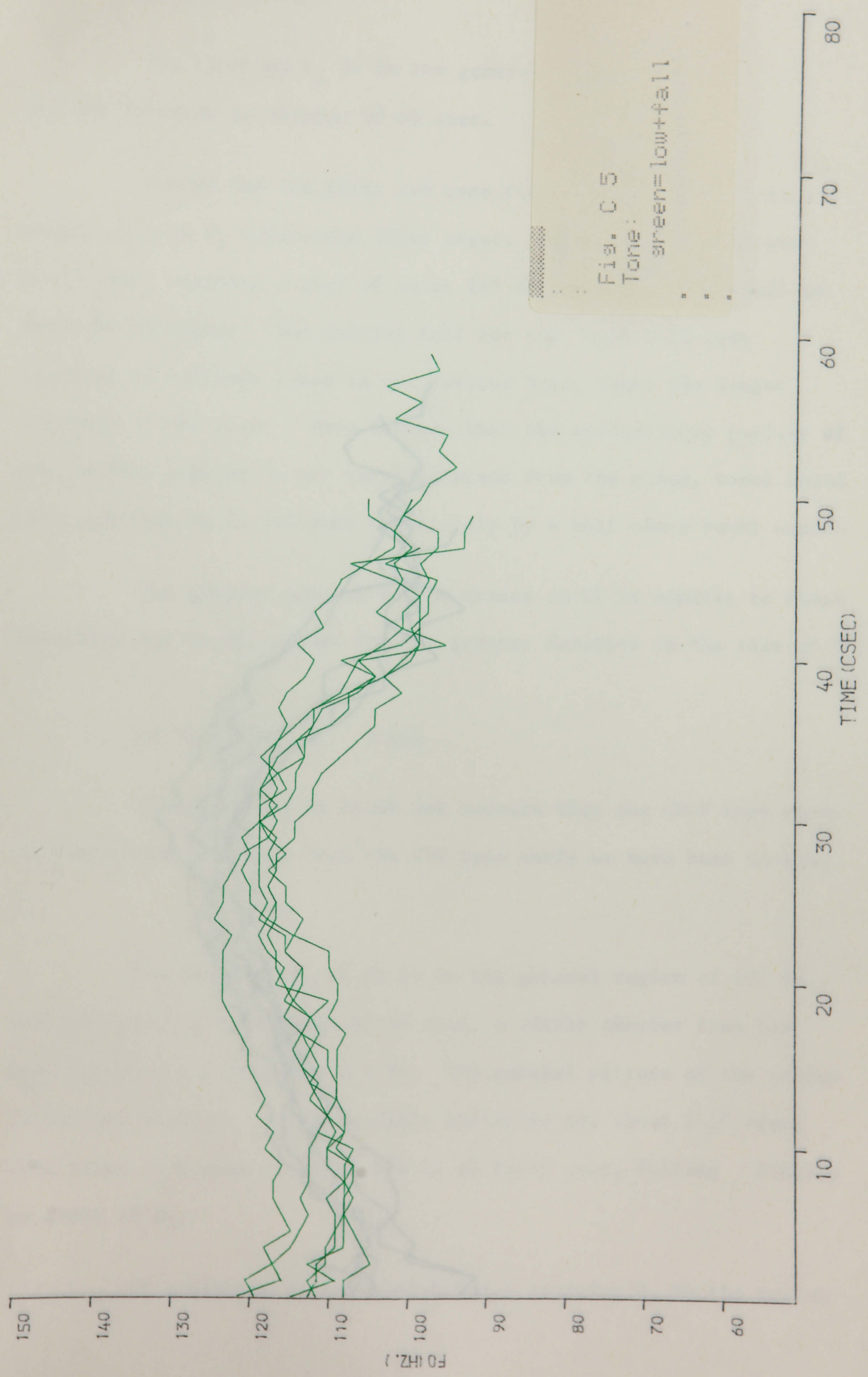


Fig. C 5
Tone: green=low+fall

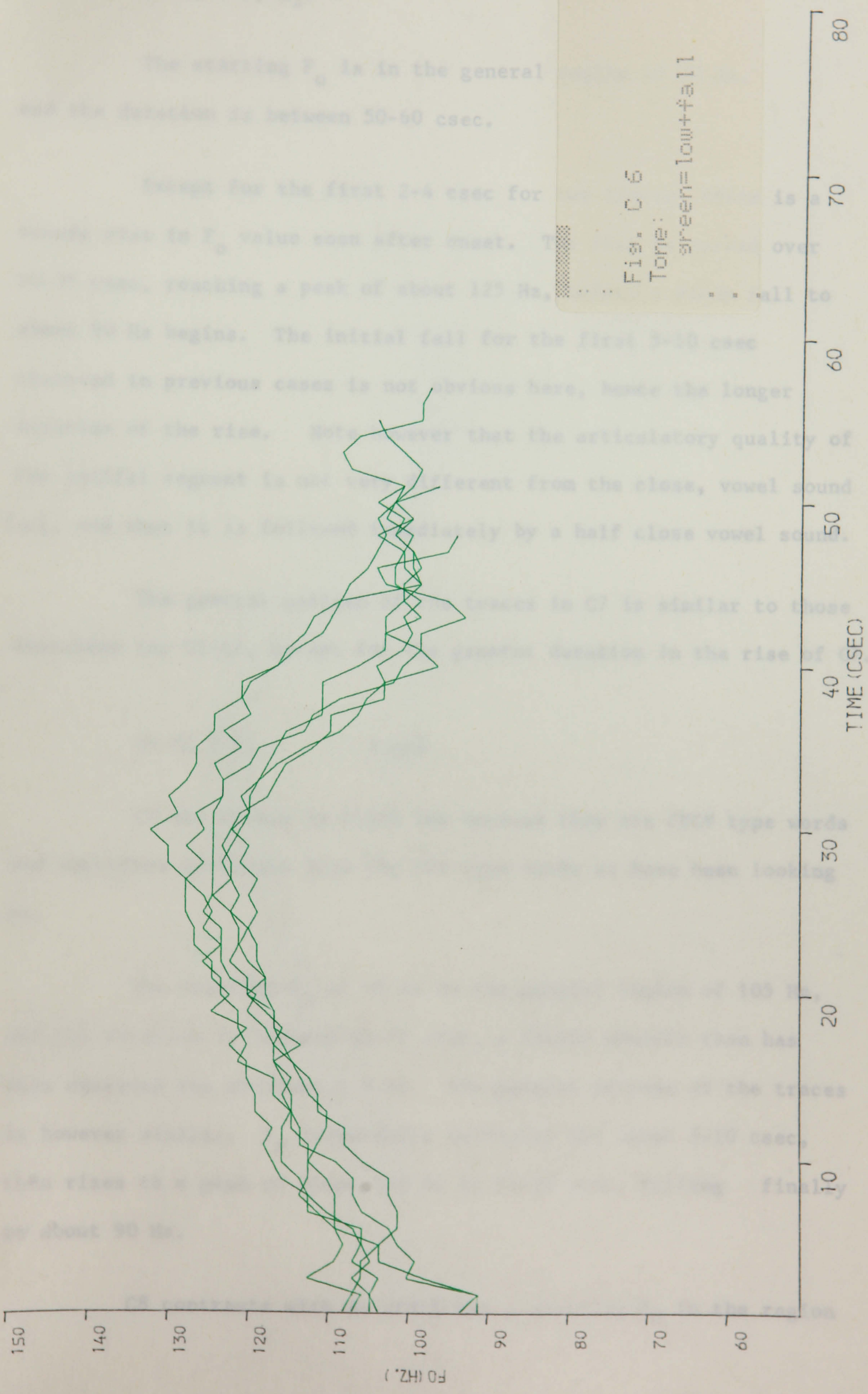


Fig. C 6
Tone: green=low+fall

The starting F_0 is in the general
and the duration is between 50-60 csec.

Except for the first 2-4 csec for
which rise to F_0 value soon after onset. The
reaches, reaching a peak of about 125 Hz,
about 30 Hz begins. The initial fall for the first 3-10 csec
observed in previous cases is not obvious here, hence the longer
duration of the rise. Note, however that the articulatory quality of
the initial segment is not different from the close, vowel sound
and that it is followed closely by a half close vowel sound.

The pattern of the traces to C is similar to those
observed in the rise of

the traces to C is similar to those
observed in the rise of

The pattern of the traces to C is similar to those
observed in the rise of

The rise to a peak of about 125 Hz,
about 30 Hz.

C7 (L + F) wò

The starting F_0 is in the general region of 96 Hz, and the duration is between 50-60 csec.

Except for the first 2-4 csec for two traces, there is a steady rise in F_0 value soon after onset. The rise is spread over 30-35 csec, reaching a peak of about 125 Hz, before a steep fall to about 90 Hz begins. The initial fall for the first 5-10 csec observed in previous cases is not obvious here, hence the longer duration of the rise. Note however that the articulatory quality of the initial segment is not very different from the close, vowel sound [u], and that it is followed immediately by a half close vowel sound.

The general pattern of the traces in C7 is similar to those described for C1-C6, except for the greater duration in the rise of C7.

C8 (L + F) kamà

C8 and C9 are in black ink because they are CVCV type words and therefore different from the CVV type words we have been looking at.

The starting F_0 of C8 is in the general region of 105 Hz, and the duration is between 45-50 csec, a little shorter than has been observed for previous L + Fs. The general pattern of the traces is however similar. F_0 value falls initially for about 5-10 csec, then rises to a peak of about 120 Hz in 15-20 csec, falling finally to about 90 Hz.

C8 contrasts with A4 which has a starting F_0 in the region

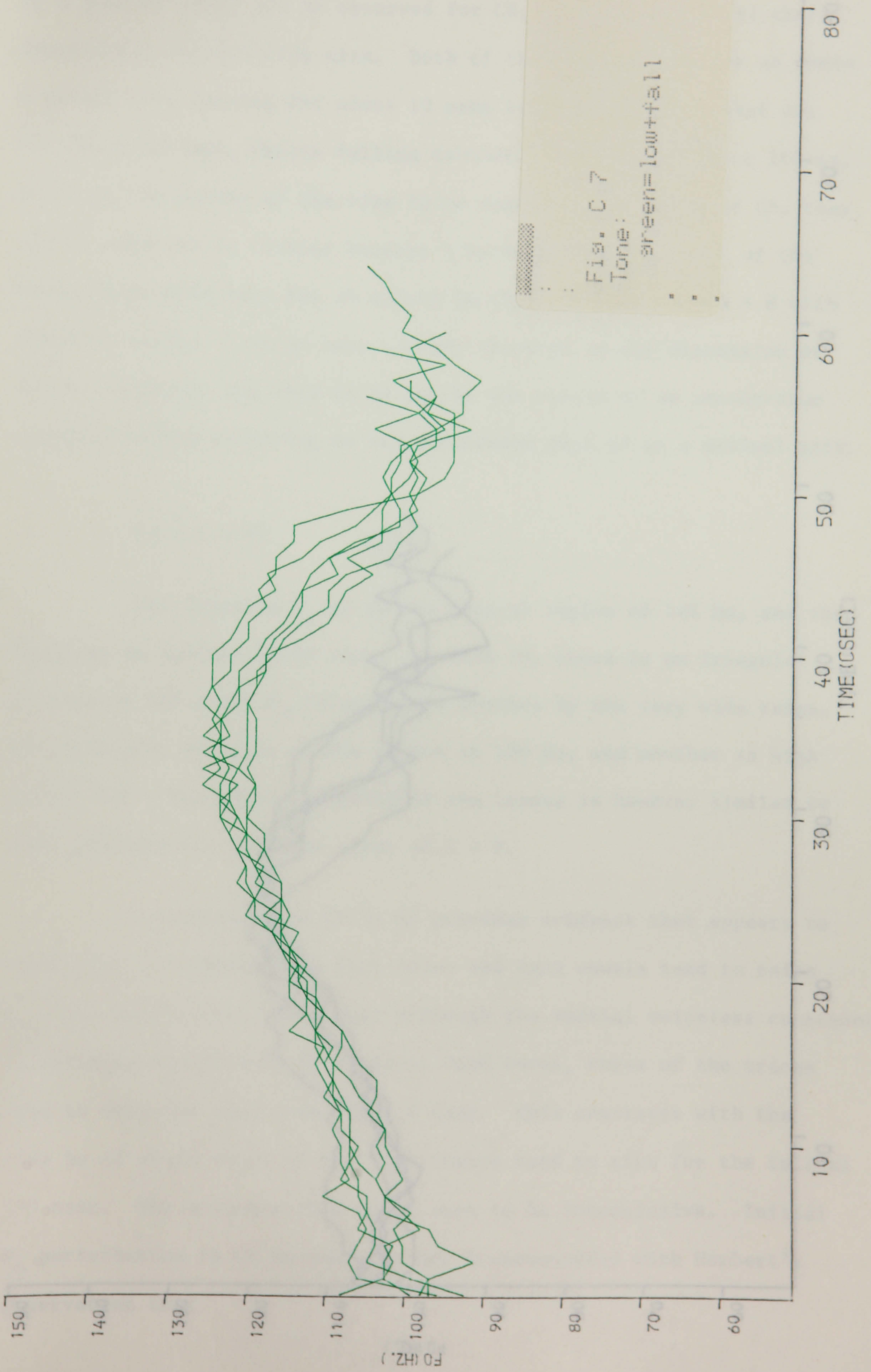


Fig. C 7
Tone: green=low+fall

of 116 Hz. Other features that distinguish C8 from A4 are the rise to a peak of about 122 Hz observed for C8, and the steep fall that immediately follows this rise. Both of these are absent for A4 where a gentle rise lasting for about 10 csec levels out, stays that way for about 10 csec, before falling downwards slightly to about 100 Hz. Although the nature of the rise in A4 contrasts with that of C8, they can be regarded as similar because they both rise. No rise of the nature described here for A4 occurs in the other cases of H + H with which it occurs. As we have already observed in our discussion of the H + H group, the rise in A4 may be the result of an unconscious response during recording to its occurrence with C8 as a minimal pair.

