

TONE LANGUAGES

A Technique for Determining the Number and Type of
Pitch Contrasts in a Language, with Studies
in Tonemic Substitution and Fusion

KENNETH L. PIKE

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PREFACE

IN the summer of 1938, at Ann Arbor, Michigan, the basic thesis of this volume was presented at a luncheon conference of the Linguistic Institute sponsored jointly by the University of Michigan and the Linguistic Society of America.¹ In the winter of 1942-43 the preparation of the manuscript in substantially its present form was made possible by a grant from the Faculty Research Funds of the University of Michigan and by my position as Research Associate of the English Language Institute. During the next few years the research in Mazateco was amplified in collaboration with Miss Eunice Victoria Pike, who had studied this language during the years 1936-45 and who had participated in the earlier Mazateco investigation. The presentation of these additional data was made possible as part of the work undertaken by me as Lloyd Postdoctoral Fellow of the University of Michigan. At the same time brief notes were inserted on a few other languages (Mandarin, Maya, Zapoteco, Matlazinca, Chinanteco, and Otomi) and a number of items were added to the Bibliography.

During the years 1935-45 annual field trips to the Mixteco tribe of Oaxaca, Mexico, gave me opportunity to study the tone language of that tribe, under the auspices of the Summer Institute of Linguistics of Glendale, California (with academic sessions at the University of Oklahoma). The problems faced during that period resulted in the development of the procedures to solve them that constitute the nucleus of this volume. Later these solutions were tested in application to other tone languages of Mexico, both for their theoretical validity and for their outworking in the formation of practical orthographies for vernacular literatures. Classroom tests have been made with the material as it was presented in mimeographed form to several hundred students in sessions of the Summer Institute of Linguistics at Norman, Oklahoma, and, more recently (1945), in sessions of the Linguistic Institute at Ann Arbor, Michigan. A number of the students had already done some work on tone languages of Africa and Asia and served as a control in keeping the material practical for other students preparing to reduce to writing tonal languages of these areas.

In previous volumes, Phonetics² and The Intonation of American English,³ I reviewed the pertinent materials of other writers before presenting my own contribution. Although in this instance I have examined the works available to me that are concerned with tone languages, I have not set out to make a critical analysis of them. The difference between the approach here and that in my earlier volumes is due to the nature of the materials themselves. In Phonetics sounds were analyzed that could be produced by the human voice, and such sounds were directly subject to test by any phonetician. In The Intonation of American English the data, again, were directly available to me for observation as a speaker of English. For tonal study, however, the data for each language would have to be analyzed separately, and the critical study of any one language would demand a considerable period of time, as well as informants who could speak the language.

¹ In that year, also, a brief statement of some of the principles of the present work appeared in my Phonemic Work Sheet (Siloam Springs, Arkansas), section d, "Tests for Prosodic Features of Pitch, Quantity, Stress."

² Phonetics: A Critical Analysis of Phonetic Theory and a Technic for the Practical Description of Sounds, "University of Michigan Publications, Language and Literature," XXI (Ann Arbor, 1943).

³ "University of Michigan Publications, Linguistics," I (Ann Arbor, 1945). Study of this volume on intonation might well precede the reading of the present one on tone languages, since the student would thereby become more aware of the problems of transfer from one type of pitch system to another.

For this reason it proved impossible to weigh with any certainty the reports of languages with which I had no direct contact.

Nevertheless, once tonal principles were arrived at in the analysis of firsthand data, it seemed advisable to give the reader some suggestion of other language groups of the world to which they might apply. In this way the student going to a specific area might be forewarned of some of the problems he would be likely to face. Illustrations for the chief characteristics of tone languages, therefore, have been abstracted at second hand from pertinent materials and furnished the student. Quotation of such data must not be construed as approval of the methods utilized to obtain them, or as certification of the accuracy of the results; it merely indicates the widespread appearance of types of phenomena presented here primarily through the medium of Mixteco and Mazateco.

The chief purpose of this book, then, is not a critical analysis of the field, but (1) the illustration of an analytical approach to tone languages, a methodology based upon recent linguistic advance, and (2) the presentation of firsthand data on Mixteco and Mazateco, languages which represent two very different structural arrangements of linguistic tone. Specifically, the book does not pretend to be a complete report on all kinds of tone-language types that may exist--though it gives hints for the future classification of some of them--or a summary of those particular tone languages that today may be culturally important.

The principles of phonemic analysis now in general use in the analysis of segmental phonemes are equally applicable, in theory, to the study of tonal phonemes. Various special practical problems arise, however, when an investigator attempts to apply these principles to pitch data. In order to solve such problems it is advisable to modify the phonemic procedures, and to amplify phonemic theory, with particular reference to tone.

The basic difficulty in discovering and transcribing the significant lexical pitch units lies in the relative nature of these pitches. The absolute pitch is not pertinent as such. Rather, the pitch of one syllable in contrast to pitches of neighboring syllables constitutes the essence of tonemic distinctions. The general pitch of the voice of a speaker may change from utterance to utterance or even in the midst of an utterance; in this way all pitches may, for example, be lowered so that the lowest pitches of the first utterance are higher than the highest pitches of the later utterance. Nevertheless, the tonemes, the significant pitch contrastive units, remain unchanged; the relative pitches are the same in each utterance.

In a language in which the majority of the syllables are without perceptible change of pitch within the syllables themselves, but in which important contrasts exist between the relative heights of neighboring syllables, the changes of general height of voice may introduce serious analytical hazards for the investigator. Rather than having a more or less stable and distinctive combination of characteristics upon which to fix his attention, in the same way in which he can listen for the typical sound quality of s, which remains somewhat constant even within the range from fronted to retroflexed varieties, he must listen only for the relative height of syllables in specific sequences. If he tries to keep in mind some definite pitch level and, when dealing with it at a later time, assumes that the contrastive tonemic analysis is the same, many errors will creep into his findings at unnoticed changes of the general pitch of the speaker's voice.

A second serious problem in the analysis of a language containing predominantly level syllables consists in the necessity for keeping these and other nonsignificant pitch fluctuations distinct from the actual substitution of one pitch phoneme for another pitch phoneme within the structural system of the language. The phonemic substitutions are caused by the interplay of tonemes in tonal morphophonemics, tonal sandhi, tonal morphology, tonal syntax, and so on. To the foreigner who wishes to speak the language it may appear to be a matter of indifference whether the pitch of a certain syllable is lowered slightly because the general pitch level of the voice has fluctuated or because, say, two high tonemes are not "allowed" in sequence and, therefore, the second of them is mechanically lowered to a mid toneme. But the results of misinterpretation are

distinctly more important for the person reducing a language to writing, since it affects the number and placement of symbols. The grammarian is likewise concerned, for incorrect interpretation gives an entirely erroneous structural picture by treating data that are actually phonemic as non-phonemic and data that really are part of the grammatical structure as mere phonetic variation.

To tone analysts who have worked primarily with languages in which syllables tend to have gliding rather than level pitches--as, for example, the languages of the southeastern part of the Asiatic mainland in contrast to those of the southern half of Africa or of southwestern Mexico--the degree of such difficulties may be surprising. The reasons for the more serious problem in level-tone types may readily be given: (1) If, for example, a falling toneme is suppressed and a rising toneme substituted for it, the change in the character of the tonal contour itself is so great that the investigator may have the substitution thrust upon his attention; in this respect the substitution of a rise for a fall parallels the substitution of an s for a k. With level tonemes, however, no such objective clue is present; the general contour of the syllable itself remains level, as before, when a level high is substituted for a level low. The fact that a change has occurred cannot in this case be proved by listening to the pitch of the syllable itself, but can only be determined with certainty by comparing the one syllable with its neighbors. Furthermore (2), in the Asiatic materials I have examined, interchange of tonemes seems to be quite rare, so that the function of substituted tonemes rarely arises. For these two reasons, certain of the chief problems in tonal analysis are best illustrated in the data of the many tonal languages of Africa and of Mexico.

Part I of this study describes some, but by no means all, of the types of tone languages that exist, along with difficulties involved in their analysis. The attempt to show a basic organizational difference in the action of gliding-tone and level-tone types of tone languages is one of the advances in the field proposed in this section.

In the study of tone languages the application of phonemic principles has been delayed much longer than in the analysis of segmental phenomena, possibly because of the difficulties just described. Although modern phonemic theory, as applied to segmental sounds, covers many of the tonal situations quite adequately, the procedures for applying such theory require considerable modification for efficient tonal analysis. Part II of this book outlines the steps in such a methodology. Many of these steps may be followed profitably by the expert as well as by the beginner. The procedure indicated is basically a method of controlling free, conditioned, key, mechanical, morphological, and sandhi tonal changes by inserting lists of words into selected contexts so as to reduce the number of variables at any one time and give the investigator the opportunity of observing the significant linguistic pitch in its simplest contrastive forms. Although some of these steps may be implicit in the research now being carried on by other investigators, most of them are, so far as I am aware, presented here for the first time.⁴ The advanced student will be especially interested in the theory and methodology for finding, in a register-tone system, a toneme which he can prove is both high and not replaced by other tonemes, and which, therefore, may be used as a point of reference for classifying the level tonemes of further syllables.

Interest in the over-all structure of a language is increasing in descriptive linguistics. In tonal study, therefore, one should be prepared to observe the systematic interrelations of tonemes with each other and with the grammar. In the light of this fact, Part III has two major

⁴Since the present volume has been in process of publication, however, I have had occasion to utilize an adaptation of certain of the analytical procedures developed for it in my Phonemics: A Technique for Reducing Languages to Writing, which appeared in 1947, as Volume III of the "University of Michigan Publications, Linguistics" (Ann Arbor). D. M. Beach ("The Science of Tonetics and Its Application to Bantu Languages," Bantu Studies, 2d series, II [1924], 75-106), has some excellent discussions of significant tones and their conditioned variations (97-98), but he does not give a methodology to show the beginning student how to find them. In fact, he says (83), "It would be impossible to prescribe any exact procedure by which in a given language the minimum significantly complete units of speech-melody are to be discovered."

objectives: (1) the presentation of a methodology for the discovery of tonal interplay, especially in languages with level tonemes; and (2) the outlining of two languages that differ greatly in such tonal substitutions: (a) Mixteco, in which much mechanical disturbance of one toneme by another occurs, and for which an arbitrary subclassification of groups of morphemes that do or do not cause such changes is given, and (b) Mazateco, in which tonemes fuse together in intricate, overlapping, pyramided layers. The systems of Mixteco tonomechanics and Mazateco tonemic fusion present important types of linguistic structure not reported on this scale within the works examined by me.

The educator who wishes to reduce to writing a tone language hitherto without literature is desirous of obtaining the alphabet that will prove most easy for the native to read and to write. Such an alphabet is assumed to be a phonemic one, with a one-to-one correlation between symbols and significant sound units. To obtain such a correlation, it is evident that a phonemic analysis of the language is prerequisite. It follows that the best practical results can be obtained by an adequate technical analysis of the data that the orthography is designed to represent. Practical social progress and an adequate scientific investigation must march hand in hand. It is to be hoped, therefore, that the technical nature of these pages will not deter from using them the "practical" people for whom they are first of all designed, and that the attention to the social applications of linguistic theory will not cause the scientist to overlook the technical principles postulated.

To my sister, Eunice Victoria Pike, I am indebted for collaboration in the analysis of the structure of the Mazateco tonemic system; she is largely responsible for the detailed lists of verbs in compound form, for the lists of the stems of independent verbs, and the like. Professor Charles C. Fries gave valuable advice in the organization of the manuscript and was largely responsible for making its preparation possible.

K. L. P.

Tetelcingo, Morelos, Mexico
February, 1946

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P A R T I

CHARACTERISTICS OF TONE LANGUAGES

C H A P T E R I

TYPES OF TONE LANGUAGES

A. Basic Characteristics of Tone Languages

A tone language may be defined as a language having lexically significant, contrastive, but relative pitch on each syllable.¹ The languages of southeastern Asia (China, Burma, Indo-China, Siam) are largely tonal, as are the languages of Africa west of Ethiopia and south of the Sahara (Sudanic, Bantu, Bushman, and the Hottentot groups).² In North America various tone languages are found in southwestern Mexico (Mixteco, Mazateco, Amuzgo, Chatino, Chinanteco, Chocho, Cuicateco, Otomi, Tlapaneco, Trique, and Zapotec) and in the United States (Navaho, Apache, and others).

1. Lexically Significant Pitch

Significant pitch distinguishes the meanings of utterances. When pitch is lexical, it distinguishes the meanings of words. Thus Mixteco³ žūkū means 'mountain,' but žukù means 'brush,' and the only difference between them is that the first word ends in a medium-pitched syllable and the second word ends in a low-pitched one. Pitch is also significant in English, but in English the semantic differential applies to the phrase as a whole, constituting a shade of meaning rather than a dictionary or lexical meaning. For this reason English is not called a tone language even though it utilizes significant pitch, since a tone language must have pitch that is both significant and lexical.

2. Contrastive Pitch

By a CONTRAST we mean that one thing is different from another thing within a functional system. Thus within the system of English sounds [p] is different from or contrasts with [b], as seen in pán versus ban; similarly, No! forms a contrast with No?, and so on. The contrastive,

¹D. M. Beach ("The Science of Tonetics and Its Application to Bantu Languages," in Bantu Studies, 2d series, II [1924], 84, 102), calls all languages (including English) tone languages, on the basis of their intonation. It would appear preferable, however, to keep tonal and intonational types distinct in nomenclature.

²That South African and West African languages are largely tonal is affirmed by A. N. Tucker (The Eastern Sudanic Languages [London, 1940], I, 57-59); those few of the Bantu languages "which are not tone languages, like Swahili, are linguae francae." See also C. M. Doke, A Comparative Study in Shona Phonetics (Johannesburg, 1931), 216; and A. N. Tucker, "Survey of the Language Groups in the Southern Sudan," BSOS, VII (1933-35), 861-96. References to literature discussing the tonal nature of many of the other languages mentioned in this paragraph will appear in later footnotes.

³Mixteco is a language of southern Mexico, the dialect represented here being that of San Miguel el Grande, Oaxaca. The data were gathered by me in 1935-45, for the Summer Institute of Linguistics. In the Mixteco illustrations given here and later č is to be read approximately like ch in English change; ž as z in azure; n̄j as nj in can joke; š as sh in ship, with a slight added whistle; ? as the catch in the throat in the middle of Oh Oh!; e as the vowel of book, but with the lips spread apart; n, after a vowel, as the nasalization of that vowel; b, d, and g, fricative, with slight escape of air, except after nasals. In a vernacular literature with an alphabet adapted to that of Spanish, the following substitutions may conveniently be made: č to ch, ž to y, n̄j to nch, š to x (following many ancient spellings of Indian languages of Latin America), ? to ' or to h (with h silent in Spanish material), e to i.

lexical units of sound are PHONEMES,⁴ or, in tonal analysis, TONEMES. In tone languages the pitch contrasts or significant pitch differences entail one pitch being kept different or separate from another pitch in the immediate context. Two level pitches may contrast by one of them being relatively higher than the other. On the other hand, a rising pitch may contrast with a falling pitch, or one rising pitch with a second pitch which, relatively, rises higher.

3. Relative Pitch

Tone languages have a major characteristic in common: it is the relative height of their tonemes, not their actual pitch, which is pertinent to their linguistic analysis.⁵ It is immaterial to know the number of vibrations per second of a certain syllable. The important feature is the relative height of a syllable in relation to preceding and following syllables. It is even immaterial, on this level of analysis (but not in the analysis of the linguistic expression of emotion), to know the height of a specific syllable in proportion to the general average pitch which the speaker uses. Rather, one must know the relationship of one specific syllable to the other syllables in the specific context in the particular utterance. A man and a woman may both use the same tonemes, even though they speak on different general levels of pitch. Either of them may retain the same tonemes while lowering or raising the voice in general, since it is the relative pitch of syllables within the immediate context that constitutes the essence of tonemic contrast.

4. Syllable Pitch

As defined here, each syllable of a tone language carries at least one significant pitch unit. Most frequently there is a one-to-one correlation between the number of syllables and the number of tonemes in any specific utterance. Mixteco tends to be of this type; in the word žukù 'brush,' instanced above, there are two syllables and two tonemes. In some languages, however, a syllable may have more than one toneme. Mazateco⁶ frequently has syllables with two tonemes: note

⁴For a discussion of phonemic principles and techniques see especially M. Swadesh, "The Phonemic Principle," Lang., X (1934), 117-29; idem, "The Phonemic Interpretation of Long Consonants," Lang., XIII (1937), 1-10; idem, "A Method for Phonetic Accuracy and Speed," Am. Anthr., XXIX (1937), 728-32; N. S. Trubetzkoy, Anleitung zu phonologischen Beschreibungen, Édition du Cercle Linguistique de Prague (Brno, 1935); L. Bloomfield, Language (New York, 1933), 74-138; E. Sapir, "Sound Patterns in Language," Lang., I (1925), 37-51; B. Bloch and G. Trager, Outline of Linguistic Analysis (Baltimore, 1942), 38-52; K. L. Pike, Phonemics: A Technique for Reducing Languages to Writing (Ann Arbor, 1947).

It is interesting to compare the criteria used by these authors for finding segmental phonemes with the ones used tacitly and explicitly in this monograph for tone; note, for example, Swadesh ("Principle"): consistency of words, partial identities, constant association, complementary distribution, pattern congruity, substitution; Swadesh ("Method"): contrast, complementary distribution, complexes. Compare C. F. Hockett, "A System of Descriptive Phonology," Lang., XVIII (1942), 9: similarity, nonintersection, contrastive and complementary distribution, completeness, pattern congruity, economy.

Beach proposed, about twenty years ago ("Tonetics," Bantu Studies, 2d series, II [1924], 75-106) and again, more recently (The Phonetics of the Hottentot Language [Cambridge, 1938]), the parallel that tone is to toneme as phone is to phoneme, but it has not had popular acceptance, since "tone" has strong nontechnical and technical usage in the meaning "significant pitch unit," i.e. toneme. He defines a toneme (90) as being a group of tones "no one of which can occur in the same position as any other."

⁵That tones are relative, and not absolute, has frequently been stated--for example, by O. Gjerdman, "Critical Remarks on Intonation Research," BSOS, III (1923-25), 495-505; I. C. Ward, An Introduction to the Ibo Language (Cambridge, 1936), 11; D. Jones and K. T. Woo, A Cantonese Phonetic Reader (London, 1912), xv.

⁶Mazateco is a language of southern Mexico, the dialect represented here being that of Huautla de Jiménez, Oaxaca. The data concerning it were gathered by me in collaboration with Miss Eunice Victoria Pike and Mrs. George Cowan, from 1936-45, for the Summer Institute of

the word ti⁴⁻² 'bowl,' which consists of one syllable with a low toneme, number 4, and a much higher toneme, number 2; these two tonemes do not constitute a single rising toneme in the structure of that system.

Tone languages may have monosyllabic or dissyllabic (or trisyllabic, and so on) words and morphemes.⁷ A dissyllabic word has two syllables and at least two tonemes. A MORPHEME may be roughly defined as a grammatically indivisible word or smallest meaningful part of a word--for example, cat, man, -ish, -ness. Morphemes, whether words or parts of words, may be monosyllabic or dissyllabic.

It is convenient to consider that the tonemes are basic to or inherent in the lexical form of the words and their syllables. Each syllable in a tone language has pitch as fully basic to the words in which it occurs as p, t, and f are inherent in English pie, time, and wife. Just as the f of wife changes to v in wives, however, so some of the tonemes may be replaced by others in the grammar of tone languages.

As will be indicated presently, there may exist languages which one desires to call tonal because, although they do not have contrastive pitch on each syllable, they do have lexically significant contrastive pitch spread over entire words or morphemes. In this book, however, the syllable type of toneme must be present for a language to be labeled tonal.

B. Level-Pitch Register Systems

Tone languages are by no means all alike in the kinds of tonemes they utilize, or in the function of these tonemes in their grammatical systems. One of the most striking differences exists between those systems which are comprised largely of level tonemes and those whose tonemes are mostly of a gliding type. A LEVEL toneme is one in which, within the limits of perception, the pitch of a syllable does not rise or fall during its production. A GLIDING toneme is one in which during the pronunciation of the syllable on which it occurs there is a perceptible rise or fall, or some combination of rise and fall, such as rising-falling or falling-rising. The manner in which this level-gliding distinction may affect a tonal system is indicated in the following paragraphs; level pitch is described first.

1. Number of Registers

When a language has a small, restricted, number of pitch contrasts between level tonemes, these contrastive levels are conveniently called REGISTERS. The number of permitted registers in various languages seems to be limited to two, or three, or four;⁸ languages have been reported

Linguistics. For a list and brief statement of the character of Mazateco sounds see Chapter VIII, note 1; for a detailed discussion of such sounds see K. L. Pike and E. V. Pike, "Immediate Constituents of Mazateco Syllables," IJAL, XIII (1947), 78-91.

⁷A. L. James and G. P. Bargery ("A Note on the Pronunciation of Hausa," BSOS, III [1923-25], 721-28) state a preference for restricting the term "tone languages" to monosyllabic types. This would make a highly arbitrary separation between them and languages otherwise acting in similar ways tonally but containing dissyllabic morphemes.

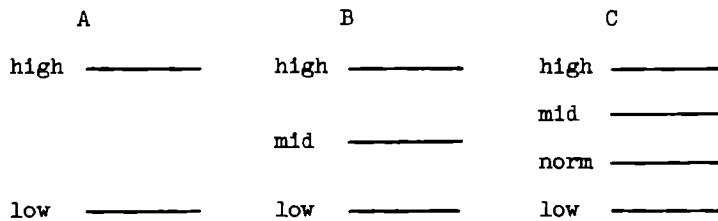
⁸A two-level system has been described for Apache (H. Hoijer, Chiricahua and Mescalero Apache Texts [Chicago, 1938]). Matlazinco (of Mexico) appears to have two registers also (data gathered by me in collaboration with Henrietta Andrews and Olive Shell, of the Summer Institute of Linguistics, in 1945).

A three-level system is present in Mixteco. One has also been claimed for Shona (Doke, Shona Phonetics, 217; but Doke's statement is not clear, for he says there are "three level tones of normal grammatical speech," but "only two are really significant"); Sechuana (D. Jones, "Words Distinguished by Tone in Sechuana," Festschrift Meinhof [Hamburg, 1927], 88-98); Ibo (I. C. Ward, "Tone in West African Languages," Proc. Third Internat. Cong. Phon. Sci. [1939], 383-88; Ward speaks here of two levels in monosyllables but of more elsewhere, and in her Introduction to the Ibo Language, though she works with five arbitrary but noncontrastive levels, she describes only

with more levels of perceived pitch than four, but apparently such numerous levels are not all contrastive or lexically significant, and would reduce to fewer phonemic registers.

If a language has two registers, it is convenient to label them "high" and "low." If there are three registers, the labels "high," "mid," and "low" may be used; with four registers, the labels may be "high," "mid," "norm," and "low."

A language with two registers tends to have the contrastive levels farther apart than are the contrastive levels of four-register systems. This tendency may be diagrammed as follows, each column representing a different language:



2. Level Tonemes Juxtaposed to Form Glides

In a register-tone system glides sometimes occur. These glides are often analyzable in terms of their end points. When this is so, the starting point of the glide is a toneme constituted of one of the level pitches; the ending point of the glide is a toneme of one of the other levels; if the direction reverses (in rise-fall-rise or fall-rise-fall), the reversal point is a toneme of a third level--or starting and ending points may be one level and the reversal point a second level. In this situation the glide itself is nonsignificant, a mere transition from one level toneme to another; the glides or contours are not separate tonemes, apart from levels, but are compounds of level tonemes with audible transitions between.⁹ A language of this type still has only its two, three, or four tonemes; the glides are two or more tonemes juxtaposed.

All the glides in Mixteco are of this type, with three levels (written ['], [-], and [']) ; the following samples will illustrate the relationships between single level tonemes, repeated level tonemes, and nonphonemic glides; a nonphonemic glide occurs between any two diverse juxtaposed tonemes:

<u>žükü</u> 'mountain'	<u>náà</u> 'mother'
<u>žüü</u> 'mat'	<u>náä</u> 'will be lost'
<u>žükù</u> 'brush'	<u>nä?ä</u> 'thatch poles'
<u>žüü</u> 'stone'	<u>?í</u> 'delicate'

three basic ones on p. 12); the Moru-Madi languages' (Tucker, Sudanic Languages, 111-14; Tucker speaks of from two to three significant contrastive levels, but also describes two noncontrastive ones); Cantonese (Jaime de Angulo, "Cantonese Dialect of Chinese," Le Maître Phonétique, LII [1937], 69-70; De Angulo suggests three levels for ordinary speech, with two ascending tones and one descending tone; this interpretation cannot be sustained, but an element of truth in it will be discussed later [p. 13 and p. 21, note 11]).

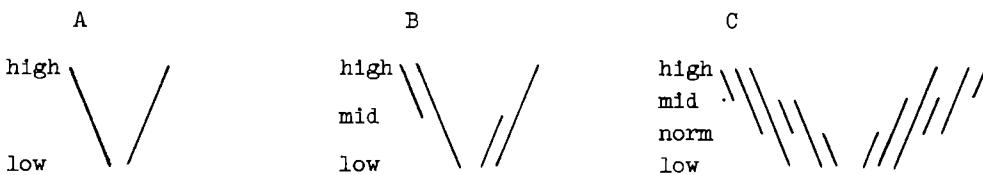
A four-level system is present in Mazateco. One has also been described for Jabo (E. Sapir, "Notes on the Gweabo [Jabo] Language of Liberia," Lang., VII [1931], 30-41).

The nine levels described by C. M. Doke ("The Phonetics of the Zulu Language," Bantu Studies, II, special number [Johannesburg, 1926]) are not all equally members of the contrastive system of the language; some of them are noncontrastive conditioned levels. Doke elsewhere ("A Dissertation on the Phonetics of the Zulu Language," BSOS, II [1921-23], 686-729) speaks of three tones in the Zulu language. (In order to be considered significant levels in the present monograph the pitches must be in contrast [presumably making differences in meaning in at least some of the words].)

⁹For reference to this situation in Apache, Navaho, and Hausa see note 4 on p. 62.

<u>kāā</u> 'metal'	<u>nāā</u> 'losing'
<u>kāā</u> 'climbing'	<u>nāā</u> 'I'
<u>kōō</u> 'snake'	<u>ná?á</u> 'remembering'

These statements may be illustrated by a chart showing the nonsignificant gliding combinations possible, in languages with two, three, or four registers. The glides charted are of the type which move in one direction only. Glides which reverse direction are theoretically much more numerous, but actually appear to be far less frequent. In the following diagram a falling line indicates a nonsignificant glide falling from one register to another; a rising line indicates a change from a lower register to a higher one by means of a similar nonphonemic glide:



Glides of this type may be parts of a single morpheme, as in the Mixteco words of the type náā 'mother' listed above. On the other hand, they may be interrupted by a morpheme barrier. Thus in Mazateco ti²⁻⁴ 'we, but not you, burn' the second toneme, pitch level 4, is all that is present of a separate morpheme meaning 'we but not you'; compare ti² 'it burns,' in which that morpheme is not present.

Although the tonemes are usually placed on the vowel of the syllable, they sometimes occur on syllabic consonants, or a glide may end on a voiced consonant in the same syllable.¹⁰ In Mixteco, syllabic consonants with their tonemes are extremely rare, occurring only in extra-rapid conversational forms as the result of the contraction of two or more morphemes: háni ?ini-rí 'hit inside-I,' i.e. 'I think,' may become hándí.

3. Frequency of Semantic Distinctions

Register-tone languages differ greatly in the number of words they contain that are distinguished by tone alone.¹¹ Of the Mexican languages Mazateco is one in which pitch is highly important semantically, but in Zapoteco¹² it is less important.

Though tone may not provide many words in a language differing by pitch alone, it may nevertheless play an important part in the language. It is a mistake to ignore the tonemes of a

¹⁰ In Takelma (see E. Sapir, "The Takelma Language of Southwestern Oregon," 17, in Franz Boas, Handbook of American Indian Languages, Part II, Bull. 40 of Bur. Am. Ethnol. [1922]), the consonants [l], [m], and [n] act like the second element of diphthongs in rising and falling tonemes which spread over the vowel plus consonant; the following words have this type of rising pitch: nank 'he will say,' gwalt 'wind,' wulx 'evening.'

C. Bien-Ming ("The Tone Behavior in Hagu: An Experimental Study," Arch. Néer. Phon. Exp., VI [1931], 11-12) states that Hagu tone is "carried along" by nasals.

¹¹ Tucker (Sudanic Languages, 57) says, "Lexical tone is a more important feature in Sudanic languages than in Bantu languages." Ward ("West African Languages," Proc. Third Internat. Cong. Phon. Sci. [1939], 384) says that the Yoruba, Ibo, Efik, Ewe, and Ga languages of Africa have more words for which one's understanding depends on tone alone than do the Twi, Hausa, Mandingo, and Wolof languages. L. Harries ("An Outline of Ma'wiha Grammar," Bantu Studies, XIV [1940], 91-146) claims that Ma'wiha "appears to be half-way between a tone and a non-tone language Only a few words are distinguished by tone."

¹² The data on Zapoteco come from Otis Leal, of the Summer Institute of Linguistics. Tone makes only a few minimal pairs. Another language in North America which has significant pitch but very few words distinguished by that alone is Maya; note, however, the sample pair móčtal 'to be crippled' (e.g. with one arm gone) and močtal 'to double oneself up.' (Data from K. L. Pike, "Phonemic Pitch in Maya," IJAL, XII [1946], 82-88.)

language just because few words depend entirely on them to distinguish meanings. Stress presents a somewhat parallel situation in English. It plays a tremendous part in the system of pronunciation, so that little disturbs us more than when foreigners misplace stress, saying, for example, hypo'thesis for hy'pothesis. Even some morphological forms in English involve stress changes, yet it is difficult to find a dozen words in English in which stress (plus intonation) constitutes the differentiating factor; per'mit versus 'permit is one pair, but most verb-noun pairs like 'con-
trast, con'trast also have differences of unstressed vowels ([kantrəst], [ken'trəst]).

C. Gliding-Pitch Contour Systems

A pure CONTOUR tone language is one in which glides are basic to the system, with no level tonemes whatever: each contrastive pitch unit is a glide. Contour systems differ from register systems in a number of points: (1) The basic tonemic unit is gliding instead of level. (2) The unitary contour glides cannot be interrupted by morpheme boundaries as can the nonphonemic compounded types of a register system. (3) The beginning and ending points of the glides of a contour system cannot be equated with level tonemes in the same system, whereas all glides of a register system are to be interpreted phonemically in terms of their end points. (4) In the printed material examined contour systems had only one toneme per syllable, whereas some of the register-tone languages, like the Mazateco, may have two or more tonemes per syllable. In a pure contour system, then, the glides are phonologically unitary, morphologically simple, and not structurally related to a system of level tonemes; the glides are minimum structural units of length in words and syllables.¹³

¹³The psychological possibility of tone contours is discussed in a letter which I received from the late Professor Edward Sapir, under the date of July 14, 1938 (Gilmanton Ironworks, N. H.):

"It is of course true in a purely physical sense that 'all tone languages can be analyzed in terms of register.' All this means is that you can't have 'movement' without having an A from which you move to B. Hence one may claim necessary priority of points A and B to movement from A to B. But movement from A to B (a physical statement) is not really the same thing as movement in a direction away from A and toward B. Psychologically, one can have an experience of such movement without being able to 'geometrize' in terms of fixed points A and B. One can define direction or 'senses' in a mathematical sense without having yet located points. In fact, this is what we do in analytical geometry, where positive and negative are first defined in terms of direction with reference to fixed axes (equivalent to tonal 'one register') but not with reference to end-points or end-axes. One then finds points on lines of direction, after which any given line may be redefined in terms of any 2 points lying on it. Fixed points are always easy to work with logically, but psychologically one gets sensations or intuitions of direction without necessary awareness of points of reference. Hence I should imagine that musically inflective languages like Lithuanian could very easily be defined in terms of voice movement, direction, without reference to register. In fact, to talk of a 'high' and a 'low' register in Lithuanian would probably only lead to confusion.

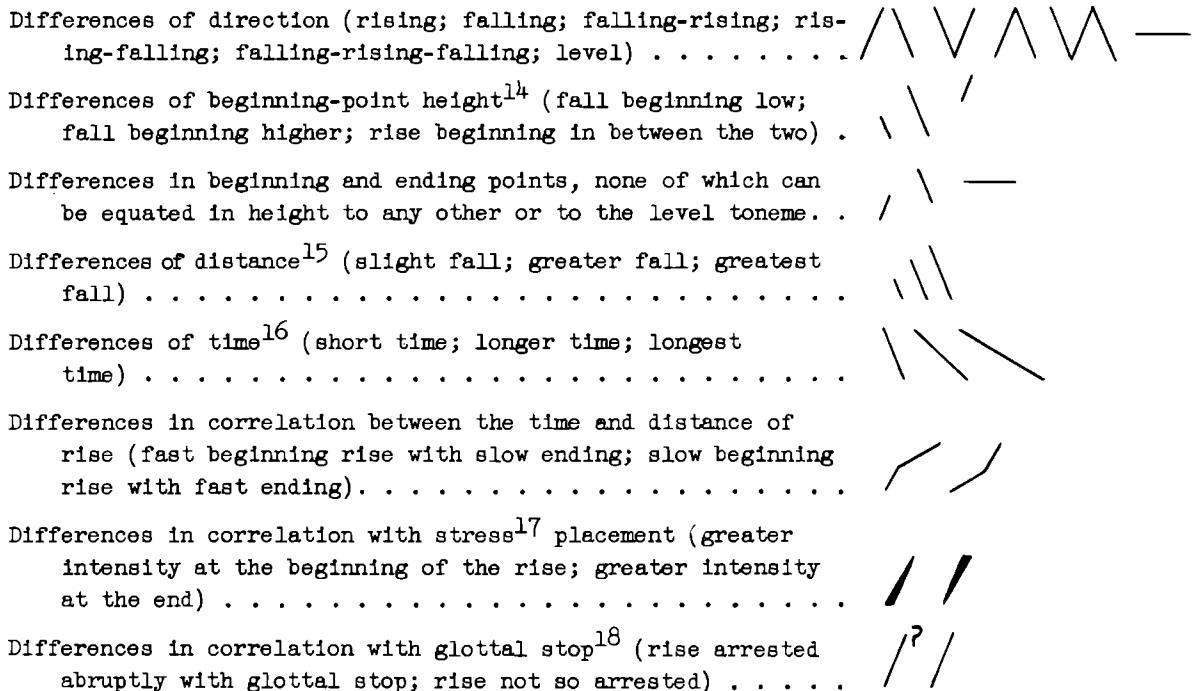
"As to Chinese, some dialects, like Cantonese, seem to have a register system complicated by an inflective system which cannot be simply defined in terms of the registers themselves but only as relatively high or low falls or rises. In other dialects like Mandarin, the old register system has disappeared as such and what is left is a contrast between a level tone (conventionally called 'high level', though it is quite often early middle level) and various inflected tones. The old Chinese system was a two-register system (possible 3-register system for 'entering' tones, i.e. syllables ending in -p, -t, -k), and within each register there were level, rising, falling, and 'entering' tones. This is entirely different from Navaho or Jabo (Africa) or, if I'm not mistaken, Mixtec or Mazatec in which rises and falls are created by combining high and low or any other 2 (or more) registers. It does not help, for Chinese, to create a middle register in order to rationalize a 'high fall' because such a middle register would have no configurative reality, only a shifting physical one

"You can have tone languages without having to define registers. You can even have inflected tones in languages recognizing registers without being able to analyze these inflections in terms of the primary registers recognized in the language; though, on the other hand, there do seem to be a great many languages in which rising and falling tones can be--must be--defined

The simplest language of such a type would have two tonemes, one a glide upwards and one a glide downwards, with the level of the end points of complete irrelevance to the system. Here the contrast would be that of a rising contour opposed to a falling contour. No system this simple has come to my attention.

A slightly more complicated system might contain a rising glide and a falling glide, but add a third contour, a glide with reverse direction, or a rising-falling or falling-rising glide. Within such a system a single level toneme may function as a fourth type of contour, a zero-glided one, provided, however, that this level toneme is not to be equated functionally with the beginning or ending points of the glides. Many of the languages of China appear to have systems somewhat like this. In them the relative intervals between the pitches of the end points of glides seem to be more or less fixed, but not related to a system of levels.

Contours may differ in characteristics other than direction of glide. Some of the differential qualities of glides may be seen in the diagrams below:



as sums of registers. The actual history of Chinese tones seems to indicate that rising and falling tones are structurally comparable to final consonants, not to register combinations. Thus, in ancient Chinese, rising pa, falling pa, and pat, pak, pap are all 'inflected' syllables contrasting as a group with 'level' syllables, whether high or low. And etymology shows that such a syllable as rising mi 'rice' goes back to an old *mblas and such a syllable as falling lai to an old *lad."

¹⁴For differences of starting points and end points of glides see Jones and Woo, Cantonese, ix; L. F. Taylor, "On the Tones of Certain Languages of Burma," BSOS, 1st series, IV (1917-20), 91-106; Bien-Ming, "Hagu," Arch. Néer. Phon. Exp., VI (1931), 6-45.

¹⁵For instrumental studies showing different distances of glides see the illustrations in Bien-Ming, "Hagu," Arch. Néer. Phon. Exp., VI (1931), 6-45.

¹⁶For samples of different speeds of glides see the musical notation of Jones and Woo, Cantonese, 3.

¹⁷For differences of stress in various tonemes see M. Swadesh, "A Condensed Account of Mandarin Phonetics," Travaux du Cercle Linguistique de Prague, VIII (1939), 213-16; M. R. Haas, "Ablaut and Its Function in Muskogee," Lang., XVI (1940), 141-50.

¹⁸For glottal stop affecting tonemic contours see D. Jones, "Chinese Tones," Le Maître

Within a contour system that contains glides beginning at different heights there may be a false appearance of a register-tone system. A tonal system should not be considered a register type, however, if the end points of the glides cannot be equated with level tonemes of that system and if the glides act as minimum structural units in the formation of syllables and morphemes.

Although the glides of a contour system must be treated as unitary tonemes and cannot be broken down into end points which constitute lexically significant contrastive pitches, the end points of the glides may, nevertheless, be abstracted from the contour for a different purpose. These end points become subunits of a noncontrastive (phonetic or tonetic) analysis¹⁹ that deals with the minutiae of sound production rather than with those units of sound which differentiate words, whereas the glides are indeed unitary as regards the meanings of the language (a phonemic or tonemic analysis). This is a parallel of phone to phoneme in segmental analysis. Evidence of such a possible phonetic breakdown of contours is seen in the musical-staff notation of writers portraying Chinese tonemes, in which the glides are often written with two notes,²⁰ or three. In a practical orthography only the contour as a whole needs to be symbolized.

Phonétique, XXVIII (1913), 95-96; in the Nanking dialect the pitch of the toneme with glottal stop is not particularly different from that of toneme 3, but the glottal stop makes it a different contour. In Burmese (see W. Cornyn, Outline of Burmese Grammar, 9-10, Lang. Disser. No. 38 [Baltimore, 1944]) one of the distinguishing characteristics between tonemes 3 and 4 is that the latter has a sharp glottal closure rather than a slow closure. When a syllable with toneme 4 precedes another syllable in "close juncture" with it (i.e. in the same word), "the glottal closure is replaced by a plain unvoiced stop of the same [articulatory] position ... as the initial sound of the following syllable." Note the doubled consonant, the first of the pair representing replaced glottal stop, in the following samples: paisshán 'money,' laikkhèba 'follow.'

The use of glottal stop in other types of tonemic systems is much more dubious; see, however, G. L. Trager ("The Theory of Accental Systems," Language, Culture, and Personality [Menasha, Wisconsin, 1941], 142), whose suggested interpretation of Mixteco (?) as a prosodic feature does not now appear to be warranted. The additional data of sandhi to which he did not have access at the time of the work cited above are that morphemes of CVV or CVVn structure abbreviate to CV or occasionally CVn ("C" represents any consonant other than [?]; "V" is any vowel; "[n]" phonetically, is nasalization of the preceding vowel, but it is convenient to consider it to be phonemically a consonant that occurs at the end of morphemes and nasalizes the preceding vowel, or the first vowel also of the dissyllabic morpheme, if the medial consonant is zero, or [h], or [?]; CV?V and CV?Vn abbreviate likewise, losing the glottal stop. In this abbreviation the glottal stop acts somewhat differently from other consonants, since morphemes of CVV or CV?V type (or with final nasal) abbreviate with extreme frequency in proclisis, with the retention of the first consonant and vowel (in enclisis this feature is less frequent), whereas with morphemes of CVCV structure, where a medial consonant other than [?] is present, abbreviation is very rare, and when it does occur it is the first syllable, not the second one, which tends to be lost.

¹⁹For theory of subphonemic linguistic segmentation see K. L. Pike, Phonetics: A Critical Analysis of Phonetic Theory and a Technic for the Practical Description of Sounds (Ann Arbor, 1943), 110-12.

²⁰For musical-staff notation showing tonemes by means of end points see Jones, "Chinese Tones," Le Maître Phonétique, XXVIII (1913), 95-96; Bien-Ming, "Hagu," Arch. Néer. Phon. Exp., VI (1931), 28; R. Ch. Guernier, "Notes sur la prononciation de la langue Mandarine de Pékin," Le Maître Phonétique, Suppl. I (May-June, 1912); C. Bien-Ming, "Chinese (Amoy Dialect)," Le Maître Phonétique, XLV (1930), 38-40.

Jones and Woo ("Cantonese," ix, xiv) give a number of diagrams of Cantonese tonemes, which are combined in the drawing below:



The tonemes are not fixed rigidly, as the diagrams make them appear to be, but actually have considerable fluctuation in duration, specific height of separate tonemes, relative height of tonemes to each other, and general height of the speaker's voice. Jones and Woo give, for example, alternate diagrams of the tonemes transposed for women's voices.

As in register-tone languages, the significant pitches of a contour system are usually carried by the vowel. Frequently, however, the glide is distributed over a vowel and a voiced consonant that follows it in the same syllable.²¹

Although for the purposes of this volume tonemes have been defined in relation to their occurrence with syllables, there remains the possibility that in some languages they are applied to an entire root, regardless of the number of the syllables in that root.²²

In contour-tone systems, as in register-tone types, some languages lean more heavily upon the tonemes for meaning distinctions than do others.²³ But the systematic function of the tone is extremely important to the contrasts of the language even when meaning rarely depends upon it. The student should not slight his tonemic study or fail to attempt to speak with correct tonemes merely because he can be understood without doing so. One's pronunciation strikes the native ear as very foreign and unpleasant when tonemes are abused, even though meanings may be clear. So, too, in the preparation of vernacular literatures one should remember that symbols for phonemic pitches may not be interchanged or omitted with impunity, any more than one may spell zebra as *sebra simply because there is no such word. Neither, in English, would one decide to write p and b as p and b when meaning contrasts depend upon them and to write them both as p when no such contrast exists--for then one would write pile and bile, but *poy for boy, *poot for boot, and so on. Such inconsistency delays the learning process. The illiterate is most readily taught to read when each sound unit has been equated with one and only one symbol. In English, again, the difference between the last sounds of hun and hung (n and ŋ) is very significant, even though the sounds cannot be found in contrast at the beginning of words, since ŋ does not occur in that position. So also š and ž as in mesh and rouge are in systematic contrast even though it is difficult to find words which differ by these sounds alone: the contrast between š and ž remains important to the phonetic and phonemic system of English in spite of the fact that words minimally different by them are not readily found.

Thus far, pure level-pitch and pure gliding-pitch systems have been described. Now certain overlapping types may be discussed.

D. Register-Contour Combinations

Linguistic classifications are seldom clear-cut. Usually some troublesome overlapping occurs. The dichotomy between register-tone languages and contour-tone types is no exception. Tone languages exist which fit completely neither the register-tone class nor the contour-tone

²¹See p. 30, note 31.

²²Beach (Hottentot, 125) has described the Hottentot tonemic system in terms of contours applied to roots of one or two syllables as a whole--not to individual syllables as such. His reasons were the "relatively isolating nature of the language" and the fact that "both the nature and the number of inherent tones of both monosyllabic and disyllabic roots were identical," and (130) "the roots of class 5 (which are fully disyllabic) had exactly the same number of tone-types (seven [four rising, two falling, one level]) as the monosyllabic roots of class 2." A falling tone on a monosyllabic root, therefore, would be actualized as a glide downward from one end point to the other; upon a dissyllabic root the falling tone might not be heard to glide, but, instead, one relatively level end point would seem to occur on the first syllable and the other lower level end point on the second syllable, presumably with no audible glide between. Compare xu 'from' and xurup 'powder,' both, according to Beach, with the same high-rising toneme; also kxop 'skin,' saop 'winter,' taras 'woman.' Beach shows (127-32) that other writers had described Hottentot as containing syllable tonemes, with level and gliding types. Beach's description is not convincing, but may be the correct one. In any case, one should note that his analysis might ultimately force a minor change in the definition of a tone language, so as to include tonemes distributed over polysyllabic roots. For contours spread over entire words or parts of words see p. 14, note 30.

²³Cantonese (see Jones and Woo, Cantonese, xv) is said to attach more meaning to tones than does Mandarin.

class, even though most of their data may be handled under the one or the other of these classes. The investigator should be alert to recognize combinatory types whether or not they are precisely the ones described here.

1. Register-Tone Languages with Contour Overlap

Probably it is best to consider a pure register-tone type of language to be one in which every vowel or syllabic consonant has one and only one level toneme. Mixteco represents this type: every short vowel has one toneme only, and no vowel is without a toneme. Thus in the sentence tē-ní-ndébē-tē žau̯ kābā 'and the animal entered the hole (in the) cliff' each vowel has one toneme. One problem is involved, however: vowels which are phonetically long have two tonemes. Thus kōō 'snake' has a long vowel beginning on a mid toneme and ending on a low toneme, with a nonsignificant glide connecting them. Mixteco words of this type act in the tonal morphology and in tonal sandhi like words which have two full vowels. In addition, phonetically long vowels like o: are structurally parallel to vowel clusters like au, since these also have two units of tone. Short words never have more than one unit of tone. For these reasons, and for others which need not be given here (but see p. 79, note 3), Mixteco long vowels are best considered to consist of two short vowels juxtaposed. With this decision in mind, Mixteco may then be classified as a pure register-tone system with one toneme per vowel.

On the other hand, Mazateco, as has already been indicated, may have two tonemes on a single short vowel, as in ška¹⁻³ 'trousers' and se⁴⁻³ 'he sings,' or it may have a single toneme on a rapidly pronounced cluster of two or even three vowels, as in ñ?ai³ 'difficult' and koai⁴ 'he will go.'²⁴ Each of these illustrations from Mazateco constitute single syllables; a single vowel with a cluster of two superimposed tonemes constitutes one syllable nucleus, as does a rapid cluster of vowels with a single superimposed toneme. This Mazateco characteristic is somewhat similar to the basic characteristic of a contour system--the occurrence of glides on single syllables. The difference between them is that in Mazateco the glide as such is unimportant, acting merely as the connection between the significant level tonemes, whereas in the contour type the glides are basic to the system. Further, the Mazateco glides may be morphologically complex, whereas those of a contour system are grammatically unitary. It proves advantageous, therefore, to consider that Mazateco represents a register-tone system with a slight overlap of contour-tone characteristics.

In other words, any language whose tonemes are all to be interpreted in terms of an interrelated system of levels is basically a register-tone type. If, however, glides develop which, though composed of juxtaposed level tonemes, have some characteristic of timing²⁵ or placement that seems different from the timing or placement of the separate level tonemes, a contour overlap may be postulated for classification. A contour overlap may also be implied if there is not a one-to-one correlation between tonemes and vowels.

2. Contour-Tone Languages with Register Overlap

In a pure contour-tone system glides would constitute the basic tonemes, although one (but only one) level toneme might occur as a special contour type; these glides would not be related to any system of levels whatsoever; there would be a one-to-one correlation between glides

²⁴For evidence that the i and the o in these words are vowels see Pike and Pike, "Mazateco Syllables," IJAL, XIII (1947), 78-91.

²⁵Sapir ("Gweabo," Lang., VII [1931], 30-41) states that both rapid and slow glides appear in Gweabo. Chinanteco may prove to be a modified register system, with three basic levels of pitch but complications of syllable division, two or three degrees of length of vowel, and a slight lowering of pitch at the end of "level" tonemes (especially the long ones). The data need further analysis (I gathered the information dialect of Yolox, Mexico, in 1944, and later in collaboration with Stanley Ford, of the Summer Institute of Linguistics; Ford is experimenting with a modified contour orthography for vernacular literature).

and syllables, with each syllable having one glide, although the glide might cover the entire syllable and be distributed over the vowel or vowels and any voiced consonant following the vowel in the same syllable.

The most frequent kind of register-tone overlap on a contour-tone system appears when two or more glides occur which move in the same direction but are of different heights--as, for instance, when two rising glides occur, but one of them rises higher than the other. If, for example, a certain language has one toneme to each syllable and each of these tonemes is a glide, with no level tonemes present in the language, the system would be a contour type. If, however, the relative height of two of the tonemes is pertinent to their differentiation, since both are rising but one rises higher than the other, then the relative height is the distinguishing characteristic. Now since relative height is the chief distinguishing characteristic of level tonemes in a register system, whereas direction of glide is one of the chief distinguishing characteristics of a contour system, a pertinent difference consisting in the relative height of glides in a contour system gives the impression of a register-tone overlap upon it. Some of the dialects of Mandarin--with one falling, one level, and two rising tonemes--seem to be of this type.²⁶

A more extreme variety of register-tone overlap on a contour-type system may be found when two or more level tonemes occur and act in the structure of the language like the gliding tonemes which are also present. Here one should be prepared to discover (1) that on a single syllable any one of the gliding tonemes may occur or any one of the level tonemes--but not a sequence of any two gliding or level tonemes--and (2) that the glides cannot be analyzed in terms of end points which are constituted of the level tonemes present because there are not enough level tonemes to account for all the end points of the glides, or because the level tonemes which do occur do not coincide with any of the end points of any of the glides. These characteristics would indicate that gliding and level tonemes alike are both minimum building blocks for word formation in such a language. The fact that two level tonemes are in contrast in this system constitutes a register-tone characteristic. The fact that such level tonemes parallel minimum-unit contours leaves the system as a whole basically a contour type. The net result is a contour system with superimposed register-tone phenomena. Various languages of China²⁷ appear to be of a contour type with some such strong register overlap.

E. Significant Pitch in Nontonal Languages

Many languages utilize pitch in ways which affect the meaning of utterances but which do not come within the definition of tone-language phenomena suggested above. The same methodology which analyzes tone languages is nevertheless helpful in the analysis of significant pitch of

²⁶ Cf. Bloomfield, Language, 116, and his references to further works, 515; Hua-wen-ch'u-chieh: Chinese Language Lessons (Los Angeles, 1943).

²⁷ Especially those which have six or more tonemes. For material on the tribal languages of southwest China, some of which are of this type, see especially the publications of Ch'ang-P'ei Lo (of Academia Sinica) with his students and colleagues: C.-P. Lo, "A Preliminary Study on the Trung Language of Kung Shan," Harv. Journ. As. Stud., VIII (1945), 343-48; unpublished studies by the same author on Lisu and Nung (and by one of his students on Idwa-Miao); M. C. Fu, A Study of the Moso Language (Wei-hsi Dialect), Part II, Grammar (in Chinese, with a short summary in English), published by the University of Western China (ca. 1940); F. K. Li, The Tai Dialect of Lung-chow (Texts, Translations, and Glossary) (in Chinese, with English translation of one text, and vocabulary), in Academia Sinica, The Institute of History and Philology Monographs, Series A, No. 16 (Shanghai, 1940); idem, data on the Mok dialect (without English translation or summary); idem, "Languages and Dialects," The Chinese Year Book, 1937 issue (Shanghai, 1937), 59-65; K. H. Nien, A Na-Su Grammar (in Chinese, with English summary), in Linguistic and Anthropological Monographs, Series B, No. 3 (1944), of the Institute of Frontier Cultural Studies, Graduate School of the College of Arts, Nan Kai University; idem, unpublished manuscript on Miao grammar (in Chinese, with English summary); S. L. Wong, "Phonetics and Phonology of the Yao Language, Description of the Yau-Ling Dialect," Lingnan Science Journ., XVIII, No. 4 (1939), 425-55.

other types. Two such types of pitch systems--and there may be various others--will be mentioned briefly here.

1. Word-Pitch Systems

A number of European languages have been described as utilizing pitch in the differentiation of the meaning of various lexical items, but with the placement of the pitch limited to certain types of syllables or to specific places in the word.²⁸ One must watch for the possibility of significant pitch contrasts which are limited, for example, to stressed syllables, or to long vowels. In Asia, Japanese may constitute some such system;²⁹ in North America, Takelma may. In North America, furthermore, languages like Cherokee need additional study before their classification can be certain;³⁰ they have some characteristics which may eventually lead to the postulation

²⁸ Swedish and Norwegian are possibly of this type; compare Norwegian 'bøner' 'peasants' and 'aksel' 'shoulder' with 'bøner' 'beans' and 'aksel' 'axel,' where the first two words have a stressed syllable accompanied by a rising pitch, but the second pair of words have a stressed syllable accompanied by falling pitch (illustrations taken from Bloomfield, Language, 116; see also B. Malmberg, "Recherches expérimentales sur l'accord musical du mot en Suedois," Arch. Neer. Phon. Exp., XVI [1940], 62-76; Swadesh, "Long Consonants," Lang., XIII [1937], 1-10; E. Haugen, "Intonation Patterns in American Norwegian," Lang., XVII [1941], 40-48).

Recently G. L. Trager ("Accentual Systems," Language, Culture, and Personality) has given a different analysis of some of these languages, describing the phenomena primarily in terms of stress and quantity; this analysis would further remove them from the category of tone languages. Compare, also, Trager, "Serbo-Croatian Accents and Quantities," Lang., XVI (1940), 29-32.

²⁹ Japanese, according to information which I have received from Dr. Bernard Bloch, of the Yale Graduate School, is one of these borderline types. There are two significant pitches--high and low. Each word may have one and only one syllable with a significant high pitch; many words have no such syllable. The significant high-pitched syllable may be called "accented." Other syllables than the accented one may have high or low pitches of a nonsignificant type; these non-significant pitches are determined by their position in relation to the accented syllable, and never directly affect the meanings of words. In the following samples ['] indicates the high accented syllables.

<u>hi</u> 'fire'	<u>hana</u> 'flower'
<u>hi</u> 'sun'	<u>hana</u> 'nose'
<u>ki</u> 'tree'	<u>hasi</u> 'bridge'
<u>ki</u> 'spirits, wits'	<u>hasi</u> 'chopstick'

For a revised, much more detailed, statement of Japanese pitch, accent, and intonation, see Bloch, "Studies in Colloquial Japanese, II: Syntax," Lang., XXII (1946), 200-1, 203-4.

For a somewhat different analysis, in which two significant registers are postulated, with one of them represented on each syllable, see K. Jimbo, "The Word-Tone of the Standard Japanese Language," BSOS, III (1923-25), 662-63; O. Pletner, "Musical Accent in Japanese Morphology," BSOS, III (1923-25), 447-56; J. K. Yamagiwa, Modern Conversational Japanese (New York and London, 1942). M. G. Mori, The Pronunciation of Japanese (Tokyo, 1929), has little of value; the work is a journalist's treatment.

³⁰ Since this was written E. Bender and Z. S. Harris ("The Phonemes of North Carolina Cherokee," IJAL, XII [1946], 14-21) have asserted: "At first blush it might seem that Cherokee is a tone language in the usual sense of the term, since the phonetic differences in tone from vowel to vowel seem to an American hearer to be considerable. It soon becomes apparent, however, that although there are no simple regularities covering the occurrence of particular tones, nevertheless some dependence is observable. For the most part, the sequence of tones in an utterance can be described as one or more occurrences of the following sequence: relative low tones, followed by one or no middle tones, followed by one (or two) high tones: ... aginehgásá 'I did move it' (a i e low, á mid, á high) The only feature which is not automatic and which therefore has to be marked is the point at which the contour ends."

For a different type of pitch system, in which stress and pitch seem to be in a complicated combination, see G. L. Trager, "An Outline of Taos Grammar," Linguistic Structures of Native America, "Viking Fund Publications in Anthropology," No. 6 (New York, 1946), 184-221.

of a new type of tone language or to a slight modification of the present definition of tone languages.

2. Phrase-Pitch Systems--Intonation

Pitch occurs even in a nontonal language. In order to be spoken at all, words must be pronounced on some pitch. This remains true whether the language containing them is tonal or not. Probably in every nontonal language the pitches of the utterances tend to be "frozen" into formalized patterns, or INTONATIONS. These patterns constitute the phrase melodies which are characteristic of a particular language and which differ from language to language.

With the change of the particular phrase melody which happens to be superimposed upon an utterance, the meaning of that utterance may be changed simultaneously. One concludes that the phrase melodies themselves have meanings--popularly called "shades" of meaning. For English these meanings are largely to be defined in terms of the attitude of the speaker, or, at times, in terms of the attitude with which the speaker expects the hearer to respond. Thus in There's a dog the basic meaning of the words is something like 'a dog is present there,' but added shades of meaning may be conveyed by pitch modifications. If one first pronounces the sentence in such a way that on the word dog the pitch falls rapidly from quite high to quite low, the attitude of the speaker is 'calling attention' to dog with 'surprised finality.' If, however, the pitch rises moderately on the word dog, the shade of meaning given by the rising phrase melody may be something like 'incompleteness' or 'part of a sequence,' so that an answer is expected from the hearer. The second utterance would traditionally be written with a question mark, as There's a dog?

The chief differences between tonemes and intonations are: (1) Intonations are distributed over phrases, rather than being completed on single syllables--though a single syllable may also constitute an entire phrase, and thus have an intonation applied to it. (2) The tonemes have no meaning of their own, any more than do p, t, and k, whereas the intonations themselves frequently carry shades of meaning. Further (3), the tonemes are intrinsic parts of the lexical items, whereas the intonations are extrinsic, adventitious parts of utterances.

In English the meaningful phrase melodies constitute a system in which the parts are constructed with reference to four relative but phonemically contrastive pitch levels at which the intonation contours begin, or end, or change direction.³¹ These levels of pitch are the basic building blocks of the intonations. In the following sample the numbers from 1 to 4 indicate these relative levels, pitch 4 being the lowest; the diagonals indicate pauses; the degree sign indicates the beginning of the primary part of a contour:

Are you asking me	or telling me?
3- °2--4- -3/ 4- °1- -4//	

The general pitch of the voice, whether controlled by the age or the sex of the speaker or by the emotional situation, and the like, is not included in these indications of the four

³¹For illustrations including connected text and for a detailed structural analysis see K. L. Pike, The Intonation of American English (Ann Arbor, 1945); for a bibliography on the subject see the same volume. Note, however, the following selected references: J. Steele, Prosodia Rationalis, or An Essay towards Establishing the Melody and Measure of Speech, to Be Expressed and Perpetuated by Peculiar Symbols, 2d ed. (London, 1779); J. Rush, The Philosophy of the Human Voice, 6th ed. (Philadelphia, 1867); D. Jones, Intonation Curves (Leipzig and Berlin, 1909); H. E. Palmer, English Intonation (Cambridge, 1922) (an excellent analysis, one of the best); L. E. Armstrong and I. C. Ward, Handbook of English Intonation (Leipzig and Berlin, 1926) (the most widely accepted analysis of British intonation, but structurally less valuable than Palmer's); M. Schubiger, The Role of Intonation in Spoken English (Cambridge, 1935); K. Malone, "Pitch Patterns in English," Studies in Philology, XXIII (1926), 371-79; Bloomfield, Language, 114-15. For application to the teaching of English to foreigners see An Intensive Course in English for Latin-American Students, by the staff of the English Language Institute, C. C. Fries, Director (Ann Arbor, 1943, revised).

contrastive levels. Characteristics of English having such a basis are of an intonational type, but do not constitute part of the contrastive system symbolized by the four levels.

One finds similar intonation patterns in many Indo-European languages. In a recent, very brief, tentative study of Rumanian, for example, I observed the kinds of intonations that are diagramed below beginning to emerge (Miss Larisa Moruzeanu, of Plataresti, Rumania, informant). Four phonemic levels are indicated by the lines, though it is not certain that there are no more than four such levels; the higher the intonation line, the higher the pitch; kum 'how,' te 'reflexive, you,' kyama 'to call'; each of the sentences means, 'What is your name?'--but the situations in which they are used vary as indicated:

'kum te 'kyama	Normal unemotional style with interrogative initial word
'kum te 'kyama	Polite, reserved
'kum te 'kyama	Polite, familiar
'kum te 'kyama	Protective, confiding, or tender, as though spoken by a schoolteacher to a timid child
'kum te 'kyama	Carefully spoken, as to a foreigner who does not know the language well
'kum te 'kyama	Indicating surprise
'kum te 'kyama	Implying, 'Is that what you asked me?'
'kum te 'kyama	Implying, 'I am surprised that you asked me; I know your name'
'kum te 'kyama	Threatening, as if spoken by a policeman
'kum te 'kyama	Brusque, spoken rapidly and irritably, as by a nervous teacher or a harried clerk
'kum te 'kyama	Implying perturbation, as of a clerk uneasy about an answer he has received

All tone languages have intonation of the emotional type, with the general height of voice affected, and so on,³² but I have not seen reported for them a highly organized contrastive

³² Intonation superimposed on tone has been reported by Beach, "Tonetics," Bantu Studies, 2d series, II (1924), 104; Taylor, "Burma," BSOS, I (1917-20), Pt. 4, 99; Guernier, "Mandarin," Le Maître Phonétique, Suppl. I (1912), 11; Jimbo, "Japanese," BSOS, III (1923-25), 666-67 (interrogation, final rise; affirmation, final fall).

For emotional modification of tone see Beach, "Tonetics," Bantu Studies, 2d series, II (1924), 104; Jimbo, "Japanese," BSOS, III (1923-25), 666-67; and cf. Doke, Shona Phonetics, 216-20.

For modification of Chinese tonemes in reading, or on the stage, see L. T. Wang, "Recherches expérimentales sur les tons du Pékinois," Arch. Néer.. Phon. Exp., XIII (1937), 1-40, and XIV (1938), 1-48, especially 26-31.

See also Y. R. Chao and L. S. Yang, Concise Dictionary of Spoken Chinese (Cambridge, 1947); a "particle indicating ... impatience" has the entire "sentence spoken at a high pitch" (40);

system with a limited number of relative levels controlling the formation of intonations that carry shades of meaning. The phrase melodies of tone languages do not change the basic register-tone or contour-tone system of the language, even though they may modify the phonetic character of the tonemes³³ or temporarily obliterate their contrasts,³⁴ or even constitute narrative versus interrogative contours,³⁵ and the like, which are superimposed on the lexical pitches.³⁶

In this first chapter tone-language types have been described so as to delineate those of their characteristics which are essential to any tone language in contrast to a nontonal language with intonational meanings. In addition, some subclassification of basic types has been presented, especially with reference to those varieties which have predominantly level or predominantly gliding tonemes. In the next chapter some of these same characteristics will be mentioned again and others will be described, in reference to the difficulties they present to the investigator who wishes to analyze them.

another, for "an echoed statement" has the "sentence spoken at a low pitch" (40). An interjection may itself carry the special intonation, as for the item "used as a mild repetition of a command" that carries a "falling or quick rising-falling intonation" (40). Other interjections are usually "middle falling" unless they are "for expressing doubt," in which case they tend to be "rising" (xviii). Still other interjections have "long, low-rising tone" for "puzzled surprise" (45). In the dictionary some entries have special segmental forms: "command to a horse" with "short vowel and a glottal stop" (45); an interjection "of contempt" with "the vowel being pron. short and whispered" (41).

³³In some dialects of Maya the pitch characteristics of the syllables are modified, but in general the contrasts are retained (Pike, "Maya," IJAL, XII [1946], 82-88).

³⁴In Burmese, intonation may eliminate tonemic contrasts: "The syllable [before 'suspensive intonation'] is spoken with greatly increased length and on an undulating tone curve under which the four tones lose their special characteristics" (Cornyn, Burmese, 10).

³⁵This situation is described by C. T. Hodge and H. E. Hause, "Hausa Tone," JAOS, LXIV (1944), 51-52. In the following sample the grave accent represents phonemic low pitch; a vowel with no accent mark has phonemic high pitch; the numbers indicate degrees of nonphonemic intonational height in narrative style--number one is highest (I have reversed the order of this example as it is given in the article):

kàkwancèmu	gà	sark?à	'Release us from the chains!'		
5	1	3 2	4	3	5

See also C. T. Hodge, An Outline of Hausa Grammar, Lang. Disser. No. 41 (Baltimore, 1947), 15-17

³⁶For intonation pitches added to Mandarin tonemes see pp. 85-86, note 6.

C H A P T E R I I

TONE CHARACTERISTICS CONTRIBUTING TO THE DIFFICULTIES OF TONEMIC ANALYSIS

Analysis of the tonemes is much more difficult than analysis of the sounds of a language. There are various reasons for this difficulty inherent in the nature of tonemes and their systems, and in the linguistic environment of the English speaker. Some of these have already been mentioned, but need further discussion from this point of view.

A. Lexical versus Superimposed Pitch

That speakers of English find it difficult to hear tonemes cannot be due to the fact that they are untrained in handling pitch. The English intonation system is fully as complicated as any tonemic system, and probably much more complicated than such a system. Furthermore, English speakers easily learn to sing songs employing a dozen or more intervals, whereas a tone language of just two contrastive levels seems extraordinarily resistant to mastery by them. The reason for this anomaly apparently lies in the conflict between the types of systems involved. With tone languages the tonemes are an integral part of the words themselves; speech intonation and song differ from each other in that they use different numbers of contrastive levels, and so on, but agree, in comparison with tonemic systems, in that both merely add extra shades of meaning to lexical meanings, and superimpose their pitch systems upon words of which they are not basically parts. It is the necessity for a transfer from a superimposed phrasal system to a lexical system that causes difficulty in hearing tonemes; nor does musical training seem to help particularly in tonal analysis, because it, too, is a superimposed system, and even one degree further removed from the lexical pitch systems of speech.

The student finds it hard, also, to govern the pronunciation of pitch in speaking a tone language. He tends to let the pitch vary as it would in his own intonation language, rather than controlling the lexical pitches in rigorous independence of his attitude toward his statements. The English speaker usually assumes--with considerable justification--that the chief difficulty in learning to speak a tone language adequately, once it is analyzed, is to memorize the particular tonemes that the words ought to have placed upon them under given circumstances. Oftentimes, however, he allows his theoretical knowledge of these essential pitches to be overridden by the unintentional application of the pitches of his English intonation. This seems to occur for various reasons: (1) because he is unaware of the existence of his highly systematized--not accidental or merely "emotional"--intonational organization of English; (2) because he assumes that his own intonations are universal in all human utterance and therefore overlooks the difference between the intonation superimposed upon the tone language by its native speakers and the intonation which he imposes upon it from English; and (3) because, even though he may be aware of these various facts, considerable practice or a native gift for mimicry is needed before he can suppress his English intonation at will.

The intonation superimposed upon a tone language by its native speakers is of such a type that it does not destroy the system of contrastive lexical pitches. It may change the general height of the voice from low to high or even to falsetto, or elongate the various syllables, or make other nonphonemic modifications of tonemes which, in the particular language concerned, do not eliminate the lexical pitch contrasts; occasionally it may even override the lexical tonemes in restricted parts of the sentence without interfering seriously with the tonal system as a whole. If English intonation is substituted for the native type, however, it may prove devastating

to the entire tonemic structure, since the English intonation contours appear to the native speakers of the tone language to be actual lexical pitches, but incorrect ones. The Mixteco word žükü 'mountain,' for example, has two level mid-pitched tonemes. If an English speaker uses this word at the end of a question he is likely to make his voice rise on the last syllable, paralleling the usage with the English word mountain? in similar circumstances. In Mixteco no such rise occurs at the end of questions of any type, but the raising of the pitch of the last syllable of žükü would force speakers of that language to interpret the word as žükú which has the same vowels and consonants but differs in having the last syllable pronounced with a high toneme and in having the meaning 'ox yoke.' Not infrequently, native speakers of tone languages take advantage of similar errors to have considerable fun at the foreigner's expense,¹ but more often the mistakes simply cause misunderstanding.

Before attempting to add to his speech the unfamiliar tonemes of a tone language, then, the student will do well to try to "de-tone" himself of the habits of English intonation. He will attempt to learn negative control of pitch, so as to avoid the usage of English intonations that reflect his attitudes toward the statements he makes, and to learn positive control of pitch so as to manipulate skillfully the lexical and superimposed pitches of the tone language being studied.

B. Tonemes versus Superimposed Quantity and Stress

Related to the difficulties caused by the speaker's native superimposed intonation are the problems resulting from superimposed stress or quantity.

Because of the tendency of English to make stressed vowels carry a higher pitch than unstressed ones,² it proves awkward for English speakers to handle stress and pitch independently and to recognize high unstressed syllables and low stressed pitches. Frequently one may even have mental metathesis, and hear a high toneme as low, and a low one as high, owing to unexpected stress placement.

Because of a similar tendency to make English stressed vowels longer in duration and higher in pitch than unstressed ones,³ the English speaker has difficulty handling pitch and duration separately in languages where long vowels have no qualitative differences from short ones⁴ or where the durational pattern is complicated.⁵ He is likely to analyze a short unstressed high-pitched syllable as long and stressed and, accordingly, to pronounce it incorrectly.

¹For texts in which a foreigner is misunderstood, deliberately or accidentally, because his intonation incorrectly affects the requisite tonemes, see K. L. Pike, "Tone Puns in Mixteco," IJAL, XI (1945), 129-39, and "Another Mixteco Tone Pun," IJAL, XII (1946), 22-24; for tonemes deliberately altered by the native in order to mimic foreign pronunciation see K. L. Pike, "Mock Spanish of a Mixteco Indian," IJAL, XI (1945), 219-24.

²For general pitch and stress correlation see R. Ortley, "An Objective Study of Emphasis in Oral Reading of Emotional and Unemotional Material," Speech Monog., IV (1937), 56-68; W. L. Schramm, "The Acoustical Nature of Accent in American Speech," Am. Speech, XII (1937), 49-56; J. Tiffin and M. D. Steer, "An Experimental Analysis of Emphasis," Speech Monog., IV (1937), 69-74. One must bear in mind, however, that stressed syllables of English are not always higher in pitch than unstressed ones. Certain intonation contours require low stressed syllables and higher unstressed ones (for example, the contour of deliberate surprise; note Thomas!?, starting low and ending high).

³See references in note 2.

⁴C. B. Miller ("Duration as a Semantic Element in the 'Bankon Language,'" Arch. Néer. Phon. Exp., XIII [1937], 129-37) describes a specific language in which quality, pitch, and stress may be controlled separately, leaving measurable unconditioned duration.

⁵P. Ariste ("A Quantitative Language," Proc. Third Internat. Cong. Phon. Sci. [1939], 276-80) claims that Estonian has three degrees of length. See D. M. Beach, "The Science of Tonetics and Its Application to Bantu Languages," Bantu Studies, 2d series, II (1924), 92, for length of tone versus phone.

Styles of speaking--whether rapid, slow, hesitant, angry, or the like--may also cause interference with one's perception of the actual characteristics of tonemes and may affect the general relation of the tonemes to each other or to the speaker's norm. All such changes add an extra factor to be accounted for in listening to, analyzing, and utilizing the pitch system.

As with intonation, the student must learn to dissociate the hearing and speaking of stress, quantity, and pitch from his ingrained habits.

C. Relative and Perceptual versus Absolute and Objective Data

1. Relative versus Absolute Pitch

One of the most distressing things about listening to tone is that there are absolutely no objective items which one can train oneself to hear in order that wherever one meets them one may say: "There is such and such a toneme." Fortunately, this is not true of the sounds themselves; if one has worked assiduously he may be able, within a very few minutes after he has started to study a strange language, to identify typical varieties of nasalized vowels, voiceless laterals, glottalized stops, and so on. One cannot do this with tone since the objective number of vibrations a second is immaterial to the system or to the specific utterance. Ear training to obtain "absolute pitch" would therefore be somewhat beside the point. There is no fixed scale involved, or even intervals fixed by a gap of a specified number of vibrations a second. The tone investigator must train his ear to catch the relationship of the pitch of one syllable to that of a neighboring syllable, and not its relation to an absolute scale; it is the approximate relative heights of contiguous tonemes that constitute the significant characteristics of the contrastive pitch system. A toneme is "high" only if it is higher than its neighbors in the sentence, not if its frequency of vibrations is high.⁶ This relative characteristic of tone is likewise true for stress and quantity.

Thus ear training for segments may be made so thorough that an investigator may very early make a rough transcription which is quite close to the phonemic system. But one who thinks he is making an "exact" transcription of tonemes from the start is almost certainly mistaken,⁷ since relationships between tonemes are the pertinent data but these relationships cannot be discovered without a considerable body of material for comparison.

2. Physical versus Perceived Pitch

One cannot hear the physical pitches exactly as they are produced. The ear is physiologically incapable of responding to changes which are too rapid and (or) too minute. A subjective record of perceived pitch may therefore vary considerably from an instrumental analysis of the pitch of the same unit of speech.⁸

⁶ Thus the "high" tonemes of a bass voice may be lower in absolute pitch than the "low" tonemes of a soprano.

⁷ Some investigators feel that an initial tone transcription can be fairly accurate. Compare Beach, "Tonetics," Bantu Studies, 2d series, II (1924), 106. I. C. Ward in her Introduction to the Ibo Language (Cambridge, 1936) first recorded a mass of material and later analyzed it. She says (xi): "Sentences, descriptions, narratives have been taken down with a close and accurate tone notation. These have subsequently been analyzed." Elsewhere (11), she calls this preliminary notation detailed and accurate. One may ask, however, in a partly parallel instance, whether it would be possible for a foreigner who was not acquainted with the English phonemes to make a detailed and accurate transcription of English before he was aware that differences between [θ] and [ð], [æ] and [ɛ], degrees of stress, and so on, were phonemically significant. Some items will inevitably be overlooked by the investigator in the early stages of study of an intricate but unfamiliar system. The analysis needs to be done in the field, where the notation can be checked and modified as necessary. Accuracy of notation of a system for practical linguistic representation can ultimately be evaluated only in terms of the faithful portrayal of the functional signals of the system--not in terms of the gross acoustic judgments of a foreigner.

⁸ A. R. Root ("Pitch-Patterns and Tonal Movement in Speech," Psychol. Monog., XL, No. 1 [1930], 109-59) has excellent diagrams showing the correlations between perceived and physical

Sometimes an illusion may occur, so that the perceived pitch is not physical pitch at all. For example, an investigator might think he was hearing pitch characteristics when he was actually hearing some phenomenon of vocalic quality. So in American-English intonation of the South a Northerner may be convinced he is hearing intonation differences, when actually it may be diphthongization, which is the main feature of dialectal difference.⁹

3. Subjective versus Instrumental Analysis

One might think that tonemes could be analyzed by instruments, inasmuch as precise frequencies can be determined from instrumental records. These measurements are a great help for describing the physical nature of tonemes after they have been otherwise discovered,¹⁰ but do not contribute greatly to their analysis since (1) it is the relative pitch of tonemes which is significant, rather than their absolute pitch, and (2) tonemes change under various conditions, so that the intervals do not remain fixed in such a way that they may be mechanically discovered; instruments merely record gross fluctuation, rather than analyzing it in terms of deviations of units within a system.

D. Register versus Contour Systems

The investigator does not know what type of system of tonemes he will find. His technique must allow him to start without this knowledge.

Furthermore, the investigator must not insist that all tone languages act the same or that they have the same characteristics. A researcher who is familiar with register systems must hesitate lest he force contour systems into the same mold.¹¹ Equal danger besets the student acquainted only with contour systems who attempts analysis of a register system; thus one who had first

pitches in English intonation, and a summary of the chief ways in which these differ for syllables heard one by one. Any person studying tone languages by instruments should be acquainted with this study, lest he overestimate the linguistic importance of the superperceptual tone characteristics present in the physical records. There is an increasing number of studies of the perceptual thresholds of pitch changes; see D. Lewis, M. Cowan, and G. Fairbanks, "Pitch and Frequency Modulation," *Journ. Exp. Psych.*, XXVII (1940), 23-36 (which shows that perceived pitch changes increase with extent of pitch change, decrease with increase of rate, are greater for sinusoidal than for linear modulation, and are independent of the direction of the pitch change). For further references see K. L. Pike, *The Intonation of American English* (Ann Arbor, 1945), 14-15 and notes. For an earlier statement see C. B. Bradley, "On Plotting the Inflections of the Voice," *Univ. Calif. Publ. Am. Arch. and Ethn.*, XII, No. 5 (1916), 208.

⁹ Diphthongization as an important difference in Southern versus Northern speech is presented by C. M. Wise, "The Southern American Drawl," *Le Maître Phonétique*, XLIV (1933), 69-71. While analyzing the intonation of various American-English speakers of the North, I assumed that that of Southerners would be considerably different. In checking the assumption later with speakers from several Southern states, I failed to find any new intonation contours. The differences actually found were largely changes in the semantic use or frequency of occurrence of certain of them, plus the effect of the diphthongization and other characteristics (see Pike, *Intonation*, 105-6).

¹⁰ For a graph of an instrumental recording of the five tones of Siamese--rising, circumflex, middle, depressed, falling--see Bradley, "Inflections of the Voice," *Univ. Calif. Publ. Am. Arch. and Ethn.*, XII, No. 5 (1916), 212. It should be noted carefully that these were measurements of the tonemes after the investigator knew that these contrastive units existed--the measurements were not taken to discover whether or not certain pitches were "meaningful."

¹¹ J. de Angulo had worked on several register systems before his work on Cantonese; he may have allowed this experience to influence him unduly in interpreting Cantonese (which is presumably of a contour type with register overlap) as a register system with three levels. Compare his article "Cantonese Dialect of Chinese," *Le Maître Phonétique*, LII (1937), 69-70, with his "The Linguistic Tangle of Oaxaca," *Lang.*, I (1925), 96-102; *idem*, "Development of Affixes in a Group of Monosyllabic Languages of Oaxaca," *Lang.*, II (1926), 46-61, 119-23; *idem*, "Tone Patterns and Verb Forms in a Dialect of Zapoteco," *Lang.*, II (1926), 238-50.

studied Mandarin might decide that Japanese had no tonemes (but only stress) if he did not appreciate the evidence for a kind of modified register system and if he did not recognize the scarcity of words distinguished by pitch only.¹²

E. Significant versus Nonsignificant Pitch Changes

An investigator unacquainted with tone systems is likely to assume that once a word has a certain pitch (or pitches) it must always have the same pitch, without change. The fact is that both significant and nonsignificant pitches do change. When the pitch of a familiar word changes, and the investigator is unaware of it, his hearing is thrown off in proportion to the amount that he was using that familiar word as a standard by which to classify the pitch of unfamiliar words. Different circumstances under which pitches change and the manner in which they affect the tonemic system can, in general, be discussed in terms of those situations (1) in which one toneme is substituted for another, and (2) in which one toneme is modified nonphonemically by the context.

1. Change from One Toneme to Another

Under the circumstances appropriate to a given language a syllable may have its normal toneme removed and a different one substituted for it. In a register system, for example, high might be substituted for mid (cf. Mixteco mēkē mékē 'brain brain,' where the first syllable changes in tone when the word occurs second in this particular sequence); in a contour system some glides may at times be replaced by other glides. Various types of this substitution are found:

a. Changes in Isolated versus Included Position

Frequently the toneme of a word in isolation may be different from its toneme when it is included in a phrase. The investigator chooses to call one of the forms of the word basic; this decision is founded upon various criteria.¹³

b. Morphological Changes

The toneme of a syllable may be replaced so as to change the grammatical meaning of the word.¹⁴ In Mixteco we find that verbs of a certain type change the potential aspect (incomplete

¹²Cf. p. 14, note 29.

¹³Sometimes the isolated form is basic or "inherent," but it is dangerous to assume that too quickly. See, however, D. M. Beach, The Phonetics of the Hottentot Language (Cambridge, 1938), 125, 143-47; Beach's assumption that the isolated form is basic may very well have been responsible for the possible error in his analysis of "root" contours; cf. p. 11, note 22.

See pp. 74-75 of the present volume for the technique for finding the basic tonemic form of a morpheme. For convenience of description as a criterion of classification in morphological analysis see L. Bloomfield, Language (New York, 1933), 219. Investigators of tonemes, or phonetics in general, cannot afford to ignore techniques of morphological analysis, since frequently the phonetic data cannot be satisfactorily described without a grammatical analysis as a background for them. In addition to Bloomfield's extremely valuable though difficult book, the student may consult B. Bloch and G. L. Trager, Outline of Linguistic Analysis (Baltimore, 1942), which is a short introductory booklet. The most helpful study for the serious beginning student, however, is that by E. A. Nida, Morphology: The Descriptive Analysis of Words (Ann Arbor, 1946).

¹⁴Many examples of tonemes changing the morphology of words have been reported in grammatical or tone literature. Chatino tkwl with low pitch is said to mean 'he tells,' but tkwí with high pitch, 'you tell' (De Angulo, "Development of Affixes in ... Oaxaca," Lang., II [1926], 119); Moru mí-zí ngagà té means 'you (sing.) called the boys,' but mí-zí ngagà te means 'you (pl.) called the boys' (A. N. Tucker, The Eastern Sudanic Languages [London and New York, 1940], 141); in Bantu, commonly, the difference between second person singular and third person singular of class I verbs is made by tone (C. M. Doke, A Comparative Study in Shona Phonetics [Johannesburg, 1931], 216); for Yoruba it is claimed that an up glide sometimes adds an object (A. L. James, "The Tones of Yoruba," BSOS, III [1923-25], 119-29); in Bamum the difference between singular and plural may sometimes be shown by tone: kaáprà 'gun,' kaáprà 'guns'; mànżè 'road,' mànżè 'roads'

action, not quite equivalent to the future tense) to the continuative aspect (action in progress, not quite equivalent to the present tense) by a toneme shift. Note the following examples:

<u>kāní-ná</u>	'I am going to hit something'	but <u>hání-ná</u>	'I am hitting something'
<u>kā?an-ná</u>	'I am going to talk'	but <u>ká?an-ná</u>	'I am talking'
<u>kíkū-ná</u>	'I am going to sew'	but <u>kíkū-ná</u>	'I am sewing'
<u>šíkó-ná</u>	'I am going to sell'	but <u>šíkó-ná</u>	'I am selling'
<u>kákā-ná</u>	'I am going to walk'	but <u>híkā-ná</u>	'I am walking'

For Mazateco, notice the following illustrations of tone affecting the person of the subject. Pitch 1 is high; pitch 4 is low; pitches 2 and 3 are in between. The pitch is applied to all the vowels immediately preceding the numbers.

<u>si⁴⁻³te²⁻³</u>	'I spin'	<u>si⁴⁻³te²⁻³</u>	'I shall spin'
<u>si¹te²</u>	'he spins'	<u>si¹te²</u>	'he will spin'
<u>si⁴⁻³te⁴⁻³</u>	'I widen'	<u>si⁴⁻³te⁴⁻³</u>	'I shall widen'
<u>si¹te⁴⁻³</u>	'he widens'	<u>si¹te⁴⁻³</u>	'he will widen'
<u>si⁴⁻³te³</u>	'I make into ten pieces'	<u>si⁴⁻³te³</u>	'I shall make into ten pieces'
<u>si¹te³</u>	'he makes into ten pieces'	<u>si¹te³</u>	'he will make into ten pieces'
		<u>si⁴te³⁻²</u>	'we all (including you) will make into ten pieces'

c. Changes of Phrase Relationships

The meaning of a phrase as a whole may be changed by a tone change of some word. These are often called "syntactic" tonemes, even though it is the tonemes of some one word of the phrase which are changed.¹⁵ The tone may indicate the syntactic function of a word, whether it is in object position, modifying position, and so on.¹⁶ In Mazateco, for example, a monosyllabic

(I. C. Ward, "The Phonetic Structure of Bamum," BSOS, IX [1937-39], 423-28). In Hausa, imperative and tense differences ('Did you go' versus 'Will you go') may be carried by tone (A. L. James and G. P. Bargery, "A Note on the Pronunciation of Hausa," BSOS, III [1923-25], 727); in Muskogee, tonemic changes play a considerable part in verb paradigms (M. R. Haas, "Ablaut and Its Function in Muskogee," Lang., XVI [1940], 141-50). For tense changes signaled by tone see F. Boas, Grammatical Notes on the Language of the Tlingit Indians, "Univ. Penn. Mus. Anthr. Publ.," VIII, No. 1 (Philadelphia, 1917).

Differences in arrangement of tonemes may give different classes of nouns ("declensions") or of verbs ("conjugations"). Sechuana is said to have forty different declensions of nouns, and seven classes of verbs; if one knows the basic tonemic class of a word, the other forms can be predicted (D. Jones, "Words Distinguished by Tone in Sechuana," Festschrift Meinhof [Hamburg, 1927], 88-98); further, some words may have three forms, depending on the nature of the sentence (question, command, and so on). The verb classes of the Moru-Madi languages are differentiated by the basic tonemic types of their words and by the type of tonemic changes which they undergo in context (Tucker, Sudanic Languages, 270-81). Compare, also, the illustration of tonemic classes in Beach, "Tonetics," Bantu Studies, 2d series, II (1924), 100-101.

¹⁵In Bamum (I. C. Ward, "Bamum," BSOS, IX [1937-39], 423-28) and Ibo (Ward, "Tone in West African Languages," Proc. Third Internat. Cong. Phon. Sci. [1939], 385) tonemes express a syntactic relationship (Ibo 'the soup is hot' versus 'soup which is hot': ófè dè ókè; ófè dè ókè). See also Jones, "Sechuana," Festschrift Meinhof (1927), 88, for Sechuana. B. Karlgren (A Mandarin Phonetic Reader in the Pekinese Dialect, in Arch. d'Études Orientales [Stockholm, 1918], XIII, 27) has a few illustrations of tonemic substitution for Mandarin.

¹⁶A few such sporadic phenomena seem to occur in Burmese. Thus: "Certain noun expression attributes, which consist of a syllable in tone I or II, change to tone III before the head noun." Compare šín 'master,' ?ein 'house,' ?ein šín 'householder.' "Quite often, however, the tone remains unchanged: ?einsin occurs beside ?ein šín" (W. Cornyn, Outline of Burmese Grammar, Lang.

adjective which contains a high toneme may have a lower toneme added when the adjective occurs at the end of a short noun phrase, as in ti³ hnti¹⁻³ 'dirty boy' (hnti¹ 'dirty').

d. Regular Mechanical Meaningless Changes

Tonemes may affect one another. Some tonemes, for instance, may cause neighboring tonemes to change to be like them. Note Mixteco fíté 'sand' and híín 'with' combined in híín fíté, in which the first toneme of the word for 'sand' is pulled up to the toneme of the preceding vowel. Other tonemes force identical neighboring tonemes to change so as to be different from them.¹⁷ Note Mixteco žúkú 'mountain' and bíná 'today' in kí?ín-ná žúkú bíná 'I am going to the mountain today,' in which the first toneme of the word for 'today' is dissimilated to high after the level tonemes of the word for 'mountain.'

Disser. No. 38 [Baltimore, 1944], 23). Cornyn also states (32): "When the members of a doubled verb are a negated verb first member followed by a verb with prefixed ta-, the juncture is open. The first member, if tone I, changes to tone III." Note hmi in hmíde 'reaches' and mahmi tahmi 'not quite reaching'; no optional unchanged form is recorded for this type. For further minor items see pp. 20 and 29 in the same publication. For Hagu (Amoy) see pp. 82-84, note 6.

¹⁷Y. R. Chao reports an occasional substitution of tonemes in two-syllable phrases in Mandarin sandhi; thus tonemes 3 plus 3 may result in the sequence tonemes 2 plus 3 (Introduction to R. H. Mathews, A Chinese-English Dictionary, revised [Cambridge, 1943]). In addition he tells me (from unpublished data) that in certain phrases with three monosyllabic words, each with a full toneme, the following tonemic substitutions are the ones that occur (note the grouping):

1 + 2 + 1 > 1 + 1 + 1	2 + 2 + 1 > 2 + 1 + 1
1 + 2 + 2 > 1 + 1 + 2	2 + 2 + 2 > 2 + 1 + 2
1 + 2 + 3 > 1 + 1 + 3	2 + 2 + 3 > 2 + 1 + 3
1 + 2 + 4 > 1 + 1 + 4	2 + 2 + 4 > 2 + 1 + 4
<hr/>	
1 + 3 + 3 > 1 + 1 + 3	2 + 4 + 4 > 1 + 1 + 4
<hr/>	
	3 + 3 + 3 > 2 + 1 + 3

From my own data note the following sample: shul 'book,' hen³ 'very, fierce,' hsiao³ 'little' becoming shul hen¹ hsiao³ 'the book is very little' (the transcriptions of segmental phonemes here, and on p. 35, are, in general, given as in the work cited earlier in this note). To account for this change in sequence one assumes that 3 + 3 gave 2 + 3, in accordance with the rule for disyllabic sequences mentioned by Chao, and that, since 2 after 1 (or after 2) gives 1, we have 1 + 3 + 3 > 1 + 1 + 3, via 1 + (3 + 3) > 1 + (2 + 3) > 1 + 1 + 3.

That these changes of pitch are actually substitutions of one toneme for another, rather than nonphonemic modifications of tonemes, is clear from the following evidence: (1) An inherent toneme 3 becomes homonymous with toneme 2, so that an inherent 2 and a derived 2 may give rise to puns: mei² 'have not,' mei³ 'beautiful,' chiu³ 'wine'; mei² chiu³ 'the [bottle] contains no wine' or 'the wine is beautiful' (Chao states that this pun is common in China). (2) An inherent toneme 3 before 3 becomes 2, and then acts as 2 in further tonemic substitutions, as illustrated in the preceding paragraph: both inherent 2 + 2 + 3 and 2 + 2 + 3 derived from inherent 2 + 3 + 3 become 2 + 1 + 3. (3) When one hears a two-syllable compound word with the tonemic sequence 2 + 3, one cannot tell from its pronunciation whether the first syllable historically had inherent toneme 2, or 3; in fact, Chao says, folk etymologies occasionally err because they assume an inherent 3 (which has been replaced by 2) to be inherent 2: thus pai²shu³ 'sweet potatoes' is treated in folk etymology as though the first syllable were inherent 2, but other evidence indicates that it must have been 3, even though the origin of the morpheme is somewhat obscure.

Since the writing of this note, some of Chao's material has appeared in Chao and Yang's Concise Dictionary of Spoken Chinese (Cambridge, 1947). Note the following tables (reproduced by permission of The Harvard Yenching Institute, from pages xvi-xvii) indicating the tone sandhi with "tone letters." The vertical line gives a basis of reference for height of pitch; slanting and horizontal lines at the left of the vertical ones show the general direction and speed of the pitch contours (for a change of falling-rising toneme 3 to its low-level variety, see p. 29, note 26; for further discussion of this symbolism, see p. 38, note 50):

Sometimes the rules for such changes are perfectly regular. These types of tonal interchange do not alter the meaning of the word or phrase, but are mechanical rearrangements of tonemes. Forced meaningless substitutions of one toneme for another may be called PERTURBATIONS of tonemes, in which one toneme is perturbed by another in REGULAR TONE SANDHI.

Occasionally one finds UNSTABLE NEUTRAL SYLLABLES that have no inherent toneme of their own but take on the toneme of the syllable they follow or precede. Some investigators call the toneme on such syllables neutral, rather than reserving the label for the syllable itself. The student should be careful to notice, however, that the tonemes on these syllables sound exactly like the tonemes on other syllables, since no new pitch contrasts or tonemes are involved.

NONLEXICAL tonemes are those that appear only in phrases, and never on words in isolation. NONLEXICAL NEUTRAL TONEMES are found only in phrases, also, but, in addition, their occurrence is limited to stressless syllables where normal lexical pitch contrasts of any type become obliterated; they may have several alternate pitch forms, determined by their relation to surrounding tonemes or by some other phonetic characteristic of the context. Some writers tend to call syllables containing nonlexical neutral tonemes TONELESS.

If syllables are RHYTHMICALLY TONELESS, their neutral pitch character is due to their position in a rhythmic sequence of tonemes that forces the disappearance of pitch contrasts, especially in a language with a level-tone system.¹⁸

3rd + 3rd	$\checkmark + \checkmark \rightarrow 1\checkmark$	好早 <u>hao-tzao</u>	'how early!'
1st-2nd-1st	717 → 777	東南風 _{1x2}	'southeast wind'
1st-2nd-2nd	711 → 771	三年級 _{3x1}	'third-year class'
1st-2nd-3rd	711 → 771	他沒 _有	'he has not'
1st-2nd-4th	71V → 77V	西红柿 _{西紅柿}	'tomato'
2nd-2nd-1st	117 → 177	梅蘭芳 _{Mei Lan-fang}	'Mei Lan-fang'
2nd-2nd-2nd	111 → 171	還沒來 _{還沒來}	'has not yet come'
2nd-2nd-3rd	111 → 171	國民黨 _{國民黨}	'Kuomintang'
2nd-2nd-4th	11V → 17V	巡洋艦 _{巡洋艦}	'cruiser'
1st-3rd-3rd	711 → 711 → 771	三眼井 _{三眼井}	'a well with three outlets'
2nd-3rd-3rd	111 → 111 → 171	寒暑表 _{寒暑表}	'thermometer'

For a different view, in which the modified toneme 3 is analyzed as a new toneme, consult C. F. Hockett, "Peiping Phonology," JAOS, LXVII (1947), 256-57.

¹⁸For samples of unstable neutral syllables see Tucker, Sudanic Languages, 112, and H. Hoijer, "Pitch Accent in the Apachean Languages," Lang., XIX (1943), 38-41. See also idem, Navaho Phonology, 30, 50, "Univ. New Mex. Publ. Anthr.," I (Albuquerque, 1945).

For nonlexical neutral (or "toneless") syllables--even under stress--see C. F. Hockett, "Peiping Phonology," JAOS, LXVII (1947), 257. For a discussion in much greater detail see Chao and Yang, Spoken Chinese, xviii-xix. Chao notes that at the end of an utterance the neutral toneme tends to have half-low pitch after the toneme 1, middle pitch after toneme 2, half-high pitch after toneme 3, and low pitch after toneme 4. Observe the samples in the following table (reproduced, by permission, from Spoken Chinese; for an explanation of the tone letters, see p. 24, note 17, and p. 38, note 50):

Half-low	.	after 1st Tone	他.的	ta.de	'his'
Middle	.	after 2nd Tone	誰.的	sheir.de	'whose'
Half-high	.	after 3rd Tone	你.的	ni.i.de	'your(s)'
Low	.	after 4th Tone	大.的	dah.de	'big one(s)'

In certain combinations of three syllables, however, the neutral toneme tends to approximate the pitch "of the tail end of the 1st syllable" of the combination; note the following examples from Chao and Yang:

e. Arbitrary Tone Sandhi

Usually the tonemic rules are not perfectly regular; one word (or class of words) which has a high toneme, for example, may cause all low tonemes following it to be changed to high, whereas a different word--also with a high toneme--may leave the low tonemes of succeeding words undisturbed. There may be nothing in the two words to give the slightest hint of why both of them do not cause the same perturbations; the words may even be homonymous, and yet act differently. This irregular effect is ARBITRARY TONE SANDHI.¹⁹ In Mixteco, for instance, kēē 'to go away' leaves the mid toneme of dē 'he' unperturbed in kēē-dē 'he will go away,' but kēē 'to eat' perturbs dē to high, as in kēē-dé 'he will eat.'

f. Alternate Pronunciations

Tonemic differences which affect the meaning of words or phrases are called to the attention of the investigator much more quickly than changes which do not affect any meanings but which are, nevertheless, complete substitutions of one toneme for another and are not free or key changes within a toneme, or nonphonemic changes conditioned by the segments, stress, quantity, or position in the word, and so on.

1st-neutral-4th	˥˨˧˥	→	˥˧˥ 中 ₂ . 國 ₃ 話 ₄	'Chinese language'
2nd-neutral-4th	˥˧˧˥	→	˥˧˥ 學 ₃ . 得 ₄ 會 ₅	'can learn'
3rd-neutral-1st	˥˧˥ ˥	→	˥˧˥ 走 ₄ . 不 ₅ 開 ₆	'cannot get away'
3rd-neutral-2nd	˥˧˥ ˥˥	→	˥˧˥ 兩 ₄ . 個 ₅ 人 ₆	'two people'

In certain other undefined syllables, however, this rule does not hold:

1st-neutral-1st ˥˧˥ 他的家₄₀ 'his home'

In certain compounds, also, Chao and Yang show that the pitch of the neutral syllable is nonpredictable. In general, however, "Particles, interjections, pronouns after verbs, and other 'empty words' of a sentence always have the neutral tone."

For rhythmically toneless syllables see H. V. Velten, "Three Tlingit Stories," IJAL, X (1944), 168-80. Tentative reports from Miss Ann Blackman and Miss Lorna Gibson (of the Summer Institute of Linguistics) suggest that a neutralization of high and low pitch tonemes gives a non-contrastive mid pitch in certain rhythmic conditions or pitch sequences (e.g. to prevent the occurrence of a sequence of three high or three low pitches) for Pamé.

¹⁹Arbitrary or regular sandhi changes may cause the investigator considerable difficulty. L. T. Wang ("Recherches expérimentales sur les tons du Pékinois," Arch. Néer. Phon. Exp., XIV [1938], 1) says: "On ne peut dire d'après quelle règle ou dans quel cas le ton change"; toneme number 1 may under certain conditions become 2, 3, 4, or 6; toneme 2 may become 1, 3, 4, or 6; toneme 3 may become 1, 2, 4, or 6; toneme 4 may become 1, 2, 3, or 6; toneme 6 does not exist independently, coming only from the change of others. I. C. Ward ("Tone in West African Languages," Proc. Third Internat. Cong. Phon. Sci. [1939], 386), in discussing the problem of words in tonemic classes which do not act in parallel ways, does not seem satisfied with her explanation, "if it can be called an explanation," of the fact that the word ényí 'elephant,' for example, changes its toneme in the genitive relationship, but the word òbù 'coucal--a kind of bird' does not: íṣí ényí 'head of the elephant,' but íṣí òbù 'head of the coucal.'

Tonemic perturbations are especially disconcerting when the investigator is unaware that such types of change exist or are possible. In the early stages of the analysis of Mixteco, unanalyzed sandhi changes so disturbed me that I finally decided that if tonemes change, ever, this of itself must constitute proof that a language is not tonal. Thereupon in Mixteco I carefully noted the pitch contour of certain words and determined to listen for them in speech; if I should later hear them in a different pitch, I would decide that the language was not tonal. Soon one of the words was heard, changed, and the conclusion temporarily drawn that tones were nonsignificant. Dozens of word pairs different only by tone later made the conclusion untenable. It was not until I was working with frames, however, that the true relation between definite tone levels and sandhi change began to emerge.

In a few words tonemes may change when there is no grammatical or sandhi reason whatsoever. On the surface this appears to be much like free variation within the phoneme, but it is quite different in function. It compares with the alternate pronunciation of I am not versus I'm not and I will go versus I'll go; or, more closely, it parallels the fashion in which some speakers of American English say either [o'be] or [ə'be] for obey, while [kət] and [kot] are the two different words cut and coat. In Mixteco, for example, 'to loose' can be either síá or síà with no difference of meaning, function, or context; such alternate forms are quite rare, however, for Mixteco words with two vowels.

2. Change within a Toneme

In the last few paragraphs several circumstances have been mentioned in which one toneme may be substituted for another. This substitution of tonemes is functionally very different from tonal change in which a specific toneme is affected although it is retained, with its phonetic form somewhat modified. In this latter case the practical orthography--that is, a phonemic one--should be unaffected. The native speaker is usually unaware of this subphonemic type of change, but is not so likely to be unaware of the substitution of the full phonemic units of tone. Various kinds of nonphonemic modification of tone are discussed below.

a. Change of Key

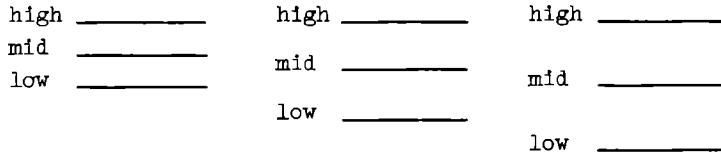
The general KEY, or octave, or general "pitch of the voice" may change and force a change of all the syllables and tonemes in the phrase. At one time the informant may speak in a high voice and at another time in a low voice. If, previous to such a change, the investigator has made a mental auditory note of the height of a certain toneme, in order to use it as a standard and to compare its absolute height with other tonemes, the change in key may abrogate his conclusions by forcing the writing of too many tone contrasts, because two syllables level with his standard would tend to be written differently at different times.

Key changes may be caused by emotional attitudes, by changes in the physical condition or environment of the informant,²⁰ by intonational influences, or by stylistic factors, or they may simply occur over a period of time.

b. Change of Spread of Intervals

The spread of pitch between tonemes, the relative pitch gap, may vary freely, with no specific cause. If this free variation is transcribed under the false assumption that it is significant, too many tonemes may be postulated.

Spread of interval in a three-register system could be diagramed as follows:



The number of tonemes remains the same, but the size of the interval has varied.²¹ For intonation, optional differences in the spread of interval can be demonstrated nicely by playing the

²⁰ For a somewhat related situation note D. F. Bleek ("Bushman Grammar," Zeitschrift für Eingeborenen-Sprachen, XIX [1928], 85-86), who says regarding Bushman that "tones are also used descriptively to denote quantity or distance. The larger or farther a thing is, the higher the tone of the adjective or adverb describing it." Tucker (Sudanic Languages, 112) also mentions some key changes.

²¹ See p. 29 for interval changes induced by stress differences in Mandarin. M. Guthrie ("Tone Ranges in a Two-Tone Language [Lingala]," BSOAS, X [1940-42], 469-78) seems to claim four

speech melodies of a nursery rhyme on a violin or other string instrument; the same rhyme may be played in different octaves (change of "key") and with different intervals and total pitch range.²² This is likewise true for the intervals of a register-tone language.

c. Free Variation about a Norm

A toneme has some range of variation. Within its limits the toneme may change a tiny bit for no reason whatsoever, just so long as it is not confused with the other tonemes. For example, in a two-register system if the two levels average about five semitones apart, each of them might vary, say, by one semitone; of course this would automatically affect the spread of the interval between the tonemes. In a contour-tone system the characteristics of the contour, rather than simply its relative height, may be modified.²³

A different type of free variation within sequences is fluctuation in the speed of pronunciation of a syllable. This change may affect the rhythm of an utterance as a whole and the actualization of the individual tonemes.²⁴

d. Changes in Tonemes Caused by Position in Word or Phrase or by Neighboring Sounds

At the end of a sentence a toneme in either a register or a contour system is likely to be a bit lower than in other positions in the sentence. This does not substitute a different tonemic unit, but merely modifies the unit involved.²⁵ Contour types may also vary in direction,

degrees of spread of interval for Lingala tonemes: he gives normal, emphatic, interrogative and subjunctive "ranges"; the second is higher than the first, and the third higher than the second. Jimbo ("Japanese," BSOS, III [1923-25], 666-67) asserts that emotional features may change the spread of Japanese tonemes. De Angulo ("Cantonese," Le Maître Phonétique, LII [1937], 69-70) states that emphatic speech gives a wider spread to Cantonese than is normal otherwise.

²² I first became aware of this possibility when Sidney Straight, of the University of Michigan, demonstrated it effectively for me by playing "Mary Had a Little Lamb," first as if an older child were speaking the poem, and then as if a very young child were reciting the same jingle. Later I came across a reference to a similar type of experiment in the early literature (J. Steele, Prosodia Rationalis, or An Essay towards Establishing the Melody and Measure of Speech, to Be Expressed and Perpetuated by Peculiar Symbols, 2d ed. [London, 1779], 15-16).

²³Sometimes there are optional forms of a toneme. Thus in Cantonese (D. Jones and K. T. Woo, A Cantonese Phonetic Reader [London, 1912], xiv-xv), toneme 1 may be either uppermost level or upper falling; the latter variant is the normal form in isolation or for the end of a group of words, although there are a few cases where the level one "appears to be necessary at the end of a group." Toneme 4 may be either low level or low falling, and the forms "may be used indifferently" --although "it is perhaps safer" to use the falling one at the end of a group. The falling variants of tonemes 1 and 4 are not the same as any of the other tonemes; in fact there are no other falling tonemes--numbers 2 and 5 are rising, 3 and 6, level. This phenomenon appears to be free choice of alternate forms of a single toneme, not the choice of two different independent tonemes for the alternate pronunciations of words.

²⁴Jones and Woo indicate changes in length or speed of tone contours in Cantonese by means of italics and boldface type, or by changes in musical notation. In ten lines of text (Cantonese, 3-5), for example, the tonemes occur with the following frequency and speed:

Toneme 1: Normal contour: regular speed 13 occurrences, slow 2, fast 2
Alternate contour: 2 occurrences
Toneme 2: regular speed 29 occurrences, fast 1
Toneme 3: regular speed 6 occurrences, slow 1, fast 6
Toneme 4: regular speed 7 occurrences, slow 3, fast 1, Half slow 1
Toneme 5: regular speed 13 occurrences, fast 8
Toneme 6: regular speed 9 occurrences, slow 1, fast 2

²⁵Final tone lowering has been reported for Ibo (Ward, Ibo, 11), Lingala (Guthrie, "Lingala," BSOS, X [1940-42], 471), Hottentot (Beach, Hottentot, 78), and Cantonese (Jones and Woo, Cantonese, xv). Cf. also above, note 23.

speed, and the like, according to position in the word or sentence.²⁶ Tonemes may be longer or shorter in isolation than when included in a phrase; or isolation may affect them in some other way.²⁷

Stress may affect the length, height, or quality of tonemes. On the basis of the brief introductory study I have made (in collaboration with Y. R. Chao) of Mandarin tone (dialect of the area slightly south of Peking, pronunciation of Chao) I would suggest that nonphonemic changes of pitch according to relation of words to stress constitute one of the most difficult characteristics of the Mandarin tonal system. Tonemes of syllables under emphatic stress tend to have wider spread of intervals: high pitches, there, are higher, low pitches are lower, falling glides begin higher and fall lower, and so on. The syllables other than the emphatically stressed one have the intervals between their pitches lessened: high tonemes tend to have their pitches lowered somewhat, low pitches are slightly raised, and glides become less long and prominent.²⁸ In a sentence with an emphatically stressed syllable there may be considerable free variation in the amount of modification of the unstressed tonemes: the glides, for example, are at times short, though still audible, or they become so abbreviated that I heard them only with close attention, or they are so drastically curtailed that I could detect no gliding pitch whatever. If in these optional, freely variant, pronunciations the glides disappear--while high tonemes become quite low and low tonemes are raised slightly--the contrast between the tonemes may be completely nullified; the foreigner cannot then identify the inherent toneme of such syllables until he hears a different, slightly contrastive, pronunciation of the same sentence, or until he recognizes the morphemes and knows the inherent character of their tonemes by evidence from other contexts. These phenomena

²⁶For tonemes of Burmese changing contour nonphonemically by situations see Cornyn (Burmese, 9): In isolation toneme 1 is low, level, and long, often accompanied by a gentle rise at the end; before a "space" [i.e. before another word?] it becomes low, level, and shorter, without the rise at the end; in "close juncture" [i.e. preceding another syllable in the same word?] it becomes low, level, and shorter than before a space. In parallel positions toneme 2 is respectively high, long, and falling toward the end; high and long but not falling; high, not so long, and rising. In parallel positions toneme 3 is high, short, falling, with a slow glottal closure; the same, except that glottal closure is not so slow; high, short, without glottal closure. In parallel positions toneme 4 is high, extremely short, with a sharp glottal closure; the same, except that in very rapid speech the final glottal stop sometimes assimilates as in close juncture; high, extremely short, with the glottal closure replaced by a nasal or unvoiced stop [or possibly a fricative?] of the same articulatory position as the initial nasal or stop of the following syllable.

For alternate tonemic forms in a language of northwest Kwangtung, China, see S. L. Wong, "Phonetics and Phonology of the Yao Language, Description of the Yau-Ling Dialect," Lingnan Science Journ., XVIII, No. 4 (1939), 424-55; here they are called "subsidiary tonemes."

For a final toneme 3, with slight low fall plus rise, which loses its rise elsewhere than finally in utterances, see Chao and Yang, Spoken Chinese, xvi; the following table is taken, by permission, from that source (see above, p. 24, note 17, for explanation of symbolism used in the table):

3rd+1st	↗ + ↘ → ↘ ↗ 好天	<u>hao-tian</u>	'good weather'
3rd+2nd	↗ + ↙ → ↘ ↙ 好人	<u>hao-ren</u>	'good man'
3rd+4th	↗ + ↖ → ↘ ↖ 好話	<u>hao-huah</u>	'good word'
3rd+neutral	↗ + ↚ → ↘ ↚ 好罷	<u>hao.ba</u>	'all right!'

²⁷Wang ("Pékinois," Arch. Nér. Phon. Exp., XIII [1937], 4) reports that, in Pekinese, tonemes of isolated syllables are a bit longer than these same tonemes when they are included within a sentence.

²⁸For similar statements, that have appeared since this was written, compare C. F. Hockett, "Peiping Phonology," JAOS, LXVII (1947), 257.

R. Ch. Guernier ("Notes sur la prononciation de la langue Mandarine de Pékin," Le Maître Phonétique, Suppl. I [1912], 11) says that tonemes in stressed syllables of the Mandarin of Peking are both longer and stronger than unstressed tonemes.

may be heard in the following series of sentences: t'a¹ yao⁴ nei⁴ pen³ shu¹ 'He wants that book,' 'He wants that book,' 'He wants that book,' 'He wants that book'; t'a¹ yao⁴ nei⁴ ko⁴ ya² 'He wants that tooth,' and so on; t'a¹ yao⁴ nei⁴ ko⁴ pi³ 'He wants that writing brush,' and so on; t'a¹ yao⁴ nei⁴ k'o¹ shu⁴ 'He wants that tree,' and so on. Words early in these sentences tend to retain slight contrastive differences of pitch between the tonemes (1 high level, 2 mid rising, 3 low rising or falling rising or low level, 4 falling) when the emphatic syllable occurs near the end of the sentence. When the stress comes elsewhere than on the last word, the final tonemes may (a) retain small contrastive differences between each other or (b) all become quite low, quiet, level, and nondistinctive.

Tonemes may be modified by being raised or lowered a bit because of partial attraction (partial assimilation) to neighboring tonemes. For example, a word of two mid level tonemes might have the first of these raised a bit following a high toneme. This could be diagramed as: phonemic [---] becomes phonetic [---].²⁹

Tonemes in syllables which have initial or final voiced stops are quite frequently a bit different from the same tonemes in syllables where the stops are voiceless.³⁰ Initial voiced consonants have, of course, some pitch. Strangely enough, the pitch of an initial consonant is usually nonsignificant to the system, whereas a final voiced consonant is likely to help carry the toneme. A similar situation may be seen in English intonation: Ann!, as a call, has a high falling pitch; man! does, likewise, except that the pitch of m must be ignored; in both utterances the pitch of the n constitutes the ending point of a glide parallel to that on the vowel in Pa! Compare also dog! Note the rise on the final consonant when a 'protesting' falling-rising pitch is used: dog!?, man!? Note the absence of a glide on the t of cat! On the other hand, I have never met a significant pitch, whether of intonation or tone, on an initial voiced stop or fricative.³¹

In some languages an initial voiced nasal, even when another consonant comes between it and the vowel (so that it sounds slightly syllabic to American listeners), may have changing pitches which are nonsignificant to the system. In Mazateco if the first consonant of an initial

²⁹ Beach ("Tonetics," Bantu Studies, 2d series, II [1924], 90), states: "In Sechuana there are three monotonemes, a high, a mid, and a low. When the high tone is followed by three mid tones, there is assimilation in the latter, so that the first of the three has a somewhat higher tone than the second, and the second a somewhat higher tone than the third. These three tones, differing slightly in height, are all members of the mid-monotoneme and may have the same tonetic symbol to designate them." Tucker (Sudanic Languages, 111-14) states that some extra levels [presumably nonphonemic] occur in conditioned sequences of tonemes in eastern Sudanic languages.

³⁰ In the Chekiang Dang-si dialect of Chinese, for example, tonemes are said to be lower in pitch when they occur on vowels which follow voiced stops than when they follow voiceless stops and nasals (data from G. A. Kennedy given by G. L. Trager in "The Theory of Accental Systems," Language, Culture, and Personality [1941], 136-37); K. E. Laman ("The Musical Tone of the Teke Language," Festschrift Meinhof [Hamburg, 1927], 119) claims that a similar situation exists in Teke. Beach ("Tonetics," Bantu Studies, 2d series, II [1924], 80, 91) asserts that such a situation exists for Xosa, so that, for example, imvana 'lamb' (with voiced fricative) has the low falling toneme of the second syllable slightly lower in pitch than does imfazwe 'war' (with voiceless fricative). The action of voiced and voiceless groups is not completely uniform, however, and this may affect the phonemic analysis in ways not discussed by Beach.

³¹ C. Bien-Ming ("The Tone Behavior in Hagu: An Experimental Study," Arch. Néer. Phon. Exp., VI [1931], 18-23) has instrumental studies showing that the pitch of dz in the syllable dzu is not added to the significant speech contour when the syllable is pronounced with the different Amoy tonemes. The pitch of the dz is usually relatively low. The toneme of the vowel is approximately the same as it is in the syllables thong, thog, and thok, which begin with a voiceless consonant. On the other hand, the pitch of the ng and g of thong and thog must be added to the pitch of the vowel o in order to obtain the complete contour found on u in dzu. E. Sapir ("Notes on the Gweabo Language of Liberia," Lang., VII [1931], 37) claims that in Gweabo doubled voiced stops (or semi-vowels or nasals) begin on a lower pitch than the rest of the syllable if the syllable has one of the two highest tonemes, but begin on the same pitch if the syllable has one of the two lowest tonemes. This consonantal rising pitch (called "anacrusis" by Sapir) does not affect the tonemic system.

consonant cluster is a nasal, the nasal is pronounced on norm pitch, as in nča³ 'fat.' In a dis-syllabic word a medial nasal or lateral has mid pitch. In neither case should the pitch of the nasal or lateral be written, even if it "sounds syllabic," because it is conditioned--hence non-contrastive, nonphonemic--and never makes a difference in the meaning of words.

In normal speech Mixteco is like Mazateco, with the pitch of nasals not tonemically significant. At the beginning of utterances this is always true. Occasionally, however, contractions--especially in extra-rapid conversation between intimate friends--leave a Mixteco n or r carrying a significant toneme: taídil 'good morning' (< tá? 'favorably' + ní- 'complete' + n̄il 'dawned'); nā-?orá kú-á-r-bí 'I said, "what time is it?"' (< nā- 'what' + ?orá 'time [Spanish hora 'hour']' + kú- 'to be' + ?aci 'to say' + -rì 'I' + bí 'indeed'); tē-há-r n̄datù?ín-yó 'shall I come to talk?' (< tē 'and' + háa 'arrive' + -rì 'I' + n̄datù?ín 'converse' + -yó 'we').

In other languages an initial nasal may be a completely separate syllable, with its own significant tone.³²

Voiceless stops at the end of syllables may make the tonemes shorter or more abrupt than they would otherwise be. This is especially true of a glottal stop.³³

One might suspect that the total configuration of the syllable (e.g. CV vs. CVC vs. CCV, and so on), rather than individual consonants (or possibly vowels), might at times be responsible for conditioned pitch changes. One must be prepared also to find that the structure of the root-or stem of a word may affect the tonemes by conditioning the number of sounds over which the significant pitch is spread.³⁴

In general, one of the most difficult problems confronting the toneme analyst is to determine whether a pitch change is of the phonemic substituting-toneme type or, rather, of the non-phonemic conditioned-pitch type. The different types of changes combine to give so many variables that it is difficult for the investigator to handle them discriminately, or even to find a solid, stable starting point from which to begin their classification. Overlapping types of change threaten to introduce errors which may vitiate one's conclusions. A methodology must be developed which discovers pitch contrasts in spite of these characteristics. For such a procedure see Part II.

3. Dialectal Change of Tonemes

Over an extended geographical area tonemes may be different in separate dialects of the same language. The number of the tonemes may be the same, with changes of the subcontrastive type; or the number of tonemes may itself change; or the number and type of tonemes may be the same, but these tonemes may not occur on the same words in the various dialects; or there may be

³²Syllabic consonants may have significant pitches even if they occur at the beginning of words. Ward (Ibo, 17) gives some examples of syllabic nasals with tone: mbō 'first,' m̄ma 'knife,' ñidò 'life,' and ñkó 'wood.' (Here, and in other illustrations from Ward's material, we have modified the method of tone marking to the style of notation used in this monograph.)

³³Note C. Bien-Ming, "Chinese (Amoy Dialect)," Le Maître Phonétique, XLV (1930), 38-40. See also above, note 26.

³⁴In his analysis of Hottentot, Beach (Hottentot, 27-28, 133-42) places the tonemes in classifications which rely to a great extent upon five types of roots, differing by phonetic shape; these consist of (1) a single consonant (e.g. the m in sa-m 'we two'); (2) a monophthongal vowel, preceded or not by a consonant (e.g. a or ?a 'drink'); (3) a vowel combination, with or without an initial consonant (e.g. oe or ?oe 'answer'); (4) a vowel plus nasal consonant, with or without an initial consonant (e.g. om or ?om 'house'); (5) a vowel, plus consonant, plus vowel, with or without an initial consonant (e.g. ari or ?ari 'dog').

a combination of changes of type, number, and occurrence of tonemes.³⁵ For a dialectal change in the rules for tonomechanical subclasses of Mixteco see page 92.

F. Limitations of Distribution of Tonemes

In some tone languages a further characteristic causes difficulty in tonemic analysis: the tonemes may not be evenly distributed in the types of phonetic or grammatical contexts in which they are found.

1. Limitation of Distribution of Tonemes Determined by Phonetic Context

Occasionally all the tonemes of a language do not occur in identical types of phonetic contexts. For example, certain of the tonemes may occur in open syllables but not in closed syllables, or certain of them may not follow voiced stops, and so on. The particular sequences of sounds within a syllable may place a limit on the specific tonemes which may occur on that syllable.³⁶

This type of limitation seems to be more frequent in languages of a contour type than in languages with a register system.

Such limitation produces two related problems of analysis: (1) It gives the early impression of differing but conditioned forms of a single toneme; it makes it appear as if one of the tonemes has a certain contour in one type of syllable, and a modified form in another. (2) It makes it difficult or awkward to find words which, differing only by tone, prove the different contours to be separate tonemes; this is so because the limitations of distribution prevent the contours from occurring in contexts where the phonetic surroundings are identical.

In order to overcome these two difficulties one must study the data carefully to see if most of the tonemes may be found in one or more types of syllables. If so, the tonemes may be proved separate in that context, and once so established, may be assumed to be phonemically different elsewhere. In addition, one should study the tonemes in contexts which are longer than a single syllable; sometimes the phonetic form of the morphemes changes in the middle of sentences in such a way as to allow tonemes to appear on some of the syllable types with which they do not occur in isolation.³⁷

³⁵Wang ("Pékinois," *Arch. Néer. Phon. Exp.*, XIV [1938], 32-38) says that the dialects of Chinese vary in the number of their tonemes and in the choice of the tonemes they place on specific words. He compares the tonal usage of various other cities to that of Peking.

Changes likewise occur in register-tone languages. Thus Zapoteco of Yatzachi el Bajo has three phonemic levels (data from E. V. Pike, "Problems in the Analysis of Zapoteco Tone," to appear in *IJAL*), but that of Juchitan has only two (data gathered by me in collaboration with Miss Velma Pickett and Miss Marjorie MacMillan of the Summer Institute of Linguistics).

³⁶In Burmese (see Cornyn, *Burmese*, 7-8), for example, "Syllables in tone IV never have nasal finals" (i.e. toneme 4 never occurs on a syllable ending in a nasal consonant). Syllables ending in the vowel clusters ai and au may have only toneme 4, whereas syllables ending in ain and aun do not occur with toneme 4 but may have tonemes 1, 2, or 3.

³⁷A very complicated series of limitations of tonemic distribution is described by G. E. Roffe in an article to which I had previously had access and which has appeared, in slightly revised form, since this note was written: "The Phonemic Structure of Lao," *JAOS*, LXVI (Oct.-Dec., 1946), 289-95.

When the initial consonant (or consonant cluster) in the syllable (or morpheme conterminous with the syllable) is p, t, c, k, ?, b, d, cw, kw, y, then on syllable-pattern CVV (with "C" representing the consonants listed, "V," any vowel), only tonemes 1, 2, and 3 may occur; on CV(N) (with "N" any permitted nasal), tonemes 1, 2, and 3; on CVS (with "S" any stop except glottal stop--the data on tonemic distribution in CV² are incomplete), toneme 6; on CVWS, toneme 4; on CVV², toneme 3. When the initial consonant or consonant cluster in the syllable is ph, th, kh, f, s, m, n, ñ, ŋ, l, h, w, thw, hw, sw, nw, ŋw, lw, hw (the second letter is raised in the two-

2. Limitation of Distribution of Tonemes Determined by Grammatical Context

At other times or in other languages the occurrence of tonemes is not limited by the phonetic character of the syllables themselves, but by the placement of the syllables in certain grammatical units or positions. These limitations may be controlled (1) by sequences of syllables within the morpheme, or within the word--so that, for example, a two-syllable morpheme may have the tonemic sequence high low but not low high³⁸--or (2) by the function which the word has in a

letter sequences here and in the list above as they appear in the published version of the article), then on syllable-pattern CVV only tonemes 1, 2, 3, 4, and 5 occur; on CV(V)N, tonemes 1, 2, 3, 4, and 5; on CVS, tonemes 2 and 6; on CVVS, tonemes 3 and 4.

Because of these severe limitations, words in isolation differing just by tone are not found for tonemes 1 and 3, 1 and 4, 1 and 6, 2 and 3, 2 and 4, 3 and 5, 3 and 6, 4 and 5, 4 and 6, 5 and 6; minimally different pairs do, however, separate tonemes 1 and 2, 1 and 5, 2 and 5, 2 and 6, 3 and 4. For samples of some of the differentiated tonemes note the following set of words: khoon¹ 'to wait for,' khoon² 'agreeable,' khoon⁵ 'belongings.' This lack of minimal pairs is serious, since various of these tonemes are level in contour, constituting a strong register overlap on the contour system: thus tonemes 3, 2, 1, and 6 are respectively high, mid, lower, and low, with toneme 4 a relatively high rising-falling type and toneme 5 a lower rising-falling one.

One might easily suppose that some of the distributional limitations represent conditioned variants of the level tonemes; this is not the fact, however, since the tonemes may be otherwise proved separate: apart from the presence of glottal stop in certain words, some of the tonemes not separated by minimal pairs earlier could have been shown to be distinct. Note, for example, khoon³ 'gong' and khoon⁴ 'fish basket,' which, apart from glottal stop, form word pairs distinct in toneme from the tonemes 1, 2, and 5 given in the words khoon¹ 'to wait for,' khoon² 'agreeable,' and khoon⁵ 'belongings.' The glottal stop, however, cannot be ignored, since it must itself be considered a phoneme because it contrasts with other consonants at the beginning of words, and with zero (i.e. no consonant) or with consonants at the end of words. Compare pan¹ 'share,' pa²l 'abandon,' pual 'protect,' phat² 'to blow,' paal 'fish.' In pa²l 'abandon,' the glottal stop constantly remains, even in the middle of phrases, as in pa²l mial 'to divorce one's wife.' For the specific words khoon³ and khoon⁴, however, the glottal stop appears only when they are at the end of phrases--and words in isolation constitute such phrases. If, now, the words are studied within phrases, the glottal stop will disappear. Following the loss of glottal stop, the words will then be minimally different from similar words which do not have the glottal stop under any conditions whatsoever. Compare the following two sentences, showing the minimal contrast thus developed between khoon³ 'gong' and khoon² 'agreeable': khoon³ yuu² nii³ 'the gong is here' and khoon² yuu² nii³ 'it's nice here.' By these contrastive phrases tonemes 2 and 3 are proved to be phonemically separate; once so proved in this context, they must be considered to be phonemically distinct in other contexts in which the proof is not immediately available.

Similar evidence separates tonemes 1, 2, 3, 4, and 5 from each other. Toneme 6 can be separated from toneme 2 in this way, but not (in the data Roffe submits) from the others. On the basis of analogy with the others, however, and because of the lack of sharply conditioned types elsewhere in Thai-Lao, it seems best to regard toneme 6 as a separate phonemic entity also.

³⁸Maya seems to have defective pitch patterns, for it appears to lack a low-high sequence on single morphemes to balance the high-low sequence, which is frequent. The absence of this pattern is probably one of the chief reasons that phonemic pitch has not been reported earlier for Maya and that Maya is not considered a tone language in the traditional sense. (See K. L. Pike, "Phonemic Pitch in Maya," IJAL, XII [1946], 82-88.) Recent preliminary studies of Otomi (D. E. Sinclair and K. L. Pike, "The Tonemes of Mesquital Otomi," IJAL, XIV [1948], 91-98) show that it, likewise, has phonemic pitch, although the lack of symmetry in its pitch system has delayed its recognition as a tone language. Compare yà (low toneme) 'the (plural),' yá (high toneme) 'his (with plural words),' yă (rising toneme or possibly a combination of low and high) 'liver'; rà 'the (singular),' ré 'his (with singular words)'; dí 'first person subject, durative aspect,' di 'third person indefinite subject, unspecified time'; pátí 'to heat,' pátí 'to change'; ?ókí 'hole,' ókí 'to cut.' The system may prove to be unsystematic in lacking a phonemically falling pitch; further, semantic differences on the second syllable of a two-syllable morpheme seldom, if ever, occur; more intensive study is necessary to establish these possibilities firmly. Rising tonemes frequently--but optionally--tend to be long. In both Maya and Otomi the student may at first suspect the existence of phonemic stress instead of phonemic pitch, but pitch contrasts persist in contexts in which stress conditions are uniform.

particular phrase--when words occur as certain types of modifiers, for example, all normal tonemes may be eliminated and a special toneme substituted for them.³⁹ Syllables having this special pitch are likely to be called "toneless" or "neutral" in tone, and the pitch unit itself may have a phonetic characteristic which differs from the regular tonemes of the language by being, for example, extra low. The limitations of tonal sequences within morphemes seem to be found mostly in languages of register-tone type, whereas the limitations according to syntactic function may be more characteristic of contour-type tone languages.

G. Speech in Contrast to Whisper, Song, Poetry, Stage Speech, and Instrumental Signals

If the student wishes to analyze the usage of tone in the entire linguistic life of the community, he may face the analysis of it in whisper, song, poetry, stage speech, or in musical signals. These involve special problems beyond those encountered in the more normal linguistic situations.

It seems impossible, or at any rate very difficult, to change the pitch of a whisper for a specific vowel, although differences can be made if one modifies the vowel somewhat. How, then, can one whisper tonemes? Apparently the tonemes either become ambiguous and undistinguished--in which case intelligibility depends upon context--or else differences of intensity substitute for pitch and partly preserve the contrasts.⁴⁰

Since music is constituted of sequences of pitches and the syllables of a tone language also form pitch sequences, some modification of the linguistic pitches must be made when a tone language is sung. The speech tonemes may be almost completely ignored or obliterated, as in Mixteco,⁴¹ or the melody may be largely confined to musical adornment of the speech tonemes.⁴² A person attempting to translate songs into a tone language, or to compose new ones, is more likely

³⁹Compare the data summarized for Hagu (Amoy) on pp. 82-84, note 6. Toneme 6 occurs only in pretonic positions. Toneme zero occurs only as the result of enclisis, yet is very important to meaning, since it modifies the grammatical function, and hence the meaning, of items on which it occurs.

In Burmese (Cornyn, Burmese, 7), "Toneless syllables consist of a consonant followed by a neutral vowel which we write as a without a tone mark. A toneless syllable never stands alone and is never final in a group." Inevitably such a syllable must have some pitch, but Cornyn does not tell us how it is related to those pitches he calls tones--whether low, or high, or varying, or short, and so on--nor why it is not a toneme in spite of the fact that it must be distinguished from them in the orthography. Cf. p. 38, note 50.

⁴⁰For a detailed study of the possibility of tonemic contrasts in whisper see C. B. Miller, An Experimental-Phonetic Investigation of Whispered Conversation, Considered from the Linguistic Point of View (Bochum-Langendreer, 1934). For a brief statement see idem, "Whispering in Chinese," Le Maître Phonétique, XL (1925), 4 (quoting Gjerdman in BSOS, III [1923-25], 495-505).

⁴¹The data on Mixteco speech tones obliterated in song are taken from my paper, "The Flea: Melody Types and Perturbations in a Mixtec Song," Tlalocan, II (1946), 128-33.

⁴²In Navaho the chants are usually closely related to the speech tones, according to G. Herzog ("Speech-Melody and Primitive Music," Musical Quarterly, XX [1934], 452-66). Y. R. Chao ("Singing in Chinese," Le Maître Phonétique, XXXIX [1924], 9-10) states that Chinese songs in an earlier stage of their history used to correspond fairly closely to the natural (or linguistic) tone. Dialect changes upset the natural relationship somewhat. Now a double standard exists, so that the tonemes of song (and speech on the stage) differ from the tonemes of conversation. Unaccented syllables may be considered toneless (i.e. without tonemes used basically in isolated lexical items), and may be placed on any pitch to suit the music. The Chinese find the old system somewhat easier, but now songs are being composed which do not fit that system. In case it would seem to foreigners that this would make the words hard to understand, Chao adds that he, in turn, has difficulty in understanding English songs because of the obliteration of the spoken melody.

to make them acceptable if he can conform to the native pattern of handling tonemes and stress. Poetry, like song, may involve especially controlled sequences⁴³ of tonemes.

⁴³ Miss Yao Shen, of the English Language Institute, University of Michigan, gives me the following information: Certain models for poetry (specifically in reference to the Peiping dialect) are very frequent. Each format has a specific number of lines, with a stated number of words to each line; certain of the words must be given one toneme and the others may be given any of the other tonemes; other words must rime in toneme and vowel and final consonant. One favorite model has four lines, with seven words a line. In the following diagram of that format, T indicates that the composer must utilize the same toneme at each occurrence of that symbol; O indicates that any other toneme may be used; A occurs when either T or O may be given; R demands that the words must rime in vowel and final consonant as well as toneme:

Line 1:	A	T	A	O	A	T	T/R
Line 2:	A	O	A	T	A	O	T/R
Line 3:	A	O	A	T	A	O	O
Line 4:	A	T	A	O	A	T	T/R

For actual poems in this or a related model see W. J. B. Fletcher, Gems of Chinese Verse Translated into English Verse (Shanghai [1918?]), 41, 47, 187.

Miss Shen states that the following poetic pun is a well-known one. The poetry format is typical: one of the common exercises in a Chinese classroom is the construction of "parallel sentences" with balanced tonemes. This pun reflects that custom; teachers are frequently the butt of jokes phrased in poetry.

In the poem as presented here numbers refer to the tonemes: 1 may be read as level, 2 as rising, 3 as falling-rising, 4 as high falling, 5 as neutral or falling. The romanization is taken from R. H. Mathews, A Chinese-English Dictionary (Shanghai, 1931).

The setting of the pun is a classroom on a hot summer day. An old teacher and several students are bending over their books. As the teacher looks up he sees one of the students scratching himself unceasingly. Much annoyed, he calls the student to him and says, "You have been scratching in front of me. That is very discourteous, so I am going to punish you. Here is the first half of an exercise in parallel sentences; you must supply the second half:

<u>chua¹</u> <u>chua¹</u> <u>yang³</u> <u>yang³</u>	'Scratch scratch itch itch,
<u>yang³</u> <u>yang³</u> <u>chua¹</u> <u>chua¹</u>	Itch itch scratch scratch,
<u>pu⁵</u> <u>chua¹</u> <u>pu⁵</u> <u>yang³</u>	No scratch no itch,
<u>pu⁵</u> <u>yang³</u> <u>pu⁵</u> <u>chua³</u>	No itch no scratch,
<u>yieh⁴</u> <u>chua¹</u> <u>yieh⁴</u> <u>yang³</u>	More scratch more itch,
<u>yieh⁴</u> <u>yang³</u> <u>yieh⁴</u> <u>chua¹</u>	More itch more scratch.'

[i.e. 'The subject matter is about scratching and itching. If you would not scratch you would not itch. The more you scratch, the more you itch.']")

The student thought for a while and then replied:

<u>"sheng¹</u> <u>sheng¹</u> <u>szu³</u> <u>szu³</u>	'Life life death death,
<u>szu³</u> <u>szu³</u> <u>sheng¹</u> <u>sheng¹</u>	Death death life life,
<u>pu⁵</u> <u>sheng¹</u> <u>pu⁵</u> <u>szu³</u>	No life no death,
<u>pu⁵</u> <u>szu³</u> <u>pu⁵</u> <u>sheng¹</u>	No death no life,
<u>hsien¹</u> <u>sheng¹</u> <u>hsien¹</u> <u>szu³</u>	Born first dies first,
<u>hsien¹</u> <u>szu³</u> <u>hsien¹</u> <u>sheng¹</u>	Dies first born first.'
or: 'Let the teacher die first.'	

[i.e. 'The subject is about life and death. Where there is no life, there is no death. The one who is born first dies first. Let the teacher die first.]" hsien¹ means 'first' and sheng¹ means 'life,' or 'born,' but hsien¹ sheng¹ means 'teacher' as well as 'the one born first.'

For reference to Mixteco tone puns see note 1 in this chapter.

In a literate community stage speech or reading styles may modify tonemes somewhat or cause some tonemic substitution on certain of the words.⁴⁴

Communication by drum signals or by horns, and so on, in Africa seems to involve a mimicry of the linguistic tonemes. The instruments are usually (but not always) formed so as to have just enough pitches to correspond to the number of registers (levels) in the language. Rhythm and quantity are reproduced in addition to relative pitch contrasts.⁴⁵ In Mexico the Mazatecos use whistling for signals, paralleling the linguistic tone. The whistling is done only by the men and boys; the women understand it, but do not use it. The Mazatecos tend to be very secretive about their whistling and do not readily let the foreigner learn its mysteries.⁴⁶

H. Practical Orthographies in Tone Languages

The formation of orthographies for vernacular literature is considerably complicated by tonal phenomena. Two general principles should, however, be observed: (1) Orthographies should be phonemic. (2) They should be adapted to the particular tonal type, such as contour- or register-tone system, and, in so far as practicable, to the local conditions and orthographies prevailing in the area. The printing type available at local presses must also be considered.

The student should bear in mind that in a practical orthography, or one for scientific publication, the significant pitch units only--the tone phonemes, the tonemes--should be written.

⁴⁴ Modification of Chinese tonemes in reading or on the stage has been reported by Wang, "Pékinois," Arch. Néer. Phon. Exp., XIII (1937), 1-40; XIV (1938), 1-48--especially 26-31. Note also the reference to Chao in note 42 above. Compare, too, Chao's statement that "In the city of Changchow, which is the writer's home town, there are two systems of tones, called the 'gentry's speech' and the 'speech of the street'" (no contrastive details are given). Chao also says, "The dangers of ... errors of uncontrolled conditions in the study of tones are so great that all the refinements of experimental study are useless unless these are properly guarded against. In the first place, the speaker must be placed in the mood of a matter of fact information. He should not be led to feel as a pupil reciting his lessons, in which case all his tones become flattened or narrowed in range, nor feel as a language teacher impressing the distinction of the tones on the ignorant learner, in which case the tones would be exaggerated" (Y. R. Chao, "Tone and Intonation in Chinese," Bulletin of the National Research Institute of History and Philology of the Academia Sinica, IV, Pt. 2 [1933], 124, 125-26).

⁴⁵ The statements about drum signaling are based upon the following articles: A. Burssens, "Le Luba, langue à intonation, et le tambour-signal," Proc. Third Internat. Cong. Phon. Sci. (1939), 504-7 (two linguistic levels); E. M. Von Hornbostel, "African Negro Music," Africa, 1 (1928), 30-62; Tucker, Sudanic Languages, 65; Herzog, "Speech-Melody," Musical Quarterly, XX (1934), 454-57. Herzog (456) reports some variation in repetitions of calls, where the player may transpose them at will to a lower pitch (although this occasions a few departures from linguistic tone). "As the player said, 'You can play them in low or in high.'" This seems to parallel to some extent the emotional changes in key described above (p. 27); Herzog appears to be unacquainted with this tone-language characteristic, for he says that "nothing equivalent to this transposition occurs in speech." Burssens recommends the study of drum signals as a technique for studying the tonemes of a language. If one could be certain that the instruments had the proper number of registers, this might be an excellent aid, inasmuch as almost all key variation and conditioned variation, and so on, seem to be eliminated. Once the number of tonemes was analyzed by an investigator utilizing linguistic techniques and he certified that the instruments contained the number of notes corresponding to the linguistic situation, a second person could utilize the instrumental signals very effectively to learn to recognize the sequences of pitches. It would not do, however, to rely upon such instruments for analysis, since the linguistic and instrumental tones are not always of the same number.

⁴⁶ Data from Eunice V. Pike; see also G. Cowan, "Mazateco Whistle Talk," to appear in Lang. Otis Leal, of the Summer Institute of Linguistics, informs me that whistling is also used extensively among the Zapotecos. The men consider it crude to raise their voices in speech or to call out aloud (it even proves difficult to get an informant to speak loudly enough for easy hearing), so that on the mountain trails they communicate by whistled signals of quite a varied nature. Among the Tlapanechos of Mexico, also, whistled signals are used (information from Hubel Lemley).

Nonsignificant variations within single tonemes should not appear in the orthography, but may be described in an introduction to printed texts or in a grammar, or both. On the other hand, tonemes substituted in morphology or syntax or sandhi should be written as pronounced. Failure to observe this principle obscures the functional system of the language,⁴⁷ hinders the natives in learning to read, and imposes unnecessary burdens upon the foreign student.⁴⁸ In general, also, one should insist that the tonemes of a tone language be written, and not ignored, even though they are hard to learn to read. There is some temptation to omit them if the natives can read the segmental signs and guess at the tonemes. Although there needs to be considerable experimentation in the field to test these possibilities and others, it appears at the moment that the tonemes should be written even in such a situation. If the tonemes are not recorded the native can never do more than guess at meanings in situations ambiguous as to tone, but if they are written he can learn to read them without the necessity of guessing. Though this may take longer in the early stages of reading, it should presumably be advantageous in the end in providing a smooth unfaltering reading style. Occasionally, local tradition, or native preference, or lack of many words differing only by tonemes may modify such decisions.⁴⁹

⁴⁷The chief difficulty with such notations as that used by Ward for Ibo is caused by a failure to keep separate the different types (tonetic and tonemic) of pitch change. Ward (*Ibo*, 12, 14) implies that Ibo has three basic levels of pitch; three levels of orthography might, therefore, have sufficed to show the morphological system of tonemic changes (as, for example, in changing noun tonemes [18-42]), but Ward uses five orthographical levels in trying to show nonsignificant assimilation and phrase changes. This results in inconsistencies; she says, for example, that there are tonemes "which may be considered as a high tone" (13) even though they may "not actually" be as high as other highs; and, "at times the tone mark just above the lowest level indicates a mid-tone which is not as low as it looks" (17), and so forth. On the other hand, "With five levels only, it has not always been possible to show all the variations in tone in a long sentence," so that "The essential relative pitches have been shown, however, but the influence of assimilation could not always be indicated" (17). In other words, extra nonphonemic markings are added to show nonphonemic pitches, but cannot do it successfully, as is evidenced by the fact that only part of the data is given. This procedure forces the introduction of further distortions: "This sentence [in a certain text] is an example of the impossibility of representing the whole range of Ibo intonation with five tonal levels. Here nwa would normally be on the same level as the preceding word ya. Every step of the gradual descent from nwa is essential; nwa has therefore been given a higher tone mark than it should have to allow for the subsequent steps down" (156, note). These distortions probably make it impossible to see the actual system of tonemic structure. The word for 'tortoise' for example, is written three different ways on one page of text (212), out of the eight times that it appears there; probably these changes are subphonemic, rather than substitution of tonemes, but it is impossible to determine this with any certainty from Ward's data because of the writing of both phonemic and nonphonemic pitches.

⁴⁸It is easier for the foreign student (e.g. a speaker of English learning Chinese) to remember the rules of pitch conditioning that do not appear in a phonemic script, than for him to try to memorize a complicated system of tone in grammar that is confused by the writing of conditioned, nonphonemic, variants. One gets an initial advantage if the nonphonemic variants are written, because one then does not need to memorize the places in which variants occur, but this temporary aid to the memory is later more than counterbalanced by the extra burden imposed by unnecessarily complicated irregular grammar patterns.

⁴⁹Compare the following material for other suggestions on tone marking: Practical Orthography of African Languages, Memorandum I of the International Institute of African Languages and Cultures (rev. ed.; London, 1930), 14; Principles of the International Phonetic Association, in Le Maître Phonétique, Suppl. (Sept.-Oct., 1912); Phonetic Transcription of Indian Languages, in "Smithsonian Miscellaneous Collections," LXVI, No. 6, Publication 2415 (Washington, 1916), with suggested changes in "Some Orthographic Recommendations, Arising out of Discussions by a Group of Six Americanist Linguists," Am. Anthr., XXXVI (1934), 629-31.

In Lisu (a language of Yunnan, China; data from A. B. Cooke, China Inland Mission) the natives themselves, when they had learned to read, preferred to write tone marks only upon those words in the sentence the meaning of which they (not foreigners) would not readily guess from the context and for which they might fail to choose the proper tonal pronunciation. For a register-tone language this is probably not advisable if there are many words differentiated by pitch only,

There is some precedent for placing tone marks before the syllables⁵⁰ of a contour system but above the vowels of a register system.

Thus for a contour system one may have the following types ("x" represents any syllable): 'x high rising, `x high falling, .x low falling, ^x high level, _x low level, and so on. A different symbolism places a circle at various positions in relation to the syllable: °x, °x, x°, x°, and so on. Numbers may also be found: x¹, x², x³. Sometimes certain of the punctuation marks are not used for indicating pauses, and the like, but are used after vowels, for indicating tonemes. In primers colors may supplement the separate tonemic signs.⁵¹

In register-tone systems the acute accent mark is often used for high pitch, placed above the vowel, as follows (in the succeeding illustrations "C" represents any consonant and "a" represents any vowel): CáCáCá. A grave accent mark may be used to represent low pitch: CàCàCà. If other symbols are needed for further level tonemes they may be the macron and (or) a vertical mark: CāCāCāCāCāCā.

These register marks may profitably be modified in various ways: for example, in any register system one of the levels need not be marked.⁵² Thus in the following illustration the unmarked

since the native needs to obtain the ability to read tone by seeing marks in unambiguous situations. He can then read them on words ambiguous except for tone. Considerably more experimentation is still needed, however, before these or substitute principles can be unequivocably established.

In a very different practical situation, that of telegraphing, J. R. Firth and B. B. Rogers ("The Structure of the Chinese Monosyllable in a Hunanese Dialect [Changsha]," *BSOS*, VIII [1935-37], 1055-74) suggest adding extra letters after the words to indicate the tonemes; ma with different tonemes would be written: maw 'mother,' mah 'beings,' mav 'horse,' ma 'scold,' maa 'wipe.' (Normal Chinese telegraphing is said to be by code; the sender writes a message, it is put into code by the telegraph office, sent thus, then decoded by the receiving office. This avoids the phonetic difficulties, but appears cumbersome.)

⁵⁰The placing of tone marks before the syllables of a contour system is illustrated by D. Jones, "The Transcription of Pekinese," *Le Maître Phonétique*, XLIII (1928), 2-4 (revising Y. R. Chao's article, *ibid.*, XLII [1927], 45-46). A very different general scheme is suggested by Chao in "A System of Tone Letters," *Le Maître Phonétique*, XLV (1930), 24-27, where he suggests an upright bar divided into five heights, with lines emanating from these points on the bar for indication of direction, and length, of glides. This orthography is utilized in various of the items listed above on p. 13, note 27. It serves to give an immediate idea of the tone contour in a language foreign to the reader, as numbers, or the like, cannot do, but because it is awkward to print would probably not be convenient for the preparation of vernacular literatures. For samples of this writing see notes 17, 18, and 26 on pp. 25-26, 29.

For contour tonemes marked with acute, grave, and circumflex signs over the vowels see Cornyn, Burmese, 7:

Toneme 1: cá 'water lily'

Toneme 2: câ 'tiger'

Toneme 3: càn 'rhinoceros'

Toneme 4 (with postvocalic glottal stop; or with postvocalic nasal or unvoiced stop substituting for glottal stop): ca? 'rupee,' wutté 'wears (clothes)'

Toneless (a without tone mark): zagabyán 'interpreter'

⁵¹W. C. Townsend, of the Summer Institute of Linguistics, has suggested the use, in primers, of colors paralleling the printed symbols for tonemes, to facilitate learning. I have heard, also, that experiments of this nature are in progress for Thai, but no specific data on them have reached me.

⁵²It is convenient to eliminate marks in this way. The principle of economy should not be pushed too far, however. Thus W. E. Welmers and Z. S. Harris ("The Phonemes of Fanti," *JAOS*, LXII [1942], 325-26) use the acute accent mark ['] to represent (1) a high toneme when followed by one or more unmarked high tonemes, and (2) a mid toneme when following a high toneme marked as [']. The grave accent mark [``] is used to indicate (1) a high toneme when followed (a) by an unmarked low toneme, or (b) by a mid toneme marked as [']. Zero marking then indicates (1) a low

vowels carry a mid toneme: CáCaCàCáCaCà. Usually the toneme which occurs the most frequently is the one which should be unmarked. Many people find it difficult to remember whether it is the acute or the grave symbol which represents the high toneme, since both of these marks are on a slant; for this reason, experiments are being conducted in Mixteco with the high toneme marked acute, the mid toneme unmarked, and the low toneme marked with a macron, rather than with a grave accent.

In the preceding paragraph one item of local adaptation may be pointed out. In Mixteco the high toneme is indicated by an acute accent mark, and it would not do to use this mark for any other of its tonemes. Spanish is the national language in the Mixteco region and is spoken by many bilingual Mixtecos; in Spanish the acute mark symbolizes stress and the stressed syllables tend to be accompanied by high pitch, so that the bilinguals who can read Spanish are likely to have a partial correlation already established between high pitch and the acute accent mark. It would prove very confusing to these bilinguals to have to break this correlation and use the acute mark for, say, the low toneme. Although orthographies must be phonemic for the most efficient teaching of the monolingual speaker, nevertheless it is essential to consider the problems of the bilinguals, since their number is increasing rapidly through the influence of the government schools--which are conducted in Spanish--and since they are the ones who are most likely to spread literacy among their comrades.

In the present text both accent marks and numbers are used as tonemic symbols, according to which was the more convenient in a particular situation.

In Part I we have studied some of the characteristics of tone languages. Part II will present a methodology for the discovery of the number of tonemes in such a language.

toneme (a) at the beginning of words, or (b) when preceded by a high toneme marked as [`]; or (2) a high toneme when preceded by a high toneme marked (a) as ['] or (b) with zero. This intricate set of rules is set up "in the interests of economy of writing and ease of reading." What is actually accomplished is the reduction of the total number of vowels which must carry a tonemic symbol. To me, however, it would appear simpler, and more practical for a vernacular literature, to postulate the following set of rules: Write every high toneme with an acute accent mark ['], every mid toneme with a macron [-], and every low toneme with zero mark. It should be noted that the Welmers-Harris orthography for tone completely departs from a phonemic writing defined as a one-to-one correlation between sound unit and symbol unit; this is the source of the complexity. Welmers elsewhere (A Descriptive Grammar of Fanti, Lang. Disser. No. 39 [Baltimore, 1946], 9) presents a tonal writing which is somewhat less intricate than his earlier transcription, but still nonphonemic.

P A R T I I

STEPS IN DETERMINING THE NUMBER AND KIND OF TONEMES
IN A LANGUAGE

C H A P T E R I I I

PRELIMINARY STEPS IN TONAL ANALYSIS

A. Ear Training for Linguistic Pitch

Speakers of English are trained in the automatic utilization of a complex pitch system. The pitches, however, are applied to phrases rather than to syllables, and their contours reflect the attitude of the speaker toward the words he is uttering rather than contribute to the lexical meaning of the words themselves. We have already pointed out (pp. 18-19) that the English speaker needs exercises to enable him to eliminate his English pitches from his pronunciation of a tone language. When he has learned to recognize, analyze, control, and transcribe intonation, he has partly overcome one of his most difficult problems and he is ready to be taught to recognize, analyze, and produce the divergent pitch patterns of tone.¹ But if he fails to acquire voluntary intonation control, his own pitch system will constantly interfere with his tonal studies.

Once the student has learned to control his intonation he should take dictation of non-sense syllables in arrangements simulating tone-language phenomena. Exercises representing a two-tone register system may consist of a series of such syllables as lá là là lá,² and so on. The student transcribes and mimics these as they are read to him by a teacher or a colleague, or he responds with oral analysis, saying "high-low-low-high," and so on. The difficulty of the exercises may then be increased by the addition of glides, further levels, and long vowels, stress differences, glottal-stop placement, and the like:

lá'là'là'lá
lá'là'là; lâ'lâ'lâ'lâ
lá'là'là; lâ'lâ'lâ'lâ'lâ'lâ; lâ'lâ'lâ'lâ'lâ'lâ
lá'lâ'lâ; lâ'lâ'lâ; lâ'lâ'lâ'lâ'lâ
'lá'lâ; lâ'lâ; lâ'lâ'lâ'lâ; lâ'lâ'lâ
lâ'lâ?; lâ'lâ'lâ?

After a person has had training of the types indicated above he should be given dictation in some tonal language already analyzed, in which his transcription can be checked. After such training, and the acquirement of the analytical techniques, he should be ready for independent work.

¹Exercises for intonation study may well include the following: reading the text marked for intonation; reading the text in a monotone to eliminate intonation; reading the text while utilizing a single, repeated, intonation contour, then rereading it with a different contour, and so on, for positive control; taking intonation dictation in one's own language; transcribing from dictation the intonation of a foreign language.

For an interesting check on tone pronunciation--but one not possible for the average student--see also Y. R. Chao, "Transcribing Reverse English," Bulletin of the National Research Institute of History and Philology of the Academia Sinica, II, Pt. 2 (1930), 220-22; Chinese tones are there pronounced in reverse, then again reversed mechanically to see if they sound normal; resultant deviations from normal pronunciation imply errors in the original analysis.

²A detailed illustration of this method is given by D. Westermann and I. C. Ward, Practical Phonetics for Students of African Languages (London, 1933), 133-57. Every student of African languages should have this book for the general phonetic outline it provides, the excellent and abundant illustrations, and the orthographical suggestions proposed by the International Institute of African Languages and Cultures that it contains.

B. Aids to the Hearing of Linguistic Pitch

Informants can usually be taught with little effort to whistle or hum their words. This can be of great help to the investigator whose ear is slow to pick up pitches, especially when the sound segments are unfamiliar and cause distraction. Since a hum or a whistle is generally accompanied by no such segments (with the exception, frequently, of the glottal stop), the ear notes pitch changes in them more readily. There is an attendant danger, however, which must be carefully guarded against: sometimes an informant whistles, but does not reproduce the speech pitch faithfully. In that event an analysis of the whistle rather than the speech will lead to error. Whistling by the informant tends to include all conditioned, free, key, and stylistic pitch changes. It does not abstract the significant pitches as drum signals tend to do.

Various instruments which record speech--for example, the phonograph, the dictaphone, and magnetic-wire or magnetic-tape recorders³--can be of considerable aid to the investigator, since they permit the repetition of phrases. The use of such machines, however, has two grave dangers: (1) The investigator tends to deprive himself of hearing the natural range of key and free variation which comes in repetition by the informant and may, therefore, record as different some utterances of tonemes which are functionally the same in spite of temporary slight, free, pitch divergences. Sufficient recordings of repetitions by the informant himself would overcome this danger.⁴ (2) The investigator is tempted to be too "accurate," that is, to transcribe (just because he can find them with instruments) details which do not reflect the system, but are changes within tonemes.⁵ Here the danger can be avoided if the investigator uses such data to describe the tonal variants but for publication of grammatical and phonetic studies uses a written transcription which records only the significant tone units (tonemes).

One cannot hear pitch merely by trying to do so. Usually one hears pitch effortlessly if one hears it at all. Training must be sufficient to enable one to hear pitch when paying attention, but without straining; otherwise one is probably not hearing correctly. When a pitch proves baffling the investigator must either wait and return to the problem after he has had more experience, or find phrase conditions in which the pitch has fewer accompanying distractions, or make hypotheses as to the possible nature of the phenomena and set up nonsense syllables to train his ears in regard to that feature. If, for example, two words seem to differ by pitch only, and the pitch seems to entail some kind of small glides, the investigator should practice nonsense

³For references to some of the papers now appearing on magnetic recording see "References to Contemporary Papers on Acoustics," Journ. Acoustical Soc. of America, section 5.16 (especially XVII [1946], 303-4). Two other instruments that may prove of value in tonal analysis--but to which I have not had access--are the tonoscope and the frequency meter. For references to them see C. E. Seashore, Psychology of Music (New York and London, 1938), 362-67; idem, "The Tonoscope," Psychol. Monog., XVI, No. 3 (1914), 1-12; C. J. Knock, "Visual Training of the Pitch of the Voice," Psychol. Monog., XXXI, No. 1 (1922), 102-27; F. V. Hunt, "A Direct-Reading Frequency Meter Suitable for High Speed Recording," Rev. Scien. Instr., VI (1935), 43-46.

Recently Martin Joos, of the University of Wisconsin, has evolved a relatively simple but accurate technique for making a graph of linguistic intonation recorded by means of the sound spectrograph; in 1947 my colleague Miss Viola Waterhouse, working under his direction, demonstrated (in unpublished preliminary findings) with Mixteco material that the method is applicable to tone languages. Joos tells me that his Acoustic Phonetics (which I have not seen) is soon to appear as a Language Monograph of the Linguistic Society of America. For further pitch data obtained by the sound spectrograph see R. K. Potter, G. A. Kopp, and H. C. Green, Visible Speech (New York, 1947), 20, 31, 45, 294-96, 304, 400-409.

⁴D. M. Beach (The Phonetics of the Hottentot Language [Cambridge; 1938], 150-77) used four recordings of the same material, with two informants giving the story once and a third informant giving the story twice. Although this is an improvement on a single recording, it does not obviate the difficulty.

⁵Segmental writing has partly emerged from a tendency to overtranscription (cf. L. Bloomfield, Language [New York, 1933], 84-85). Tonemics has so far been somewhat less successful.

syllables with various types of glides--laà laà, and so on. He begins these with a wide spread that he can perceive easily and then continually narrows the pitch range, but no faster than he can train himself to hear the glide. When he thinks his ears will register glides of the requisite general type, he returns to the troublesome specific words to see if he can hear their pitch. If he still cannot hear it, he wastes no time straining to do so, but continues to work with those features of pitch in the language which he can hear. The chances are quite good that within a few weeks the difficulty will have vanished because of accretions of other pieces of information, from the morphology, for example, or the syntax.

At the start of each study period one should repeat, and have the informant repeat, a certain amount of old material as a warming-up exercise. This refreshes the ear, so that it recognizes pitch contrasts previously discovered; otherwise, one can waste much time learning anew elements previously analyzed. The warming-up exercise also tends to relate the general pitch of voice used by the informant in the previous session to that used in the present one, and so helps to eliminate difficulties due to changes of key. The informant, too, tends to settle down into a more or less uniform key after such an exercise, without as many disturbing changes as he might otherwise introduce.

C. Transcribing, Checking, and Memorizing Early Acoustic Impressions

In the writing of tone it is important that the investigator realize that his first transcription is essentially tentative and temporary. Final transcription is the symbolism of a system; until the system is analyzed, no tone writing can be accurate. Tone writing in the early stages of analysis is, therefore, merely a convenient, rough, mnemonic device for use prior to the discovery of the tonemic system.

The choice of the first symbols of transcription is to be entirely according to the convenience of the investigator. Any type of marking will do if it is easy to handle and sufficiently flexible to allow modifications to meet unpredicted pitch phenomena. The investigator may--and almost inevitably does--begin the analysis by recording the foreign language in terms either of his own intonational system or of some other tone language he has analyzed. This is perfectly legitimate and satisfactory. It is a grave error, however, to continue in such a method. With an adequate technique one should soon start to discover the internal system of the language and should then adapt one's transcription to reflect that pattern. The final orthography can be any which is convenient in the publication of technical or primer material, just so long as it portrays the internal system and not an extraneous or nonphonemic one; it should be as simple as possible, easy to print, easy to read, easy to write, and tonemic.

As a sample of the possibilities of early, tentative writing, one might start by recording three levels, thus: ['], [`], and [-] (or [']). If more symbols are needed, a short line above these would show each one raised; a short line below would show them lowered; connected pairs of lines would show glides from high to low. The investigator should be ready to apply other symbols (arrows, for example) for himself, ones which he can write rapidly and remember easily. Many people find it much simpler to start with numbers, rather than lines: 1 for high, 2 for mid, 3 for norm, 4 for low; 1+, 2+, 3+, 4+ for pitches a bit higher; 1-, 2-, 3-, 4-, for pitches a bit lower; and so on. This avoids the initial confusion in remembering whether ['] is high or low.

For several reasons records of early transcriptions of pitches should be saved for some time, even if the investigator is convinced that they are in error. Pitches frequently change, in ways already pointed out; if the investigator throws away an early attempt at transcription he may be destroying evidence of some type of significant or nonsignificant variation; both recordings may prove to be correct. One must never change a transcription without checking the data with the informant; transcriptions frequently "look wrong" simply because the investigator has not found the subrule governing them. Even his mistakes may be important in indicating to him the difficult parts of the language, the points on which his attention must be constantly focused.

He should not be too quick to erase the evidence, whether of error of hearing on his own part or of change of pitch on the part of the speaker.

In checking one's written material, attention should be directed to syllables which in the first draft were written with the same symbol. The informant may pronounce the words while the investigator notes whether the pitches are really the same. If the pitches are now seen to be different, that fact should be carefully noted. Contiguous (adjacent) pitches which have been transcribed by symbols indicating that one of them is higher than the other should be checked to be sure that the tones are actually different in pitch. In verifying the height of noncontiguous pitches, separated by a few syllables, it is frequently difficult to retain the auditory impression long enough for comparison. If the investigator hums the whole phrase, but hums the two pertinent syllables aloud and the rest of the phrase mentally, only, the auditory impression suffers less interruption and the pitch levels are more easily checked. But it must be remembered that these transcriptions are still in the temporary stage; final writing awaits the completion of the analysis, which may show that the two pitches are the same tonemic unit even though they vary a bit in height.

Practice in the production, or speaking, of the pitches should be concurrent with attempts at hearing. Ear training includes efforts at both analysis and control; the processes interact upon each other. One can hardly hear what one cannot pronounce and can hardly pronounce what one cannot hear; so one learns by a circle of approximations. Control of pitch production may be cultivated by the same devices as have already been outlined for the hearing of the pitches--control of nonsense syllables, control of intonation, and mimicry of tone languages. Once analyzed, the tonemes of specific words must be learned by dint of repetition and memory drill. In addition, the student should use the words many times in easy sentences, or in any way which will give him familiarity with them. One way of learning to control tonemic changes is to practice them in the same controlled contexts--frames--as are used in analyzing them (see Chapter IV).⁶

While the investigator is saying the words and phrases aloud he should try to mimic with the utmost fidelity the exact "tone of voice," the facial expression, the gestures, the entire action and speech of the informant. He must deliberately force himself to mimicry, to sounding queer to himself so that he may seem natural to the informant, since all speech habits foreign to us at first appear strange.

D. Recognition of a Tone Language

The student is certain to hear pitch phenomena in any language which he studies, since all languages have their words spoken on some pitch, whether or not these pitches are organized into a tonal system. If a language is tonal, it is to his advantage to know that fact early in his studies, so that he may apply to the data the most efficient techniques of tonal analysis.

Two kinds of data may prove to him that tone is phonemic in a particular language: (1) pairs of words differing just by pitch and meaning, and (2) unconditioned patterns of contrastive pitch.

The earliest data one is likely to meet which give evidence that a language has tonemes are words minimally different by pitch. Pairs or groups of words may be collected which have different meanings, but which in pronunciation differ by pitch only: for example, Mixteco žukú 'mountain,' žukù 'brush,' žukú 'yoke,' žukú 'nondomesticated.'⁷ If many words are different

⁶For various suggestions for learning a language see L. Bloomfield, Outline Guide for the Practical Study of Foreign Languages (Baltimore, 1942); T. Cummings, How to Learn a Language (New York, 1916); I. C. Ward, Practical Suggestions for the Learning of an African Language in the Field, International Institute of African Languages and Cultures, Memorandum XIV (London, 1937).

⁷For further examples of words distinguished by pitch note Yoruba bá 'alight,' bá 'crouch,' bá 'overtake'; Ibo ákwa 'cry,' àkwá 'egg,' ákwa 'cloth' (from I. C. Ward, "Tone in West African Languages," Proc. Third Internat. Cong. Phon. Sci. [1939], 384).

merely by tone, one is likely to recognize the tonal nature of the language very soon; if few such words exist, he may be unaware of the presence of phonemic tone for some time. One must be sure that no other differences exist between the pairs--such as voiced versus voiceless consonants or heavy versus light stress--lest the extra features be responsible for causing the pitch to change; pitch conditioned in such a fashion is not significant to a tonal system. It must also be clear that the syllable pitches are basic to the word, rather than merely part of an intonation system.

One may assume that a language is tonal if the pitches can be shown to form a typical pattern according to one of the tone-language types described in Chapter I. This evidence must ultimately be substantiated by demonstrating (preferably by using suitable test frames [see pp. 56 and 61-67]) that (1) the pitch phenomena are not conditioned or caused by any other phonetic or grammatical item, and (2) the pitches in the large majority of words or phrases are persistently different from each other, rather than freely interchangeable under all circumstances (they may, however, interchange in special restricted positions, as in sandhi). Ultimately, also, a few minimally different words ought to be found to corroborate the decision.

C H A P T E R I V

CLASSIFICATION OF WORDS INTO GROUPS WITH CONTRASTIVE PITCH FOR TONAL ANALYSIS

Since linguistic pitches are relative to one another and since their significance is determined by their mutual contrasts rather than by their absolute nature, the student needs to hear the tonal data in circumstances which allow him to recognize the contrasts with the most facility and certainty. Much of the difficulty of tonal analysis develops when the student attempts to compare words which are not comparable, or words which are so far removed from each other in the context that he cannot readily note dissimilarity, or words which have been modified by the context in ways unknown to him. In order to be significant the tonal contrasts must be found in words which are sufficiently similar to rule out interference from nonpitch characteristics, and they must occur in contexts which cannot cause the observed pitch differences.

This chapter deals with two types of classification of data which the student should make before attempting the analysis of the pitch characteristics of his materials. These initial classifications do not, as such, solve the tonal problems; for this reason the student, impatient to know the number of tonemes in the language, may hesitate to undertake the detailed labor required. He should understand, however, that early guesses may turn into prejudices which can obscure the facts in later study.

The first classification brings together words which are somewhat alike in phonetic and grammatical structure. Such a grouping tends to reduce the hazards introduced in the analysis of these words by segments which cause nonphonemic modification of tonemes. The ear is distracted in its listening for pitch when the forms of the items under attention are not comparable. If, for example, one word has two syllables and another word four syllables, it is difficult for the ear to make a comparison of the pitch of the two words, or of any of the syllables of the words. For this reason the investigator should first compare words of one phonetic FORM (or shape) with other words of the same or similar form before trying to reach a conclusion as to the number of tonemes in a language. When the words have been classified into groups of similar phonetic structure as regards number of syllables and sequences of vowels and consonants, the ear can concentrate upon the points in the pronunciation which may be potentially different in significant pitch. At a later stage in the analysis words of different form can be compared with each other.

The second classification groups together, within the lists resulting from the first classification, words which, in the judgment of the student, are identical in pitch. The beginner is able to hear two words and decide with some degree of assurance that they have the same or different pitches long before he can state with certainty the nature of those pitches. By this procedure he lessens enormously the number of words whose pitch contour he must attempt to keep in mind at any one time, since for practical purposes one word (or a few words) may serve as a representative of the entire group. It thus becomes possible to study the major tonal characteristics of the entire language by utilizing representative data of manageable proportions; later investigation can determine minutiae or irregularities. The chief aim of the student, in this second classification, is the achievement of lists of words uniform in tone.

The principal method of attaining this goal consists in a comparison and contrasting of the words as they are pronounced by the informant in controlled contexts. When a word is heard in a sentence its tone may be compared with the tone of neighboring words. If now the word is

replaced by another word of similar phonetic type the student is likely to notice any change of tone in the new word, not only because of the difference between its pitch and that of its predecessor but also because of the change in the relationship of the pitch of the first word to its context and the pitch of the second word to that same context. The context-word relation aids the ear in determining the likenesses and differences between the two substituted words. In addition, if the general pitch of the speaker's voice rises (or falls) from one utterance to the next, the pitch of the entire context rises with it, so that the context-word pitch relation remains constant; the change of absolute pitch is then less likely to cause the student to conclude that two tones are phonemically distinct when, actually, they are phonemically identical. Initial classifications of this type lead to much more certain results--especially in a language with level pitches--than does a study simply of pairs of words that differ by pitch alone.

A. Classification of Words into Groups Phonetically and Grammatically Uniform

Before a serious comparison is made of word pitches, the words should be sorted into groups which are partly uniform in syllable structure. One group should consist of monosyllabic words, another of dissyllabic words, and so on, e.g. (1) group CV, (2) group CVCV, (3) group CVCVCV. Furthermore, these large groups should be subdivided into smaller ones in which the words have the same number of consonants, in the same position, within the syllables, e.g. (1) group CV, (2) group CVC, (3) group CCV.

Frequently it is wise to subdivide the groups still further into smaller lists containing words which begin with similar consonants--say one group with initial voiced stops, a different group with initial voiceless stops, and so on. The amount of detail advisable will depend upon the specific language. As a rough example, however, it would appear that if a foreigner were seeking tonemes (not intonemes) in English, he should first compare pan, toll, Tom, king [pæn, tol, tam, kɪŋ] with each other, before comparing them with pencil, incriminate, ski, stick ['pɛnsəl, ɪn'krɪmɪneɪt, ski, stɪk].

In addition to classifying words according to syllable and segment structure, one should also take stress into consideration. Stressed words should be separated from unstressed words. Items with stress on the first of two syllables should be segregated from items with stress on the second (e.g. [1] group 'CVCV, [2] group CV'CV, and so on), since pitch differences may be conditioned by stress; relatively high pitch, for example, might accompany heavy stress. Quantity, likewise, should be controlled, and the groups of words classified according to the length of the vowels of their syllables, e.g. (1) group CV, (2) group CV:, (3) group CVCV, (4) group CVCV:, (5) group CV:CV, and so on. Pitch glides may be considerably affected by the length of vowel on which they occur: a glide may be much more apparent on a long vowel than a short one; the glide on a long vowel may at first appear to be just one toneme, but later have to be analyzed into two tonemes.

The order of words and the kinds of words should also be uniform for any list of phrases, since both intonational and tonal differences are frequent when the syntax differs. Compare the intonational pitches in the English phrase Tom, a sailor with those in Thomas, sail er! Words may be forced to change their tonemes according to their position in the phrase. Even an apparently innocuous shift in position may cause such a change: in Mixteco, for example, a word spoken twice in succession will often change one of its tonemes, so that the student in asking for a word over again may not be able to obtain exact repetition from the informant. Thus in ?iči ?iči kɪ?in-ri 'road road going-I,' that is, 'I will keep on the road,' the word ?iči has the first, mid, toneme changed to high on the second occurrence.

The morphological form should be carefully noted and controlled in grouping. Often it is best first to group and compare nouns with nouns, and verbs with verbs, rather than nouns with verbs, and so on. It is not always necessary or desirable to carry the morphological segregation to its limits, because this might give so many small groups that there would be considerable possibility of error in comparing or equating them later. On the other hand, the divisions sometimes

have to be quite small for handling in controlled contexts, since the context itself may allow only a small number of items to be placed in it. Morphological differences might easily be the cause of morphological tonemic changes and, unless properly grouped, could obscure the basic contrasts of pitch for which the investigator is watching.

In order to demonstrate sample groupings with which one might wish to experiment in studying a tone language, a few brief lists of words and phrases from English are given below, even though English is not tonal and the lists actually used for a tone language would depend upon the grammatical and phonetic structure of the specific language.

One-syllable words

Pattern CVC (with voiceless consonants)

- [sɪs] 'sis'
- [təp] 'tap'
- [sɪt] 'sit'

Pattern CVC (with initial consonant voiced, final consonant voiceless)

- [bət] 'bat'
- [mɪs] 'miss'
- [lɪp] 'lip'

Pattern CCVC

- [stɪk] 'stick'
- [plæn] 'plan'
- [blɪs] 'bliss'

Complex words of pattern CVC-C

- | | | | |
|--------|--------|--------|----------|
| [mæts] | 'mats' | [kɛpt] | 'kept' |
| [rənz] | 'runs' | [kænd] | 'canned' |

Words of pattern CV'CVC or CV'CV-C

- | | | | |
|----------|-----------|----------|----------|
| [ri'siv] | 'receive' | [dɪ'ten] | 'detain' |
| [ri'pez] | 'repays' | [bi'hɛv] | 'behave' |

Phrases of pattern VC CV 'CVC

- | | | | |
|--------------|---------------|--------------|----------------|
| [ɪn ðə 'hom] | 'in the home' | [on ðə 'čer] | 'on the chair' |
| [ɪn ðə 'buk] | 'in the book' | [əv ðə 'bos] | 'of the boss' |

An investigator would not have to use the precise types of groups set up here. The important thing is to classify the data finely enough to eliminate the more probable sources of conditioned pitch change and to leave groups of sufficiently simple phonetic and grammatical structure that the investigator may quickly discover any conditioning that remains (for example, in the group CCVC given above, if the pitch of the second item differed from the pitch of the first and third, the investigator might suspect that the final voiced nasal was causing the difference). If the investigator believes that a new alignment would give better results, he may divide the groups more finely or on the basis of different criteria.

B. Classification of Words into Groups Tonally Uniform in Controlled Contexts

1. The Nature of Controlled Contexts

When, in any syntactic or morphological construction, one member can be removed and have substituted for it a different item, the undisturbed portion of the construction is the SUBSTITUTION FRAME,¹ and the exchanged portion is the SUBSTITUTION ITEM; a list of items prepared for such substitution is a SUBSTITUTION LIST.

¹I am indebted to the late Dr. Edward Sapir for a brief suggestion, made in a session of the Linguistic Institute at the University of Michigan in 1937, that led to my development of frames for tonemic analysis.

A number of sample frames and substitution lists from English are given below to demonstrate that frames may be long or short and composed of single words, parts of words, or phrases of different kinds. The emotional context must also be controlled in English, to prevent intonation changes. In number 1 below, "my ..." is the frame; hat, shoe, eye, nose compose the substitution list.

1. "my ..."

my hat
my shoe
my eye
my nose

2. "...er"

farmer
singer
burner

3. "a round ..."

a round apple
a round stone
a round table

4. "It's ... coat"

It's my coat
It's his coat
It's her coat

5. "... go home today"

I go home today
You go home today
We go home today

6. "She ... the cake"

She baked the 'cake
She ate the cake
She saw the cake

7. "I entered the ... in the city"

I entered the house in the city
I entered the store in the city
I entered the street in the city

The investigator should choose a frame which seems natural to the informant and in which the latter does not object to inserting the appropriate items of the particular substitution list the investigator wishes to use. The best frames are short, also, but with a syllable or two on each side of the substitution item, so that the frame pitch is contiguous to the beginning and end of the item.

If the first frame happens to be a fortunate choice, a number of facts can be learned by using that one frame alone. Usually, however, one should expect to lose some time on frames which do not seem to contribute much data. In any event, many varied frames must be set up and used, until the investigator has classified by tone all items in the language (or, rather, a large sampling) and has analyzed the system as a whole.

Oftentimes a part of a paradigm may serve as a frame. With the verb stem unchanged as the frame, the pronouns may be added as the substitution list. With a single pronoun as a frame, different tenses (and the like) of a stem may be changed. With a single pronoun and the same grammatical type (e.g. tense) retained, different stems may form the substitution list. Frame types such as these are frequently the best ones.

2. The Value of Controlled Contexts for Tonemic Analysis

Frames aid the investigator of tone in many ways. An investigator who has never studied tone languages finds work with frames one of the easiest ways in which to train the ear, because significant pitch features are most readily noted in contrast with such controlled contexts. In addition, the control of context allows the attention to be focused on points of potential contrast, with a minimum of distraction.

Words in context present a more normal situation than do words in isolation. The informant is likely to give slow variants, or specialized pronunciations, or even very abnormal forms to words in isolation. A frame context helps to avoid such specializations and abnormalities.

In addition, a variation in key might trip the investigator were it not for the fact that the frame changes along with the list under observation. This puts the investigator on his guard against writing the pitch differently, and thereby reduces the number of preliminary tone markings which he must later analyze. More important, the proportionate pitch intervals of frame to list are preserved in spite of changes of key. Since relative pitch, not absolute pitch, is important, this helps to keep attention focused upon the essential characteristics of the pitch relationships, rather than on absolute pitch, and provides a sort of basis of reference for seeing their proportions.

By controlling the context the frame also largely controls the presence or absence of prosodic or segmental conditioning factors extraneous to the substitution. Any remaining pitch contrasts within a frame are almost certain to be phonemic if the possibility of tonal conditioning by the phonetic form of the substitution list has been carefully weighed and eliminated after the initial discovery of tone differences. In fact, persistent unconditioned differences in tonal form within a controlled context, and with the shape of the words controlled, prove that a language is tonal and set the stage for the analysis of the number and type of tonemes.

A single frame for a substitution list is much more satisfactory than a collection of miscellaneous contexts differing from item to item, since the single frame permits each item to be compared to the frame tonemes, which are likely to be semipermanent, rather than highly varied, instead of being compared solely with each other. Contrasts of substitution items to the contiguous frame pitches as points of reference may be noted. The items may be classified according to their relationships to those points of reference, rather than by the less satisfactory method of auditory judgments in regard to relationships between isolated items.

If monosyllabic items with level pitches are pronounced in isolation, they carry no clue to their place in a register system; significance here depends on contrast, but such items in isolation are not seen in contrast with other syllables. In a frame, however, the pitch of the monosyllabic substitution item may be compared with the pitches of the frame syllables, and any contrasting levels may be noted.

By studying the tonal regrouping of his lists in different frames, where he may find two words in one frame to be tonally alike and in a different frame tonally different, the investigator can discover rules and conditions for tonemic sandhi and for tonemic substitution in the morphology.

With appropriate modifications, frames may be used in the examination of any type of prosodic phenomenon, whether of stress, quantity, intonation, or tone; consequently, frames make an acceptable starting point for the investigator before he has analyzed the particular tonemic system which confronts him. In fact, it may at times be advisable to use frames and groupings by phonetic form and vowel quantity in order to discover whether or not quantity is significant, before beginning tonemic analysis. This may be true of stress also.

3. The Danger of Error Introduced by Unrecognized Changes in Some Toneme of the Controlled Context

One must be constantly alert lest his frame tonemes change without his knowing it. One may hear the pitch of the frame change without realizing what has happened, but assume incorrectly that the key has changed. Conclusions in regard to changes of key must therefore be kept tentative until one is sure the differences do not actually represent frame-toneme changes. Another situation which should cause one to suspect that the frame toneme has changed is the sudden necessity for changing the tone markings of an entire substitution group, or of several groups. The investigator may decide he has previously heard them incorrectly and that he must now write the pitches differently, when the real difficulty is an unsuspected change of the frame toneme.

To guard against incorrect judgments due to unnoticed changes in frame, one must be certain to use a number of different frames and not to rely heavily on any one of them. It is a serious error to depend too much upon a single context. In addition, a specific technique for locating unchanging frames will appear in Chapter V.

4. Grouping Items According to Their Pitch in Controlled Contexts

At this stage of the analysis there is one simple question to be asked in regard to any two substitution items: In a particular frame are the substitution items the same in pitch or are they different? In answering this question, some phrase is selected to serve as the frame. The informant is then asked to say the phrase as a frame for the first item in the phonetically uniform substitution list; he is then requested to utter the phrase again, but to replace the first word of the substitution list with the second word. The student listens to the two utterances, comparing the tone of the substitution items with each other and with the tones of the frame. If the two items appear to him to have distinctive tone patterns, he has discovered the first evidence of tonemic subdivision in the substitution list. If the third word he tries is the same as the second, he places it with the second, and so on, until all the items which seem to have the same pitch height and contour in that frame have been grouped together.

After all the items of the substitution list have been divided into one or more groups uniform in tone, the same words should be inserted into another frame and classified again. If the resultant groups are the same as were found by means of the first frame, no new problems are likely to arise. If they are different, the investigator must keep a record of the groupings and the types of contexts in which they occur; these may then be analyzed grammatically according to techniques presented in Part III. The student should continue to place the substitution list in additional frames until he is fairly certain of the accuracy of his groupings. He may then classify all his remaining substitution lists by means of these frames or by means of others in which the grammar permits their occurrence.

Notice that up to this point there has been no essential need for tonal transcription. It is the grouping as such which has been important. The items could have been given a tentative pitch marking, however, to help the ear in noting likenesses and differences more quickly, to facilitate ready recognition of items, and to aid the memory. It must be emphasized, however, that such a marking by no means accurately symbolizes the tonemic system; the investigator shows an unfortunate lack of patience if he attempts serious judgments as to the system before a considerable body of data is assembled, for such data enable him to eliminate prejudices rising from his own intonational system and to perceive group contrasts that may provide clues to the pattern new to him. Serious efforts to make an early "correct" transcription only tend to confuse him, for it is difficult to correlate the many nonsignificant tone variations in such a transcription.

5. Checking the Groups

The ear does not hear pitch uniformly; a simple judgment as to similarity versus non-similarity is much more accurate than attempts to transcribe contours. The making of this elementary distinction is a big stride ahead in the examination of a language. Even here, however, the student is susceptible to numerous errors. Some of these mistakes of grouping can be eliminated in the early stages of analysis by careful checking of the groups for consistency within themselves. Usually there is some reclassifying to do: (1) small pitch gradations may have been missed and new groups must be added to care for the extra differences, or (2) a few items may have to be transferred to other groups because of early mistakes of judgment, or (3) initial error or a bit of untimely free variation may have caused the establishment of a group which can now be eliminated, perhaps by combining two or more of the groups originally postulated.

The psychological pressure associated with hearing, one after another, a group of words supposedly uniform in pitch is so strong that deviations are much more readily apparent than when words of many different pitches are heard. For this reason the checking of a group for uniformity

of pitch is considerably more accurate, whether for the beginner or the advanced student, than the initial grouping. The informant should repeat the phrases in succession (not the words themselves, in isolation, lest the groupings change and free variation interfere), with the pertinent items substituted. Any word should be reclassified if its pitch deviates from the contour of the rest of the subgroup in hand.

If the student is using a "zero" frame, that is, listening to words in isolation, a sandhi check must be made. The mere fact that one word is necessarily said before the other in repetitions by the informant will frequently cause sandhi changes, or phrasal conditioning, or intonational modifications of one of the words. To check on this possibility the investigator should (1) reverse the order in which the items are repeated, and (2) have the informant make a marked pause before each item. If the pause leads to changes, it may be necessary to include it each time, or else one must abandon isolated items and work solely within free frames.

The groups that subdivide the substitution list should be studied to see if any phonetic factor persistently appears in one group and is absent from the others. If, for example, a voiced consonant occurs at the beginning of every word in the second group, but never appears in any of the other groups, or if [?] occurs only in the second group, certain of the pitch characteristics which differentiate the second group from the other groups are probably nonphonemic, and caused by the voiced consonants or by the [?]. The student must likewise study the tentative pitch transcriptions of the group--and later his revised transcriptions--to see if a certain pitch characteristic appears with one group or in one pitch context but not in other groups or in other pitch contexts. If, for example, a pitch of relatively medium height occurs only between syllables one of which is high and the other low in pitch, the mid pitch is presumably nonsignificant as such, being a phonemic low raised after high or a phonemic high lowered before low.

6. Words Representative of the Groups

After groups have been formed, the investigator may work on the principle of REPRESENTATION. Instead of having to analyze the pitch of thousands of morphemes, words, and phrases, he has a much simpler task, that of analyzing the contrasts in a few dozen representative forms, one or two samples from each group. The principle of representation must be used with caution, however, since a group may contain subgroups which act differently in different phonetic or grammatical contexts, so that one sample of the group would not represent the entire group in every situation. To guard against this situation the investigator should utilize the representative words to discover the first clues to grammatical change of tone; once he has discovered an important change by this means he should check it with all the words in the lists affected to see if the groups act uniformly. In addition, the representative words may be used as STANDARDS from day to day to check deviation in key and to get orientation in key at the start of a study period. They may also be used in classifying new words, which may be compared with the representative ones to see if they belong to the same group.

C H A P T E R V

ANALYSIS OF THE CONTRASTIVE PITCHES OF GROUPS OF WORDS UNIFORM IN PITCH

Once the substitution lists have been divided into groups of words with similar pitch characteristics and similar phonetic shape, the investigator may proceed to the analysis of the pitches themselves. The type of pitch system must be discovered, and the specific number and type of level and (or) gliding tonemes must be analyzed.

A. Determining the Number and Type of Tonemes by Comparing the Differences of Pitch between Uniform Groups

1. Analysis of Representative Level Pitches

The words grouped according to their pitch in frames may at this point be analyzed for contrasts from group to group. Dissyllabic words are preferable to monosyllabic ones for initial study because helpful contrasts sometimes occur between the pitches of two syllables. If the investigator has found many level, nongliding pitches, he may begin with them.

a. Analysis of Words of Different Lengths

If, then, there are many dissyllabic items with level pitches, the investigator seeks among the groups uniform in pitch and structure for one which has tones as high or higher in pitch than the tones of any of the other groups. To locate this highest-toned group he chooses the frame which allows him to hear the pitches of the substitution list most clearly and selects a representative word (or words) from each group which likewise has easily heard pitches (but avoids words with [?] since [?] frequently causes nonphonemic modification of pitch); he then has the informant utter the frame phrase, placing each of the representative words in it in turn. Hearing the words thus in contrast he can select the one with the highest pitches. If both syllables of the highest-toned representative word have the same pitch, he marks them high high: group 1, CáCá (with "a" representing any vowel). He then looks for a representative word whose first syllable has a pitch of that same height but whose second syllable is lower; if he finds such a word he marks the pitches high low: group 2, CáCà. (Or he might discover the reverse of this type, CàCá, which would prove equally important.)

Provided the researcher has previously investigated and rejected the possibility (or does so now) that the pitch differences between these two groups are caused by nonphonemic modification of the pitches by the sounds of the respective words or by the pitches of the frame, the pitches of the second syllables in the representative words are in unconditioned contrast and constitute distinct tone phonemes, that is, two level tonemes or pitch registers. Further search would probably enable him to discover words distinguished only by their meanings and by this pitch difference.

To test for the existence of a third register the investigator hunts for a group in which, again, the pitch of the first syllable is high, like the pitches of the syllables of group 1, but in which the second syllable is lower in pitch than the tones of (1) but not of the same height as the second syllable of (2). If the syllable is lower in pitch than the second syllable of (2), he then writes (3) as CáCà and rewrites (2) as CáCá; if, however, the second syllable of (3) is higher in pitch than the second of (2) but lower than the second of (1), he writes (3) as CáCá.

and (2) remains CáCà. If the investigator has eliminated the possibility that these differences are conditioned nonphonemically by some segmental or pitch characteristic, a third toneme and a third register are proved by the three contrasting heights of either of these situations.

The same procedure could have been followed by starting with low tones and finding CáCà in contrast with CáCà, CACÀ. It could likewise be followed, but with much more danger of error, by beginning with a representative word of two tones and by finding the representative word of another group with a first tone lower than the first tone of the first word, and then by finding a third representative word with a first tone higher than the first tone of the first word: CACÀ, CáCà, CáCà.

A fourth toneme would have to be added if another contrasting height were found (CACÁ, CáCá, CACÁ, CACÁ) by similar procedures.

Trisyllabic items (morphemes, words, phrases) can be used in much the same way as dissyllabic ones, and may offer the added advantage of having three contrasting levels in a single morpheme. Note CáCáCá, and so on. Items with four syllables are sometimes similarly convenient in checking contrasts when four registers are present; note CáCáCáCá, and so on.

The use of words of three or four syllables considerably increases, however, the possibility of nonphonemic modification of one tone by another within the words of the substitution list. In a language with two phonemic levels, for example, a sequence high low high might at first be incorrectly analyzed as phonemic high mid high if in the language a low toneme is slightly raised nonphonemically between two high pitches: the two pitches of CáCáCá might appear to contrast with the two of CáCáCà, and seem to prove that the third phonetic pitch level constitutes a third phonemic level. In order to avoid such erroneous conclusions the student must make certain that the phonemic pitch contrasts appear in comparable unconditioned positions in the words. In the illustration just given (CACÁCá and CáCáCà) the á and à are not in comparable positions, since á occurs in the middle of the word after a high pitch and before a high pitch, whereas à occurs at the end of the word after a high pitch but before silence. Before the student can with certainty conclude that three pitch levels are phonemically distinct he must find them in contexts which preclude the possibility of nonphonemic conditioning. Any of the following sets (only a few of the twenty-seven theoretical possibilities with three levels and three syllables) would serve to prove the existence of tonemic contrasts provided there were no interference from the segmental phonemes: CáCáCá, CáCáCá, CáCáCà, CáCáCà, CáCáCà, CáCáCá, CáCáCá, CáCáCá.

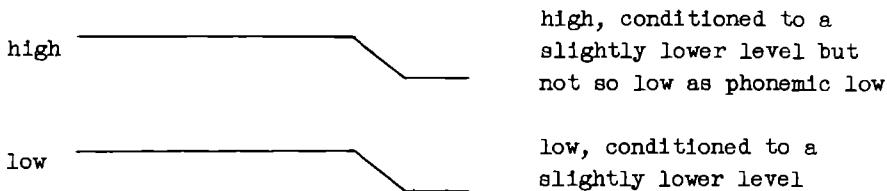
One can readily see that monosyllabic items cannot be analyzed in just the same way as dissyllabic ones since, by definition, there are no sequences of two syllables within a single monosyllabic morpheme. But the monosyllabic item may be considered in conjunction with a neighboring frame syllable and the tonemes compared in this fashion.

Although monosyllabic items have the limitation indicated above, a quick rule of thumb might be that there are as many significant levels in a register-tone language as there are isolated monosyllables that are different only by height of pitch. Compare Mazateco c[?]e¹⁻³ 'pheasant,' c[?]e² 'lazy,' c[?]e³ 'membrane,' c[?]e⁴ 'his.' Here the difference in height is seen in reference to the general height of the speaker's voice at the moment. This rule must be used with caution, however. It cannot be used at all in Mixteco, for there are no isolated words whatever which are monosyllabic (i.e. which have short single-toned vowels) in that language. In languages which do have isolated monosyllables, moreover, there is the hazard that the general height of the speaker's voice may change between utterances of the words, and thus upset the comparison between specific syllable height and general voice height.¹ Whenever this method is used, it should always be checked by testing contrasts between groups in frames.

¹I. C. Ward's data on Ibo (An Introduction to the Ibo Language [Cambridge, 1936], 12, demonstrate another difficulty in using isolated monosyllables to determine the number of levels: namely, the fact that there are three levels, yet "no monosyllabic word of any kind exists in the language with an essential mid-tone (with the exception of m, go, ya, ha [pronouns or possessive

When the levels and patterns of one frame have been examined and classified, the material of other frames must be studied to see if the same number and kind of contrasts occur there also. Various frames may obliterate some contrasts or not permit the presence of particular tonemes. In Mixteco, for example, certain frames force most low tonemes to change to high. In special contexts (after type [b] words [see p. 80]) the tonemes of two-syllable words containing a low toneme change: mid low becomes mid high; low mid becomes high mid; low high becomes high high. Only high low remains unchanged, and there are scarcely half a dozen words of the whole language in this group: náá 'mother,' táá 'father,' máá 'godfather,' bá?ù 'coyote.'

Furthermore, the tonemes of a language may all be modified slightly by some frame. For example, the pitches may be lowered nonphonemically at the ends of phrases. Two frames might each show, let us say, two pitches in contrast, but in the frame in which they appeared in phrase-final position one pair of contrastive pitches would be slightly lower than the same tonemes when they occurred in an earlier position in the other frame. This can be diagrammed as follows:



Phonetically, four pitches are present (and would be recorded instrumentally); phonemically, only two of the pitches are functionally in contrast, and the corresponding high tonemes (and low tonemes) should be equated.² Only two tonemes should be written here for a practical, phonemic, orthography. The student must be careful not to confuse this situation with the different one in which one toneme is substituted for another either mechanically or as part of the grammatical structure; in order to be significantly different two tonemes must contrast in a few types of contexts, at least, even though elsewhere only one toneme appears.

b. Symmetry and Minimally Different Word Pairs as Tests for the Analysis of Tonemic Systems.

Languages tend to be symmetrical in their phonemic systems, and, although frequent non-symmetrical characteristics appear, some degree of symmetry is sufficiently probable, especially in a register-tone language, to make the presence of symmetry in one's analysis of the tonemic system supporting evidence of the accuracy of one's work. Conversely, a lack of symmetry should make the investigator cautious, since it may result from an incorrect analysis. If in a particular language three registers were erroneously postulated instead of two phonemic ones, for example, many of the theoretically possible sequences of tonemes would not be found.

In a two-register system there are four possible combinations of tonemes on dissyllabic items: high high, high low, low high, and low low: CáCá, CáCà; CàCá, CàCà.

A three-register system presents nine theoretical dissyllabic possibilities: CáCá, CáCà, CàCá; CáCá, CàCá, CàCà; CàCá, CàCá, CàCà. Mixteco has all these combinations on single morphemes except the pattern low low.

A four-register system presents sixteen theoretical dissyllabic possibilities: CáCá, CáCà, CàCá, CàCà; CáCá, CáCá, CàCà, CàCà; CáCá, CàCá, CàCà, CàCà; CàCá, CàCá, CàCà, CàCà. In single

adjectives]); as subject, these pronouns have a high toneme. This rarity of mid toneme on monosyllables might make it difficult to find word pairs which illustrate all tonemes but which differ just by pitch.

²For an argument in favor of equating segmental phonemes when they fill a "like place in a comparable series," see W. F. Twaddell, "On Various Phonemes," Lang., XII (1936), 53-59; see also M. Swadesh, "Phonemic Contrasts," Am. Speech, XI (1936), 298-301, and XII (1937), 127.

morphemes Mazateco provides all these combinations except CáCá; between morphemes this combination appears also. Note the following sample (high pitch is written with the numeral 1, low pitch with 4; the dash after a toneme in the second syllable indicates that a further toneme would be added if the word occurred in isolation; the forms quoted here are abstracted from a frame in which the nouns precede adjectives):

<u>ya¹nchi¹-</u>	'women'	<u>na³ti¹-</u>	'corn tassel'
<u>nta¹ti²-</u>	'kerosene'	<u>to³ncho²-</u>	'onion'
<u>nta¹a³-</u>	'saliva'	<u>?i³hna³-</u>	'fern'
<u>šo¹hno⁴</u>	'lime'	<u>či³se⁴</u>	'bluebottle fly'
[Pattern Ca ² Ca ¹ lacking]		<u>na⁴hmi¹-</u>	'conversation'
<u>sq²šta²-</u>	'altar'	<u>či⁴ša²</u>	'married'
<u>co²ti³</u>	'girl'	<u>ni⁴?yo³-</u>	'ant'
<u>mi²yo⁴</u>	'friend'	<u>či⁴nka⁴</u>	'pig'

When a hypothesis has been made as to the number and type of tonemes in a language, the investigator returns to the pairs of words that differ by pitch alone. He attempts to describe in terms of the total tonemic system the pitch differences of the word pairs he has found. If there are not enough tonemes postulated to make adequate distinctions in writing all the minimal pairs, the procedure must be rechecked to discover the error. But if the minimal pairs can be readily recorded by the proposed orthography (especially if natives themselves can be taught to write their language with it) the investigator has practical evidence that his analysis is approximately correct.

2. Analysis of Representative Glides Accompanying Level Pitches

If the investigator has found level pitches which seem to be resolvable into a register system, he should next check any glides that are present to see if their beginning and ending points can be related to the levels already established.

If it is a register system, he should see if the glides tend to form a symmetrical pattern, by trying to fill in all the theoretically possible combinations of any two levels joined together. If the system is defective only a few of these may be found, or only one or two may be missing. The glides analyzed into end points have the same possibilities as were present in disyllabic words with level tones. A single-direction glide in a two-register system could be Cá' or Cà'; in a three-register system it could be Cá', Cá', Cá', Cá', Cà', Cà'. Two-direction glides which go first up and then down, or down and then up, have many more possibilities: Cá'', Cá'', Cá'', and so on.

The next problem in such a language is to discover whether or not a single-direction glide occurs on just one vowel (or consonant) phoneme, or is distributed over two, and whether two-direction glides are distributed over one, two, or three vowel (or consonant, or vowel and consonant) phonemes. Closely connected with this problem is the length of time occupied by the glide. If the glide is very rapid it may be all on a single vowel. A slow glide in a register system is more likely to be distributed over two vowels. In Mixteco the glides are never on single vowels but always on multiple ones, double, triple, and so on, as in kää 'iron,' žäü 'hole,' naä 'mother,' ñüü 'town'; ñüü-i 'the child's town,' ñüü-i-ún 'that child's town.' In Mixteco such words act in tonemic substitution like a two-syllable CaCa pattern, e.g. žäkü 'some' or ñü?ü 'fire,' except for a few specialized tonomechanical subclassifications. In Mazateco the length of time taken to pronounce a glide is independent of the number of vowels which it covers; one toneme may be spread over a sequence of one, two, or three vowels, whereas a sequence of two tonemes may be spread over two or three vowels or pronounced on a single vowel.

A convenient label for a unit of length in tonemic placement is the term MORA. Usually it is best to apply this term to a unit of length approximately equivalent to the length of a short vowel, or to half the length of a long vowel. A one-mora glide would be a rapid glide on a single

short vowel or a short diphthong; a two-mora glide would be a slower one on a long vowel or long diphthong or on two syllables comprised of a short vowel each. In general, a pure register system is one in which one-mora tonemes are level; a pure contour system contains one-mora gliding tonemes.

3. Analysis of Basic Gliding Pitches

If the investigator finds no level pitches in contrast with each other, but only gliding tones, the procedure must be somewhat different from that indicated for level tonemes and for level tonemes accompanied by glides in a register system.

The basic preparation for the analysis of a contour system is the same as for a register system. More than that, the initial steps may all have been taken before the investigator has determined whether the system is of the register or the contour type. Words (or morphemes) are first grouped according to phonetic shape, and according to pitch similarity in frames. Conditioned pitches should next be accounted for. The pitch glides are then ready for analysis, if there is no predominance of level pitches.

After choosing representative words from the various groups found in a single frame, the investigator diagrams (or plots on a rough graph or musical staff) the general contour of the pitches of each of these words. Next he studies the diagrams or transcriptions to find what basic types of contrasts are present. He watches for differences in direction of glide, whether up, down, up and down, down and up; speed of glide, whether fast or slow; length of glide, whether it has a large or a small pitch range; height of glide, whether one glide is relatively higher than the other; contrasting end points, whether one glide begins where the other leaves off, whether the glides begin at the same or separate places, and so on; steadiness of glide, whether it begins rapidly and ends slowly, or vice versa; stressed versus unstressed glides; gliding pitches as contrasted with a level pitch or two; and so on. The smallest pitch units which prove to be in unconditioned contrast constitute the tonemes. The investigator then lists his tonemes in an order which shows the most significant progression or system of contrasts and checks the system for symmetry and for accommodation of the contrasts of pairs of words minimally different by tone.

The procedure is repeated for various frames. The data gathered are then equated, and the tonemes given a final listing and numbering. The final number of tonemes postulated should be large enough to accommodate all the unconditioned pitches of all frames.

A rule-of-thumb analysis for contour tonemes, as for level tonemes, is that the number of different unconditioned pitches on isolated monosyllabic words is probably the basic number of tonemes in the language. Frequently, however, a contour system will include one or two tonemes which do not occur in isolation but are found only in special types of phrases; these tonemes will be discovered if the investigator utilizes an adequate variety of frames. In descriptions of Chinese languages the tonemes which result from sandhi changes but which do not occur inherently upon isolated words are frequently not counted in the basic number of tonemes or called tones; syllables containing them are likely to be termed "toneless." The rule of thumb for isolated monosyllables would tend to lead to that type of classification, since enclitic monosyllables do not occur as such in isolation--or they would not be enclitic. The total number found by the fuller procedure with frames, however, would include enclitic-toneme types, but the investigator might place them in a subgroup, somewhat distinct from the inherent lexical tonemes.

4. Analysis of Intonation

For the study of intonation, frames may be used much as they are for the study of tone, but with a few major differences.

Intonation contours are not confined to single syllables, and the same contour may at one moment spread over one syllable and at the next moment spread over half a dozen. Therefore some

of the test substitution lists must not be restricted to short items and phonetically analogous morphemes, but must include phrases and words of different sizes and shapes, e.g.:

"I want to ...!"

I want to go!

I want to go with you!

I want to go with you if I can!

The phonetic shape of the substitution list is not so important, perhaps, as in the study of tone proper, since a much wider variety of shapes may carry an identical intonation contour. This very fact makes conditioning of intonation contours common, since the contour length will depend upon the item on which it rests. For example, if one uses a stressed low pitch rising to high (for, say, 'surprised exclamation'), the rise will be rapid and gliding on the vowel before voiceless consonants (What!?); more slow and prominent on final vowels (Who!?); moderately slow, and spread over the consonant if the consonant is voiced (When!? Where!?); stepping up, instead of gliding, and spread over two syllables or more in longer words and phrases (Women! Yesterday!? All the people!?).

In order to find these conditioning factors some of the substitution lists must be strictly controlled in phonetic structure. Especially must one be careful to keep stress placement uniform. Obtaining the proper balance between lists of items varying in size, lists of items with controlled structure, and single items exhibiting intonation changes (the latter to be illustrated immediately) is part of the skill needed in intonation analysis.

Minimally different phrase pairs may have the same lexical meaning and be composed of precisely the same words but differ in shades of meaning conveyed by changing intonation; in English these shades of meaning usually express the attitude of the speaker toward his utterances. Since much of the contrastive system may be seen functioning upon single items, phrases minimally different by pitch are much more important in intonation analysis than in analysis of tone. A single phrase may be said to constitute a frame within which the play of superimposed intonation gives the effect of a substitution list (composed of changing pitch contours significant in themselves, not of substituted words).

Contrast within a frame for intonation can, then, be comprised in considerable degree of pitch differences occurring on items basically the same:

He's gone.
He's gone!
He's gone?
He's gone!?
He's gone, ...

These contrastive pitches must, however, be correlated with the related pitch phenomena observed in the substitution lists having items that vary in length, grammatical construction, and phonetic structure. The data must also be correlated with the phenomena seen in the frames in which grammatical and phonetic form are controlled.

While analyzing the intonation contours as meaningful entities, in the manner just described, the investigator should be ready to observe significant relative pitches at the end points of these contours. Thus all American-English intonation contours begin or end on one of four relative pitches which constitute the key points of the contours. The pitches of other syllables tend to be unimportant and to follow automatically from the key pitches. The details of this system have been presented elsewhere.³

³K. L. Pike, The Intonation of American English (Ann Arbor, 1945). One may choose to call the key pitches INTONATION PHONEMES or INTONEMES. Neither the key points nor the contours, however, completely parallel either tonemes or segmental phonemes. See ibid., 177.

B. Determining the Number and Type of Tonemes by Comparing the Differences of Pitch between the Uniform Groups and Their Context

It is easier to match colored cloths when the samples of similar shades are placed one at a time next to each other than it is to identify them when the samples are in a heterogeneous pile. So, also, it proves easier to classify words according to their tonemic content when they are heard one after another in a stable, standard frame with which they can be compared or contrasted.

It is easier to perceive likenesses and differences of contiguous pitches (pitches of syllables next to each other) than of noncontiguous ones. For this reason it is easier to compare the pitch of a substitution item with its frame, since they are spoken in the same phrase, than to compare it with a different item spoken in a separate utterance. In AB and AC (in which "A ..." is the frame) it is easier to compare A with B, and A with C, than to compare B directly with C. This is another reason why frames are of great value in tonal analysis, in addition to their partial control of free and conditioned variation.

Not only may the tonemes of substitution items be compared with the frame tonemes, but they may also be compared with each other, indirectly, through the medium of the frame tonemes. If, for example, in AB and AC the pitch of B is higher than that of A, but the pitch of C is lower than that of A, then the pitch of C (if the pitch of A has remained steady) is also lower than that of B.

1. Analysis of Level Pitches

In a language which has level pitches the investigator finds that a monosyllabic item in a frame is either higher, lower, or equal in pitch with the syllable of the frame immediately preceding (or following) it. If in AB and AC the level pitches of B and C have different relationships to A, then the language has at least two level tonemes, unless the pitches are conditioned by some other prosodic or segmental factor, such as stress, or voiced versus voiceless consonants in the syllables, or glottal stop. To provide satisfactory evidence, words B and C should not be random samples, but should each represent a uniform group of words of the same pitch level or contour within the frame "A"

If both B and C are different from A, this does not of itself prove the existence of three significant, phonemic, pitches since only B and C are in corresponding (analogous) positions (i.e. B and C both follow A, but A does not follow A). If either B or C is thrown slightly higher or lower by some conditioning feature of the frame toneme A, the other one is likely to be affected in the same way; but this is not true of A in relation to B, for A might be the same toneme as B, but lowered in conditioned variation preceding B or C.

To prove the existence of a third (or a fourth) toneme, three (or four) different representative substitution items (B, C, D [or B, C, D, E]) must contrast within frame "A ..."; these may be related to the pitch of A in various ways, provided they exhibit unconditioned contrast with each other (e.g. in the frame "A ..." B may be higher than A, C may be lower than A, D may be level with A, E may be higher than A but not so high as B).

The contrasts should be noted in a number of different frames and then equated from frame to frame (1) by height (i.e. highest pitch in frame "A ..." to highest pitch in frame "N ... N," and so on), (2) by number of contrasts (say, three contrasts in frame "A ..." to three in "N ... N"), (3) by symmetry of tone-language type (i.e. according to the number of combinations of heights and sequences of levels and glides theoretically possible within a specific register or contour system). If in a certain frame a specific list of thirteen words contains ten words which carry one toneme and three words with a different toneme, but in a different frame the same list has five words with the first toneme and eight words with the second toneme, a grammatical statement must be made of the kind of context which brings about the replacement of one toneme by the other.

When one is dealing with dissyllabic or trisyllabic items which have level pitches, the procedure is quite similar to that for monosyllables except that one may combine with it those techniques for discovering contrast between syllables which were described earlier in this chapter. If, for example, BD symbolizes a two-syllable representative item, then in ABD the frame syllable A can be compared and contrasted with the contiguous syllable B or the noncontiguous syllable D (using contrasts of frame to substitution list); contrasts may also be sought between B and D (using contrasts within the substitution list). By combining these two procedures the total number of contrasts may be discovered more readily and certainly than by either method alone.

2. Analysis of Gliding Pitches

If contrasting levels and glides are both found, the glides should be interpreted in terms of the level tonemes, as a register system, if possible (since that gives the simplest analysis);⁴ or, if that is not possible, they should be interpreted in terms of a contour system which has some level tonemes.

If gliding pitches are present, but there are no level pitches, then the contiguous frame pitch serves as a standard for judging the relative speed, height, distance, and so on, of the glide. Thus, in AB, AC, the tones of B and C may be contrasted with each other by first contrasting them separately with the tone of A.

3. The Hazard of Unperceived Tonemic Substitutions in the Frame

A word of warning is necessary for the student using frames: Conclusions gained by comparing lists with the frame pitch are abrogated if, unknown to the investigator, the frame itself

⁴I. C. Ward (An Introduction to the Ibo Language [Cambridge, 1936], 15), illustrates glides resulting from the juxtaposition of vowels containing register tonemes of different pitches by saying that in Ibo a "rising or a falling tone may be due to the running together of neighboring vowels having different tones. Thus in the present form of the verb, a low tone verb with a vowel suffix has a rising tone, since the inherent pitch of the root-vowel is low and the vowel suffix is high: e.g. há égésé ntè 'they listen' ... òléé 'what' has a fall since the second e must be lower than the first. ... A rising or falling pitch is naturally heard in the glide from low to high or high to low tones."

Possibly J. H. Greenberg ("Some Problems in Hausa Phonology," Lang., XVII [1941], 316-23), could reinterpret in some such way the falling glides he has recorded. They seem to be closely related to long vowels, and this fact raises the question whether [â] might not possibly be better interpreted as [áá]. The data as he presents them do not quite seem to permit this interpretation. See, however, C. T. Hodge and H. E. Hause, "Hausa Tone," JAOS, LXIV (1944), 52.

The analysis of Apache by H. Hoijer ("Pitch Accent in the Apachean Languages," Lang., XIX [1943], 38-41) would appear to be simpler if only two tonemes were postulated--high and low--with the rising and falling glides, and long level tonemes, interpreted as combinations of two simple tonemes. This would eliminate half of his tone markings and allow a simpler statement of morphology when high and low tonemes come together at boundaries of word parts. The data which he gives would allow such an interpretation, since (40) "when a syllable is made up of inherent-tone morphemes possessing different tones, the tone of the syllable is always inflected. The syllable tone is falling if the high-toned morpheme precedes the low-toned morpheme, rising if these positions are reversed." Further (39), he says that "the inflected tones [i.e., the falling and rising] are found only in syllables having a long vowel or a vowel cluster. Long vowels and vowel clusters are approximately equal in length and both (under the same or similar conditions of speech) are about twice the duration of a short vowel." Many long level tones or vowels or vowel clusters are likewise to be found (cf. 40), resulting from morphological juxtaposition or fusion of short elements. Thus the pattern of vowels in clusters, the length of time involved, the symmetry of the theoretically possible combinations of two tonemes, and morphological junctures all contribute to the possibility of interpreting phonetically long tones, whether level or gliding, as combinations of two short tonemes juxtaposed. (I am indebted to Richard Pittman, of the Summer Institute of Linguistics, for calling this interpretation to my attention; for similar conclusions in regard to Navaho see Z. S. Harris, "Navaho Phonology and Hoijer's Analysis," IJAL, XI [1945], 244.)

has undergone a mechanical or grammatical tonemic substitution; if a frame pitch is used as a standard for comparison, an unrecognized change in the standard yields false and inconsistent comparisons. If in AB and AC, B and C are both the same as A, B is not the same as C if A is different before B from what it is before C. The following section gives the method for finding, in a register-tone language, frame tonemes which one can be certain do not change.

C. Determining the Number and Type of Tonemes by Discovering at Least One Unchanging Pitch to Serve as a Point of Comparison

1. The Theory of Finding a High Level Unchanging Toneme

If, for a register-tone language, the investigator could locate a single level-toned frame syllable which he could prove did not change its toneme so long as it remained a part of that frame, he could apply the method of contrast of frame toneme to substitution-list tonemes but avoid the danger of vitiating his classification by basing it falsely upon reference to a frame toneme which changed without his being aware of the fact. The following argument serves as a background for the required technique:

(1) In a register system some level pitches are phonemically "high." This must be true since the essence of a register system consists in the contrast of level pitches of various heights with each other. Hence, in such a system one of the levels is higher than any of the other levels and this level may be called "high." Furthermore, one of the levels is lower than any of the others; this may be called "low." In addition there may be one level of pitch, or more than one, in between these two.

(2) Some high pitches will appear in an adequate sampling of syllables in a register-tone language. The precise number of syllables required to demonstrate this depends upon the relative frequency of each toneme in the particular language. In a substitution list of reasonable length one would expect to find some high syllables, although in rare lists a sandhi or tonomechanical phenomenon might prevent their occurrence. A frame which was long enough (say, at a guess, ten syllables) would also have one or more high syllables. A short frame, of a syllable or two, would be less likely to have one.

(3) In normal unemotional speech the highest pitches would also be phonemically high--since it would be an anomaly for "low" tones to be higher than "high" ones within material uniform in key.⁵

(4) If the investigator hears pitches which are phonemically lower than high he will ultimately hear some pitches that are higher, because in a fair number of syllables he will hear some which are phonemically high--and, of course, these will be of higher pitch than the low ones.

(5) If, therefore, no syllable of the substitution list ever goes higher in pitch than a specific syllable of the frame, two extremely important conclusions may be drawn: (a) The toneme of the specific frame syllable is itself high--since, ultimately, the tone of some substitution item would otherwise have gone higher in pitch--and (b) the frame toneme is unchanging in pitch within that context--since, if it were high with part of the substitution list, but changed in pitch for a different part, it could only change to a lower toneme, in which event some of the unanalyzed high tonemes of the substitution list or the high tonemes of the other frame syllables would be heard as higher in pitch.⁶

⁵In a change from nonemotional to emotional material, if the first few syllables of an utterance should happen to be phonemically low, the key change might cause them to be higher in pitch than previous calm "high" tonemes. The tonemes in the emotional style of speech would, however, still retain their relative high-low positions, and when phonemically high tonemes appeared, such tonemes would be higher than the emotionally raised low tonemes.

⁶The hypothetical difficulty that the investigator might be using a short frame with no high syllables itself but with tonemes that nonetheless changed all basic highs of the substitution

If the frame itself is two or more syllables long, it is not at all necessary that all its syllables be high and unchanging in order for it to be of service. Only one of the syllables needs to be so to permit the frame to be used as a point of reference in checking. It is desirable, however, to have the reference test syllable contiguous to the substitution list, either directly preceding it or directly following it.

The same technique may be applied to find a low level unchanging frame toneme. The procedure is precisely in reverse--one assumes the presence of a number of phonemically low tonemes, and goes on from there.⁷ The discovery of such a toneme is especially valuable if one fails to find a satisfactory high toneme. Even if a high toneme is first located, and the other levels then found by contrast within the substitution list, a low-toned unchanging frame syllable is very helpful in checking.

By the time he has finished his analysis of the number and kind of tonemes in the system, the investigator should have ready a convenient number of TEST FRAMES, with unchanging tonemes of various pitches; into these he can place any newly acquired words and quickly and easily classify them tonemically by comparing the pitch of the unknown toneme with that of the known test tonemes.

In a three-register system a mid unchanging toneme may sometimes be found. It can be identified after the three levels are established by finding a syllable which is never either high or low. Such a syllable serves as a test frame for classifying words discovered after the analysis is completed, but is highly unsatisfactory for the initial analysis of the system, since the student may easily overlook tonemic substitution and be led into error. In Mazateco it is quite simple to find items to serve as unchanging test tonemes in many different contexts, for all four registers.

One caution must be given. The fact that a frame syllable does not change its toneme in a specific context and with a specific type of substitution list is no guarantee that it will remain fixed if syllables are added to or dropped from the frame. If one wishes to determine whether a frame toneme which is unchanging in one context is also a toneme which does not change anywhere in the language, that frame syllable must itself be placed in various other frames and tested. This does not affect the usefulness in register analysis of a toneme that is high and unchanging in a single specific situation, since such a toneme is almost as convenient to use as one which is high and unchanging throughout the entire language. The number of significant contrasts within the substitution list may be found in that one context and then equated to other contexts.

2. Illustration of Procedure for Finding a High Level Unchanging Toneme

The procedure for locating a high toneme that is unchanging in a specific context may be illustrated, with letters as symbols for the different elements, as follows:

list to low (so that no basic highs would be heard), would be taken care of when the investigator used the same list in other frames (different contexts), at which time real highs would occur; in equating the frames, too, the extra height would be present. There is also the theoretical possibility that a frame pitch would be high before high substitution items, but mid before mid substitution items, so that the change to mid might pass unnoticed because the mid-toned substitution item did not go higher than the frame. This change would be discovered in long frames because other high-toned syllables in the frame would then be higher than the test tone, whereas they had previously been level with it. In a single-syllable frame this error would be discovered when the results of different frames were being equated, when it was noticed that the grouping of the substitution items in this frame was unaccountably different from that of other frames, or when the test tone itself became a substitution item and was placed as part of a list in a testing frame. These possible sources of error emphasize the necessity of using numerous frames rather than relying upon one or two.

⁷I. C. Ward (An Introduction to the Ibo Language [Cambridge, 1936], xii) states that in Ibo na 'and' always has a low toneme. Perhaps it could be used as an unchanging low frame toneme for that language.

List of Frames	Substitution List
"A ..."	K
"XY ..."	T
"XZ ... X"	D
"XZZ ... YXZZXYZ"	S
	F
	G

The investigator places the items K, T, D, S, F, and G, each in its turn, in frame "A ..." He finds that the pitch of S and F is higher than the pitch of A; this causes the rejection of the frame, since A is, therefore, not a high unchanging toneme. He repeats with frame "XY ..." and rejects it because S and F are both higher than X and Y. He repeats with frame "XZ ... X," but rejects the frame because S is higher than X and Z. He repeats with frame "XZZ ... YXZZXYZ" and discovers that frame-toneme Y is high and unchanging in this context because no pitch of K, T, D, S, F, or G is higher; further, the tonemes of S and F are also high because they are the same pitch as Y; the pitches of K, T, D, G are lower than Y, so there is at least a second pitch level significant to the language. By contrasting these remaining four items with each other, the investigator sees that K is lower than T, whereas D has the same pitch as G and both are lower than K. This would lead him to set up a total of four significant pitch levels except that he notices that D and G end in voiced stops, whereas all the other words end in voiceless consonants; so he advances the hypothesis, for checking in other frames, that words D and G have the same toneme as K, but that it is lowered nonphonemically in pitch by their phonetic form. He concludes, then, that he has found a system of three phonemic levels: high, represented by Y, S, F; mid, by T; low, by K, D, G; and proceeds to other frames.

If one were trying to find whether a Mixteco first-person enclitic might serve as a high frame toneme he would deal with the following data:

First-Person Pronominal Enclitics

- ri 'I,' 'my,' 'me'; 'we,' 'ours,' 'us'; exclusive, familiar
- žo 'we,' 'ours,' 'us'; inclusive
- na 'I,' 'my,' 'me'; 'we,' 'ours,' 'us'; exclusive, polite

Abbreviated Substitution List⁸

<u>kutu</u> 'nose(s)'	<u>ba?u</u> 'coyote(s)'
<u>hito</u> 'bed(s)'	<u>lusu</u> 'pup(s)'
<u>fiunu</u> 'net(s)'	<u>ñite</u> 'sand(s)'
<u>sana</u> 'turkey(s)'	<u>kuči</u> 'pig(s)'

⁸This list could, of course, be expanded to a couple of hundred items. The longer the list, in actual practice, the better. Such lists can be run through a frame quite rapidly once the process is under way and the informant understands what the investigator wants.

One has to check to be sure that the informant is not making errors because of the continued repetition within the frame. The investigator does this by using a few key words that he knows; or the investigator himself may occasionally make a deliberate mispronunciation to see if the informant corrects him. If the informant corrects every error known to the investigator, he is probably quite accurate or consistent. If the informant does not comment on obvious mistakes, many errors are probably being entered on the record. For a time I had an informant who would almost go to sleep while pronouncing words in frames, but he instantly snapped wide awake if any error were deliberately introduced by the investigator. One should insist, however, that all information gathered in lists of any type, rather than from normal speech context, be checked carefully and in detail against considerable bodies of text. If rules postulated on the basis of data gathered in lists can be applied consistently and without distortion of the facts to recorded stories or conversation, they are presumably sound. When the connected text departs in any way from the tentative rules, the facts must be rigorously investigated in further appropriate frames

Let us suppose that the investigator first tried to use -ri as a one-syllable frame: he would notice that the first syllables of the words for 'coyote,' 'pup,' and 'pig' were higher in pitch than -ri and that the second syllables of the words for 'bed,' 'pup,' and 'pig' were also higher, and discard this pronominal enclitic immediately, even though it sounded high after 'net' and 'nose.' Next the pronominal enclitic -žo would be discarded because higher syllables would be found in the words for 'coyote' and 'pig,' although -žo would sound high with some of the other words.

With -na as the frame, however, the investigator would find that none of the syllables of the words in the list are higher in pitch, although both syllables of the word for 'turkey,' the first syllables of 'pup' and 'coyote,' and the second syllables of 'pig' and 'sand' are just as high. He would conclude, then, that the -na might serve as an excellent frame syllable with a known high unchanging toneme; those syllables in the substitution list which proved to be of the same height would also be high. The investigator would next recognize that the second syllables of the words for 'pup' and 'coyote' are both lower than the second syllable of 'turkey,' and that their heights are unconditioned; from this he would conclude that there are at least two phonemic pitch levels. In addition, the fact that the second syllable of 'coyote' has a lower, unconditioned, pitch than does the second syllable of lúsú 'pup,' would lead him to believe that there are at least three phonemic pitch levels (compare the contrasting second syllables of sáná 'turkey,' lúsú 'pup,' bá?ù 'coyote'). He would then find both syllables of 'net,' the first syllables of 'pig' and 'nose,' and the last syllable of 'bed' to have the same pitch as the second syllable of 'pup,' and the first syllables of 'bed' and 'sand' and the second of 'nose' to be the same as the second of 'coyote.' Thus all pitches would be accounted for and the investigator would need to set up no more than three significant levels to write núnú 'net,' kúčí 'pig,' kútù 'nose,' níté 'sand,' hitō 'bed.'

If he then compared -ri and -žo with these words (i.e. using the nouns, in effect, as frames) the investigator would find that -ri is sometimes low and sometimes high, whereas -žo may be low, high, or mid depending upon the tonemic class of the preceding noun: sáná-ri, lúsú-ri, bá?ù-ri, kúčí-ri, núnú-ri, kútù-ri, níté-ri, hitō-ri; sáná-žo, lúsú-žo, bá?ù-žo, kúčí-žo, núnú-žo, kútù-žo, níté-žo, hitō-žo. It was precisely this series of substitutions of tonemes that made -ri and -žo unsatisfactory as frame syllables.

3. Discovering an Unchanging Toneme in a Contour System

Since a contour system does not have a series of basic contrasting level pitches, the procedure outlined above is not directly applicable to a contour situation, inasmuch as the underlying assumptions postulate the certain presence of high and low level tonemes in the register system. It is possible, nevertheless, to retain some of the values of the procedure in seeking for an unchanging contour toneme, even if it must be gliding rather than level. There is considerable value in locating a toneme which does not change within a specific known context. If the toneme cannot be used for direct equating with levels, it may be equated to similar glides; and if it cannot be used to study contrasting numbers of levels, it may be used as a semistable point of reference from which to begin the serious study of contrasting types of glides. Though in a language in which every toneme changes in certain syntactic positions it would be manifestly paralleling that context, and in further connected contexts also. Then the rules--not the facts--should be modified to accommodate the newly made observations.

Beginners are likely to be tempted to "forget" a small fact, or to twist it slightly, if it seems to them "improbable" in that it does not fit the rules they have set up. The suppression of data may at first appear to save the discarding of a hard-won rule or to gain time, but in the end it is certain to cause difficulties elsewhere. Nothing short of the strictest regard for the data as they actually exist really advances the scientist who wishes to describe the structure of the language or the "practical" person who wishes to form an orthography; it is frequently the "exception" that gives the clue to the analysis of some of the most important phenomena of the language.

impossible to find a toneme that never changes, yet it would seem that in many contour languages tonemes might be located which remain stable in certain definite syntactic positions, regardless of the surrounding tonemes and regardless of whether the particular tonemes themselves change in a different syntactic position.

In order to locate a glide unchanging in the entire system or in one frame, the investigator first, by using frames, classifies the words into groups phonetically and tonetically similar. (Up to this point the procedure is the same whether the language is of a register or contour type.) He then works with words representative of the groups and seeks a frame one syllable of which has a pitch that begins as high as--or higher than--any pitches in any of the words of the substitution list, and that appears to preserve its contour unmodified. He may assume that this falling glide has an unchanging beginning pitch, in that context, since, if it changed, the starting point would probably have received a lower pitch than some of the other tones. If no pitch can be found which has the starting point of its glide consistently higher than or equal in height to the other tones, the investigator may work with the ending points of rising glides in order to find in a certain rising pitch the highest tone point in the language.

With the high unchanging starting point of a falling glide as a point of reference for the other tonemes, the investigator may then study the number and type of contrasts afforded by the representative words in that frame. Specifically, he may look for the glides which have the same general type of falling contour as the unchanging one, but different starting heights (or ending heights); he will likewise study the pitches which begin at the same height as the reference glide, and have the same general contour, but differ in detail (for example, in the amount of drop in pitch or in the speed of the glide).

Next, the investigator may study a different group of glides, of a different general contour (for example, the rising ones). Here, also, he should try to find a fixed point to serve as a reference in classifying the types of contrast. When the various general types of glides have been studied, the investigator is ready to determine the general tone-language type and the number and kind of tonemes. Before he reaches a final conclusion, however, he should have used numerous frames, in order to insure the discovery of all possible tonemes on the substitution words (assuming that differences of position in the phrase may cause some changes of toneme). If the investigator does not use a sufficient variety of frames, he may fail, for example, to find specialized enclitic-toneme types or to discover the rules for syntactic tonemic substitution.

P A R T I I I

THE ANALYSIS OF TONEMIC SUBSTITUTION IN PHRASES

C H A P T E R V I

PROCEDURE FOR THE ANALYSIS OF TONEMIC SUBSTITUTION IN PHRASES

Part I described the nature of tonemic systems. Part II outlined a methodology designed to aid the student in finding the number and kinds of tonemes in a language. The analysis of a tone language does not stop there. One must discover how the tonemes are used in the grammar of the language to show tense, parts of speech, pluralization, attribution, and so on. In addition, there may be some shifts from one toneme to another which are caused by a purely mechanical interaction of the tonemes in a specific context. Part III gives a procedure whereby these tonemic changes may be discovered and illustrates in some detail the complexities of tonemic substitution in two languages which differ considerably in the way this tonemic replacement occurs. The method for discovering the rules for substitution of tonemes is an extension of the use of controlled contexts explained in Chapter V. Instead of being handled in a way calculated to prevent or display conditioned subtonemic changes, and the like, the material is here realigned so as to bring any tonemic substitution into view.

A. First Set of Tonally Uniform Groups of Words Analyzed

The investigator must decide what general type of word he wishes to study first. He might, for example, choose to study tonemic substitution on nouns (or verbs or adjectives, if the language has these particular basic form classes), after subdividing them according to their phonetic shape and their pitch, and after analyzing and marking their tonemes. The various tonemically uniform subgroups of a basic grammatical form class constitute a single SET of small groups because of the fact that they can be inserted into some one frame. Most groups of nouns, for example, could be placed in a frame such as "this is a ...," or possibly "two ...," or "a big"

1. The Use of Frames in Studying Tonemic Substitution

In studying tonemic substitution a frame is chosen which will allow the insertion of the majority of the words of the basic set of groups previously decided upon. One must not be concerned if a few sporadic items of the list cannot be used simply because in that particular context they do not "make sense." They can be classified later. The tonemic pattern of each group of the set is recorded as it occurs in the first frame. A representative word of one of the groups is then inserted into a second frame and spoken by the informant. If the toneme of the word in the second frame differs from its toneme in the first frame, the changed tonemic pattern is written down. The other words of the group are then pronounced by the informant in the second frame. If all the words of the group act alike, no further changes will be noted. Frequently, however, one may find subgroupings which are either completely arbitrary or else caused by the particular consonant and vowel arrangement of the subgroups, or by morphological differences between them; half of the group, for example, may not change at all, or two subgroups may be different from each other and from the tonemes of the entire group in the first frame, and so on.

Inasmuch as the informant may be unable to read his own language (or the investigator unable to write the language satisfactorily because he has not finished its analysis), some finesse is needed to get the informant to pronounce the words in the frame at all, or to do so naturally, without disturbing the normal pitch. The investigator either gives the phrase (frame plus particular item) in a second language known by the informant and asks the informant to translate the phrase, or he suggests the desired word by some synonym, or else he actually pronounces the word

itself in isolation and requests the informant to pronounce the word in the frame. Once the informant catches the idea of the frame procedure, the last method is the fastest, and is relatively free from error, but it must be checked (1) by comparing the tonemes of similar words and phrases as they appear in stories and conversation, and (2) by seeing if the informant rigorously corrects every error known to or deliberately introduced by the investigator.¹ Some informants never do develop the ability to help with frames, but insist on volunteering long digressions. Other informants pick up the procedure easily, so that the merest hint will elicit the desired phrase.²

A second group of words uniform in toneme in the first frame, but different from the first group, is next chosen from the first general set of groups. Its toneme is recorded as it appears in the first frame. The informant speaks the words in the second frame phrase, and any tonemic changes, or subgroupings according to tonemic changes, are recorded by the investigator. This process is repeated for all other groups of words whose grammatical form class permits them to be inserted into that frame.

The next step is to choose a third frame into which the same groups of words may be readily inserted. Group by group, the informant pronounces the words in the new frame. The investigator listens to see (1) if any changes occur in relation to the tonemes of the words in the first frame, and (2) if the same or different changes occur as were noted in the second frame. All tonemic changes are recorded for further study. The same procedure is then repeated for a fourth frame, a fifth, and so on, until one thinks one has enough varied types of frames to show all the tonemic changes which that particular set of groups of words can undergo. If the investigator uses too few frames he will ultimately find in text or conversation some tonemic change he has not accounted for, and will have to investigate the new change.

2. Organization and Description of Data

The data of the tonemic substitution should next be tabulated in several forms in order that any correlations may appear which exist in the relationships of basic and perturbed tonemes to the phonetic and grammatical form of the frames and inserted items. If the word lists are arranged ahead of time, much of this tabulation can be done while the work in frames is proceeding.

One tabulation might list all basic toneme types and show what they become when and if they are perturbed. In a column at the left the words themselves might be listed, alphabetically arranged within the tonemically uniform groups. A second column would show the tonemes they receive when perturbed. The entire list of words might have to be repeated for each context.

In Table 1 (p. 73) formulas symbolize representative words in various frames, that is, in different contexts. Frame 0 indicates the pronunciation in isolation. In each frame the words divide into two or three tonemically different groups, but in frame 3 the first and third groups split further into tonemic subgroups.

Often, a slightly different arrangement of material or a modified symbolism helps the investigator to see a further set of tonemic relations. Table 2 (p. 73) lists the same data as Table 1, but assumes that the isolated pronunciation of the word (frame 0) represents its basic tonemic form, and that any departures from that pattern are perturbations caused by the other frames. In addition, numbers instead of accent marks are used to indicate the tonemes.

All contexts which affect the tonemes alike should be grouped together. Their common characteristics should be recognized and used to explain the unity of their effect upon tonemic patterns in terms of phonetic or grammatical reasons or as a purely arbitrary feature.

¹Cf. p. 65, note 8.

²For further discussion of the use of informants see L. Bloomfield, Outline Guide for the Practical Study of Foreign Languages (Baltimore, 1942), 2-4, 10-12; E. A. Nida, Morphology, The Descriptive Analysis of Words (Ann Arbor, 1946), 162-63.

TABLE 1

Hypothetical Patterns of Tonemic Substitution According to Context

Frame	Group 1	Group 2	Group 3
0	CáCá	CáCá	CáCá
1	CáCá	CáCá	CáCá
2	CáCá	CáCá	CáCá
3	CáCá/CáCá	CáCá	CáCá/CáCá

TABLE 2

Hypothetical Patterns of Tonemic Substitution Construed as Perturbation of the Isolated Form by the Context

Context	Group	Isolated form	Perturbed form
1	1	Ca ¹ Ca ²	Ca ¹ Ca ¹
	2	Ca ² Ca ¹	Ca ² Ca ²
	3	Ca ² Ca ²	(Not perturbed)
2	1	Ca ¹ Ca ²	Ca ¹ Ca ¹
	2	Ca ² Ca ¹	(Not perturbed)
	3	Ca ² Ca ²	Ca ² Ca ¹
3	1	Ca ¹ Ca ²	
	la	Ca ¹ Ca ²	(Not perturbed)
	lb	Ca ¹ Ca ²	Ca ¹ Ca ¹
	2	Ca ² Ca ¹	Ca ² Ca ²
	3	Ca ² Ca ²	
	3a	Ca ² Ca ²	(Not perturbed)
	3b	Ca ² Ca ²	Ca ² Ca ¹

A different type of tabulation presents the data in such a way that the investigator may readily discover whether neighboring tonemes are causing the perturbations. The tonemic patterns of the words inserted in the frame may be shown at the right, and the tonemic patterns of the preceding frame words at the left, as in Table 3.

TABLE 3

Hypothetical Patterns of Tonemic Substitution in Relation to Preceding Frame Word

Frame	Tonemic pattern of preceding frame word	Patterns of tonemic substitution		
		Group 1	Group 2	Group 3
0	zero	Ca ¹ Ca ¹	Ca ¹ Ca ²	Ca ² Ca ¹
1	Ca ¹ Ca ¹ -	-Ca ¹ Ca ²	-Ca ¹ Ca ¹	-Ca ² Ca ²
2	Ca ¹ Ca ² -	-Ca ¹ Ca ¹	-Ca ¹ Ca ¹	-Ca ² Ca ²
3	Ca ² Ca ¹ -	-Ca ² Ca ²	-Ca ¹ Ca ¹	-Ca ² Ca ²

Another type of tabulation lines up the patterns so that one may discover if it is the syntactic position of the words which is causing the perturbations. Instead of the contexts being classified according to the tonemes of their syllables, and then listed, the constructions are first analyzed and the substitution words are grouped according to the tonemes they have when filling different positions in them. See Table 4.

TABLE 4

Hypothetical Patterns of Tonemic Substitution According to
Position in Grammatical Constructions

Syntactic position of substitution word	Patterns of tonemic substitution		
	Group 1	Group 2	Group 3
In isolation, as a call	Ca ¹ Ca ¹	Ca ¹ Ca ²	Ca ² Ca ¹
Head of substantive phrase	Ca ¹ Ca ¹	Ca ¹ Ca ²	Ca ² Ca ¹
Modifier of substantive	Ca ² Ca ²	Ca ² Ca ²	Ca ² Ca ²
Modifier of modifier	Ca ² Ca ¹	Ca ² Ca ¹	Ca ¹ Ca ²

The particular tabulations suggested here may not be the ones required to bring out the tonemic perturbations of the specific language which the investigator is studying. He must constantly be alert to notice in phonemically written texts or in conversation any tonemic perturbations which he has not analyzed. These should serve, in turn, as clues to the types of frames needed in order to discover and tabulate remaining unanalyzed changes.

From the tabulations the investigator abstracts the tonemic rules. He states the situations under which the tonemes may change, and the tonemes with which they are replaced under these circumstances.

In Table 4, for example, he should note that the tonemes are never perturbed when the morpheme is the head of a substantive phrase; all tonemes are always perturbed to low when modifying a substantive; morphemes which are modifiers of modifiers are perturbed to low high, except that morphemes which are low high in isolation perturb to high low.

In Table 3 (p. 73) the investigator should note that in frames 1, 2, and 3 group 2 always perturbs to high high and group 3 always perturbs to low low, but that group 1 perturbs to high low in frame 1, and to low low in frame 3, and in frame 2 remains high high, as it is in frame 0.

In Table 2 (p. 73) he should notice that words of group 2 act uniformly in each context, so that all words in this group are perturbed alike in the particular context, but that groups 1 and 3 must each be subdivided in context 3 since part of the words of these groups are unperturbed and part of them are perturbed. Specifically, group 3 is never perturbed in context 1, or group 2 in context 2, or groups 1a and 3a in context 3; group 1 is perturbed in contexts 1 and 2, group 1b in context 3, group 2 in contexts 1 and 3, group 3 in context 2, group 3b in context 3. Two further observations would prove helpful in memorizing these changes: group 1, if perturbed at all (regardless of which context causes the perturbation) goes to high high; group 2, to low low; group 3, to low high. In each of the perturbations in these hypothetical data, the first toneme of the morpheme is unchanged, but the second toneme is reversed in height.

One should note, also, that it could prove very awkward to try to abstract rules of this type from a dictionary listing or from a file of morphemes. Tables and charts are much more serviceable for this purpose since a large amount of data can be seen in a small compass.

In Table 2 (p. 73) it was assumed that the isolated tonemic pattern was basic to the words symbolized, and so any differences were described as perturbations from that form. It is

not always true, however, that the isolated pattern is the most pertinent for descriptive purposes. Frequently, the forms that appear in phrases must be considered more basic than those occurring in isolation.

The criterion for deciding which should be taken as the "basic" or "inherent" toneme or tonemic pattern is PREDICTABILITY IN DESCRIPTION. Convenience of description usually dictates the choice of that tonemic pattern as basic which will most easily allow for the statement of rules predicting how the tonemes will be perturbed elsewhere. The investigator may first work on the hypothesis that the isolated tonemic pattern of a word is the basic one, and describe perturbations as deviations from it, but he should not be content with this description until he has tried to rephrase the rules, starting with one of the other tonemic forms as basic, to see which gives the best result.

If, for example, one had four representative words which had tonemes (1) CáCá, (2) CàCá, (3) CáCá, and (4) CáCá when they were spoken in isolation, but which in phrases always became (1) CáCà, (2) CàCá, (3) CàCà, and (4) CáCá, it would be preferable to regard as basic that tonemic pattern that appears in phrases. A simple descriptive statement of these data would be: There are two registers. All words are dissyllabic. All of the four theoretically possible tonemic combinations occur ('', ' ', ''', ''). In isolation, word types (1) and (3) change tonemically to high high, but (2) and (4) remain unchanged.

The alternate statement, in which the tonemic form in isolation is considered to be basic, is much more complicated, as may be seen from the following description of the same data: There are two registers. All words are dissyllabic. The system is very defective because only two ('' and '') of the four theoretically possible toneme combinations appear in isolation, though the other two appear in consequence of the perturbations of certain words. Words with low high tonemes remain the same in phrases. The form high high, on the contrary, is nonpredictable in perturbation, being extremely arbitrary in that the list of words represented in group (1) becomes high low, and the list represented by group (3) becomes low low, whereas the list represented by group (4) remains unchanged, with nothing in the context to give a clue as to which form will appear; full lists of words that are classified in each group must be appended to the rule and separately memorized.

In memorizing the vocabulary of a language presenting this particular type of situation, utilization of the form in phrases as basic would save an enormous amount of labor, since, once it was learned, the other tonemic forms of any word could be determined mechanically from the rule. From this point of view, the "basic" forms are a kind of "principle parts," chosen to limit memorization of data to what will serve as a basis for the prediction of the remaining forms.

A corollary to the choice of basic forms affording the maximum PREDICTABILITY, when a number of groups of words and their changes are being considered, is the choice of the series of forms that exhibit the greatest DIFFERENTIATION in the tonemic combinations. Further examination of the data just discussed shows that the phrase forms contain four groups of words all tonemically different, whereas the isolated forms have only two different tonemic combinations: the more diverse forms were proved above to be the more convenient as basic types. The reason why the more diverse forms proved easier to use as a basis of prediction is that it is simple to state that two different forms become the same in certain contexts, but to describe the separation of one combination into two distinct combinations is much more difficult and demands a full list. In the alternate description, starting with isolation forms as basic, note that reference had to be made to specific lists of words. Sometimes lists must be used, if no basis of prediction can be found, but they should be avoided if possible.

As a further corollary, notice that the language as a whole must be utilized to arrive at basic forms, since one cannot be sure which will be the most convenient basis of prediction of the other forms until the other forms are known. Nor can one know in which context or with what usage forms are most highly differentiated until all the forms are listed for comparison.

B. Further Sets of Tonally Uniform Groups of Words Analyzed

The analysis in the previous sections of this chapter has been concerned with several groups of words which formed one set because of their general syntactic type (i.e. they belonged to the same basic form class or "part of speech") and which therefore could all be placed into a single frame. Tonemic perturbations were studied especially as they affected specific tonemic subgroups within the one basic form class.

The investigator should next choose a different list of words, ones comprising a set of groups which could not be fitted into the frames previously utilized. If, for example, verbs and nouns occur in the language and nouns form the first set, verbs may well form the second. If no basic classes of nouns and verbs are present, full words and particles may constitute the first and second sets. The analysis of the second set is then made by the same general procedure as was used for the first set.

If there is some overlapping of the second set on the first, the first data obtained may be used a second time, but to gather the information a second time from a different point of view is frequently very desirable, for it may then serve as a check on the initial accuracy both of the informant and of the investigator. An investigator cannot expect to be perfectly consistent in his hearing, and some type of check is necessary.

Further sets of groups are analyzed in a similar way, until all the words of the language have been classified for basic tonemic type and tonemic perturbations.

The data and the descriptive statements proceeding from the separate sets of groups are compared. The investigator then tries to produce succinct and accurate statements that describe the tonemic perturbations of the language as a whole, after which he provides descriptions of perturbations that are restricted in type and apply to a smaller section of the language. The simpler the statements the better, provided they are both complete and accurate.

The next two chapters will describe certain tonemic perturbations actually occurring in living languages, so that the nature of their systems may be presented concretely.

C H A P T E R V I I

TONEMIC PERTURBATIONS IN MIXTECO, WITH SPECIAL EMPHASIS ON TONOMECHANICAL SUBCLASSES

A. The Nature of Tonomechanical Subclasses

1. Mechanical Tonemic Substitution

Tonemes which come together in adjacent morphemes are likely to interact. In this way one of the tonemes may cause a mechanical perturbation of the other. Thus, in Mixteco, the word for 'mountain' is žukū; 'today' is bínā; both words have mid level tonemes on each syllable. If, however, the words are placed one after the other, the toneme of the first syllable of the second word is perturbed (changed) from mid to high:

kí?in-ná žukú 'I'm going to the mountain'
kí?in-ná bínā 'I'm going today'
but kí?in-ná žukú bínā 'I'm going to the mountain today'

These changes are mechanical, and therefore do not directly affect the meaning of words, even though the indirect result of tonomechanical differences in words is sometimes differences in meaning.

The sequences of tonemes that are permitted to occur together may be limited. Various restrictions on permitted sequences might require some tonemes of a sentence to change. For example, if four low tonemes are not allowed to occur together, yet in a certain phrase the basic tonemes of four adjacent syllables are all low, one or more of them might be forced to change to high. This particular type of restriction does not occur in Mixteco. One can say, for example, ná-nání-ná nání-ní 'what-name-I name-you,' i.e. 'I have the same name as you,' in which seven high syllables occur together; or bitán "jáa tē-káhi-žó 'now immediately and-(potential)-eat-we-(inclusive, "editorial")' i.e. 'I'm surely going to eat him up now,' in which eight mid level tonemes happen to occur together in a phrase in the story "The Talking Cave."¹ One can get a very inadequate idea of how the phenomenon works by comparing the behavior of the English indefinite article [ə] a and [ən] an before words beginning with consonants or vowels, [ə tri, ən ai] a tree, an eye; the form a tends to be limited in its distribution so that it may occur only before words beginning with a consonant.

2. Surface Identity versus Different Tonemic Functions

The perturbation of one toneme by another is complicated by an additional factor: Words that on the surface appear to be alike, and that have the same or similar sounds, nevertheless act differently in toneme perturbations.

In Mixteco, words must be classified into two groups, here labeled type (^a) and type (^b), according to whether or not they cause certain words that follow them to change their-tonemes. Note, for example, that the noun ?isò 'rabbit' is changed after only one of the two following verbs:

¹For an exposition of the grammatical details of this legend, and for the larger context from which this phrase and some of the others in the chapter have been drawn, see K. L. Pike, "Analysis of a Mixteco Text," IJAL, X (1944), 113-38.

kēē ?Isò 'the rabbit will go away' (class [a] verb)
kēē ?Isó 'the rabbit will eat' (class [b] verb)

The tonomechanical difference here is not basically in the noun, in spite of the fact that the toneme of the noun is the only phonetic difference between the utterances. The tonomechanical difference lies in the verbs, the first of which (subclass [a]) has no perturbing power, but the second of which (homophonous with the first) is tonomechanically of subclass (b), having power to perturb the low-toned second syllable of ?Isò to high. This is a mechanical phenomenon, even though in rare cases like this it results indirectly in semantic differences.

3. Segmental Parallels

Analogous differences in the perturbation of segmental phonemes (sounds) may be seen in the following Mixteco illustration:

Words with No Segmental Change	Words with Segmental Change
<u>kūnū-ná</u> 'I am going to weave'	<u>kūnū-ná</u> 'I am going to run'
<u>kūnū-ná</u> 'I am weaving'	<u>hínū-ná</u> 'I am running'

Words that have the same sounds basically, but that act differently in the grammar (like kūnū 'weave' vs. kūnū 'run') may be said to be PHONOMECHANICALLY² different. For an English analogy of segmental phonomechanical changes, compare the different action of [f] in English. [klɪf] cliff and [klɪfs] cliffs with [lɪf] leaf and [lɪvz] leaves; the [f] of leaf changes to [v] in the plural, whereas the [f] of cliff does not change. Similarly, kēē 'go away' and kēē 'eat' are TONOMECHANICALLY different, because the second changes the tones of many words that follow it, but the first never affects them.

4. Combined Segmental and Tonemic Differences

As a matter of fact, this word pair is simultaneously both tonomechanically and--segmentally--phonomechanically different. Compare:

kēē ?Isò 'the rabbit will go away'
kēē ?Isó 'the rabbit will eat'
kéē ?Isò 'the rabbit is in the process of going away'
zéē ?Isó 'the rabbit is in the process of eating'

The word kēē 'go away' and the word kēē 'eat' are homophonous (having identical phonemes and tonemes) in the potential aspect, but not in the continuative aspect since kēē 'eat' there becomes

²So far as I know, the first person to use the term "phonomechanics" was M. R. Haas, in a grammar, Tunica (extract from Handbook of American Indian Languages, IV [New York, 1940]); this grammar forms an excellent model for the beginner who wishes a descriptive pattern. Haas uses the term for various types of internal (morphological) and external (syntactic) sandhi changes. It seems preferable to "morphophonemics" since it is more descriptive; I have extended the term, also, to include tonomechanics, i.e. phonomechanics of tone.

"Tonomechanics," in a broad sense, may be defined as the study of all mechanical tonemic substitution or perturbation on the phonemic level--i.e. substitution of one phonemic pitch for another, whether or not it affects the meaning of isolated words or of the grammar. In a narrower sense "tonomechanics" is limited to the study of those tonemic perturbations that are purely mechanical, not due to morphological processes or syntactic constructions, and that do not directly change meanings of words or constructions; they are, rather, the result of one toneme mechanically affecting another in much the same way that one domino tipped over may upset an entire row of dominoes. In this narrower interpretation two major subdivisions are encountered: (1) an OBLIGATORY (or REGULAR, or UNIVERSAL) tonomechanical set of changes comprising those tonemic perturbations for which a rule may be stated that applies to all the words of a language, without the need of listing exceptions; (2) an ARBITRARY (or IRREGULAR, or SPECIAL) tonomechanical set of changes, differing from the obligatory one in that lists of words must be given to show which of them will allow (or cause) the changes in question.

žéé and kéé 'go away' becomes kéé. The tonomechanical difference is in the perturbation of ?isò caused by 'eat' but not by 'go away.'

B. Mixteco Dissyllabic Toneme Forms: Tonemic Couplets

With the possible exception of a few particles that have not been found in isolation, all Mixteco morphemes are basically dissyllabic. Every Mixteco morpheme found in isolation is without exception dissyllabic, though when included in phrases morphemes frequently become monosyllabic. Long vowels function as two syllables.³

1. Perturbations by Tonomechanical Subclasses

There are eight basic toneme patterns for the dissyllabic morphemes:

- | | |
|-----------------------------|--|
| 1. <u>sána</u> 'turkey' | 5. <u>bé?é</u> 'house' |
| 2. <u>ñí?í</u> 'steam bath' | 6. <u>kóó</u> 'snake' or
<u>kútú</u> 'nose' |
| 3. <u>bá?ù</u> 'coyote' | 7. <u>súčí</u> 'child' |
| 4. <u>kúčí</u> 'pig' | 8. <u>míní</u> 'puddle' |

Of the eight basic groups, only the second four may be tonemically perturbed in sandhi:

- 5. bé?é may become bé?é
- 6. kóó may become kóó, but
kútú becomes kútú
- 7. súčí may become súčí
- 8. míní may become míní

Notice that all these perturbations involve a change from a lower pitch to high pitch. The perturbing factor is a RAISING INFLUENCE, which causes a mid or a low toneme to have a high toneme substituted for it. High tonemes are more STABLE than low tonemes; basic high tonemes are seldom changed; basic low tonemes are very frequently changed, eliminated in favor of high tonemes. Specifically, a morpheme with a basic tonemic sequence of high high tonemes is the most stable. In addition, a morpheme with a basic high toneme and a basic mid toneme is tonemically stable. A high low morpheme is stable, whereas a low high is unstable since the first toneme is much more likely to be affected than the second. Mid mid morphemes, or ones with tonemic sequences mid low or low mid, are also unstable. The series of tonemic changes listed in the preceding paragraph is the most important to the language and the most frequent; it is caused by a

³Mixteco long vowels must be regarded as constituting two basic units of length since (1) every long vowel carries two tonemes; (2) no short vowel carries two tonemes; (3) the long vowels are paralleled by clusters of diverse vowels, each vowel having its own toneme; (4) in rules for perturbation of tonemes--as may be seen in the following sections--long vowels or clusters of two short vowels act like those morphemes that have a structural pattern CVCV; (5) with the exception of morphemes containing long vowels, every word pronounced in isolation must have (a) two tonemes, (b) two vowels, and (c) two syllables, so that the long vowel furnishes the two units of length requisite to such an isolated morpheme; and (6) no morpheme has more than two units of length (i.e. no pattern of *CVCVCV or *CVVVCV or *CVCVV occurs for any morpheme), so that the long vowel fills the requirement for a minimum of two units for the isolated utterance of morphemes and for a maximum of two units of tonemic or vocalic or syllabic length in morpheme structure. It is certain, then, that a long vowel is structurally parallel to a sequence VCV in the morpheme. Inasmuch as it is convenient to use the term "syllable" (although the term "mora" might have been used instead), it proves convenient to define "syllable" for Mixteco as the equivalent of a phonetically short syllable or of one half of a long vowel.

A rare type of exception to the requirement that there be two moras in isolated utterances should also be mentioned. In a few extremely frequent formula-like expressions, a glottal stop may be substituted for the final mora of a CVV-pattern word. Thus note bé-tá? beside the regularly constructed bé-táà 'yes sir' and có?ò-tá? beside the regularly constructed có?ò táá 'let's go sir.' Compare té-nú-tú? 'and if not,' a fast form, beside the slow té-nú-túú.

perturbing influence in a preceding morpheme that induces the raising of the pitch of a mid or low toneme in a following unstable morpheme.

The syllable affected is always the first one of the perturbed morpheme, except for the morphemes of type CāCà, a subdivision of group 6. Occasionally, also, type CāCā, group 5, may optionally have both vowels affected rather than the first only.

The rules for mechanical perturbation of or by dissyllabic morphemes are unchanged regardless of the basic form class ("part of speech") of the morpheme. Thus nouns were given in the list immediately above, but the same phenomena occur with the verbs kózó 'to scratch,' síá 'to loosen,' kákā 'to walk,' túhí 'to scrape,' súčá 'to swim,' kíkú 'to sew,' and so on.

Groups 5-8 are perturbed when following a class (^b) morpheme, including one of basic high high pattern⁴--not a high high resulting from a previous mechanical perturbation--in the same breath group. Note súčí 'child,' but máá súčí 'that child.' Compare táká súčí 'all the children,' in which the táká is not of a perturbing type, with híín táká súčí 'with all the children,' in which táká is perturbed to táká by híín but in its perturbed state still acts as a low high non-perturbing form rather than a high high perturbing one.⁵

These perturbations do not occur if a pause or light rhythm break comes between the morphemes concerned. Note the difference in bíná 'today' before and after a pause, following the perturbing morpheme súčí 'child': ní-hínl-ná één súčí bíná 'I saw a child today'; ní-hínl-ná één súčí, bíná tē-čáa-í 'I saw a child, today it will return.'

Patterns 3, 4, and 8 ('', '--, '') never cause any perturbations. Morphemes with tonemic patterns 1, 2, 5, 6, and 7 ('', '--, --, ''), however, must be subdivided into tonomechanical subclasses according to whether or not they (^a) leave the unstable groups 5, 6, 7, and 8 unchanged or whether (^b) they perturb them by causing one of their tonemes to be replaced by a high pitch.

In the following illustrations the letters in parentheses indicate these subdivisions:

kéé(^a) súčí 'the child will go away'
kéé(^b) súčí 'the child will eat'

In the dissyllabic list given above (p. 79) we observe, then, that there are eight word classes that are tonemically different (having different tonemes): high high, high mid, high low, and so on. But there are several other cross divisions of classes that are tonomechanically different: groups 1-4 versus 5-8, because the latter are unstable and may be perturbed; groups 3, 4, 8 versus 1, 2, 5, 6, 7, because the latter may be subdivided into nonperturbing type (^a) and perturbing type (^b), tonomechanically different.

Group 5 (mid mid) may be subdivided, since type Cāā₁ (the subscript numeral 1 indicates identical vowels or a phonetically long vowel interpreted as two phonemic short vowels; subscript

⁴Morphemes of basic high high (^b) pattern are at first likely to appear to be type (^a), since they do not perturb -dē, -í, and -ná; for several years I classified them as (^a). Further data, and a suggestion from my colleague Donald Stark, have led to the present classification. The problem is heightened by the fact that the pronouns náá, níí, róó, and zóó tend to be the only high high morphemes of type (^a) and these pronominal morphemes rarely occur in contexts that make their nonperturbing nature apparent; note, however, the phrases ní-hínl-dē róó bíná 'saw-he you today,' náá kúú-ná 'I will-sleep-I,' i.e. 'as for me, I shall sleep,' instead of *ní-hínl-dē róó bíná and *náá kúú-ná. The final evidence that these items are type (^a) rather than type (^b) is the parallel with those few low high morphemes which occur, and which are found in both types (see Table 5, p. 91); contrast the change of bíná in "dè?é bíná 'look now' with unchanged -dē in "dèvé-dē 'he will look.' In one instance I have found the morpheme síí(^b) 'or' acting as type (^a), and failing to perturb má- 'not' to the expected má-, which is found elsewhere.

⁵When changes are not mechanical in the present sandhi system, but represent derived tonemic forms in the grammar, the tonemic action may, however, be different. Thus žúú 'rock' is a perturbing type, as seen in žúú-dé 'his rock,' but in the derived item ndí-žúú-dé 'his gizzard' the morpheme has become nonperturbing and no longer raises -dē to -dé.

2 would indicate that the second vowel is different from the first) may optionally perturb to high high instead of high mid: kēē 'go away' may become kēē or kéé. The type CāCā of group 6 may be perturbed only to mid high.

Further, group 6 with mid low tonemes must be subdivided by segmental form (arrangement of sounds) and tonomechanical action, since in this group morphemes with the segments Cāā₁, Cāā_{1n}, Cā?ā, Cā?ān, Cā?Cā are perturbed to high low by a preceding (^b) morpheme, but morphemes of type CāCā, Cāā₂, Cāā_{2n} are perturbed to mid high by such a morpheme. Illustrations of ?Isò 'rabbit,' hāā 'arrive,' and žāū 'cave, hole' may be seen in the following excerpts from the story "The Talking Cave":

tē-nì^(a)-hāā-tè 'and the animal arrived'
nè-?orá kú-à^(b) hāā^(a) ?Isò 'what time the rabbit would arrive'
...kōò k'w'ā?ān-tè ?Iní^(a) žāū^(a) ?Isò 'the snake went into the rabbit's cave'
tē-nì^(a)-ndèbē-tè^(b) žāū kābā 'and he (animal) entered the rock cave'
tē-híkā kuu^(a) ?Isò 'and the rabbit was walking about'
hā-ndátū kōò^(b) ?Isò 'that the snake might await the rabbit'

The difference in perturbation is seen more clearly after the words kēē (group [a]) 'go away' and kēē (group [b]) 'eat,' below.

With CāCā:

kēē^(a) ?Isò 'the rabbit will go away'
kēē^(b) ?Isò 'the rabbit will eat'

With Cāā₁:

kēē^(a) kōò 'the snake will go away'
kēē^(b) kōò 'the snake will eat'

Notice that in some of the illustrations the toneme that is perturbed is noncontiguous to the (preceding) morpheme that causes the perturbation. This should be observed in conjunction with the fact that it cannot be predicted that a certain syllable (just because it is high, mid, or low) will cause or receive perturbations; one has to know the toneme of both syllables of a morpheme, not of just one of them, before one knows whether it can possibly be of the (^b) perturbing type (limited to subclasses of groups 1, 2, 5, 6, 7); one has to know the tonemes of both syllables of a morpheme before one can know if it is in group 5, 6, 7, or 8, and hence eligible for perturbation. These two factors show that in the tonemic sandhi the morpheme as a whole, not the isolated syllable, is the basic unit. Mixteco dissyllabic morphemes might be called TONEMIC COUPLETS because of this unified action.

2. A Unique Perturbation

In addition to the rules for dissyllabic morphemes, which apply to practically the entire vocabulary, there is one change that is unique and does not follow any pattern.

The word bē?ē 'house' (having mid mid tonemes) becomes bē?ē (having low mid tonemes) in the phrase ?Iní bē?ē 'in the house.' Now ?Iní is a member of tonomechanical subclass (^a) and elsewhere never causes any perturbation at all--and there is no apparent reason for an exception with this one word. If it were type (^b), ?Iní would cause bē?ē to become bē?ē by raising the first syllable. Here, however, the toneme of the first syllable is lowered. No other word than ?Iní has been found that changes bē?ē in this way.

Several unique features are thus present in the one phrase: (1) bē?ē differs from other mid mid words and from the whole tendency of the language by being perturbed lower rather than higher. (2) ?Iní differs from other (^a) words because here--but never elsewhere--it causes a perturbation, and no other words have been found which cause this particular perturbation.

A few extracts from "The Talking Cave" illustrate the phenomenon: nì-n'dòō kōò ?Iní žāū: 'the snake stayed in the cave' (kōò [^b] 'snake' perturbs ?Iní 'in,' but ?Iní does not perturb žāū

'cave'); ní-kítí ?íní-té 'the animal got angry' (ní^[a]-, complete aspect, kítí^[a] 'be angry,' but ?íní^[a] 'inside' does not perturb -té 'animal'); té-ní-háa-té ?íní bē?é kábá-té 'and the animal (snake) arrived into the animal's (rabbit's) rock house' (from téé^[a] 'and, then,' ní^[a], complete aspect, háa^[a] 'arrive,' -té^[b] 'animal,' enclitic, ?íní^[a] 'in,' perturbing bē?é 'house' to bē?é, kábá^[b] 'rock cliff,' -té^[b] 'animal,' enclitic).

3. Perturbation by a Zero Word

Now the Mixteco perturbations so far discussed in this chapter have been entirely mechanical, having no direct relation to a meaningful grammatical function. In Mixteco, however, it appears at first that tone is used also in the grammar to form the difference between the potential and continuative aspects of the verb, so that ká?án means 'going to talk,' but ká?én means 'talking.'

Some features of this tonemic change are very peculiar. The perturbation acts like the ^(b) effect of a preceding word, except that no preceding word is present. This "zero word" meaning 'going on at the moment' can come before the main verb in a close-knit verb construction, or it can come at other places in a construction. The implication of this fact is that the zero word or "ghost word" has lost all its consonants and vowels, but retains its position in the sentence and retains its tonomechanical ability as a member of the ^(b) subclass to perturb things which follow it. The following group of phrases do not have this zero word in them:

1. kíkú-ná 'I will sew'
2. ná-kíkú-ná 'I will re-sew (mend)'
3. ná^(b)-kíkú-ná 'I insist I will sew'; note the perturbation of kíkú to kíkú by ná-, which is subclass ^(b)
4. ná^(b)-ná-kíkú-ná 'I insist I will mend'

If the zero word is written ...^(b), with ^(b) meaning perturbing influence, the phrases are modified as follows:

1. ...^(b) plus kíkú-ná becomes kíkú-ná 'I am sewing'
2. ...^(b) plus ná-kíkú-ná becomes ná-kíkú-ná 'I am mending,' but is not homonymous in tone with 'I insist I will sew' because ná- 're-' is type ^(a), not type ^(b), and does not perturb kíkú.
3. ná^(b)- plus ...^(b) plus kíkú-ná becomes ná-kíkú-ná 'I insist I am sewing,' but is homonymous with 'I insist I will sew' because kíkú would have been perturbed in any case by ná^(b)-.
4. ná^(b)- plus ...^(b) plus ná-kíkú-ná becomes ná-ná-kíkú-ná 'I insist I am mending,' but is homonymous with 'I insist I will mend' because the ná- would be perturbed in any case by ná^(b)-.

This specific tonemic change, then, is now highly important to meaning and to grammatical function, but gives the impression of a disembodied mechanical change of the same type as was described on pages 79-81.

4. Perturbations by Syntactic Relationships⁶

In addition to the mechanical changes in Mixteco, an entirely different series of tonemic changes may be used for word derivation, or to show certain subordinative relationships in close-

⁶In neither Mixteco nor Mazateco is there as much change of tonemes according to syntactic position as has been reported for the modified contour system of Hagu (Amoy) by C. Bien-Ming in "The Tone Behavior in Hagu: An Experimental Study," Arch. Néer. Phon. Exp., VI (1931), 6-45. For this reason the article is one of the most interesting in tone literature. Unfortunately, Bien-Ming fails to give even a brief description of Hagu syntax or to describe grammatically the significance of his terms "tonic," "pre-tonic," and "enclitic" or the usage of hyphen, double hyphen,

knit verb or noun constructions. Thus tá?án means 'comrade, relative,' and may be used as an ordinary noun, as object, in ní-káñi tá?án-ná 'complete-hit comrade-mine,' i.e. '(he) hit my

space, and hyphen plus space. This tends to leave his description of the tonemic changes themselves open to serious question. If, however, his instrumental data are to be trusted, some of the tonemic changes seem to be substantiated by them. In spite of the possibility of error I shall summarize some of his findings, since the language represents a type that I have not seen fully described elsewhere.

The Hagu tonemes as described by Bien-Ming are of the contour type, with possibly a register overlap. Toneme 1 is level, long (in time), high; toneme 2 falls a long distance from extra high and is long in time; toneme 3 falls a short distance from lowered mid and is long in time; toneme 4 falls a long distance in a short time, from high, but does not go quite so low as tonemes 2 and 3, and begins stressed; toneme 5 rises a long distance and is long in time, beginning from lower mid and ending extra high; toneme 6 is level, short, and mid; toneme 7 is level, long, and raised mid; toneme 8 is level (or has a slight rise), short, and extra high, with an extremely rapid start and a stressed ending; toneme zero is falling and low--lower than toneme 3. Note the following diagram of the tonemes:



Tonemes 1 to 5, 7, and 8 are basic to lexical items in isolation. Toneme 6 occurs only as the result of pretonic changes. Toneme zero occurs only as the result of changes in enclitic position.

The important syllable of a syntactic construction in Hagu is called by Bien-Ming the "tonic" (presumably this morpheme is the head of the construction). He states that the tonic syllable retains its basic lexical tone without change. The syllable immediately preceding the tonic (some kind of modifier), however, is changed sharply. If the basic lexical pitch of the pretonic syllable is 3, it becomes 2; if 2, it becomes 1; if 1, 7; if 7, 6; if 4, 8; if 8, 6; if 5, 7; if 7, 6. These statements may be shown in the form of three CHAINS of tonemic change:

- (a) 3 > 2 > 1 > 7 > 6
- (b) 4 > 8 > 6 (except that syllables of toneme 4 which end in glottal stop shift to toneme 2)
- (c) 5 > 7 > 6

Notice that 3, 4, and 5 are basic tonemes, but are never found as the result of tonemic change; toneme 6 occurs frequently as a result of tonemic change, but is never a basic lexical toneme.

Now "this tone behavior of the first syllable is carried out with precisely the same regularity, no matter what the toneme of the second syllable may be." The rule for shifts is said to apply as well to the sentence as to specialized repetitions of tonemes. A proverb may be quoted to illustrate the point. In this proverb the tonemes are indicated by numbers beneath the words; where one has changed, we have given the basic toneme first. A bar follows the tonic syllable. Hyphens and spaces seem to show closeness of syntactic relationship. In order to pronounce the tonemes, compare the numbers with the musical chart given above. By marking over each syllable of the illustration a rough drawing of the contour of the tonemes--in black, before they are changed, and red, after the changes--one may see how the sandhi operates, and may get an impression of the over-all differences between the changed and unchanged phrases by reading them aloud both ways. A word-for-word translation is not given us. The proverb follows:

Soe-han/ thau- ban pu;
3>2 3 1>7 2>1 5

Toa-han/ thau- khan gu/
7>6 3 1>7 1>7 5

'If as a child he steals a gourd
As a man he will steal a cow.'

(Footnote continued on p. 84.)

comrade'; contrast the form nì-kānì tá?án-ná 'complete-hit together-I we,' i.e. 'we traded blows.' In the last sentence notice that the noun tá?án 'comrade' has become a derived modifier tá?án

(Footnote 6 continued.)

Notice in the following illustrations that the tonemes of the tonic syllables, the heads of the constructions, are important to the interpretation of the interrelationships of words in the constructions and, therefore, to meanings:

hong/ tshe/ (both syllables tonic) 'the wind blows'
 $\begin{matrix} 1 & \\ 1 & \end{matrix}$

hong-tshe/ (first syllable pretonic; second syllable tonic) 'a kite'
 $\begin{matrix} 1 > 7 & \\ 1 & \end{matrix}$

hoe/ ang (both syllables tonic) 'the flower is red'
 $\begin{matrix} 1 & \\ 5 & \end{matrix}$

hoe-ang/ (first syllable pretonic; second syllable tonic) 'a gift in money'
 $\begin{matrix} 1 > 7 & \\ 5 & \end{matrix}$

thiⁿ/ toe/ (both syllables tonic) 'heaven and earth'
 $\begin{matrix} 1 & \\ 7 & \end{matrix}$

thiⁿ-toe/ (first syllable pretonic; second syllable tonic) 'the universe'
 $\begin{matrix} 1 > 7 & \\ 7 & \end{matrix}$

Bien-Ming calls a construction a "triplet" when an identical syllable occurs three times consecutively, and describes its tonemes as follows: the last of the three syllables is the tonic, which remains unchanged; the next to the last, the pretonic, changes according to the rules already given for a modifier; the one before the pretonic changes according to special rules, which may be summarized thus (compare Bien-Ming, Table IV):

- (a') 3 > 2 > 1 > 5 > 5
- (b') 4 > 8
- (c') 7 > 5
- (d') 8 > 5

These triplets are for emphasis. Thus phang (toneme 1) means 'fragrant,' but phang phang phang (tonemes 1 > 4, 1 > 7, 1) means 'very, very fragrant.'

Post-tonic syllables within a syntactic construction are called "enclitics" by Bien-Ming. The tonic toneme remains stationary as before, and is somewhat stressed. The enclitic syllable is unstressed, and receives a toneme different from any of the other eight--a "low, falling, dying-away tone" that sounds "like tone 3, but is in fact even lower." This enclisis of syllables introduces "different shades of expression, and very often radical changes of meaning," because of the changed syntactic arrangement. Thus kian-si (with first syllable pretonic, basic toneme 1 shifted to 7; second syllable with tonic toneme 2, and head of the construction) means 'to be afraid of death'; but kianⁿ-si (with first syllable the tonic, toneme 1, head of the construction; second syllable enclitic, basic toneme 2 shifted to enclitic toneme) means 'frightened to death.'

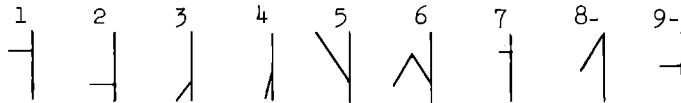
In general, the material presented in this note indicates that the more central or basic constituents of a Hagu construction tend to be unchanged in toneme, whereas modifiers may occur in various types of syntactic position with several corresponding types of tonemic change.

Occasionally in other parts of China, also, one finds tonemes influenced by their syntactic position. Thus Y. R. Chao states that "In Peiping, when words are reduplicated to form adjectives or adverbs of manner, the second syllable always takes a high level tone" ("Tone and Intonation in Chinese," Bulletin of the National Research Institute of History and Philology of the Academia Sinica, IV, Pt. 2 [1933], 129).

In the same article Chao summarizes and revises somewhat the data on Foochow presented by Yu Min Tao in "Phonetics of the Foochow Dialect," Bulletin of the National Research Institute of History and Philology of the Academia Sinica, I, Pt. 4 (1930), 445-70 (in Chinese). There one finds a complex series of tonemic substitutions, but conditioned largely by succeeding tonemes rather than by place in the grammatical structure. Only the two-syllable combinations are discussed; three-syllable groupings might show even more complicated patterns of tonemic replacement. In the material below, there is first given a numbered list of the tonemes, symbolized by Chao's tone letters (in which the vertical lines provide a point of reference for relative height of

'togetherness,' with the modification by the essential character of the noun from which it is derived, rather than by the object itself; the verb phrase, composed of main verb and its modifier, acts as a close-knit unit which can be preceded by a completive and followed by a normal subject.

pitch, and the horizontal or sloping lines to the left of the vertical ones show the direction and speed of the pitch contour). Then the tonemes are listed by number as they occur in isolation and as they are replaced when they precede other tonemes; tonemes 8- and 9- do not occur in isolation, only in phrases:



1	remains	1	before	1, 5, or 7
1	is replaced by	5	before	2, 3, 4, or 6
2	remains	2	before	1, 5, or 7
2	is replaced by	8-	before	2, 3, 4, or 6
3	is replaced by	1	before	1, 5, or 7
3	is replaced by	5	before	2, 3, 4, or 6
4	is replaced by	1	before	1, 5, or 7
or 4	is replaced by	2	before	1, 5, or 7
4	is replaced by	5	before	2, 3, 4, or 6
or 4	is replaced by	7	before	3, 4, or 6
or 4	is replaced by	8-	before	2
5	is replaced by	2	before	2, 3, 4, 5, or 6
5	is replaced by	9-	before	1 or 7
6	is replaced by	1	before	1, 5, or 7
6	is replaced by	5	before	2, 3, 4, or 6
7	is replaced by	1	before	1 or 7
7	is replaced by	2	before	2, 3, 4, 5, or 6

The same Foochow data may be lined up in a different way so as to group together the like tonemes of the first of the two syllables:

3, some 4, and 6	are replaced by	1	before	1, 5, or 7
7	is replaced by	1	before	1 or 7
5 and 7	are replaced by	2	before	2, 3, 4, 5, or 6
some 4	are replaced by	2	before	1, 5, or 7
1, 3, some 4, and 6	are replaced by	5	before	2, 3, 4, or 6
some 4	are replaced by	7	before	3, 4, or 6
some 4	are replaced by	8-	before	2
2	is replaced by	8-	before	2, 3, 4, or 6
5	is replaced by	9-	before	1 or 7
1 and 2	remain unchanged		before	1, 5, or 7

Neither the change by syntactic position nor the mechanical sandhi changes should be confused with those due to intonational elements superimposed upon the lexical tonemes. Thus Chao shows, in his article from which this Foochow material has been abstracted, that in addition to the substitutions of tonemes, the pitch of the syllables may be changed (1) by modifying them in a way not affecting the general type of contour of the tones, e.g. by lengthening the syllable; (2) by modifying the contour (a) through general raised level of pitch, (b) through general lowered level of pitch, (c) through widening of range of pitch, or (d) through narrowing of range of pitch (but raised or lowered levels usually carry with them the narrowing of pitch range as well); (3) by adding to a syllable additional contour elements (e.g. a rise for sentence-medial pitch added, say, to a falling lexical pitch; or a fall for sentence-final pitch added to a rising lexical pitch).

(Footnote continued on p. 86.)

For a similar situation, but one in which a noun is the head of a close-knit construction, notice that in the first phrase which follows the head noun is modified by another straight noun, but that in the second phrase only the modifying noun's characteristics are pertinent: n¹dēžū^(b) 'food' plus žūù 'rock(s)' becomes n¹dēžū žūù 'food made out of rocks,' but n¹dēžū žūú means 'rock-like food,' i.e. 'thick or solid food.'

Notice the relationships between n¹k^wāān 'it became yellow,' kētē k^wāān 'a yellow animal,' ?itā k^wāān (or, rarely, ?itā k^wāān) 'yellow flower.' Here the verb k^wāān 'to become yellow' first changes its tonemes to high high; this is the normal change for deriving modifiers for verb or noun construction heads if the tonemes of the modifiers change at all (some words do not change); a tonomechanical subrule may be seen in that, following a construction head of mid low tonemes, the modifier usually changes to low high (as in ?itā k^wāān), although there is a rare optional variant to high high paralleling the tonemes normal to modifiers following words of toneme combinations other than mid low.

As has been stated above, some of the modifiers of verbs or nouns do not have their tonemes changed, especially if the basic meaning of the basic form of the modifying word is preserved. In the first of the two following illustrations the meaning of the basic form of the modifier seems to have changed but little; in the second illustration the meaning seems to have changed somewhat, without change of tonemes: čā-ún 'those men,' bāl 'to come,' and kōžō 'to pour out [as of potatoes]' unite in the phrase bāl kōžō čā-ún 'those men pouring-forth-coming,' i.e. 'those men are coming in a group'; čā-ún, kēs 'to eat,' and kā?nū 'large' unite in the phrase kēs kā?nū čā-ún 'those men will big/together-eat,' i.e. 'those men will all eat out of the same dish.'

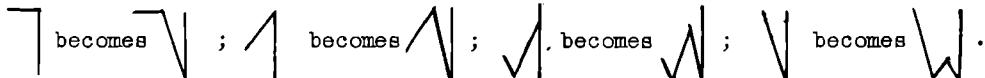
For a combination of the two types of modification, one with no change of the modifying noun and one with tonemic and semantic changes of its basic form, compare the following phrases.

Basic forms of the morphemes:

<u>čāā</u>	'man'	<u>ñānl̄</u>	'brother, cousin'
<u>žūkān/-ún</u>	'that one'	<u>sūčí</u>	'child'

(Footnote 6 continued.)

In Mandarin, for example, if the sentence 'What did you say' ends in three low "neutral" tones, these tones may become high on repetition of the question by the other speaker. Enumeration (especially "impressive" enumeration), protesting statements, exclamations of satisfaction over new situations, or affected exclamations may have the added final fall. This fall may be added to the tonemes as shown in the following tone letters:



Note these illustrations given by Chao:

說你多有錢↑，說他多好看↓，說你們多快活↖
不是你↖，是他也↖
壯↖，這樣好↖
真可憐↖

Chao cautions the reader, however, not to conclude that these are the only ways in which such sentences can be pronounced; enumeration can be expressed by lengthening and so on--a one-to-one essential correlation does not exist between a grammatical form and its intonation type.

Note also the following diagrams, which show how the rising expressive intonation of Mandarin is added to the regular lexical tonemes (sometimes making them rise higher than the normal tone height, but for one toneme developing a circumflex glide):



Phrases combining these morphemes:

1. čà-súčí-ún 'that child-like man,' i.e. 'that young man'
2. súčí súčí-ún 'that young child'
3. nānlì súčí-ún 'the brother of that child'
4. nānlì súčí-ún 'that younger brother'
5. nānlì súčí súčí-ún 'the brother of that young child'

(An optional rhythm break may come between the first two words of this last illustration, but the second and third words are always pronounced rapidly together; this prevents ambiguity as to whether the second word modifies the first and then the whole is modified by the third, or whether [as is actually the case] the third word first modifies the second and then the combination of second and third modifies the first.)

6. nānlì súčí súčí súčí-ún 'the younger brother of that young child'

(This is structurally a combination of phrases 4 and 2, in which phrase 2 as a whole modifies phrase 4 as a whole. The reason that the third word is súčí instead of súčí [as in phrase 2] is that súčí is a (^b) form, and perturbs what follows it whether or not it is perturbed itself. In this case the form resulting from the normal (^b) type of perturbation happens to be homonymous with the special perturbation for deriving a form that indicates modification of one object by a characteristic of another object. I had not heard this particular combination in conversation, so asked the informant for the Mixteco phrase as it might hypothetically appear. He produced the phrase as it stands, but found it awkward, though it was correct. He preferred to use the following expression: nānlì súčí, súčí súčí-ún. This form is the same combination of 4 and 2, but has a pause in between. This allows clear indication of the basic parts of the construction, showing that the first two words and the second group of two words form subunits of which the second modifies the first. In addition, the pause breaks the perturbing power of any (^b) word, so that the third word reverts to its nonperturbed form; this avoids the awkward repetition of three homonymous forms that have different uses. The pause does not by any means need to be strong, but merely a slight rhythmic break to indicate the syntactic division.)

5. Perturbations in Direct Address

A still different series of changes occurs in direct address, or call. Here basic tonemic differences are leveled out, and all words become high low. Thus kētē 'animal' becomes ké́tē 'animal!'; ñáli 'Angel (as a name)' becomes ñá́li 'Angel!' In addition, the spread of interval is extra-wide.

There seems to be an alternate form in which the second syllable glides slowly from high to mid. Thus, kētḗ. The form is somewhat rare, and the analysis obscure. Possibly the second form is less severe or commanding than the first type of perturbation.

C. Tonemes of Mixteco Monosyllables

The rules for Mixteco tonemic change so far discussed apply to dissyllabic morphemes. The rules for these same morphemes in monosyllabic form are at times quite different.

Dissyllabic morphemes of the patterns CVV, CV?V, CVVn, CV?Vn are very readily abbreviated to CV, and in that atonic form they are attached in pronunciation as PROCLITICS to the following word or as ENCLITICS to the preceding one (cf. English s'the truth for it's the truth; I'm for I am). In rare instances morphemes of CVCV pattern may be abbreviated. This type tends to lose the first syllable--thus kētē 'animal' becomes -tē, ñdūčā 'water' becomes -čā.

1. Tonomechanical Subgroups of the Pronominal Enclitics

There are only a few enclitics, comprising ten pronominal enclitics (for which see below), in addition to the form -čā 'water' (from the full form n̄dūčā), and two demonstratives (e.g. -ún suppletion with žúkān 'that one'), and a few others that occur in special combinations of proclitic plus enclitic without a full form between.

The pronominal enclitics are very interesting in the variety of their tonomechanical subclasses; the major rules follow.

a. Basic Tonemes of the Enclitics

The full dissyllabic morphemes related to the pronominal enclitics are listed below; these forms are nouns⁷ and follow the normal tonemic rules for the basic tonemic classes and tonomechanical subclasses of nouns:

<u>náá</u>	'the one speaking, I'	<u>žóó</u>	'we'
<u>níí</u>	'the one spoken to, you'	<u>róó</u>	'the one spoken to, you'
<u>čáá</u>	'man'	<u>rúú</u>	'the one speaking, I'
<u>súčí</u>	'child'	<u>kéte</u>	'animal'
<u>ñá?á</u>	'woman'	<u>?í?á</u>	'sacred personage'

⁷Nouns, verbs, and adjectives are defined in terms of their function in the sentence. For example, nouns serve as subjects and objects of predicates. Verbs constitute the simple predicate. Adjectives may modify nouns or--in special positions--verbs. Nouns occasionally modify other nouns or verbs but tonemic changes are likely to be involved in such modification; in addition, the structural order of layers of immediate constituents differs when they function in this fashion. Verbs, with similar reservations, may occasionally modify nouns or other verbs. A few morphemes cannot yet be conveniently related to any of these three classes, since they serve as connectives, or the like, and are not used in the major positions occupied by nouns, verbs, or adjectives.

The English speaker at first glance is likely to insist that the abbreviated forms of the words serving as subjects and objects of predicates constitute a distinct class of "pronouns," but that the full forms are "nouns." Such an analysis leads to confusion since the words for 'animal,' 'woman,' 'child,' and so on, are normal nouns in all but these characteristics, that they may be abbreviated and that they may react to special tonemic rules in certain syntactic positions. Compare žá?á ká-n̄jáa-i 'here is seated (the) child' and žá?á ká-n̄jáa één súčí 'here is seated one (a) child'; the syntactic position of unmodified subject demands the abbreviated encliticized form, but when the subject is modified by a numeral the full form must occur. Compare also žá?á kúú bē?é-i 'here is (the) house (of the) child,' žá?á kúú bē?é súčí lúlí 'here is (the) house (of the) small child,' and žá?á kúú bē?é súčí-ná 'here is (the) house (of) my child.' These items, and a discussion of some of the phrasal positions involved, appear in my article "Analysis of a Mixteco Text" (IJAL, X [1944], 132), along with further evidence that these are special forms of words rather than suffixes (126, 128, 131). But if the analyst insists that the occurrence of special abbreviated forms makes these words distinct "pronouns," then the word for 'water' must also be classed as a pronoun since it has an abbreviated alternate in similar phrasal positions--but this analysis is unacceptable.

Certain of the enclitics, however, (1) because of their abbreviated form and (2) because of their use as substitutes--a characteristic not found in enclitics like -čā 'water'--are here labeled "pronominal enclitics" and classed as a special subdivision of nouns.

Phonetic differences between some of the full forms and their enclitic forms are explainable only on historical grounds. For example, the word for 'man' appears to have been *tyáá. In the dialect of Yucuañe it is now téé, whereas in San Miguel el Grande it is čáá. In Yucuañe the [y] palatalized the following vowel, but in San Miguel it palatalized the preceding consonant. The position of enclisis gave a different phonetic conditioning: In Yucuañe the form *tyáá became and now remains -tē. In San Miguel the palatalization likewise affected the following vowel, but then the [t] by pressure of the enclitic position became [ð]. Here it would be a nonphonemic variant of [t] were it not for the newly developed contrast with the enclitic -té 'animal'; the phoneme [ð] (here written d) seems to occur in no normal full word in the dialect, although it does occur in one interjection bldáa 'indeed.' Such historical digressions are not pertinent to

Compare these with the list of the pronominal enclitics below. More complete meanings are given there.

The enclitics interchange with the full forms with sufficient frequency in related contexts (e.g. in emphatic isolation versus inclusion) to make the relationship quite certain. This relationship of enclitic forms to full forms is also established by the parallels of grammatical function in situations where full nouns would be used. Thus the vast majority of nouns occur only in full form, regardless of their position; notice that the name 'Angel' is ʔáli, with two syllables, in the subject position of the sentence ní-hāʔàn ɬáli 'Angel went' and is also two syllables in the position of call in ʔáli 'Angel!' In a few instances--those under discussion plus a few more--nouns in certain positions have enclitic forms substituted for the full forms. Notice that the subjects in the following utterances are represented by the enclitic forms: kéte 'animal!' but ní-hāʔàn-té 'the animal went'; súči 'child!' but ní-hāʔàn-I 'the child went.'

There are three groups of pronominal enclitics, which differ from each other by basic tone:

Group 1--high

-ná First-person polite; singular, or plural exclusive (i.e. 'I and he but not you'); subject, object, or possessor

-ní Second-person polite; singular or plural; subject, object, or possessor

Group 2--mid

-dé Third-person masculine polite; singular or plural; subject, object, or possessor

-I Third-person masculine or feminine familiar; singular or plural; subject, object, or possessor

-ñá Third-person feminine polite; singular or plural; subject, object, or possessor

Group 3--low

-žo First person; plural inclusive (i.e. 'I and you [and perhaps he]'); subject, object, or possessor

-rò Second-person familiar; singular or plural; subject, object, or possessor

-ri First-person familiar; singular, or plural exclusive; subject or possessor

-tè Third-person animate nonpersonal (i.e. 'animal'); singular or plural; subject, object, or possessor

-žá Third-person, of sacred personage; singular or plural; subject, object, or possessor

b. Tonomechanical Subclasses in Perturbation

The enclitics must be subdivided in various ways according to their tonemic action and their effect on other morphemes. Some of them may be perturbed, and some of them may not. Some of them may cause perturbations, and others may not do so. Of those which may cause perturbations, some do so only when unperturbed themselves, but others perturb regardless of their own state. At least one enclitic that does not perturb is related to a full form that does perturb, whereas one enclitic that does perturb is related to a full form that does not do so. These various characteristics are discussed below.

Group 1 is basically high pitched, group 2 is mid, and group 3 is low, as may be seen from the list of pronominal enclitics above.

Group 1 is never changed; -ná and -ní always remain high. No other pronominal enclitic has this characteristic. All others may be perturbed. Compare kéé-ná 'I will go away' and kéé-ná 'I will eat' with kéé-ñá 'the woman will go away' and kéé-ñá 'the woman will eat.'

Of group 1 the -ná and -ní, of group 2 the -dé and -I, and of group 3 the -ri never perturb other morphemes.

a descriptive analysis. The highly divergent forms are now best described as related by suppletion, like go, went, gone and am, is, are, be.

Of group 2 the -nā and of group 3 the -žò, -rò, -tè, and -žà do under certain circumstances cause the tonemes of morphemes following them to change. Note that bínā 'today' is unperturbed in kí?in-ná bínā 'I am going today' but is perturbed in kí?in-ñá bínā 'she is going today'; the remainder of these perturbing enclitics may affect neighboring words in a similar fashion.

Of those enclitics which cause perturbations, -ñā, -tè, and -žà do so only if they are themselves unperturbed. When they are first perturbed by a preceding morpheme these three enclitics do not cause perturbations of the morphemes following them. Contrast kéē-ñā bínā 'the woman is going away today'--in which kéē 'to go away' does not perturb -ñā but -ñā does perturb bínā--with kéē-ñá bínā 'the woman will eat today'--in which kéē 'to eat' first perturbs -ñā and then -ñā cannot perturb bínā. In this respect -tè and -žà act like -ñā. Because of this difference in tonemic action, -ñā, -tè, and -žà may be labeled type (^{b2}), in contrast to -rò, and -žò, of type (^{b1}), which perturb whether or not they are perturbed themselves: compare nō?ò-žò bínā 'we are going home today' and "dè?é-žò bínā 'we will see today,' in both of which bínā is perturbed in spite of the difference of pitch of -žò/-žó.

The enclitics -rò and -žò further differ from -rì, -tè, and -žà in that the latter three when perturbed always go to high--which is true of the vast majority of perturbations in the language--whereas -rò and -žò change to mid pitch when perturbed by a type (^b) morpheme of basic tonemes mid mid or high mid. Note kéē-žò 'we will eat,' but kéē-rí 'I will eat.' In addition, -rò, -žò, -rì, -tè, and -žà all take a high toneme after a basic high high morpheme, but -rò and -žò also take a high toneme following a type (^a) morpheme of tonemic sequences high mid, mid mid, and low mid--but this is not true of -rì, -tè and -žà. Contrast kúnū-žò 'we will run' and kúnū-rí 'I will run.'

The pronominal enclitic classes, then, comprise the following:

Type (^a), which does not cause perturbations

Type (^{b1}), which causes perturbations regardless of whether or not it is perturbed itself

Type (^{b2}), which causes perturbations only when unperturbed itself

The actual pitches may be seen in Table 5, p. 91.

The construction of some such table is essential in the early stages of investigation for convenient analysis of the tonemic changes involved. Once the rules have been arrived at, however, formulas may be devised to make the presentation of the data more compact and less cumbersome, though at times they may be less convenient in actual practice. Thus if -ná is used to represent itself as well as -ní, -dē to represent itself as well as -í and -ñā, -rò to represent itself as well as -žò, and -rì to represent itself as well as -tè and -žà, we get the following formulas:

-ná always -ná

-dē > -dé after CaCā/a(^b) (in which the unmarked vowel represents any vowel with any tone)

-rò > -ró after CaCā(^a) or CaCá(^b), but

> -rō after CaCā(^b)

-rì > -rí after CaCa(^b)

A set of illustrations may be given to demonstrate the tonemic action of these enclitics and of the words that follow them. The word ?isò 'rabbit' will be used in each instance to succeed the enclitics; if ?isò is perturbed, the second syllable is changed to high. Preceding the enclitics we shall use two homonyms, skéē 'to cause to go away'⁸ (< s...[b] 'to cause' + kéē[^a]

⁸The form skúnū 'to cause to run, to chase away' (< s...[b] + kúnū 'run') would probably be used more frequently than skéē, but has not been given here because it does not show so neatly the arbitrary nature of tonomechanical subclasses (for kéē and kéē are homonymous, but kéē and kúnū are not).

TABLE 5

Tonemes of Mixteco Enclitics in Relation to Tonomechanical
Morpheme Classes Preceding Them

Tonemes and class of preceding morpheme	Tonemes and class of pronominal enclitics									
	Group 1		Group 2			Group 3				
	<u>-ná</u> (^a)	<u>-ní</u> (^a)	<u>-dē</u> (^a)	<u>-í</u> (^a)	<u>-ñá</u> (^{b2})	<u>-ró</u> (^{b1})	<u>-žó</u> (^{b1})	<u>-rí</u> (^a)	<u>-tè</u> (^{b2})	<u>-žá</u> (^{b2})
Type (^a)*	'	'	-	-	'p [†]	'p	'p	'	'	'
	'	'	-	-	'p	'p	'p	'	'p	'p
	'	'	-	-	'p	'p	'p	'	'p	'p
	'	'	-	-	'p	'p	'p	'	'p	'p
	'	'	-	-	'p	'p	'p	'	'p	'p
	'	'	-	-	'p	'p	'p	'	'p	'p
Type (^b)*			-	-	'p	'p	'p	'	'	'
	'	'	-	-	'p	'p	'p	'	'	'
	'	'	-	-	'p	'p	'p	'	'	'
	'	'	-	-	'p	'p	'p	'	'	'
	'	'	-	-	'p	'p	'p	'	'	'

*Grouped according to the pitch of the final syllable.

† The letter p after a toneme in the body of the chart indicates that it will perturb a perturbable morpheme following it.

'to go away') and skéé 'to cause to eat' (i.e. 'to feed') (< s...[^b] 'to cause' + kéé[^b] 'to eat'). Note the tonemes of the enclitics that differ according to which of these two words they follow, and then notice the way in which the tonemes of 'rabbit' are affected in turn.

skéé... ?Isò '... will cause the rabbit to go away'

skéé-ná ?Isò 'I ...'

skéé-ní ?Isò 'you [polite] ...'

skéé-dé ?Isò 'the man ...'

skéé-í ?Isò 'the child ...'

skéé-ñá ?Isò 'the woman ...'

skéé-žó ?Isò 'we (and you) ...'

skéé-ró ?Isò 'you [polite] ...'

skéé-rl ?Isò 'I [familiar] ...'

skéé-té ?Isò 'the animal ...'

skéé-žá ?Isò 'the sacred personage ...'

skéé... ?Isò '... will feed the rabbit'

skéé-ná ?Isò 'I ...'

skéé-ní ?Isò 'you [polite] ...'

skéé-dé ?Isò 'the man ...'

skéé-í ?Isò 'the child ...'

skéé-ñá ?Isò 'the woman ...'

skéé-žó ?Isò 'we (and you) ...'

skéé-ró ?Isò 'you [familiar] ...'

skéé-rl ?Isò 'I [familiar] ...'

skéé-té ?Isò 'the animal ...'

skéé-žá ?Isò 'the sacred personage ...'

In general it proves convenient to postulate for Mixteco a DESCRIPTIVE ORDER for tonemic changes in which such changes "seem" to be applied starting from the end of an utterance and working toward the beginning, since regular morphemes act tonomechanically just as if they had never

been perturbed themselves. Thus compare tūhí-rí 'I will scrape' (in which tūhí^[b] perturbs -rí to -rí) with mā-tūhí-rí 'I will not scrape' (with mā^[b] 'not'). Here -rí is perturbed after both tūhí and tūhí; yet, according to the table of changes previously given, a mid high morpheme never causes perturbation of -rí. How explain the apparent contradiction? The answer is that tūhí "first" perturbed -rí and "then" was itself perturbed by mā^(b) to tūhí. Actually, of course, mā was first spoken, and then tūhí, and finally -rí, but the descriptive order is most conveniently taken from end to beginning, so that one may see the original form of a morpheme and its perturbing powers before it is itself perturbed by another morpheme.

With ñā^(b2)-, however, the descriptive order is from beginning to end. It must "first" have been perturbed by the preceding kēē 'to eat' or it would have perturbed ?Isò to ?Isó as it did when it was preceded by kēē 'to go away.' The enclitics of type (b2) are the only forms which are known to act in this way in Mixteco.

Two phrases taken from the story "The Talking Cave" illustrate a series of changes: ... šíí há-má-ká?àñ-zò ... '... or would it be better to say nothing?' (< šíí^[b] 'or' + háa 'that which,' a noun serving as a particle to nominalize the phrase, + máa^[b] 'not,' negative used with potential aspects, + ká?àñ^[a] 'speak,' here ambiguously potential or continuative as regards tonemic structure but certainly potential following má-, + -zò^[b1] 'we,' but nothing follows in the breath group for it to perturb); há-kúní kōhá-káhí-té 'although the desire of the snake was to eat the animal' (< háa^[b] 'that which,' phrase nominalizer, + kúní^[a] 'to desire,' potential aspect [not "future" or "past," but here a negated fact which previously was potentially possible], + kō^[b] 'snake' + háa^[b], phrase nominalizer, + káhí^[b] 'eat up' + kétē^[b] 'animal' as enclitic -tē^[b2], but nothing follows to be perturbed).

The tonomechanical relationship of enclitic to full form is not uniform. Thus róó and zóó appear to be type (a), but -rò and -zò are type (b1); kétē and ñá?à are type (b), but -tè and -ñá are (b2); súí is type (b), but -í is (a); ?I?à is (a), but -zà is (b2); náá, ñíí, rúú and čáá are (a), as are the corresponding -ná, -ní, rí, and -dē.

Some differences of dialect, even within a very small area, affect these rules. The cousin of one of my informants (both men from the same village and living within one hundred yards of each other) changed enclitics of type (b1) to act like those of type (b2). More drastic changes occur in dialects farther separated from each other.

The classifications just given apply to the pronominal enclitics. As has been indicated elsewhere,⁹ the enclitics occur in certain phrase positions but not in others. In object position one always gets--or probably always--the full forms rúú, róó, zóó; optionally, the full forms náá and ñíí or the enclitic forms -ná and -ní; optionally, čáá or -dē, with -dē seeming very inelegant and distasteful to some speakers; normally, -ñá, -tè, and -zà but with the full forms also permissible and in certain situations--e.g. when followed by the enclitic -ún 'that one'--preferable. Full or enclitic forms that are normally type (a) or (b2) retain their nonperturbing or perturbing characteristics in object position. Note, then, the tonemes on bíná 'today' in the following samples: ní-híní-rí bíná 'I saw/understood today,' ní-híní-dē rúú bíná 'he saw me today,' ní-híní-rò bíná 'you saw today,' ní-híní-dé róó bíná 'he saw you today,' ní-híní-dē-ná/náá bíná 'he saw me today,' ní-híní-ná-dē bíná or ní-híní-ná čáá bíná 'I saw the man today,' ní-híní-ná-ñá bíná 'I saw the woman today' and ní-híní-rò-ñá bíná or ní-híní-rò ñá?à bíná 'you saw her/the woman today,' ní-híní-ná ñá?à ún bíná 'I saw that woman today.'

2. Proclitic Tonemes

The tonemic rules for proclitics are different from the rules for enclitics. In general their description is much simpler since the tonemic subclasses are less complicated. The proclitics tend to retain the toneme of the first syllable of the full dissyllabic form, although

⁹See note 7 in this chapter.

there is considerable variation from mid to low, either unconditioned or dependent upon the toneme of the following morpheme. Preceding a mid low morpheme, for example, the proclitic ni-/ni- 'completed' is likely to be low in tone: ni-kā?an-ná 'I spoke.' The mid-low alternation of proclitic tonemes, however, needs further investigation. Proclitics may be perturbed to high, if they are themselves mid or low; thus we have ná- 're-' , kíkú 'to sew,' ná-kíkú-ná 'I will mend,' but ná(b)-ná-kíkú-ná 'I insist I will mend.' In ná(b)-kíkú-ná 'I insist I will sew,' the ná- form has been abbreviated from náa(b); this particular full form has been found only in slow, hesitant, or interrupted pronunciations of the same phrases as those in which ná- appears.

In general, a proclitic retains the perturbing power of a type (b) morpheme from which it comes, as in the illustration just given for ná(b)-. The types of proclisis and their tonemic action will not be given here in further detail.

D. A Sample Text

In order that some of the tonemic changes described in earlier sections may be seen in a larger setting, a text of some 28 lines is presented here. Each morpheme is followed by a symbol in parentheses indicating its basic nonperturbing (a) or perturbing (b) nature; the latter causes an unstable disyllabic morpheme to substitute a mid or low toneme for a high one, or a monosyllabic abbreviated morpheme to change a mid toneme to high or a low toneme to high or mid. Morphemes which have been tonemically perturbed are followed by the basic form in brackets on the first occurrence of the perturbed form, except that enclitics are given in the nonperturbed enclitic form rather than in full unabridged form.

THE RABBIT, THE COYOTE, AND THE MOON

ká(a) [...(b) + kúúl-n-déé(a) ?Isò(a) žú(b)-n-dúčá(b)[n-dúčá] '(there) is present (a) rabbit (at the) edge (of a body of) water' žúán(a)-ná(a) té(a)-nì(b)-há bá?ù 'thereupon there arrived (a) coyote' ná(a)-ún(a) sá(a)-ró(b) ?Isò(a)[?Isò] 'what are you doing, rabbit?' ?áčí(a)[...b) + ?áčí bá?ù(a) híní(a)[...b) + kúní]-té(b2) 'says (the) coyote to (the) animal' náá(a) čáá(a) ká(a)-n-déé(a) žá?á(a)-nì(a) tiú(a)[tiú] 'I'm the man present right here, Uncle' ?áčí(a) ?Isò(a) híní(a) bá?ù(a) 'says (the) rabbit to (the) coyote' žá?á(a) hító(a)[...b) + kótó] núú(a)-ná(a) nú(b)-n-dúčá(b) žá?á 'here I'm looking down into the water' n-déé(b)-ná(a) késú 'I'm looking (at a) cheese' tú(a) kúní(a)[...b) + kúní(a)]-nì(a) kí(a)-kí?In(a)-nì(a) késú 'don't you want to go fetch (the) cheese' ká(a)-n-déé(a) nú(b)-n-dúčá(b) žá?á '(which) is present in the water here?' sá(a)-nì(a) fábóör(a) kébé(a)-nì(a) kí(a)-kí?In(a)-nì(a) késú(a)-ún(a) 'you do (me a) favor, enter (and) fetch that cheese' té(a)-nì(a)-káčí(a) bá?ù(a) 'and (the) coyote said' né(b)-kí?in(a)[kí?ln]-ri nú-sáá(a) 'let me go,' then! únl(a)-nì(a) nì(a)-ké(a)-n-dápá(b) bá?ù(a) 'with a rush (the) coyote jumped' nì(a)-kébé(a)-té(b2) číl(a)[číl] n-dúčá(b) '(the) animal entered beneath (the) water' há(b)[háá]-k'vá(a)-kí?In-té(b2) késú(a) núú(a) 'that it (might) go get (the) cheese--so it figured' té(a)-ná(a)-ún(a) híní(a)[...b) + kúní] bá?ù(a) 'and how (little did the) coyote know' há(b)-má(b)-žóó(b)[žóó] kúú(a)[...b) + kúú] 'that (it) was the moon' té(a)-nì(a)-híní(a)-nì(a) ?Isò(a) há(a)-nì(a)-kébé(a)-té(b2) číl(a) n-dúčá(b) 'and (the) rabbit saw that (the) animal entered beneath (the) water' páén(a) kúú(a) nú(b)-n-dúčá(b) ká(a)-n-déé(a) bá?ù 'paang goes the water (where the) coyote is' té(a)-nì(a)-čáá(a)-nì(a) ?Isò(a) kóré(a) k'vá?án(a)-té(b2) 'and (the) rabbit hit (the trail) and went fast' žúán(a)-ná(a) té(a)-nì(a)-náná(a) bá?ù 'thereupon (the) coyote came up' nì(a)-hító(a)-té(b2) há(b)[háá]-tuké(a) ?Isò(a) ká(a)-n-díl(a) '(the) animal saw that no longer was (the) rabbit standing (there)' číl(a)-k'vá?án(a)-nì(a) ?Isò(a) kóré(a) 'because (the) rabbit (had) just gone away rapidly' tón-dó(a) ?ú?ù(a) nì(a)-kúní(a) bá?ù(a) nú(b)-?Isò(a) '(the) coyote wanted (to do something) very hurtful to (the) rabbit' há(b)-nì(a)-š(b)-n-dáñí(a) ?Isò(a) bá?ù(a) 'because (the) rabbit tricked (< caused to be poor) (the) coyote' té(a)-nú(a)-nì(b)-ká(a)-n-díl(a)-gá(a) ?Isò(a) núú(a) 'and if (the) rabbit had stood (there) longer' číl(a)-káhí(b) bá?ù(a) ?Isò(a) núú(a) 'then (the) coyote would have eaten the rabbit' nì(a)-n-déé(b)-k'vá?dú(a)-té(b2) '(the) story (of the) animal has ended'

A few special items of interest may be pointed out in this text:

In žū-ⁿdúčā note the mechanical perturbation of mid mid ⁿdúčā 'water' to high mid by the type (b) word žū?ñ 'mouth, edge' occurring here in proclitic form.

In 'what are you doing rabbit?' note the tonemic change from mid low to high low on ?lsò 'rabbit' when it is used for a call. A bit later tiú 'uncle' similarly becomes tiù.

Several times the morpheme ...^(b) affects the tonemes of following morphemes. In addition it tends to exert a palatalizing influence.¹⁰ In the text, note ?áčí 'says' (< ?áčl), káⁿdéé 'be present' (< kúⁿdéé), hítō 'look' (< kótō), né?é 'look' (< né?é), híní 'know' (< kúní). Note also the verb (?) translated as a preposition--occurring twice--híní 'to' or 'hears' (< kúní) in 'says the coyote/rabbit to the rabbit/coyote'; no other word in the language seems to act in this way; some informants would be more likely to use the noun híní meaning 'accompaniment,' a very common construction type and parallel in the text to žū?ñ 'mouth' abbreviated to žū- in the phrase žū-ⁿdúčā 'edge of the water,' núù 'face' in 'in the water,' číl 'stomach' in číl ⁿdúčā 'beneath the water,' and so on.

The perturbing proclitic ná- 'to insist' changes kí?ín to kí?ín in 'let me go ...'

The type (b²) pronominal enclitic -tè perturbs číl to číl in ...tè číl ⁿdúčā '(the) animal (entered) beneath (the) water.'

Notice the stability of the basic high tonemes, and of morpheme types high high, high mid, high low, and mid high. These are never changed except in direct address in calling (as in tiú from tiú). On the other hand, many mid and low tonemes are changed to high: of about thirty tonemic substitutions in this very short text, approximately two thirds were from mid to high and one third from low to high; of these, nearly one half were caused by the morpheme ...^(b) 'is in progress'; two changes were to high low in direct address, and the remainder were of a strictly mechanical sandhi type within the tonomechanical patterns already delineated.

Finally, note that the changes appear to be regular only when one has first symbolized the basic irregularities of the system in terms of arbitrary nonpredictable classes of type (b)--a perturbing type carrying a raising influence, with a subdivision type (b²) which does not cause the raising of following tonemes if it is itself first raised by a preceding morpheme--and of type (a), which does not have a raising influence.

¹⁰The formula for the morpheme may be stated more fully as ...y(b). For a list of ways in which the palatalization is actualized see my "Analysis of a Mixteco Text," IJAL, X (1944), 123-24.

C H A P T E R V I I I

TONEMIC PERTURBATIONS IN MAZATECO, WITH SPECIAL EMPHASIS ON TONEMIC FUSION

In spite of the fact that the basic tonemes of Mazateco are level, like those of Mixteco, the two systems differ very strikingly.

As has been shown in Chapter VII, Mixteco tonal structure is complicated by a great deal of tone sandhi in which the tonemes of one word cause interference mechanically with tonemes in following words. It is only occasionally that these sandhi changes have grammatical significance or contrast as such. Further, Mixteco has highly complicated tonomechanical differences in which two words identical in consonants, vowels, and tonemes nevertheless affect differently the tonemes of words which follow them. Such words may be completely homophonous, identical both phonetically and tonemically, but differ tonomechanically in that they affect differently the tonemes of other words in the sentence.

In Mazateco, however, we find that neither of these features is prominent, for there is little or no pitch sandhi, and there is but little subclassification according to arbitrary tonomechanical differences. On the other hand, several characteristics basic to the structure of Mazateco are not present in, or not an important part of, Mixteco structure. Mazateco, for example, indicates the ending point of certain types of noun phrases by means of glides from one toneme to another. Moreover, in Mazateco there is a highly intricate organization of pronouns fused tonally to verbs and to some of the nouns. This fusion may be seen simultaneously at several (five or more) parts of a single verb, in several overlapping layers. At each point in such a verb the tonemic fusion operates independently, or nearly independently, of the other points. For a summary of this fusion of subject pronouns see pages 161-63. These characteristics and others will now be described in some detail.

A. Tonemes of Nouns and Noun Phrases

Mazateco has several basic form classes or "parts of speech." These include nouns, verbs, adjectives, adverbs, and probably certain groups of particles, which need to be more clearly identified. The noun may serve as subject or as object of a verb, or as the second part of a compound verb. The verb serves as a predicate, or as the second part of a compound noun, or, with special tonemic changes, as modifier of a noun. The adjective modifies nouns or serves as the second part of compound nouns or verbs. Certain other details of permitted occurrence are not pertinent to this analysis.

Of the nouns, there are three principal types: NONPERSONAL nouns constitute the bulk of nouns in the language and are identifiable in that they are accompanied by enclitic possessive pronouns rather than fused pronouns and in that all of them except those having lexical toneme 4 are followed by a syntactic down glide when they constitute a close-knit noun phrase. RELATIONAL nouns are similar except that they comprise but a few words--largely indicating some personal relation--and lack the down glides just mentioned. PERSONAL nouns are likewise few, and are largely comprised of terms indicating parts of the body; they have the possessive pronouns fused to them.

1. Tonemes of Nonpersonal Nouns with Syntactic Tonemic Modification

a. Lexical Tonemes on Nuclei of Different Length

There are four level pitch phonemes--that is, tonemes--in Mazateco. Monosyllabic words may be found containing any of the four pitches, as the following samples will show. The highest toneme will be numbered 1; the next highest, 2; the next to the lowest, 3; the lowest, 4. The numbers are placed immediately after the vowel nuclei to which they are applied.¹ Note that nouns may occur on all these pitch levels.

Pitch 1: ška ¹⁻	'trousers'	ša ¹⁻	'work'
Pitch 2: nča ²⁻	'gruel'	šo ²⁻	'nail'
Pitch 3: ška ³⁻	'a large water animal'	ša ³⁻	'lion'
Pitch 4: ška ⁴⁻	'leaf'	čo ⁴⁻	'animal'

The noun forms whose final tonemic symbol is followed by a raised solid dash (e.g. as in šo¹l²i¹⁻) do not occur separately in that form, although they do occur thus in noun phrases followed by an adjective. Pronounced by themselves they receive a syntactic down glide on the vowel. This constitutes one of the identifying characteristics of nonpersonal nouns. Here and elsewhere in this study, then, nonpersonal nouns which are quoted in their basic form, rather than with a syntactic glide, will be so indicated.

There are a great many dissyllabic nonpersonal nouns, also, of which the following are samples:

šo ¹ l ² i ¹⁻	'burning ember'	ki ⁴ šo ⁴⁻	'charcoal'
na ⁴ ši ¹⁻	'horse'	ška ² ča ³⁻	'broom'
to ³ nka ³⁻	'large gourd'	yo ³ me ²⁻	'bumblebee'
šo ⁴ kho ²⁻	'cocoon'	ča ¹ hno ⁴⁻	'squirrel'

Within either the monosyllabic or the dissyllabic noun, the syllabic nucleus may be composed of one vowel, or two, or three. Regardless of the number of vowels in the nucleus, the length of time taken to pronounce the nucleus is, within the limits of perception, approximately the same. The illustrations below should all be pronounced with the same general speed. This implies that a syllabic nucleus composed of two or three vowels must have the individual vowels pronounced much more rapidly than do nuclei composed of a single vowel. Timing is largely the function of the number of nuclei, not of the number of separate vowel phonemes within the nuclei.

¹In the orthography now being tested in reading campaigns, toneme 1 has an acute accent mark ['] directly over the vowel; toneme 2 is written with a macron [=], also over the vowel; toneme 4, with a grave accent mark [`]; and vowels with toneme 3 are given no tonemic symbol. When two tonemes occur on a single vowel, the letter is doubled (but this does not represent phonetic doubling) and a tonemic mark is placed over each letter, where it is pertinent; syllable nuclei with two and three vowels have two and three tonemic marks, respectively. Note the relationship between the two systems of tone symbolization: škal/šká, ška¹⁻³/škáa, ša³⁻⁴/šaa, s²o¹/s²óí, khoa³⁻²/khoá.

The consonants of Mazateco include voiceless stops t, k (which are voiced after nasals); glottal stop ?; voiceless affricates--also voiced after nasals--c ([ts]), č, č (retroflex č); voiced nasals m, n, ň; voiceless fricatives s, š (the latter retroflex, especially before vowels, but less retroflex before consonants), and h (with light velar friction before vowels but nasalized before nasals); voiced fricative y (when preceding h, approximately like f by unvoicing); the glide y; lateral l; retroflex flap r; and occasionally, from Spanish loans, p, b, d, and trilled r, with unassimilated t and č voiceless after nasals (various problems arise from the borrowing of Spanish sounds, but these need not concern us here). The vowels that are phonemic are i, e, a, o and their nasalized counterparts; o varies freely to u; i and o tend to become rapid and nonsyllabic at the beginning of vowel clusters, but remain phonemically distinct from y and v; all vowels become laryngealized ("glottalized") after any consonant plus ?, an effect that is phonetically and phonemically distinct from the sequence CV?V.

<u>n²o¹-</u>	'rope'	<u>na⁴hča¹-</u>	'grandmother'
<u>s²oi¹-</u>	'fiesta'	<u>n²a¹₄₋₃hča¹-</u>	'grandfather'
<u>čo⁴</u>	'animal'	<u>nki³čao³</u>	'ranch'
<u>čoa⁴</u>	'mark' or 'sign'	<u>či³co³-</u>	'boat'

A single vowel may have a single level toneme, or it may have a glide composed of two (or, rarely, three) tonemes. (A glide is indicated by a hyphen between the tone numbers; this hyphen between numbers does not indicate dependent morphemes, for which see p. 100.) A syllabic nucleus composed of two or three vowels may likewise contain one level toneme, only, or it may contain a phonetic glide caused by the combination of two simple level tonemes. The number of vowels in the syllabic nucleus is largely immaterial to the actualization of the tonemes, since the tonemes tend to be spread over the nucleus with little or no regard for its vocalic composition. (Contrast this situation with that found in Mixteco, where every vowel has a toneme and every toneme appears on only one vowel.) As a corollary to this fact, it follows that a vowel in a nucleus with no other vowel tends to sound slightly long to English ears, since it has the full time value of the entire nucleus, whereas three vowels in a single nucleus sound as if they were pronounced with extreme rapidity (also from the point of view of the English speaker), since the time value of the nucleus is spread over the three vowels.

In the following illustrations the timing should be preserved uniformly for all nuclei regardless of length, and the toneme should be spread evenly over them, except that with a two- or three-vowel nucleus glides are often delayed to the second or third vowel.

Nuclei with three vowels seem to be found only in complex morphological situations in which a pronoun is fused to a verb or to a personal-noun stem, but there are many stems which have two vowels within the nucleus of a single monosyllabic morpheme.

In the following illustrations notice the number of vowels in the nucleus.

Nonpersonal Nouns	Personal Nouns plus Fused Pronouns
<u>yao³-</u> 'meat'	<u>hko⁴</u> 'his head'
<u>čoa⁴</u> 'plate'	<u>khoa³⁻²</u> 'our (incl.) heads'
<u>na³nta¹-</u> 'water'	<u>ncha³</u> 'his hand'
<u>šo⁴nthoa⁴</u> 'door'	<u>ncao⁴⁻³</u> 'your (pl.) hands'
<u>ni³tha³-</u> 'griddle'	<u>nc²oai³</u> 'your (sing.) stomach' (alternates with toneme 4-3) <u>nc²oao³</u> 'your (pl.) stomachs' (alternates with toneme 4-3)

We have already shown that noun stems may occur with any of the level tonemes. In addition, however, there are two lexical toneme combinations that appear on such stems. One of these is a glide from pitch level 4 to pitch level 3, and the other is a glide from 4 to 2. Other combinations have not yet been found. Note the following examples:

<u>ški⁴⁻³</u> 'medicine'	<u>ti⁴⁻²</u> 'bowl'
<u>ya¹te⁴⁻³</u> 'board'	<u>nai⁴⁻²</u> 'devil'

In Mazateco the stress falls mechanically on the final syllable of a word (this applies, also, to the nouns already listed) and need not be indicated by any orthographic device. The stressed syllable of a dissyllabic word is noticeably longer in duration than the unstressed one that precedes it. The glides of unstressed syllables may be pronounced with extreme rapidity, so rapidly that it is very hard to hear them. The difficulty is somewhat less with the stressed syllables because of their extra time length, but, even so, a three-vowel nucleus sounds very rapid to speakers of English.

b. Syntactic Tonemes in Noun Phrases

(1) Close-knit Noun Phrases

In Mazateco, tonemic phenomena may indicate the end of short noun phrases of a certain type. Such a noun phrase may be called a CLOSE-KNIT one. A close-knit noun phrase may be composed either (1) of a single noun, or (2) of a noun plus one--and only one--adjective. At the end of a close-knit noun phrase a down glide appears under the following conditions: If the final word of the phrase is an adjective and the final toneme of this adjective is on pitch 1, it will glide to 3; if it is already pitch 2 lexically, it will glide to level 3, and if lexically it is pitch 3, it will glide to level 4; if it is lexically level pitch 4, it will remain unmodified. Lexical 4-3 and 4-2 likewise remain unmodified. The stress on the adjective is stronger than on the noun.

Note the following examples:

Nonpersonal Noun	Adjective	Close-knit Noun Phrase
<u>ti³-</u> 'boy'	+ <u>hnti¹</u> 'dirty'	> <u>ti³ hnti¹⁻³</u> 'dirty boy'
<u>ni³tha³⁻</u> 'griddle'	+ <u>hma²</u> 'black'	> <u>ni³tha³ hma²⁻³</u> 'black griddle'
<u>nta¹he⁴</u> 'river'	+ <u>hnti¹</u> 'dirty'	> <u>nta¹he⁴ hnti¹⁻³</u> 'dirty river'
<u>šo¹hno⁴</u> 'lime'	+ <u>čoa³</u> 'white'	> <u>šo¹hno⁴ čoa³⁻⁴</u> 'white lime'
<u>co³hmi²⁻</u> 'thing'	+ <u>hma²</u> 'black'	> <u>co³hmi² hma²⁻³</u> 'black thing'
<u>yo³me²⁻</u> 'bumblebee'	+ <u>?nti¹</u> 'little'	> <u>yo³me² ?nti¹⁻³</u> 'little bumblebee'
<u>ši¹ne¹⁻</u> 'lard'	+ <u>čoa³</u> 'white'	> <u>ši¹ne¹ čoa³⁻⁴</u> 'white lard'
<u>sa⁴se¹⁻</u> 'clown'	+ <u>c?e⁴</u> 'bad'	> <u>sa⁴se¹ c?e⁴</u> 'bad clown'

Notice that the down glide is preserved at the end of a close-knit noun phrase even when this phrase becomes part of a longer sentence:

ki³si⁴⁻³nta⁴⁻³-le⁴ kao⁴--ši¹ne¹ čoa³⁻⁴ kao⁴--yao³⁻⁴ 'she made it with white lard and meat'
ca³ka³ne¹ho³ hnko³ ni³tha³ hma²⁻³, ca³ka³kha¹-le⁴ 'she washed a black griddle, she broke it'

Compare the unglided adjective toneme when it is not part of such a noun phrase, but constitutes a predicate adjective:

hnti¹ khi³ ti³⁻⁴ 'dirty appears boy' or 'the boy is dirty'
hma² khi³ ni³tha³⁻⁴ 'black appears griddle' or 'the griddle is black'
hnti¹ khi³ na³nta¹⁻³ 'dirty appears water' or 'the water is dirty'
hma² khi³ co³hmi²⁻³ 'black appears thing' or 'the thing is black'
čoa³ khi³ ši¹ne¹⁻³ ši³--th¹-le⁴ ti³⁻⁴-le⁴ 'white appears lard which has-he boy-his' or 'the lard is white that his boy has'

When a nonpersonal noun constitutes the entire noun phrase, it receives the glide. This is true whether the noun is pronounced by itself or is included in a longer sentence. In earlier illustrations nouns have been followed by a raised dash when they have been given in their basic structural form (i.e. the form in which they have no added syntactic glide), rather than with the glide they would actually receive if they were pronounced by themselves. In the following illustrations notice the basic form when it remains unglided as the first part of a noun phrase in a sentence, and then the same words constituting entire noun phrases:

Basic Structural Form
of Nonpersonal NounBasic Form of Nonpersonal Noun as First Part of a Close-knit
Noun Phrase Included in a Sentence

nta⁴hai³⁻ 'sugar cane'

čo¹ce⁴⁻³-lai⁴ nta⁴hai³ nk?a³⁻⁴ 'look-(you, sing.)-at-it sugar cane
tall' or 'look at the tall sugar cane'

sa⁴se¹⁻ 'clown'

čo¹ce⁴⁻³-lai⁴ sa⁴se¹ he³⁻⁴ 'look-(you, sing.)-at-him, the fat clown'

Nonpersonal Noun Form When
Pronounced in Isolation

nta⁴hai³⁻⁴ 'sugar cane'
sa⁴se¹⁻³ 'clown'

Nonpersonal Noun Constituting Complete Noun
Phrase within a Sentence

nta⁴hai³⁻⁴ ma³hčal¹ ?i⁴-vi⁴ 'sugar cane grows here'
hnko³ sa⁴se¹⁻³ ka²vha³?ai³ 'a clown came'

(2) Expanded Noun Phrases

One adjective only may enter a close-knit noun phrase. If a second one is added to the phrase, the proclitic connective ši³-- is inserted between the adjectives, and the syntactic glide is added to each. (Proclitics of Mazateco, in Chapter VIII, are symbolized by a broken dash [--] following them; this symbol is used for proclitics both when they occur in context and when they are discussed out of context. Grammatically, a Mazateco proclitic is not closely bound to the morpheme it precedes; phonologically, however, it is linked to the following morpheme in rhythmic pronunciation, and proclitics have not been found as separate free words pronounced by themselves.) Notice the following illustrations of noun phrases of this type:

hnko³ ti³ hnti¹⁻³ ši³--?nti¹⁻³ 'one boy dirty connective little' or 'a dirty little boy'
hnko³ ni³tha³ hma²⁻³ ši³--hnti¹⁻³ 'one griddle black connective dirty' or 'a black dirty griddle'
hnko³ yo³me² ?nti¹⁻³ ši³--hma²⁻³ 'one bumblebee little connective black' or 'a little black bumblebee'
hnko³ šo¹hno⁴ čoa³⁻⁴ ši³--hnti¹⁻³ ši³--ki³ši²⁻³ 'one lime white connective dirty connective dry'
or 'a white dirty dry lime'

Verbs may modify nouns by being placed after the connective ši³--. Optionally they have the down glide to toneme 3 added to them: si¹ša¹ 'he works,' ti³ 'boy'; ti³⁻⁴ ši³--si¹ša¹(-3) 'the boy who works.'

c. Tonemes of Nonpersonal Nouns in Compounds

We stated in the section immediately preceding that only one adjective could follow a noun in a close-knit phrase. Actually, however, certain data at first appear to contradict this statement. But further study shows that in practically every such instance (1) there is considerable specialization of meaning in the combination of the noun plus the first of the adjectives, whereas the second adjective has its normal meaning, and (2) the first noun loses its stress. It is best to conclude, therefore, that the noun plus its first adjective has formed a compound, and that, once formed, this compound (a) has specialization of meaning, and (b) acts in phrases like a simple noun, so that it also allows an adjective to follow it, or may occur by itself in isolation. Note the following examples:

Nonpersonal Noun	Adjective	Compound Pronounced in Isolation
<u>čo⁴</u> 'animal'	+ <u>ta²ha⁴⁻³</u> 'tough'	> <u>čo⁴ta²ha⁴⁻³</u> 'mule'
<u>yao³⁻</u> 'meat'	+ <u>?nti¹</u> 'little'	> <u>yao³?nti¹⁻³</u> 'tenderloin'
<u>na⁴hma¹⁻</u> 'bean'	+ <u>ko¹to¹</u> 'round'	> <u>na⁴hma¹ko¹to¹⁻³</u> 'pea'
<u>nt?ia³⁻</u> 'house'	+ <u>va³se³</u> 'half'	> <u>nt?ia³va³se³⁻⁴</u> 'town hall'

Compound nouns may also be formed of a noun plus a second noun, or a noun plus a verb, or by other combinations. In each instance they act tonally like the compounds described above. Note the following illustrations:

Nonpersonal Noun	Nonpersonal Noun	Compound plus Syntactic Glide
<u>čao³⁻</u> 'dust'	+ <u>l?i¹-</u> 'fire'	> <u>čao³l?i¹⁻³</u> 'ashes'
<u>n?o¹-</u> 'rope'	+ <u>ki⁴ča⁴</u> 'metal'	> <u>n?o¹ki⁴ča⁴</u> 'wire'

Nonpersonal Noun	Verb	Compound plus Syntactic Glide
<u>ška</u> ⁴ 'leaf'	+ <u>ča</u> ³ 'to be lacking' > <u>ška</u> ⁴ <u>ča</u> ³⁻⁴ 'broom'	
<u>khoa</u> ⁴ 'thing'	+ <u>va</u> ³ 'to be grieved' > <u>khoa</u> ⁴ <u>va</u> ³⁻⁴ 'grief'	

In the next set of samples certain of the nominal and adverbial stems in the compounds have not yet been found as regular independent nouns or adverbs. Except for proclitics (which are cited with a broken dash following them) all morphemes that have not been discovered in the language as free forms are cited with a hyphen preceding or following them.

Nominal Bound Form	Adjective	Compound plus Syntactic Glide
<u>ni</u> ³ - nominalizer	+ <u>nk?a</u> ³ 'tall'	> <u>ni</u> ³ <u>nk?a</u> ³⁻⁴ 'corncrib'
Nominal Bound Form	Verb	
<u>nta</u> ¹ - 'liquid'	+ <u>ti</u> ² 'it burns'	> <u>nta</u> ¹ <u>ti</u> ²⁻³ 'kerosene'
Noun	Adverbial Bound Form	
<u>šti</u> ³ - 'children'	+ <u>-hq</u> ³ 'on the surface of'	> <u>šti</u> ³ <u>hq</u> ³⁻⁴ 'stepchildren'
Nominal Bound Form	Nominal Bound Form	
<u>šo</u> ¹ - 'colorful thing'	+ <u>-?ya</u> ¹ 'prickly thing'	> <u>šo</u> ¹ ? <u>ya</u> ¹⁻³ 'rose'

Note the compounds previously illustrated occurring in the samples below with an adjective (plus a syntactic glide) following them, as they would appear in isolated phrases and within sentences:

Compound	Adjective	Close-knit Noun Phrase
<u>šo</u> ¹ ? <u>ya</u> ¹ - 'rose'	+ <u>ni</u> ² 'red'	> <u>šo</u> ¹ ? <u>ya</u> ¹ <u>ni</u> ²⁻³ 'red rose'
<u>n1</u> ³ <u>nk?a</u> ³ - 'corncrib'	+ <u>nk?a</u> ³ 'tall'	> <u>n1</u> ³ <u>nk?a</u> ³ <u>nk?a</u> ³⁻⁴ 'tall corncrib'
<u>nta</u> ¹ <u>ti</u> ² - 'kerosene'	+ <u>hnti</u> ¹ 'dirty'	> <u>nta</u> ¹ <u>ti</u> ² <u>hnti</u> ¹⁻³ 'dirty kerosene'
<u>šti</u> ³ <u>hq</u> ³ - 'stepchildren'	+ <u>c?e</u> ⁴ 'bad'	> <u>šti</u> ³ <u>hq</u> ³ <u>c?e</u> ⁴ 'bad stepchildren'

Compounds with Two Adjectives

<u>he</u> ²⁻³ third person + <u>nta</u> ¹ <u>ti</u> ² - 'kerosene' + <u>hnti</u> ¹ 'dirty' + <u>hko</u> ³ 'purple' > <u>he</u> ²⁻³ <u>nta</u> ¹ <u>ti</u> ² <u>hnti</u> ¹⁻³
<u>ši</u> ³ -- <u>hko</u> ³⁻⁴ 'this purple, dirty kerosene'
<u>he</u> ²⁻³ third person + <u>šo</u> ¹ ? <u>ya</u> ¹ - 'rose' + <u>ni</u> ² 'red' + <u>ce</u> ³ 'big' > <u>šo</u> ¹ ? <u>ya</u> ¹ <u>ni</u> ²⁻³ <u>ši</u> ³ -- <u>ce</u> ³⁻⁴ 'this big red rose'

d. Tonemes of Nonpersonal Nouns before Enclitics

Certain items (single morphemes or sequences of fused morphemes) follow nouns or close-knit noun phrases and depend upon them in pronunciation by being grouped with them rhythmically. In addition, these dependent items have no stress, whereas every phonologically independent Mazateco item does have stress. It is precisely for this reason that the items under discussion will here be called ENCLITICS. In the examples that follow, a hyphen will be placed between the noun phrase and the enclitic. In reading this material, the syllable preceding the hyphen must receive stress and length, whereas the enclitic itself, following the hyphen, should be unstressed and short. Were not some such orthographic device utilized, confusion would result, unless

stresses were indicated. It proves more convenient to mark this grammatical juncture before a few enclitics with a hyphen than to write a stress on all noun stems in the language, and it is more convenient to describe stress as conditioned by the place in the grammar unit--the end of normal words--than to set it up as a phoneme.

The enclitics are not considered part of the close-knit noun phrases, since the down glide on the end of the noun phrase precedes them.

Note the following samples:

Nonpersonal Noun	Enclitic	Resultant Phrase	
<u>ti³⁻</u> 'boy'	+ <u>-na⁴</u> 'my'	> <u>ti³⁻⁴-na⁴</u> 'my boy'	
Nonpersonal Noun	Adjective	Enclitic	Resultant Phrase
<u>ti³⁻</u> 'boy'	+ <u>?nti¹</u> 'small'	+ <u>-na⁴</u> 'my'	> <u>ti³ ?nti¹⁻³-na⁴</u> 'my small boy'
<u>či³k¹₁</u> 'firewood'	+ <u>hkoe³</u> 'rough'	+ <u>-vi⁴</u> 'here'	> <u>či³k¹₁-hkoe³⁻⁴-vi⁴</u> 'the rough firewood here'

The enclitics are subdivided on the basis of their grammatical usage (but not upon the basis of their phonological characteristics) into three major types. One of these enclitic types indicates the possessor of the noun. These possessive enclitics are paralleled by independent elements, as follows:

Independent Possessive Pronouns	Dependent Possessive Pronominal Enclitics
<u>c²a⁴</u> 'mine'	<u>-na⁴</u> first person sing.
<u>ci⁴</u> 'yours (sing.)'	<u>-li⁴</u> second person sing.
<u>c²e⁴</u> 'his, their'	<u>-le⁴</u> third person sing. and pl.
<u>ca⁴⁻²</u> 'ours (incl.)'	<u>-na¹</u> first person incl.
<u>ca⁴-hi⁴</u> 'ours (excl.)'	<u>-nai⁴</u> (or <u>-nai⁴-hi⁴</u>) first person excl.
<u>ca⁴⁻³</u> 'yours (pl.)'	<u>-no⁴⁻³</u> second person pl.

The dependent possessive pronominal enclitics may occur directly after the noun they qualify, or after a close-knit noun phrase composed of a noun with its modifying adjective. The enclitic may be followed by a second adjective provided the article ši³-- comes between; optionally, the first adjective may follow the enclitic and ši³--. The possessive enclitics are cognate with the object-subject ones (when following verbs), but tend to differ from them in tone. The syntactic down glide on the close-knit noun phrase precedes the enclitic.

Notice the following illustrations of the possessive enclitics showing their position in the phrase and the position of the syntactic down glide:

Nonpersonal Noun	Possessive Enclitic	Resultant Phrase	
<u>ška¹₁</u> 'trousers'	+ <u>-le⁴</u> 'his'	> <u>ška¹⁻³-le⁴</u> 'his trousers'	
Nonpersonal Noun	Adjective	Possessive Enclitic	Resultant Phrase
<u>ška¹₁</u> 'trousers'	+ <u>htoa²</u> 'short'	+ <u>-le⁴</u> 'his'	> <u>ška¹ htoa²⁻³-le⁴</u> 'his short trousers'
<u>čo⁴?nta³</u> 'servant'	+ <u>nt?e¹</u> 'good'	+ <u>-na⁴</u> 'my'	> <u>čo⁴?nta³ nt?e¹⁻³-na⁴</u> 'my good servant'

Expanded Phrases

ška¹⁻³-le⁴ ši³--htoa²⁻³ 'his trousers which are short'
čo⁴?nta³ nt?e¹⁻³-na⁴ ši³--hči¹nka³⁻⁴ 'my good servant who is old'

A second type of enclitic is adverbial, and includes the following items:

- vi⁴ 'here'
- ve⁴ 'there, fairly close'
- ha¹ 'there, far off'
- ?ni³ 'oh well'

These may occur in the same positions in the noun phrase as was indicated for the possessive enclitics. The syntactic down glide comes before the enclitic. When a possessive enclitic and an adverbial enclitic occur in the same phrase, the possessive one comes first. Notice the following illustrations of adverbial enclitics:

Nonpersonal Noun	Adverbial Enclitic	Resultant Phrase
<u>ši³hca³⁻</u> 'bag'	+ <u>-vi⁴</u> 'here'	> <u>ši³hca³⁻⁴-vi⁴</u> 'the bag here'
<u>na⁴čha⁴</u> 'banana'	+ <u>-ve⁴</u> 'there, fairly close'	> <u>na⁴čha⁴-ve⁴</u> 'the banana there'
<u>nta¹ti²⁻</u> 'kerosene'	+ <u>-ha¹</u> 'there, far off'	> <u>nta¹ti²⁻³-ha¹</u> 'the kerosene there'
<u>nto⁴ya¹⁻</u> 'jail'	+ <u>-?ni³</u> 'oh well'	> <u>nto⁴ya¹⁻³-?ni³</u> 'well, the jail'

Nonpersonal Noun	Adjective	Adverbial Enclitic	Resultant Phrase
<u>ši³hca³⁻</u> 'bag'	+ <u>he³</u> 'big'	+ <u>-vi⁴</u> 'here'	> <u>ši³hca³ he³⁻⁴-vi⁴</u> 'the big bag here'

Nonpersonal Noun	Adjective	Possessive Enclitic	Adverbial Enclitic	Resultant Phrase
<u>ši³hca³⁻</u> 'bag'	+ <u>he³</u> 'big'	+ <u>-na⁴</u> 'my'	+ <u>-vi⁴</u> 'here'	> <u>ši³hca³ he³⁻⁴-na⁴-vi⁴</u> 'my big bag here'

Expanded Phrase

ši³hca³⁻ 'bag' + he³ 'big' + -na⁴ 'my' + ši³-- 'which' + hnti¹⁻³ 'dirty' > ši³hca³ he³⁻⁴-na⁴
ši³--hnti¹⁻³ 'my big, dirty, bag'

The adverbial enclitics may also follow verbs, as will be demonstrated later in the study.

A third type of enclitic may be called modal; it includes a few items such as the following:

- šo¹ 'so it is reported'
- ni¹ 'it is indeed thus'
- la² (or -la⁴) 'it is probably thus'
- hi² 'it is not thus'
- ni³ 'it is in such a relationship to something'

After nonpersonal nouns or close-knit noun phrases these modal enclitics may be used in the same positions as were the possessive and adverbial enclitics. The syntactic down glides precede them. The modal enclitics may be used with verbs, as will be shown later, or they may have dependent subject pronouns fused to them when they follow nouns, and produce a resultant affirmation--and in conditions similar to this may sometimes be stressed. Notice the following illustrations:

Nonpersonal Noun	Modal Enclitic	Resultant Phrase
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<u>na⁴hme¹</u> 'corn'	+ <u>-šo²</u> 'so it is reported'	> <u>na⁴hme¹⁻³-šo²</u> 'corn, he says'
<u>č?a¹</u> 'cargo'	+ <u>-la²</u> 'it is probably thus'	> <u>č?a¹⁻³-la²</u> 'a load, probably'

Nonpersonal Noun	Modal Enclitic	Fused Dependent Subject Pronoun	Resultant Phrase
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<u>ti³</u> 'boy'	+ <u>-šo²</u> 'so it is reported'	+ <u>-a³</u> first person sing.	> <u>ti³⁻⁴šoa²⁻³</u> 'I have the report that it is a boy'
<u>ti³</u> 'boy'	+ <u>-ni¹</u> 'it is indeed thus'	+ <u>-a³</u> first person sing.	> <u>ti³⁻⁴nia¹⁻³</u> 'I am indeed a boy'

Oftentimes two modal enclitics are found in sequence after a noun or pronoun: he²⁻³-la² šo¹ si¹ša¹ 'it is reported that probably he is working.'

2. Tonemes of Relational Nouns

Although most nouns that end in tonemes 1, 2, or 3 glide downward when they constitute a close-knit noun phrase (and this group plus those ending in toneme 4 constitute the nonpersonals), there is a small number of nouns (about thirty that have basic toneme 3 and a few that end in toneme 1) that do not have such a down glide. In general, the nongliding nouns in pitch 3 include a few of the kinship terms, such as the word for 'aunt'; a few names for professional classes, such as the word for 'priest'; a restricted list of persons; and a few things intimately related to human beings, such as the term for 'ring.' For convenience, they may be called RELATIONAL. In the following illustrations notice that the relational nouns, when they constitute the entire close-knit noun phrase, do not glide.

Relational Nouns in Isolation, Constituting Complete Close-knit Noun Phrases

<u>na⁴mi³</u>	'priest'
<u>ni³hña³</u>	'straw mat'
<u>ni³nta³</u>	'bone'
<u>ni³so³</u>	'gourd dipper'
<u>nk?a³hmi³</u>	'heaven'
<u>hnka³</u>	'wing'
<u>khoa⁴tao³</u>	'injury'
<u>to³</u>	'fruit'
<u>khoa⁴vi³hna³čo³</u>	'life'
<u>čhi³nčo³</u>	'blackberry'
<u>čha³</u>	'arm'
<u>čhao³</u>	'music'
<u>ya¹ncha³</u>	'stick for pounding coffee'
<u>nti³c?j³</u>	'tail'

Relational Nouns Constituting Complete Close-knit Phrases by Themselves before Enclitics

<u>na⁴mi³-vi⁴</u>	'priest here'
<u>ni³hña³-vi⁴</u>	'straw mat here'
<u>ni³nta³-vi⁴</u>	'bone here'
<u>ni³so³-vi⁴</u>	'gourd dipper here'
<u>nk?a³hmi³-vi⁴</u>	'heaven here'
<u>hnka³-vi⁴</u>	'wing here'
<u>khoa⁴tao³-vi⁴</u>	'injury here'
<u>to³-vi⁴</u>	'fruit here'
<u>khoa⁴vi³hna³čo³-vi⁴</u>	'life here'
<u>čhi³nčo³-vi⁴</u>	'blackberry here'
<u>čha³-vi⁴</u>	'arm here'
<u>čhao³-vi⁴</u>	'music here'
<u>ya¹ncha³-vi⁴</u>	'stick for pounding coffee here'
<u>nti³c?j³-vi⁴</u>	'tail here'

The relational nouns in the preceding list all end in toneme 3. Names of some cities, and a few other words, must also be considered relational, since they, too, do not have a down glide when they constitute close-knit noun phrases; they are likely to end in toneme 1: nta¹nčao³ 'Cuicatlán,' but ha⁴n?i¹ 'Ojitlan' and ya¹čhia¹ 'San Bernadino.' Note also the personal name ka³mi² 'Camila,' and the word na⁴ši⁴na³nta¹ 'city.' Especially note the contrast between the relational noun nč?oa¹ 'cemetery,' which has no down glide in isolation, and the nonpersonal noun nč?oa¹⁻³ 'fence,' which does have a glide in isolation. In the lists below note that the words--nonpersonals--do glide:

Nonpersonal Nouns in Isolation,
Constituting Complete Close-
knit Noun Phrases

<u>ni³</u> sa ³⁻⁴	'water jug'
<u>šo¹</u> ?ya ¹⁻³	'rose'
<u>yo³</u> me ²⁻³	'bumblebee'
<u>čao³⁻⁴</u>	'dust'

Nonpersonal Nouns Constituting
Complete Close-knit Phrases by
Themselves before Enclitics

<u>ni³</u> sa ³⁻⁴ -vi ⁴	'water jug here'
<u>šo¹</u> ?ya ¹⁻³ -vi ⁴	'rose here'
<u>yo³</u> me ²⁻³ -vi ⁴	'bumblebee here'
<u>čao³⁻⁴</u> -vi ⁴	'dust here'

When, however, the relational noun does not constitute the entire close-knit noun phrase by itself, but is followed by an adjective, it acts like a nonpersonal noun; the glide is then applied indiscriminately to noun phrases which begin with relational and nonpersonal types. Note the following illustrations:

Relational Nouns at the Beginning of Noun Phrases Which Include Adjectives

<u>na⁴</u> ?mi ³	?nti ¹⁻³	'little priest'
<u>ni³</u> hňia ³	?nti ¹⁻³	'little straw mat'
<u>hnka³</u>	?nti ¹⁻³	'little wing'
<u>čha³</u>	?nti ¹⁻³	'little arm'

Nonpersonal Nouns at the Beginning of Close-knit Noun Phrases Which Include Adjectives

<u>ni³</u> sa ³	?nti ¹⁻³	'little water jug'
<u>šo¹</u> ?ya ¹	?nti ¹⁻³	'little rose'
<u>yo³</u> me ²	?nti ¹⁻³	'little bumblebee'
<u>čao³</u>	?nti ¹⁻³	'little dust'

3. Tonemes of Personal Nouns, Including Those Denoting Numerous Body Parts, with Their Fused Possessive Pronouns

The large majority of nouns, the nonpersonals, use for their possessive pronouns the enclitics already listed. There is a group of about twenty noncompounded nouns, PERSONALS, which does not utilize the possessive enclitics, but instead has fused pronominal forms.

These personal nouns are divided into several subgroups. The largest group has pitch 3 in the first person singular, second person singular, and second person plural; a glide from 3 to 2 in the first person plural inclusive; and either level pitch 1, or 3, or 4 in the third persons; except in the third person, where it does not vary, pitch 3 occasionally varies to 4-3, and 3-4 sometimes varies to 3. This group includes words like 'eye,' 'head,' and 'face,' listed in Table 6 (p. 105).

If one assumes that the stem vowel for these personal nouns may be found in the third person, and that the stem toneme may be found in the second person singular, then the rules for fusion of pronominal elements are identical with those which will be given later for the second (as last) main stem of personal compound verbs with fused dependent subject pronouns. For these formulas see Tables 7, 8, and 10 (pp. 108, 109-10, 118-19); the detailed rules are given for verbs, where the data are more ample.

However, in this group of personal nouns that have toneme 3 in the second person singular, one must consider that there is a suppletion of stem toneme and sometimes of the stem consonant (i.e. a substitution of stem) for the third person, since the toneme of the third-person form could not be predicted from the other persons, nor the other persons from the third, from the formulas in Tables 7 and 8 (pp. 108, 109-10). Similarly, the absence of n in the third person of the words for 'stomach,' 'back,' 'mouth,' or its presence in other persons could not be predicted; nor could the presence of the n in the third person of the word for 'sister' be predicted from the other persons. So, also, h occurs in the third person only of 'hand,' and a nasal vowel in the third person only of 'family.'

Two of the personal nouns--those for 'hand' and 'family'--have pitch 4 in the second person singular, first person singular, and first person plural exclusive, but pitch 4-3 (without variation to level 3) in the second person plural and pitch 4-2 in the first person plural

TABLE 6

Personal Nouns with Fused Dependent Possessive Pronouns

Meanings	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
Group 1:						
'eye'	šk ^Q ⁴	šk ^{Qa} ^{3*}	šk ^{Qi} ^{3*}	šk ^Q ^{3*}	šk ^{Qi} ^{3-4†}	šk ^{Qa} ³⁻²
'head'	hko ⁴	hko ^a ³	hkoi ³	hko ³	hkoi ³⁻⁴	hko ^a ³⁻²
'tongue'	ni ⁴ he ⁴	ni ³ he ³	ni ³ hei ³	ni ³ ha ³	ni ³ hai ³⁻⁴	ni ³ he ³⁻²
'nose'	nti ⁴ th ⁴	nti ³ th ^o ³	nti ³ th ^o ³	nti ³ th ^o ³	nti ³ th ^o ³⁻⁴	nti ³ th ^o ³⁻²
'teeth'	ni ⁴ ?no ⁴	ni ³ ?no ^a ³	ni ³ ?noi ³	ni ³ ?no ³	ni ³ ?noi ³⁻⁴	ni ³ ?no ^a ³⁻²
'stomach' . . .	c [?] oa ⁴	nc [?] oa ³	nc [?] oai ³	nc [?] oao ³	nc [?] oai ³⁻⁴	nc [?] oa ³⁻²
'foot'	nco ⁴ ko ⁴	nco ⁴ ko ^a ³	nco ⁴ koi ³	nco ⁴ ko ³	nco ⁴ koi ³⁻⁴	nco ⁴ ko ^a ³⁻²
'brother' . . .	nc [?] e ⁴	nc [?] e ³	nc [?] ai ³	nc [?] ao ³	nc [?] ai ³⁻⁴	nc [?] e ³⁻²
'back'	ya ¹ c [?] i ⁴	ya ¹ nc [?] ia ³	ya ¹ nc [?] i ³	ya ¹ nc [?] iq ³	ya ¹ nc [?] i ³⁻⁴	ya ¹ nc [?] ia ³⁻²
'ear'	šo ⁴ ño ³	šo ⁴ ño ^a ³	šo ⁴ ñoi ³	šo ⁴ ño ³	šo ⁴ ñoi ³⁻⁴	šo ⁴ ño ^a ³⁻²
'forehead' . . .	th ^q ³	th ^q ³	thai ³	tha ^q ³	thai ³⁻⁴	th ^q ³⁻²
'chin'	nki ³ ?va ³	nki ³ ?va ³	nki ³ ?vai ³	nki ³ ?vao ³	nki ³ ?vai ³⁻⁴	nki ³ ?va ³⁻²
'neck'	ya ¹ s [?] i ³	ya ¹ s [?] ia ³	ya ¹ s [?] i ³	ya ¹ s [?] iq ³	ya ¹ s [?] i ³⁻⁴	ya ¹ s [?] ia ³⁻²
'mouth'	c [?] oa ³	nco ⁴ ?va ³	nco ⁴ ?vai ³	nco ⁴ ?vao ³	nco ⁴ ?vai ³⁻⁴	nco ⁴ ?va ³⁻²
'sister'	nti ³ čha ³	ti ² čha ³	ti ² čhai ³	ti ² čhao ³	ti ² čhai ³⁻⁴	ti ² čha ³⁻²
'face'	nkhai ¹	nkha ³	nkhai ³	nkha ^q ³	nkhai ³⁻⁴	nkha ³⁻²
Group 2:						
'hand'	ncha ³	nca ⁴	nc <i>ai</i> ⁴	nc <i>ao</i> ⁴⁻³	nc <i>ai</i> ⁴	nca ⁴⁻²
'family'	ši ¹ nkhi ¹	ši ² nkia ⁴	ši ² nki ⁴	ši ² nkio ⁴⁻³	ši ² nki ⁴	ši ² nkia ⁴⁻²
Group 3:						
'plaza'	nti ⁴ c ¹ ⁴	nti ⁴ c ¹ ⁴ ⁴⁻²
'outdoors' . . .	nti ³ c ¹ ³	nti ³ c ¹ ³ ³⁻²

*Items in this section of the table sometimes vary from 3 to 4-3.

†Items in this section of the table sometimes vary from 3-4 to 3.

inclusive. The third person in this subgroup, as in the previous one, is more highly differentiated than the other persons. Here the word for 'family' has pitch 1, but that for 'hand' is on level pitch 3.

A further subgroup includes the words for 'plaza' and 'outdoors.' Both are defective, since they occur only in the first person plural inclusive, and in the third person. The word for 'outdoors,' however, otherwise belongs to the larger subgroup with 'eye' and 'face,' whereas the word for 'plaza' patterns with 'hand' and 'family,' because of the tone of the first person plural inclusive.

A few of the personal-noun morphemes serve as one member of compound personal nouns. The compounds act like the noncompounded forms: na⁴hma¹ncha³ 'his finger' (ncha³ 'his hand,' na⁴hma¹ 'bean'), na⁴hma¹ncai⁴ 'your (sing.) finger,' na⁴hma¹nca⁴ 'my finger'; ncha⁴he¹ško⁴ 'his eyelash' (ncha⁴ 'hair,' -he¹ '?,' ško⁴ 'his eye'), ncha⁴he¹ško³ 'my eyelash,' ncha⁴he¹ško³ 'your (sing.) eyelash,' and about six others; we have, also, without shorter related forms, to c?i³ 'buttocks,' nki³che³ 'armpit,' nki³nč?i³ 'kneepit.'

Personal nouns in metaphorical use tend to become nonpersonals, using the possessive enclitics rather than the fused form. Contrast hkoa³ 'my head' with hko⁴-le⁴ 'their captain'; ni³?noa³ 'my tooth' with ki⁴ča⁴ni⁴,?no⁴-na⁴ 'my saw' (ki⁴ča⁴ 'metal').

When an adjective modifies a personal noun with its fused pronoun, the adjective occurs in the position of the expanded noun phrase after ši³--. The pitch of the noun with its fused pronoun is unchanged:

hkoa³ ši³--?nti¹⁻³ 'head my connective small' or 'my small head'
nca⁴⁻² ši³--?nti¹⁻³ 'hand ours inclusive connective small' or 'our (incl.) small hands'

Apart from the verbs, which will be treated in the next section, no other large-scale tonemic relationships have been found in the language. Before proceeding to the verbs, however, note a few minor phenomena:

Down glides occur in the middle of a few noun compounds, such as ya¹⁻³ma¹⁻ 'avocado tree' (ya¹⁻ 'wood,' yo³ma¹⁻ 'avocado'). Here the tonal glide seems to be due to an obvious contraction; in some other instances the source of the glide is not now apparent.

Down glides appear in a few expressions of place, probably as a result of tonemic fusion incident to the loss of the morpheme ha⁴⁻ 'place': ya³⁻⁴--ni³?ya³⁻⁴ 'into the house' (compare ya^{3--ni³?ya³⁻⁴} 'in the house') from *ya ha⁴--ni³?ya³⁻⁴.

Note, also, two sets of cognate words distinguished by tone (the interrogative set with toneme 1): hñia³ 'a place,' hñal¹ 'where?'; k?ia³ 'a time,' k?ia¹ 'when?'; ho³ 'a manner,' ho¹ 'how?'; hme³ 'something,' hme¹ 'what?'; ?ya³ 'someone,' ?ya¹ 'who?'; and two or three complex forms, including ?a³-ni³ 'a query,' ?a¹-ni³ 'why?' and a few others. In context we have: ñal¹⁻³ ?ya³⁻² ho³ kø⁴ 'we know how it will be done' (ñal¹⁻³ 'we [incl.],' ?ya³⁻² 'we [incl.] know,' ho³ 'a manner,' kø⁴ 'it will be done'); ho¹ kø⁴ 'how will it be done?'

B. Tonemes of Verbs

Within the verbs there is an intricate pattern of pronominal fusion to the stem, complicated by the added fusion (also to the stem) of certain of the auxiliaries and by frequent stem suppletion.

Dependent subject pronouns are fused to most (but not quite all) of the compound verbs. Those verbs which do not have this fusion are the IMPERSONALS, and will be discussed separately. The larger number of verb compounds, the PERSONAL ones, have fused subjects. These will be presented in the following section.

1. Compound Verbs with Fused Dependent Subject Pronouns (Personals)

The most regular verbs in Mazateco are the compound ones, and for this reason it proves convenient to describe the compounds before giving a detailed discussion of the noncompounded verbs.

Within the verb compound, tonemic changes occur at various morphemes. The most interesting changes constitute a late layer of fusion (i.e. in relatively recent times) between dependent subject pronouns and the last main stem of the personal compound. Other fusions with the same pronominal elements occur on enclitics which come later in the verbal expression. Still other changes, quite irregular, represent an earlier layer of fusion (i.e. one that came about in more

remote times) and possibly a different set of pronominal subject elements, and are found on the first main stem of personal compounds or on their compounded auxiliaries. Of these changes, the ones to be presented first are those which affect the second main stem of the personal compound or its enclitics when no third or fourth main stem is present.

a. The Second Main Stem of the Verb Compound

In discussing the second main stems of personal compound verbs, the formation of these stems and their basic tonemes will be considered, and then the tonemic and vocalic modifications caused by the fusion of various personal subjects to them will be described.

(1) Formation of the Second (as Last) Main Stem of the Verb Compound from Independent Nouns, Adjectives, Verbs, and Miscellaneous Dependent Forms

The second main stem of the compound verb may be comprised either of an independent noun, or of an independent adjective, or of an independent verb, or of some kind of dependent form, such as a directional adverb. Regardless of whether or not the second main stem be an independent noun, adjective, or verb, its pitch when it is the last main stem of a compound is basically that which is found when the same morpheme occurs as a free form. Stems may end, therefore, in a stressed syllable with any of the noun tonemes or tonemic combinations previously described: 1, 2, 3, 4, 4-3, or 4-2.

In the following illustrations notice that the free forms of the parts of the compound are listed before the compound itself. Certain of the noun forms are followed by a dash, since they are not given with the down glide which they would have at the end of a close-knit noun phrase. The verbs are quoted in the third person, for the third person represents the basic stem form of a verb, having no fused pronominal element; in addition, it is convenient to consider it the basic form since in that person the most highly differentiated stem forms are encountered; no difference in form exists between third persons singular and plural.

First Main Stem	Second Main Stem	Compound Verb
v?e ¹ 'he deposits'	n ⁴ thao ⁴ 'wind'	v?e ¹ n ⁴ thao ⁴ 'he fans'
s?i ¹ 'he makes'	sa ¹ - 'work'	si ¹ sa ¹ 'he works'
v?e ¹ 'he deposits'	n ¹ lo ¹ 'strong'	v?e ¹ n ¹ lo ¹ 'he braids'
v?a ³ 'he carries'	nk?a ³ 'tall, high'	v?a ³ nk?a ³ 'he carries in his arms'
s?i ¹ 'he makes'	khe ² 'he eats'	si ¹ khe ² 'he feeds'
v?e ¹ 'he deposits'	se ⁴⁻³ 'he sings'	v?e ¹ se ⁴⁻³ 'he whistles'
v?e ¹ 'he deposits'	-ho ³ 'on the surface of'	v?e ¹ ho ³ 'he shaves'
v?a ³ 'he carries'	-kao ⁴ 'and, with'	v?a ³ kao ⁴ 'he goes with someone and carries'

(2) The Basic Toneme of the Second (as Last) Main Stem of the Compound with Fused Tonemes and Fused Vowels of Dependent Pronominal Elements

The independent subject pronouns differ from the independent possessive ones given earlier. They are listed in Table 7 (p. 108) in order that they may be compared there with the cognate dependent forms which are fused to the end of the personal compound verbs.

Preceding the verb, the independent pronoun occurs by itself; optionally, the same subject pronoun may follow the verb, but in that case it is preceded by the proclitic nka³--. In this position after the verb, however, the pronoun is ambiguous, because it may represent the object instead of the subject, though the ambiguity tends to be resolved by the presence of an independent object, or by object-subject pronominal enclitics.

In Table 7 (p. 108) notice that the third-person dependent pronominal form is zero, and does not modify the stem either in pitch or vocally, whereas the first person plural inclusive is toneme 2, first person plural exclusive is toneme 4, and all the others are basically toneme 3.

TABLE 7

Subject Pronouns

Person	Independent form following verb	Independent form preceding verb	Dependent fused form (recent outer layer)
Third persons singular and plural	nka ³ --he ²⁻³	he ²⁻³	zero
First person singular .	nka ³ --?a ³⁻⁴	?a ³⁻⁴	-a ³
Second person singular.	nka ³ --hi ³⁻⁴	hi ³⁻⁴	-i ³
Second person plural..	nka ³ --ho ²⁻³ (alternate, nka ³ --haq ²⁻³)	ho ²⁻³ (alternate, haq ²⁻³)	-o ^{3*}
First person plural exclusive.	nka ³ --hi ⁴ (alternate, nka ³ --ha ⁴)	hi ⁴ (alternate, ha ⁴)	-i ⁴
First person plural inclusive.	nka ³ --ñal ¹⁻³	ñal ¹⁻³	-a ²

*This item is tonemically the same as the two which precede it, but tonomechanically different from them in that in fusion it tends to develop a 4-3 glide instead of remaining 3.

It should be further noted in Table 7 that the tonemes on the isolated independent subject pronouns act like noun phrases, since they contain a down glide at the end. It may be seen that the basic pitches for the first and second person singular and the first person plural exclusive of the dependent forms are the same as the pitch of the independent form apart from the syntactic glide of the independent pronoun, but that none of the other persons have corresponding tonemes between the dependent and independent items.

When the dependent form of the pronominal toneme is fused to personal compounds whose second element is the final verb stem and is any of the types described in the preceding section, the result may usually be predicted both for tonemes and for vowels.

The pitch of the second (as last) stem of the compound with a third-person subject remains the same as the basic stem toneme--that is, on any one of the four level tonemes, or on a glide from 4 to 3, or from 4 to 2. See Table 8a (p. 109) for the formula and Tables 9a-f (pp. 111-116) for the actual data. In using Tables 9a-f one should remember that it is only the final stem of the compound which is at present under consideration.

If the toneme of this stem is pitch 1, and the subject is second person singular, there will be a glide from that pitch to the fused pitch level 3. If the stem pitch is level 2, it also will glide to level 3. If the stem pitch itself is level 3, then complete fusion occurs with the pronominal pitch 3, so that the result is simple toneme 3. If the stem toneme is pitch 4, the fusion with pitch level 3 gives simple toneme 4. If the stem toneme is a glide from 4 to 3, the fusion with 3 gives simple 4-3. If the stem toneme is 4-2, fusion with pronominal pitch 3 gives the glide 4-2-3. For these formulas see Table 8c (p. 109). For the actual data see Tables 9a-f (pp. 111-116).

In the first person singular the same statement holds true, except that the fusion of 3 plus 3 normally gives 2-3 instead of 3; however, there is an arbitrary subclass of stems ending

TABLE 8

Formulas for Fusion of Tonemes of Dependent Subject Pronouns to
Tonemes of Second (as Last) Main Stems of Personal Compounds

TABLE 8a

Stem toneme		Third-person toneme: zero		Fused result
1	+	zero	>	1
2	+	zero	>	2
3	+	zero	>	3
4	+	zero	>	4
4-3	+	zero	>	4-3
4-2	+	zero	>	4-2

TABLE 8b

Stem toneme		First-person singular toneme: 3		Fused result
1	+	3	>	1-3
2	+	3	>	2-3
3	+	3	>	2-3 (or 3, arbitrary subclass)
4	+	3	>	4
4-3	+	3	>	4-3
4-2	+	3	>	4-2-3

TABLE 8c

Stem toneme		Second-person singular toneme: 3		Fused result
1	+	3	>	1-3
2	+	3	>	2-3
3	+	3	>	3
4	+	3	>	4
4-3	+	3	>	4-3
4-2	+	3	>	4-2-3

TABLE 8d

Stem toneme		Second-person plural toneme: 3		Fused result
1	+	3	>	1-3
2	+	3	>	2-3
3	+	3	>	3, varying to 4-3
4	+	3	>	4-3
4-3	+	3	>	4-3, varying to 3
4-2	+	3	>	4-2-3

TABLE 8e

Stem toneme		First-person plural exclusive toneme: 4		Fused result
1	+	4	>	1-4
2	+	4	>	2-4
3	+	4	>	3-4
4	+	4	>	4
4-3	+	4	>	3, varying to 4-3 or possibly 4-3-4
4-2	+	4	>	4-2-4

TABLE 8f

Stem toneme		First-person plural inclusive toneme: 2		Fused result
1	+	2	>	1
2	+	2	>	2 (or 3-2, arbitrary subclass)
3	+	2	>	3-2
4	+	2	>	4-2
4-3	+	2	>	4-2, varying to 3-2
4-2	+	2	>	4-2

TABLE 8g

Summary of Formulas for Fusion of Dependent Subject Pronouns
to Second (as Last) Main Stems of Personal Compound Verbs

Stem toneme	3d-person sing. and pl. to-toneme: zero	1st-person sing. to-toneme: 3	2d-person sing. to-toneme: 3	2d-person pl. to-toneme: 3	1st-person pl. excl. toneme: 4	1st-person pl. incl. toneme: 2
1	1	1-3	1-3	1-3	1-4	1
2	2	2-3	2-3	2-3	2-4	2 (or 3-2, arbitrary subclass)
3	3	2-3 (or 3, arbitrary subclass)	3	3 varying to 4-3	3-4	3-2
4	4	4	4	4-3	4	4-2
4-3 ..	4-3	4-3	4-3	4-3 varying to 3	3 varying to 4-3	4-2 varying to 3-2
4-2 ..	4-2	4-2-3	4-2-3	4-2-3	4-2-4	4-2

in pitch level 3 which, when fused with the pronoun pitch 3, yields level 3. For this formula see Table 8b (p. 109). For the actual data see Tables 9a-f (pp. 111-16).

In the second person plural the results are the same as for the second person singular, except that following pitch 4 a glide develops from 4 to 3, and following pitch 3 or the glide 4-3 the result is either a glide from 4 to 3, or, optionally, simple toneme 3. For these formulas see Table 8d (p. 109). For the actual data see Tables 9a-f (pp. 111-16).

In the first person plural inclusive the fusion of stem toneme 1 with the pronominal toneme 2 gives toneme 1. Fusion of 2 and 2 gives pitch 2, except that in a few verbs there is a glide from 3 to 2 when the compound is accompanied by the incomplete compounded auxiliary. The fusion of 3 plus 2 gives 3-2; of 4 plus 2, 4-2; of 4-3 plus 2, 4-2 with possible alternates to 3-2; and of 4-2 plus 2, 4-2. For these formulas see Table 8f (p. 109). For the actual data see Tables 9a-f (pp. 111-16).

In the first person plural exclusive the fusion of stem tonemes 1, 2, and 3 produces glides from those points to level 4. Fusion of toneme 4 to toneme 4 remains 4; fusion of tonemic glide 4-3 with 4 gives level 3, optionally 4-3, or possibly 4-3-4; and fusion with 4-2 gives 4-2-4. For these formulas see Table 8e (p. 109). For the actual data see Tables 9a-f (pp. 111-16).

These various formulas are summarized in Table 8g, which shows the resultant fusion of pronominal toneme to final stem toneme.

In general, the fusion of two like tonemes produces a single pitch of that same level without extra length. The fusion of two unlike tonemes frequently, but not always, produces a glide between them. Illustrations of these statements will be found in Tables 8 and 9 (pp. 109-10, 111-16).

The fused subject elements at the end of a personal compound verb are indicated not only by the tonemes, but also by the vowels. The vowel of the last main stem fuses with the vowel of the pronominal elements in a very regular pattern: Identical vowels fuse to a single vowel of

TABLE 9

Second (as Last) Main Stem of Personal Compound Verbs with Fused Dependent Subject Pronouns

TABLE 9a

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 1 with Fused Dependent Subject Pronouns

Main stems	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to send' < v ³ e ¹ - 'he deposits' + ša ¹ - 'work'	Timeless	v ³ e ¹ ša ¹	v ³ e ⁴⁻³ ša ¹⁻³	v ³ e ² šai ¹⁻³	v ³ e ² šao ¹⁻³	v ³ e ² šai ¹⁻⁴	v ³ e ² ša ¹
	Complete	ca ³ k ³ e ¹ ša ¹	ca ³ k ³ e ⁴⁻³ ša ¹⁻³	ca ³ k ³ e ² šai ¹⁻³	ca ³ k ³ e ² šao ¹⁻³	ca ³ k ³ e ² šai ¹⁻⁴	ca ³ k ³ e ² ša ¹
	Incomplete	k ³ oe ⁴⁻² ša ¹	k ³ oe ⁴⁻³ ša ¹⁻³	k ³ oe ¹ šai ¹⁻³	k ³ oe ¹ šao ¹⁻³	k ³ oe ¹ šai ¹⁻⁴	k ³ oe ¹ ša ¹
'to braid' < v ³ e ¹ - 'he deposits' + n ³ iq ¹ 'strong'	Timeless	v ³ e ¹ n ³ iq ¹	v ³ e ⁴⁻³ n ³ iq ¹⁻³	v ³ e ² n ³ iq ¹⁻³	v ³ e ² n ³ iq ¹⁻³	v ³ e ² n ³ iq ¹⁻⁴	v ³ e ² n ³ iq ¹
	Complete	ca ³ k ³ e ¹ n ³ iq ¹	ca ³ k ³ e ⁴⁻³ n ³ iq ¹⁻³	ca ³ k ³ e ² n ³ iq ¹⁻³	ca ³ k ³ e ² n ³ iq ¹⁻³	ca ³ k ³ e ² n ³ iq ¹⁻⁴	ca ³ k ³ e ² n ³ iq ¹
	Incomplete	k ³ oe ⁴⁻² n ³ iq ¹	k ³ oe ⁴⁻³ n ³ iq ¹⁻³	k ³ oe ¹ n ³ iq ¹⁻³	k ³ oe ¹ n ³ iq ¹⁻³	k ³ oe ¹ n ³ iq ¹⁻⁴	k ³ oe ¹ n ³ iq ¹
'to play' < s ³ j ¹ - 'he makes' + ska ¹ 'it is foolish'	Timeless	si ¹ ska ¹	si ⁴⁻³ ska ¹⁻³	ni ² skai ¹⁻³	ni ² skao ¹⁻³	ni ² skai ¹⁻⁴	ni ² ska ¹
	Complete	ki ³ si ⁴⁻³ ska ¹	ki ³ si ⁴⁻³ ska ¹⁻³	ki ³ ni ² skai ¹⁻³	ki ³ ni ² skao ¹⁻³	ki ³ ni ² skai ¹⁻⁴	ki ³ ni ² ska ¹
	Incomplete	si ⁴⁻² ska ¹	si ⁴⁻³ ska ¹⁻³	si ⁴ skai ¹⁻³	si ⁴ skao ¹⁻³	si ⁴ skai ¹⁻⁴	si ⁴ ska ¹
'to wrap' < v ³ e ¹ - 'he deposits' + hte ¹ - 'a bundle'	Timeless	v ³ e ¹ hte ¹	v ³ e ⁴⁻³ hte ¹⁻³	v ³ e ² htai ¹⁻³	v ³ e ² htao ¹⁻³	v ³ e ² htai ¹⁻⁴	v ³ e ² hte ¹
	Complete	ca ³ k ³ e ¹ hte ¹	ca ³ k ³ e ⁴⁻³ hte ¹⁻³	ca ³ k ³ e ² htai ¹⁻³	ca ³ k ³ e ² htao ¹⁻³	ca ³ k ³ e ² htai ¹⁻⁴	ca ³ k ³ e ² hte ¹
	Incomplete	k ³ oe ⁴⁻² hte ¹	k ³ oe ⁴⁻³ hte ¹⁻³	k ³ oe ¹ htai ¹⁻³	k ³ oe ¹ htao ¹⁻³	k ³ oe ¹ htai ¹⁻⁴	k ³ oe ¹ hte ¹
'to wear (clothes)' < v ³ a ³ 'he carries' + -kha ¹ 'slantwise'	Timeless	v ³ a ³ kha ¹	v ³ a ³ kha ¹⁻³	č ³ a ² khai ¹⁻³	č ³ a ² khao ¹⁻³	č ³ a ² khai ¹⁻⁴	č ³ a ² kha ¹
	Complete	ca ³ k ³ a ³ kha ¹	ca ³ k ³ a ³ kha ¹⁻³	ki ³ č ³ a ² khai ¹⁻³	ki ³ č ³ a ² khao ¹⁻³	ki ³ č ³ a ² khai ¹⁻⁴	ki ³ č ³ a ² kha ¹
	Incomplete	k ³ oa ⁴ kha ¹	k ³ oa ³ kha ¹⁻³	č ³ a ⁴ khai ¹⁻³	č ³ a ⁴ khao ¹⁻³	č ³ a ⁴ khai ¹⁻⁴	č ³ a ⁴ kha ¹
'to tighten' < va ¹ - 'he places' + ht ¹ - 'a pile'	Timeless	va ¹ ht ¹	va ⁴⁻³ ht ¹	vha ³ ht ¹	vha ³ ht ¹	vha ³ ht ¹	vha ³ ht ¹
	Complete	ca ³ ka ¹ ht ¹	ca ³ ka ⁴⁻³ ht ¹	ca ³ kha ³ ht ¹	ca ³ kha ³ ht ¹	ca ³ kha ³ ht ¹	ca ³ kha ³ ht ¹
	Incomplete	koa ⁴⁻² ht ¹	koa ⁴⁻³ ht ¹	khoa ¹ ht ¹	khoa ¹ ht ¹	khoa ¹ ht ¹	khoa ¹ ht ¹

TABLE 9b

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 2 with Fused Dependent Subject Pronouns

Main stems	Auxiliary stems: zero, ki ³ -, ko ¹ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to toast'	Timeless	si ¹ cho ²	si ⁴⁻³ choa ²⁻³	ni ² choi ²⁻³	ni ² cho ²⁻³	ni ² choi ²⁻⁴	ni ² choa ²
	Complete	ki ³ si ⁴⁻³ cho ²	ki ³ si ⁴⁻³ choa ²⁻³	ki ³ ni ² choi ²⁻³	ki ³ ni ² cho ²⁻³	ki ³ ni ² choi ²⁻⁴	ki ³ ni ² choa ²
	Incomplete	si ⁴⁻² cho ²	si ⁴⁻³ choa ²⁻³	si ⁴ choi ²⁻³	si ⁴ cho ²⁻³	si ⁴ choi ²⁻⁴	si ⁴ choa ²
'to plant'	Timeless	va ¹ nthe ²	va ⁴⁻³ nthe ²⁻³	vha ³ nthai ²⁻³	vha ³ nthao ²⁻³	vha ³ nthai ²⁻⁴	vha ³ nthe ²
	Complete	ca ³ ka ¹ nthe ²	ca ³ ka ⁴⁻³ nthe ²⁻³	ca ³ kha ³ nthai ²⁻³	ca ³ kha ³ nthao ²⁻³	ca ³ kha ³ nthai ²⁻⁴	ca ³ kha ³ nthe ²
	Incomplete	koa ⁴⁻² nthe ²	koa ⁴⁻³ nthe ²⁻³	khoa ¹ nthai ²⁻³	khoa ¹ nthao ²⁻³	khoa ¹ nthai ²⁻⁴	khoa ¹ nthe ²
'to fight'	Timeless	si ¹ tqa ²	si ⁴⁻³ tqa ²⁻³	ni ² tqa ¹ _i ²⁻³	ni ² tqa ² _i ²⁻³	ni ² tqa ²⁻⁴	ni ² tqa ²
	Complete	ki ³ si ⁴⁻³ tqa ²	ki ³ si ⁴⁻³ tqa ²⁻³	ki ³ ni ² tqa ¹ _i ²⁻³	ki ³ ni ² tqa ² _i ²⁻³	ki ³ ni ² tqa ²⁻⁴	ki ³ ni ² tqa ²
	Incomplete	si ⁴⁻² tqa ²	si ⁴⁻³ tqa ²⁻³	si ⁴ tqa ¹ _i ²⁻³	si ⁴ tqa ² _i ²⁻³	si ⁴ tqa ²⁻⁴	si ⁴ tqa ²
'to put on'	Timeless	v?e ¹ sq ²	v?e ⁴⁻³ sq ²⁻³	v?e ² sq ¹ _i ²⁻³	v?e ² sq ² _i ²⁻³	v?e ² sq ²⁻⁴	v?e ² sq ²
	Complete	ca ³ k?e ¹ sq ²	ca ³ k?e ⁴⁻³ sq ²⁻³	ca ³ k?e ² sq ¹ _i ²⁻³	ca ³ k?e ² sq ² _i ²⁻³	ca ³ k?e ² sq ²⁻⁴	ca ³ k?e ² sq ²
	Incomplete	k?oe ⁴⁻² sq ²	k?oe ⁴⁻³ sq ²⁻³	k?oe ¹ sq ¹ _i ²⁻³	k?oe ¹ sq ² _i ²⁻³	k?oe ¹ sq ²⁻⁴	k?oe ¹ soa ^{3-2*}
'to close'	Timeless	v?e ¹ čhoa ²	v?e ⁴⁻³ čhoa ²⁻³	v?e ² čhoai ²⁻³	v?e ² čhoao ²⁻³	v?e ² čhoai ²⁻⁴	v?e ² čhoa ²
	Complete	ca ³ k?e ¹ čhoa ²	ca ³ k?e ⁴⁻³ čhoa ²⁻³	ca ³ k?e ² čhoai ²⁻³	ca ³ k?e ² čhoao ²⁻³	ca ³ k?e ² čhoai ²⁻⁴	ca ³ k?e ² čhoa ²
	Incomplete	k?oe ⁴⁻² čhoa ²	k?oe ⁴⁻³ čhoa ²⁻³	k?oe ¹ čhoai ²⁻³	k?oe ¹ čhoao ²⁻³	k?oe ¹ čhoai ²⁻⁴	k?oe ¹ čhoa ^{2-3*}
'to dry'	Timeless	v?e ¹ ši ²	v?e ⁴⁻³ šia ²⁻³	v?e ² ši ¹ _i ²⁻³	v?e ² šio ²⁻³	v?e ² ši ²⁻⁴	v?e ² šia ²
	Complete	ca ³ k?e ¹ ši ²	ca ³ k?e ⁴⁻³ šia ²⁻³	ca ³ k?e ² ši ¹ _i ²⁻³	ca ³ k?e ² šio ²⁻³	ca ³ k?e ² ši ²⁻⁴	ca ³ k?e ² šia ²
	Incomplete	k?oe ⁴⁻² ši ²	k?oe ⁴⁻³ šia ²⁻³	k?oe ¹ ši ¹ _i ²⁻³	k?oe ¹ šio ²⁻³	k?oe ¹ ši ²⁻⁴	k?oe ¹ šia ^{2-3*}

*Note that these 3-2 glides in the forms with the "incomplete" auxiliary stems and the first person plural inclusive fused subject pronouns are the only tonemes in the last three illustrations which put these three verbs into an arbitrary tonomechanical group different from that to which the first three belong.

TABLE 9c

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 3 with Fused Dependent Subject Pronouns

Main stems	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to hide' < v?e ¹ 'he deposits' + -?ma ³ 'secret'	Timeless	v?e ¹ ?ma ³	v?e ⁴⁻³ ?ma ²⁻³	v?e ² ?mai ³	v?e ² ?mao ³	v?e ² ?mai ³⁻⁴	v?e ² ?ma ³⁻²
	Complete	ca ³ k?e ¹ ?ma ³	ca ³ k?e ⁴⁻³ ?ma ²⁻³	ca ³ k?e ² ?mai ³	ca ³ k?e ² ?mao ³	ca ³ k?e ² ?mai ³⁻⁴	ca ³ k?e ² ?ma ³⁻²
	Incomplete	k?oe ⁴⁻² ?ma ³	k?oe ⁴⁻³ ?ma ²⁻³	k?oe ¹ ?mai ³	k?oe ¹ ?mao ³	k?oe ¹ ?mai ³⁻⁴	k?oe ¹ ?ma ³⁻²
'to beg' < v?e ¹ 'he deposits' + c?oa ³ 'his mouth'	Timeless	v?e ¹ c?oa ³	v?e ⁴⁻³ c?oa ²⁻³	v?e ² c?oai ³	v?e ² c?oao ³	v?e ² c?oai ³⁻⁴	v?e ² c?oa ³⁻²
	Complete	ca ³ k?e ¹ c?oa ³	ca ³ k?e ⁴⁻³ c?oa ²⁻³	ca ³ k?e ² c?oai ³	ca ³ k?e ² c?oao ³	ca ³ k?e ² c?oai ³⁻⁴	ca ³ k?e ² c?oa ³⁻²
	Incomplete	k?oe ⁴⁻² c?oa ³	k?oe ⁴⁻³ c?oa ²⁻³	k?oe ¹ c?oai ³	k?oe ¹ c?oao ³	k?oe ¹ c?oai ³⁻⁴	k?oe ¹ c?oa ³⁻²
'to loose' < s?i ¹ 'he makes' + ča ³ 'to be lacking'	Timeless	si ¹ ča ³	si ⁴⁻³ ča ²⁻³	ni ² čai ³	ni ² čao ³	ni ² čai ³⁻⁴	ni ² ča ³⁻²
	Complete	ki ³ si ⁴⁻³ ča ³	ki ³ si ⁴⁻³ ča ²⁻³	ki ³ čai ³	ki ³ čao ³	ki ³ čai ³⁻⁴	ki ³ ča ³⁻²
	Incomplete	si ⁴⁻² ča ³	si ⁴⁻³ ča ²⁻³	si ⁴ čai ³	si ⁴ čao ³	si ⁴ čai ³⁻⁴	si ⁴ ča ³⁻²
'to cover' < va ¹ 'he places' + -hca ³ 'cover'	Timeless	va ¹ hca ³	va ⁴⁻³ hca ²⁻³	vha ³ hc ¹ i ³	vha ³ hca ³	vha ³ hc ¹ i ³⁻⁴	vha ³ hca ³⁻²
	Complete	ca ³ ka ¹ hca ³	ca ³ ka ⁴⁻³ hca ²⁻³	ca ³ kha ³ hc ¹ i ³	ca ³ kha ³ hca ³	ca ³ kha ³ hc ¹ i ³⁻⁴	ca ³ kha ³ hca ³⁻²
	Incomplete	koa ⁴⁻² hca ³	koa ⁴⁻³ hca ²⁻³	khoa ¹ hc ¹ i ³	khoa ¹ hca ³	khoa ¹ hc ¹ i ³⁻⁴	khoa ¹ hca ³⁻²
'to bless' < s?i ¹ 'he makes' + či ³ kø ³ 'holy'	Timeless	si ¹ či ³ kø ³	si ⁴⁻³ či ³ kø ^{3*}	ni ² či ³ kø ³	ni ² či ³ kø ³	ni ² či ³ kø ¹ ³⁻⁴	ni ² či ³ kø ³⁻²
	Complete	ki ³ si ⁴⁻³ či ³ kø ³	ki ³ si ⁴⁻³ či ³ kø ^{3*}	ki ³ ni ² či ³ kø ³	ki ³ ni ² či ³ kø ³	ki ³ ni ² či ³ kø ¹ ³⁻⁴	ki ³ ni ² či ³ kø ³⁻²
	Incomplete	si ⁴⁻² či ³ kø ³	si ⁴⁻³ či ³ kø ^{3*}	si ⁴ či ³ kø ³	si ⁴ či ³ kø ³	si ⁴ či ³ kø ¹ ³⁻⁴	si ⁴ či ³ kø ³⁻²
'to fold' < kho ³ 'he changes the direction of' + -nki ³ 'underneath'	Timeless	kho ³ nki ³	kho ³ nkia ^{3*}	čho ³ nki ³	čho ³ nkio ³	čho ³ nki ³⁻⁴	čho ³ nkia ³⁻²
	Complete	ki ³ sko ³ nki ³	ki ³ sko ³ nkia ^{3*}	ki ³ čho ³ nki ³	ki ³ čho ³ nkio ³	ki ³ čho ³ nki ³⁻⁴	ki ³ čho ³ nkia ³⁻²
	Incomplete	sko ⁴ nki ³	sko ³ nkia ^{3*}	čho ¹ nki ³	čho ¹ nkio ³	čho ¹ nki ³⁻⁴	čho ¹ nkia ³⁻²

* Words which have toneme 3 in the first person singular constitute an arbitrary tonomechanical group different from that which has a 2-3 glide in that person.

TABLE 9d

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 4 with Fused Dependent Subject Pronouns

Main stems	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -s ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to break up' < s?j ¹ 'he makes' + -ško ⁴ 'pieces'	Timeless	si ¹ ško ⁴	si ⁴⁻³ ško ⁴	ni ² škoai ⁴	ni ² škoao ⁴⁻³	ni ² škoai ⁴	ni ² ško ⁴⁻²
	Complete	ki ³ si ⁴⁻³ ško ⁴	ki ³ si ⁴⁻³ ško ⁴	ki ³ ni ² škoai ⁴	ki ³ ni ² škoao ⁴⁻³	ki ³ ni ² škoai ⁴	ki ³ ni ² ško ⁴⁻²
	Incomplete	si ⁴⁻² ško ⁴	si ⁴⁻³ ško ⁴	si ⁴ škoai ⁴	si ⁴ škoao ⁴⁻³	si ⁴ škoai ⁴	si ⁴ ško ⁴⁻²
'to read' < v?e ¹ 'he deposits' + -škia ⁴ '??'	Timeless	v?e ¹ škia ⁴	v?e ⁴⁻³ škia ⁴	v?e ² škiai ⁴	v?e ² škiao ⁴⁻³	v?e ² škiai ⁴	v?e ² škia ⁴⁻²
	Complete	ca ³ k?e ¹ škia ⁴	ca ³ k?e ⁴⁻³ škia ⁴	ca ³ k?e ² škiai ⁴	ca ³ k?e ² škiao ⁴⁻³	ca ³ k?e ² škiai ⁴	ca ³ k?e ² škia ⁴⁻²
	Incomplete	k?oe ⁴⁻² škia ⁴	k?oe ⁴⁻³ škia ⁴	k?oe ¹ škiai ⁴	k?oe ¹ škiao ⁴⁻³	k?oe ¹ škiai ⁴	k?oe ¹ škia ⁴⁻²
'to fan' < v?e ¹ 'he deposits' + nthao ⁴ 'wind'	Timeless	v?e ¹ nthao ⁴	v?e ⁴⁻³ nthao ⁴	v?e ² nthoai ⁴	v?e ² nthao ⁴⁻³	v?e ² nthoai ⁴	v?e ² nthoa ⁴⁻²
	Complete	ca ³ k?e ¹ nthao ⁴	ca ³ k?e ⁴⁻³ nthao ⁴	ca ³ k?e ² nthoai ⁴	ca ³ k?e ² nthao ⁴⁻³	ca ³ k?e ² nthoai ⁴	ca ³ k?e ² nthoa ⁴⁻²
	Incomplete	k?oe ⁴⁻² nthao ⁴	k?oe ⁴⁻³ nthao ⁴	k?oe ¹ nthoai ⁴	k?oe ¹ nthao ⁴⁻³	k?oe ¹ nthoai ⁴	k?oe ¹ nthoa ⁴⁻²
'to touch' < s?j ¹ 'he makes' + -kao ⁴ 'with, and'	Timeless	si ¹ kao ⁴	si ⁴⁻³ ko ⁴	ni ² koai ⁴	ni ² kao ⁴⁻³	ni ² koai ⁴	ni ² ko ⁴⁻²
	Complete	ki ³ si ⁴⁻³ kao ⁴	ki ³ si ⁴⁻³ ko ⁴	ki ³ ni ² koai ⁴	ki ³ ni ² kao ⁴⁻³	ki ³ ni ² koai ⁴	ki ³ ni ² ko ⁴⁻²
	Incomplete	si ⁴⁻² kao ⁴	si ⁴⁻³ ko ⁴	si ⁴ koai ⁴	si ⁴ kao ⁴⁻³	si ⁴ koai ⁴	si ⁴ ko ⁴⁻²
'to pick' < v?a ³ 'he carries' + -he ⁴ 'downward'	Timeless	v?e ³ he ⁴	v?e ³ he ⁴	č?e ² ha ⁴	č?e ² haq ⁴⁻³	č?e ² hai ⁴	č?e ² he ⁴⁻²
	Complete	ca ³ k?e ³ he ⁴	ca ³ k?e ³ he ⁴	ki ³ č?e ² ha ⁴	ki ³ č?e ² haq ⁴⁻³	ki ³ č?e ² hai ⁴	ki ³ č?e ² he ⁴⁻²
	Incomplete	k?oe ⁴ he ⁴	k?oe ³ he ⁴	č?e ⁴ ha ⁴	č?e ⁴ haq ⁴⁻³	č?e ⁴ hai ⁴	č?e ⁴ he ⁴⁻²
'to begin' < v?e ¹ 'he deposits' + -c?ia ⁴ '??'	Timeless	v?e ¹ c?ia ⁴	v?e ⁴⁻³ c?ia ⁴	v?e ² c?iai ⁴	v?e ² c?iao ⁴⁻³	v?e ² c?iai ⁴	v?e ² c?ia ⁴⁻²
	Complete	ca ³ k?e ¹ c?ia ⁴	ca ³ k?e ⁴⁻³ c?ia ⁴	ca ³ k?e ² c?iai ⁴	ca ³ k?e ² c?iao ⁴⁻³	ca ³ k?e ² c?iai ⁴	ca ³ k?e ² c?ia ⁴⁻²
	Incomplete	k?oe ⁴⁻² c?ia ⁴	k?oe ⁴⁻³ c?ia ⁴	k?oe ¹ c?iai ⁴	k?oe ¹ c?iao ⁴⁻³	k?oe ¹ c?iai ⁴	k?oe ¹ c?ia ⁴⁻²

TABLE 9e

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 4-3 with Fused Dependent Subject Pronouns

Main stem	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to bury' < v ² e ¹ 'he deposits' + -ñai ⁴⁻³ ?!	Timeless	v ² e ¹ ñai ⁴⁻³	v ² e ⁴⁻³ ñe ⁴⁻³	v ² e ² ñai ⁴⁻³	v ² e ² ñao ⁴⁻³	v ² e ² ñai ³	v ² e ² ñe ⁴⁻²
	Complete	ca ³ k ² e ¹ ñai ⁴⁻³	ca ³ k ² e ⁴⁻³ ñe ⁴⁻³	ca ³ k ² e ² ñai ⁴⁻³	ca ³ k ² e ² ñao ⁴⁻³	ca ³ k ² e ² ñai ³	ca ³ k ² e ² ñe ⁴⁻²
	Incomplete	k ² oe ⁴⁻² ñai ⁴⁻³	k ² oe ⁴⁻³ ñe ⁴⁻³	k ² oe ¹ ñai ⁴⁻³	k ² oe ¹ ñao ⁴⁻³	k ² oe ¹ ñai ³	k ² oe ¹ ñe ⁴⁻²
'to chase' < v ² e ¹ 'he deposits' + te ⁴⁻³ 'broad'	Timeless	v ² e ¹ te ⁴⁻³	v ² e ⁴⁻³ te ⁴⁻³	v ² e ² tai ⁴⁻³	v ² e ² tao ⁴⁻³	v ² e ² tai ³	v ² e ² te ⁴⁻²
	Complete	ca ³ k ² e ¹ te ⁴⁻³	ca ³ k ² e ⁴⁻³ te ⁴⁻³	ca ³ k ² e ² tai ⁴⁻³	ca ³ k ² e ² tao ⁴⁻³	ca ³ k ² e ² tai ³	ca ³ k ² e ² te ⁴⁻²
	Incomplete	k ² oe ⁴⁻² te ⁴⁻³	k ² oe ⁴⁻³ te ⁴⁻³	k ² oe ¹ tai ⁴⁻³	k ² oe ¹ tao ⁴⁻³	k ² oe ¹ tai ³	k ² oe ¹ te ⁴⁻²
'to medicine' < s ² j ¹ 'he makes' + ški ⁴⁻³ 'medicine'	Timeless	si ¹ ški ⁴⁻³	si ⁴⁻³ škia ⁴⁻³	ni ² ški ⁴⁻³	ni ² škio ⁴⁻³	ni ² ški ³	ni ² škia ⁴⁻²
	Complete	ki ³ si ⁴⁻³ ški ⁴⁻³	ki ³ si ⁴⁻³ škia ⁴⁻³	ki ³ ni ² ški ⁴⁻³	ki ³ ni ² škio ⁴⁻³	ki ³ ni ² ški ³	ki ³ ni ² škia ⁴⁻²
	Incomplete	si ⁴⁻² ški ⁴⁻³	si ⁴⁻³ škia ⁴⁻³	si ⁴ ški ⁴⁻³	si ⁴ škio ⁴⁻³	si ⁴ ški ³	si ⁴ škia ⁴⁻²
'to heat' < va ¹ - 'he places' + so ⁴⁻³ 'warm'	Timeless	va ¹ so ⁴⁻³	va ⁴⁻³ soa ⁴⁻³	vha ³ soi ⁴⁻³	vha ³ so ⁴⁻³	vha ³ soi ³	vha ³ soa ⁴⁻²
	Complete	ca ³ ka ¹ so ⁴⁻³	ca ³ ka ⁴⁻³ soa ⁴⁻³	ca ³ kha ³ soi ⁴⁻³	ca ³ kha ³ so ⁴⁻³	ca ³ kha ³ noi ³	ca ³ kha ³ soa ⁴⁻²
	Incomplete	koa ⁴⁻² so ⁴⁻³	koa ⁴⁻³ soa ⁴⁻³	khoa ¹ soi ⁴⁻³	khoa ¹ so ⁴⁻³	khoa ¹ soi ³	khoa ¹ soa ⁴⁻²
'to carry (on back)' < v ² a ³ 'he carries' + -mi ⁴⁻³ 'upward'	Timeless	v ² a ³ mi ⁴⁻³	v ² a ³ mia ⁴⁻³	č ² a ² mi ⁴⁻³	č ² a ² mio ⁴⁻³	č ² a ² mi ³	č ² a ² mia ⁴⁻²
	Complete	ca ³ k ² a ³ mi ⁴⁻³	ca ³ k ² a ³ mia ⁴⁻³	ki ³ č ² a ² mi ⁴⁻³	ki ³ č ² a ² mio ⁴⁻³	ki ³ č ² a ² mi ³	ki ³ č ² a ² mia ⁴⁻²
	Incomplete	k ² oa ⁴ mi ⁴⁻³	k ² oa ³ mia ⁴⁻³	č ² a ⁴ mi ⁴⁻³	č ² a ⁴ mio ⁴⁻³	č ² a ⁴ mi ³	č ² a ⁴ mia ⁴⁻²
'to whistle' < v ² e ¹ 'he deposits' + se ⁴⁻³ 'he sings'	Timeless	v ² e ¹ se ⁴⁻³	v ² e ⁴⁻³ se ⁴⁻³	v ² e ² sai ⁴⁻³	v ² e ² sao ⁴⁻³	v ² e ² sai ³	v ² e ² se ⁴⁻²
	Complete	ca ³ k ² e ¹ se ⁴⁻³	ca ³ k ² e ⁴⁻³ se ⁴⁻³	ca ³ k ² e ² sai ⁴⁻³	ca ³ k ² e ² sao ⁴⁻³	ca ³ k ² e ² sai ³	ca ³ k ² e ² se ⁴⁻²
	Incomplete	k ² oe ⁴⁻² se ⁴⁻³	k ² oe ⁴⁻³ se ⁴⁻³	k ² oe ¹ sai ⁴⁻³	k ² oe ¹ sao ⁴⁻³	k ² oe ¹ sai ³	k ² oe ¹ se ⁴⁻²

TABLE 9f

Second (as Last) Main Stem of Personal Compound Verbs Ending in Toneme 4-2 with Fused Dependent Subject Pronouns

Main stem	Auxiliary stems: zero, ki ³ , koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to travel'	Timeless	va ¹ ntia ⁴⁻²	va ⁴⁻³ ntia ⁴⁻²⁻³	vha ³ ntiai ⁴⁻²⁻³	vha ³ ntiao ⁴⁻²⁻³	vha ³ ntiai ⁴⁻²⁻⁴	vha ³ ntia ⁴⁻²
< va ¹ - 'he places' + ntia ⁴⁻² 'road'	Complete	ca ³ ka ¹ ntia ⁴⁻²	ca ³ ka ⁴⁻³ ntia ⁴⁻²⁻³	ca ³ kha ³ ntiai ⁴⁻²⁻³	ca ³ kha ³ ntiao ⁴⁻²⁻³	ca ³ kha ³ ntiai ⁴⁻²⁻⁴	ca ³ kha ³ ntia ⁴⁻²
	Incomplete	koa ⁴⁻² ntia ⁴⁻²	koa ⁴⁻³ ntia ⁴⁻²⁻³	khoa ¹ ntiai ⁴⁻²⁻³	khoa ¹ ntiao ⁴⁻²⁻³	khoa ¹ ntiai ⁴⁻²⁻⁴	khoa ¹ ntia ⁴⁻²

that same quality. A pronominal vowel -i or a pronominal -o, apart from the coalescence just mentioned, remains unchanged, but certain of the stem vowels preceding them are modified. Before pronominal -i a stem vowel e becomes a and ao becomes oa. Before pronominal -o a stem vowel e becomes a and ai also becomes a (probably by analogy with the other second-person plural forms in which pronominal -o of the plural corresponds to pronominal -i of the singular).

These statements are illustrated by formulas in Table 10 (pp. 118-19).² In Tables 10a, 10b, 10c three sample stem vowels are listed before each of the pronominal elements. Then these tables, with the remaining data for other stem vowels, are summarized in Table 10d. For the actual data illustrating these formulas--and from which the formulas were derived--see Tables 9a-f (pp. 111-16).

The resultant form of the end of a personal compound can, then, be mechanically predicted in almost every case, provided that one knows the stem toneme and stem vowel of the last part of the compound. The resulting vocalic nucleus can be predicted by consulting Table 10 (pp. 118-19), and the resulting tonemic nucleus can be predicted by consulting Table 8 (pp. 109-10). The only exception to this rule is that with stem tonemes 3 and 2 one must find by experiment whether the toneme is in one of the arbitrary subclasses listed in Tables 8b and 8f. In other words, although the data as such are extremely complicated, the resultant forms are nevertheless highly regular and form an intricate structural pattern which is one of the most characteristic features of the language. This is especially true since the personal compound verbs comprise a large percentage of the verbal forms that actually occur in any given text. In one text examined personal compound items constitute 32 per cent (112 out of 348) of the total number of verb forms. Furthermore, there are a great many more compound verbs than noncompounded ones--348 personal compounds in lists presented later, as against 66 noncompounded personal verbs; in addition, more compounds are being discovered frequently, but noncompounded verbs only very rarely.

Three illustrations will be given to demonstrate the manner of utilizing these tables.

The verb si¹ska¹ in Mazateco means 'he plays (a game).' This has a third-person subject, and so the final vocalic nucleus represents the unmodified final stem vowel a and final stem toneme 1 (see Tables 9a [p. 111], 10d [p. 119], 8g [p. 110]). If one wishes to construct, say, the form of the second person plural, he must fuse to the stem the dependent pronominal element -o³ (Table 7 [p. 108]). The stem toneme 1 plus the pronominal toneme 3 produces a glide 1-3 (Tables 8d, 8g). The stem vowel a plus the pronominal vowel o gives ao (Table 10d). The actual fused nucleus of the second stem of the compound plus the fused pronominal element, then, would be ao¹⁻³. If, now, one turns to the data in Table 9a, the actual form encountered is ni²ska¹⁻³ 'you (pl.) play (a game).' (Changes in the first stem, such as from si to ni, will be handled presently; see also Table 12 [pp. 141-46].)

It should be emphasized, in this illustration and the remaining ones, that the data were first collected and the formulas then deduced from the data. The tabular data were not modified in order to support the formulas.

To predict the last stem of the first person plural inclusive from the second stem seen in the third singular v?e¹te⁴⁻³ 'he chases,' one fuses to the stem nucleus e⁴⁻³ the pronominal -a². The fusion of pitches 4-3 plus 2 gives 4-2, or the occasional freely variant pronunciation 3-2 (Table 8f [p. 109]). The vowel e fused to a results in e (Table 10b [p. 118]). The fused nucleus with vowel and toneme would then be e⁴⁻² or e³⁻². The data in Table 9e (p. 115) record the permitted variant v?e²te⁴⁻². (The change in the toneme of the first stem will be described later; see also Table 12 [pp. 141-46].)

If one wishes to predict the second stem of the first person singular from the third person v?e¹c?oa³ 'he begs,' one fuses to the stem nucleus oa³ the pronominal element -a³ (Table 7 [p. 108]). The fusion of the vowels oa with a gives oa (Table 10c [p. 118]). The fusion of the stem toneme 3 to the pronominal first-person toneme 3 will produce either 2-3 or 3 (Table 8b [p. 109]), depending upon the arbitrary subclass of the particular verb; the word must actually be

²Certain of these vocalic formulas were earlier postulated by my colleague, E. A. Nida.

TABLE 10

Formulas for Fusion of the Vowels of Pronominal Elements to the Vowels
of the Second (as Last) Main Stems of Personal Compounds

TABLE 10a

Person	Stem vowel: -o		Pronominal vowel		Fused result
Third singular and plural	o	+	zero	>	o
First singular	o	+	a	>	oa
Second singular	o	+	i	>	oi
Second plural	o	+	o	>	o
First plural exclusive ...	o	+	i	>	oi
First plural inclusive ...	o	+	a	>	oa

TABLE 10b

Person	Stem vowel: -e		Pronominal vowel		Fused result
Third singular and plural	e	+	zero	>	e
First singular	e	+	a	>	e
Second singular	e	+	i	>	ai
Second plural	e	+	o	>	ao
First plural exclusive ...	e	+	i	>	ai
First plural inclusive ...	e	+	a	>	e

TABLE 10c

Person	Stem vowel: -oa		Pronominal vowel		Fused result
Third singular and plural	oa	+	zero	>	oa
First singular	oa	+	a	>	oa
Second singular	oa	+	i	>	oai
Second plural	oa	+	o	>	ooo
First plural exclusive ...	oa	+	i	>	oai
First plural inclusive ...	oa	+	a	>	oa

TABLE 10d

Summary of Formulas for Fusion of Pronominal Vowels
to Final-Stem Vowels

Last Stem vowel(s) of compound	3d-persons sing. and pl. vowel: zero	1st-person sing. vowel: -a	2d-person sing. vowel: -i	2d-person pl. vowel: -o	1st-person pl. excl. vowel: -i	1st-person pl. incl. vowel: -a
i	i	ia*	i	io†	i	ia*
e	e	e	ai	ao	ai	e
a	a	a	ai	ao	ai	a
o	o	oa	oi	o	oi	oa
ia	ia	ia	iai	iao	iai	ia
io	io	ios	ioi	io	ioi	ioa
ai	ai	e	ai	ao	ai	e
ao	ao	oa§	oai	ao	oai	oa§
oi	oi	oia	oi	io	oi	oia
oe	oe	oe	oai	oao	oai	oe
oa	oa	oa	oai	oao	oai	oa

* But preceded by č, > a; also, ?i + a/o > ?ya/o.

† But preceded by č, > o.

§ But preceded by v(?), > a.

heard before one can know which of the two forms will occur. If one were to hear this particular word in that person, he would receive the pronunciation v?e⁴⁻³c²⁻³oa²⁻³ 'I beg,' which is recorded in Table 9c (p. 113).

Many other personal compound verbs follow the same rules. Note the following list:

Personal Compounds Which Contain Two Simple Main Stems

- si¹ča³ 'he loses' (< s?j¹ 'he makes' + ča³ 'it is lacking')
- si¹čo³ 'he makes it look that way' (-čo³ 'weather, scenery')
- si¹če² 'he steals' (-če² 'softly')
- si¹čhe² 'he uses' (-čhe² 'useful')
- si¹čha¹ 'he cooks' (-čha¹ 'cooked')
- si¹čoa³ 'he whitens' (čoa³ 'white')
- si¹hča¹ 'he raises' (hča¹ 'old')
- si¹he¹ 'he asks for' (he¹ 'fault')
- si¹he³ 'he fattens' (he³ 'fat')
- si¹hnta² 'he borrows' (-hnta³ '?')
- si¹hnti¹ 'he dirties' (hnti¹ 'dirty')
- si¹kao⁴ 'he touches' (-kao⁴ 'and, with')
- si¹khe² 'he feeds, boards (someone)' (khe² 'he eats')

- si¹khie² (or si¹khe²) 'he uses up' (-khie² '?')
- si¹k?i⁴⁻³ 'he paints' (-k?i⁴⁻³ '?')
- si¹nta⁴⁻³ 'he makes' (nta⁴⁻³ 'good, straight, in order')
- si¹ska¹ 'he plays' (ska¹ 'it is foolish')
- si¹s¹₃ 'he takes care of' (-s¹₃ '!?)
- si¹ši² 'he dries' (-ši² 'dry')
- si¹šal 'he works' (šal 'work')
- si¹ški⁴ 'he counts, measures' (-ški⁴ '?')
- si¹ški⁴⁻³ 'he medicates, treats' (ški⁴⁻³ 'medicine')
- si¹škoə⁴ 'he breaks in pieces' (škoə⁴ 'a piece')
- si¹šo³ 'he boils' (-šo³ 'it boils')
- si¹š?i⁴⁻³ 'he grinds' (-š?i⁴⁻³ 'powderlike')
- si¹te² 'he spins' (te² 'he dances')
- si¹te³ 'he makes into ten pieces' (te³ 'ten')
- si¹te⁴⁻³ 'he widens, pats out corncakes' (te⁴⁻³ 'wide')
- si¹the⁴⁻³ 'he coughs' (the⁴⁻³ 'itchy')
- si¹toa² 'he fights' (toa² 'fierce')
- si¹choa³ 'he pleases, makes happy' (choa³ 'happy')
- si¹cho² 'he toasts' (cho² 'crisp')
- si¹c¹₄₋₃ (or si¹hc¹₄₋₃) 'he delivers (e.g. a baby)' (c¹₄₋₃ 'he is born')
- si¹ya³ 'he mimics' (-ya³ 'inside')
- si¹yao³ 'he sharpens' (yao³ 'sharp')
- si¹?ya⁴ 'he makes string' (-?ya⁴ '?')
- va¹čha¹ 'he roasts' (< va¹ 'he places' + -čha¹ 'cooked')
- va¹h¹₄₋₃ 'he mixes in' (-h¹₄₋₃ 'penetrated throughout')
- va¹ht¹₁ 'he binds' (ht¹₁ 'a pile')
- va¹hca³ 'he covers' (-hca³ 'covering')
- va¹hčo³ 'he covers the opening' (-hčo³ 'in open form')
- va¹ne² 'he bears down, i.e. 'works hard' (-ne² 'downward with force')
- va¹nki³ 'he accuses' (-nki³ 'beneath')
- va¹nta⁴⁻³ 'he spreads out' (nta⁴⁻³ 'good, straight, in order')
- va¹nthe² 'he plants (e.g. a field)' (nthe² 'a hill [of corn]')
- va¹shai³ 'he looks for' (-shai³ '?')
- va¹so² 'he places over the fire, he takes hold of' (-so² 'on top of')
- va¹ši² 'he spreads out to dry' (-ši² 'dry')
- va¹te⁴⁻³ 'he folds' (te⁴⁻³ 'wide')
- va¹thao² 'he puts away and keeps' (-thao² 'kept')
- va¹cho² 'he toasts' (cho² 'crisp')
- va¹t?a⁴⁻³ 'he sticks (something) (e.g. a bur) to' (-t?a⁴⁻³ 'against')
- va¹ya³ 'he wears (e.g. sandals), she puts (e.g. a corncake) on the griddle' (-ya³ 'inside')
- va¹?a³ 'she weaves' (-?a³ 'face to face')
- va³h³ 'he spreads' (< va³ '?' + h³ 'on the surface of')
- va³ki³ 'the baby nurses' (-ki³ 'nipple')
- v?a³če² 'he steals' (< v?a³ 'he carries' + -če² 'softly')
- v?a³he⁴ 'he picks (e.g. coffee), he lowers' (-he⁴ 'downward')
- v?a³kao⁴ 'he goes with someone and carries' (-kao⁴ 'and, with')
- v?a³kha¹ 'he wears (e.g. clothes)' (-kha¹ 'slantwise')
- v?a³mi⁴⁻³ 'he carries on his back' (-mi⁴⁻³ 'upward')
- v?a³nk?a³ 'he carries in his arms' (nk?a³ 'tall')
- v?a³ntha² 'he trades' (-ntha² 'overflowingly, intermediary')
- v?a³she³ 'he takes out' (-she³ 'out from')
- v?a³the⁴ 'he falls' (-the⁴ 'following')
- v?a³to³ 'he carries by' (-to³ 'through, by')
- v?e¹ča³ 'he sweeps' (< v?e¹ 'he deposits, gives birth to, hits' + ča³ 'it is lacking')

- v?e¹čhi¹ 'he pays' (čhi¹ 'it is expensive')
- v?e¹čhoa² 'he closes' (-čhoa² 'shut')
- v?e¹ča¹ 'he spits' (-ča¹ 'saliva')
- v?e¹ha¹ 'he roasts' (-ha¹ 'oven')
- v?e¹hčo³ 'he patches' (-hčo³ 'in open form')
- v?e¹h₄₋₃ 'he puts in' (-h₄₋₃ 'penetrated throughout')
- v?e¹hnta³ 'he tears' (-hnta³ 'two things related')
- v?e¹hq³ 'he shaves' (-hq³ 'in relation to the surface of')
- v?e¹hte¹ 'he wraps' (hte¹ 'a bundle')
- v?e¹hte⁴⁻³ 'he throws out' (-hte⁴⁻³ 'up side down')
- v?e¹htia¹ 'he ties' (-htia¹ 'knot')
- v?e¹hc?₁ 'it sprouts' (third person only) (hc?₁ 'a sucker')
- v?e¹hve³ 'he drags' (-hve³ 'in motion over the ground')
- v?e¹kha¹ 'he ties around his waist' (-kha¹ 'slantwise')
- v?e¹kha₄₋₃ 'he fits together' (-khao⁴⁻³ 'fitted')
- v?e¹ne² 'he pounds, commands' (-ne² 'forcefully downward')
- v?e¹nki³ 'she wears hanging down (e.g. earrings)' (-nki³ 'beneath')
- v?e¹nta₄₋₃ 'he builds, cooks' (nta₄₋₃ 'good, straight, in order')
- v?e¹nthao⁴ 'he fans, winnows' (nthao⁴ 'wind')
- v?e¹nthe² 'he plants' (nthe²- 'a hill [of corn]')
- v?e¹n?io¹ 'he braids' (n?io¹ 'strong or forceful')
- v?e¹ñai₄₋₃ 'he buries' (-ñai₄₋₃ '?')
- v?e¹se⁴⁻³ 'he whistles' (se⁴⁻³ 'he sings')
- v?e¹shoe² 'he heats' (shoe² 'hot')
- v?e¹skoa¹ 'he engages in a raffle' (-skoa¹ '?')
- v?e¹so⁴⁻³ 'he warms' (so⁴⁻³ 'warm')
- v?e¹so² 'he puts (e.g. on the fire)' (-so² 'on top of')
- v?e¹ša¹ 'he sends (someone)' (ša¹ 'work')
- v?e¹ši² 'he dries' (-ši² 'dry')
- v?e¹ški⁴ 'he counts' (-ški⁴ '?')
- v?e¹škia⁴ 'he reads' (-škia⁴ '?')
- v?e¹ško¹ 'he gathers' (-ško¹ 'doubled')
- v?e¹ško¹ 'he watches' (-ško¹ 'amazing')
- v?e¹šo² 'he boils' (-šo² 'it boils')
- v?e¹š?i¹ 'he pinches' (-š?i¹ '?')
- v?e¹te⁴⁻³ 'he chases' (te⁴⁻³ 'wide')
- v?e¹tha³ 'he toasts' (tha³ 'light in weight')
- v?e¹thao² 'he guards, keeps' (-thao² 'kept')
- v?e¹thi³ 'he spins' (thi³ 'round')
- v?e¹tia³ 'he empties' (-tia³ 'empty')
- v?e¹tqa³ 'he puts in an order for' (-tqa³ '?')
- v?e¹ce³ 'he blows' (-ce³ '?')
- v?e¹c?ia⁴ 'he begins' (-c?ia⁴ 'in the beginning')
- v?e¹c?oa³ 'he begs' (c?oa³ 'his mouth')
- v?e¹ya³ 'he serves (the table)' (-ya³ 'inside')
- v?e¹?ma³ 'he hides (something)' (-?ma³ 'out of sight')

Note also the following personal compound verbs, with first main stem cognate, but with vague meanings:

- kho³mi⁴⁻³ 'he picks up' (< kho³ 'to change the direction of' + -mi⁴⁻³ 'upward')
- kho³nki³ 'he folds' (-nki³ 'beneath')
- kho³nthai² 'she embroiders' (-nthai² 'overflowingly, intermediary')
- kho³t?ao¹ 'he breaks (e.g. a stick)' (-t?ao¹ '?')

- kho³?ai² 'he opens (e.g. a box)' (-ai² '?')
- kho³?nto¹ 'he pulls' (-?nto¹ '?')
- kho³ya³ 'he sews by machine' (< kho³- '?' + -ya³ 'inside')
- kho²he³ (or kho²he³) 'he swallows' (-he⁴ 'downward'--note the more usual tonemic form)
- ko³hnta¹ 'he ties' (< ko³- 'to investigate' + -hnta¹ '?')
- ko³nhe⁴ 'he smells (something)' (nhe⁴ 'smelly')
- ko³nkha⁴ 'he washes his face' (-nkha⁴ 'face' [?])
- ko³ce⁴⁻³ 'he looks' (-ce⁴⁻³ 'in sight')
- ko³t?ta⁴⁻³ 'he tests' (-t?ta⁴⁻³ 'against')
- ko³ya³ 'he waits' (-ya³ 'inside')
- ko³?a³ 'he stares' (-?a³ 'face to face')
- ko³?nta³ 'he takes care of (e.g. animals)' (-?nta³ '?')
- ko³s?a⁴ (or ko³s?a⁴) 'he opens (e.g. a door)' (< ko³- '?' + -s?a⁴ 'a hole')

Note, also, a few defective and rare first main stems:

(c is alphabetized in the Mazateco verb lists under its phonetic components [ts].)

- ka⁴⁻³t?ta⁴⁻³ 'he falls against' (< ka⁴⁻³ 'he falls' + -t?ta⁴⁻³ 'against')
- khi²⁻⁴ne² 'he jumps on' (< khi² 'he jumps' + ha⁴⁻ 'place' [?] + -ne² 'forcefully downward')
- khi³?ntia¹ 'he cries' (< khi³- '?' + -?ntia¹ '?')
- khoe²thao² 'he takes to care for' (< khoe² 'he takes' + -thao² 'kept')
- mo³hnka² 'he shells (e.g. peas)' (< mo³- '?' + -hnka² '?')
- m?aq³she³ 'he puts out' (< m?aq³- '?' + -she³ 'out from')
- m?o¹h⁴⁻³ 'he mixes up' (< m?o¹- '?' + -h⁴⁻³ 'penetrated throughout')
- n?oa²keo⁴ 'he comes with' (< n?oa² 'he comes' + -keo⁴ 'and, with')
- n?oa²s?e⁴⁻³ 'he comes in' (-s?e⁴⁻³ 'into')
- si²⁻⁴ncha³ 'he protects' (< si²⁻⁴- '?' + ncha³ 'his hand')
- thio¹⁻³kao⁴ 'they are with' (< thio¹⁻³ 'they are' [third person plural only] + -kao⁴ 'and, with')
- thio¹⁻³ko³ 'they are alive, awake' (-ko³ 'mentally')
- thio¹⁻³ya³ 'they are inside' (-ya³ 'inside')
- choa¹so² 'he gives more than necessary' (< choa¹ 'he gives' + -so² 'on the top of')
- choa¹?nte³ 'he grants permission, authority' (?nte³⁻ 'land')
- ve³sko¹ 'he worships' (< ve³ 'he knows' + -sko¹ 'amazing')
- vha¹kao⁴ 'he talks with' (< vha¹- '?' + -kao⁴ 'and, with')
- vha³h⁴⁻³ 'he selects' (< vha³- '?' + -h⁴⁻³ 'penetrated throughout')
- vha³ne³ 'it resounds' (third person only) (-ne³ '?')
- vha¹⁻³a³ 'they converse' (< vha¹⁻³- '?' + -?a³ 'face to face')
- vhi³co⁴⁻³ 'it becomes useless' (< vhi³- '?' + -co⁴⁻³ 'useless')
- vhi³c?ao³ 'it goes out' (-c?ao³ '?')

(3) The Basic Toneme of the Second (as Last) Main Stem of the Compound Preceding Object-Subject Enclitics

When a transitive verb has a pronoun as its "object"--whether the translation be to an English direct or indirect object--the toneme of the last stem of the compound is found in two different forms, depending upon the personal dialect of the speaker. Very close neighbors, who live no more than two hundred yards from each other, may differ.

The dialect of Camila Carrera de Martinez typifies the simpler of one such pair of dialects. The other is exemplified in the speech of Petra Martinez Pineda, distantly related to Camila and living near her. Camila's dialect will be discussed first.

In Camila's dialect the stem toneme remains unchanged before the object enclitic. A basic stem toneme which is high on the second (as last) main stem of the compound remains high regardless of the object form which it precedes, and so on. Notice the following illustrations:

Compound stem	Object- subject enclitic	Result
<u>v²e²ša¹-</u>	+ <u>-le⁴⁻²</u> > <u>v²e²ša¹-le⁴⁻²</u> 'we (incl.) send him'	
<u>v²e²škia⁴-</u>	+ <u>-le⁴⁻²</u> > <u>v²e²škia⁴-le⁴⁻²</u> 'we (incl.) read it'.	

The object pronouns never occur independently. Their forms must be abstracted from the object-subject fused forms which occur encliticized to verbs. For a complete list of the fused object-subject forms and for the abstracted object and subject data, see Table 11.

TABLE 11

Enclitics Formed from the Fusion of Dependent Subject Pronouns to Dependent Object Pronouns in the Dialect in Which They Are Not Fused to the Last Stem

Object form of person	Subject form of person	Fused enclitic
Third singular and plural ... -le ⁴ -	+ Third singular and plural ... zero > -le ⁴	
	-le ⁴ - + First singular -a ³ > -le ⁴	
	-le ⁴ - + Second singular -i ³ > -lai ⁴	
	-le ⁴ - + Second plural -o ^{3*} > -lao ⁴⁻³	
	-le ⁴ - + First plural exclusive -i ⁴ > -lai ⁴	
	-le ⁴ - + First plural inclusive -a ² > -le ⁴⁻²	
First singular -na ³ -	+ Third singular zero > -na ³	
	-na ³ - + Second singular -i ³ > -nai ¹⁻³	
	-na ³ - + Second plural -o ³ > -nao ¹⁻³	
Second singular -li ² -	+ Third singular and plural ... zero > -li ²	
	-li ² - + First singular -a ³ > -le ²⁻³	
	-li ² - + First plural exclusive -i ⁴ > -lai ²⁻⁴	
Second plural -no ⁴⁻³ -	+ Third singular and plural ... zero > -no ⁴⁻³	
	-no ⁴⁻³ - + First singular -a ³ > -no ⁴⁻³	
	-no ⁴⁻³ - + First plural exclusive -i ⁴ > -lai ³⁻⁴	
First plural exclusive..... -nai ³⁻⁴ -	+ Third singular zero > -nai ³⁻⁴	
	-nai ³⁻⁴ - + Second singular -i ³ > -nai ³⁻⁴	
	-nai ³⁻⁴ - + Second plural -o ³ > -nao ³⁻⁴	
First plural inclusive -na ¹ -	+ Third singular and plural ... zero > -na ¹	

*This item is tonomechanically different from the two which precede it, in that in fusion it tends to give 4-3 instead of 3 or 4.

In general, the dependent subject forms fuse to the dependent object enclitics in the same way that they fuse to the last main stem of a personal compound. Rules for tonemic and vocalic fusion are in the majority of instances the same. For all the items in Table 11 (p. 123), except those otherwise described in the next paragraph, the final fused form can be predicted by utilizing the rules for tonemic fusion given in Table 8 (pp. 109-10) and the rules for vocalic fusion given in Table 10 (pp. 118-19). For example, the abstracted object form -le⁴ 'him' fuses to the abstracted subject form -a² 'we (incl.)' to produce -le⁴⁻² 'we to him.' Here the fusion of toneme 4 to toneme 2 produces a glided 4-2 (see Table 8g), while the fusion of the vowel e to vowel a produces e (Table 10b).

A few of the object-subject forms cannot be analyzed in this way. Of these, some are regular in their vocalic fusion, but irregular in their tonemic changes. Thus one might expect that -nai¹⁻³ and -nao¹⁻³ with first-person singular object might each have had toneme 3, without the glide, since 3 plus 3 tends to give 3, as seen in Table 8g (p. 110). As for vocalic irregularity, -le²⁻³ with second-person singular object would be expected to have had vowels ia, since the fused vowels are i and a. Furthermore, -no⁴⁻³ with second-person plural object (vowel o) and first-person singular subject (vowel a) has the vowel o instead of the expected oa; -lai³⁻⁴ with second-person plural object occurs in the form cited instead of with the consonant n and the vowels oi; -nai³⁻⁴ with first-person plural exclusive object and second-person plural subject occurs with ai instead of the expected ao. Finally, -lai²⁻⁴ with second-person singular object and first-person plural exclusive subject is irregular, since the expected form would have been *-li²⁻⁴ (here the asterisk preceding the morpheme indicates a hypothetical form, one not found either in isolation or in context). All other forms cited in Table 11 (p. 123) are completely regular both in tonemic and vocalic fusion, and can be predicted from the tabular data previously given.

The dialect of Petra differs from that of Camila in that the tonemic form which with Camila occurs just on the pronominal complex is with Petra at times--and perhaps always--distributed over the enclitic and the preceding stem. Thus, with both Camila and Petra, there is a 4-2 pitch pattern when the object-subject enclitic -le⁴⁻² 'we (incl.) to him' follows the compound. With Camila a 4-2 glide occurs on the enclitic complex (Table 11 [p. 123]), but with Petra the enclitic has only the level toneme 2, whereas the toneme 4, pertinent to the enclitic complex, is actualized on the preceding stem. If the preceding stem toneme is basically pitch 1, then the fused tonemic form of that stem will be a glide 1-4, and so on. Compare the following items in the two dialects:

Camila: v²e²ško¹- 'we (incl.) gather' + -le⁴⁻² 'we (incl.) to it' > v²e²ško¹-le⁴⁻² 'we (incl.) gather it'

Petra: v²e²ško¹- 'we (incl.) gather' + -le⁴⁻² 'we (incl.) to it' > v²e²ško¹⁻⁴-le² 'we (incl.) gather it'

Camila: si¹to² 'he fights' + -no⁴⁻³ 'he to you (pl.)' > si¹to²-no⁴⁻³ 'he fights you (pl.)'

Petra: si¹to² 'he fights' + -no⁴⁻³ 'he to you (pl.)' > si¹to²⁻⁴-no³ 'he fights you (pl.)'

(4) The Basic Toneme of the Second (as Last) Main Stem of the Compound Preceding Modal Enclitics

Immediately following the second (as last) main stem of a personal compound, there may occur one or more of several modal enclitics. These include items such as -šo³ 'so it is reported'; -la² (or -la⁴) 'it is probably thus'; -ni¹ 'it is indeed thus'; -ni³ 'it is in such a relationship to'; -hi² 'it is not thus' (limited to use after some word that is preceded by one of several negative proclitics). These enclitics, as already stated, may also occur following nouns or other parts of speech.

The modal enclitics precede the dependent subject pronouns, which are fused to them in the same way in which the subject pronouns may be fused to the last main stem of the personal compound when an enclitic does not intervene. The rules for tonemic and vocalic fusion are the same, so that the resultant form can be predicted by using the identical formulas that were given for the personal compound stems in Tables 8 and 10 (pp. 109-10, 118-19).

In the following illustrations the tonemic and vocalic fusion on the enclitics, then, may be checked against the appropriate tables. The irregularities that occur when the subject pronoun fuses to the object enclitics are not present.

Compound Stem	Modal Enclitic	Pronominal Enclitic	Result
v ² e ⁴⁻³ sa ¹ - 'I send'	+ <u>-la²</u> 'it is probably thus'	+ <u>-a³</u> 'I'	> v ² e ⁴⁻³ sa ¹⁻³ -la ²⁻³ 'I probably send'
v ² e ² sa ¹ - 'you send'	+ <u>-la²</u> 'it is probably thus'	+ <u>-i³</u> 'you (sing.)'	> v ² e ² sa ¹⁻³ -lai ²⁻³ 'you (sing.) probably send'
v ² e ² sa ¹ - 'you (pl.) send'	+ <u>-la²</u> 'it is probably thus'	+ <u>-o³</u> 'you (pl.)'	> v ² e ² sa ¹⁻³ -lao ²⁻³ 'you (pl.) probably send'
va ³ ko ² ya ³ - 'we (excl.) teach'	+ <u>-ni¹</u> 'it is indeed thus'	+ <u>-i⁴</u> 'we (excl.)'	> va ³ ko ² ya ³ -ni ¹⁻⁴ 'we (excl.) indeed teach'
va ³ ko ² ya ³ - 'you (pl.) teach'	+ <u>li²-...-hi²</u> 'it is not thus'	+ <u>-o³</u> 'you (pl.)'	> li ² --va ³ ko ² ya ³ -hi ² 'don't teach you (pl.)'

The data concerning the tonemes of the personal compound stems as they directly precede the modal enclitics are as yet incomplete. A few tentative statements may be made concerning them, however. With some speakers of the language the stem toneme before the enclitics usually, but not always, appears to glide down, provided that the stem toneme is basically of pitch 1 or 2. The glide is omitted from a stem in pitch 1 when the subject of the verb is third person or is first person plural inclusive. This constitutes an important characteristic of the language; the subject may be indicated not only by the toneme (and vowels) fused to the modal enclitics, but by a pronominal toneme simultaneously fused (without vocalic fusion) to the last main stem of the compound preceding such enclitics. Note the double partial indication of the subject by the toneme in the following illustrations:

Compound Stem	Modal Enclitic	Pronominal Element	Result
si ¹ ska ¹ - 'he plays' + <u>-so¹</u> 'so it is reported' + zero 'he' > si ¹ ska ¹ - <u>so¹</u> 'he plays, so it is said'			
si ¹ ska ¹ - 'he plays' + <u>-so¹</u> 'so it is reported' + <u>-a³</u> 'I' > si ⁴⁻³ ska ¹⁻³ - <u>soa¹⁻³</u> 'I play, so it is said'			

In the illustration just given, the first stem of the compound has not been discussed. Notice, however, that it also, independently, gives a tonal clue to the subject.

When a modal enclitic appears in a verb combination with an object-subject pronominal element, the modal enclitic precedes the object-subject one. In this event the stem toneme preceding the modal enclitic is affected as previously described; but in Camila's dialect the modal enclitic has no subject pronoun fused to it. In Petra's dialect, however, the tonal complex of the object-subject form following it may be partially distributed over the modal enclitic. Note the following illustrations:

Camila: v²e²sa¹- 'we (incl.) send' + -la² 'it is probably thus' + -le⁴⁻² 'we (incl.) to him'
> v²e²sa¹-la²-le⁴⁻² 'we (incl.) probably send him'

Petra: v²e²sa¹- 'we (incl.) send' + -la² 'it is probably thus' + -le⁴⁻² 'we (incl.) to him'
> v²e²sa¹-la²⁻⁴-le² 'we (incl.) probably send him'

Certain adverbial enclitics may follow the fused dependent subject pronoun. These have already been listed under the discussion of the nouns. They do not seem to affect the tone of the verbal combination which precedes them: si⁴⁻³ska¹⁻³ 'I play,' si⁴⁻³ska¹⁻³-vi⁴ 'I play here.'

(5) The Basic Toneme of the Second Main Stem of the Compound Preceding a Third Main Stem

When the second main stem of a personal compound verb precedes a further main stem, the second stem retains its stem toneme and vowel without any modification by the changing person of the subject. In the following examples note that a morpheme serving as the second of three main stems of a compound is the same, regardless of the person of the subject of the compound, as when it occurs as the last main stem of a two-stem compound with third-person subject.

Two-Stem Compound with Third-Person Subject	Same Compound with Third Stem Added and with Third-Person Subject	Same Compound with Same Third Stem but with First-Person Subject
<u>v?</u> e ¹ c?oa ³ 'he begs'	<u>v?</u> e ¹ c?oa ³ ntha ² 'he begs in behalf of, intercedes'	<u>v?</u> e ⁴⁻³ c?oa ³ nthe ²⁻³ 'I beg in be- half of, intercede'
si ¹ s ¹ a ¹ 'he works'	si ¹ s ¹ a ¹ kao ⁴ 'he works with'	si ⁴⁻³ s ¹ a ¹ kao ⁴ 'I work with'
si ¹ ča ³ 'he loses'	si ¹ ča ³ t?a ⁴⁻³ 'he pardons'	si ⁴⁻³ ča ³ t?a ⁴⁻³ 'I pardon'
v? <u>e</u> ¹ čhi ¹ 'he pays'	v? <u>e</u> ¹ čhi ¹ n?iq ¹ 'he pays all at once'	v? <u>e</u> ⁴⁻³ čhi ¹ n?iq ¹⁻³ 'I pay all at once'

(6) The Basic Toneme of a Second Main Stem Which Is Morphologically Complex, Consisting of Two or More Morphemes

In preceding sections all second main stems of personal compound verbs have been composed of one syllable and one morpheme only. There are numerous stems in the second position, however, which contain two syllables, each of which constitutes a separate morpheme; these two morphemes form a COMPLEX (noun unit or adjective unit or verb unit) which is best treated as a single stem in the second main position of the compound verb.³

Two-syllable noun stems are best considered single stems in this position for the following reasons:

1. The complexes frequently occur in isolation, as independent nouns, whereas most of the morphemes that serve as constituents of the complexes may not do so.
2. The complexes act as units in other grammatical functions, i.e. in long compound nouns, in respect to fusion or enclisis of pronouns, and the like.
3. An entire complex may be followed by a third main stem as if it were a single-syllable single-morpheme noun.
4. Treating a noun complex as two separate main stems would necessitate setting up a fourth main position in compound verbs, without adequate parallels to justify it; this extra-positional item would disrupt succinct statements of the character of items entering the various positions, since the second part of the complex does not consist of a morpheme of the type that regularly occupies the third main position of the compound.
5. The meanings of the separate morphemes are often very vague, whereas the total meaning tends to be very concrete. Note the following illustration: nčoa²ni⁴the⁴ 'he comes by night' (< nčoa² 'he comes' + ni⁴the⁴ 'night' [< ni⁴-, nominalizer, + -the⁴ '?']).

For similar reasons, two-syllable adjective stems like va³se³ 'half' (< va³- 'placed'? + -se³ 'in the middle of'?) are best treated as single complex stems within the compound verb.

Two-syllable complex verbal items may also occur as the second main stem of the compound verb. For the reasons just listed, these items, too, are best treated as single complexes in compounding. Two further reasons may be given, however:

6. The second syllable of the complex does not act like a third main stem because it undergoes changes (with change of subject) alien to such a third stem; it is convenient to say, descriptively, that the changes in the second morpheme of the complex are "first" made, "then" it is joined to the first morpheme of the complex, and, finally, the entire complex serves as the second main stem of the verb compound, preserving the changes mentioned.
7. Many of the items that serve as complex second main stems may likewise serve as complex first main stems; this is characteristic of verbal elements that enter the second main position of verb compounds, but is not characteristic of the third main element of such compounds.

When the complex second main stem is basically nominal, the first syllable retains its lexical toneme and vowel unchanged throughout the various forms of the compound verb. When the complex second main stem is the last, the toneme and vowel of the final syllable of the stem fuse with the subject pronoun according to the rules already described for a single-syllable stem in that position. Note the following sample: na⁴hmi¹⁻³ 'story' (< na⁴-, nominalizer, + -hmi¹ 'conversation'), nčha⁴na⁴hmi¹ 'he converses,' nčha⁴na⁴hmia¹⁻³ 'I converse.'

When the two-syllable second main stem is basically adjectival, the rules are the same as for nouns. Note the following sample: ti¹tho² 'first' (< ti¹- '!' + -tho² 'first'), vhi²ti¹tho² 'he goes before,' vhi³ti¹thoa²⁻³, 'I go before'; as for simple second main stems, there is no fusion of dependent subject pronoun before a third main stem: vhi³ti¹tho²ko⁴ 'I go before with.'

When the two-syllable second main stem is basically verbal, the first syllable of the complex tends to preserve its toneme and vowel regardless of the subject of the compound. Note the following illustration: hti³ke⁴⁻³ 'he hates' (< hti³- 'anger' + -ke⁴⁻³ 'emotion directed toward'), si¹hti³ke⁴⁻³ 'he is angry at,' si⁴⁻³hti³ke⁴ 'I am angry at.'

The form of the second syllable of a verbal, complex, second main stem is much more involved, since the toneme, the consonants,⁴ and the vowels may all be modified with the change of subject. These changes are the same as occur in the complex when it serves as an independent non-compounded verb.⁵ Since the noncompounded independent verbs will be discussed later and since all of them are irregular--many of them highly so--only one set of illustrations will be given here of their usage as a second but complex main stem of compound verbs: hti³ke⁴⁻³ 'he hates,' hti³cai³ 'you (sing.) hate,' but ni²hti³cai³ 'you (sing.) are angry at,' si¹hti³ke⁴⁻³ 'he is angry at.'

Note the following list of compounds which follow the rules just described:

Personal Compounds Which Contain a Complex Second Main Stem but Simple First Main Stem

kho³na³nki³ 'he asks' (< kho³- 'to change the direction of' + na³nki³ 'land')

nčoa²ka³ni¹ 'he comes to leave (something)' (< nčoa² 'he comes' + ka³ni¹ 'he leaves [something]')

nčoa²ni⁴thę⁴ 'he comes by night' (ni⁴thę⁴ 'night')

si¹či³ko³ 'he blesses' (< s?il 'he makes' + či³ko³ 'holy, blond')

si¹čha³?ai³ 'he irons' (čha³?ai³ 'smooth')

si¹hňa¹čo³ 'he quiets' (hňa¹čo³ 'peaceful')

si¹hti³ke⁴⁻³ 'he is angry at' (hti³ke⁴⁻³ 'he hates')

si¹khi³?ntia¹ 'he plays music' (khi³?ntia¹ 'he cries')

si¹ki²ši⁴ 'he straightens' (ki²ši⁴ 'straight')

si¹koi²nta⁴ 'he takes care of (e.g. a child)' (koi²nta⁴ from Spanish cuidar 'to care for')

si¹mi²yo⁴ 'he is friendly' (mi²yo⁴ 'a friend,' Spanish amigo)

si¹nka³hte⁴⁻³ 'he spills' (nka³hte⁴⁻³ 'upside down')

si¹nko¹sq² 'he does the same' (nko¹sq² 'the same')

si¹ši¹ne¹ 'he fries' (ši¹ne¹- 'lard')

si¹thao²ke⁴⁻³ 'he gives a gift' (thao²ke⁴⁻³ 'he takes care of')

si¹tho³ka⁴⁻³ 'he makes to run (e.g. a horse)' (tho³ka⁴⁻³ 'he runs')

si¹ti²?nta³ 'he greets' (ti²?nta³ 'it is greeting')

si¹ci³ti³ 'he bends in the form of an arch' (ci³ti³ 'curved')

v?e¹ti⁴š?a⁴ 'he opens' (< v?e¹ 'he deposits, hits' + ti⁴š?a⁴ 'open')

⁴In two or three known morphemes a single-syllable second main stem, also, has a consonant change: nčoa²ko³ 'he comes up to,' nčoa²čo¹? 'you (sing.) come up to' (< nčoa² 'he comes' + -ko³ 'point of contact'); si¹he³ko³ 'he comforts' (< s?il 'he makes' + he³ 'fat' + -ko³ 'mentally'), ni²he³ta³ko¹? 'you (sing.) comfort' (-ko³ has suppletive complex stem -ta³ko¹?).

⁵There are other verbs that, when independent, have two morphemes in a complex with certain subjects, but a simple stem with third-person subject. These verbs form their compounding

In a different type of complex second main stem the complex is composed (1) of one, two, or three stems (simple or complex), and (2) of the item ki³- fused to these verbal elements. The ki³- is possibly, but not certainly, related to or identical with the compounded auxiliary ki³- meaning 'complete'.⁶ If the item following ki³- is of the complex verbal type, it usually has the same rules for tonemic, vocalic, and consonantal change as does such a complex directly following a first main stem.⁷ The first main stem preceding the ki³- is limited to one of about four verbal elements, including nčoa² 'he comes' (rare), si¹- 'to make' (s?i¹ 'he makes'), vhi² 'he goes' (rare, varying to complex, listed later), vha³ai³ 'he arrives' (rare, listed with complex first main stem).

Note the following samples: si¹khi³nč?oe¹ 'he notifies' (< s?i¹ 'he makes' + khi³nč?oe¹ 'he heard' [< ki³- 'completed' + nč?oe¹ 'he hears']) ; vhi²ka³ko¹ 'he goes to show' (< vhi² 'he goes' + -ka³ko¹ 'to show' [< ki³- 'completed' + va³ko¹ 'he shows'--with the last complex item in turn composed of va³- '?' + -ko¹ 'to show']). For further samples see the list below:

Personal Compounds with Simple First Main Stem but
Complex Second Main Stem Beginning with ki³-

- nčoa²ki³nča³v?a³kha¹ 'they gather together' (< nčoa² 'he comes' + -ki³nča³v?a³kha¹ 'to stand close together' [< ki³- 'completed' + vi³nča¹ 'he fills'--in turn composed of vi³- '?' and nča¹ 'filled'-- + v?a³kha¹ 'he wears'--in turn composed of v?a³ 'he carries' and -kha¹ 'slantwise']).
- si¹ka¹hna³hi⁴⁻³ 'he places in' (< s?i¹ 'he makes' + -ka¹hna³hi⁴⁻³ 'to be in')
- si¹ka¹nta⁴⁻³ 'he drapes (someone)' (-ka¹nta⁴⁻³ 'to spread out')
- si¹ka³ki³ 'she suckles' (-ka³ki³ 'to nurse')
- si¹ka³se¹ 'he sends' (-ka³se¹ '?')
- si¹ka³tio² 'he leaves in place' (-ka³tio² 'to leave')
- si¹ka³?nči⁴ 'he wets' (-ka³?nči⁴ '?')
- si¹kha³ka¹ 'he scolds' (-kha³ka¹ '?')
- si¹kha³ne³ 'he plays (e.g. a drum)' (-kha³ne³ 'to resound')
- si¹kha³ne³ya³ 'he claps' (-kha³ne³ya³ 'to make a noise in')
- si¹kha³ce¹ 'he shakes (something)' (-kha³ce¹ 'to tremble')
- si¹kha³?a³s?₂e⁴⁻³ 'he turns in, betrays' (-kha³?a³s?₂e⁴⁻³ 'to enter')
- si¹kha³?ai³che⁴⁻³ 'he thinks' (-kha³?ai³che⁴⁻³ 'to remember')
- si¹khao²?a³ 'he advises' (-khao²?a³ 'to converse')
- si¹khi³nč?oe¹ 'he notifies' (khi³nč?oe¹ 'he heard')
- si¹khi³co¹ 'he breaks' (-khi³co¹ 'to be useless')
- si¹khi³c?ao³ 'he extinguishes' (-khi³c?ao³ 'to go out')
- si¹ki³nča¹ce⁴⁻³ 'he arranges' (-ki³nča¹ce⁴⁻³ '?')
- si¹ki³nhe³ 'he wins' (ki³nhe³ 'it was gained')
- si¹ki³nhe³nk³ 'he has left over' (ki³nhe³nk³ 'it was left over')
- si¹ki³so¹the⁴ 'he gets (someone) up' (-ki³so¹the⁴ 'to get up')

stem regularly from the third person. Sample: nč?oe¹ 'he hears,' no²yai²⁻³ 'you hear'; si¹khi³nč?oe¹ 'he notifies,' ni²khi³nč?oail³ 'you (sing.) notify.'

⁶Two items militate against this interpretation: (1) The over-all meaning of the compounds that contain the ki³- frequently does not include this subordinate meaning. (2) If the ki³- is to be interpreted as the morpheme ki³- 'complete,' then in certain of the forms the morpheme appears twice, once in the alternate k- and once as hi³- in stems such as si¹khi³nčoa² 'he makes to come' (nčoa² 'he comes,' hi³nčoa⁴⁻³ 'he came').

The ki³-, however, may assume various forms in its fusion, similar to those already mentioned for ki³- as a complete compounded auxiliary. In conjunction with stems beginning with v, for example, the k is generally retained and the v is lost.

⁷After si¹- + ki³-, however, the complexes beginning with v resist these changes.

si¹ki³ši²nka³ 'he stretches' (-ki³ši²nka³ '?')
 si¹ki³?q³ 'he injures' (-ki³?q³ 'to be hurt')
 si¹k?a³ 'he transports' (-k?a³ 'to carry')
 si¹k?a³ntha² 'he changes (something)' (-k?a³ntha² 'to change')
 si¹k?a³kha¹ 'he dresses (someone)' (-k?a³kha¹ 'to wear')
 si¹k?a³tha⁴ 'he throws out' (-k?a³tha⁴ 'to carry down')
 si¹k?a³the⁴⁻³ 'he throws in' (-k?a³the⁴⁻³ 'to fall in')
 si¹k?a³to³ya³ 'he carries a message' (-k?a³to³ya³ '?')
 si¹k?a³ce⁴⁻³ 'he declares' (-k?a³ce⁴⁻³ 'to carry openly')
 si¹k?e¹hna³?nčo³va³se³ 'he leaves (something) in the middle' (-k?e¹hna³?nčo³va³se³ 'to be in the middle')
 si¹k?je³ (or si¹k?e³) 'he kills' (k?je³ [or k?e³] 'dead')
 si¹k?o¹hi⁴⁻³ 'he stirs' (-k?o¹hi⁴⁻³ 'to mix')
 si¹k?o¹nhio⁴kao⁴ 'he makes dizzy by going around' (-k?o¹nhio⁴kao⁴ 'it gets dizzy by going around')
 si¹k?o¹vha³ya³ 'he changes' (-k?o¹vha³ya³ 'to turn around')
 si¹k?o¹vha³ya³t?a⁴⁻³ 'he changes his mind' (-k?o¹vha³ya³t?a⁴⁻³ 'to turn against')

b. The Third (as Last) Main Stem of the Verb Compound: Its Formation, Largely from Directionals, and Its Toneme

With few exceptions the items which may fill the position of a third (as last) main stem in compound verbs are dependent directional adverbs.⁸ Note kho³ne²ya³ in the list below.

The tonemic and vocalic rules for the fusion of a third main stem to subject pronouns are the same as for a second main stem when it is the final stem of the compound. Note the following examples of third main stems fused to subject pronouns; for the rules governing this fusion see the discussion in previous sections: v?e¹ča³hq³ 'he cleans the surface of' (< v?e¹ 'he deposits' + ča³ 'it is lacking' + -ho³ 'on the surface of'), si¹ša³t?a⁴⁻³ 'he greets' (< s?i¹ 'he makes' + -ša³ '?' + -t?a⁴⁻³ 'against'), v?a³she³hca³ 'he takes the top off' (< v?a³ 'he carries' + -she³ 'out from' + -hca³ 'covered').

Personal Compounds Containing a Third (as Last) Main Stem but Simple First Main Stem

kho³ne²ya³ 'he spades up' (< kho³- 'to change the direction of' + -ne² 'forcefully downward' + -ya³ 'inside')
 kho³?ai²nki³ 'he takes the top off' (-?ai² '?,' -nki³ 'beneath')
 ko³hnta¹a³ 'he unravels' (< ko³- 'to investigate' + -hnta¹ '?' + -a³ 'face to face')
 ko³t?a⁴⁻³sq² 'he looks around' (-t?a⁴⁻³ 'against,' -sq² 'on top of')
 ko³t?a⁴⁻³ya³ 'he studies' (-t?a⁴⁻³ 'against,' -ya³ 'inside')
 si¹ča³šk³ 'he loses' (< s?i¹ 'he makes' + ča³ 'it is missing' + -šk³ 'eye')
 si¹ča³t?a⁴ 'he pardons' (ča³ 'it is missing,' -t?a⁴⁻³ 'against')
 si¹čo³nta⁴⁻³ 'he arranges' (-čo³ 'weather, scenery,' nta⁴⁻³ 'good, straight, in order')
 si¹čo⁴ya³ 'he ponders' (-čo⁴ '?,' -ya³ 'inside')
 si¹ča¹ne² 'he piles up' (ča¹- 'a load,' -ne² 'forcefully downward')
 si¹hao²ya³ 'he divides' (hao² 'two,' -ya³ 'inside')
 si¹he³k³ 'he comforts' (he³ 'big, fat,' -k³ 'mentally')
 si¹hco²z³ 'he appeals' (-hco² '?,' -z³ 'face to face')
 si¹khao²hi⁴⁻³ 'he advises' (-khao² 'fitted,' -hi⁴⁻³ 'penetrated throughout')
 si¹k?i²ya³ 'he lends' (-k?i² '?,' -ya³ 'inside')
 si¹nka³za³ 'he gargles' (nka³ '?,' -za³ 'face to face')

⁸A few items that do not indicate direction but that serve as the third main stem of compound verbs are: n?iol¹ 'forcefully' (v?e¹čhi¹n?iol¹ 'he pays all at once') [<> v?e¹ 'he deposits' + čhi¹ 'it is expensive' + n?iol¹ 'forcefully']); -s?i² 'neck' (si¹the⁴⁻³s?i² 'he coughs') [<> s?i¹ 'he makes' + the⁴⁻³ 'itchy' + -s?i² 'neck']); -čo³ 'weather, scenery' (si¹hñalčo³ 'he makes peace' [<> s?i¹ 'he makes' + hñal- 'desolate place' + -čo³ 'weather, scenery']).

si¹ñá³kó³ 'he is agreed' (-ñá³ '?, ' -kó³ 'mentally')
 si¹šá¹kao⁴ 'he works with' (šá¹- 'work,' -kao⁴ 'and, with')
 si¹šá³t?á⁴⁻³ 'he greets' (-šá³ '?, ' -t?á⁴⁻³ 'against')
 si¹ší²hnto³ 'he hangs (something)' (-ší² '?, ' -hnto³ '?')
 si¹šo³nka³ 'it flies up (e.g. popcorn)' (-šo³ '?, ' -nka³ '?')
 si¹the⁴⁻³si³ 'he coughs' (the⁴⁻³ 'itchy,' -si³ 'neck')
 si¹tho³sq² 'he obeys, completes' (-tho³ 'out from,' -sq² 'on top of')
 si¹tj³ya³ 'he stirs' (-tj³ 'bent,' -ya³ 'inside')
 si¹toa²nthai² 'he defends' (toa² 'fierce,' -nthai² 'overflowingly, intermediary')
 si¹choa³t?ai³ 'he laughs at' (choa³ 'happy,' -t?ai³ 'above')
 va¹hí⁴⁻³kó³ 'he memorizes' (< va¹ 'he places' + -hí⁴⁻³ 'penetrated throughout' + -kó³ 'mentally')
 va¹ško¹ya³ 'he puts away' (-ško¹ 'doubled,' -ya³ 'inside')
 va¹ya²⁻⁴kó³ 'he notifies in advance' (-ya²⁻⁴ '?, ' -kó³ 'mentally')
 va³t?á⁴⁻³i¹ 'he puts fire to' (< va³- '?' + -t?á⁴⁻³ 'against' + -i¹ 'fire')
 vha³he¹t?ai³ 'he accuses' (< vha³- '?' + he¹- 'sin' + -t?ai³ 'above')
 v?a³mi⁴⁻³ya³ 'he carries (e.g. with a shawl)' (< v?a³ 'he carries' + -mi⁴⁻³ 'upward' + -ya³ 'inside')
 v?a³na⁴ča⁴ 'he deceives' (-na⁴ '?, ' -ča⁴ '?')
 v?a³she³hca³ 'he takes the top off' (-she³ 'out from,' -hca³ 'covering')
 v?a³she³nthai² 'he saves (e.g. from jail)' (-she³ 'out from,' -nthai² 'overflowingly, intermediary')
 v?a³she³sí² 'he sets apart' (-she³ 'out from,' -sí² 'separately')
 v?e¹ča³ho³ 'he cleans' (< v?e¹ 'he deposits, gives birth to, hits' + ča³ 'it is missing' + -ho³ 'on the surface of')
 v?e¹čhi¹n?í¹ 'he pays all at once' (čhi¹ 'it is expensive,' n?í¹ 'strong, forcefully')
 v?e¹čhoa²nki³ 'he closes up' (-čhoa² 'shut,' -nki³ 'beneath')
 v?e¹hí⁴⁻³kó³ 'he obeys, keeps in mind' (-hí⁴⁻³ 'penetrated throughout,' -kó³ 'mentally')
 v?e¹nco³?a³ 'he kisses' (-nco³ '?, ' -?a³ 'face to face')
 v?e¹sg²ce⁴⁻³ 'he foretells' (-sg² 'on top of,' -ce⁴⁻³ 'in sight')
 v?e¹ško¹ya³ 'he folds' (-ško¹ 'doubled,' -ya³ 'inside')
 v?e¹cao³hne³ 'he shakes (e.g. clothes)' (-cao³ '?, ' -hne³ '?')
 v?e¹cao³va³ 'he scatters' (-cao³ '?, ' -va³ '?')
 v?e¹c?ia⁴kao⁴ 'he begins with' (-c?ia⁴ 'in the beginning,' -kao⁴ 'and, with')
 v?e¹c?oa³nthai² 'he asks in behalf of, intercedes' (c?oa³ 'his mouth,' -nthai² 'overflowingly, intermediary')

c. The First Main Stem of the Verb Compound

(1) Stem Toneme and Formation of the First Main Stem of the Verb Compound from Independent and Dependent Verbs

The first main stem of a personal verb compound may be comprised of an intransitive verbal element or of a transitive verbal element. As will be shown later, when the independent verbs are discussed, the TRANSITIVES differ from the INTRANSITIVES in that the independent transitive verbs may take an object (but are not required to do so), whereas the intransitives do not occur with objects at all; further, in the transitives there is always some change of stem--suppletion--concomitant with the change of subject, whereas no such change takes place in the stems of the intransitives. Of the transitive verbal elements, some are independent and others are dependent. The independent intransitive and transitive verbal elements may occur as independent verbs, whereas the dependent ones occur only as the first main stems of compound verbs.

The first main stem of a compound verb, whether personal or impersonal, is always of verbal origin; it may not be chosen from the nouns or adjectives which at times constitute the second main stem of the verb compound. The number of these verbal elements is relatively very small. Thus, though every verb in the entire language must either consist of such an element or have one

of them as its first main stem, yet in the present data there are only five simple intransitive independent verbs, one simple intransitive dependent verbal element, nineteen simple transitive independent verbs, fourteen simple transitive dependent verbal elements, twenty-seven simple impersonal independent verbs, seven intransitive, thirty-five transitive, and fifteen impersonal independent complex verbal stems, and three dependent complex transitive stems. Thus the noncompounded verbs occupy a place of importance in the language far out of proportion to their number. Of this small number, many are quite rare independently or in compounds, or have not been observed in compounds at all, so that the vast majority of verbs in the language either consist of or contain one of about forty verbal elements.⁹

When the first main stem of the verb compound consists of an independent intransitive verbal element, the tonemes, vowels, and consonants of the stem are the same as occur in its corresponding noncompounded form. These independent forms themselves are somewhat irregular--and will be listed later--in that (1) the toneme of the stem in the basic form¹⁰ may be modified when the stem is accompanied by the complete or incomplete compounded auxiliaries, and (2) the consonantal form of the stem may be modified under the same conditions. It is important to notice, however, that these intransitive verbal elements, both in independent form and as parts of personal compounds, are not changed when the subject of the verb is changed.

Compounds made with intransitive elements are, nevertheless, always transitive as a whole. In summary, then, once the stem form of an intransitive verb is determined by its usage independently, the derivation of its compounding stem is perfectly regular, consisting of the third person independent form of the stem with or without a fused compounding auxiliary. In the following illustrations notice the relation between the independent verb and the first main stem of the compound: ka⁴⁻³ 'he falls,' ka⁴⁻³t²a⁴⁻³ 'he falls against,' ka⁴⁻³ 'I fall,' ka⁴⁻³t²a⁴⁻³ 'I fall against,' kai⁴⁻³ 'you (sing.) fall,' ka⁴⁻³t²vai⁴⁻³ 'you (sing.) will fall against,' skai⁴ 'you (sing.) will fall,' ska⁴t²ai⁴⁻³ 'you (sing.) will fall against,' ska⁴t²a⁴⁻³-nai¹⁻³ 'you (sing.) will fall against me'; n̄oaa² 'he comes,' n̄oaa²ka³ni¹ 'he comes to leave (something),' n̄oaa²⁻³ 'I come,' n̄oaa²ka³nia¹⁻³ 'I come to leave (something),' n̄oai²⁻³ 'you (sing.) come,' n̄oaa²ča³ni¹⁻³ 'you (sing.) come to leave (something),' khoi⁴h̄oai⁴⁻³ 'you (sing.) will come,' khoi⁴n̄oaa⁴⁻³ča³-ni¹⁻³ 'you (sing.) will come to leave (something).'

When the first main stem of the verb compound consists of an independent transitive verbal element, the tonemes, vowels, and consonants of that stem are the same as occur in its corresponding independent form.¹¹ These independent forms themselves are highly irregular, the largest body of irregular forms in the language. Like the independent intransitives, the basic form of the stem may be modified by its occurrence with complete or incomplete compounded auxiliaries, but

⁹Note the following data, drawn from a short text:

Frequency of Occurrence of Verbal Elements

	Number of Instances	Percentage
First ten most frequent elements . . .	271	65.3
Second ten most frequent elements . . .	75	18.1
Third ten most frequent elements . . .	25	6.0
Fourth ten most frequent elements . . .	19	4.6
	390	94.0
Remaining 25 elements	25	6.0
Total	415	100

Further verbal elements (about 54, most of them rare) did not occur in this text.

¹⁰The "timeless" form is chosen as basic, since (1) it is simplest, (2) it is the form that occurs unchanged with most auxiliaries--in fact all of them but the complete and incomplete--and (3) it serves as well as a basis of prediction for the other forms as any of them could do.

¹¹With the exception of sil- from s?il- 'to make, to cause.'

the changes are often much more extensive. In addition--and this is the only difference between intransitive and transitive verb forms--there are marked changes that accompany the change of subject.

The changes of stem accompanying changes of subject are so great and of such varied type that it proves easier to postulate a suppletive stem for certain of the persons than to attempt to formulate rules for the derivation of all persons from a single basic stem. The specific details for independent transitive verbs will be listed later (see Tables 12c-d [pp. 143-44]), but meanwhile it may be noted that once the noncompounded forms for person and accompanying auxiliary are given, the derivation of the compound is perfectly regular.

Instead of being based upon the third-person singular form, however, the compounding stem for each person and auxiliary is the same as for the respective person and auxiliaries of the noncompounded form before its fusion to the subject vowel and toneme.¹² Apart from by noting the actual forms of the morphemes in compounds, the stem form before the fusion may often be found (1) by observing the stem form as it occurs before either the modal or the object-subject enclitics, or sometimes (2) by judicious application of Tables 8 (pp. 109-10) and 10 (pp. 118-19) in reverse. Thus the compounding stems for ve³ 'he knows' and ?yai³ 'you (sing.) know' are ve³- and ?ya³- as seen in ve³-li² 'he knows me' and ?ya³-lai⁴ 'you (sing.) know them'; or ?ya³- may be derived from ?ya³⁻² 'we (incl.) know' by noting in Table 8g that the glide 3-2 comes only after stem tonemes 2, or 3, or 4-3--but the possibility of stem tonemes 2 or 4-3 being correct is eliminated by finding the form ?yai³ 'you (sing.) know,' whose fused toneme 3 in the second person singular could occur only with a stem toneme 3. Note the basic and suppletive stems in a compound: ve³ško¹ 'he worships' (-ško¹ 'amazing'), ?ya³škoj¹⁻³ 'you (sing.) worship.'

In the following illustrations observe that the first main stem of the compound is derived directly from the stem in the noncompounded form, and that both the compounded and the noncompounded form vary the stem tonemic, vocalic, and consonantal arrangement in certain of the persons and with incomplete or complete auxiliaries: v?e¹ 'he deposits,' v?e¹ne² 'he pounds' (-ne² 'forcefully downward'); v?e⁴⁻³ 'I deposit,' v?e⁴⁻³ne²⁻³ 'I pound'; v?ai²⁻³ 'you (sing.) deposit,' v?e²nai²⁻³ 'you (sing.) pound'; k?oe⁴⁻³ 'I will deposit,' k?oe⁴⁻³ne²⁻³ 'I will pound'; k?oai¹⁻³ 'you (sing.) will deposit,' k?oe¹nai²⁻³ 'you (sing.) will pound'; vhi² 'he goes,' vhi²kao⁴ 'he goes with someone' (-kao⁴ 'and, with'); vhiā³ 'I go,' vhi³kao⁴ 'I go with someone'; ?mi³ 'you (sing.) go,' ?mi³kao⁴ 'you (sing.) go with someone'; khoia¹⁻³ 'I will go,' khoi¹kao⁴ 'I will go with someone.'

When the first main stem of the compound is a dependent transitive verbal element, the same types of changes occur as with the independent transitive elements. The only difference between them is that the dependent ones have not been observed as independent noncompounded verbs. There are only a dozen or so such verbal elements.¹³ Note the following example: va¹shai³ 'he looks for,' va⁴⁻³she²⁻³ 'I look for,' vha³shai³ 'you (sing.) look for.'

¹² Again with the exception of s?jl¹-/sil¹-.

¹³ Of the simple dependent transitive verbal elements note the following, with their suppletive stems:

<u>khi³-/čhi³-</u> '·'	<u>m?o¹-</u> (defective, third person only)
<u>kho³-/čho³-</u> 'to change the direction of'	'?'
<u>kho³-/čho³-</u> '·'	'?'
<u>ko³-/čo³-</u> 'to investigate'	'to put'
<u>ko³-/čo³-</u> '·'	'to talk'
<u>mo³-/no³-</u> '·'	'?'
<u>m?ao³-</u> '·'	'?'
	<u>vhi³-</u> (defective, third person only)

Of the complex dependent transitive verbal elements note the following, with their suppletive stems:

Various types of simple first main stems have already been given in the lists of two-stem and three-stem personal compounds and need no further illustration.

(2) The Basic Toneme of a First Main Stem Which Is Morphologically Complex, Consisting of Two Morphemes

The same types of intransitive and transitive complex verbs that may serve as the second main stems of compound verbs may likewise constitute the verbal elements for the first main stems.

These complex verbal stems may serve as independent (complex [see p. 126, note 3]) noncompounded verbs, also. The first morpheme of the complex is usually either va³- or vi³-; the initial consonant changes with certain changes of compounded auxiliary, and the toneme changes with some changes of subject with the incomplete auxiliary.

The second morpheme of the complex changes its stem toneme, vowel, and consonants with certain changes of subject and, in addition, has fused to it the dependent subject pronouns. These independent items will be listed later (see Tables 12b, 12d, 12f [pp. 142, 144, 146]). The derivation of the compound form is predictable once the complex noncompounded forms are known; the compounding stem follows all the stem changes of the noncompounded usage, in person and with auxiliaries (minus the fused vowel and toneme of the subject pronoun): va³ko¹ 'he shows' (< va³- '?' + -ko¹ 'to show'), va³ko¹ya³ 'he teaches' (-ya³ 'inside'), va³ko⁴⁻³ 'I show,' va³ko⁴⁻³ya²⁻³ 'I teach,' va³koi²⁻³ 'you (sing.) show,' va³ko²yai³ 'you (sing.) teach,' ko³ko⁴⁻³ 'I will show,' ko³ko⁴⁻³ya²⁻³ 'I will teach,' ko⁴koi²⁻³ 'you (sing.) will show,' ko⁴ko²yai³ 'you (sing.) will teach.'

In addition, a few (three) dependent complex verbs may serve as the first main stem of personal compounds; the meaning of these complexes is often vague or unknown: va³nko²-, vha³?a¹-, vi³so¹-. A few of these dependent complexes occur as part of the second main stem of compounds, but only in conjunction with fused ki³-: si¹ki³so¹the⁴ 'he gets (someone) up' (< s?i¹ 'he makes' + -ki³so¹ '?' + -the⁴ 'in sequence'). See the earlier list of personal compounds with complex second main stems; see also note 13, pages 132-33.

Personal Compounds with a Complex First Main Stem

Ending with a simple second main stem

- ma³nka³sq² 'it is rumored' (< ma³nka³ 'he flees' + -sq² 'on top of')
- ti¹hna³kq³ 'he is living' (< ti¹hna³ 'he is' + -kq³ 'mentally')
- ti¹hna³nki³ 'he is underneath' (-nki³ 'beneath')
- ti¹hna³nta⁴⁻³ 'he is ready' (nta⁴⁻³ 'good, straight, in order')
- ti¹hna³ya³ 'he is inside' (-ya³ 'inside')
- co²?va³kao⁴ 'he chums with' (< co²?va³ 'he walks' + -kao⁴ 'and, with')
- co²?va³sq² 'he walks on' (-sq² 'on top of')
- co²?va³ce⁴⁻³ 'he goes around openly' (-ce⁴⁻³ 'in sight')
- va¹hna³h³o³ 'he places over the opening' (< va¹hna³ 'he places' + -h³o³ 'opening')

<u>va³nko²-</u> / <u>vi³nto²-</u>	'?'
<u>vha³?a¹-</u> / <u>lst vha³?a⁴⁻³-</u> / <u>čha³?a²-</u>	'?'
<u>vi³so¹-</u> / <u>lst vi²so⁴-</u> / <u>vi²so⁴-</u>	'?'

One simple dependent intransitive stem has been found: va³- '?,' as in va³h³o³ 'he spreads (something),' va³h³o³ 'I spread (something),' va³h³o³i³ 'you (sing.) spread (something).'

Occasionally a morpheme listed as dependent by an investigator is later found in use as an independent verb; this removes the morpheme from the dependent category and adds it to the independent one. Since the time of writing this note, for example, three of the morphemes listed here have been reported to me (by Miss Margaret Hull, in collaboration with Miss Eunice Pike) as independent: val-/vha³- 'to place'; va³nko²-/vi³nto²- 'to bathe in a steam bath'; vha³?a¹-/'to be at hand, ready to go.' See also p. 140.

va¹hn³thao² 'he puts away and keeps' (-thao² 'kept')
va¹hn³ya³ 'he lays (something) out' (-ya³ 'inside')
va¹hn³?ma³ 'he hides (something)' (-?ma³ 'out of sight')
va¹hn³?nčo² 'he puts it in between' (-?nčo² 'in between')
va³ko¹ya³ 'he teaches' (< va³ko¹ 'he shows' + -ya³ 'inside')
va³ne¹ho³ 'he washes the surface of' (< va³ne¹ 'he washes' + -ho³ 'the surface of')
va³ne¹nki³ 'he washes his head' (-nki³ 'beneath')
va³ne¹ya³ 'he washes inside (e.g. the dishes)' (-ya³ 'inside')
va³nko¹ya³ 'he bathes' (< va³nko²- '?' + -ya³ 'inside')
va³se¹hnta³ 'he tears' (< va³se¹ 'to place in position, to throw' + hnta³ 'two things related')
va³se¹nki³ 'he piles up' (-nki³ 'beneath')
va³se¹?a² 'he combs his hair' (-?a³ [sic] 'face to face')
va³se²kao⁴ 'he helps' (< va³se² 'he stands, he is in office' + kao⁴ 'and, with')
va³se²ne² 'he steps on' (-ne² 'forcefully downward')
va³se²nto⁴⁻³ 'he stands up' (nto⁴⁻³ 'long')
va³te¹ča³ 'he sweeps' (< va³te¹ 'he thatches' + ča³ 'it is lacking')
va³te¹čhoa² 'he prohibits' (-čhoa² 'shut')
va³te¹nta¹ 'he baptizes' (-nta¹ 'liquid')
va³te³čoa⁴ 'he cuts by measure' (< va³te³ 'he cuts' + čoa⁴ 'mark, symbol')
va³te³hco³ 'he tears open' (-hco³ '?')
vha³?a¹hi⁴⁻³ 'he chooses' (< vha³?a¹- '?' + -hi⁴⁻³ 'penetrated throughout')
vha³?a³s⁴⁻³ 'he enters' (< vha³?a³ 'he passes' + -s⁴⁻³ 'inward')
vha³?a³to³ 'he passes by' (-to³ 'by')
vha³?ai³ko² 'he arrives at' (< vha³?ai³ 'he arrives' + -ko³ [sic] 'up to')
vi³čha¹ya³ 'he skins (e.g. a banana or a cow)' (< vi³čha¹ 'he harvests' + -ya³ 'inside')
vi³hno²ke⁴⁻³ 'he laughs at (someone)' (< vi³hno² 'he laughs' + -ke⁴⁻³ 'emotion directed toward')
vi³nča¹kao⁴ 'he helps a lot' (< vi³nča¹ 'he fills' + -kao⁴ 'and, with')
vi³nča¹nki³ 'he fills up (something)' (-nki³ 'beneath')
vi³nča¹nta⁴⁻³ 'he arranges' (nta⁴⁻³ 'good, straight, in order')
vi³nča¹nthe² 'he plants' (nthe² 'a hill [e.g. of corn]')
vi³nča¹si⁴⁻³ 'he is a nuisance' (-si⁴⁻³ 'troublesome')
vi³nča¹škp¹ 'he frightens' (-škp¹ 'amazingly')
vi³nča¹?a³ 'he fills with advice' (-?a³ 'face to face')
vi³so¹the⁴ 'he gets up' (< vi³so¹- '?' + -the⁴ 'in sequence')
vi³ša³kao⁴ 'he marries (someone)' (< vi³ša³ 'he marries' + -kao⁴ 'and, with')
vi³tho³he³ 'he goes down' (< vi³tho³ 'he goes out' + -he⁴ [sic] 'downward')
vi³tho³hi⁴⁻³ 'he goes out from among' (-hi⁴⁻³ 'penetrated throughout')
vi³tho³nthai² 'he goes out free' (-nthai² 'overflowingly, intermediary')
vi³tho³ši² 'he goes apart' (-ši² 'separately')
vi³tho³t?a⁴⁻³ 'he goes away from' (-t?a⁴⁻³ 'against')
vi³tho³ya³ 'it swells (e.g. a sore foot)' (-ya³ 'inside')

Ending with a complex second main stem

va³ko¹?i³se⁴⁻³ 'he commands' (< va³ko¹ 'he shows' + ?i³se⁴⁻³ 'light')
va³se¹nti³so³ 'he tells a lie' (< va³se¹ 'he places in position, he throws' + nti³so³ 'it is lying')
va³se¹va³se³ 'he puts in the middle' (va³se³ 'middle, half')
va³se²ti¹tho² 'he stands first' (< va³se² 'he stands' + ti¹tho² 'first')
vha³?ai³ka³ne¹ 'he comes to wash' (< vha³?ai³ 'he arrives' + -ka³ne¹ 'to wash')
vha³?ai³k?a³she³ 'he comes to take out' (-k?a³she³ 'to take out')
vha³?ai³k?e¹yo³t?a⁴⁻³ 'they come to sit against' (-k?e¹yo³t?a⁴⁻³ 'to sit against')

Including a third main stem

- ti¹hna³nčo²va³se³ 'he is in the middle' (< ti¹hna³ 'he is' + -nčo² 'between' + va³se³ 'half, middle')
- va³ka¹hma³?a³ 'he burns his mouth' (< va³ka¹ 'he burns' + hma² [sic] 'black' + -?a³ 'face to face')
- va³ko¹sq²ce⁴⁻³ 'he brings out into the open' (< va³ko¹ 'he shows' + -sq² 'on the top of' + -ce⁴⁻³ 'in sight')
- va³ne¹hq³nki³ 'he brushes his teeth' (< va³ne¹ 'he washes' + -hq³ 'on the surface of' + -nki³ 'beneath')
- va³sg²ško¹nč?i³ 'he kneels' (< va³sg² 'he stands' + -ško¹ 'doubled' + -nč?i³ 'knee')
- va³te¹šo³ma³ 'he commands' (< va³te¹ 'he thatches' + -šo³ '?' + ma³ 'it is being done')
- va³te³kha¹ya³ 'he comes in between, pacifies' (< va³te³ 'he cuts' + -kha¹ 'slantwise' + -ya³ 'inside')
- vha³a¹čo⁴ya³ 'he measures' (< vha³a¹ '?' + -čo⁴ '?' + -ya³ 'inside')
- vha³a³hi⁴⁻³va³se³ 'he passes through the middle of' (< vha³a³ 'he passes' + -hi⁴⁻³ 'penetrated throughout' + va³se³ 'half, middle')
- vha³a³kha¹ko³ 'he passes on the road above' (-kha¹ 'slantwise,' -ko³ 'mentally')
- vha³a³nki³hmi¹ 'he criticizes' (-nki³ 'beneath,' -hmi¹ 'conversation')
- vha³a¹ce⁴⁻³ntai³ 'he surrounds' (< vha³a¹ 'he arrives' + ce⁴⁻³ 'big' + -ntai³ 'around')

In a few compounds the first main stem is simple in some persons but complex in others:

nčha⁴če² 'he whispers' (< nčha⁴ 'he talks' + -če² 'softly'), nčha²če²⁻³ 'I whisper,' no²khoa³čai²⁻³ 'you (sing.) whisper,' no²khoa⁴čai²⁻⁴ 'we (excl.) whisper.'

These morphemes will be discussed in greater detail under the independent noncompounded verbs.

Personal Compounds with First Main Stem Simple, but Varying to Complex

- nčha⁴če² 'he whispers' (< nčha⁴ 'he speaks' + -če² 'softly')
- nčha⁴na⁴hmi¹ 'he converses' (na⁴hmi¹ 'conversation')
- nčha⁴ki³ti³ 'he speaks forcefully' (-ki³ti³ 'quickly')
- nčha⁴sq²ce⁴⁻³ 'he speaks openly' (-sq² 'on top of,' -ce⁴⁻³ 'in sight')
- nčha⁴ti²kao⁴ 'he scolds' (-ti² '?,' -kao⁴ 'and, with')
- nčha⁴ce⁴⁻³ 'he speaks plainly' (-ce⁴⁻³ 'in sight')
- nčha⁴ya³ 'he addresses an audience' (-ya³ 'inside')
- nčha⁴aq³ 'he disparages' ('aq³ 'it is painful')
- co²ya³ 'he explains' (< co² 'he says' + -ya³ 'inside')
- vhi²he³ 'he goes down' (< vhi² 'he goes' + -he⁴ [sic] 'downward')
- vhi²ka³ko¹ 'he goes to show' (-ka³ko¹ 'to show')
- vhi²ka³ko¹ya³ 'he goes to teach' (-ka³ko¹ 'to teach')
- vhi²ka³ni¹ 'he goes to leave (something)' (ka³ni¹ 'he leaves [something]')
- vhi²ka³nko²ya³ 'he goes to take a bath' (-ka³nko² 'to bathe oneself')
- vhi²kao⁴ 'he goes with' (-kao⁴ 'with, and')
- vhi²kha³?a¹ 'he goes to get' (-kha³?a¹ 'to fetch')
- vhi²khe² 'he goes to eat' (khe² 'he eats')
- vhi²ko³ 'he goes to' (-ko³ 'up to')
- vhi²mi⁴⁻³ 'he goes up' (-mi⁴⁻³ 'upward')
- vhi²the⁴nki³ 'he follows' (-the⁴ 'in sequence,' -nki³ 'beneath')
- vhi²ti¹thq² 'he goes ahead' (ti¹thq² 'first')

d. Compounded Auxiliaries

(1) Formation of Compounded Auxiliaries

Immediately preceding a noncompounded verb or the first main stem of a compound verb, whether personal or impersonal, there may be an auxiliary, or a sequence of two or three of them, compounded to the main stem. The general meaning of these auxiliaries has to do with the status of the action (complete, incomplete, and the like), time of the action (present, past, and so on), and other characteristics, such as compulsion or capacity. Two of these auxiliaries (vhi² 'he goes' and vha³?ai³ 'he arrives') are independent transitive verbs; one of them (nčoa² 'he comes') is an independent intransitive verb; vhe³ 'it is ending' and ma³ 'it is being done' are independent impersonal verbs; khe³ 'not yet' is used as an independent particle (as a full sentence). Others of the compounded auxiliaries occur only as dependent forms: ki³- (with various mechanical alternates) 'completed,'¹⁴ koi⁴- (with various alternates) 'incomplete,'¹⁴ ti¹- 'continuing,'¹⁵ ka²- 'irremediable, unchanging or permanent state,' me⁴⁻³- 'to be consummated in the near future,' s?a⁴- 'to have assurance of,' ti⁴- (with irregular alternates)¹⁶ or ka²ta³- 'to order to do it,' ča⁴⁻³- 'probable state in the future,' k?oa⁴- 'to do in this manner.' When a single stem has fused to it a following subject pronoun and a preceding auxiliary, the resultant forms become highly intricate. The compounds are treated first in this chapter so that the reader will not be confused by overlapping layers of fusion on single syllables.

(2) Tonemes of Compounded Auxiliaries

Although most of these compounded auxiliaries preserve their tonemes without change, regardless of the subject of the compound, two of them (koi⁴- 'incomplete' and ti¹- 'continuing') may have their tonemes changed when the subject of the compound changes.¹⁷ These tonemic changes appear to be limited to the occurrence of the auxiliaries before morphemes of transitive type, or before complex intransitive ones; before simple intransitive stems the tonemes of the compounded auxiliaries do not change. In the following set of illustrations note the relationship between the subject of the compound and the toneme of ti¹-: ti¹val¹ya³ 'he is wearing (shoes),' ti²va⁴⁻³ya²⁻³ 'I am wearing (shoes),' ti³vha³yai³ 'you (sing.) are wearing (shoes);' ti¹si¹he¹ 'he is asking for,' ti²si¹⁻³he¹⁻³ 'I am asking for,' ti³ni²hai¹⁻³ 'you (sing.) are asking for.' In the next illustrations note the relationship between the subject of the compound and the toneme of koi⁴-; observe also the tonemic, vocalic, and consonantal fusion of koi⁴- to the following stem: v'a³mi⁴⁻³ 'he carries (on his back),' k?oa⁴mi⁴⁻³ 'he will carry (on his back),' k?oa³mia⁴⁻³ 'I will carry (on my back),' č'a⁴mi⁴⁻³ 'you (sing.) will carry (on your back).'.

¹⁴The modification of ki³- and koi⁴- preceding the first main stem of compounds is the same, or approximately the same, as when they are added to independent verbs. For a discussion of these modifications see pp. 140 and 147-48. For illustrations see Tables 9 (pp. 111-16) and 12 (pp. 141-46) and all verb listings in which the complete and incomplete auxiliaries are given (pp. 151-60).

¹⁵Though ti¹- as such does not occur independently, it has a cognate form thio¹⁻³ which is used when the third-person subject is plural; this form is not paralleled by any other singular-plural distinctions in the structure of the linguistic forms: ti¹nčha⁴ 'he is talking,' thio¹⁻³nčha⁴ 'they are talking'; ti²nčha²⁻³ 'I am talking,' but ti³mo²khoa⁴⁻² 'we (incl.) are talking.' The thio¹⁻³ is also used as an independent form, 'there are present.'

The form ti¹- may be basically a verbal particle 'to be in existence,' since (1) it is the verbal item in the independent verb ti¹hna³ 'he is in existence' or 'he is sitting,' whereas the -hna³ may be a directional adverb 'downward' or 'in a sitting position'; furthermore, (2) ti¹- varies freely with ti¹hna³ in ti¹nta⁴⁻³/ti¹hna³nta⁴⁻³ 'it is done, ready' (nta⁴⁻³ 'good, straight, in proper order').

¹⁶With rules for change somewhat like those for koi⁴- 'incomplete.'

¹⁷The basic form of the verb has here been called "timeless." Since the majority of the auxiliaries are merely added on to the basic form, with no change, and since the incomplete koi⁴- is the most highly irregular item, these two forms have been used for many of the illustrations in previous sections in order to show the most highly divergent forms.

Note below that the same type of phenomena exists when two or three auxiliaries are compounded in sequence¹⁸ to the first main stem: v?e¹nthe² 'he plants' (< v?e¹ 'he deposits' + nthe² 'a hill [e.g. of corn']'), s'a⁴ti¹v?e¹nthe² 'he is just now planting,' k'oe⁴⁻²nthe² 'he will plant,' me⁴⁻³k'oe⁴⁻²nthe² 'he will soon plant,' khoe⁴k'oe⁴⁻²nthe² 'he will finish planting,' khoe⁴k'oe⁴⁻³nthe²⁻³ 'I will finish planting,' khoe⁴k'oe¹ntha²⁻³ 'you (sing.) will finish planting.'

The following illustrations based on vhia³ 'I go' show the difference between auxiliaries compounded to the main verb and the same auxiliaries used apart from such compounding. Note that in the compounded form there is not the same fusion of subject to that auxiliary as there is when it constitutes an independent noncompounded verb auxiliary in a phrase with the compound verb which it precedes; though the compound itself and the expanded phrase may be used more or less interchangeably, the isolated compound is the more frequent: vhia³ 'I go,' si⁴⁻³sa¹⁻³ 'I work,' vhi³si⁴⁻³sa¹⁻³ 'I go to work,' vhia³ vhi³si⁴⁻³sa¹⁻³ 'I go I go to work'; khoia¹⁻³ 'I will go,' k'oe⁴⁻³nthe²⁻³ 'I will plant,' khoi¹k'e⁴⁻³nthe²⁻³ 'I will go to plant,' khoia¹⁻³ khoi¹k'e⁴⁻³nthe²⁻³ 'I will go I will go to plant.' Notice also that the phrases may be interrupted by further words--but this is not permissible within the compound: vhia³ nt?ai⁴ vhi³si⁴⁻³sa¹⁻³ 'I go now I go to work,' khoia¹⁻³ nt?ai⁴ khoi¹k'e⁴⁻³nthe²⁻³ 'I will go now I will go to plant.'

e. The Fourth (as Last) Main Stem of the Verb Compound

Very rarely one finds in a completely normal context a compound which contains a fourth (as last) main stem. As is true of the third main stem, the fourth one is almost always comprised of a dependent directional adverb. The rules for tonemic and vocalic fusion of subject to the fourth main stem appear to be similar to those for a third main stem which is final in the compound--and these rules in turn are the same as for a second, but final, main stem. The paucity of data on fourth main stems, however, forces all generalizations concerning them to be tentative only. The following list includes all the verbs of this type thus far recorded:

Personal Compounds with a Fourth (as Last) Main Stem

ko³t?a⁴⁻³ya³sq² 'he reviews' (< ko³- 'to investigate' + -t?a⁴⁻³ 'against' + -ya³ 'inside' + -sq² 'on top of'). Compare ko³t?a⁴⁻³ 'he tries' and ko³t?a⁴⁻³ya³ 'he studies.'

ti¹hna³hi⁴⁻³kao⁴ 'they are together' (< ti¹hna³ 'he/they is/are existing/sitting' + -ya³ 'inside' + -hi⁴⁻³ 'penetrated throughout' + -kao⁴ 'with'). Note the complex first main stem. The compound was obtained in a context in which two babies were together in a tubful of water.

va³ne¹hq³nki³kao⁴ 'he brushes his teeth with (something)' (< va³ne¹ 'he washes,' independent transitive complex stem, + -hq³ 'on the surface of' + -nki³ 'beneath' + -kao⁴ 'with'). In general, this compound seems to act in a regular fashion, with pronominal subject elements fused to the last stem. Before the noun for 'salt,' however, the pronominal element (note the vowel) was at one time observed to be fused to the -nki³ rather than to the -kao⁴: va³ne⁴⁻³hq³nki³kao⁴-na³sa¹⁻³ 'I brush (my teeth) with salt.' This might imply that the fourth stem is more loosely compounded to the first stem than are the second and third, which have not been seen to act in this way. For shorter compounds compare va³ne¹hq³ 'he washes the surface of (e.g. a table),' va³ne¹hq³nki³ 'he brushes his teeth.'

v?a³she³nki³nta¹ 'he takes out from under the water' (< v?a³ 'he carries,' simple independent transitive verb, + -she³ 'out from,' dependent directional adverb, + -nki³ 'beneath,' dependent directional adverb, + -nta¹ 'liquid,' nominal bound form). Note that this compound is exceptional in that the fourth stem is nominal rather than adverbial. Compare also v?a³she³ 'he takes out' and v?a³she³nki³ 'he takes out from under.' The four-stem compound occurred in a text in which a dead man was pulled out of the water.

¹⁸Many theoretically possible combinations of compounded auxiliaries have not been observed. Among those found are: me⁴⁻³me⁴⁻³-, ka²vhe³ka²-, ki³- + vhe³- (fused to he³-), ki³- + ka²- (fused to he³ka²-), ki³- + vhe³- + me⁴⁻³- (fused to he³me⁴⁻³-), koi⁴⁻ + vhe³- + koi⁴⁻ (fused to khoe⁴koi⁴-), s'a⁴ka²-, s'a⁴koi⁴-, s'a⁴til¹-, ka²ta³-, khi³ma³-, s'a⁴ma³-, ki³- + vhe³- + ma³- (fused to he³ma³-), koi⁴- + vhi²- (fused to koai⁴-).

2. Compound Verbs with Object-Subject Enclitics (Impersonals)

Impersonal compound verbs may have for their second main stem a noun or an adjective or a directional adverb: ma³či⁴nka⁴ 'it is avaricious' (< ma³ 'it is being done,' impersonal verb, + či⁴nka⁴ 'pig,' nonpersonal noun); ma³hča¹ 'it is growing' (hča¹ 'old,' adjective); ma³ce⁴⁻³ 'it can be seen' (-ce⁴⁻³ 'in sight,' adverb, dependent). Transitive or intransitive verbs rarely serve as the second main stem of impersonal verb compounds.¹⁹

The first main stem of an impersonal verb compound is always an independent impersonal verb: thi¹hi⁴⁻³ 'it is remembered' (thi¹ 'it is present').

Impersonal compound verbs use object-subject enclitics, as do the noncompounded impersonals, rather than the fused dependent subject pronouns which are found on the personal compounds: nhe³-na³ 'it is gained by me' (i.e. 'I win'), nhe³nki³-na³ 'it is gained beneath by me' (i.e. 'I have left over').

Occasionally the impersonals occur with no such enclitics. If this happens, the subject is translated as 'it'; ma³ 'it is being done,' ma³hča¹ 'it is made old' (i.e. 'it grows'), ma³-skalya³ 'it is made foolish inside' (i.e. 'it is a mistake').

When the first main stem of the compound is an impersonal verb element, there is no change of toneme, vowel, or consonant for person, but there is occasionally a change of toneme accompanying the change to complete or incomplete compounded auxiliaries. Note the following samples: thi¹-na³ 'it is present to me' (i.e. 'I have'), thi¹hi⁴⁻³-na³ 'it is present inside to me' (i.e. 'I remember'), thi¹hi⁴⁻³-le⁴ 'it is present inside to him' (i.e. 'he remembers'), thi¹hi⁴⁻³-na³ 'it will be present inside to me' (i.e. 'I will remember'); ča³-na³ 'it is lacking to me' (i.e. 'I lack'), ča⁴-na³ 'it will be lacking to me' (i.e. 'I will lack').

The complete compounded auxiliary ki³- + ma³ > koa³; the incomplete koi⁴- + ma³ > koa⁴: ma³ško¹ 'it is collected' (< ma³ 'it is being done' + -ško¹ 'doubled'), kop³ško¹ 'it was collected,' kop⁴ško¹ 'it will be collected.' There are further irregularities that follow the independent forms, for which see Tables 12e-f (pp. 145-46).

The occurrence of modal enclitics with impersonal compounds is the same as with impersonal independent verbs, and will be discussed with them.

Impersonal Compounds Which Contain a Simple First Main Stem

- ma³čhe¹ 'it is needed' (< ma³ 'it is being done' + -čhe¹ 'useful')
- ma³či³ne³ 'it is edible' (-či³ne³ 'to eat')
- ma³či⁴nka⁴ 'it becomes avaricious' (či⁴nka⁴ 'pig')
- ma³čo⁴ya³ 'it is understood' (-čo⁴ '?,' -ya³ 'inside')
- ma³hča¹ 'it is growing' (hča¹ 'old')
- ma³hti³ 'it is maddening' (-hti³ 'angry')

¹⁹In a few instances a transitive verb is found as the second element. In these compounds the suppletive stem is likely to be used: ma³či³ne³ 'it is edible' (< ma³ 'it is being done' + či³ne³ 'he eats' [suppletive stem seen in či³ne³-2 'we (incl.) eat'], transitive verb); ma³?yo² 'it is drinkable' (< ma³ 'it is being done' + ?vi⁴⁻³ 'he drinks' [suppletive stem seen in ?yo² 'we (incl.) drink'], transitive verb).

One may easily mistake for impersonal verb compounds certain verbs that have impersonal verbal morphemes serving as auxiliaries compounded to the remainder of the verb. In this case, the entire compound has the fused subject pronouns characteristic of personal compounds; further, the particular auxiliary--the impersonal morpheme--may have another one substituted for it or may be completely eliminated without changing the basic meaning or structure or function of the personal compound as a whole: ma³sílšal 'he can work' (< ma³ 'it is being done,' compounded auxiliary, + síl- 'to make,' first main stem, transitive verbal morpheme, independent, from síl 'he makes,' + šal- 'work,' independent nonpersonal noun); contrast ki³sílšal 'he worked' and sílšal 'he works.'

- ma³kha¹ 'it is believed' (-kha¹ '?')
- ma³nka³ 'it is agreeable' (-nka³ '?')
- ma³shai³ 'it is encountered' (-shai³ '?')
- ma³ska¹ya³ 'it is mistaken' (ska¹ 'it is foolish,' -ya³ 'inside')
- ma³ško¹ 'it is collected' (-ško¹ 'doubled')
- ma³ško¹ 'it is amazing' (-ško¹ 'amazing')
- ma³ce⁴⁻³ 'it is seen' (-ce⁴⁻³ 'insight')
- ma³choa³ 'it is happy' (choa³ 'happy')
- ma³yī³he³ 'it can all be done' (-yī³he³ 'all')
- ma³?ao³ 'it is aching' (?ao³ 'it is painful')
- nhe³nki³ 'it is left over' (< nhe³ 'it is gained' + -nki³ 'beneath')
- thi¹hi⁴⁻³ 'it is remembered' (< thi¹ 'it is present' + -hi⁴⁻³ 'penetrated throughout')
- thi¹hnko³le⁴kq³ 'it is agreed' (hnko³-le⁴ 'one of his' [a rare type of complex within compounds], -kq³ 'mentally')
- thi¹ne² 'it is forcefully present, it is necessary' (-ne² 'forcefully downward')
- thi¹?nte³ 'power or authority is present' (?nte³- 'land')
- vhe³t?a⁴⁻³ 'it is the end' (< vhe³ 'it is ending' + -t?a⁴⁻³ 'against')

Impersonal Compounds Which Contain a Complex First Main Stem

- sa³ko¹ya³ 'it is found' (< sa³ko¹ 'it is found' + -ya³ 'inside')
- vha³?a¹ya³ 'it is coming to life again' (< vha³?a¹ 'it wakes up' + -ya³ 'inside')

3. Independent Noncompounded Verbs with Fused Elements

As has already been indicated, the independent noncompounded verbs in the language are relatively very few--about fifty-one simple and fifty-seven complex--but their importance to the language is far out of proportion to their number. In addition to being used by themselves, one of them--or one of the few additional dependent verbal morphemes--constitutes the essential verbal element which must be present in every compound in each of the many compound verbs that represent the bulk of the verbs of the language.

The independent verbs themselves tend to be highly irregular as to the tonemes, vowels, and consonants of their stems and in their fusion to the complete and incomplete auxiliaries; in contrast to them, the compounds built upon these same morphemes are highly regular in tonemes, vowels, and consonants, once the irregularities of the noncompounded forms are granted and transferred to the compounds.

Now that the regular characteristics of the compounds have been discussed, the more irregular, independent noncompounded forms may be profitably considered in some detail.

Several types of independent noncompounded verbs are found. PERSONALS are those which occur with fused subject pronouns, whereas IMPERSONALS have only enclitic pronominal elements to indicate the actor; both of these classes may have fused elements of other kinds, such as auxiliaries. The personals are comprised of INTRANSITIVES and TRANSITIVES, which differ from each other in two respects: (1) The intransitives never take an object, whereas all transitives may occur with object elements even though they often occur without such elements (the term "object" must be used in nontraditional senses since the translation of these morphemes into English frequently requires indirect pronouns rather than direct ones and since such object elements occur in situations and with types of elements which are at times completely foreign to English usage). (2) All transitive verbs have some suppletive stem change coincident with the change of subject; such suppletion does not occur with the intransitives. Two types each of intransitives, transitives, and impersonals are found: a SIMPLE one, comprised of a single syllable or morpheme, and

a COMPLEX one, comprised of a two-morpheme combination which seems to represent a very old layer of compounding, of which the separate elements are often--but not always--now lost or unidentifiable as to form and (or) meaning. In addition, a few verbs listed as DEPENDENT act like the compounding stems of the independent transitive, intransitive, and impersonal verbs, but have not been found by themselves; occasionally some such dependent item appears separately and must then be removed from the dependent list and added to the independent one. (See pp. 132-33, note 13.)

a. Independent Intransitive Verbs

There are five simple independent intransitive verbs: ka⁴⁻³ 'he falls,' ti² 'he burns,' nčoa² 'he comes,' c¹₄₋₃ 'he is born,' m?₄₋₃ 'he is sick.' These verbs do not occur with objects. In the timeless form, with no compounded auxiliary, the stem tonemes, vowels, and consonants of these verbs remain stable; the stems fuse regularly to the dependent subject pronouns in the same way as does the final main stem of a personal compound verb. In the following set of illustrations note that the third person represents the basic stem form, whereas the stem form for the other persons can be predicted from the formulas in Tables 8 and 10 (pp. 109-10, 118-19): ti² 'he burns,' tia²⁻³ 'I burn,' ti²⁻³ 'you (sing.) burn,' and so forth.

When the complete auxiliary ki³- is compounded to these independent intransitive verbs the following third-person forms occur (note that there are some differences of toneme between the timeless forms given in the preceding paragraph and the complete forms listed here; other persons follow regularly from the third singular): ki³ska⁴⁻³ 'he fell,' ki³ti² 'he got burned,' hi³nčoa⁴⁻³ 'he came,' ki³c¹₄₋₃ 'he was born,' k?ie³ 'he is dead.'

When the incomplete auxiliary koi⁴- is compounded to these independent intransitive verbs the following third-person forms occur (note that the tonemes differ from those with the timeless and complete compounded auxiliaries in the preceding paragraphs; other persons follow regularly from the third singular): ska⁴ 'he will fall,' koi⁴ti⁴ 'he will get burned,' khoi⁴nčoa⁴⁻³ 'he will come,' c¹¹ (or hc¹¹) 'he will be born'; the verb m?₄₋₃ 'he is sick' appears to be lacking with the incomplete compounded auxiliary, but the expression sa⁴ko²-le⁴ č?₃₋₄ 'he will find sickness' occurs instead.

The full data for all the simple independent intransitive verbs in their timeless form and with complete and incomplete compounded auxiliaries are given in Table 12a (p. 141).

When the continuative auxiliary ti¹- is compounded to the intransitives it retains its high toneme regardless of the subject of the verb, if the verb is one of the group ka⁴⁻³ 'fall,' ti² 'get burned,' c¹₄₋₃ 'be born.' With the verbs nčoa² 'come' and m?₄₋₃ 'be sick,' however, the toneme of ti- reflects the person of the subject: thus, with a third-person subject, ti¹- has toneme 1; with a first-person subject, toneme 2; with a second-person singular subject or a first- or second-person plural subject, toneme 3. The stem forms would be like the timeless. Note, then, ti¹nčoa² 'he is in the process of coming,' ti²nčoa²⁻³ 'I am in the process of coming,' ti³nčoa²⁻³ 'you (sing.) are in the process of coming,' and so on; ti¹m?₄₋₃ 'he is continuing sick,' ti²m?₄₋₃ 'I am continuing sick,' ti³m?₄₋₃ 'you (sing.) are continuing sick,' and so forth.

In the data at hand there are seven complex independent intransitive verbs. In four of these, the first morpheme is vi³- (with no clear meaning): vi³hno² 'he laughs,' vi³ya⁴⁻³ 'he dies,' vi³hta³ 'he is tired' (this also occurs as an impersonal verb), viša³ 'he marries.' Two of them begin with tho³- 'out from': tho³ka⁴⁻³ 'he runs,' tho³nta¹ 'he sweats.' The seventh begins with hčo¹- 'up to a certain point': hčo¹nč?oe² 'he is able to reach.'

This first morpheme of the complex preserves its tonemes, consonants, and vowels without change regardless of the person of the subject: tho³nta¹ 'he sweats,' tho³nta¹⁻³ 'I sweat.'

With fused compounded auxiliaries, however, there are some changes of toneme: tho³nta¹ 'he sweats,' ki³tho²nta¹ 'he sweated,' tho¹nta¹ 'he will sweat.' For the other verbs see Table 12b (p. 142).

TABLE 12

Independent Verbs

TABLE 12a

Simple Independent Intransitive Verbs

Meaning	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to fall'	Timeless	ka ⁴⁻³	ka ⁴⁻³	kai ⁴⁻³	kao ⁴⁻³	kai ³	ka ⁴⁻²
	Complete	ki ³ ska ⁴⁻³	ki ³ ska ⁴⁻³	ki ³ skai ⁴⁻³	ki ³ kao ⁴⁻³	ki ³ kai ³	ki ³ ka ⁴⁻²
	Incomplete	ska ⁴	ska ⁴	skai ⁴	skao ⁴⁻³	skai ³	ska ⁴⁻²
'to burn'	Timeless	ti ²	tia ²⁻³	ti ²⁻³	tio ²⁻³	ti ²⁻⁴	tia ²
	Complete	ki ³ ti ²	ki ³ tia ²⁻³	ki ³ ti ²⁻³	ki ³ tio ²⁻³	ki ³ ti ²⁻⁴	ki ³ tia ²
	Incomplete	koi ⁴ ti ⁴	koi ⁴ tia ⁴	koi ⁴ ti ⁴	koi ⁴ tio ⁴⁻³	koi ⁴ ti ⁴	koi ⁴ tia ⁴⁻²
'to come'	Timeless	nčoa ²	nčoa ²⁻³	nčoai ²⁻³	nčoao ²⁻³	nčoai ²⁻⁴	nčoa ²
	Complete	hi ³ nčoa ⁴⁻³	hi ³ nčoa ⁴⁻³	hi ³ nčoai ⁴⁻³	hi ³ nčoao ⁴⁻³	hi ³ nčoai ³	hi ³ nčoa ⁴⁻²
	Incomplete	khoi ⁴ nčoa ⁴⁻³	khoi ⁴ nčoa ⁴⁻³	khoi ⁴ nčoai ⁴⁻³	khoi ⁴ nčoao ⁴⁻³	khoi ⁴ nčoai ³	khoi ⁴ nčoa ⁴⁻²
'to be born'	Timeless	c ₁ ⁴⁻³	c ₁ q ⁴⁻³	c ₁ ⁴⁻³	c ₁ q ⁴⁻³	c ₁ ³	c ₁ q ⁴⁻²
	Complete	ki ³ c ₁ ⁴⁻³	ki ³ c ₁ q ⁴⁻³	ki ³ c ₁ ⁴⁻³	ki ³ c ₁ q ⁴⁻³	ki ³ c ₁ ³	ki ³ c ₁ q ⁴⁻²
	Incomplete	c ₁ ¹	c ₁ q ¹⁻³	c ₁ ¹⁻³	c ₁ q ¹⁻³	c ₁ ¹⁻⁴	c ₁ q ¹
'to be sick'*	Timeless	m ⁷ q ⁴⁻³	m ⁷ q ⁴⁻³	m ⁷ q ₁ ⁴⁻³	m ⁷ q ₁ ⁴⁻³	m ⁷ q ₁ ³	m ⁷ q ⁴⁻²
	Complete	k ⁷ q ³ , varying to k ⁷ q ₁ ³	k ⁷ q ³ , varying to k ⁷ q ₁ ³	k ⁷ q ₁ ³ , varying to k ⁷ q ₁ ³	k ⁷ q ₁ ³ , varying to k ⁷ q ₁ ³	k ⁷ q ₁ ³⁻⁴ , varying to k ⁷ q ₁ ³⁻⁴	k ⁷ q ³⁻² , varying to k ⁷ q ₁ ³⁻²

* With the complete auxiliary the meaning of this verb is 'to be dead.'

TABLE 12b
Complex Independent Intransitive Verbs

Meaning	Auxiliary stems: zero, ki ³ , koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to run'	Timeless	tho ³ ka ⁴⁻³	tho ³ ka ⁴⁻³	tho ³ kai ⁴⁻³	tho ³ kao ⁴⁻³	tho ³ kai ³	tho ³ ka ⁴⁻²
	Complete	ki ³ tho ² ka ⁴⁻³	ki ³ tho ² ka ⁴⁻³	ki ³ tho ² kai ⁴⁻³	ki ³ tho ² kao ⁴⁻³	ki ³ tho ² kai ³	ki ³ tho ² ka ⁴⁻²
	Incomplete	tho ¹ ka ⁴⁻³	tho ¹ ka ⁴⁻³	tho ¹ kai ⁴⁻³	tho ¹ kao ⁴⁻³	tho ¹ kai ³	tho ¹ ka ⁴⁻²
'to sweat'	Timeless	tho ³ nta ¹	tho ³ nta ¹⁻³	tho ³ ntai ¹⁻³	tho ³ ntao ¹⁻³	tho ³ ntai ¹⁻⁴	tho ³ nta ¹
	Complete	ki ³ tho ² nta ¹	ki ³ tho ² nta ¹⁻³	ki ³ tho ² ntai ¹⁻³	ki ³ tho ² ntao ¹⁻³	ki ³ tho ² ntai ¹⁻⁴	ki ³ tho ² nta ¹
	Incomplete	tho ¹ nta ¹	tho ¹ nta ¹⁻³	tho ¹ ntai ¹⁻³	tho ¹ ntao ¹⁻³	tho ¹ ntai ¹⁻⁴	tho ¹ nta ¹
'to die'	Timeless	vi ³ ya ⁴⁻³	vi ³ ya ⁴⁻³	vi ³ yai ⁴⁻³	vi ³ yao ⁴⁻³	vi ³ yai ³	vi ³ ya ⁴⁻²
	Complete	ca ³ ki ³ ya ⁴⁻³	ca ³ ki ³ ya ⁴⁻³	ca ³ ki ³ yai ⁴⁻³	ca ³ ki ³ yao ⁴⁻³	ca ³ ki ³ yai ³	ca ³ ki ³ ya ⁴⁻²
	Incomplete	koi ⁴ ya ¹	koi ³ ya ¹⁻³	koi ⁴ yai ¹⁻³	koi ⁴ yao ¹⁻³	koi ⁴ yai ¹⁻⁴	koi ⁴ ya ¹
'to laugh'	Timeless	vi ³ hno ²	vi ³ hnoa ²⁻³	vi ³ hnoi ²⁻³	vi ³ hno ²⁻³	vi ³ hnoi ²⁻⁴	vi ³ hnoa ²
	Complete	ca ³ ki ³ hno ²	ca ³ ki ³ hnoa ²⁻³	ca ³ ki ³ hnoi ²⁻³	ca ³ ki ³ hno ²⁻³	ca ³ ki ³ hnoi ²⁻⁴	ca ³ ki ³ hnoa ²
	Incomplete	koi ⁴ hno ⁴	koi ³ hnoa ⁴	koi ⁴ hnoi ⁴	koi ⁴ hno ⁴⁻³	koi ⁴ hnoi ⁴	koi ⁴ hnoa ⁴⁻²
'to marry'	Timeless	vi ³ š ³ q ³	vi ³ š ³ q ³	vi ³ š ³ q ¹ ₃	vi ³ š ³ q ³	vi ³ š ³ q ¹ ₃ ³⁻⁴	vi ³ š ³ q ³⁻²
	Complete	či ³ š ³ q ³	či ³ š ³ q ²⁻³	či ³ š ³ q ¹ ₃ ²⁻³	či ³ š ³ q ²⁻³	či ³ š ³ q ¹ ₃ ²⁻⁴	či ³ š ³ q ²
	Incomplete	koi ⁴ š ³ q ³	koi ⁴ š ³ q ³	koi ⁴ š ³ q ¹ ₃	koi ⁴ š ³ q ³	koi ⁴ š ³ q ¹ ₃ ³⁻⁴	koi ⁴ š ³ q ³⁻²

TABLE 12c
Simple Independent Transitive Verbs

Meaning	Auxiliary stems: zero, ki ³ , koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to make'	Timeless	s?i ¹	s?ia ⁴⁻³	n?iai ²⁻³	n?iao ²⁻³	n?iae ²⁻⁴	n?ia ²
	Complete	ki ³ s?i ⁴⁻³	ki ³ s?ia ⁴⁻³	ki ³ n?iai ²⁻³	ki ³ n?iao ²⁻³	ki ³ n?iae ²⁻⁴	ki ³ n?ia ²
	Incomplete	s?i ⁴⁻²	s?ia ⁴⁻³	s?iae ⁴	s?iao ⁴⁻³	s?iae ⁴	s?ia ⁴⁻²
'to go'	Timeless	vhi ²	vhia ³	?mi ³	ma ³ nk ¹ o ¹⁻³	ma ³ nk ¹ i ¹⁻⁴	ma ³ nkia ¹
	Complete	ki ³	kia ³	k?i ³	ca ³ nk ¹ o ²⁻³	ca ³ nk ¹ i ²⁻⁴	ca ³ nkia ²
	Incomplete	koai ⁴	khoa ¹⁻³	k?oi ¹⁻³	ko ⁴ nk ¹ o ¹⁻³	ko ⁴ nk ¹ i ¹⁻⁴	ko ⁴ nkia ¹
'to deposit'	Timeless	v?e ¹	v?e ⁴⁻³	v?a ²⁻³	v?ao ²⁻³	v?ai ²⁻⁴	v?e ²
	Complete	ca ³ k?v ¹ e ¹	ca ³ k?v ⁴⁻³ e ¹	ca ³ k?ai ²⁻³	ca ³ k?ao ²⁻³	ca ³ k?ai ²⁻⁴	ca ³ k?e ²
	Incomplete	k?oe ⁴⁻²	k?oe ⁴⁻³	k?oai ¹⁻³	k?oao ¹⁻³	k?oai ¹⁻⁴	k?oe ¹
'to carry'	Timeless	v?a ³	v?a ³	č?ai ²⁻³	č?ao ²⁻³	č?ai ²⁻⁴	č?a ²
	Complete	ca ³ k?a ³	ca ³ k?a ³	ki ³ č?ai ²⁻³	ki ³ č?ao ²⁻³	ki ³ č?ai ²⁻⁴	ki ³ č?a ²
	Incomplete	k?oa ⁴	k?oa ³	č?ai ⁴	č?ao ⁴⁻³	č?ai ⁴	č?a ⁴⁻²
'to sing'	Timeless	~ ⁴⁻³	se ⁴⁻³	hntai ³	hntao ³	hntai ³⁻⁴	hnta ³⁻²
	Complete	ki ³ se ⁴⁻³	ki ³ se ⁴⁻³	ki ³ hntai ³	ki ³ hntao ³	ki ³ hntai ³⁻⁴	ki ³ hnta ³⁻²
	Incomplete	se ¹	se ⁴⁻³	koi ⁴ hntai ¹⁻³	koi ⁴ hntao ¹⁻³	koi ⁴ hntai ¹⁻⁴	koi ⁴ hnta ¹
'to write'	Timeless	khi ⁴⁻³	khia ⁴⁻²	čhi ³	čho ³	čhi ³⁻⁴	čha ³⁻²
	Complete	ki ³ ski ⁴⁻³	ki ³ skia ⁴⁻³	ki ³ čhi ³	ki ³ čho ³	ki ³ čhi ³⁻⁴	ki ³ čha ³⁻²
	Incomplete	ski ¹	skia ⁴⁻³	čhi ¹⁻³	čho ¹⁻³	čhi ¹⁻⁴	čha ¹

TABLE 12d
Complex Independent Transitive Verbs

Meaning	Auxiliary stems: zero, ki ³ , koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to wash'	Timeless	va ³ ne ¹	va ³ ne ⁴⁻³	va ³ nai ²⁻³	va ³ nao ²⁻³	va ³ nai ²⁻⁴	va ³ ne ²
	Complete	ca ³ ka ³ ne ¹	ca ³ ka ³ ne ⁴⁻³	ca ³ ka ³ nai ²⁻³	ca ³ ka ³ nao ²⁻³	ca ³ ka ³ nai ²⁻⁴	ca ³ ka ³ ne ²
	Incomplete	koa ⁴ ne ²	koa ³ ne ⁴⁻³	koa ⁴ nai ²⁻³	koa ⁴ nao ²⁻³	koa ⁴ nai ²⁻⁴	koa ⁴ ne ²
'to cut'	Timeless	va ³ te ³	va ³ te ³	vi ³ čai ²⁻³	vi ³ čao ²⁻³	vi ³ čai ²⁻⁴	vi ³ ča ²
	Complete	ca ³ ka ³ te ³	ca ³ ka ³ te ³	ca ³ ki ³ čai ²⁻³	ca ³ ki ³ čao ²⁻³	ca ³ ki ³ čai ²⁻⁴	ca ³ ki ³ ča ²
	Incomplete	koa ⁴ te ³	koa ³ te ³	koi ⁴ čai ¹⁻³	koi ⁴ čao ¹⁻³	koi ⁴ čai ¹⁻⁴	koi ⁴ ča ¹
'to go out'	Timeless	vi ³ tho ³	vi ² thoa ⁴	vi ² thoi ⁴	vi ² tho ⁴⁻³	vi ² thoi ⁴	vi ² thoa ⁴⁻²
	Complete	hi ³ tho ³	hi ² thoa ⁴	hi ² thoi ⁴	hi ² tho ⁴⁻³	hi ² thoi ⁴	hi ² thoa ⁴⁻²
	Incomplete	koi ⁴ tho ³	koi ² thoa ⁴	koi ² thoi ⁴	koi ² tho ⁴⁻³	koi ² thoi ⁴	koi ² thoa ⁴⁻²
'to pass by'	Timeless	vha ³ ŋa ³	vha ² ŋa ⁴	vi ³ thai ⁴⁻³	vi ³ thao ⁴⁻³	vi ³ thai ³	vi ³ tha ⁴⁻²
	Complete	ha ³ ŋa ³	ha ² ŋa ⁴	hi ³ thai ⁴⁻³	hi ³ thao ⁴⁻³	hi ³ thai ³	hi ³ tha ⁴⁻²
	Incomplete	khoa ⁴ ŋa ³	khoa ² ŋa ⁴	koi ⁴ thai ¹⁻³	koi ⁴ thao ¹⁻³	koi ⁴ thai ¹⁻⁴	koi ⁴ tha ¹
'to eat (e.g. a dish of food)'	Timeless	khi ³ ne ³	khi ² ne ⁴	čhi ³ nai ³	čhi ³ nao ³	čhi ³ nai ³⁻⁴	čhi ³ ne ³⁻²
	Complete	ki ³ ski ³ ne ³	ki ³ ski ² ne ⁴	ki ³ čhi ³ nai ³	ki ³ čhi ³ nao ³	ki ³ čhi ³ nai ³⁻⁴	ki ³ čhi ³ ne ³⁻²
	Incomplete	ski ⁴ ne ⁴	ski ² ne ⁴	čhi ⁴ nai ⁴	čhi ⁴ nao ⁴⁻³	čhi ⁴ nai ⁴	čhi ⁴ ne ⁴⁻²
'to love'	Timeless	choa ³ ke ⁴⁻³	choa ³ ke ⁴	choa ³ čai ³	choa ³ čao ³	choa ³ čai ³⁻⁴	choa ³ ča ³⁻²
	Complete	kqa ³ choa ³ ke ⁴⁻³	kqa ³ choa ³ ke ⁴	kqa ³ choa ³ čai ³	kqa ³ choa ³ čao ³	kqa ³ choa ³ čai ³⁻⁴	kqa ³ choa ³ ča ³⁻²
	Incomplete	kqa ⁴ choa ³ ke ⁴⁻³	kqa ⁴ choa ³ ke ⁴	kqa ⁴ choa ³ čai ³	kqa ⁴ choa ³ čao ³	kqa ⁴ choa ³ čai ³⁻⁴	kqa ⁴ choa ³ ča ³⁻²

TABLE 12e
Simple Independent Impersonal Verbs

Meaning	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to be able'	Timeless	ma ³ (-le ⁴)	ma ³ -na ³	ma ³ -li ²	ma ³ -no ⁴⁻³	ma ³ -nai ³⁻⁴ -hi ⁴	ma ³ -na ¹
	Complete	kø ³ (-le ⁴)	kø ³ -na ³	kø ³ -li ²	kø ³ -no ⁴⁻³	kø ³ -nai ³⁻⁴ -hi ⁴	kø ³ -na ¹
	Incomplete	kø ⁴ (-le ⁴)	kø ⁴ -na ³	kø ⁴ -li ²	kø ⁴ -no ⁴⁻³	kø ⁴ -nai ³⁻⁴ -hi ⁴	kø ⁴ -na ¹
'to lack'	Timeless	ča ³ (-le ⁴)	ča ³ -na ³	ča ³ -li ²	ča ³ -no ⁴⁻³	ča ³ -nai ³⁻⁴ -hi ⁴	ča ³ -na ¹
	Complete	ki ³ ča ³ (-le ⁴)	ki ³ ča ³ -na ³	ki ³ ča ³ -li ²	ki ³ ča ³ -no ⁴⁻³	ki ³ ča ³ -nai ³⁻⁴ -hi ⁴	ki ³ ča ³ -na ¹
	Incomplete	(h)ča ⁴ (-le ⁴)	(h)ča ⁴ -na ³	(h)ča ⁴ -li ²	(h)ča ⁴ -no ⁴⁻³	(h)ča ⁴ -nai ³⁻⁴ -hi ⁴	(h)ča ⁴ -na ¹
'to be obtained'	Timeless	s?e ⁴⁻³ (-le ⁴)	s?e ⁴⁻³ -na ³	s?e ⁴⁻³ -li ²	s?e ⁴⁻³ -no ⁴⁻³	s?e ⁴⁻³ -nai ³⁻⁴ -hi ⁴	s?e ⁴⁻³ -na ¹
	Complete	ki ³ s?e ⁴⁻³ (-le ⁴)	ki ³ s?e ⁴⁻³ -na ³	ki ³ s?e ⁴⁻³ -li ²	ki ³ s?e ⁴⁻³ -no ⁴⁻³	ki ³ s?e ⁴⁻³ -nai ³⁻⁴ -hi ⁴	ki ³ s?e ⁴⁻³ -na ¹
	Incomplete	s?e ⁴ (-le ⁴)	s?e ⁴ -na ³	s?e ⁴ -li ²	s?e ⁴ -no ⁴⁻³	s?e ⁴ -nai ³⁻⁴ -hi ⁴	s?e ⁴ -na ¹
'to win'	Timeless	nhe ³ (-le ⁴)	nhe ³ -na ³	nhe ³ -li ²	nhe ³ -no ⁴⁻³	nhe ³ -nai ³⁻⁴ -hi ⁴	nhe ³ -na ¹
	Complete	ki ³ nhe ² (-le ⁴)	ki ³ nhe ² -na ³	ki ³ nhe ² -li ²	ki ³ nhe ² -no ⁴⁻³	ki ³ nhe ² -nai ³⁻⁴ -hi ⁴	ki ³ nhe ² -na ¹
	Incomplete	koi ⁴ nhe ⁴ (-le ⁴)	koi ⁴ nhe ⁴ -na ³	koi ⁴ nhe ⁴ -li ²	koi ⁴ nhe ⁴ -no ⁴⁻³	koi ⁴ nhe ⁴ -nai ³⁻⁴ -hi ⁴	koi ⁴ nhe ⁴ -na ¹
'to be washed for'	Timeless	vhe ⁴⁻³ (-le ⁴)	vhe ⁴⁻³ -na ³	vhe ⁴⁻³ -li ²	vhe ⁴⁻³ -no ⁴⁻³	vhe ⁴⁻³ -nai ³⁻⁴ -hi ⁴	vhe ⁴⁻³ -na ¹
	Complete	he ⁴⁻³ (-le ⁴)	he ⁴⁻³ -na ³	he ⁴⁻³ -li ²	he ⁴⁻³ -no ⁴⁻³	he ⁴⁻³ -nai ³⁻⁴ -hi ⁴	he ⁴⁻³ -na ¹
	Incomplete	khoe ⁴⁻³ (-le ⁴)	khoe ⁴⁻³ -na ³	khoe ⁴⁻³ -li ²	khoe ⁴⁻³ -no ⁴⁻³	khoe ⁴⁻³ -nai ³⁻⁴ -hi ⁴	khoe ⁴⁻³ -na ¹
'to have'	Timeless	thi ¹ (-le ⁴)	thi ¹ -na ³	thi ¹ -li ²	thi ¹ -no ⁴⁻³	thi ¹ -nai ³⁻⁴ -hi ⁴	thi ¹ -na ¹
'to not have'	Timeless	cj ² (-le ⁴)	cj ² -na ³	cj ² -li ²	cj ² -no ⁴⁻³	cj ² -nai ³⁻⁴ -hi ⁴	cj ² -na ¹
'to want'	Timeless	me ³ (-le ⁴)	me ³ -na ³	me ³ -li ²	me ³ -no ⁴⁻³	me ³ -nai ³⁻⁴ -hi ⁴	me ³ -na ¹
'to be unwilling'	Timeless	kai ³ (-le ⁴)	kai ³ -na ³	kai ³ -li ²	kai ³ -no ⁴⁻³	kai ³ -nai ³⁻⁴ -hi ⁴	kai ³ -na ¹

TABLE 12f
Complex Independent Impersonal Verbs

Meaning	Auxiliary stems: zero, ki ³ -, koi ⁴ -	Third persons singular and plural: zero	First person singular: -a ³	Second person singular: -i ³	Second person plural: -o ³	First person plural exclusive: -i ⁴	First person plural inclusive: -a ²
'to awake'	Timeless	vha ³ ?a ¹ (-le ⁴)	vha ³ ?a ¹ -na ³	vha ³ ?a ¹ -li ²	vha ³ ?a ¹ -no ⁴⁻³	vha ³ ?a ¹ -nai ³⁻⁴ -hi ⁴	vha ³ ?a ¹ -na ¹
	Complete	ha ³ ?a ³ (-le ⁴)	ha ³ ?a ³ -na ³	ha ³ ?a ³ -li ²	ha ³ ?a ³ -no ⁴⁻³	ha ³ ?a ³ -nai ³⁻⁴ -hi ⁴	ha ³ ?a ³ -na ¹
	Incomplete	khoa ⁴ ?a ¹ (-le ⁴)	khoa ⁴ ?a ¹ -na ³	khoa ⁴ ?a ¹ -li ²	khoa ⁴ ?a ¹ -no ⁴⁻³	khoa ⁴ ?a ¹ -nai ³⁻⁴ -hi ⁴	khoa ⁴ ?a ¹ -na ¹
'to find'	Timeless	sa ³ ko ¹ (-le ⁴)	sa ³ ko ¹ -na ³	sa ³ ko ¹ -li ²	sa ³ ko ¹ -no ⁴⁻³	sa ³ ko ¹ -nai ³⁻⁴ -hi ⁴	sa ³ ko ¹ -na ¹
	Complete	ki ³ sa ³ ko ³ (-le ⁴)	ki ³ sa ³ ko ³ -na ³	ki ³ sa ³ ko ³ -li ²	ki ³ sa ³ ko ³ -no ⁴⁻³	ki ³ sa ³ ko ³ -nai ³⁻⁴ -hi ⁴	ki ³ sa ³ ko ³ -na ¹
	Incomplete	sa ⁴ ko ² (-le ⁴)	sa ⁴ ko ² -na ³	sa ⁴ ko ² -li ²	sa ⁴ ko ² -no ⁴⁻³	sa ⁴ ko ² -nai ³⁻⁴ -hi ⁴	sa ⁴ ko ² -na ¹
'to be thirsty'	Timeless	vha ³ ti ² (-le ⁴)	vha ³ ti ² -na ³	vha ³ ti ² -li ²	vha ³ ti ² -no ⁴⁻³	vha ³ ti ² -nai ³⁻⁴ -hi ⁴	vha ³ ti ² -na ¹
	Complete	kqa ³ vha ³ ti ² (-le ⁴)	kqa ³ vha ³ ti ² -na ³	kqa ³ vha ³ ti ² -li ²	kqa ³ vha ³ ti ² -no ⁴⁻³	kqa ³ vha ³ ti ² -nai ³⁻⁴ -hi ⁴	kqa ³ vha ³ ti ² -na ¹
	Incomplete	kqa ⁴ vha ³ ti ² (-le ⁴)	kqa ⁴ vha ³ ti ² -na ³	kqa ⁴ vha ³ ti ² -li ²	kqa ⁴ vha ³ ti ² -no ⁴⁻³	kqa ⁴ vha ³ ti ² -nai ³⁻⁴ -hi ⁴	kqa ⁴ vha ³ ti ² -na ¹
'to like'	Timeless	sa ³ se ¹ (-le ⁴)	sa ³ se ¹ -na ³	sa ³ se ¹ -li ²	sa ³ se ¹ -no ⁴⁻³	sa ³ se ¹ -nai ³⁻⁴ -hi ⁴	sa ³ se ¹ -na ¹
	Complete	ki ³ sa ³ se ³ (-le ⁴)	ki ³ sa ³ se ³ -na ³	ki ³ sa ³ se ³ -li ²	ki ³ sa ³ se ³ -no ⁴⁻³	ki ³ sa ³ se ³ -nai ³⁻⁴ -hi ⁴	ki ³ sa ³ se ³ -na ¹
	Incomplete	sa ³ se ