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Lindsey, Geoffrey Alan

INTONATION AND INTERROGATION: TONAL STRUCTURE AND THE EXPRESSION OF A PRAGMATIC FUNCTION IN ENGLISH AND OTHER LANGUAGES

University of California, Los Angeles PH.D. 1985

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UNIVERSITY OF CALIFORNIA

Los Angeles

Intonation and Interrogation:
Tonal Structure and the Expression of a Pragmatic Function
in English and Other Languages

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Linguistics

by

Geoffrey Alan Lindsey

1985

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The dissertation of Geoffrey Alan Lindsey is approved.

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for

Tom and Betty Lindsey

my beloved parents

"Die Tonsprache ist Anfang und Ende der Wortsprache, wie das Gefühl Anfang und Ende des Verstandes, der Mythos Anfang und Ende der Geschichte, die Lyrik Anfang und Ende der Dichtkunst ist."

Richard Wagner, Oper und Drama

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ABSTRACT OF THE DISSERTATION

Intonation and Interrogation:

Tonal Structure and the Expression of a Pragmatic Function

in English and Other Languages

by

Geoffrey Alan Lindsey

Doctor of Philosophy in Linguistics

University of California, Los Angeles, 1985

Professor Robert P. Stockwell, Chair

There is little consensus regarding the issues of what the semantic effects of intonation are, and how these effects are achieved; likewise, relatively little effort has been made to compare the form and function of intonation in different languages.

This dissertation attempts to set up a framework in which both lacunae may be remedied. Chapter One gives an account of the function and the form of intonation in English. The semantic analysis makes crucial use of the notion of an interpretive continuum between relatively iconic and relatively conventionalized levels of meaning, and so reconciles seemingly incompatible previous work on intonational

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semantics; the formal analysis, while building on earlier advances by Pierrehumbert, Ladd, and others, proposes revisions and attempts to arrive at an inventory of the tonal devices which are available to languages for semantic/ pragmatic use.

For comparative purposes a single semantic/pragmatic function (or 'π-function') is chosen, namely interrogativity. Chapter Two describes the interaction of tonal devices and yes-no interrogation in English, and examines implications for other languages.

Chapter Three considers the tone language Hausa, and finds that all of the kinds of tonal device found in English are also present there, and moreover that most of them are used in the expression of the declarative/interrogative distinction; a similar state of affairs is found in the pitch-accent language Luganda.

Chapter Four looks at Cherokee. The first analysis of its pitch-accent system is outlined, and the same tonal devices are again found, though not primarily as markers of interrogativity, which Cherokee expresses morphosyntactically.

We conclude that the definition of intonation as the use of tonal devices to express π-functions is accurate, insightful, and allows cross-linguistic similarities and differences to be captured appropriately.

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0. Introduction

The last ten years have seen a considerable growth in interest in the study of many different aspects of intonation. Linguists in the generative tradition have begun to take an interest in intonation beyond the discussions of sentence stress and focus in Chomsky 1971 and Jackendoff 1972: the development of autosegmental phonology and of metrical phonology both resulted in contributions to the study of English intonation, for example Leben 1976 and Liberman 1975, respectively. Pierrehumbert 1980, building on Liberman's work, gives a rigorous account of the phonology of English intonation and its phonetic interpretation, while Selkirk 1984 is concerned (among other things) with fitting intonation into an overall grammar, specifying the organization of intonational phonology with respect to both phonetic and semantic interpretation.

Phoneticians around the world have been hard at work providing intonational models for a variety of languages. Fujisaki and Gårding 1982 gives an overview of the breadth of this work.

At the other end of the linguistic spectrum, linguists have been investigating the meaning and function of intonation in new and

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interesting ways, for instance Brazil 1975 and 1978, Cruttenden 1981, Pakosz 1982a, 1982b and 1983, and Gussenhoven 1983. Ladd (e.g. 1980, 1983), has contributed to intonational semantics within more general work on intonation and Bolinger (e.g. 1982b) has continued to work on the function of intonation.

Perhaps surprisingly, much of this work seems to have been conducted in a vacuum, in that relatively little consensus has been reached amongst these intonologists; nor have several rival "schools" emerged. Increasingly, linguists (e.g. Ladd, Gussenhoven) have adopted the autosegmental notation of Liberman 1975 and Pierrehumbert 1980, but without necessarily adopting the rest of their frameworks. Phonetic models have often been concerned with generating the facts of the particular language at hand (while the other work mentioned above has been almost exclusively on English). And accounts of intonational meaning vary widely, from the almost purely iconic (Bolinger 1982b) to the almost purely morphemic/conventional (Gussenhoven 1983).

Is this to say that many of the various results achieved have been in vain, that adopting the work of one intonologist precludes utilizing that of another? It is the aim of the present work to answer that question in the negative, to attempt a framework in which the best of the recent

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research may be synthesized. This is not to say that the present study intends to be comprehensive; there is relatively little discussion of phonetic modeling, and no attempt to fit the picture of intonation outlined here into a single, particular model of grammar.

On the other hand, however, we intend to lay a foundation which is novel in two respects. Firstly, it attempts to give a full account of the components of intonation, the units of formal description and the full range of the ways in which they may be semantically interpreted. Secondly, it attempts to be non-language specific: intonation is defined as no more than the intersection of a set of phonological (specifically tonal) structures and a set of semantic-pragmatic functions (here termed "π-functions"), both sets being universal. The extent to which π-functions are realized by tonal structures varies considerably across languages. A language, it is claimed, may be relatively non-intonational to the extent that it realizes π-functions by other than tonal means; on the other hand, a language like English demonstrates a rather extensive intersection of tonal structures and π-functions. English is thus intonationally rich; we hypothesize that one reason for the emphasis of intonational studies on English is precisely this language specific fact.

The first of these avenues of research will be pursued exclusively

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with respect to English; Chapter One discusses English intonation (its tonal structures and their semantic interpretation), and proposes a tonal grammar à la Pierrehumbert 1980, including some modifications along the lines of those proposed in Ladd 1982, Lindsey 1983 and Gussenhoven 1983. A theory of the semantic interpretation of English intonation is outlined, making crucial use of the notion of a semantic continuum between relatively iconic and relatively conventional meanings.

The second of the two avenues of research necessitates looking beyond English. Moreover, since it would be impractical to attempt analyses not only of all the tonal structures of a set of languages but also of all their semantic-pragmatic functions (and the various markings of these), one particular π-function has been selected for comparison: interrogativity, specifically the "yes-no" question. Chapter Two comprises an exploration of interrogativity in English, from an intonational standpoint.

The two following chapters move beyond English. Chapter Three investigates the tone language Hausa in the light of the preceding discussion. Focusing primarily on interrogativity, we will discover certain similarities between Hausa and English with respect to the realization of that π-function (optionally tonal in English, obligatorily so

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in Hausa) and to some particular tonal structures found in both languages (specifically, the Boundary H tone proposed for English by Liberman 1975, Pierrehumbert 1980 and others, the features [delayed peak] and [raised peak] first proposed by Ladd 1983, and probably universal global features of overall range and slope).

Chapter Four investigates Cherokee, which is found to be more divergent from English: interrogativity is not primarily realized tonally, but rather by means of a wide range of clitics which formally distinguish types of yes-no questions not so distinguished in English. However, both the Boundary H and the [delayed peak] feature are again present, although not as realizations of π-functions.

Chapter Five articulates the conclusions of the thesis: that advances in the phonology and semantics of English intonation may be reconciled, as in the intonational grammar of English proposed here, and that the facts of English, Hausa and Cherokee (and other languages) may be taken to support the universality both of tonal structures of the kind adopted here (and the commonness of the specific tonal structures discussed in detail) and also of π-functions such as interrogativity. The definition of intonation as merely the intersection of tonal structures and π-functions is taken to be accurate, insightful and of use for future work on the

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intonation of English and other languages.

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1. English intonation: tonal structures and their semantic interpretation

1.1 Tonality, tonicity, and tone proper

Intonation is, we claim, the use of the tonal component of a language's phonology for the expression of various semantic/pragmatic functions. It would appear that all languages have a tonal component, and the range of semantic/pragmatic functions is largely constant across languages, yet the extent to which languages use the former component for the expression of the latter functions varies considerably.

This chapter is concerned with the tonal phonology of English, and how it used to convery various kinds of meaning. What is the organization of this tonal phonology? According to Halliday 1967 (p. 18):

> ...in any utterance in English three distinct meaningful choices, or sets of choices, are made which can be, and usually are, subsumed under the heading of "intonation". These are: first, the distribution into tone groups -- the number and location of tone group boundaries; second, the placing of the tonic syllable... the location, in each tone group, of the pretonic and tonic sections; third, the choice of primary and secondary tone I propose to call these three systems "tonality", "tonicity" and "tone".

For example, a speaker may choose to divide the utterance The king of France is dead into two phrases ('tone groups', in Halliday's

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terms), a choice of 'tonality':

(1)

The king of France | is dead

Within each phrase, the speaker chooses a syllable to bear greatest prominence, a choice of 'tonicity':

(2)

The KING of France | is DEAD

Lastly, the speaker chooses the particular shape of the pitch prominence accorded to each prominence, a choice of 'tone'; for example[1]:

(3)

The ˇKING of France | is ˋDEAD

The extent to which it is desirable to subsume all three systems under the heading 'intonation' is not immediately clear. 'Tonality', the question of phrasing, is no more intimately related to the meaningful use of vocal pitch than it is to syntax, for example. The assignment of tonal structure to a string presupposes the assignment of phrasal boundaries, but the choices are quite independent: we may (and to some extent must) indicate phrasing orthographically by means of punctuation, without making any commitment whatsoever to particular tonal patterns.

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Likewise, while (as Bolinger 1955 and Fry 1955 showed) pitch is the overriding cue (or embodiment) of stress, 'tonicity' (or 'sentence stress', i.e. the use of prosodic means to add prominence to constituents for the purpose of structuring information content) is quite distinct from the semantic contribution made by particular tonal structures (Halliday's 'tone').

Selkirk 1984 devotes considerable attention to the distinction between tonicity and tone, although she concludes (unnecessarily, as we will see) that rules concerning tonicity need to refer to properly tonal material. Our opinion is that, whether one decides to use the label 'intonation' to refer to all three of Halliday's systems or simply (as we will use it) to refer to the system of 'tone' (as it is used to express certain semantic/pragmatic functions), it is nonetheless possible to show that 'tone' is quite autonomous, although tonal structure must of course be mapped onto the metrical and phrasal structure of a phonological string.

Selkirk, like Halliday, claims (pp. 197-8) that intonational structure

> involves three things. First, it involves the intonational phrasing of the sentence, the division of the sentence into one or more intonational phrases... Second, intonational structure involves the particular intonational contour of each intonational phrase... Third, the intonational structure of a

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> sentence involves the assignment of pitch accents to the words of the sentence...

She does however distinguish the second component (Halliday's 'tone') from the first and third components ('tonality' and 'tonicity', respectively), on semantic grounds. She distinguishes two kinds of intonational meaning, the 'expressiveness' component and the 'informational structure' or 'focus structure' component, and observes that, "Of the three aspects of a sentence's intonational structure, the one that contributes most obviously to its expressiveness is its (sequence of) intonational contours" (p. 199); she further elects not discuss considerations of expressiveness. We will follow Selkirk in making these distinctions, restricting our attention on the other hand to properly tonal considerations, for the most part. In fact, we contend that these are still more separable from the tonicity issue than Selkirk allows (with one reservation, to be discussed below).

Selkirk's major innovation in her work on the relationship between intonation and stress (relative to the generative tradition of which her study is a development) is the claim that intonation 'comes first'. Specifically,

> ...the stress-relevant tonal elements (which, following Pierrehumbert 1980, we take to be the pitch accents of the intonational contour...), are assigned to words in surface

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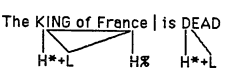
> structure regardless of (and indeed prior to the establishment of) phrase stress patterns, and... phrase stress patterns are defined partly as a function of the location of pitch-accent- bearing words in the sentence.

The Pitch Accent Prominence Rule (PAR) gives greater rhythmic prominence to pitch accented words; it overrides the Nuclear Stress Rule (NSR), but if there are no pitch accents, the NSR applies. Moreover, it is pitch accent assignment rather than phrase stress patterns that is directly related to the focus structure of a sentence.

But is it necessary to let rules of either metrical structure or focus structure refer to tonal properties? It would appear that it is not. Selkirk has in fact seized upon the term 'pitch accent' and extended it into a truly accentual sense not implied in Pierrehumbert 1980. There, pitch accents are tonal entities, consisting of either one tone (e.g. H*) or two conjoined tones (e.g. H*+L), and distinguished by bearing a star (asterisk), which marks the starred tone for association with a metrically strong syllable. For example, we might represent (3) above in Pierrehumbert's notation (slightly modified in ways to be discussed in section 1.4 below):

(4)



(H% represents a tone aligned with a boundary.)

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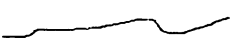
Note that a syllable is designated as strong prior to the assignment to it of a pitch accent (in this respect, the theory resembles that of Bolinger, for whom pitch accents are realizations in vocal pitch of preexistent 'abstract' stresses). Selkirk's innovation is to allow the (free) assignment of pitch accents to syllables to determine (partially) the prominence patterns of a string. Her intuition is, of course, sound: that speakers may freely assign prominences to syllables regardless of the default ('normal') stress pattern predicted by the metrical phonology, and that there is moreover no such thing a 'normal stress' pattern for a given phrase.

This point, however, is quite independent of tone. The speaker of The king of France is dead, having decided to assign prominences to king and dead, may choose the tonal pattern shown above, or any other, without affecting the prominence relations and focus structure:

(5)

(6)



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(7)

The ˋKING of France | is ˇDEAD

Even Selkirk concedes (p. 200) that, "As for the choice of intonational contour (the choice of particular elements from the tonal repertoire), it appears that, in English at least, this is irrelevant to focus structure." There is in fact no need for that part of the phonology which determines prominence relations to refer to intonation proper (tonal structure). Prominences may be freely assigned without regard to tones: notationally, we may simply replace Selkirk's pitch accent assignment with 'star assignment', assigning prominences freely to constituents of word size or smaller, provided that the constituent in question is a focus (see Selkirk 1984 for the remainder of the analysis). The stars on the pitch accents may then be thought of in Pierrehumbert's original terms, as diacritics marking tones for association with starred (prominent) syllables, rather than as truly accentual entities which assign prominences.

Selkirk seems to consider it attractive to mix tonal and accentual processes (p. 269):

> The choice of pitch accent is (apparently) not relevant to focus structure and the old/new informational content of an

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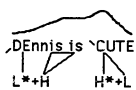
utterance, but it is relevant to expressiveness. A pitch-accent- first theory would therefore allow all aspects of intonational meaning to form part of one and the same level of representation -- the surface structure. This would seem to be a desirable result.

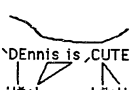
What matters, however, is that tone is autonomous, both formally and functionally. The one reservation alluded to above is in the role which tonal choices play in scaling degrees of prominence (as Fox 1985 and Pakosz 1982a and 1982b have shown). Consider the following:

(8)



Both Dennis and cute have been assigned prominences ('accented'), making them eligible for pitch accents (starred tones): here, L*+H and H*+L respectively. Accordingly, by Selkirk's system, both words may be interpreted as foci[2]. But now consider:

(9)



The tonicity and focus structure remain constant, but the relative prominence of the foci has reversed. Both utterances pick out and

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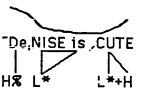
balance two concepts ('Dennis' and 'cuteness'), but whereas in (8) 'Dennis' is much more likely than 'cuteness' to have been given in the preceding discourse or to be presupposed, the reverse is true of (9). Compare these with:

(10)



This has the same overall contour as (9), but the final stress on Denise shows that the contour represents a different set of tonal choices. Specifically, the high fall at the beginning now represents not H*+L (which is potentially 'nuclear', in that it may stand as the final element of a phrase's contour), but a high prehead (initial H%) plus a single-toned pitch accent L* (which is not potentially nuclear, due to the Nuclear Contour Principle to be stated in section 1.4). The relative prominence of the foci is closer to that of (8) than to that of (9), despite the superficial similarity of the contour to (9)'s; however, in (10) there is a greater likelihood that neither of the two concepts in question is entirely new: it might be a response to the assertion Denise [overtly given] doesn't have one good quality ['cuteness' implicitly given].

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The important conclusion to which these facts lead us is not that tone proper determines focus, but rather that different tonal configurations bring differing degress of attitudinal strength or force to the constituents with which they are associated ('filtering out' for present purposes the semantic contribution made by the opposition between rising and falling terminations); the precise nature of this hierarchy of attitudinal strength will be discussed later in this chapter. Accent (or 'prominence' or 'tonicity') may be an all-or-none property, but the emotional force connected with tonal choice is gradient. Thus tone in English is crucially distinct from phrasing ('tonality') and accent ('tonicity'), although it must be mapped onto phrasal and accentual structure just as it must be mapped onto morphosyntactic structure. In the remainder of this work, the term 'intonation' will be primarily used to refer, at the phonological level, to tone proper.

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1.2 Units of intonation: morphemes vs. icons

The question of what the basic bits and pieces of intonation are is intimately related to the question of intonational meaning. The impression of Pierrehumbert 1980 (p. 30) is that "the meaning of the contours is in general compositional from the pitch accents, phrase accent, and boundary tone" of her system. For Liberman 1975, however, the basic intonational unit might be said to be the metrical tree: intonation contours are holistic entities stored complete with metrical structures (although these may be in some sense be segmented into the tones at the terminal nodes of the tree structure in question), in an intonational lexicon.

For Gussenhoven 1983, intonation "is a system of morphemes and of rules that operate on those morphemes to produce well-formed surface structures" (p. 5); an intonational 'fall' is a morpheme, a minimal unit of meaning, even though it may be segmented into H + L as tea might be segmented into /t/ + /i/. Likewise for Selkirk 1985, intonation is essentially morphemic, although her morphemes are precisely the pitch accents of Pierrehumbert's system, but assigned to words by the morphology, like affixes. As we have seen, however, Selkirk is hesitant to discuss what she calls the "expressive" meaning of intonation,

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restricting herself (Selkirk 1984) to the issue of focus and information-structure, so that a pitch accented constituent is assigned a focus.

Bolinger 1982a hypothesizes that "the basis for intonation is binary and iconic: it is a succession of tensions and relaxations, modified by rate and extent, which are symbolic -- or symptomatic -- of internal states (real or feigned" (p. 526), and according to Bolinger 1982b, "the ups and downs of intonation are fundamentally the opposition of strain and rest, of tension and relaxation"; accordingly, Bolinger prefers to represent intonation contours directly, with textual illustrations rising and falling on the page in imitation of vocal pitch movements (Bolinger's A, B, and C accents are not definitive of the intonation contour, but rather representations of the contrasting ways in which lexical stresses may be realized).

In all these instances, the intonational units posited (including the 'up' and 'down' which define the ends of Bolinger's gestural continuum) embody claims about the way in which intonation means what it means. We can detect, in fact, a dichotomy in the literature between analyses which, broadly speaking, treat intonation as relatively morphemic and conventional (represented most extremely by Gussenhoven 1983) and

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those which treat intonation as relatively iconic and ideophonic (represented most extremely by Bolinger 1982a and 1982b).

Bolinger 1982a is in fact an attack upon the notion that intonation contours may be considered as holistic entities with unitary meanings, and succeeds in pointing out the compositional aspects of the meaning of utterance-length tunes. The main body of his argument concerns the proposed 'contradiction contour' (CC) of Liberman & Sag 1974 and Sag & Liberman 1975, as exemplified by the now-famous:

(11)

This sentence is obviously rather contradictory regardless of its intonation, but the claim is that the tune is itself contradictory. Bolinger shows that 'contradiction' is neither a sufficient nor a necessary characterization of the tune's meaning. For example, a quite different contour might be chosen without detracting from the contradiction:

(12)

On the other hand, Bolinger gives examples of non-contradictory sentences which may be uttered quite comfortably with the CC; here are

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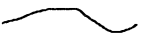
some of his suggestions (including non-declaratives):

(13)

(14)



(15)

(16)

Bolinger's position is that the CC's meaning is entirely compositional, the contribution of each part rooted in the gestural symbolism mentioned above. His analysis of the CC is as follows:

> (a) Initial rise, cueing the hearer to the concern, interest etc. of the speaker.
> (b) High pitch on an unaccented syllable, marking the concern etc. as 'broad focus', i.e. applying to the utterance as a whole.
> (c) Immediately succeeding stepped or gradual fall, showing the tension to be under control, and therefcre intended.
> (d) Accented syllable at low pitch, de-emphasizing the referent of the word and contributing to the restraint of the down-motion.
> (e) Terminal rise, leaving the utterance 'open' to further comment or to continuation within a larger utterance. The

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> gradient extent of the terminal rise augments the effect of the initial rise.

This is all intuitively appealing, but how might we extend this form of analysis to other intonation contours? What are the principles of semantic interpretation which underly this analysis? Lindsey 1981 proposes three interpretive parameters (p. 18):

> high pitch tends to indicate interest and involvement on the part of the speaker, while low pitch tends to indicate the opposite (just as greater or lesser loudness will imply greater or lesser involvement); great variation in pitch over a given utterance tends to indicate stronger emotions on the part of the speaker, while a monotone tends to indicate less emotion (just as greater or lesser variation between loudness and softness would imply much the same); and direction at the end of the utterance towards or away from low pitch, which I take to be in some sense 'neutral', tends to indicate completeness or incompleteness of a sentence or a topic or an idea.

Independently, Pakosz 1982a (and 1983, from which the former is derived), proposed several principles by which contours may be evaluated in terms of a single scale of 'strength'. This scale corresponds to the 'Activity' dimension used by psychologists in the classification of emotions (the other dimensions in the most common model being 'Evaluation', i.e. pleasant vs. unpleasant, and 'Control', i.e. active/intentional vs. passive/unintentional), the Activity dimension being, as Pakosz shows, the only one relevant to intonation. Four of Pakosz' principles are as follows (couched in the terms of the British

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school of intonational analysis, where a 'nucleus' is the tonal pattern of the last accent in a phrase, and a 'head' is the prenuclear stretch of the contour):

> Principle 1 Given any two intonation patterns with identical nuclei preceded by static heads, the strength potential of the pattern with wider pitch interval following the head, is to be judged higher than that of the pattern without such interval.
> Principle 2 Given any two intonation patterns with identical nuclei preceded by a level and a non-level head, respectively, the strength potential of the pattern with the non-level head will override that of the pattern containing the level head.
> Principle 4 Given any two intonation patterns where one contains a simple nuclear tone and the other its complex counterpart, the pattern with the complex nucleus will be placed higher on the strength scale.
> Principle 5 Given any two intonation patterns whose nuclear tones display the same direction of pitch movement and the same range, but which differ with respect to the pitch height of their starting points, the pattern containing the higher placed nucleus will also rank higher in its relative strength potential.

Principle 5 clearly corresponds to the first of the parameters of Lindsey 1981 given above, while Principles 1, 2 and 4 follow from the second parameter. With regard to the third parameter, Pakosz concedes (p. 166) that strength potential "does not completely determine the meaning of the pattern, but specifies its semantic potential together with the value of the nucleus derived from its directionality"; and he entertains some values posited for the falling-rising opposition, such as 'finality -

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non-finality', Jassem's 'proclamatory - evocative', and Brazil's 'proclaiming - referring'. Pakosz' analysis of intonation thus rests on two dimensions, the strength dimension and the rising/falling opposition. In this respect it differs from Bolinger 1982a, where apparently even the rise/fall opposition is to be seen as boiling down to the binary opposition of 'strain' (high) and 'rest' (low). We shall return to this issue.

Pakosz' remaining (third) principle is more questionable than the others:

> Principle 3 Given any two intonation patterns with identical nuclei preceded by an ascending and a descending head, respectively, the strength potential of the pattern exhibiting an 'endocentric' relation in the direction of pitch movement that obtains between the head and the nucleus, will be greater than the potential of the pattern displaying 'exocentric' relation of such movement.

Pakosz uses 'endocentric' and 'exocentric' in the sense of Crystal 1969: a sequence of pitch movements is 'exocentric' if it entails a skip in pitch between one movement and the next (e.g. fall + fall, rise + rise), but 'endocentric' if the overall pitch movement is smooth (e.g. fall + rise, rise + fall). However, while Pakosz' examples are representative of his principle, other examples demonstrate the contrary; endocentricity is simply overridden by the other principles in determining strength. Consider:

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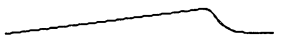
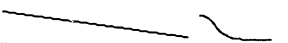
(17a)

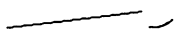


(17b)

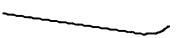


Pakosz correctly observes that (17a) is more forceful than (17b), but with a rising nucleus the reverse seems to be true:

(18a)



(18b)



The exocentric contour in (18a) seems emotionally more aroused than the endocentric contour in (18b). The correct conclusion seems to be that rising heads are stronger than falling ones. This would certainly seem to accord with Bolinger's theory: a rising head is a gradual increase in tension, while a falling head is a gradual relaxation. This fact is interesting insofar as it indicates that the direction in which a contour moves over time is relevant to its strength (as distinct from the 'finality - non-finality' of its final termination). According to Pakosz' principles 1, 2, 4 and 5 (and the first two parameters of Lindsey 1981 to which they

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correspond), the strength of a contour could be quantified reading either from left to right or from right to left; in fact, it seems that overall direction of movement is relevant too. We term this the principle of Temporal Relevance: that where a contour is going carries more weight than where it is coming from.

To summarize our findings on intonational strength, let us rephrase the first two interpretive parameters of Lindsey 1981:

(19) Parameter 1 Ceteris paribus, high pitch is stronger than low pitch.

Parameter 2 C.p., pitch movement is stronger than level pitch.

We might tentatively add a third (in place of Pakosz' principle 3): "C.p., an overall rise is stronger than an overall fall." This, however, falls directly out of the conjunction of Parameter 1 and Temporal Relevance.

Is this to say that a purely iconic/compositional theory gives an exhaustive account of the CC? Some observations in Lindsey 1983 indicate that there might yet be grounds for considering the tune in some sense a whole. These observations concern the relation between the CC's tonal form and the accentual properties of the string with which it is associated.

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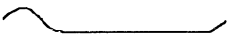
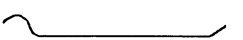
Consider (11), repeated here as (20):

(20)



The nuclear syllable is the primary-stressed syllable of incurable, and it has been capitalized in the example for that reason. But the status of the initial rise-fall is rather less clear. There would appear to be a L* pitch accent on the primary stress of èlephantíasis (in British terms, a low level head beginning on that syllable); but the rise-fall commencing on the initial syllable is associated with a secondary stress, which, if the rise-fall reflects the presence of a pitch accent, in general ought not to be possible unless the purpose is to emphasise the secondary-stressed constituent within the word for contrastive purposes. In fact, such an interpretation of (20) is possible: '...but únicorniasis certainly is!' Moreover, as Bolinger (p.c., 23 April 1983) points out, the contrastive reading may be forced by making the primary stress (here, -tí-) non-pitch-prominent:

(21)



Or, perhaps a more plausible example (Bolinger's, contrasting

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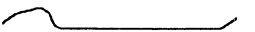
'walking away' with, say, 'hopping away'):

(22)



The contrastiveness comes from the marked (i.e. non-default) accenting (revealed by the pitch contour) of élephant within èlephantíasis and of wálking within wàlking awáy. However, there is evidence that, even if the primary-stressed syllables (here, -tí- and -wáy) ARE accented, thus allowing broad, non-contrastive focus at the start of the utterance, the preceding rise-fall is ALSO accentual, that is it must be associated with a syllable which is the primary-stressed syllable of some constituent. Consider:

(23)

(24)

Neither of these is possible on the non-contrastive CC reading: (23) would be interpreted as bearing a H*+L pitch accent on insomnia, while (24) would be interpreted as bearing a H*+L pitch accent on the syllable -fa- of infatuation (conceivably in contrast with, say, 'inSINuation'). The

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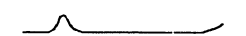
reason is that the initial rise-fall is a pitch accent (i.e. bears a star), and so may not be associated with the stressless in- of insomnia and infatuation (unless, to belabor the point, the morpheme in- is itself being selected for contrast). In order to transfer the CC to the sentences in (23) and (24), we must begin the rise-fall on the first primary stress of some constituent (in effect, the first primary or secondary stress, here -som- and -fat-):

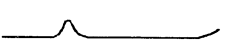
(25)

(26)



(25) is an interesting case, since it appears to be ambiguous between the broad focus CC reading (a response to As you know, insomnia is incurable) and a reading with CONTRASTIVE accent on insomnia (a response to Both insomnia and dandruff are incurable). This is the same distinction as between (20) and (27):

(27)



Since the two readings of (25) are identical in superficial pitch contour, we conclude that the distinction lies in the nature of the

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accentuation and the tonal structure associated with the string. In the contrastive reading, the string has been assigned two prominences and two pitch accents, a rise-fall (the precise phonological status of which we will discuss shortly) and a low-rise; in the broad focus CC reading, the string has no contrastive prominence but is assigned the CC, an utterance-length unitary contour consisting of the same two pitch accents, with the specification that the initial rise-fall is associated with the first (primary or secondary) lexical stress.

This is analogous to the compositional and non-compositional readings of kick the bucket, with one significant and crucial difference: while the unitary meaning of kick the bucket is not related in any obvious way to the compositional meaning, the two senses of (25) are closely related: both, indeed, are subject to interpretation by the two parameters specified above, and by the interpretive principle (to be discussed) which evaluates terminal pitch movement toward or away from low pitch. The semantic difference lies in the accentuation. Tonally, the difference is essentially formal: we have seen that the CC is neither necessarily nor sufficiently characterized by 'contradiction'; rather, it is a collocation (of component elements) which has approximately the force 'there's something in which I'm emotionally interested [initial rise-fall] but which

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I feel in control of [low pitch of the nuclear tone], although the case is not closed [terminal rise].'

Bolinger 1982a (p. 530) characterizes the CC still more loosely "as implying that the speaker is 'keyed-up about something that there is cause to be restrained about'", but, given his single iconic parameter of strain and rest, it is not clear how he would characterize the rather distinct interpretations of (25) which correspond to (20) and (27).

A word on the phonological structure of the CC is appropriate at this point. We have seen that the initial rise-fall is accentual, in that it must align with a (lexical) prominence in the string (the leftmost); if this prominence is not primary within its constituent, a L* must follow on that primary prominence; and the final, nuclear tone is a low rise. We will have occasion to discuss the formal representation of low (and other) rises in section 1.4, but for present purposes we may assume that the final tone is L*+H. The CC is thus: Rise-fall (L*) L*+H (with association specifications). We will further see that the English rise-fall is convincingly analyzed (following Ladd 1982) as a form of the plain fall derived by a feature which delays its peak (and we will find cross-linguistic evidence for the same phenomenon). Assuming the correctness of this analysis, the question arises whether the CC may in

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fact be thought of simply as: H*+L (L*) L*+H, rather than as H*+L[+delayed peak] (L*) L*+H. We do not intend to investigate this question in detail, but it seems that a form such as (9) above may indeed be interpreted, like (25), with both contrastive and non-contrastive readings, one corresponding to (20) and the other corresponding to (27); likewise, it seems that a [-delayed peak] variant of (20) is possible:

(28)

Having discussed one proposed utterance-length intonational 'morpheme', let us now turn to the issue of iconic and morphemic interpretations of terminal rises.

For Bolinger, again, the opposition is between movement towards or away from rest; Bolinger 1982 explicitly infers a commonality between his binary strain/rest opposition and other treatments: "A number of otherwise distinct approaches seem to be converging on a binary analysis. Cf. the High and Low of Pierrehumbert 1980 and Ladd 1982, the Open and Closed of Cruttenden 1981, and the Unfinished and Finished of Lindsey 1981" (fn.3). There is obviously an iconic connection between the proposals of Bolinger, Cruttenden 1981 and Lindsey 1981, but even here it takes a degree of metaphorical extension

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to get from strain/rest to open/closed or incomplete/complete.

Cruttenden 1981 is an interesting discussion of the meanings of falls and rises; Cruttenden (p. 81) comes up with a list of the kinds of semantic oppositions than this phonetic opposition may represent:

Fall	Rise
REINFORCING	LIMITING
STATEMENT	QUESTION
FINALITY	CONTINUITY
CLOSED-LISTING	OPEN-LISTING
CONDUCIVE	NON-CONDUCIVE
STATEMENT	STATEMENT WITH RESERVATIONS
DOGMATIC	CONCILIATORY

Cruttenden suggests the labels 'open'/'closed' as cover terms for these; the more specific senses will follow, given particular linguistic and non-linguistic contexts. The crucial notion, which we will adopt and develop (see section 1.3 below), is that "more specific meanings at a lower level of abstraction are systematically related to more general meanings at a higher level of abstraction" (p. 89).

We can see a distinction (albeit, perhaps, one of emphasis) between Bolinger's insistence on the fundamental nature of a single gestural opposition, and Cruttenden's somewhat more sophisticated view that different levels of abstraction are relevant to intonational interpretation. For the opposing view that intonational meanings are entirely conventional, we may turn to Gussenhoven 1983.

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Gussenhoven advances the notion of intonation's "linguistic normalcy", and argues that claims of the context-dependency of intonational meaning are "extreme, because they deviate greatly from what linguists would so far seem to have established language is like. There are, so far as I know, no examples of morphemes whose meaning changes when the context is changed" (p. 2). For Gussenhoven, therefore, the basic units of intonation are morphemes rather like any others, with unvarying meanings.

Specifically, there are three basic intonational morphemes (nuclear tones), the fall, the rise and the fall-rise, each of which may appear in one of four modifications, creating twelve basic allomorphs (though the modifications may be combined to create further variants). The three nuclear tones correspond to, and express, three 'manipulations', i.e. ways in which a speaker may treat a piece of information (the 'Variable') in a discourse. The fall ADDS the Variable to the background; the fall-rise SELECTS a Variable from the background; and the rise TESTS the Variable's relevance or suitability to the background. Thus Gussenhoven is making a very strong and interesting claim about the kind of meaning which tonal choices express:

> ...if sentence accents, which as we have seen are there to realise the speaker's focus options, receive a further

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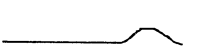
> specification in terms of the FØ movements that nuclear tones consist of, it is natural to assume that the semantic contribution of these tones consist in a further specification of the status of the 'contribution' with respect to the 'background'. (pp. 11-12)

It is in this way that Gussenhoven's ideas may be seen to interlock with Selkirk's (though neither linguist refers to the other). In fact, we have already seen that tonal choices may affect the relative strength of focal prominences; and we shall see presently that one role of intonation is indeed to reflect speakers' manipulations of information, as Gussenhoven suggests. But, crucially, the iconic force of tonal choices is never absent from semantic interpretation; and, where a tonal choice is not the pitch realization of a sentence accent (that is, in preheads, head contours and certain kinds of terminal rises), there is no a priori reason to see such a choice as a specific manipulation of information at all.

To return to the nuclear tones, let us see how Gussenhoven's semantic definitions hold up. The main problem with evaluating their accurateness is the fact that they are rather vague. For example, Gussenhoven cites an example in which, responding to I'm going to Gone with the Wind tomorrow, at the Calley, a speaker says:

(29)



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This is obviously rather questioning, but Gussenhoven's explanation is that the speaker "tentatively adds the Variable to the background, leaving the boy free to correct it, if necessary, without having to feel that the answer if going to be of any importance to the questioner, who after all, by not using TESTING [i.e. the rise], never indicated that the answer was really needed for an update of their background" (p. 17). But in fact it seems that such tentative addition is itself an instance of testing. Again, we may note a certain duality in the semantic interpretation of intonation: an 'adding' fall is being used rather metaphorically for the purpose of 'testing', but both the inherent meaning and the extensional one are relevant, as in Cruttenden's system of lower and higher levels of abstraction.

Gussenhoven himself discusses metaphorical "orientations" whereby manipulations may refer to the speech situation itself rather than to a Variable, but these in fact seem intended to account for the more basic, iconic effects of intonation rather than extended, metaphorical senses. For example, Gussenhoven (p. 27) considers the frequently observed correlation of rises with 'non-finality' to be a metaphorical extension of his conventional, morphemic definitions: "The fact that both [fall-rises and rises] signal non-finality must then be a fortuitious

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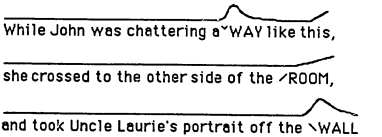
similarity of the effects of different manipulations." Specifically, the fall-rise is supposed to denote 'selection' of a Variable for "a background for some event yet to be mentioned", while the rise allegedly 'tests' the relevance of the Variable to the background on the grounds that "there's more to come -- you've only got half the story so far". Gussenhoven concludes that the latter will create suspense, while the former will not, "but rather define a setting." On these grounds, he deems (30) well-formed but (31) questionable:

(30)



(31)

While John was chattering a/WAY like this
she crossed to the other side of the ˘ROOM
and took Uncle Laurie's portrait off the \WALL

Our intuitions simply do not concur with Gussenhoven's: (31) is every bit as well-formed as (30), and the circuitous route by which Gussenhoven arrives at 'non-final' senses for terminal (phrase-final) rises is unrealistic. Rises do indeed express some more or less abstract

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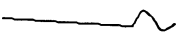
sense of incompleteness. The fall-rise is interesting in that, while its compositional and relatively iconic meaning can always be inferred, it has quite clearly been conventionalized, and not only as a formal unit, but also with some relatively specific and conventionalized semantic content. As illustrated in Lindsey 1983, the fall-rise often has a specifically contrastive sense:

(32)



John went to the ˇPARK ('and not the zoo')

In this example, the fall-rise has the effect of making a narrow-focus interpretation (focal on 'park') much more likely than a broader-focus interpretation, while a plain fall would allow either with equal ease. However, the same pitch contour could simply reflect a more iconic, compositional sense: plain declarative fall, with a 'comma' rise tagged onto the end to denote incompletion:

(33)

John went to the ˇPARK, and instantly fell ill

Significantly, for Bolinger the fall-rise is a variant of the A accent (the plain fall): that is, it is defined not as an independent holistic entity (as it is by Gussenhoven, O'Connor & Arnold, Halliday et al) but rather,

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like the CC, in terms of its component parts. What is most important for our purposes is to point out that in (32) and (33) the fall-rise does not have identical force; but that the more conventional sense in (32) may nonetheless be seen as an extension from the more iconic sense in (33). The incompleteness in (32) is not literally of the linguistic string, as in (33), but is more metaphorical: there is in some sense more to be said (or implied) on the matter. It is this potential for extended usage on the part of the fall-rise that Ladd 1980 is referring to when he defines its meaning as 'picking out one member of a set'; and, again, it is this potential that leads Gussenhoven to his notion of 'selection'.

Thus the distinction between (32) and (33) is not, strictly, one of ambiguity. Genuine ambiguity would allow for the possibility of quite unrelated meanings; on the contrary, we see that the fundamental iconic senses are not violated even on relatively conventional interpretations. When a particular tonal choice is made, both higher-level and lower-level meanings are available simultaneously.

Before making this notion more explicit, let us briefly consider the consequences of Gussenhoven's morphemic theory for universal considerations. He himself raises the question of cross-linguistic data (p. 6): "Cross-linguistic comparison of intonational data should be based on

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a morphemic analysis of the languages concerned. If there are such things as **syntactic** universals, we do not, after all, expect to find them in the **phonologies** of the languages concerned. English and Dutch will be said to have the syntactic option [±plural], despite the fact that the phonological shapes of their morphemes differ." Gussenhoven is thus ignoring the fact that intonation does have a relation with gesture and is therefore in some measure universal. For example, on the subject of yes-no questions (p. 501), Bolinger 1978a cites Hermann 1942's survey of 175 languages, which "found without exception a tendency to higher pitch somewhere in the utterance."

Nonetheless it is an equally obvious fact that languages do not all have the same intonation; Cruttenden, however, has anticipated this point. He proposes (p. 89) that "the abstract meanings associated with falls and rises represent universal tendencies among languages" (emphasis added) and, moreover, that "various implicational and scalar relationships exist in the application of intonational meanings at lower levels of abstraction." For example, "When a particular distinction of meaning is marked by the formal difference between a falling tune and a rising tune, then the forms and meanings will stand in a predictable correlation" (p. 86; see Cruttenden's table of fall/rise meanings quoted

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above). We will adopt this point of view, although we will have occasion in Chapters Three and Four to see that tonal structures which may be identified in two languages may be used for purposes which differ slightly or indeed radically, necessitating a definition of the kinds of functions which may be expressed intonationally.

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1.3 The iconic-conventional continuum

The facts examined in the previous section lead us to the conclusion that, while intonational meaning is rooted in a gestural, iconic base, certain pitch configurations may be conventionalized as formal units and with more particular meanings; however, a more conventionalized meaning will never clash with the basic, iconic (and compositional) content of the contour's meaning. That is, intonation, like morphosyntax, allows the formation of compounds and collocations with their own conventional meanings; but, unlike morphosyntax, intonation is a language in which the linguistic sign is NOT arbitrary. We conclude that the best model of intonational semantic interpretation is therefore one involving a CONTINUUM between relatively iconic and relatively conventional levels of meaning, ALL of which are available for the interpretation of a given utterance.

How might this continuum be organized? We assume that, at its most iconic extreme, interpretation is simply in terms of Bolinger's binary opposition up/down = strain/rest; this is essentially our Parameter 1, which states that high pitch is stronger than low pitch. Also relevant to emotional strength is the amount of pitch variation in a given domain (Parameter 2). At a slightly more metaphorical level, termination at or

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above low pitch (which we take to be neutral, like Bolinger's notion of 'rest') correlates with the open/closed or incomplete/complete opposition.

English makes a further, more conventionalized distinction between two kinds of open or incomplete termination, which correlate with the British-school low rise and high rise. In keeping with our assumption that more basic, iconic levels of interpretation are always relevant, the high rise is stronger, and more open/incomplete, than the low rise. The distinction is conventionalized, however, in that the high rise virtually forces an interrogative sense, while the low rise, although it may occur with morphosyntactically interrogative strings (like all intonation contours, as we shall see in Chapter Two), does not in any way force an interrogative interpretation.

Consider, for example, Yes uttered with a low pitched rise in answer to the question Have you finished your work?, where the openness of the rise implies no more than 'and what of it?' but does not demand a response from the interlocutor; contrast this with Yes? uttered with a high rise, perhaps by a waiter or clerk summoned by a customer. The waiter/clerk could equally well use the low rise (although the absence of attentive interrogativity might come across as a little

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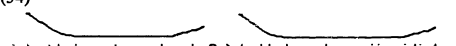
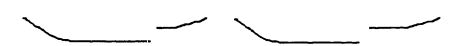
insulting), but a high rise on the response to a yes-no question is distinctly bizarre (if uttered, it would almost certainly be a low rise with its overall range shifted up for emotional intensity, and accompanied by appropriately animated facial expression and gesture). To further illustrate the distinction, we may point to tags, which generally take low but not high rises. Consider:

(34)



(35)



The utterances in (34) contain perfectly respectable tags; those in (35), however, terminate with a degree of interrogativity which forces us to hear them as separate questions. In the first example in (35), the speaker makes a statement in which he then seems to lose confidence. In the second example, the speaker adds the questioning tag as if to ask 'Perhaps you've heard of him?' (Jack being a well-known idiot).

While the strength and (in)completeness parameters rely simply on the distinction between H and L, and on the number of tones within a

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given domain, the distinction between the high and low rises correlates with the formal status of nuclear pitch movements as unitary (although, in keeping with our analysis, these may be broken down into their component tones). At a slightly more conventionalized level is the unitary status of the fall-rise, which consists of a nuclear pitch accent (H*+L) AND a final boundary tone H. We have already seen how this melody can itself be employed with senses of varying conventionalization, for instance as a 'contrasting', 'selecting', or 'correcting' contour.

We will see in section 1.4 that certain contour characteristics are convincingly analyzed, following Ladd 1983 (and Gussenhoven 1983) as features which modify tones. For example, a tone may be spread as a level pitch over a following stretch of segmental material, usually with some accompanying sense of 'routineness'. At its most iconic level, this will be interpreted directly by Parameter 2; however, as demonstrated by Ladd 1978 and 1980, the feature [+spread] may carry a more specific sense of 'stylization', as in the famous 'vocative chant' or calling tune. Another feature is [±delayed peak], which derives the rise-fall from the plain fall and contributes a sense of emphasis by means of syncopation. At a more conventionalized level, it often is used for 'surprise'.

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Lastly, we come to utterance-length contours. These are roughly of two types: collocations, which recur commonly as units but add little to the compositional meaning, and idioms, which have more conventionalized senses. The CC is an example of a more collocational utterance-length tune. Further examples are provided by the 'tone groups' of O'Connor & Arnold 1973: for example, their 'Switchback' is basically a fall-rise nucleus preceded by a falling head. They simply state (p. 20) that, "In this book the falling head occurs only before the Fall-Rise nuclear tone"; the clear implication is that these two components belong together, which, if only probabilistically, strikes us as correct (see (32) and (33) above). We offer no particular explanation for this -- perhaps the fall-rise, with its 'under-control' terminal low rise, has some inherent compatibility with the 'relaxation' or 'restraint' of the falling head; we simply note that the Switchback is stereotyped as a collocation.

Some of O'Connor & Arnold's other 'tone groups' seem to be good candidates for true intonational idioms. One is the 'Long Jump', also known since Liberman 1975 as the 'surprise-redundancy' contour. It consists of a rising head and a high-fall nucleus, and thus, compositionally, represents a gradual mounting of tension followed by

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its precipitate release. Sag & Liberman 1975 observe that it is used more specifically to denote either surprise (which it thus has in common with the rise-fall nuclear tone, i.e. the [+delayed peak] plain fall) or the 'redundancy' of the utterance in question ('You ought to know this already'). For example, (19) above might be uttered either to convey the surprise of 'My God! Elephantiasis isn't incurable!' or the redundancy of 'How often do I have to tell you: elephantiasis isn't incurable!'. Significantly, Bolinger 1982a notes that "if any tune can be said to have a set meaning -- divorced from a particular content -- this is it" (pp. 530-31). As might be expected, Bolinger has reservations about the applicability of 'surprise-redundancy' to every occurrence of this tune, but our system predicts that its compositional meaning will at least always be available.

Lindsey 1983 describes the O'Connor & Arnold 'Low Bounce' as a 'Placation Contour'. It consists of sustained high level pitch (by means of a high prehead and/or high head) followed by a low rise nucleus. O'Connor & Arnold find it "soothing, reassuring" and "encouraging, calmly patronising" (p. 158), and on statements and commands it is especially appropriate for addressing children (or idiots). On questions it is less marked (that is, its more conventionalized meaning is less

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apparent), but it is more common in (old-fashioned?) R. P. English than in other dialects; the claim of O'Connor & Arnold (p. 64) that "This is by far the most common way of asking yes-no quesions" is certainly not true for the present writer. Examples include:

(36)

'Come to ˏDaddy. 'I'm not going to ˏhurt you.

(37)

'Anyone for ˏtennis?

The examples in (36) demonstrate the soothing/patronizing connotation of the Placation Contour. The interrogative (37) shows that 'placation' is not necessarily present. Still, there appears to be a holistic sense which (37) shares with the examples in (36): the sustained high pitch creates a sense of interest, the low rise is controlled but open-ended, and the overall force seems to be one of polite concern.

It would appear moreover that this contour, in its more holistic, conventionalized persona, is restricted to (or at least much more common in) British English, specifically R. P. (37) above would sound much less natural in American English, for instance, and Bolinger 1982a points out the same thing with reference to examples such as:

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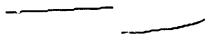
(38)

How can I con,vince them?

(39)



How can I con,vince them?

Bolinger (p. 522) observes that sustaining the high pitch (in his examples, a rise) for one or two syllables, as in (38), is quite comfortable for the American speaker. It is the abrupt drop of (39), diagnostic of the Low Bounce/Placation Contour, which Bolinger's American finds "excessive to the point of affectation".

We claim that it is the more conventional levels of intonational form and meaning which are likely to be dialect- or language-specific. The sequence of high head + low-rise nucleus is not prohibited in American English, but it seems unlikely that it is conventionalized in American English; if it occurs there, it will be because the compositional effects of its pitch shape are appropriate. The sharp drop in the tune retains its direct iconic emotional force for the American (by Parameter 2), while for the R.P. speaker this drop has been conventionalized in a more ritual (metaphorical) display of concern for the hearer.

The most iconic levels of form and meaning will, we hypothesize,

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remain more or less constant across dialects. This is not to claim that, wherever high and low pitch contrast in a language, this contrast must embody the strain/rest opposition. A tone language like Hausa, for example, opposes two tones, H and L, but their role is lexical. Our claim, in keeping with Cruttenden's implicational universals, is that IF a language opposes H and L for the purpose of exhibiting a strain/rest opposition, THEN H will represent strain (incompletion, etc.) and L will represent rest (completion, etc.). We define intonation precisely as the use of tonal structure for such means.

This leaves us with an overall picture of the iconic-conventional continuum which we might begin to sketch along the following lines:

	MEANING	FORM
Iconic	Strain/rest (Parameter 1)	Up/down, i.e. H/L
|	Emotional strength (P. 2)	Tonal complexity
|	(In)completion	Terminal rise/fall
|	(Non-)interrogativity	High rise/low rise distinct
|	Routineness; emphasis...	[±spread]; [±delayed peak]...
|	Contrast (one of set)	Unitary fall-rise (H*+L...H%)
|	'Correcting'...	Fall-rise (extended usages)
|	CC; Switchback...	Utterance-length collocations
Convent'l	Placation; surp.-redund.	Utterance-length idioms

As an example of how this system might work, let us return to the Low Bounce (i.e. H[+spread]...L*+H^3) and give an analysis of its semantic structure in R.P. English:

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Strain/rest:	Sustained strain, then sudden relaxation and moderate final tension
Strength:	Overall wide variation (strong), but nucleus has low emotional charge
Completeness:	Termination open
Interrogativity:	No
Routineness:	Initial H is [+spread] -- air of routine
Collocation:	Matter of consequence treated routinely and with (abrupt) control, leaving case open for further action/discussion
Idiomatic force:	Placation

It is important to note that while the most iconic levels are always accessed in interpreting a contour, the selection of additonal, more conventional senses is optional. The basic interpretive parameters are always referred to in evaluating a contour, and more particular interpretive rules specifying, for example, senses of the unitary fall-rise or the Placation Contour, while available, do not obligatorily override the basic parameters.

Likewise, the basic parameters are present in all dialects, while conventional specifications need not be; for instance, we might reasonably claim that the semantic continuum available for the interpretation of the high head + low rise contour in American English would be identical to that given above except in lacking the last, and

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possibly also the next-to-last, level.

Since we claim that compositional characteristics are always available and relevant to the interpretation of contours, it follows that we favor a compositional approach to the formal representation of tonal structure. We thus consider debates on the unitary or compositional status of such entities as the intonational rise or fall-rise to be non-issues: a rise is interpretable both unitarily and compositionally, and its formal representation should reflect this. Since compositional representation allows the statement of larger units as compounds, collocations, etc., whereas non-compositional representation would not allow the representation of smaller atoms, we adopt the former.

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1.4 The tonal grammar of English

The tonal grammar adopted here is a modified version of the system put forward in Pierrehumbert 1980, which is itself a development of work begun in Goldsmith 1976 and Liberman 1975. The atoms of intonation are tones associated with syllables, as in autosegmental analyses of tone languages. In Pierrehumbert's system, there are only two tones, H and L; she thus dispenses with the mid tone M of Liberman 1975. These two tones, however, may appear in three different kinds of tonal entity: pitch accents of one or two tones, one of which is marked (with a star) for alignment with a prominent syllable; boundary tones, marked (with %) for alignment with the initial or final boundary of an intonation phrase; and phrase accents (adopted from Bruce 1977), which fall near the end of the word bearing the nuclear (rightmost) pitch accent.

Within an intonation phrase, an initial boundary tone is optional; at least one pitch accent is obligatory, as is a single phrase accent and a single final boundary tone.

Pierrehumbert illustrates her system with the following finite state grammar "which generates the set of well-formed tonal sequences for an intonation phrase" (p. 29):

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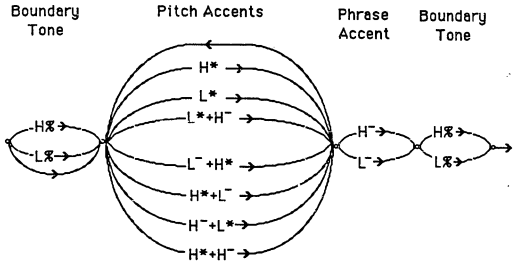

In Pierrehumbert's system, the overall shape of a contour follows from two main factors: (a) the sequence of tones, associated primarily with prominent syllables and with boundaries, and (b) phonetic interpolation rules which join one tone to the next in a fairly direct manner. We assume certain revisions to this system, however. First, let us consider the tonal entities themselves.

Following Lindsey 1983, we discard the L% boundary tone for standard English dialects (taking low pitch to be the default case in the absence of a H% boundary tone); the final H% derives terminal rises, while the initial H% corresponds to the high prehead of the British school.

The high prehead, in the words of O'Connor & Arnold 1973, is a high pitch associated with "the syllable(s) occurring before the stressed

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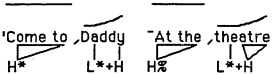
syllable of the first accented word in a word group [=intonation phrase]" (p. 286). As an illustration, consider the Low Bounce/Placation Contour, which consists of a high level pitch followed by a low rise nucleus. The initial high level stretch will usually begin on a prominent (starred) syllable, and so would be analyzed, in British terms, as a high head. However, if no prominent syllables precede the low rise, the initial high level must be the result of an initial H% boundary tone, spread over the prenuclear syllable(s); this would be a British-style prehead. Compare the following two examples:

(40)



It is the properly tonal structure which defines the Placation Contour, which we therefore describe as /H[+spread]...L*+H/ without reference to the accentual properties of the text with which the initial H (be it H% or H*) is aligned.

We further discard both phrase accents. These, taken over from work on Swedish, are a complication to the system which is not convincingly motivated for English. They were introduced to account for nuclear contours, involving two and three pitch movements, beyond

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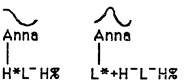
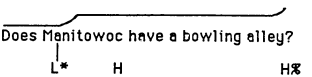
the descriptive power of a bitonal pitch accent.

For example, consider the following contours, with Pierrehumbert's analyses:

(41)



(42)



Obviously the first example in (41), a fall-rise, and (42), a two-step rise, could be handled with a bitonal pitch accent and the final boundary H%: H*+L...H% and L*+H...H%, respectively (we discard the superscript hyphen which Pierrehumbert uses for tones which are not marked for assignment to prominent syllables). It is of course necessary that the H% in (42) be interpreted as a step up from, and not equal to, the preceding H. I therefore adopt from Lindsey 1983 a rule of Upstep, a more general version of Pierrehumbert's Upstep (her rule adds the value of the boundary tone to the value of a preceding H⁻ phrase accent):

(43) Upstep (Lindsey 1983)

In T H%: /H%/ = /T/ + /H%/

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(That is, in all environments, the value of the boundary tone H% is added to the value of the preceding tone.)

This rule gives a unitary interpretation to the final boundary H%, that is, as a terminal rise. The rule is considerably more general and natural than Pierrehumbert's Upstep, which was necessitated by the absence from English of postnuclear falls, which, in her system, would otherwise be predicted by sequences of a H⁻ phrase accent and a L% boundary tone[4].

As for the second example in (41), we can analyze it as differing from the first simply in that the initial H*+L is [+delayed peak]. This analysis is put forward by Ladd 1983 to account for the similarities between the plain fall and the rise-fall or 'scooped' fall (in English and German):

(44)

a. wonderful Düsseldorf (scooped)

b. wonderful Düsseldorf (plain)

Intuitively this is quite appealing, as Ladd shows: the rise-fall seems only to be a more emphatic variant of the fall, just as by extension the rise-fall-rise is a more emphatic variant of the fall-rise. This solution

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is simpler than that in Lindsey 1983, where the phrase accents were also discarded, but replaced with tritonal pitch accents.

Ladd 1983 advocates two other peak features, [downstep] and [raised peak]. The former accounts for contrasts like the following:

(45)

a. There are many intermediate levels
H H H+L

b. There are many intermediate levels
H H H+L
[+d.step] [+d.step]

Pierrehumbert had generated such downstepping contours with an automatic downstep rule triggered by certain tonal sequences. We adopt Ladd's alternative without discussion; it further allows the semantic effects of downstepping to be captured more directly. Lindsey 1983 described the semantic connotation of this feature to be "authoritative emphasis": both the falling contour and the leveling effect give an impression of (possibly authoritative) control and reserve/restraint; the emphasis, however, follows more from the presence of a series of pitch accents (and therefore of textual prominences) than from the additional contribution of downstep.

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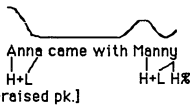
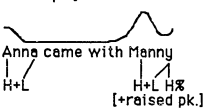
[raised peak] is introduced to account for contrasts such as:

(46)

a. 

b. 

(These examples are taken from Pierrehumbert and Ladd, but the nuclear contour in (46b) has been changed here from a plain fall into a fall-rise in order to factor out the specific effects of [raised peak].) (46a) would be an appropriate answer to Who came with Manny?, while (46b) might be a contradicting/correcting response to Anna came with Joe, or perhaps rather Jane came with Fred and Anna came with Joe (to account for the prominence on Anna). As Ladd himself points out, [raised peak] is distinct from the mere widening of the whole pitch range for greater emotional force: contrasts like those in (46) can be maintained regardless of pitch range.

Again, we adopt [raised peak] without further discussion, although we will return to this feature, and to that of [delayed peak], in connection

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with Hausa and Cherokee in Chapters Three and Four.

We turn now to the pitch accents. Pierrehumbert's system allows the (maximal) two tones of a pitch accent to be organized in either of two ways: the starred tone may be on the left or on the right. Prima facie this seems somewhat odd, since accent-related pitch perturbations seem to begin on the starred syllable. In fact, the right-starred pitch accents are a rather indirect means of generating a wide range of PREnuclear contours.

Recall that for Pierrehumbert, phonetic interpolation is basicaliy a direct connection of one tone to the next to form a contour. As Ladd 1983 points out (p. 745), "P[ierrehumbert]'s analysis suffers primarily from her attempt to represent all distinctions as different sequences of 'atomic' H's and L's." This position she states as follows (p. 11):

> The complete phonological representation for intonation is thus a metrical representation of the text with tones lined up in accordance with the rules. In other languages, rules which alter tonal values or delete tones can apply to such a representation. English appears to lack such rules, with the result that the underlying and the derived phonological representations of intonation are identical.

Following Ladd 1983, Lindsey 1983 and Gussenhoven 1983, however, we believe that certain contour characteristics are appropriately factored out; for Ladd these are his phonological features,

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while Gussenhoven speaks of 'modifications' which, like his nuclear tones, are themselves claimed to be morphemes with constant specific meanings.

Pierrehumbert's approach leads to problems, for example in the generation of 'exocentric' contours, those in which there is an abrupt skip in pitch between the end of the head and the onset of the nucleus. Consider the Switchback: a falling head followed by a fall-rise nucleus. Since the contour begins with a high pitch on a prominent syllable, this must be a H* pitch accent; the nuclear pitch contour is, for Pierrehumbert, H*...L⁻...H%. Yet Pierrehumbert's interpolation rules will generate a fairly straight line between the initial H* and the nuclear H* (in fact, Pierrehumbert's interpolated line will sag or 'dip' slightly, by an amount proportional to the distance between the two H*s); the only way for her to generate the required gradual fall is to posit a nuclear pitch accent of the form L⁻+H*, with the initial L⁻ existing solely to specify an endpoint for the falling contour beginning on the initial H*.

Clearly this is not a desirable solution. It complicates the form of the pitch accents, and further causes significant generalizations to be missed. A nuclear fall-rise will be analyzed differently depending on whether the preceding contour ends high or low: if it ends high, the

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nuclear fall-rise is H*...L⁻...H%; if it ends low, the nuclear fall-rise is L⁻+H*...L⁻...H%. This analysis attributes characteristics of the head to the nucleus, as a result of Pierrehumbert's attempt to account for all contour features in terms of the basic tonal sequence alone.

Here we assume that prenuclear H* and L* may simply be diacritically marked for pitch movements which they may instigate. Most generally, we follow Lindsey 1983 in assuming that any tone may be [+spread], i.e. associated with any syllables to the right which have not been associated with some other tone. (Pierrehumbert allowed only T⁻ to spread, necessitating the H*+H⁻ pitch accent to generate a NON-dipping high level contour.) This will give us the Low Bounce/Placation Contour, and also the converse exocentric contour involving a low level head and a high fall nucleus. Falling heads necessitate an enriched notion of Pierrehumbert's 'dipping': the contour must be allowed not merely to sag between distant Hs, but to fall right up to the nuclear pitch accent. We rather tentatively assume that a prenuclear H may be marked [±dipping], but that if it is [+dipping] the degree of dipping is gradient, and may persist until the syllable preceding the nuclear syllable.

As for rising heads, as seen in (17a) and (18a) above, we must assume a corresponding feature [+rising] whose phonetic interpretation

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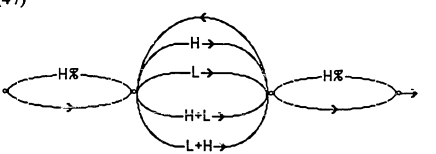
presumably determines the pitch of each successive syllable by multiplying the value of the preceding syllable by some (gradient) coefficient greater than 1. Since the upper limit of the phonetic pitch range is in principle indefinitely high (whereas the baseline at the lower end of the range, as Pierrehumbert shows, is fixed for each speaker), this solution is theoretically plausible.

We are left with pitch accents of one or two tones; the two tones may not be identical (in keeping with the Obligatory Contour Principle proposed for tone languages), and no stars need be marked since it is always the leftmost tone which will be associated with the prominent syllable (although we will continue to mark stars where this will aid clarity). The overall finite-state grammar will therefore look like this:

(47)



There remain certain problems with postnuclear contours (the 'tails' in British terms). Firstly, note that our system generates eight nuclear configurations: H, L, H+L, L+H, H...H%, L...H%, H+L...H%,

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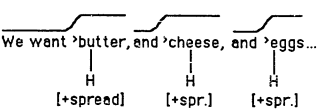
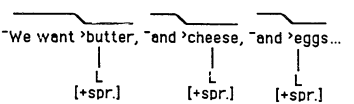
and L+H...H%. It seems that a monotonal pitch accent (H or L) is not sufficient for a nuclear contour; that is, the nucleus requires not merely pitch prominence but also pitch movement. The exception to this principle is the use of spread, level nuclear pitch to denote either a high level of routineness on the part of the utterance (the 'stylization' of Ladd 1978 and 1980) or that the utterance itself is unfinished (the mid level nucleus of O'Connor & Arnold 1973). Both routineness and unfinishedness are exhibited in certain kinds of very montonous listing:

(48)



(49)



(It is not clear if these are the correct analyses in O'Connor & Arnold's terms, since they do not distinguish high and low level nuclei; we have not marked H% initial boundary tones in (49) since the L pitch accents alone entail low pitch prominence relative to the preceding material.)

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Ladd himself (1983) entertains this kind of analysis, with an hypothesized feature of sustained pitch.

Having dealt with the proviso of [+spread] monotonal nuclear contours, we may now state the Nuclear Contour Principle:

(50) Nuclear Contour Principle

Unless it is [+spread], a monotonal pitch accent may not be the last tone in a prosodic phrase.

This ensures that a nuclear H or L, unless spread, must be followed by the final boundary H%. If the H% does follow, what sort of contour results between the nuclear tone and the boundary? Two kinds of contour are possible: a 'monotonic' interpolation giving a gradual rise from the H or L to the H% (which, by Upstep, is always higher than the preceding tone), or else rightward iteration of the nuclear tone, with the H% resricted to the final syllable. Moreover, it would seem that this rightward iteration carries no special connotation of 'routineness', and so should not be considered an instance of the feature [+spread], but rather simply the result of normal principles of autosegmental phonology; thus monotonic interpolation is itself an optional rule rather than an automatic process of phonetic interpolation.

We now have six different forms of terminal rise involving H%,

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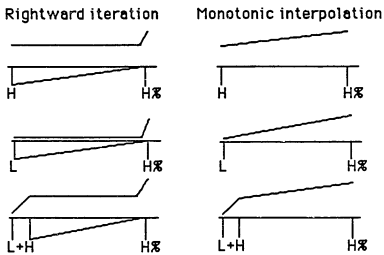
which we may represent schematically with reference to a baseline:

(51)



All six of these seem to be possible; the high rises, i.e. those with a nuclear H pitch accent, are distinct from the others in carrying a higher likelihood of interrogativity, but the lower four are semantically very alike[5]; phonetically they will be distinct only if the postnuclear textual string is long enough, as for example in MAnitowoc has a bowling alley. It seems that the contours of the form L+H...H% are intermediate between H...H% and L...H% in terms of interrogative force, but it is not clear that they should be grouped with one or the other (for instance by claiming that all contours ending in ...H...H% are likely to be overridingly interrogative). Lastly, the status of the remaining possible terminal rise is also unclear, namely L+H with no following H%. Since

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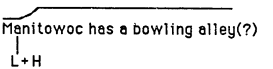
no tone follows the nuclear pitch accent, monotonic interpolation is not an option; we assume that [rising] and [dipping] are available only to prenuclear pitch accents (and possibly also the initial H%); therefore final L+H must simply undergo rightward spreading, resulting in a high level terminal contour:

(52)



This is not a contour described by, for instance, O'Connor & Arnold 1973. It is however possible, and, like the other rising contours which begin low, noncommittal with regard to interrogativity. Moreover, it seems to carry some of the routineness and unfinishedness which other terminal level contours exhibit: (52) might be offered as one of a routine list: Lots of places have bowling alleys -- for example, MAnitowoc has a bowling alley.... This being the case, the level contour would seem to be the result of the feature [spread] rather than default rightward iteration. If so, the Nuclear Contour Principle in (50) above might well have to be complicated, and somewhat weakened, along the following lines:

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(53) Nuclear Contour Principle (Revised)

Unless it is [+spread], no pitch accent except H+L may be the last tonal entity in a prosodic phrase.

This revised NCP would ensure that nuclear contours are of three basic types: falls, rises (with final H%), and level ([+spread], with concomitant 'routineness'/'unfinishedness'). The revised NCP also highlights the assymetry in standard English dialects between nuclear falls, which are abrupt and local to the nuclear syllable, and nuclear rises, which occupy the entire postnuclear string (tail).

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2. English interrogation: a π-function and its marking

We hypothesize that some degree of tonal structure is present in every language, but that it is 'intonational' only to the extent that it expresses certain kinds of semantic/pragmatic functions (rather than, for example, making lexical or syntactic distinctions). These functions we label here for convenience 'π-functions'. In the previous chapter we saw how some of these functions that are expressed tonally in English might be scaled on an iconic-conventional interpretive continuum: for instance, emotional strength, conceptual (in)completeness, interrogativity, routineness/stylization, surprise-redundancy, etc.

In this chapter we will examine one π-function, interrogativity, specifically yes-no interrogativity, in order to see how it operates in English, and most particularly how it interacts with the tonal system. When we move beyond English in Chapters Three and Four, we will again use interrogativity as our focus in drawing comparisons and contrasts between English, Hausa and Cherokee with respect to π-functions and tonal structure.

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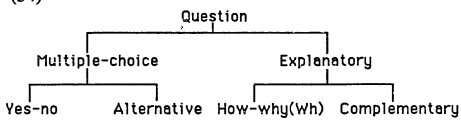
2.1 Interrogative structures of English: morphosyntax

Bolinger 1957 makes a primary distributional cut giving four kinds of questions on the basis of the kinds of response they elicit:

(54)



Yes-no questions are answered appropriately with assent or dissent; alternative questions, marked by or, are answered by selecting one of the proffered alternatives; how-why questions, more widely known as wh-questions, are marked by wh-words and call for elaboration; while complementary questions, marked by syntactic incompleteness, call for continuation (some of Bolinger's examples: His reason being?, And John?, But later?).

We are primarily concerned with those interrogatives which does not obligatorily carry morphosyntactic marking: non-wh- questions. Of these the vast majority are plain yes-no questions.

Bolinger analyzes yes-no questions morphosyntactically in terms of six characteristics: completeness or fragmentary structure, the finiteness of the main verb, the presence or absence of subject-verb

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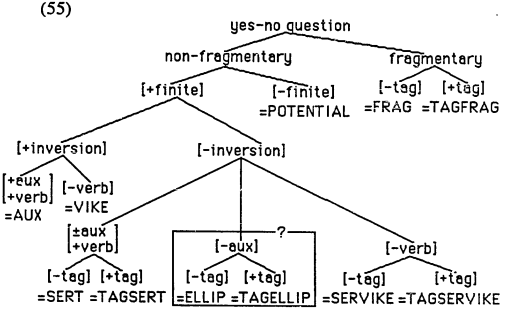
inversion, the presence or absence of a main verb, the presence or absence of an auxiliary verb, and presence or absence of a tag. We might diagram the choices as follows (with Bolinger's category labels as terminal nodes):

(55)



Here are some of Bolinger's examples of these eleven types:

AUX: Did he go?

VIKE (vicarious): Would anybody?

SERT (assertive): He went?

TAGSERT (sert with tag): He went did he?

ELLIP (elliptical): Ever try Campbell's?

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TAGELLIP: Get there will they?

SERVIKE (vicarious assertive): You will?

TAGSERVIKE: You will will you?

POTENTIAL: (How can we help them?) Give them a little money?

FRAG: John?

TAGFRAG: Because he wants to is he?

Potentials do not occur in tagged forms, since they have infinitival verbs from which inverted auxiliary forms cannot be derived. However, Bolinger does allow two other tagged forms, tagaux and tagvike, which do not strike us as well-formed unitary constructions. Bolinger's examples include ?Did he go did he? (tagaux) and ?Can your brother can he? (question-mark judgements supplied). Bolinger remarks (p. 36) that "There is probably always intonation of high tension"; we conclude that these forms, if uttered, are sequences of two questions, asked one after the other at a high level of emotional strength/involvement. More generally, we claim that a question which is [+inversion] may not also be [+tag].

The least satisfactory classification in our chart is that of ellips and tagellips, which seem to be only superficially a natural class, being derived rather differently. Ellips seem to be regular aux questions (e.g.

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Did you ever try Campbell's?, Would anyone like a cup of coffee?, Does she buy many things like this?), and the inverted auxiliary (with the subject, if you) may be deleted: (You) ever try Cambell's?, Anyone like a cup of coffee?, She buy many things like this?. The clear connotation of a stylistic omission gives this construction a colloquial tone.

Note now, however, that if ellips are derived from regular aux questions, and therefore are [+inversion] (contrary to the chart in (55)), then, by our claim that [+inversion] questions may not be [+tag], they should not occur in tagged forms; yet tagellips occur.

But tagellips seem to be quite distinct from ellips. They do not seem to involve 'colloquial' omission, but rather are completed by the following tag. They do not require that a deleted subject be the addressee: Sick is he?, Going are we?, Stolen it had they?, etc. They allow the subject to be present in the main clause, even as a full NP (although this is only likely if auxiliary or main verb be is missing): Your parents coming are they?, George the new chairman is he?; Bolinger takes this fact as evidence against a movement analysis transposing the tag from sentence-initial position (Sick is he < Is he sick?). In fact, it seems that tagellips are formed by deleting the auxiliary (and the subject, if pronominal) from regular [+aux] tagserts: Your parents (ARE) coming

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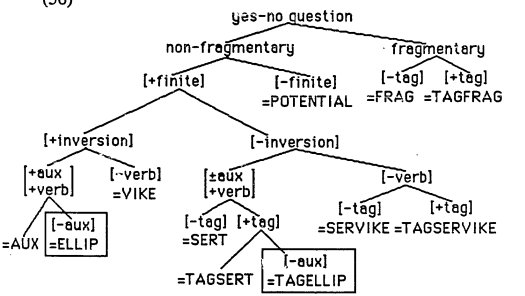
are they?, George (IS) the new chairman is he?, (HE IS) sick is he?.[1]

Thus ellips are formed from aux questions ([+inversion]) and tagellips are formed from tagserts [-inversion], both by deletion of the auxiliary; (55) can therefore be revised as follows:

(56)



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2.2 The intonation of English interrogation

2.2.1 Morphosyntactically interrogative structures

First let us consider those yes-no questions which are morpho-syntactically marked for interrogativity, i.e. those which are [+inversion]. These may be full (aux), or may lack the auxiliary verb (ellip) or the main verb (vike).

As might be expected, the most likely intonational choice for inverted questions is a rise:

(57)

(a) Do you want to ˌgo? Want to ˌgo? ˌDo you?

(b) Do you want to ˊgo? Want to ˊgo? ˊDo you?

On inverted questions the distinction between low and high rises does not seem to be categorial, since the distinctive power of the high rise to 'force' an interrogative interpretation is masked by the inherent interrogativity of the morphosyntax. The high rise is simply 'more' interrogative, and context will determine the most felicitous degree of interrogativity: if, for instance, the question is an offer (especially if asked of a social 'superior' by a social 'inferior' such as a waiter), then a higher degree of interrogativity (a high rise, hence 'stronger' and more

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'incomplete') will be more polite and appropriate than a lower degree of interrogativity (low rise):

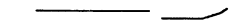
(58)

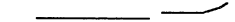
(a) Can I ˌget you anything?

(b) Can I ˊget you anything?

If on the other hand the question is a demand, a high degree of interrogativity will be pushy, and the low rise will be a little less insistent and more polite:

(59)


(a) Could you do it ˌpromptly?


(b) Could you do it ˊpromptly?

Interestingly, (59b) is more likely than (59a) to be interpreted not as a demand but as a straightforward information question. Thus the high rise is higher than the low rise on scales of both emotional strength and interrogativity, as our sketch of the semantic continuum in Chapter One would predict.

But inverted questions do not require rising intonation. In fact, any contour is possible. Nuclear falls (both plain and delayed) and

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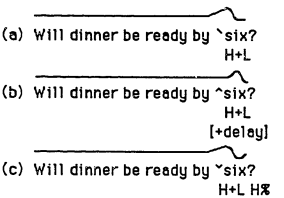
fall-rises occur quite readily:

(60)



As in non-interrogatives, the rise-fall and fall-rise both increase the salience of the pitch-prominence and make an interpretation with narrow focus on the prominent word more likely ([+raised peak], as we saw in the previous chapter, has the same effect): 'Did you say dinner will be ready by SIX (and not at five, seven, or some other time)?' Such an interpretation is also quite possible with plain rises, however, and can be made more likely by increasing the high/low pitch prominence of the rise's onset, increasing intensity on the prominent word, etc.

Independent of focus, the falling intonation as in (60a) is, of course, even less 'incomplete' and 'open' than the low rise. It can denote lack of genuine interest on the part of the questioner, or that the questioner is leaving the answer much less open, so that the question is more of a formality. Of course, the fall may begin on a high pitch and

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fall over a wide range, investing the question will a high level of emotional strength; but in conjunction with a falling contour, this will mean an increase in insistence. The stronger a rising-pitch question, the greater the questioner's desire for the information requested; the stronger a falling-pitch question, the greater the questioner's desire THAT the question be answered, whatever the answer might be.

The [+delay] fall (=rise-fall) as in (60b) is a syncopated or 'reinforced' plain fall. Semantically it seems to reinforce the declarative connotation of the plain fall, rather as if the expression 'I declare!' were added, giving overtones varying from emphasis to surprise. Interrogatives with this contour lend themselves readily to use as an echo of someone else's question, or, non-echoically, as a self-imposed rhetorical question. In this sense the question is being 'mentioned' rather than 'used' directly, as if orthographic quotation marks were being used. Again, this is neither all nor only the sense of the rise-fall; it may ask a surprised direct ('used') question, while other intonations may occur on 'mentioned' questions.

We saw in the last chapter that the fall-rise as in (60c), with its 'comma' termination, is often used in more conventional, metaphorical ways as a 'selecting', 'contrasting' or 'correcting' intonation, where the

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other material from which the fall-rise-marked item is selected (or against which it is contrasted, or as a correction of which it is put forward) need not follow overtly but may be merely implied. Used on a question, the contrastive function of the fall-rise drastically increases the likelihood of a narrow-focus interpretation. The 'correcting' usage will for obvious reasons only apply when the question is mentioned rather than used, e.g.:

(61)

A: Will dinner be ready by seven?

B: Will dinner be ready by ˇSIX -- remember we agreed to leave at seven -- Yes, it will.

A very common interrogative usage of the fall-rise is on emotionally strong echo-questions:

(62)

(a) A: Will dinner be ready by six?
B: Will dinner be ready by ˇSIX? Of course it will!

(b) A: Are you having fun? B: ˇAm I?! Sure I am!

We might try to concoct relatively iconic explanations for this; for example, we might make reference to the tendency of echo-questions to be followed by further comment (as in both of speaker B's responses in (62)) -- and of course this usage of the fall-rise is necessarily compatible with its more iconic levels of meaning on the interpretive continuum --

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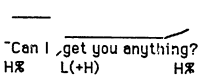
but the echo-question usage of the fall-rise is probably best regarded as rather arbitrarily specified at a relatively conventional level of the continuum.

Lastly in this section, let us note that inverted questions appear to occur quite readily with any of the utterance-length tunes we have considered. Recall the Low Bounce, which as we pointed out in section 1.3 is for O'Connor & Arnold's dialect of R.P. "by far the most common way of asking yes-no questions" (1973:64). The highly conventional sense of 'placation' is not called into play in interrogatives, but the slightly more iconic connotations of 'concern', 'control' and 'restraint' certainly apply, making this contour ideal (especially in standard British English) for politely offering yes-no questions as in (58) above: what the terminal low rise lacks in vehemence, the high level head more than makes up for in controlled interest:

(63)



The Long Jump/surprise-redundancy contour occurs readily on inverted questions. Interestingly, its 'surprise' meaning does not seem very compatible with the 'multiple-choice' nature of yes-no

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interrogativity; wh-questions, being open-ended, may freely express curious surprise, but since a yes-no questioner is already aware of all (i.e. both) the possible answers to the question, (s)he is not in an equivalent position for the expression of surprise:

(64)

{ I'm amazed! / How many times must I ask - } „Why on earth did you `do it?

{ ??I'm amazed! / How many times must I ask - } „Did you really `do it?

We might hypothesize that in yes-no questions 'surprise' is merely a by-product of 'redundancy': 'It's redundant to ask this question -- why would I ask it unless I were so surprised by the answer, which I know already'. However, it would seem that this is really just a rather arbitrary fact about the Long Jump contour, a conclusion which facts to be considered in the next sub-section support.

Lastly, let us note that both Switchback and CC occur readily on inverted yes-no questions. This is interesting in the case of the CC, since as Bolinger has shown it helps to invalidate the notion that the CC really is a 'contradiction' contour. (16) above is one of Bolinger's non-declarative illustrations of the CC; here is one of his yes-no questions:

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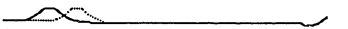
(65)



Are you gonna keep on complaining all day?
H+L L(+H)H%
[±delay]

This returns us to the problem of specifying what the elusive semantic basis for the contour's formal unity might be. We suggest rather feebly that it is something along the lines of 'topic-comment', having its (diachronic?) roots in bi-focal, two-prominence utterances of the form H+L...L+H (e.g. ANNA came with MANNY). The initial rise-fall of the CC does not pick out a narrow focal prominence, but contributes to the utterance as a whole the connotation that some topic is being selected from the immediate discourse, to which the nuclear low rise will contribute a (restrained and open-ended) comment: in Bolinger's gloss, "the speaker is 'keyed-up about something that there is cause to be restrained about'."

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2.2.2 Morphosyntactically non-interrogative structures

Let us first consider simple non-inverted finite sentences, i.e. serts (full) and servikes (serts minus their main verb). The facts are largely the same as for inverted forms: the unmarked case for morphosyntactically declarative questions is rising intonation:

(66)

(a) Dinner will be ready by ˊsix? It ˊwill?

(b) Dinner will be ready by ˌsix(?) It will(?)

The main difference from the situation for inverted forms is that, whereas intonation is quite powerless to neutralize the interrogativity of a morphosyntactic question, it may (in the case of the high rise) be the sole marker of interrogativity on a morphosyntactic declarative. This is the interpretive level on which high rises can be categorially distinguished from low rises, since the latter, like all other nuclear contours, are quite compatible with non-interrogativity.

(66b) may equally well be a declarative. Low-rise declaratives, like fall-rises (which themselves have low-rise terminations) are 'open-ended' in a manner distinct from both interrogativity and the 'unfinishedness' of terminal level pitches: they require neither a response

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nor overt completion, but leave the matter at hand open for further treatment, by any participant in the discourse. A common usage for the low rise is in indignant responses or retorts, in which the speaker implies that more needs to be said on the topic; for example, (66b) might be a retort implying anything from 'I wonder why you ask' to 'How dare you insinuate that dinner might be late!'.

On the other hand, as (66b) demonstrates, low rises may perfectly well accompany non-inverted interrogatives in the appropriate context; what is not widely acknowledged is that the same can be said of all nuclear contours:

(67)

(a) Dinner will be ready by `six(?)

(b) Dinner will be ready by ^six(?)

(c) Dinner will be ready by ˇsix(?)

Falling intonation is quite possible on non-inverted questions in the appropriate context, usually where confirmation or denial is being sought. An interrogative interpretation can be enhanced with a conjunction such as so: So dinner will be ready by six?. Courtroom scenes, in which a witness is cross-examined for confirmation or denial

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of previously-discussed information, are breeding-grounds for morphosyntactically-declarative questions with falling intonation: (So) you were present on the night of the FIFTH?, etc.

Making the nuclear fall on the word fifth in the immediately preceding example into a [+delay] fall has essentially the same effect that we saw on inverted questions with [+delay] falls: the higher salience of a rise-fall over a plain fall makes narrow focus on the word fifth more likely, while the overall attitudinal effect is to increase emotional strength, making the question more emphatic/vehement, or (at a slightly more conventional level) making the question sound surprised:

(68)

Aha! (So)
What?! (You say)} you were present on the night of the ^fifth!

Ending as it does in a rising movement, the fall-rise as in (67c) is perhaps more comfortable on non-inverted questions than plain or delayed falls. As elsewhere, its 'contrastive'/'correcting' usage is quite common: transferring a fall-rise to the word fifth in our courtroom example illustrates this well. As with inverted constructions, the fall-rise is also very common in its rather stereotyped usage on emotionally strong echo-questions:

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(69)

(a) A: (I submit that)you were present on the night of the fifth.
B: I was present on the night of the ˇfifth? That's absurd!

(b) A: He's a Ph.D. B: He ˇis? I knew it!

We pause here to point out that the facts outlined here for serts and servikes apply almost equally well to potentials ([-finite]) and fragmentary questions. Let us illustrate the possibilities with the potential Give him some money? and the frag By train?:

	Potential	Frag
Hi rise	How? Give him some ´money?	How? By ´train?
Lo rise	How? Give him some ˌmoney?	How? By ˌtrain?
Fall	Now what could we do? Give him some `money (perhaps)?	How? By `train (perhaps)?
Rise-fall	Give him some ^money?! --ˇThat's an idea...	Are you mad? By ^train (yet)?!
Fall-rise	Give him some ˇmoney? That's `brilliant!	By ˇtrain? You're mad!

Some very interesting results appear when we try to use utterance-length contours on non-inverted questions: specifically, it seems that neither the surprise-redundancy contour (SRC) nor the topic-comment contour (or TCC, as we will henceforth call the CC) allow morphosyntactic declaratives to function as questions:

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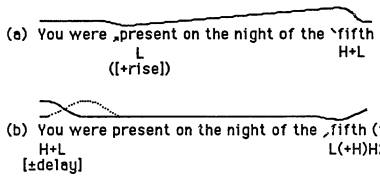
(70)



The incongruity of the SRC on questions, and its impossibility on non-inverted questions, is mentioned in Bolinger 1957 (p. 15): "The glide [up to a falling nucleus, as opposed to an abrupt skip]...is highly insistent, and especially when set off by a preceding fall, becomes almost incongruous when applied to a merely factual Q... Consequently when such an utterance lacks the Q-marking inversion, it is simply taken as a N[on]Q".

The exclamatory nature of the SRC, and the comment-contributing nature of the TCC, seem to override all other possible extensional interpretations of their compositional/iconic content, precluding interrogativity in the absence of its morphosyntactic marking. This is particularly notable in showing that, under 'extreme' circumstances, highly conventional levels of intonational meaning may be obligatorily accessed -- since there is nothing in the compositional effects of the SRC

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or TCC which would categorially preclude interrogative interpretation in the appropriate context. Note, however, that these highly conventional senses still do not violate the more iconic meanings of the contours.

Our earlier surmise that, while iconic levels of the continuum are always accessed, more conventional levels are only optionally available, must therefore be revised: under certain morphosyntactic conditions, conventionalized interpretations of pitch contours as utterance-length units may be forced, potentially with concomitant (specified) categorial restrictions against other kinds of semantic interpretation.

It should be noted that the arbitrarily categorial nature of the facts exemplified in (70) may itself be taken as strong evidence for the view that certain tunes like the SRC and TCC are indeed interpretable as unitary entities at conventional levels of the continuum.

Having examined some intonation patterns which may not occur on certain kinds of question, let us look at instances of 'interrogative intonation' (the high rise) which are arguably non-questions.

One widespread usage of the high rise, especially in American dialects, seeks confirmation that the hearer is receiving the information being sent, along the lines of a tag such as right? or okay? or you know?.

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Consider the following real example which was uttered with raised eyebrows, wide-open eyes, and the other gestural concomitants of a question:

(71)

The speaker was evidently concerned that her table manners should not be misinterpreted, and so couched the information in intonation which would oblige her hearers to acknowledge receipt of the message in some way. This usage is particularly common for some speakers when 'setting up' a narrative. Writers may even point it out with a question mark, as in this example of parodied Southern Californian English:

(72)

> My head's all messed up. I went to this encounter rap? This guy has this hot tub that seats ten in the basement of his house, and, you know, people get in it and, like, talk and touch and stuff.[2]

Gussenhoven 1983 discusses this kind of high rise as a 'metaphorical' use of his 'testing' rise morpheme referring to the locution rather than to the information in the utterance: "Children learning to read may use rises for no other reason than that they are leaving it up to their hearers to say whether they are reading it right. Similarly, foreign language learners may use rises when reading bits of

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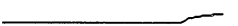
foreign language" (p. 29). We concur that these rises 'mention' question intonation rather than 'using' it directly, since the interrogativity is secondary to the imparting of information.

However, it has been claimed by Bolinger 1957 and 1982b, Lindsey 1981, and others that high rises are possible on rather clearly non-interrogative utterances which are 'exasperated', 'contradictory', 'indignant', or 'remonstrative'. Consider Bolinger's example:

(73)



(73) is interpretable as a question, but Bolinger is probably right in insisting that it may simply be an exclamation. What is clear is that it carries high degrees of emotional strength and incompleteness: although not demanding a specific response, it obliges the addressee to make a self-justification of some kind. In this way, (73) can be made more apt in an interrogative matrix: What are you thinking of? Money doesn't grow on trees! In an assertive context, a low rise (perhaps the TCC) would be much more likely: I won't lend you a cent -- money doesn't grow on trees!

It is nonetheless true that high rises can occur with no overtone other than one of exasperation. Just as falls correlate with control, and

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the power of the speaker to 'close' the matter at hand, a high rise may sometimes signal nothing but a marked lack of control, with a very high degree of emotional strength. Consider an intense command, with several prominences, such as:

(74)

Our conclusion must simply be that even the interrogative meaning of the high rise may be subordinated to the contour's more iconic senses, in contexts which favor the high emotional strength, great incompleteness, and/or lack of control which it implies.

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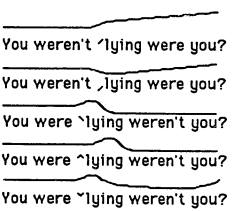
2.2.3 Tag questions

Morphosyntactically, tag questions generally reverse the polarity of the main body. A special kind of tag retains the (positive) polarity of the main body; we turn to these constant-polarity tags below.

Intonationally, tag questions may either continue a pitch movement begun in the main body of the utterance or be assigned a pitch movement of their own. In the former case, any of the nuclear contours are possible; terminally rising contours are for obvious reasons more interrogative than plain or delayed falls; tags in falling-pitch utterances seek confirmation of the assertion in the main body, with a stronger expectancy of assent than in rising-pitch utterances:

(75)



(75e) is very similar to a form with a plain fall on the body and a low rise on the tag. The formal distinction is between H+L...H% and

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H+L...L(+H)H%, which in performance may be negligible; compositionally, the meanings too are similar, although it is the fall-rise /H+L...H%/ which may be interpreted unitarily with a selecting/contrasting/correcting sense. Thus (75e) might be used contrastively in response to I was sitting there. Phonetically, the unitary fall-rise often does not fall to the bottom of the pitch range, whereas a plain fall is far more likely to. O'Connor & Arnold illustrate the distinction with two responses to an offer of chocolate:

(76)

(a) I ˇlike chocolate... (= 'but that's not the whole story'
H+L H% = 'no thanks')

(b) I ˋlike ˏchocolate. (= 'as for chocolate, I like it'
H+L L(+H)H% = 'yes please')

(Note that (76b) is interpretable as a good example of the TCC, without any sense of contradiction.)

This leads us to the issue of tag questions with separate intonation. Here the choices are not so wide. The low rise is by far the most common possibility, but plain and delayed falls are both fine:

(77)

(a) You were ˋlying, ˏweren't you?
(b) You were ˋlying, ˋweren't you?
(c) You were ˋlying, ^weren't you?

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High rises and fall-rises, however, seem to give the tag a life of its own, making it a separate question in its own right (in the case of the fall-rise it is akin to the usage on echo-questions which we discussed in 2.2.1 and 2.2.2):

(78)

(a) You were `lying; ´weren't you?

(b) You were `lying; ˇweren't you?

All the examples in (77) and (78) have main bodies with a 'default' fall, although this is not the only possibility. However, the choice again is not entirely open: the high rise, with its strong interrogativity, turns the main body itself into a (self-contained) question, so that the tag seems to be a separate, appended question:

(79)

You were ´lying? Weren't you?

Excepting high rise main bodies and tags, and fall-rise tags, any permutation of contour on main body and tag seems possible.

The intonationally most restrictive construction among tags (and throughout the entire English language, as far as I can tell) is the constant-polarity tag, which, if the tag is given separate intonation, seems to require a fall on the main body and a low rise on the tag, as in (34) above; we repeat the example as (80):

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(80)

`Jack's been here,,has he?

A delayed fall on the main body is fine, giving fairly conclusive proof that rise-falls are indeed variants of plain falls; a high rise, as we saw in (35) above, is not possible, giving fairly conclusive proof that the distinction between low and high rises is real. The constant-polarity tag construction must simply be specified to take /H+L/ on the body and /L(+H)H%/ on the tag, if the tag takes separate intonation. Other permutations are not possible, e.g.:

(81)

(a) *You were `lying, `were you?
(b) *You were ,lying, ,were you?
(c) *You were ˇlying, ,were you?

The utterances in (81) are possible, but not as tag constructions. The reason for the impossibility of contours other than fall plus low rise seems to be that they cause the tag to be interpreted as a separate utterance: interestingly, we can get a variety of contours on these constructions if the tag receives no pattern of its own, but merely continues the pitch pattern of the main body:

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(82)

(a) You were ´lying were you?

(b) You were ˌlying were you?

(c) You were `lying were you?

(d) You were ^lying were you?

(e) You were ˇlying were you?

These are apparently well-formed since the absence of a distinct nuclear pitch movement on the tag precludes interpretation as a separate utterance.

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2.2.4 Non-yes-no questions

We conclude this section with a brief look at the remaining two kinds of questions which do not necessarily carry morphosyntactic marking of interrogativity (as wh-questions do); these are alternative questions (alQs), which like yes-no questions are 'multiple-choice' questions, and complementary questions (compQs), which like wh-questions are 'explanatory' questions.

Like frag yes-no questions, compQs are marked by incompleteness: "Segmentally, compQs are like sert how-why from which the x, or I[nterrogative]W[ord], has been replaced by a blank" (Bolinger 1957:165); thus His reason being? alternates with His reason being what?. Frags, however, may be tagged, e.g. At five o'clock is she? ('coming to the meeting' understood); although sert wh-questions may be tagged, with constant polarity (He said what, did he?), compQs may not: *He said, did he?. Intonationally, compQs exhibit all the possibilities for frags listed in the chart in subsection 2.2.2.

AlQs, like yes-no questions, may or may not exhibit inversion: Do you want coffee, or tea?, You want coffee, or tea?; Is he going there, or is he coming here?, He's going there, or he's coming here?; etc. The distinctive intonation of alQs comprises rising pitch on the first

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alternative(s) and falling pitch on the last. The initial rise(s) may be of any variety, usually low but potentially high or fall-rise (or a mixture); and the final fall may be plain or delayed. On the basis of this rise plus fall configuration, it has been argued by Langacker 1970 (and, as Bolinger 1978b points out, by many others before him) that yes-no questions are in fact curtailed alQs, rising 'question intonation' being none other than the 'comma intonation' of the first half of an alQ. Bolinger 1978b argues persuasively against this notion. As we have seen, the intonational facts are not so simple: yes-no questions may take any contour, even falling, and the most interrogative contour (the high rise) is distinct from the low rise which is most common pitch on the first alternative(s) in an alQ.

Bolinger demonstrates moreover that yes-no questions and alQs are not semantically equivalent. We will see in our discussion of Cherokee in Chapter Four that it is possible for a language to mark the distinction formally (with clitics), militating against an analysis deriving one from the other.

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2.3 Tonal structure and interrogation: implications

In this chapter we have examined the interaction of tonal structure and interrogativity. Questions may or may not be morphosyntactically marked as such, and they may or may not be intonationally marked as such (the high rise comes close to entailing interrogativity, to such an extent that this property of the high rise must be specified at a relatively conventional level of the iconic-conventional continuum, but we have seen that even this correlation has exceptions). This means that in many instances the interrogative status of an utterance can be defined only by context; interrogation is thus a pragmatic function or 'π-function', to the expression of which English tonal structure contributes in various rather subtle and complex ways.

Obviously, not all languages will mix intonation and interrogation in exactly the same ways that English does. Before we move on to examine the facts of other languages, let us pause to consider what implications (of the type postulated by Cruttenden 1981) the facts of English, as we have analyzed them, might have for the form and function of intonation and interrogation elsewhere.

Firstly, given our semantic continuum, we would expect that, where a language marks (non)interrogativity with a distinction between

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falls and rises, then the rises rather than the falls will correlate with interrogativity. Formally, since in our analysis attributes terminal rises to a final H%, we would expect languages, if they employ H% in interrogative-relevant ways, to use this boundary tone to mark interrogativity rather than its absence.

More generally, if a language marks (non)interrogativity with a distinction between high pitch and low pitch, then high rather than low pitch will correlate with interrogativity. Recall the discussion in Bolinger 1978a of the prosody of yes-no questions; this, according to Bolinger,

> is the intonation universal that has been most thoroughly studied. In his survey of 175 languages, Hermann 1942 found without exception a tendency to higher pitch somewhere in the utterance. Ultan 1969 repeated the performance with 53 languages and got almost the same result. [In his Table 3] I add 41 more.

What might this mean in formal terms? The distinction between high rise and low rise, we claim, rests in the distinction between the H or L tone with which the rise begins. Thus we would expect a language to use H but not L tones (if any) to mark interrogativity. Ladd 1983 refers to but does not elaborate an analysis of the high rise/low rise distinction as a peak feature distinction on a single pitch accent L+H, presumably the [raised peak] feature. This strikes us as a promising hypothesis;

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following from it, we would expect languages to mark interrogativity with [+raised peak] but not with [-raised peak]. We would also expect languages to mark questions with widening of the overall pitch range (and consequent raising of all tones, especially H tones) but not with narrowing of the range.

Conversely, we would expect the more arbitrary, conventionalized facts of English intonation and interrogation (such as the preclusion of interrogativity on morphosyntactic declaratives with the SRC and TCC, and the idiosyncrasies of constant-polarity tags) to be much less likely to show up in other languages.

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3. Intonation and tone: Hausa

3.1 Tone in Hausa

Hausa is a Chadic language spoken primarily in Nigeria. It has two tones, H and L, and a falling tone which can be analyzed underlyingly as a sequence of these two tones, H+L. These tones are lexical, that is they are specified arbitrarily in underlying representations and function to maintain lexical contrasts. Consider, for example:

(83) kuukaa 'crying'

kuukàa 'baobab tree'

(The absence of an accent represents high tone, a grave accent low; vowel length is phonemic, and the tone of a long vowel is represented on the first mora of that vowel.)

A certain amount of tonal behavior is rule-governed, however. There is for example an 'identifier' particle nee/cee (Cowan & Schuh 1976; the alternants are masculine and feminine respectively) which exhibits 'polar' tone, that is its tone is always the opposite of that on the preceding syllable:

(84) shii Audù nee 'he is Audu'
he A. ident.

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(85) ita Kànde cèe 'she is Kande'
she K. ident.

Many tonal alternations in the verb system and elsewhere are also predictable. For example, 'adverbial nouns of state' can be formed from basic verb forms by changing the final vowel to -e and making all preceding syllables L:

(86) zaunàa 'to sit down'

zàune 'seated'

Such rule-governed behavior is always strictly morphosyntactic and belongs either in the lexical or phrasal phonology; it does not correlate with the expression of pragmatic functions on an iconic-conventional continuum of the type outlined in Chapter One.

However, Hausa forms yes-no questions from declaratives by prosodic means. This is interesting since a priori tone languages might be expected to favor morphosyntactic strategies, having more to lose from the tampering with pitch patterns. With the basic H/L tonal distinction reserved for lexical marking, what tonal devices are available for intonational use?

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3.2 Hausa statement/question intonation

The pitch patterns of yes-no questions differ both globally and locally from those of statements. Hausa declaratives are marked by the global phenomenon of 'downdrift', by which a H tone is lowered when it follows a L tone. This is distinct from what we might term (after Pierrehumbert) 'declination', the tendency of all tones to be placed relatively lower over time, which may be a low-level phonetic (or physiological) universal for declarative intonation (or at least the unmarked case for such utterances). Downdrift is a rather more drastic phenomenon which may reduce the value of a H tone to the same level as a preceding L.

Figure 1 (reproduced from Lindau 1983) shows pitch contours for two Hausa utterances, Muudii yaa zoo gidaa 'Mudi went home' and Maalàm yaa àuni lèemoo, with all-H and alternating H-L patterns respectively. The effects of declination and of downdrift are both clearly visible; it is important to bear in mind, however, that downdrift may be more extreme, or even complete, i.e. a H may rise no higher than a preceding L.

It is possible to represent the effects of downdrift either by means of a Pierrehumbert-style tonal evaluation rule, which decreases the value

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of a post-L H tone by some coefficient; alternatively, we might take downdrift to be symptomatic of a peak feature such as the feature [downstep] which, as we saw in Chapter One, Ladd 1983 motivates for English (see (45a) and (45b)). In Hausa, however, [+downstep] would be automatically assigned to a H tone following a L tone.

Declaratives are also marked by the presence of a final glottal stop /?/ if the utterance ends in a short vowel; and a final L tone syllable is either at the bottom of the speaker's range, or falls to that level.

A final H tone syllable exhibits such a downslur only optionally, but even this optional downslur is interesting in view of the fact that certain studies fail to mention it. Newman & Newman 1981, for example, present an analysis of Hausa question intonation which considers a final L to be a characteristic of questions only; Miller & Tench 1980 and 1982, on the other hand, consider a final downslur to be de rigueur in declaratives. The spectrographic data on which Lindau 1983 is based, however, show the downslur to be common but not obligatory. Consider Figure 2, which shows two declarative-final instances of the H-H word gidaa 'house, compound' from utterances by different speakers. The first example exhibits a marked terminal fall, the second no more than the effects of declination).

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We conclude that Hausa declaratives may optionally end in a L% boundary tone, phonetically interpreted (analogously to the Upstep rule which we motivated for English in Chapter One) as lower than the value of any preceding tone.

Yes-no questions are distinguished chiefly by a global strategy and a local strategy: globally, downdrift is decreased by any amount up to and including its total suspension; locally, the last H tone syllable in the utterance is raised to a superhigh level.

Kraft & Kirk-Greene 1973 imply that downdrift is not reduced, but state that the whole utterance is higher than a corresponding statement; Lindau's data on the contrary show ZERO slope, but the overall pitch register is not significantly higher. It seems that decrease of downdrift is almost always characteristic of questions, but that raised register (marked by a higher pitch for the first H or L in the utterance) is also possible.

According to Kraft & Kirk-Greene, the last H "will jump to a pitch level at least one step higher [in the range of five steps which they use to describe intonation patterns] than the pitch level of the previous high-tone syllable... If the final syllable is high, it will slur from the very high level to a level at least one step lower. A following low tone (if

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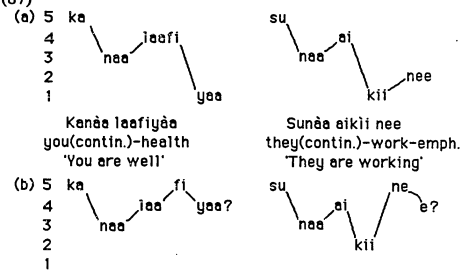
present) will drop only one step rather than all the way down to level 1 as in the declarative pattern" (p. 16). Their illustrations of statement and question intonation are as follows:

(87)



This description is generally echoed by Cowan & Schuh and by Newman & Newman, except that both these studies describe the last H as ABOVE the level of the first H in the utterance. Lindau's data show this latter claim to be generally true; see her diagrams in Figure 3, which show typical pitch contours for all-H and alternating H-L questions, here Muudii yaa ga zoomoo? 'Did Mudi see the hare?' and Maalàm yaa àuni lèemoo? 'Did the teacher weigh the oranges?'. We take the final H in a yes-no question to be marked with the feature [+raised peak]; if downdrift is reduced to zero, this peak feature will entail a higher pitch

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than the first H in the utterance. We will turn to the post-raised-peak shape of the contour shortly.

There is some evidence that the final H in a Hausa question may be not only [+raised peak] but also [+delayed peak]. Consider Figure 4, which shows on the top line declarative-final utterances of the word naamàa 'meat' by four different speakers; below each is an interrogative-final utterance of the same word by the same speaker. The locations of /n/ and /m/ are marked. It is clearly visible that while the pitch peaks at the middle or end of the H-tone syllable in the declarative, it peaks well into or beyond the /m/ of the interrogative.

This might be taken to be an automatic consequence of the feature [+raised peak], since the speaker will, ceteris paribus, take longer to attain a higher peak than a lower peak. However, we saw in Chapter One that both [raised peak] and [delayed peak] are under independent control for English speakers: the contrasts attributable to each feature, as illustrated in (44) and (46), may be maintained without affecting the status of the other. Mona Lindau (p.c.) has pointed out the plausible alternative view that, where a language maintains a [±raised peak] contrast but no [±delayed peak] contrast, then [+delayed peak] will be the unmarked, default case for a raised peak.

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This view is attractive since it accounts naturally for the occurrence of raised-and-delayed peaks (i.e. higher pitch plus downslur) for specific forms in many languages. We will see in Chapter Four that this contour is characteristic of one of Cherokee's two main accent patterns. A widely-noted example of raised-and-delayed peaking for yes-no questions is provided by Russian. This is the /2 3'-4 1#/ group of Leed 1965 (1=L, 3=H), where it is described as "the most frequent yes-no question contour" (p. 73). Leed makes the error of considering this contour impossible in English, where it is of course quite natural, though (being [+raised peak] and [+delayed peak]) emotionally very strong and consequently rather marked.

Questions in Hausa are also characterized by durational changes: an overall shortening of the utterance, but a lengthening of the final vowel (if lexically short). The overall increased tempo is estimated by Lindau at about 10-15% over corresponding declaratives; and utterance-final short vowels are marked by the absence of /?/. Such vowels exhibit breathy release; they are considered phonologically lengthened by Newman & Newman 1981, who argue that yes-no questions underlyingly contain an interrogative morpheme 'q' which consists of phonemic length and a L tone. As Newman & Newman themselves point out, however,

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these 'long' vowels do not undergo the Hausa rule of Low Tone Raising (LTR), which generally raises derived L final long vowels to H if they follow another L. Thus:

(88) àjìyɛ̀ kanènkì! 'put down your little brother!'

àjìyɛ̀ɛ shi! 'put him down!' (data from Cowan & Schuh 1976)

Final vowels are short before full NP objects but lengthened before pronouns; since imperatives of most verbs receive L tones, the lengthened final vowel of a form such as that in (88) must undergo LTR to become H. Contrast these with:

(89) àkwai àkwàatʔ[?] 'there is a box'

àkwai àkwàatʔ[breathy release]? 'is there a box?'

Newman & Newman conclude that "the raising rule, which operates within a word, must be applied before the attachment of q" (p. 45). Even if the appropriate boundary can be motivated[1], there remains the problem of the L component of q, since L% not only is optionally present in declaratives, but also is optionally absent from questions. Thus, while the pitch may fall from the [+raised peak] rightmost H in a question, it may equally well remain level, or indeed rise.

Consider Figure 5 (from Lindau 1983), which shows the FØ contours of four question-final words uttered by nine speakers, with

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lexical H-H, H-H, L-H and H-L patterns respectively. The dotted lines represent terminally falling contours, and the unbroken lines represent non-falling contours. Interestingly, the three speakers who consistently fall in questions are those who also employ a distinct L% after a final lexically H syllable in declaratives; we tentatively conclude that a L% boundary tone, which is clearly present in neither all nor only interrogatives, is idiolectally present/absent in both declaratives and interrogatives.

What of the terminal rises? The obvious conclusion is that these reflect the optional presence of a high boundary tone H%, along with Upstep as in English, to ensure a rise even after a final lexical H. In accordance with our expectations regarding the correlation of tonal forms and π-functions, H%, though optional, is present only in questions.

The interpretation of the H% varies somewhat depending on the lexical tones which precede. In the vast majority of Hausa utterances, the final or penultimate syllable bears a lexical H tone, since few Hausa words, and no basic verb forms, are L-only; moreover, LTR serves to eliminate many terminal L-L sequences. If the last, [+raised peak] H in the question is penultimate, and the utterance is assigned a H%, the intervening L is generally suppressed (as the contours on naamàa in

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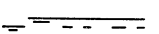
Figure 5 show), resulting in a rise from the [+raised peak] H to the end. In the relatively rare cases in which a greater number of Ls intervene, these seem generally not to be suppressed, so that the terminal rise is restricted to the end of the utterance -- usually the final syllable, but possibly the final word.

Where there is no H%, a sequence of final Ls begins at a relatively high level after the [+raised peak] H. Newman & Newman claim that all final L tones maintain a raised pitch: this follows from their analysis of question intonation proper (as opposed to the lengthening and L tone of their supposed q morpheme) as consisting of 'key raising', which is a property not of the last H syllable but of the whole utterance from this syllable onward. One of their schematized examples is:

(90)



ən bəə kə̀ ə̀kwə̀ətì?

The raising of the last H does have an effect on following Ls, but given that Pierrehumbert-style phonetic tonal evaluation in Hausa clearly makes reference to the value of the tone to the left (cf. downdrift) this may be seen as a local side-effect rather than a specified global rule. The diagram from Newman & Newman moreover implies that final Ls

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maintain a level pitch at least as high as that of intial Hs. If the sequence of following Ls is sufficiently long, however, they may return to a phonetic level close to that exhibited in corresponding declaratives; see Figure 6, which shows pitch contours for declarative and interrogative readings of àkwai àyàbà dà àkwàatì(?) 'there is a banana and a box(?)' by the same speaker.

There remains the question of all L-tone interrogatives. These are relatively unusual but possible, either as fragmentary or echo questions involving only L-tone nouns and particles, or echoed imperatives with all-L verbs, for example:

(91) àkwàatì? 'a box?'

"gàa àyàbà"? "'there's a banana"?'

"rùfè àdàdà!"? "'open the shed!"?'

These forms are of interest, since they lack H tones and therefore cannot exhibit either of the two fundamental characteristics of yes-no questions: the decrease of downdrift (lowering of Hs after Ls) and the assignment of [+raised peak] to the rightmost H. In fact they exhibit considerable variation. Minimally, all-L yes-no questions lack /?/ after a final lexically short vowel; context and accompanying gesture carry the interrogative sense. Usually, however, register is raised, and/or the final

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H% is used. Figure 7 shows three different interrogative-final utterances of the word àkwàatì 'box' by the same speaker. The first is from the utterance àkwai àkwàatì?, and exhibits a pitch falling from the [+raised peak] H on the second syllable of àkwai; the second two are fragmentary questions consisting of the noun alone, and exhibit the H% with varying degrees of Upstep.

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3.3 The intonation of morphosyntactically marked questions

Question-word questions ('wh-questions') in Hausa, like all question types, exhibit decreased downdrift; optionally, the rightmost H may be [+raised peak]. Interestingly, wh-questions seem always to end with a L%, although this boundary tone is only optional in declaratives. We would not expect L% to be associated with interrogatives but not declaratives (or to be more strongly associated with the former than the latter); but we have seen that this intonation (raised termination with downslur) seems to be a common unitary phenomenon for marked functions, such as interrogativity, in many languages (e.g. Russian).

We may conclude that the sequence of a H which is [-downstep] (i.e. non-downdrifted) or [+raised peak], plus a L%, is an intonational unit at a somewhat conventional level of the functional continuum in Hausa (like the /H+L[+raised peak], [+delayed peak]/ in Russian), and is obligatory in wh-questions. It remains true that CETERIS PARIBUS a L% does not line up with interrogatives rather than non-interrogatives.

Figure 8 reproduces Lindau's pitch contour diagrams for an all-H and an alternating H-L wh-question, Wàa ya ga zoomoo? 'Who saw the hare?' and Wàa ya àuni lèemoo? 'Who weighed the oranges?', uttered by one speaker (there are no H-tone question-words in Hausa).

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The main body of tag questions in Hausa exhibits the expected reduction of downdrift; the tag is koo ('or'), which is only optionally [+raised peak], but which is always followed by H%. Not surprisingly, koo occurs also in alternative questions, in which the first alternative is marked by the same patterns as yes-no questions, while the second exhibits declarative patterns. An overall higher register is optional.

Figure 9 shows contours for a tag question construction, Maalàm yaa rabà naamàa, koo? 'The teacher divided the meat, didn't he?', and an alQ formed on the same sentence with the full second alternative, koo bàa hakà ba? 'or is that not so?'; freely-formed second alternatives take the same declarative pattern exhibited by this formalized alQ clause.

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3.4 Summary

The tonal facts of the Hausa statement/question distinction may be summarized as follows:

	Decrease downdrift	Last H [+raised pk]	L%	H%
Declarative			opt.	
YNQ	yes	yes	opt.	opt.
WhQ	yes	opt.	yes	
Tag: body	yes			
tag		opt.		yes
AiQ: 1st	yes	yes	opt.	opt.
2nd			opt.	

Further, a final lexically short vowel will be followed by /ʔ/ in a declarative; and questions are shorter overall, and more likely to be given a raised register.

Thus, while the basic H/L tonal distinction is employed in Hausa for lexical purposes, a variety of tonal mechanisms is nonetheless available for the expression of π-functions such as interrogativity: specifically, peak features, boundary tones, and global contour characteristics.

Lastly, let us note the observation of Miller & Tench that 'surprise' may be expressed in Hausa by means of the yes-no question patterns. As they say, "This can be explained by taking an utterance displaying

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surprise or incredulity as questioning the truth of the proposition"(1980:58). There is clearly a connection between surprise and interrogativity, by way of 'puzzlement'[2]; we take this to indicate that the interrogative tonal strategies outlined in this chapter have, as in English, an iconic basis in such notions as emotional strength and open-endedness, and are not the arbitrary marking of a hard-and-fast syntactic division between two categories 'statement' and 'question'.

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3.5 Luganda

At this point we may pause to make some brief comparisons between Hausa and the East African language Luganda. Luganda is a Bantu language and quite unrelated to Hausa; moreover, although it has two tones, H and L, it has been shown by Hyman 1983 to be a pitch-accent language (rather than a strict tone language) in which morphemes may be marked (or not) for a syllable which is associated with the language's HL melody. Consider two of Hyman's examples, in which an asterisk represents the location of the lexical accent, an acute accent mark represents H, and a grave accent represents L:

(92) a. ò-kù-bàl-à 'to count' /o-ku-bal-a/

b. ò-kù-láb-à 'to see' /o-ku-la*b-a/

In declarative utterances, there are two possible forms; (92) illustrates one of these. The other is termed by Hyman "list intonation" (although it is not clear that this is an appropriate label): optionally, a final H may be assigned, which spreads leftward as long as it leaves at least one syllable L. For instance:

(93) a. /o-mu-pa*kas-i/ 'porter' -> òmùpákàsì OR òmùpákàsí

b. /o-mu-lamuz-i/ 'judge' -> òmùlàmùzì OR òmúlámúzí

Forms elicited in isolation may appear in either form; the supposed

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"list intonation" may perhaps be somewhat like the low rise in English, appropriate for 'open-ended' declaratives.

Interestingly, Luganda forms yes-no questions tonally, employing both of the main local strategies which Hausa uses: (1) the assignment of peak features located with reference to the rightmost H in the utterance, and (2) the assignment of a H% boundary tone.

Alvin 1983 argues for a SL (superhigh-low) interrogative melody in Luganda, associated to the immediate right of the last accent. In our data, the superhigh pitch is associated with the last H itself; consider the following (the circumflex represents the superhigh pitch):

(94) a. bábílábà 'he sees them'

b. bábílâbà? 'does he see them?'

It is reasonable to conclude that this strategy represents the assignment to the last H of the [+raised peak] feature. Assuming that Alvin's data represents a dialectal or idiolectal variation, this would amount to the additional assignment to the last H of the feature [+delayed peak], such that the pitch peak is attained in the syllable following the accented syllable.

It is not clear that 'interrogative' is the best label for the [+raised peak] strategy, at least for our consultant. 'Emphatic', in the 'I declare!'

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sense, might perhaps be more accurate; this may be interrogative in the appropriate context.

The more common interrogative strategy for our consultant involves a terminal rise, above the pitch of a preceding H. Consider the following (we use underlining to represent the high rising termination):

(95) a. àgúlá ébíkópò 'he's buying cups'

b. àgúlá ébíkópǫ? 'is he buying cups?'

We assume that this represents the presence of a boundary H%, along with the customary interpretive rule of Upstep. As in Hausa, an intervening L may be overridden:

(96) a. òmùpákàsì 'a porter'

b. òmùpákásį? 'a porter?'

Interestingly, the terminal rise may even be used on Hyman's "list" pattern:

(97) a. òmúlímí 'a farmer'

b. òmúlímį? 'a farmer?'

This indicates that Luganda has an intonational H% independent of the final H tone which marks one of the possible declarative patterns. Upstep applies to H% but not to the "list" H. Conversely, the "list" H may spread leftwards, but H% seems not to.

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Lastly, let us point out a distinctive further pattern which denotes surprised interrogativity. It takes the form of lengthening of the final vowel and H% associated with the added mora, such that the tone pattern on the preceding vowel remains unaffected. For example:

(98) a. òmùwálábù 'an Arab'

b. òmùwálábùu?! 'an Arab?!'

(99) a. àbìléètá 'he's bringing them'

b. àbìléètáa?! 'he's bringing them?!'

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4. Interrogation without intonation: Cherokee

4.1 Pitch-accent in Cherokee

Cherokee constitutes the Southern branch of the Iroquoian language family, from the Northern members of which it split off as much as an estimated four thousand years ago. Most of its speakers live in northeastern Oklahoma, their ancestors having been forcibly removed to the Cherokee Nation there nearly 150 years ago; a smaller number are the descendants of escapers from the removal, living in North Carolina. Correspondingly, there are two main dialects, Western (Oklahoma) Cherokee, with which the present study is primarily concerned, and Eastern Cherokee.

Cherokee has been studied relatively little, and its rather complex pitch system in particular has received little attention. The present section, based on Lindsey (in progress), though not at all complete, attempts to give the most adequate account to date of pitch-accent phenomena in Cherokee.

There are two basic morphosyntactic types in Cherokee, which may be termed 'tonic' and 'atonic' after Cook 1979. All verbs may appear in both tonic forms, which correspond to indicative main verbs,

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and atonic forms, which correspond to subjunctives, infinitives, subordinates, etc. A small number of non-derived nouns are inherently tonic, but deverbal nouns (the majority of nouns) are generally atonic. All adjectives, whether deverbal, denominal or non-derived, are marked to be inherently atonic (cf. Lindsey & Scancarelli 1985).

One of the main defining characteristics of the tonic/atonic distinction is pitch-accent; there are two accent patterns, which we may term tonic accent and atonic accent, although it appears that atonic accent is superimposed upon tonic accent patterns (rather than replacing them), in accordance with the notion that atonics are generally derived from tonics.

Although there are only two basic accent patterns, Cherokee exhibits six (arguably seven) surface tones. These six tones may be illustrated with the following eight words, each of which is, in its minimal surface form, monosyllabic. No free morphemes in Cherokee are underlyingly monosyllabic, however, since they all contain an additional underlying final vowel (of unpredictable quality, although the default vowel, as on loanwords, is -i) which generally surfaces in utterance-final position or in formal speech registers[1]:

(100) a. nvv[1]ya 'rock'

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b. noo^{2}ya 'sand'; a^{2}ma 'water'

c. skoo^{23}ya 'insect'

d. aa^{3}ma 'salt'; so^{3}ʔi 'another'

e. thaa^{32}li 'two'

f. oo^{4}sta 'good'

Figure 10 illustrates these six types with FØ contours for one speaker. The numerical diacritics in (100) are adopted from Feeling 1975, where Eunice Pike is credited with suggesting them. Feeling 1975, the official dictionary of the Cherokee Nation, deals with the Oklahoma dialect and is the only source in the literature of explicit pitch descriptions for Cherokee words of either dialect. Unfortunately, there is no account of tone or pitch-accent in the Introduction or accompanying Grammatical Sketch, and the notation implies rather little in the way of phonemic analysis.

[2] represents a low level pitch and [3] a high level pitch; note that only these simple tones occur on short vowels. [23] and [32] represent glides from one of the two level pitches to the other. [1], following Feeling, is an abbreviation for [21], a fall from the low pitch to an even lower level; spectrographic analysis reveals a descent into creaky voice. [1] may be referred to informally as 'superlow'.

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[4] is described by Feeling as simply higher than [3]; according to him (p. xi), "Before pause, the final syllables of Cherokee words exhibit a pitch beginning at level 4 and falling to a lower point." In fact, spectrographic analysis shows that final pitch is only optionally higher than a preceding [3] (see Figure 10); nor is the downslur always present. It is this pitch on the optional final vowel of a Cherokee word which is the arguable surface 'seventh tone'. Here we conclude that the final vowel is always associated with a H% boundary tone, usually with Upstep to create a pitch higher than a preceding [3] (which, it will be seen, we take to be H). We will follow Feeling in not marking pitch on final vowels, since it is predictable (as is final vowel length, i.e. short; final vowels are also nasalized).

Feeling continues, "A word which exhibits pitch 4 on a preceding syllable, however, has a final pitch beginning at level 3 and falling to a lower point." Feeling's failure to understand the division of Cherokee words in tonic and atonic categories leads him into confusion on the issue of [4] (informally, 'superhigh'). Where the final syllable is the highest pitched syllable in the word (as it often is even after [3], thanks to Upstep), he considers this to be a (predictable) [4]. Where the final syllable is not the highest pitched syllable in the word, he considers the

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penult to be (marked as) [4], with the proviso that final vowels in such words are lower than they are elsewhere.

In fact, spectrograms show that a final vowel is always at about the same pitch, whether it is the highest pitched syllable in the word or not (see Figure 10). When a preceding syllable is even higher (such that Feeling would mark it as [4]), this is an instance of what we take to be atonic accent, which is generally a superhigh rising pitch on the rightmost long vowel of the word. Specifically, we take atonic accent to be a H tone which is both [+raised peak] and [+delayed peak]. This, contra Feeling, is distinct from the H% (plus Upstep) assigned to all final vowels (when present).

In fact, with less than a handful of exceptions in his entire dictionary, Feeling marks [4] only on a penultimate syllable, i.e. the only environment in which atonic accent precludes a step up in pitch to the final vowel (since the highest post-atonic-accent pitch is [3], i.e. H, and H% will usually be somewhat higher than this thanks to Upstep). When the rightmost long vowel in an atonic form is prepenultimate, Feeling's implicit diagnostic for pitch [4] (descent to the final vowel) is absent, and he marks the atonic-accented syllable as a plain rise, i.e. [23]. Consider, for example,

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(101) uu^{4}tha^{2}na 'large'

Feeling transcribes this word as uu^{23}tha^{2}na, since for him pitch [4] only occurs (unmarked) on those final vowels which are the highest pitched syllables of their word, or (marked) on the penults of words whose final vowel is not the highest pitched syllable of the word. It is quite clear, however (and confirmed by spectrographic analysis, as demonstrated by the FØ contour for this word in Figure 11), that the pitch of the first syllable of uu^{4}tha^{2}na rises considerably higher than that of a true [23]-initial word such as skoo^{23}ya 'insect' as in (100), and moreover is higher than the final syllable.

Indeed, all instances in Feeling's dictionary of a [23] syllable immediately preceding a [2] syllable appear to be misanalyzed cases of prepenultimate atonic accent; as we will see, a genuine [2] pitch is not in fact possible after a [23] syllable, due to the operation of tonic pitch-accent.

We will represent atonic accent with a circumflex on the first mora of the appropriate vowel (and for typographical convenience accents are placed BEFORE the mora in the case of /v/). Thus 'large' is ûuthana, and 'good' (as in 100f) is ôosta. It is important to note that when an atonic form contains no long vowel, the accent is assigned to the (short) initial

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syllable; in most dialects this seems to be indistinguishable from [3], since the short vowel cannot accommodate the full extent of the [+raised] and [+delayed] H. We have found some Oklahoman speakers, however, who seem able to maintain the contrast between [3] and [4] on short vowels. An example of an all-short atonic word is sô?i 'another' in (100d) above.

'Large', 'good', and 'another' are all adjectival. Atonic forms of verbs behave rather distinctly in accentual terms. All verbs occur in five aspectual forms (denoted chiefly by suffixes): present, imperfective, perfective, punctual and infinitive. Certain forms, such as imperatives and infinitives, appear to require specific accent patterns determined by verb class; the tonic/atonic status of these forms is at present unclear. The atonic forms of present, imperfective and perfective verbs (the forms of these verbs used for example in relative clauses) seem always to receive penultimate accent: a short penult is lengthened to accommodate the accent.

Cook 1979 terms these 'suffix accented', although he does not provide an analysis of Cherokee pitch-accent, simply marking the appropriate vowels with an acute accent [́] which for him merely denotes 'high pitch'. According to Cook (p. 93), "The accent of the atonic verb lengthens the vowel which bears it when a single consonant follows." He

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formulates it as

(102) -ˊVC- --> -ˊV:C- / __ atonic

and gives the following example:

(103) késti ya:kí:?a 'he is not eating'

(cf. á:ki?a 'he is eating')

We consider these forms to be kêesti yaakîi?a and aakí?a respectively (Cook considers there to be marked high pitch on the first syllable of á:ki?a, which conflicts with our data, but it should be borne in mind that Cook's study is of the North Carolina dialect; the interpretation of our own tonic accent [ˊ] will be explained shortly). For present purposes it is sufficient to note the lengthening of the penult under the influence of atonic accent. Cook's restriction of the rule to open syllables (viz. his specification of a single following consonant) remains to be tested.

Atonic accent is 'culminative' in the sense of Hyman (1978), where it is observed (p. 8) that, "In an ideal culminative accent situation, there will be at least and at most one accent per accentual unit." The accentual unit for the Cherokee atonic accent is the whole word.

Tonic accent in Cherokee is not so strongly culminative, since tonic forms may lack accent altogether; it seems that the accentual unit for

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tonic accent is the morpheme, which may contain no more than one accent. Tonic accent takes the form of a mark assigned to a mora within a morpheme; we take this to be a mark of the first syllable within the morpheme to be assigned a H tone. This H is then iterated rightwards over remaining moras; moras to the left which bear no tone are assigned L tone by default. Thus an accentless vowel, unless it receives H tone iterated from an accent to the left, is L, or pitch [2] in Feeling's terms. An accented mora is H, or [3]. If the accented mora is the left mora of a long vowel, the long vowel as a whole is H; if the accented mora is the right mora of a long vowel, and the left mora does not receive H from an accent to the left, the result is a long vowel with the tone pattern L-H, i.e. [23].

We thus take the forms in (100b), (100c), and (100d) to be underlyingly as follows:

(104) a. noo^{2}ya < /nooya/

a^{2}ma < /ama/

b. skoo^{23}ya < /skoóya/

c. aa^{3}ma < /áama/

They receive their patterns as follows:

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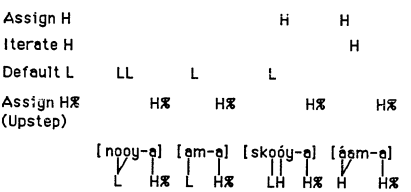
(105)



These are all examples of rightward iteration within a syllable. It is not as yet clear precisely in what ways an accentual H may be iterated rightward; specifically, how far, and across what kinds of boundaries, iteration may proceed. There is evidence, however, that rightward iteration may proceed across a syllable boundary from an accent on the right-hand mora of a long vowel; and across the boundary between a verb stem (root plus aspectual suffix) and the following modal suffix. Consider the imperfective aspect suffix (of Verb Class 4), /-iísk-/. The underlying second-mora accent on this morpheme results in the surface pattern [23], as in (106a), unless it is immediately preceded by a [23] syllable, in which case it is realized as -ii^{3}sk, as in (106b):

(106) a. ka + l + iísk + 6o?i 's/he used to take it (long obj.) out'
3sgA-take out-impf.-habit.

-> [ka^{2}lii^{23}skoo^{3}?i]

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b. aa + kahthoóst + iísk + óo?i 's/he used to look at
3sgA-look at-impf.-habit. her/him'

-> [aa^{1}khthoo^{23}stii^{3}skoo^{3}?i]

Cherokee pronominal prefixes divide into two classes, A and B; the functional basis for this distinction in the pronominal system, among other topics, is investigated in Scancarelli (in progress). The pronominal prefixes ka- and aa- are alternants conditioned by certain characteristics of the root to which it is prefixed; the pitch [1] on aa- is, as we will see, predictable. In (106b) the first vowel of the root is deleted by a rule of Metathesis described in King 1975, Cook 1979 and elsewhere, by which /h/ moves to the left of a short vowel, or a resonant plus short vowel, with concomitant loss of the vowel if followed by an obstruent:

(107) Metathesis

(R) V h C
1 2 3 4 => 3 1 2 4 (if 4 is [+obst], 2 --> Ø)

The raising of [23] to [3] after a preceding [23] can also be seen on the modal suffix -v´v?i, which appears on past tense forms to indicate that the action is an objective fact (not reported). In North Carolina, it has the form -vvki; King calls it 'definitive' while for Cook it is 'assertive'.

(108) a. aa + hloo + sk + a 's/he is surpassing her/him'
3sgA-surp.-pres.-indic.

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-> [aa^{1}hloo^{2}ska]

b. uu + hloo + s + v´v?i 's/he surpassed her/him'
3sgB-surp.-perf.-assert.

-> [uu^{1}hloo^{2}svv^{23}?i]

(109) a. aa + skoó + sk + a 's/he is digging it'
3sgA-dig-pres.-indic.

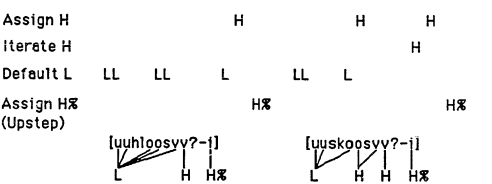
-> [aa^{1}skoo^{23}ska]

b. uu + skoó + sk + v´v?i 's/he dug it'
3sgB-dig-perf.-assert.

-> [uu^{1}skoo^{23}svv^{3}?i]

B pronominal prefixes are stipulated in perfectives. Pitch [1] on uu-, as on aa-, is predictable. (108b) and (109b) are derived:

(110)



(The derivation of pitch [1] on the prefixes is not shown.)

Significantly, the assertive suffix retains its L-H ([23]) pattern after a stem syllable with H-tone ([3]); consider for example, uu^{1}kii^{3}svv^{23}?i

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's/he's picking it up', uu^{1}lskii^{3}svv^{23}ʔi 's/he's dancing', etc. We tentatively conclude that the H tone assigned to a tonic-accented mora iterates only one mora to the right, but does so regardless of intervening consonants, syllable boundaries or morpheme boundaries:

(111) H-spreading

(/.../ may be zero, but may contain no V)

It is this process which also eliminates from Cherokee the occurrence of L ([2]) syllables after L-H ([23]) syllables; forms in Feeling's dictionary such as uu^{23}tha^{2}na are, as we pointed out above, mistranscriptions of atonic forms with [4-2] sequences.

The rules we have so far presented give Cherokee words the characteristic overall rising pattern noted by Bender & Harris 1946, although their analysis is far too simple (at least for the Oklahoma dialect; their study is of the North Carolina dialect): "The only feature which is not automatic and which therefore has to be marked is the point at which the contour ends... The vowels preceding it, up to the next accented vowel, will be lower: the vowel immediately preceding the accented one will often be middle-tone, while the ones preceding it will

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be low-tone" (pp. 14-5).

The two tones which violate this general rising shape, [1] (=[21]) and [32], remain to be accounted for, and we turn to them now.

There is a process in Cherokee whereby certain pronominal prefixes cause the leftmost /h/ in a verb stem to change into /?/; the prefixes which trigger this are a rather arbitrary subset of the total set of pronominal prefixes, and the diachronic basis for this process is not clear. The h-->? rule can be illustrated with the verb root /-h-/ 'kill':

(112) aa + h + iha 's/he is killing him/her'
3sg-kill-pres

(113) tsi + ? + iha 'I am killing him/her'
1sg

However, the /?/ surfaces only prevocalically in the Oklahoma dialect; preconsonantally, it is realized as lengthening of the preceding vowel (if short) and the assignment to that vowel of falling pitch, by a rule which we can call Glottal Lowering (GL):

(114) Glottal Lowering (GL), informal

Preconsonantal /?/ is realized as falling pitch on the preceding vowel, which is lengthened if short.

For instance, consider the first person singular A prefix tsi-, with an underlying short vowel (cf. 115a), but which undergoes GL when it triggers h-->? on a following root-initial /h/:

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(115) a. tsi + yée + k + a 'I'm waking up'
1sgA-wake up-pres.-indic.

-> [tsi^{2}yee^{3}ka]

b. aa + hyée + k + a 's/he is taking it'
3sgA-take-pres.-indic.

-> [aa^{1}hyee^{3}ka]

c. /tsi + hyée + k + a/ 'I am taking it'
h-->? ?
GL ii^{1}
[tsii^{1}yee^{3}ka]

We can now account for the pitch [1] on vocalic pronominal prefixes (which is present only in tonic forms; these prefixes in atonic forms bear pitch [2]) with a rule which inserts /?/ to the right of an initial vowel in the pronominal prefix of a tonic form:

(116) Tonic Glottal Insertion (TGI)

Ø --> ? / [$_{pron}$V__ cond.: in tonic forms

(We tentatively suggest that it is TGI which guarantees the length of pronoun-initial vowels, as well as their pitch.)

We assume that all instances of pitch [1] and pitch [32] are reflexes of an underlying preconsonantal /?/; pitch [2], or L-tone, alternates with [1], while [32], or H-L, is the result of the interaction of Glottal Lowering and H-assigment, although the ordering of these two processes is not as

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yet clear. We can now give the underlying forms of (100a) and (100e) above as follows:

(117) a. nvv^{1}ya < /nv(v)?ya/ 'rock'

b. thaa^{32}li < /thá(a)?li/ 'two'

It seems likely that one of the major distinctions between the Eastern and Western dialects of Cherokee is the greater retention of preconsonantal glottal stops in the former. A survey of works on North Carolina Cherokee (e.g. Bender & Harris 1946, King 1975, Cook 1979) indicates that preconsonantal /?/ is quite common. King's dictionary of North Carolina Cherokee does not show a /?/ in the entry for 'rock' (nvvya, cf. 117a), but his form for 'rock armor' is nv?ya uuhnuwu. Oddly, King's dictionary shows no glottal stop for 'two' (thaali, cf. 117b), while Feeling's dictionary of the WESTERN dialect DOES show one: tha^{3}?li; this word seems to vary considerably: some Oklahoma speakers use the form with /?/, while others, including our principal consultant, lack preconsonantal glottal stop entirely. Generally, preconsonantal /?/ in the Eastern dialect correlates with falling pitch in the West, e.g. sv?ki 'onion' (King) vs. svv^{1}ki (Feeling); titastu?tiyu 'jail' (King) vs. tii^{2}taa^{2}stuu^{1}tii^{4}?i (Feeling); kaka?thahv?a 'I am turning' (King) vs. ka^{2}kaa^{1}tha^{2}hvv^{3}?a (Feeling); akwahlski?sti 'for me to dance'

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(King) vs. u^{2}lskii^{1}sti 'for him/her to dance' (Feeling); etc.

The absence of GL from the Eastern dialect might also help to explain the relative dearth of commentary on the Cherokee pitch system in North Carolina, since GL, perhaps a Western innovation of the last 150 years, gives rise to much of the Oklahoma dialect's tonal complexity.

All of the rules we have encountered so far interact in the following derivations involving the verb 'brag':

(118)

	/a + tlv'vkwah + sk + a/	/ka + tlv'vkwah + sk + a/
TGI	?	--
h-->?	--	?
Metath.	hØw	--
H assign.	H	H
H spread	--	H
Default L	L L	L L
GL	aa^{1}	aa^{32}
H% assign.	H%	H%
	[aa^{1}tlvv^{23}khwska]	[ka^{2}tlvv^{23}kwaa^{32}ska]
	's/he's bragging'	'I'm bragging'

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4.2 Interrogation in Cherokee

Yes-no question formation in Cherokee is not primarily by prosodic means; like many languages with lexical use of the pitch system (Mandarin and Yoruba, for instance), Cherokee chiefly uses question particles.

These particles are clitics which are attached to the end of the first constituent of the question; they are attached to the full form of this constituent, i.e. including its final vowel. In declaratives, as was mentioned earlier, final vowels usually surface only in utterance-final position; in yes-no questions, final vowels are visible not only utterance-finally (if the initial constituent is not also the last) but also before the interrogative clitic on the initial constituent. Final vowels thus play a secondary role in establishing the utterance-type of a given sentence[2].

The clitics, like underlying final vowels, are associated with a H% boundary tone, so that H%'s may be "stacked"; there is some evidence (including Durbin Feeling, p.c.) that Upstep applies iteratively, creating a gradual increase in pitch over a series of clitics. This question, however, requires further study.

The most widespread interrogative clitic is -s(ko); its most

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common form is -s, but the full form does occur, especially in the speech of older speakers. For example:

(119) a. kawóoniha 's/he is speaking'

b. kawóonihas(ko)? 'is s/he speaking?'

(120) a. yoóna 'bear'

b. yoónas(ko)? 'is it a bear?'

Holmes & Smith 1977 list an even more extended form, -skohv, but this is not mentioned elsewhere and has not appeared in our data. Cherokee final vowels, however, appear to be somewhat in flux, showing a marked capacity for vanishing and multiplying.

Holmes & Smith list another suffix, -tsv, which is attested by no one else except King 1975, who appears however not to distinguish it from the more widely noted -tsu (p. 96), claiming further that it is interchangeable with -s(ko). Nonetheless, it appears that, at least in the Oklahoma dialect, -tsu can be distinguished semantically from -s(ko) as a 'conducive' yes-no question clitic. The description in Feeling 1975 (p. 293) implies that it is used when assent is expected; for example:

(121) kawóonihatsu? 'well, is he speaking?'

Our principal consultant has provided the following illuminating contrast between a -tsu conducive question (122b) and a -s plain

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information question (122c):

(122) a. tanalskiisi 'we will dance'

b. tanalskiisitsu? 'shall we dance?'

c. tanalskiisis? 'are we going to dance?'

(Accent is left unmarked here, since these examples involve the prepronominal future prefix ta- which, like other prepronominal prefixes, affects the pitch of the rest of the word; the tonal effects of prepronominal prefixes are the least well understood aspect of Cherokee pitch-accent, and we do not touch upon them in the present study.)

It is significant that -tsu is used in the formalized greeting thoohîitsu 'how are you?', formed on thoohîi?i 'fine' (laryngeal-vowel sequences seem prone to loss, even before the interrogative clitics; moreover this is a frozen expression). The greeting expects automatic assent, and is not strictly speaking a true request for information.

The clitic -khe is used for alternative questions; Feeling 1975 gives the following example (pitches omitted):

(123) kawoonihas, teekanookii?akhe ? 'is s/he speaking, or singing?'

The first alternative, as in English and Hausa, takes the basic yes-no question form; the second alternative receives the special clitic. Significantly, -khe can be used as the only interrogative clitic in a

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question with only one alternative:

(124) a. héeka 'you are going'

b. héekakhe ? 'or are you going?', 'are you going or not?'[3]

These facts provide some cross-linguistic evidence against the sort of analysis proposed for English by Langacker 1970 et al, that plain yes-no questions should be derived from alQs.

In the Oklahoma dialect, tags are formed with the particle khaa, which is odd in several respects: it is marked by low pitch and length on its final vowel, and seems not to be a clitic of the same type as the others in that its location is not restricted to the end of the first constituent. King 1975, on the other hand, lists the less aberrant clitic form -ka; the facts require further investigation. The low pitch is especially interesting in view of the statutory rise on the tag koo in Hausa; but recall that standard (reversed-polarity) tags in English take both rises and falls (with different semantic effects). An example of the Oklahoma usage is:

(125) a. kiíhli 'dog'

b. kiíhli khàà ? 'it's a dog, isn't it?'

An interrogative clitic not previously mentioned in the literature is -ki, which is used on echo-questions:

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(126) a. askaya 'man'

b. askəyaki ? '(did you say) a man?'

Thus the interrogative clitics of Cherokee are interesting insomuch as they make distinctions morphosyntactically which are often thought to be precisely the domain of intonation. Conduciveness and echoing, for instance, are good examples of pragmatic functions, which a priori we might not expect to be marked in the morphosyntax.

What then remains for intonation to perform in Cherokee? Although the evidence as yet is scanty, it does seem that questions may be formed prosodically without recourse to the clitics. Holmes & Smith 1977 list their interrogative clitics as an alternative way to form questions "besides using a questioning tone of voice as in English" (p. 73), although this is not pursued any further. In Feeling 1975 it is observed that, "Questions can also be marked in Cherokee by intonation changes, when surprise is indicated" (p. 347), and a single example is given, without commentary:

(127) a. a^2ska^2ya 'a man'

b. $a^3ska^3ya^3$? 'a man?'

Most significant here is the raised register, and the concomitant SUPPRESSION of the H% (or at least of its Upstep rule). Although

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examples are not common and are difficult to elicit, this pattern does seem to occur; for instance:

(128) a. khaáhwi 'coffee'

b. khaáhwí ? '(would you like some) coffee?'

In a coffee-serving context, the plain yes-no form khaáhwis ? would inappropriately ask 'is it coffee?'. The reference to 'surprise' in Feeling 1975 is also significant: reliance on intonation for interrogativity in Cherokee probably tends to require what Bolinger 1957 calls "high tension", or an unusually high level of emotional strength.

The suppression of the customary terminal rise in intonational questions is prima facie bothersome; but recall that the H% in Cherokee is not itself strictly intonational by our definition -- it does not express any π-function but seems rather to be a kind of boundary-marker. The strategy probably represents not so much the unexpected opposition of a declarative rise vs. an interrogative level pitch, as the opposition of regular (lexical-phonological) pitch patterns vs. the suspension of these pitch patterns and their replacement with global high pitch.

Thus Cherokee, while possessing the H and L tones, peak features, and boundary H% that we have already seen in English, Hausa, and Luganda, does not make use of any of them for the expression of the

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interrogative π-function (and perhaps the expression of any other). To the extent that it uses pitch for such purposes at all, Cherokee seems to rely on the global contour features (specifically, register) which are likely to be common to all languages.

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5. Conclusions: universals and continua

The present study has attempted to give an outline of the form and the function of intonation which is applicable not only to English but also to other languages of widely differing typological (and, more specifically, tonological) character. We have aimed to arrive thereby at a realistic and insightful definition of intonation: that is, the use of tonal structure to express semantic/pragmatic functions ('π-functions').

To give substance to this definition, we have presented evidence for the universality of a particular notion of tonal structure and a particular conception of semantic/pragmatic functions (more specifically, that of interrogativity).

Functionally, we have seen that languages (not surprisingly) express yes-no interrogativity in certain recurrent ways: in plain information questions, in tagged and alternative forms, conducively, surprised, as echoes, etc.

Formally, we have seen the recurrence of specific tonal mechanisms upon which languages may draw for one purpose or another. There is the fundamental opposition between H tones and L tones; combinations of these tones to forms pitch-accent melodies, or (as

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in English) larger 'compounds' and collocations; peak features which modify the pitch prominences embodied in the H and L tones; boundary tones which determine the shape of the contour at the beginning or (more commonly) the end of a phrase; and global contour characteristics such as slope, register, and pitch range (although we have had relatively little to say regarding the formal representation of these characteristics).

Two crucial continua appear to be of importance in defining the role of intonation: one intra-linguistic (or perhaps metalinguistic), the other inter-linguistic (or typological).

Firstly, there is the semantic or functional continuum which expresses the simultaneous iconic and conventional nature of the use of vocal pitch in language. Certain implications regarding the relation of intonational form and meaning across languages have come to light, and we have investigated them most explicitly in connection with interrogativity. These implications rest fundamentally on the notion of the semantic continuum according to which even relatively conventionalized uses of tonal structure for π-functions may not violate the basic correlations: high pitch with strain and low pitch with rest; kinetic pitch with greater emotional strength and static pitch with less emotional strength; and terminal motion toward/away from low pitch

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with closedness/openness.

From these correlations follow our expectations that interrogativity, where it is expressed tonally, will be associated with H rather than L, [+raised peak] rather than [-raised peak], the presence of H% rather than its absence, and globally raised pitch rather than globally lower or falling pitch.

Secondly, our brief survey has demonstrated the existence of a cross-linguistic continuum between "intonationally rich" languages and "intonationally poor" languages; that is, between languages which make use of the whole range of tonal mechanisms for the expression of π-functions, and languages which use a much narrower range of tonal phenomena for such purposes.

Thus English uses tones, boundary tones, peak features and global features for the expression of emotional strength, (in)completeness, interrogativity, etc.; Hausa and Luganda make lexical use of the H/L tonal distinction, but use boundary tones, peak features, and global features to mark yes-no questions of various kinds; while Cherokee, although its grammar clearly contains H and L tones, H%, [+raised peak], etc., seems to use only the global feature of pitch register as marks of interrogativity.

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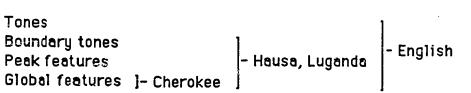
In this sense, English and Cherokee may be considered as lying toward opposite ends of the typological continuum, although it should not be concluded that they represent extreme or abnormal states of affairs; it is likely, for example, that the majority of the world's tone languages align more closely with Cherokee than with any of the other languages considered in the present study, forming yes-no interrogatives primarily by morphosyntactic means and resorting only to global contour features for some marked interrogative purposes.

We might begin to diagram the inter-linguistic continuum as follows:



The continuum may prove to be implicational, such that, for instance, a language which uses the basic H/L opposition intonationally would be expected to employ boundary tones likewise.

Obviously, much work remains to be done. The intonational sketches of English, Hausa, and Cherokee given here are far from complete; and virtually nothing has been said here of non-interrogative-related intonation beyond English. Substantive

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intonational research on many languages has yet to be begun, and only extensive cross-linguistic work will flesh out the picture of tonal structure given here.

As for π-functions, it would be interesting to learn which are truly universal, which less so; and which are more likely than others to be expressed by means of vocal pitch.

Intonation is exceptionally interesting precisely because of its iconic, non-arbitrary basis. The more we understand its working in the world's languages, the better will be our understanding of the relation between linguistic sound and meaning -- the fundamental goal of linguistics.

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Footnotes

Chapter One

[1]Three kinds of intonational transcription will be used, more than one simultaneously where this will be helpful. Curved lines are the most transparent, and will be used at the beginning and where clarity of phonetic detail is important. By far the most typographically economic are the 'tonetic' marks of the British school of intonational analysis, and these will be used in the forms of O'Connor and Arnold 1973, which are as follows (the symbols are broadly iconic, and pertinent details of their precise interpretation will be discussed in the text):

[,] low fall nucleus (tonal pattern of 'sentence stress')

[`] high fall nucleus

[^] rise-fall nucleus

[,] low rise nucleus

[´] high rise nucleus

[ˇ] fall-rise nucleus (rise is delayed to end of phrase)

[ˉ] mid-level nucleus

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[ˈ] high head (pre-nuclear stretch of phrase, commencing with first accent)

[ˌ] low head

[ˇ] falling head

[ˌ] rising head

[¯] high prehead (phrase-initial unaccented stretch)

[ˈ, ˌ] high and low non-pitch-prominent stresses

[|] phrase boundary without pause; [||], with pause

Lastly, we will make use in the examples of the autosegmental-tonal form of representation, adopted in this work in a modified version of the system of Pierrehumbert 1980. The precise character of this system will be made clear in the text.

[2]It should not be concluded from this, however, that we adopt Selkirk's theory of focus unreservedly. In fact, certain of her claims seem to be false. For example, according to her Phrasal Focus Rule (p. 207), a constituent may be a focus if its head is a focus and/or if an argument of the head is a focus." She concludes from this that I have INSTRUCTIONS to leave, on the (non-preferred) complement interpretation ('I am instructed to leave'), can be interpreted with either narrow focus (on INSTRUCTIONS) or broad focus (on (have) INSTRUCTIONS to leave), since INSTRUCTIONS is the head of

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INSTRUCTIONS to leave, and INSTRUCTIONS to leave is an argument of have INSTRUCTIONS to leave. Thus this sentence may be appropriately uttered in response to Why are you going? WITHOUT forcing narrow focus on INSTRUCTIONS. This, she claims, is in contrast with I have instructions to LEAVE, on the relative clause reading (again, non-preferred; 'I must leave instructions'), which purportedly disallows broad focus interpretation, since the relative clause to LEAVE "is an adjunct, not an argument" (p. 238). This sentence would indeed be odd, given the particular choices of lexis and the indefiniteness of instructions; but consider I have PLANS to write and I have plans to WRITE, each on its non-preferred reading (complement and relative clause, respectively). The former might be a response by a writer to the question Why haven't you published anything lately? and the latter might be a response by an architect leaving a planning meeting to the question Why are you going so early? Selkirk's implication that the latter allows only narrow focus, while the former allows either narrow or broad focus, seems unrealistic.

We will have little more to say on the subject of focus in the body of the present work.

[3]We leave until section 1.4 discussion of the status of the initial H,

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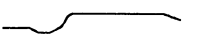
which may be either a boundary tone or a pitch accent; we also defer discussion of the precise structure of low (and high) rises.

[4] This is true of standard dialects of American and British English. In other dialects, however, postnuclear falls may be observed; consider, for example, Liverpudlian and stereotypical Yiddish-influenced English:

(i)



(ii)

The terminal fall in (i) is slight and, indeed, optional (without altering the meaning significantly); the fall in (ii) is gradual from the postnuclear syllable to the end of the phrase. However, neither case necessitates the phrase accents of Pierrehumbert's system. Gussenhoven 1983 (fn. 8) implies that the Liverpool contour is a [+delay] fall; on phonological grounds this would be a possible solution, but seems improbable since the more local rise-fall (i.e. H*+L [+delay]) occurring in standard English dialects is also quite common in Liverpool. A better solution, then, is to analyze (i) as L*+H followed by a LOW boundary tone L%; this entails that one way in which Liverpudlian differs from

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standard dialects is in the presence of this non-default boundary L%. This analysis extends to the contour in (ii), with monotonic interpolation of the H...L sequence rather than iteration of the H (see below in the text).

[5]Thus the crucial distinction between low rise and high rise is in the kind of pitch prominence with which the rise begins; in this way the analysis coincides with the distinction between Bolinger's C and B accents. Cf. Bolinger (p.c., Dec. 17 1983): "the low rise is simply my C profile, in which the important part is the attainment of the relatively low pitch, with a higher pitch following (and also preceding, if there is unaccented syllabic material there) to set it off. The pattern remains the same regardless of where it occurs on the pitch range. The 'high rise' is my B profile, a pattern in which a higher pitch is jumped up to." Thus the formal distinction between the interrogative-weighted high rise and the low rise is that between H...H% and L(+H)...H%.

An alternative suggested by Ladd, which we consider in Chapter Two, is that "both the high-rise and the low-rise should be represented as LH [=L+H], with a feature difference on the L [presumably that of 'raised peak']" (Ladd 1983, fn. 13).

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Chapter Two

[1]The facts regarding the deletability of the subject are not entirely clear, but it seems that you can be retained more easily than other pronouns; thus You going are you? is better than We going are we? or They going are they?, which are both better than ?He going is he?

[2]From the novel The Movie Lover by Richard Friedel, New York 1981.

Chapter Three

[1]The ordering of Low Tone Raising in the phonology of Hausa is itself unclear. Leben 1971 proposes internal word boundaries for reduplicated forms which violate LTR such as yàayàa 'how?', which is obviously the kind of solution which Newman & Newman are resorting to for their q morpheme. Russell Schuh on the other hand has proposed that LTR be used to account for the polar tone of nee/cee illustrated in the text above. These particles would be lexically specified as L and undergo LTR after a preceding L; LTR would then be required to ignore the boundary between nee/cee and the preceding word. McHugh 1982 discusses these issues and presents a general analysis of Hausa verb tone.

[2] But recall that in Chapter Two we saw for English that the

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'exclamatory' form of surprise ('I declare!'), conveyed by the surprise-redundancy contour, may in fact clash with interrogativity on yes-no questions. On inverted yes-no questions in English, the interrogative sense is forced by the morphosyntax and overrides the surprise component of the contour; on non-inverted questions, the 'exclamatory' sense wins out and suppresses interrogativity.

Chapter Four

[1] Long vowels are represented here as geminates. /v/ is a nasalized central vowel. The obstruents /t/, /k/, and /ts/ (this affricate being alveolo-palatal for most speakers) are unaspirated and may be voiced intervocalically; a following /h/ is realized as voicelessness and aspiration of the obstruent. (There is some evidence that this aspirating /h/ and the /?/ with which it alternates, as described in the text below, may be best analyzed as an autosegmental feature on the consonant in question.)

[2] Since the clitics cause underlyingly final vowels to be no longer final, final vowel shortening is no longer applicable, and this is therefore the only environment in which underlyingly long final vowels may retain their length. However, speakers are often erratic with respect to the length of pre-clitic final vowels, and it may be that final vowel

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shortening, and the markedness and statistical rarity of the clitic environment, are causing the underlying long/short distinction to break down in final position. The general issue of vowel length in Cherokee is rather unclear; all of the major studies specify vowel length, and, although it has been suggested that length is entirely predictable, this remains to be demonstrated.

[3] Likewise, yes-no questions in Hausa may be introduced with koo 'or'. These are described as 'polite', which might prima facie be considered a secondary effect of explicitly giving the addressee more than one option for the reply. Contrast this, however, with the difference in English between the neutral Are you coming? and the insistent, LESS polite Are you coming or not?.

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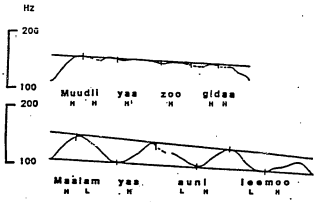
Fig. 1



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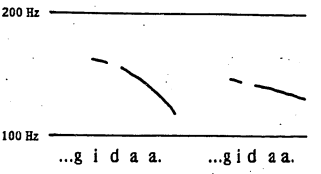

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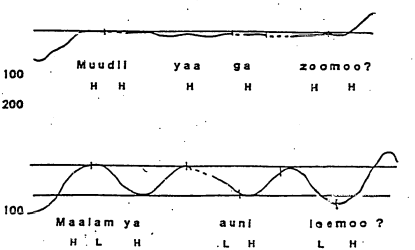

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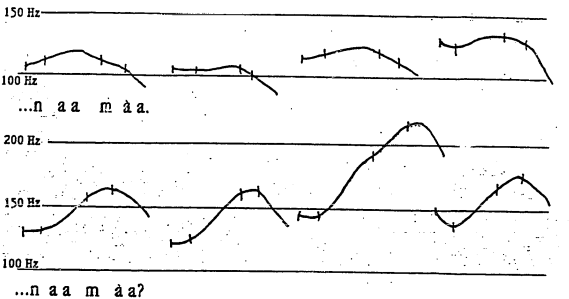

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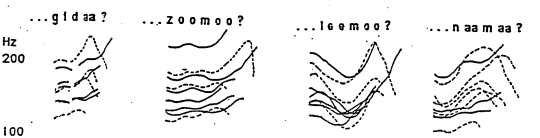

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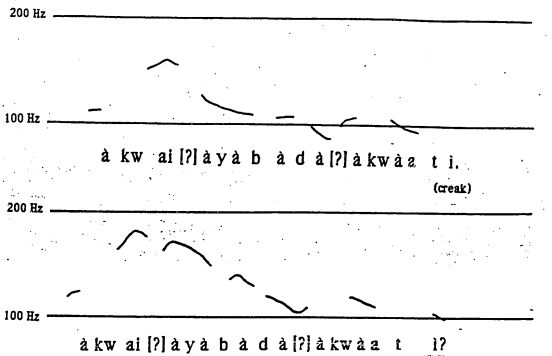

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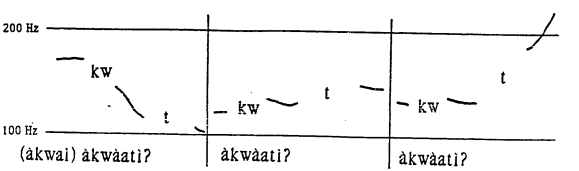

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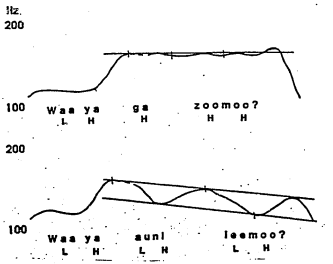

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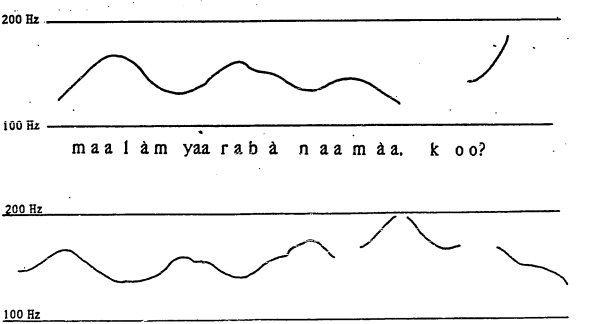

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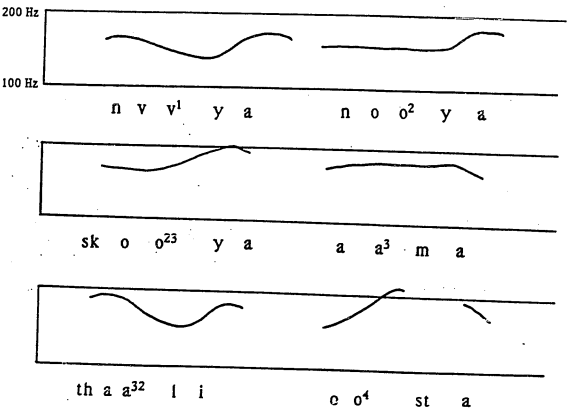
Fig. 10



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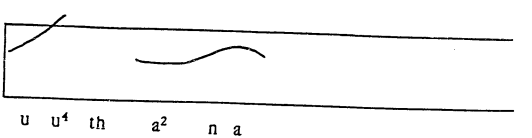

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