C9 (L + F) k_unè

The starting F_0 is in the general region of 108 Hz, and the duration is between 40-50 csec. As with C3, there is an irregular pattern to the start F_0 values, made obvious by the very wide range. One trace for instance starts as low as 100 Hz, and another as high as 121 Hz. The general pattern of the traces is however similar to that observed for previous cases of L + F.

A comparison of C9 to A5 provides evidence that appears to contradict our observation that close and back vowels tend to raise F_0 value initially. Note that although the initial voiceless consonant is followed immediately by a close, back vowel, three of the traces tend to drop for about the first 5 csec. This contrasts with the case in A5 where three of the five traces tend to rise for the initial 2-5 csec. The evidence then would seem to be inconclusive. Initial F_0 perturbation in C9 however may not be unconnected with Hombert's observation that

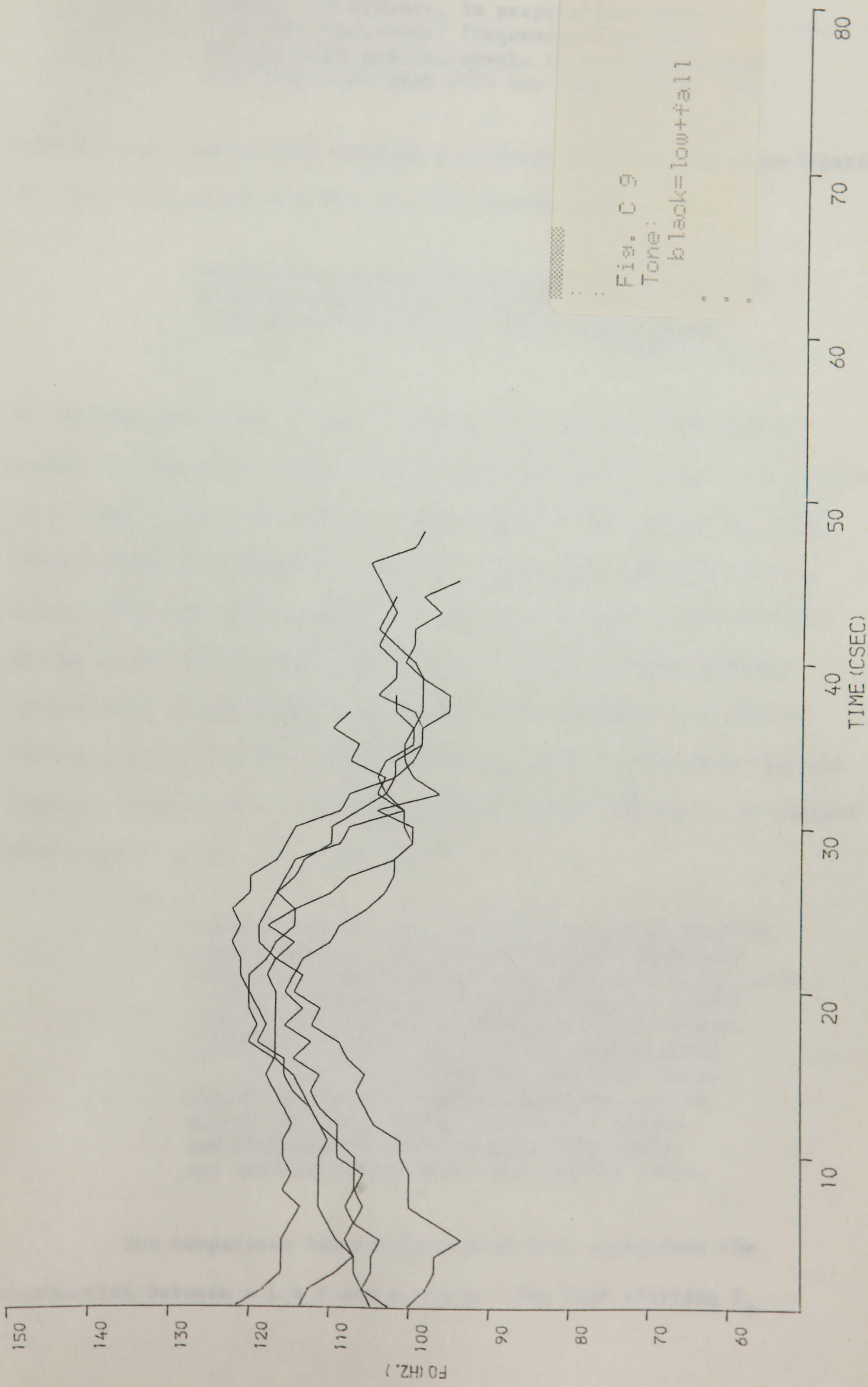


Fig. C 9
Tone:
b lack=low+fall

Data from Yoruba (Hombert 1977a) and Ewe (Lafage and Hombert, in preparation) show... that the fundamental frequency difference between high and low vowels is more pronounced with high tone than with low tone. (1978: 98)

Hombert also reports that Gandour's findings (1974) in his investigations of Thai tones agree with his own, for Yoruba, that

The effect of a voiced consonant on a following high tone is greater than the effect of a voiceless consonant on a following low tone. (1978: 83)

We have not here made a direct study of the relationships Hombert refers to, but it is significant in this regard that most of the traces in A5 tend to rise initially. Note that the vowel occurring immediately after the consonant in A5 has a high tone, and that the same vowel, after the same consonant in C9 has a low tone. Similarly most of the traces in C6 and C7 where we have voiced initial segments tend to rise in about the first 5 csec. The evidence in favour of our observation may not be conclusive, but most of the cases observed appear to support it. Perhaps we should report finally in this regard that Hombert (1978: 97) reports that

Several studies have shown that American English vowels have an intrinsic fundamental frequency related to their height: High vowels (low F_1) have a higher fundamental frequency than low vowels (Black 1949, House and Fairbanks 1953, Lehiste and Peterson 1961, Peterson and Barney 1952) ... The same correlation between vowel height and F_0 is found in other languages, such as Danish (Petersen 1976), French (Di Cristo and Chafcouloff 1976), Korean (Kim 1968), and Serbo-Croatian (Ivic and Lehiste 1963).

The comparison between C9 and A5 also emphasises the distinction between a L + F and a H + H. The high starting F_0

of A5 contrasts with the relatively low starting F_0 of C9. More obvious is the generally level pattern of A5 with its gentle downward tendency. This contrasts sharply with the steady rise of C9 to a peak of about 121 Hz in 15-20 csec, followed by a steep fall to about 90 Hz.

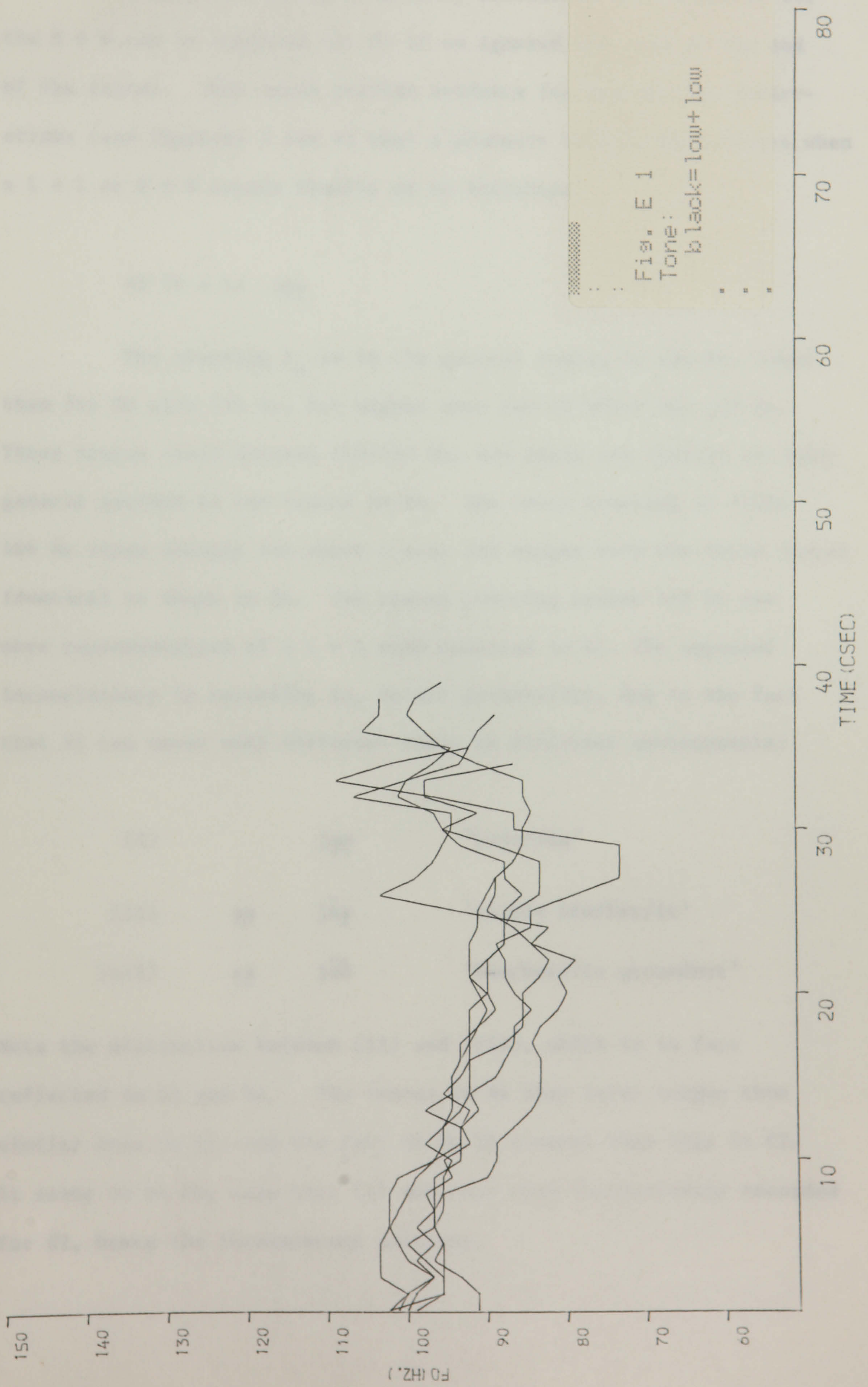
El (L + L) faa

The starting F_0 is in the general region of 99 Hz, and the duration is between 30-40 csec, shorter than for the H + Fs and the L + Fs. There is a rise with no well defined pattern at the end of the traces. In fact, the traces are very irregular over the last 5-10 csec. This has been observed for all the L + L cases. The rise is hard to explain, but three possible reasons considered are:

(i) It is just the way the tones are realised in Kono, i.e., the rise is language specific.

(ii) It could be due to an unreliable F_0 meter. It may be the case that as the intensity dies away at the end, the machine starts looking for energy at other frequencies, and may pick up the second harmonic, or F_1 ; i.e. the final rise is an artefact.

(iii) Physiological causes may be responsible. On a single syllable, low tone can be allowed to descend to abnormally low F_0 by going from low phonation, through creak, to silence. On L + L, this cannot be done, because phonation must keep going, from low phonation, through high-effort, forcibly lowered F_0 to a final relaxation that allows F_0 to rise back nearer to normal F_0 level; i.e. comfortable speaking level.



A slightly downward tendency similar to that observed for the H + H can be observed for E1 if we ignored the rise at the end of the traces. This would provide evidence for our earlier observations (see Chapters 5 and 6) that a phonetic falling tone occurs when a L + L or H + H occurs finally or in isolation.

E2 (L + L) jaa

The starting F_0 is in the general region of 110 Hz, lower than for B4 with 116 Hz, but higher than for C3 which has 103 Hz. Three traces start between 110-120 Hz, and these are similar in their general pattern to the traces in B4. One trace starting at about 106 Hz rises sharply for about 2 csec and merges with the three traces identical to those in B4. Two traces starting nearer 100 Hz are more representative of a L + L when compared to E1. The apparent inconsistency in recording is, in all probability, due to the fact that E2 can occur with different tones in different environments:

- | | | | |
|-------|-----------|-------------|-------------------------|
| (i) | | j <u>aa</u> | 'cajoling' |
| (ii) | <u>aa</u> | j <u>aa</u> | 'cajole him/her/it' |
| (iii) | <u>aa</u> | j <u>aa</u> | 'his/her/its groundnut' |

Note the distinction between (ii) and (iii), which is in fact reflected in E2 and B4. The traces in B4 stay level longer than similar ones in E2, and the fall in B4 is steeper than that in E2. It seems to be the case that (i) and (ii) were unconsciously recorded for E2, hence the inconsistent patterns.

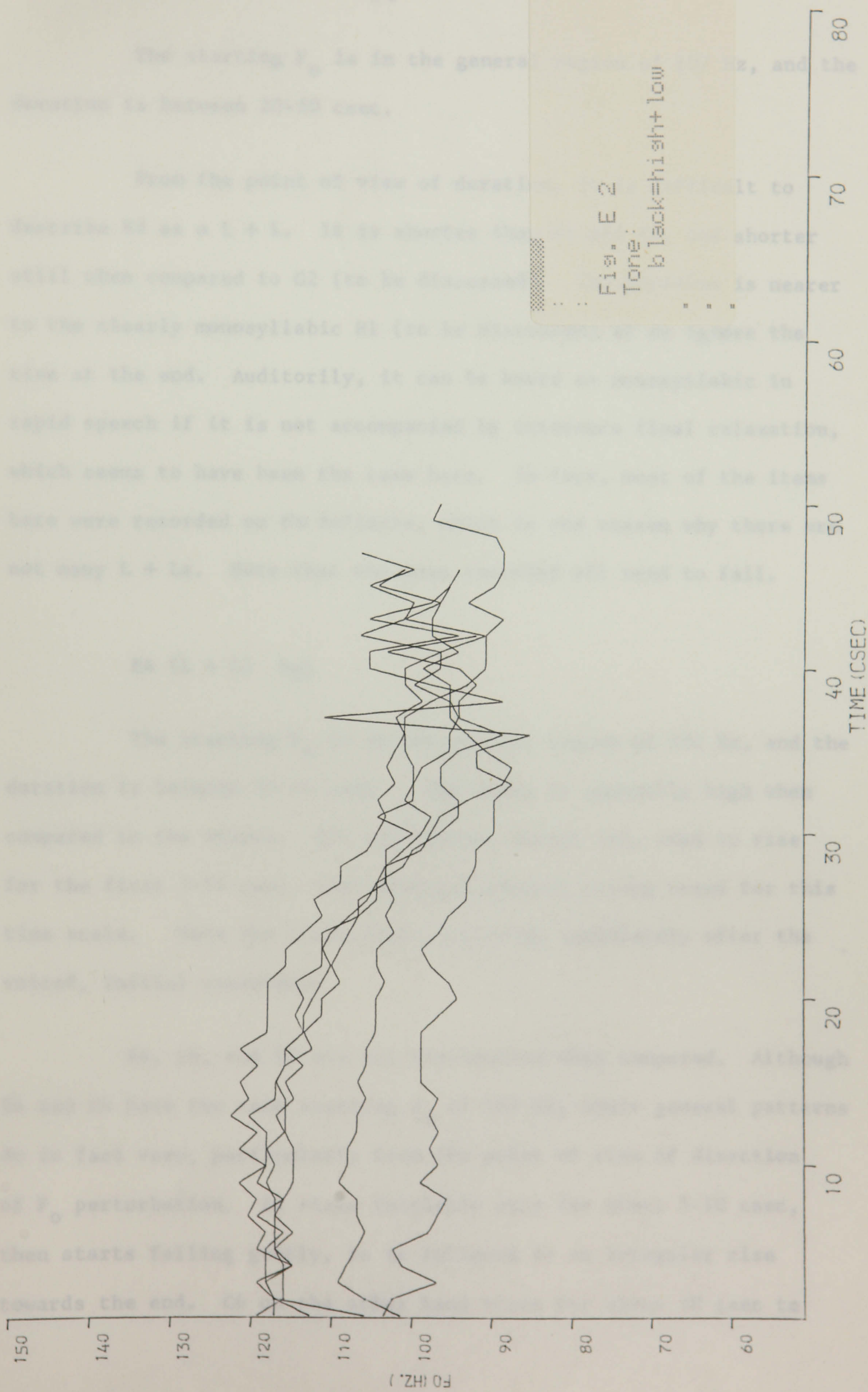


Fig. E 2
 Tone:
 b lack=high+low

E3 (L + L) tεε

The starting F_0 is in the general region of 107 Hz, and the duration is between 20-30 csec.

From the point of view of duration, it is difficult to describe E3 as a L + L. It is shorter than E1 and E2, and shorter still when compared to G2 (to be discussed). Its duration is nearer to the clearly monosyllabic H1 (to be discussed) if we ignore the rise at the end. Auditorily, it can be heard as monosyllabic in rapid speech if it is not accompanied by utterance final relaxation, which seems to have been the case here. In fact, most of the items here were recorded on the definite, which is one reason why there are not many L + Ls. Note that the ones recorded all tend to fall.

E4 (L + L) bui

The starting F_0 is in the general region of 102 Hz, and the duration is between 35-45 csec. One trace is unusually high when compared to the others. All the traces, except one, tend to rise for the first 5-10 csec, thus giving a general rising trend for this time scale. Note the close vowel occurring immediately after the voiced, initial consonant.

E4, C6, and B6 are all distinctive when compared. Although E4 and C6 have the same starting F_0 of 102 Hz, their general patterns do in fact vary, particularly from the point of view of direction of F_0 perturbation. E4 rises initially only for about 5-10 csec, then starts falling gently, to be followed by an irregular rise towards the end. C6 on the other hand rises for about 30 csec to

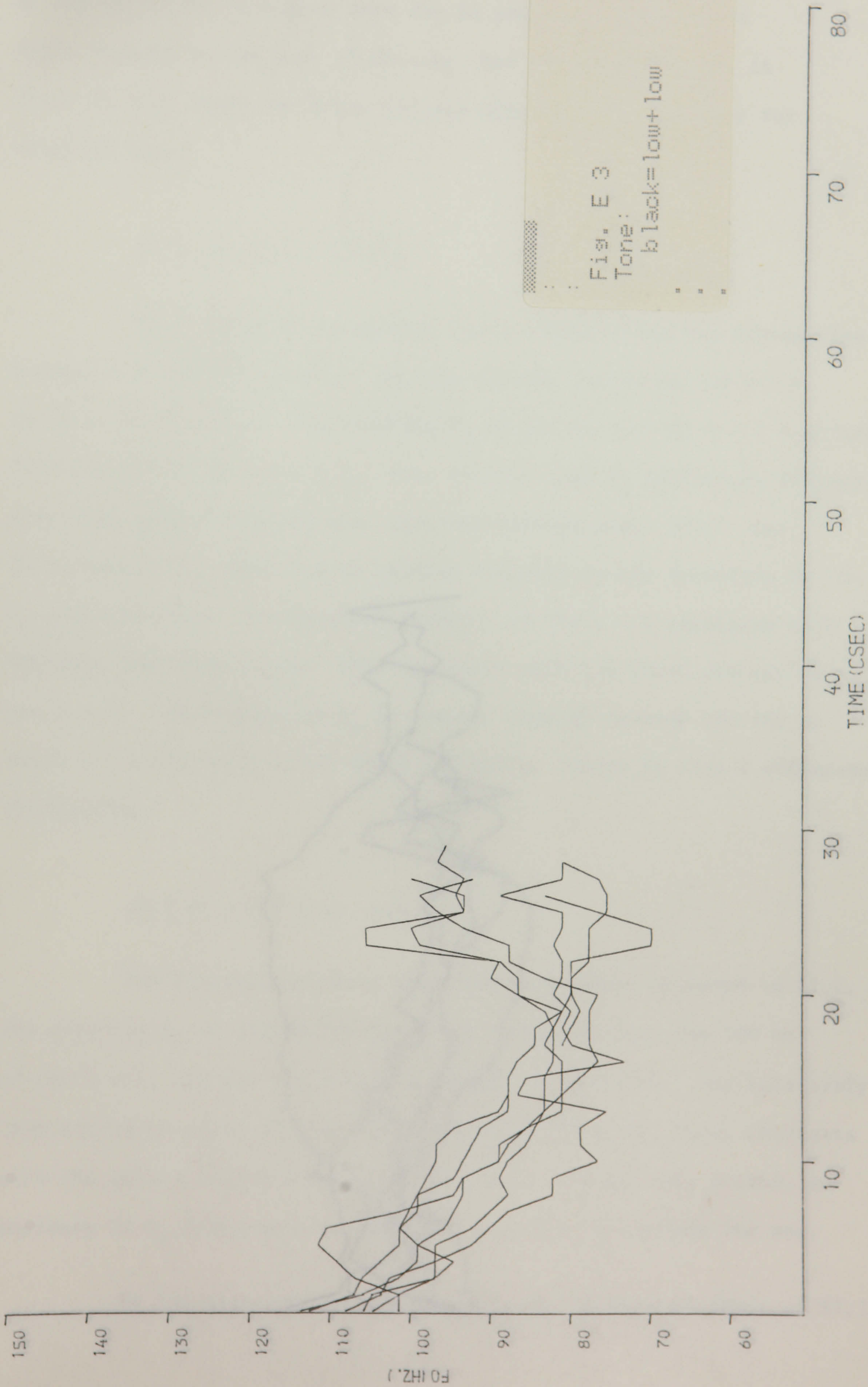


Fig. E 3
Tone:
b lack=low+low

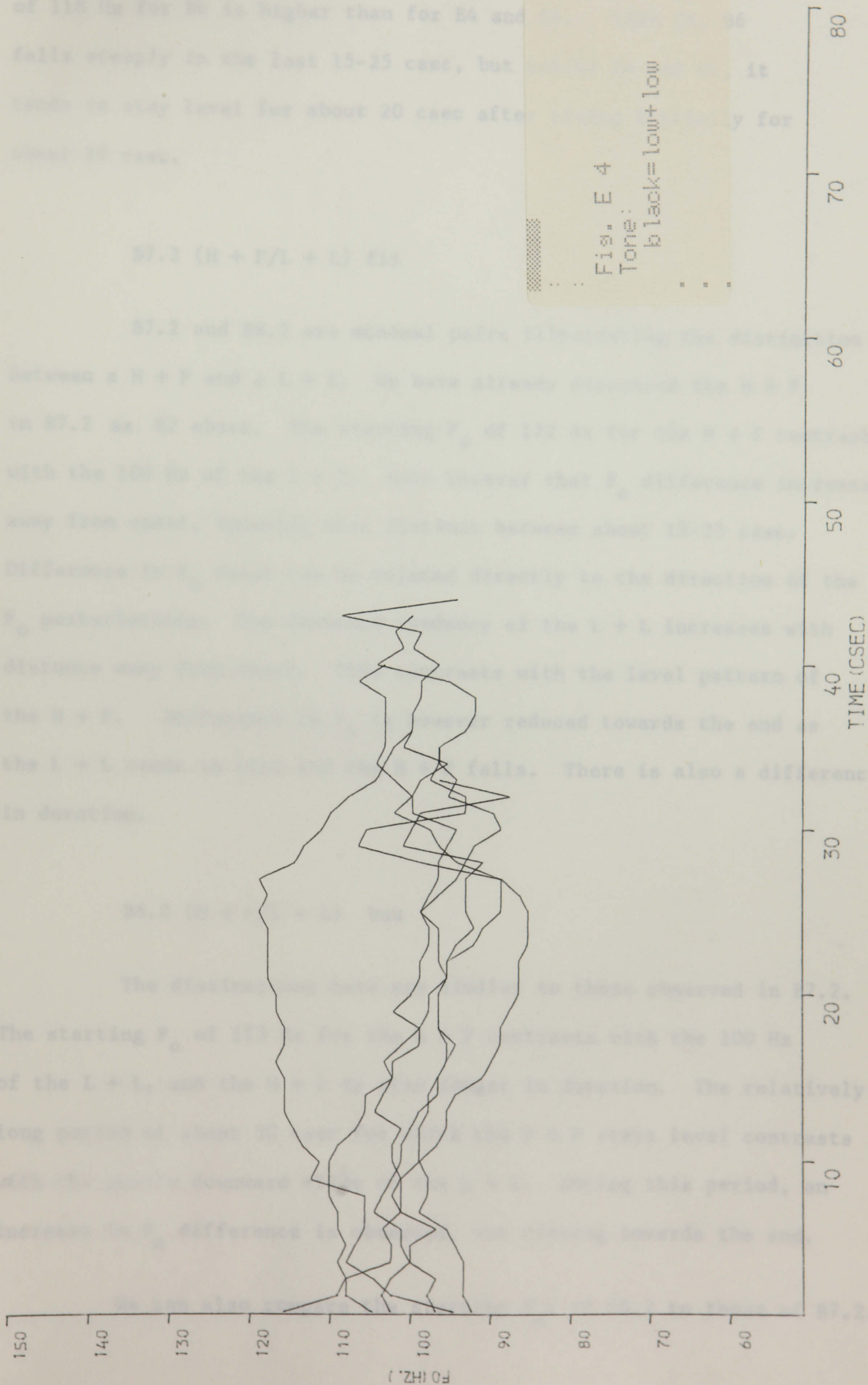
a peak of 130 Hz, then falls steeply to 90 Hz at 10 sec. The starting F_o of 115 Hz for B4 is higher than for E4 and falls steeply in the last 15-25 cases, but tends to stay level for about 20 cases after about 10 cases.

27.2 (R + L + L) 213

27.2 and 28.2 are similar pairs illustrating the difference between a R + L and a L + L. We have already discussed the R + L in 27.2 as B2 above. The starting F_o of 122 Hz for the R + L contrasts with the 100 Hz of the L + L. The latter level that F_o difference is very way from usual, especially since the time between about 10-25 cases. Difference in F_o does not increase directly in the direction of the F_o perturbation. The frequency of the L + L increases with distance away from usual. The frequency of the R + L increases with the level pattern of the R + L. Difference in F_o is reduced towards the end of the L + L runs as the level falls. There is also a difference in duration.

28.2 (L + L) 213

The structure of the level pattern is similar to those observed in 27.2. The starting F_o of 115 Hz for the L + L contrasts with the 100 Hz of the R + L, and the level pattern is similar to that of the R + L. The relatively long period of about 20 cases at the 100 Hz level contrasts with the shorter duration of the R + L. During this period, the level of F_o difference is reduced towards the end of the L + L runs as the level falls.



a peak of 130 Hz, then falls steeply to 90 Hz. The starting F_0 of 118 Hz for B6 is higher than for E4 and C6. Like C6, B6 falls steeply in the last 15-25 csec, but unlike E4 and C6, it tends to stay level for about 20 csec after rising initially for about 10 csec.

B7.2 (H + F/L + L) fii

B7.2 and B8.2 are minimal pairs illustrating the distinction between a H + F and a L + L. We have already discussed the H + F in B7.2 as B2 above. The starting F_0 of 122 Hz for the H + F contrasts with the 108 Hz of the L + L. Note however that F_0 difference increases away from onset, becoming most distinct between about 15-25 csec. Difference in F_0 value can be related directly to the direction of the F_0 perturbations. The downward tendency of the L + L increases with distance away from onset. This contrasts with the level pattern of the H + F. Difference in F_0 is however reduced towards the end as the L + L tends to rise and the H + F falls. There is also a difference in duration.

B8.2 (H + F/L + L) buu

The distinctions here are similar to those observed in B7.2. The starting F_0 of 113 Hz for the H + F contrasts with the 100 Hz of the L + L, and the H + F is also longer in duration. The relatively long period of about 30 csec for which the H + F stays level contrasts with the gentle downward slide of the L + L. During this period, an increase in F_0 difference is observed, but closing towards the end.

We can also compare the starting F_0 s of B8.2 to those of B7.2.

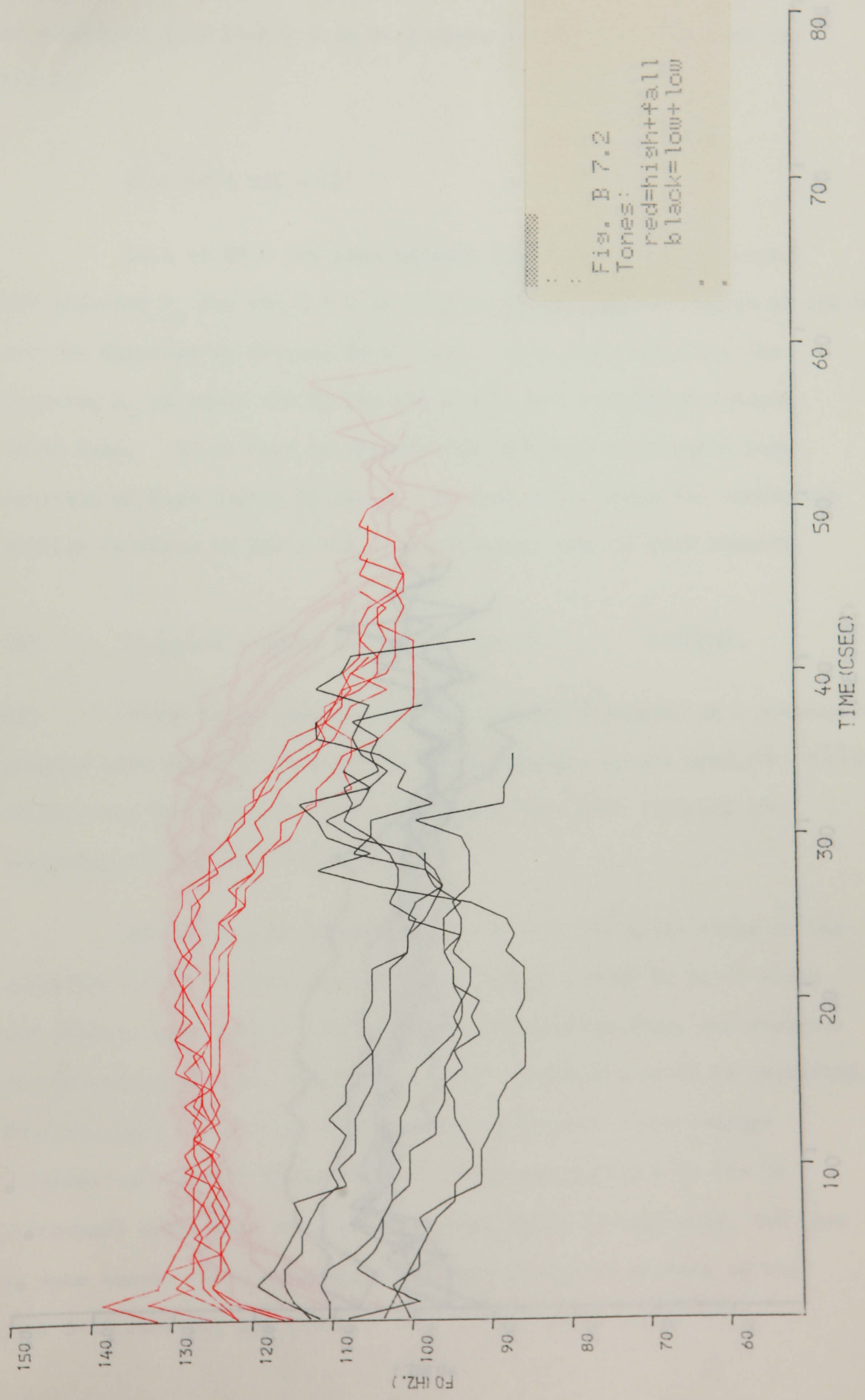


Fig. B 7.2
Tones:
red=high+fall
black=low+low

We observe that tones are higher in 20.2
is voiceless than they are in 20.1 when
voiced.

20.2 (h + a) + (l)
20.1 (h + a) + (l)

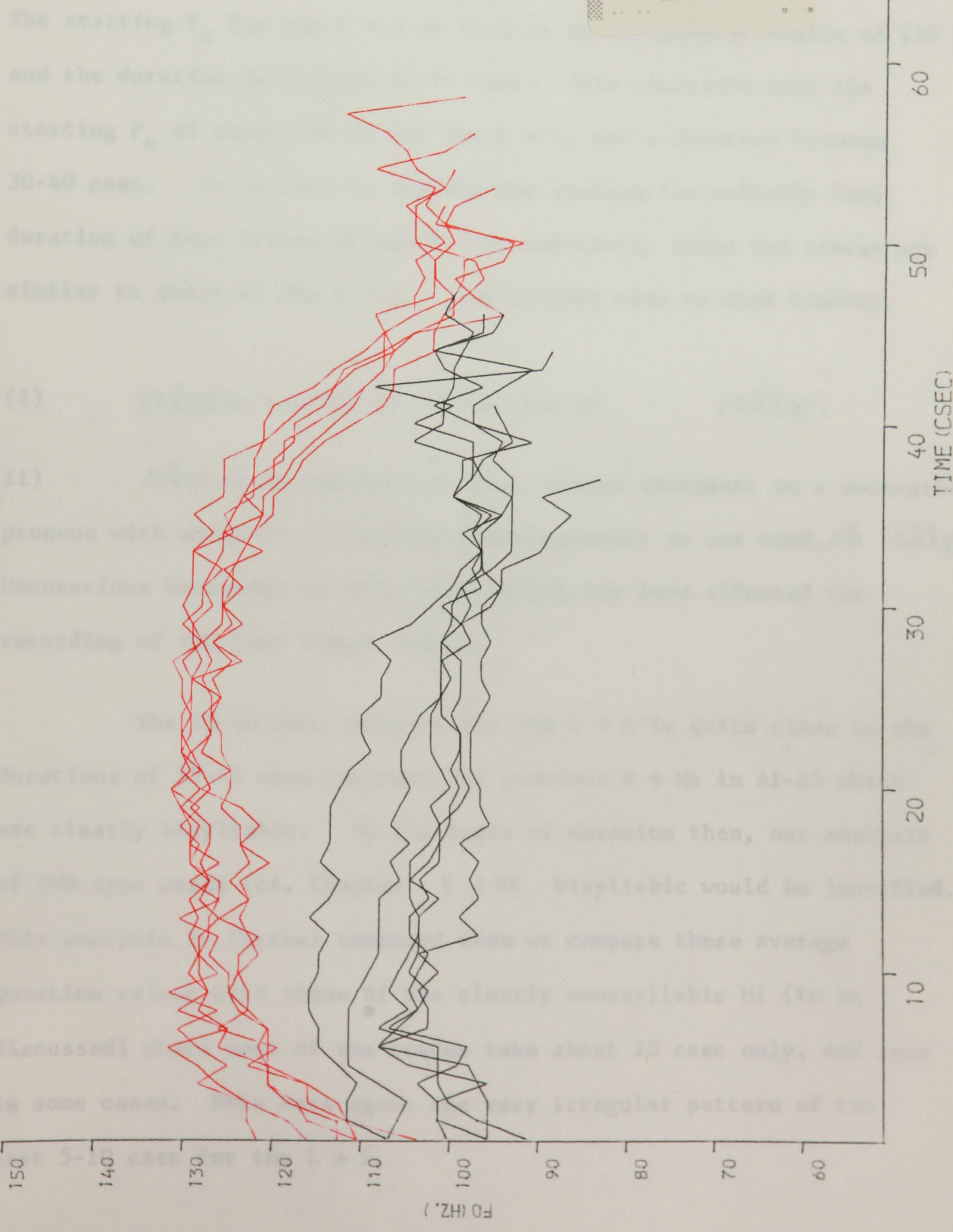


Fig. B 8.2

Tones:
red=high+fall
black=low+low

We observe that these are higher in B7.2 where the initial consonant is voiceless than they are in B8.2 where the initial consonant is voiced.

D1.2 (H + H/L + L)

bɛŋ

D1.2 to D5.6 are also minimal pairs with CVN type words.

The starting F_0 for the H + H in D1.2 is in the general region of 116 Hz, and the duration is between 40-50 csec. This contrasts with the starting F_0 of about 104 Hz for the L + L, and a duration between 30-40 csec. It is hard to explain the uncharacteristically long duration of four traces of the H + H, especially since two traces are similar to those of the L + L. Two reasons come to mind however:

- (i) [bɛ̄ŋ] is a phonetic contraction of /bāīŋ/.
- (ii) /bɛ̄ŋ/ is an inalienable noun, always dependent on a possessive pronoun with which it is realised phonologically as one word, /m̄ bāīŋ/. Unconscious knowledge of this relationship may have affected the recording of the four longer traces.

The 30-40 csec recorded for the L + L is quite close to the durations of 35-45 csec recorded for previous H + Hs in A1-A5 which are clearly bisyllabic. On the basis of duration then, our analysis of CVN type words (cf. Chapter 5) as bisyllabic would be justified. This analysis is further enhanced when we compare these average duration values with those of the clearly monosyllabic H1 (to be discussed) where most of the traces take about 20 csec only, and less in some cases. Note here again the very irregular pattern of the last 5-10 csec for the L + L.

$$D5.4 (N + N/3 + 1) f_{ij}$$

The starting f_{ij} is in the general duration is between 30-40 msec. The $L +$ of about 112 Hz, but a stiffer duration is 30-40 msec. Note that the duration for similar to that recorded for previous $N +$

The high f_{ij} values for the $N +$ 11.2. Note however that the initial $N +$ as opposed to the voiced, partial $N +$

$$D5.4 (N + N/3 + 1) f_{ij}$$

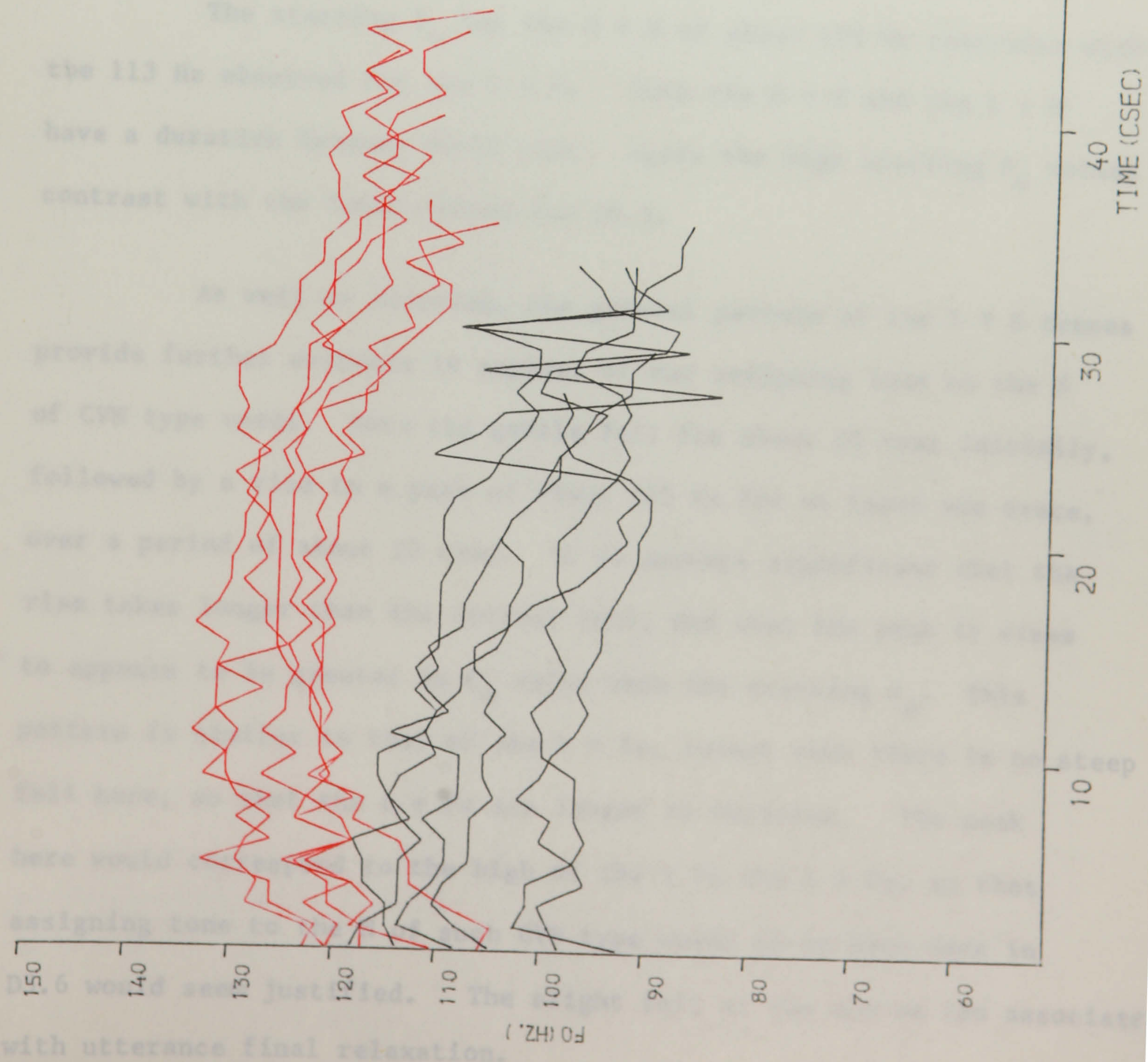


Fig. D 1.2

Tones:

red=high+high

black=low+low

150
140
130
120
110
100
90
80
70
60

10 20 30 40 50 60 70 80

TIME (CSEC)

F0 (HZ.)

with utterance final relaxation.

D3.4 (H + H/L + L) f ε η

The starting F_0 is in the general region of 126 Hz and the duration is between 30-40 csec. The L + L has a lower starting F_0 of about 112 Hz, but a similar duration in the general region of 30-40 csec. Note that the duration for the L + L here is very similar to that recorded for previous H + Hs.

The high F_0 values for the start contrast with those in D1.2. Note however that the initial consonant here is voiceless, as opposed to the voiced, initial consonant of D1.2.

D5.6 (H + H/L + H) s ɔ η

The starting F_0 for the H + H of about 128 Hz contrasts with the 113 Hz observed for the L + H. Both the H + H and the L + H have a duration between 30-40 csec. Again the high starting F_0 values contrast with the lower values for D1.2.

As well as duration, the general pattern of the L + H traces provide further evidence in support of our assigning tone to the N of CVN type words. Note the gentle fall for about 10 csec initially, followed by a rise to a peak of about 125 Hz for at least one trace, over a period of about 20 csec. It is perhaps significant that the rise takes longer than the initial fall, and that the peak it rises to appears to be greater in F_0 value than the starting F_0 . This pattern is similar to that of the L + Fs, except that there is no steep fall here, so that the L + Fs are longer in duration. The peak here would correspond to the high of the F in the L + Fs, so that assigning tone to the N of such CVN type words as we have done in D5.6 would seem justified. The slight fall at the end we can associate with utterance final relaxation.

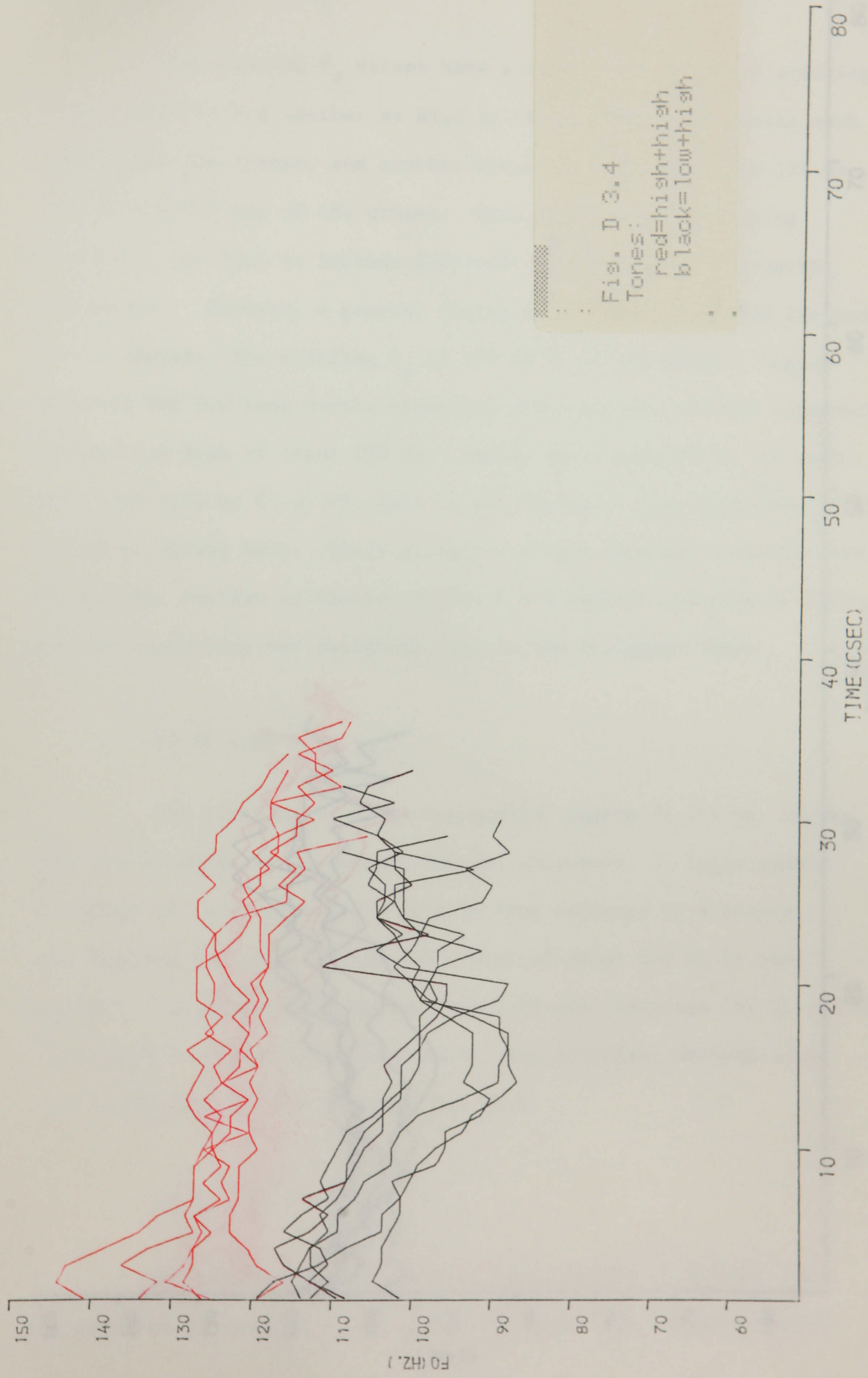


Fig. D 3.4
Tones:
red=high+high
black=low+high

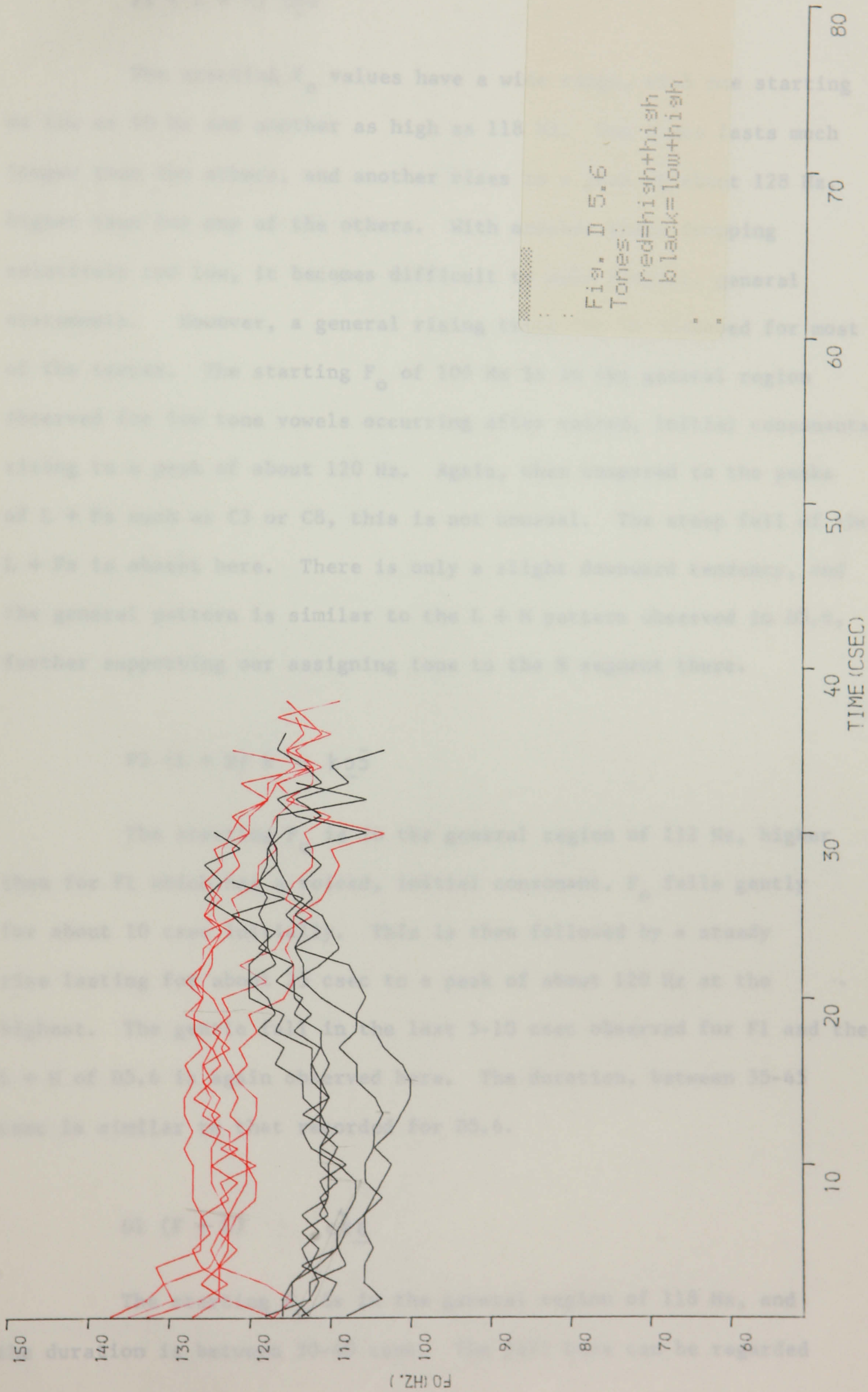


Fig. D 5.6
 Tones:
 red=high+high
 black=low+high

F1 (L + H) boo

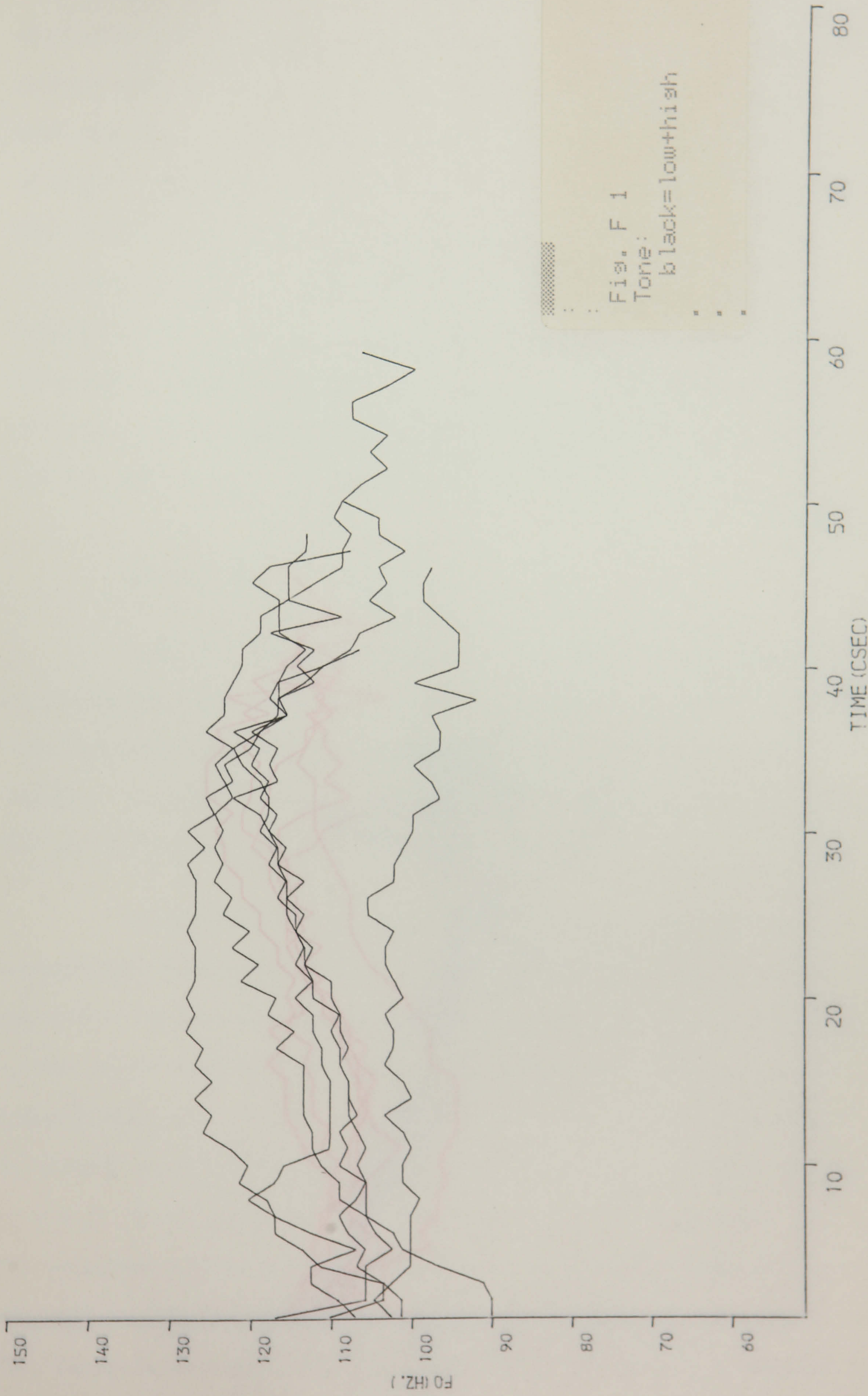
The starting F_0 values have a wide range, with one starting as low as 90 Hz and another as high as 118 Hz. One trace lasts much longer than the others, and another rises to a peak of about 128 Hz, higher than for any of the others. With another trace dropping relatively too low, it becomes difficult to make precise, general statements. However, a general rising trend can be observed for most of the traces. The starting F_0 of 105 Hz is in the general region observed for low tone vowels occurring after voiced, initial consonants, rising to a peak of about 120 Hz. Again, when compared to the peaks of L + Fs such as C3 or C8, this is not unusual. The steep fall of the L + Fs is absent here. There is only a slight downward tendency, and the general pattern is similar to the L + H pattern observed in D5.6, further supporting our assigning tone to the N segment there.

F2 (L + H) k = koo

The starting F_0 is in the general region of 112 Hz, higher than for F1 which has a voiced, initial consonant. F_0 falls gently for about 10 csec initially. This is then followed by a steady rise lasting for about 25 csec to a peak of about 120 Hz at the highest. The gentle fall in the last 5-10 csec observed for F1 and the L + H of D5.6 is again observed here. The duration, between 35-45 csec is similar to that recorded for D5.6.

G1 (F + L) cee

The starting F_0 is in the general region of 118 Hz, and the duration is between 30-40 csec. The fall here can be regarded



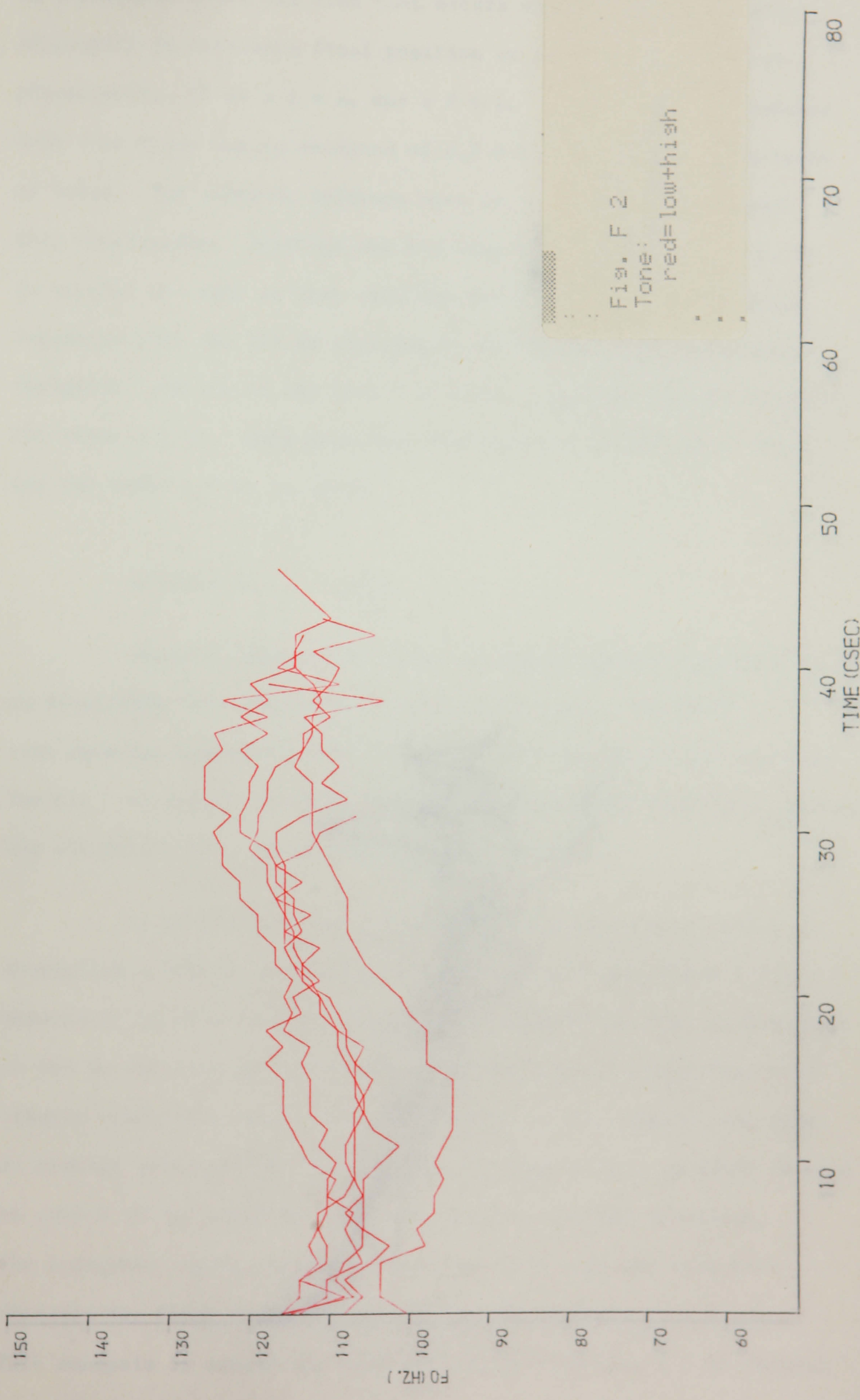


Fig. F 2
Tone: red=low+high

as a phonetic fall, the kind that occurs when
 adjacently in utterance final position or
 phonetically, G1 is a L + L, not a P + L.
 here that there was no evidence of a P + L
 of tones. The acoustic evidence here is
 this observation. Although the starting
 is exactly the same as that recorded for
 contrasts with the 125 Hz starting F_0 of
 irregular pattern of the last 3-10 case, a
 for other L + Ls. Note also that the
 for the other L + Ls in G1-13.

G2 (P + L)

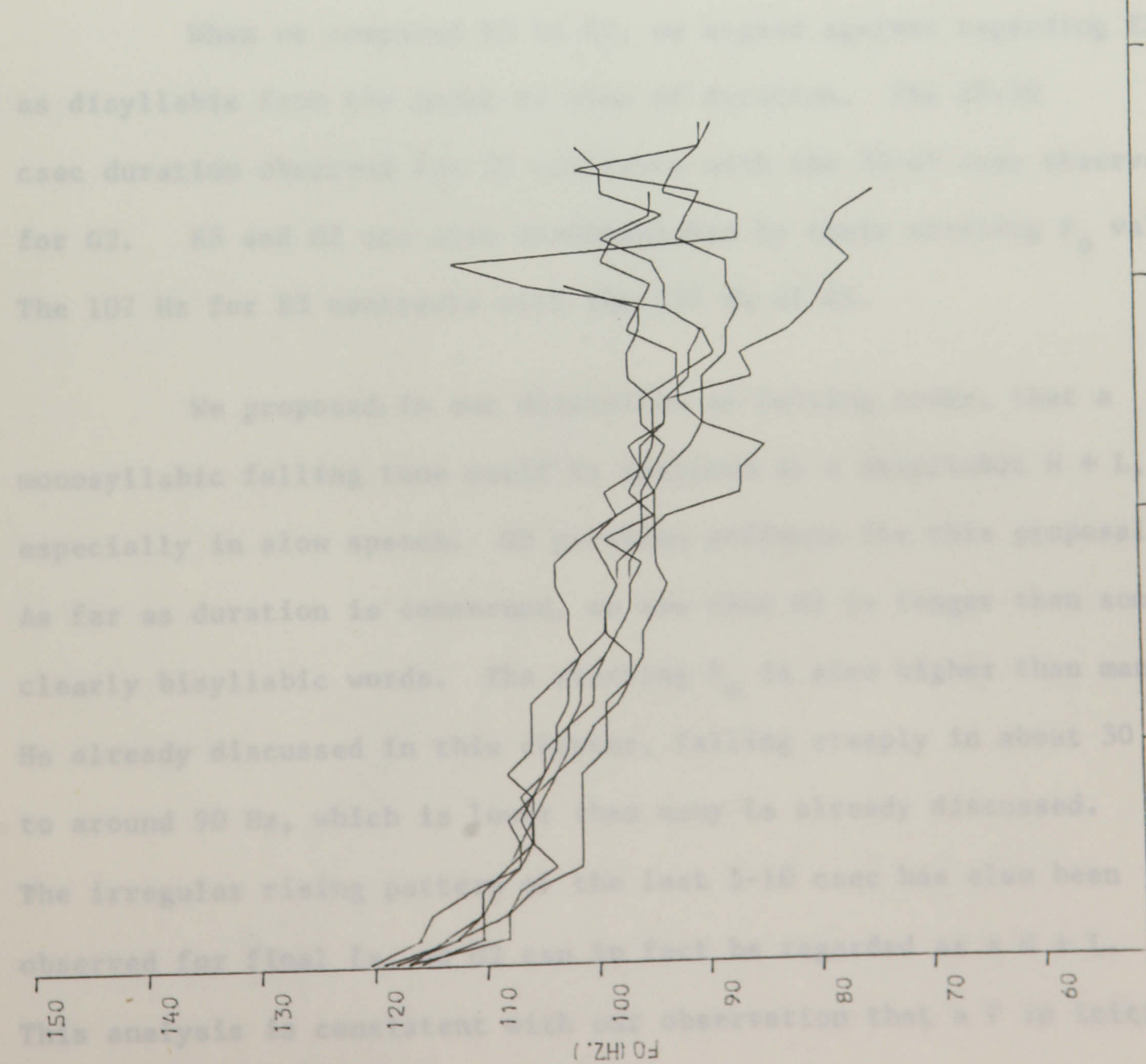


Fig. G 1
 Tone:
 black = low + low

as a phonetic fall, the kind that occurs when two low tones occur adjacently in utterance final position or in isolation, so that phonemically, G1 is a L + L, not a F + L. It should be remembered here that there was no evidence of a F + L in our auditory analysis of tones. The acoustic evidence here in fact appears to support this observation. Although the starting F_0 seems high for a L, it is exactly the same as that recorded for C1, a L + F. This value contrasts with the 125 Hz starting F_0 of A2, a H + H. Note the irregular pattern of the last 5-10 csec, a pattern already observed for other L + Ls. Note also that the duration is similar to those for the other L + Ls in E1-E4.

G2 (F + L) $t \underline{\epsilon \epsilon}$

When we compared E3 to G2, we argued against regarding E3 as disyllabic from the point of view of duration. The 20-30 csec duration observed for E3 contrasts with the 35-45 csec observed for G2. E3 and G2 are also distinguished by their starting F_0 values. The 107 Hz for E3 contrasts with the 128 Hz of G2.

We proposed, in our discussion of falling tones, that a monosyllabic falling tone could be analysed as a disyllabic H + L, especially in slow speech. G2 provides evidence for this proposal. As far as duration is concerned, we see that G2 is longer than some clearly bisyllabic words. The starting F_0 is also higher than many Hs already discussed in this chapter, falling steeply in about 30 csec to around 90 Hz, which is lower than many Ls already discussed. The irregular rising pattern of the last 5-10 csec has also been observed for final Ls, so G2 can in fact be regarded as a H + L. This analysis is consistent with our observation that a F in initial

position is not usually followed by any
word.

W (u/L) fa

These traces are difficult to
statements about W, especially the L. From
from the other traces, we can see that
about 130 Hz, higher than for the highest W. The lowest
trace can be identified for the W because of its relatively
low of 100 Hz, lower than all the top of the L traces, and rising
sharply to about 120 Hz. It is not obvious why these traces are
unusual, but we might suggest here that the higher W traces
L could be the F₂ rather than the F₁ of the conditions mentioned
voicing. Crossings often occur in the tracing that L is traced by
this speaker, so that the traces of the W and L are often
bursts associated with other vowels.

If we ignore the
the W and the L of the W traces, the W traces are
about 120 Hz, and the L traces are
slope of the W traces is
for W than for L. The W traces are
20-30 Hz. This is the same as the
discussed in this paper. The W traces are
monosyllabic, and the L traces are

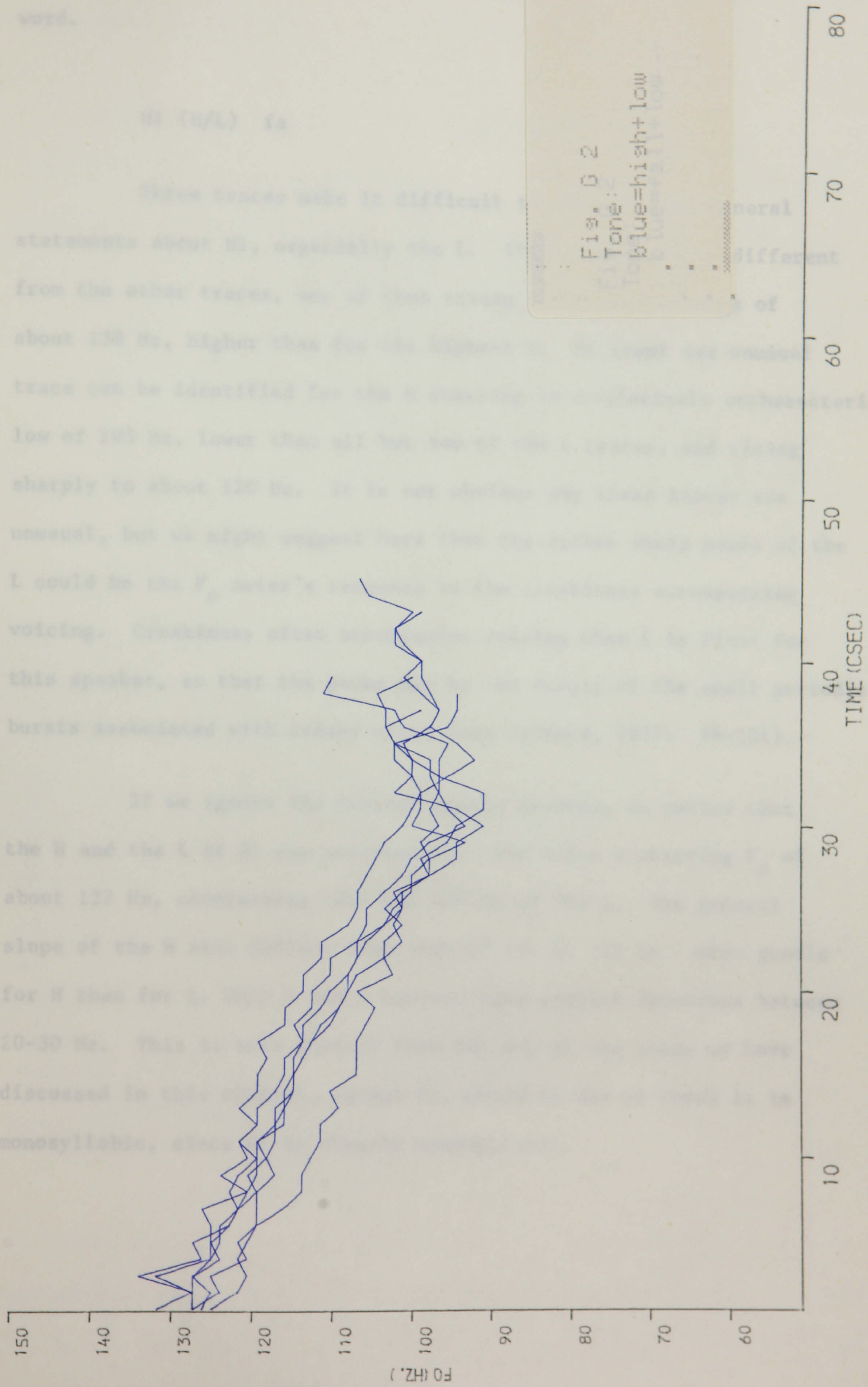


Fig. 0 2
Tone:
blue=high+low

position is not usually followed by any other tone in the same word.

H1 (H/L) fa

Three traces make it difficult to make precise general statements about H1, especially the L. They are radically different from the other traces, one of them rising to an unusual high of about 138 Hz, higher than for the highest H. At least one unusual trace can be identified for the H starting at a relatively uncharacteristic low of 105 Hz, lower than all but two of the L traces, and rising sharply to about 120 Hz. It is not obvious why these traces are unusual, but we might suggest here that the rather sharp peaks of the L could be the F_0 meter's response to the creakiness accompanying voicing. Creakiness often accompanies voicing when L is final for this speaker, so that the peaks may be the result of the small periodic bursts associated with creaky voice (see Catford, 1977: 98-101).

If we ignore the unusual traces however, we notice that the H and the L of H1 are contrastive. The H has a starting F_0 of about 122 Hz, contrasting with the 108 Hz of the L. The general slope of the H also differs from that of the L. It is more gentle for H than for L. Both H and L however have similar durations between 20-30 Hz. This is much shorter than for any of the cases we have discussed in this chapter, except E3, which is why we think it is monosyllabic, since H1 is clearly monosyllabic.

7.5

Based on our analysis of the above...

conclusions can be made:

- (1) Prevoicallis consonant types affect... values are associated with voiceless consonants... associated with voiced ones. Previous studies... relationship has implications for consonant...

The development of contrastive tones in speech is due to the loss of a voicing distinction as obstruents in prevoicallis position, probably the most well documented type of obstruents. When such a development occurs, a relatively lower pitch register develops on vowels following the previously voiced series, and a relatively higher pitch is found after the previously voiceless series. (Rosen, 1972: 78)

- (2) The articulatory quality of vowel segments affects the direction of F_0 perturbation. Closer vowels tend initially to raise F_0 values, and more open and front vowels tend to lower them. This effect is more obvious with difference in vowel height than it is for vowel frontness or backness. It must be emphasized however that the evidence here was anecdotal but not conclusive.

- (3) Different... direction of F_0 perturbation... provide cues for... it raises...

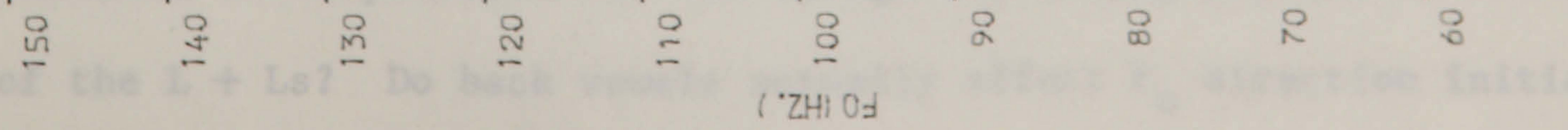


Fig. H 1
Tones:
red=high
black=low

7.5 Based on our analysis of the acoustic data, the following conclusions can be made:

(1) Prevocalic consonant types affect F_0 values. Higher F_0 values are associated with voiceless consonants, and lower ones are associated with voiced ones. Previous studies show that this relationship has implications for tonogenesis:

The development of contrastive tones on vowels due to the loss of a voicing distinction on obstruents in prevocalic position is probably the most well documented type of tonogenesis. When such a development occurs, a relatively lower pitch register develops on vowels following the previously voiced series, and a relatively higher pitch is found after the previously voiceless series. (Hombert 1978: 78)

(2) The articulatory quality of vowel segments affects the direction of F_0 perturbation. Closer vowels and back vowels tend, initially, to raise F_0 value, and more open and front ones tend to lower them. This effect is more obvious with difference in vowel height than it is for vowel frontness or backness. It must be emphasised however that the evidence here was abundant but not conclusive.

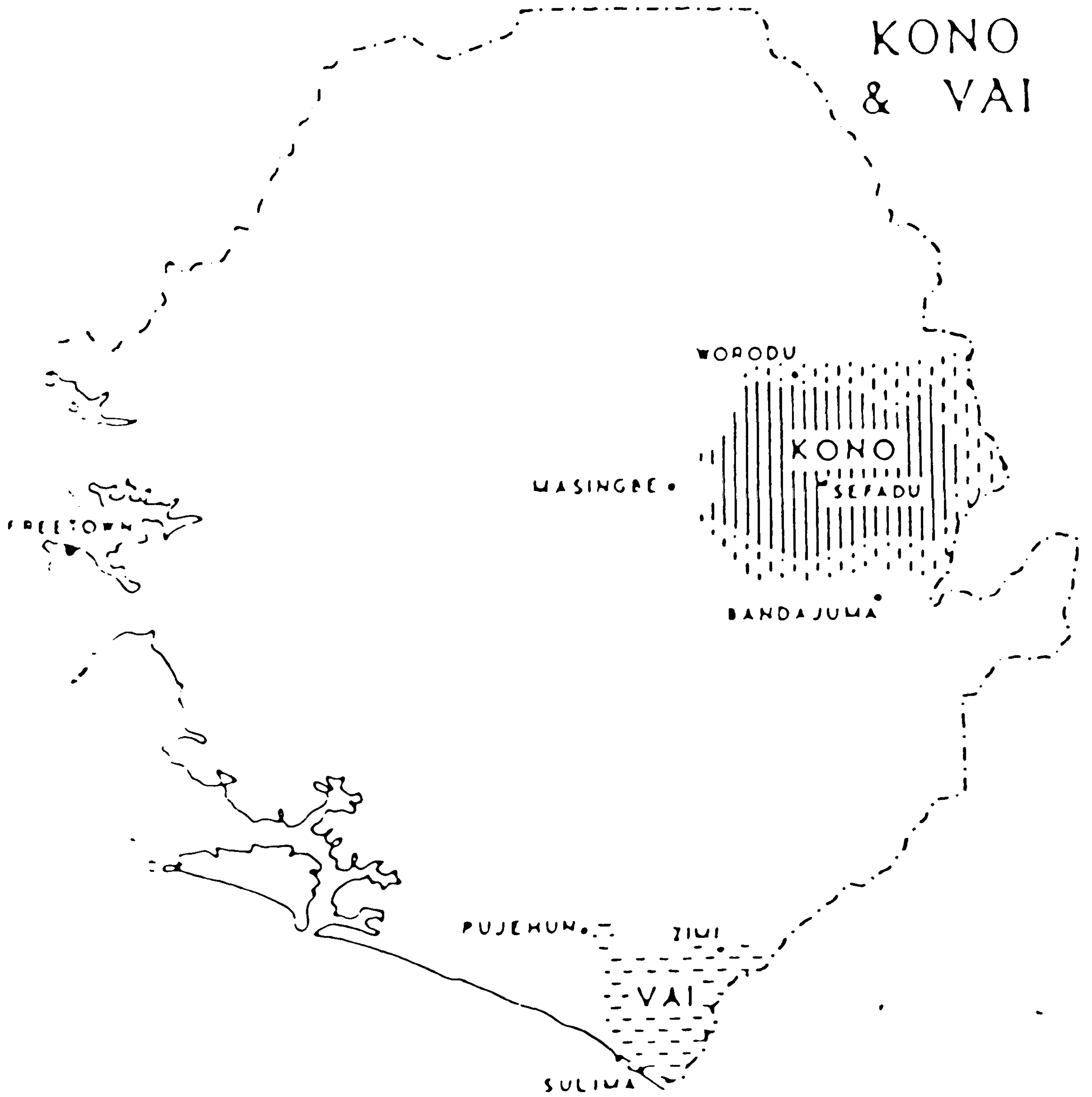
(3) Differences in the value of the average start F_0 , direction of F_0 change, and average duration can provide cues for tonal and syllable contrasts.

Our discussion may have answered some questions, but it raises others which require further investigation. What, for instance is responsible for the irregular, rising pattern at the end of the L + Ls? Do back vowels actually affect F_0 direction initially? And why do L or L + L tones fall faster than H or H + H tones?

A P P E N D I C E S

A P P E N D I X A

DISTRIBUTION OF KONO & VAI IN SIERRA LEONE¹

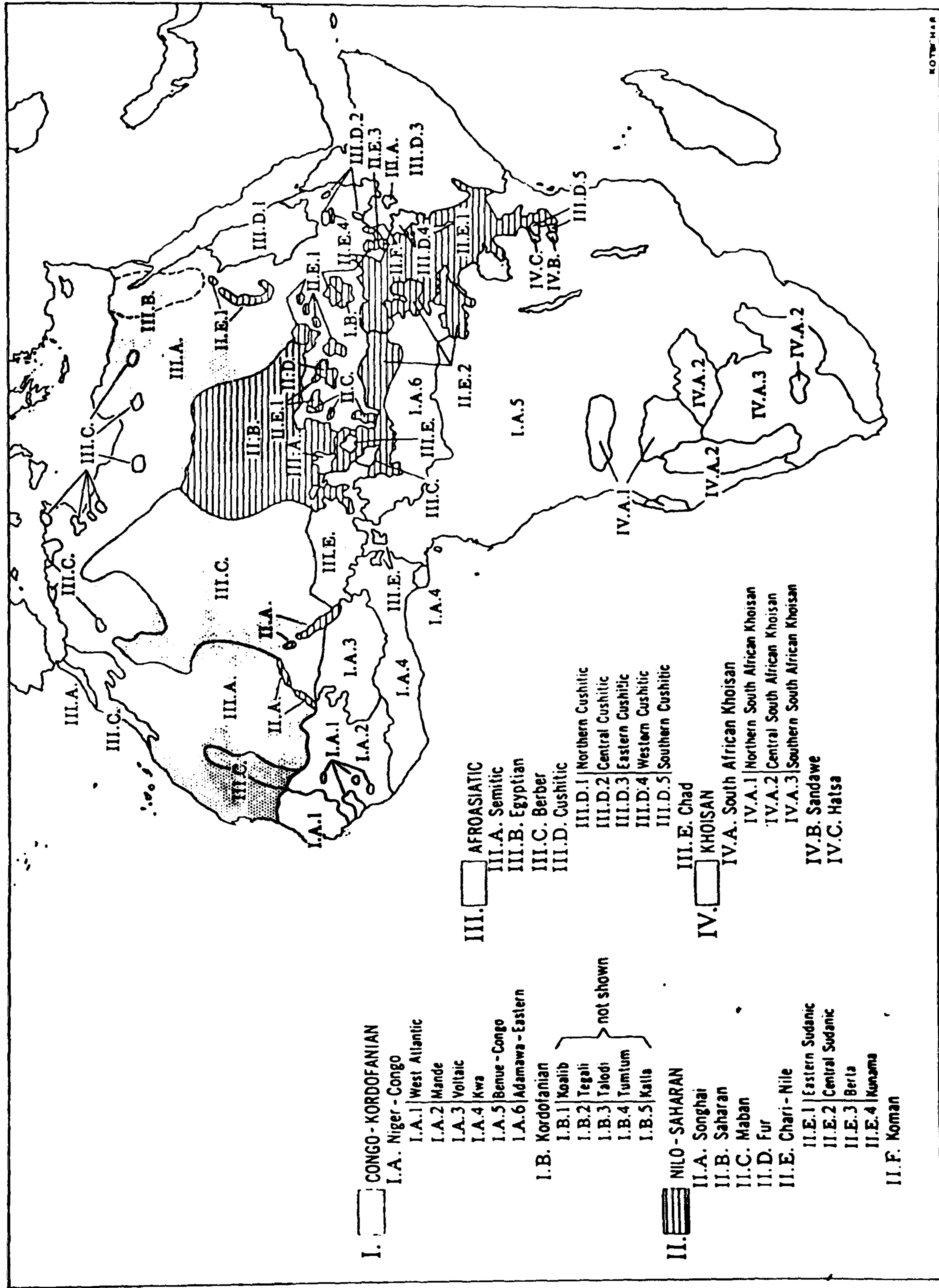


Key: Broken shading around Kono indicates areas of overlap with other languages.

¹ Adapted from T.D.P. Dalby (1966) in Sierra Leone in Maps

A P P E N D I X B

LANGUAGE FAMILIES OF AFRICA 1



NOTES

A P P E N D I X C

WORD LIST

This word list represents part of the data upon which this study is based. Proper names and seemingly obvious loanwords from English have been omitted, although these are included in some of our discussion. The nouns are mainly indefinite forms. In the case of the CV type words, the forms include those we have described in Chapter Six as occurring in adjectival phrases. Alternative pronunciations are in brackets.

CV type words

pī	'a type of leaf'	tu	'to pound, beat'
pa	'scar'	cē	'to be able, arrive, reach'
pu	'overseas, abroad'	cε	'this'
ti	'owner'	cē	'to do'
te	'to break'	kī(cī)	'egg'
tē	'day, sun'	kā	'this way, like this'
tε	'to cut'	ka	'to excuse'
tā	'to go'	kō	'to share with, give'
ta	'drinking vessel'	kɔ	'to scoop up'
tō	'name'	ko	'big, to wash'
tɔ	'remainder'	kpa	'different from'
tō	'to remain, stay behind'	kpe(ɡbε)	'wine'
tū	'oil'	kpō(ɡbō)	'to bear fruit, blossom'

b <u>i</u>	'today'	mb <u>ε</u>	'then'
b <u>e</u>	'to give'	f <u>ī</u>	'soil, earth'
b <u>a</u>	'goat'	f <u>e</u>	'shopping, goods'
b <u>ā</u>	'nucleus, parent'	f <u>ē</u>	'to blow air'
b <u>ō</u>	'to take off/out to get out'	f <u>ā</u>	'to fill'
b <u>ɔ</u>	'mate, companion'	f <u>a</u>	'father'
b <u>o</u>	'excrement'	f <u>ō</u>	'to say'
b <u>ū</u>	'stomach'	f <u>o</u>	'to miss'
d <u>i</u>	'cry'	f <u>u</u>	'brush - for' bathing and washing dishes'
d <u>ī</u>	'sweet'	s <u>ī</u>	'witness'
d <u>ā</u>	'mouth'	s <u>i</u>	'to sit or put down'
d <u>a</u>	'pot'	s <u>ε</u>	'to climb'
m <u>ē</u>	'to be overdue'	s <u>ā</u>	'to <u>lie</u> down'
m <u>ā</u>	'negative particle'	s <u>a</u>	'sheep'
n <u>i</u>	'if'	s <u>ō</u>	'firewood'
n <u>è</u>	'here'	s <u>ɔ</u>	'to stand, bean'
n <u>a</u>	'to come'	s <u>o</u>	'horse'
n <u>ō</u>	'there'	s <u>ū</u>	'witch, boil'
n <u>ī</u>	'nice, beautiful'	s <u>u</u>	'corpse, root'
n <u>ē</u>	'fish'	w <u>ā</u>	intensifier suggesting 'very big'
n <u>ɔ</u>	'corn'	w <u>ū</u>	'you, your (plural)'
mb <u>ī</u>	'I'		
j <u>ī</u>	'water'		
j <u>ɔ</u>	'chain, fetters'		
j <u>u</u>	'rope'		

CVCV type words

p <u>a</u> w <u>a</u>	'pay, reward'	c <u>ε</u> s <u>ε</u>	'vagina'
p <u>ō</u> s <u>ē</u>	'to say pshaw'	c <u>ē</u> w <u>ī</u>	'work'
p <u>ō</u> p <u>ō</u>	'disgrace, shame'	c <u>o</u> m <u>a</u>	'witch doctor'
p <u>u</u> m <u>ɔ</u>	'whiteman'	k <u>ī</u> s <u>ī</u> (c <u>ī</u> s <u>ī</u>)	'termite, to be protected from'
p <u>u</u> t <u>u</u>	'pepper'	k <u>e</u> t <u>e</u> (c <u>e</u> t <u>e</u>)	'snail'
t <u>ī</u> k <u>ī</u>	intensifier suggesting 'very black'	k <u>ā</u> f <u>ā</u>	'cheat'
		k <u>ā</u> f <u>ō</u>	'lightweight'
t <u>ī</u> s <u>ā</u>	'to ask, question'	k <u>ā</u> m <u>ā</u>	'shoulder'
t <u>e</u> m <u>a</u>	'dry season'	k <u>a</u> m <u>a</u>	'elephant'
t <u>ē</u> n <u>ā</u>	'towards'	k <u>ā</u> n <u>ā</u>	'iguana'
t <u>ε</u> t <u>ε</u>	'spider'	k <u>a</u> n <u>a</u>	'to survive'
t <u>ā</u> c <u>ē</u>	'to walk'	k <u>ā</u> n <u>ā</u>	'bilharzia, gonorrhoea'
t <u>ā</u> k <u>p</u> <u>a</u>	'to become difficult'	k <u>a</u> s <u>a</u>	'rust'
t <u>ā</u> w <u>ā</u>	'to cook'	k <u>ā</u> w <u>ā</u>	'leprosy'
t <u>a</u> (j) <u>i</u>	'to be in someone's protection'	k <u>ā</u> w <u>ā</u>	'to admire'
t <u>ō</u> f <u>ō</u>	'confess adultery'	k <u>ō</u> k <u>ō</u>	'very old'
t <u>ɔ</u> s <u>a</u>	'bat'	k <u>ɔ</u> k <u>ɔ</u>	'a type of leaf'
c <u>ī</u> m <u>ā</u>	'cold, fever'	k <u>ɔ</u> s <u>a</u>	'to be argumentative'
c <u>ε</u> b <u>ɔ</u>	'uncircumcised penis'	k <u>o</u> k <u>o</u>	'cocoa'
c <u>ε</u> m <u>a</u>	'hundred'	k <u>ō</u> n <u>ā</u>	'bitter'
c <u>ē</u> n <u>ē</u>	'world, at large'	k <u>ō</u> t <u>ē</u>	'commit adultery'

kōjā	'obedience'	bā(j)ē	'matchete'
kūmā	'on top, above'	bōbō	'a disease affecting skin of the head'
kūnē	'to wake up'		
kūnū	'yesterday'	bōnō	'one's look-alike, double'
kūnē	'to smell'		
kpēkpē	'frog'	bōkpā	'handiwork'
kpēsā	'a variety of rice'	bōnā	'a little extra'
kpεkpε	'comb'	bōsā	'whip'
kpafu	'rice flour'	būmā	'to make/become pregnant'
kpako(gbako)	'elderly person'		
kpākū	'bridge'	dīkpā	'female society official'
kpāmā	'ordinary'	dīkpā	'to compress - the skin'
kpāna	'rice sticking to bottom of pan after cooking'	dīsā	'to apologise, ask for forgiveness'
kpānā	'plier'	dēmā	'palm wine'
kpāsā	'strong, head scarf'	dēmā	'help'
kpōsō	'duty, care'	dākō	'to entertain'
kpūsī	'a type of plant'	dā(j)ī	'spittle'
kpusu	'sauce'	dāwā	'arm'
bēnā	'horn'	dōfō	'insignificant'
bēnε	'benin seed'	dōkpē	'another'
ba fa	'baft'	dōmā	'little, 'small'
bāsī	'a type of tree'	dōmā	'shirt'
		dū(1)ū	'five'
		dūmē	'to ache'
		dūpā	'world, universe'

dūsū	'fibre from bamboo tree'	sunā	'rain'
gbīnī	'Poro spirit'	wɛwɛ	'whisper'
gbētē	'masked devil'	wō(1)ō	'six'
mɛmɛ	'mirror'	wō(1)ā	'forest'
mēsē	'tiny, small'	wōsē	'powdered clay'
māma	'grandparent'	wusa	'Poro official'
-mānā	'ant'	jīfā	'pocket'
mɔ̄kpu	'human being'	jese	'thread'
musu	'woman'	-jāmā	'ugly, bad'
nīmɔ̄	'younger sister or brother in law'	jāsī	'sacrifice'
nīna	'monster'	jawa	'red, to be ripe'
nina	'to forget'	jā(j)ī	'tears'
nima	'beautiful'	jokpa	'potato leaves'
fisa	'better'		CVV type words
fētū	'pineapple'	pɛɛ	'minute one'
fasa	'vein'	pai	'deep end of lake'
fɔ̄nō	'to puke'	tia	'truth'
sīnā	'tomorrow'	tai	'story'
sāma	'rainy season'	taa	'to creep'
sawa	'three, law'	tōō	'ear, jealous'

ci <u>a</u> (ce <u>a</u>)	'ring'	bū <u>ū</u>	'horn - for blowing'
cē <u>ē</u>	'to call'	bu(1) <u>i</u>	'anus'
c <u>εε</u>	'to war, be trapped'	b <u>u</u> a	'beard, ash'
kē <u>ē</u> (cē <u>ē</u>)	'but'	d <u>e</u> e	'to shout at'
kā <u>ā</u>	'gun'	d <u>e</u> a	'lizard'
ka <u>a</u>	'snake'	d <u>εε</u>	'rice flour, to grip with intent to fight'
kā <u>ī</u>	'to pick'		
kā <u>ū</u>	'moon'	dū <u>u</u>	'to bend'
k <u>ɔɔ</u>	'rice'	dū <u>ā</u>	'to bless'
kō <u>o</u>	'to be obedient'	du <u>a</u>	'hernia'
kū <u>u</u>	'bone'	g <u>bo</u> o	'padlock'
ku <u>u</u>	'buttocks'	m <u>εε</u>	'knife'
kp <u>ii</u> (g <u>bi</u> i)	'pumpkin'	ma <u>a</u>	'banana'
kp <u>ee</u> (g <u>be</u> e)	'path'	ma <u>i</u>	'fibre from palm tree'
kp <u>ā</u> i	'trap'	ma <u>u</u>	'to be ashamed'
kp <u>oo</u>	'book, skin, paper, oath'	m <u>ɔɔ</u>	'except'
kp <u>ū</u> u	'swell'	nī <u>ī</u>	'life'
bi <u>i</u>	'(newly) circum-sised male'	nā <u>ī</u>	'glue'
bi(j) <u>a</u>	'catch'	n <u>ɔɔ</u>	'female society official'
ba <u>i</u>	'word'	fi <u>i</u>	'to miss someone'
bō <u>o</u>	'hand'	fī(j) <u>ā</u>	'bush'
		fi(j) <u>a</u>	'breeze'
		fe <u>a</u>	'two'

f <u>ε</u> ε	'winnowing basket'	pā̄ŋ	'there'
fēī	'lacking in, in great want'	tī̄ŋ	'to jump'
fāā	'savanna'	tē̄ŋ	'to step on'
f <u>a</u> a	'heart'	tā̄ŋ	'ten'
f <u>a</u> i	'crocodile'	tāŋ	'to meet'
f <u>o</u> o	'a variety of fish'	tā̄ŋ	'to straighten'
s <u>ε</u> ε	'a musical instrument'	tō̄ŋ	'to lock'
sēī	'urine'	tū̄ŋ	'palm kernel oil'
w <u>i</u> i	'blood'	cī̄ŋ	'to bite'
w <u>ε</u> ε	'a type of bird'	cē̄ŋ	'house'
wēī	'work, thorn'	kēŋ	'a type of musical instrument'
w <u>ε</u> i	'a type of game'		
w <u>a</u> i	'a type of bird'	kāŋ	'to level, equal'
w <u>o</u> o	'to become mad'	kā̄ŋ	'to learn, teach'
w <u>u</u> u	'dog'	kō̄ŋ	'tree'
wūū	'short'	kūŋ	'head'
jāā	'groundnut'	kū̄ŋ	'to groan'
jaa	'lion, hammock'	kpē̄ŋ	'to become erect - male sex organ'
CVN type words		kpē̄ŋ	'to get rid of, to chase away'
pē̄ŋ(pō̄ŋ)	'first'	kpā̄ŋ	'to become stuck, unable to move out'
p <u>ε</u> ŋ	'to call attention by pulling at'	bī̄ŋ	'bed'

bēŋ	'to pass'	ŋaŋ	'to become rich, make'
bāŋ	'to finish'	ŋōŋ	'who'
baŋ	'to refuse'	fīŋ	'black'
bōŋ	'to spill'	fēŋ	'what'
bōŋ	'to stone'	fēŋ	'to sow'
būŋ	'to cover with'	fēŋ	'to look'
dīŋ	'to press, squeeze'	sīŋ	'to rub'
dēŋ	'child'	seŋ	'stone, rock'
dēŋ	'to hang'	sēŋ	'farm'
dāŋ	'to count, believe'	sēŋ	'to sharpen'
dōŋ(da u ŋ)	'to eat'	sōŋ	'to know'
dōŋ	'intensifier, suggesting absolute quiet!'	sōŋ	'character, habit'
mīŋ	'to wrap'	sōŋ	'coitus'
mēŋ	'to abuse'	sōŋ	'hole'
māŋ	'to light'	sūŋ	'nose'
maŋ	'left hand'	suŋ	'to give birth'
mūŋ	'to turn'	wēŋ	'a type of bell for dancers' feet'
nyŋ	'gut, intestine'	jēŋ	'to laugh at)'
nyŋ	'to hide'	jaŋ	'to look for, search'
niŋ	'tooth'	joŋ	'slave'
ŋēŋ	'to write'	jōŋ	'to spoil, to become poor'
ŋāŋ	'to scratch, bird's nest'		

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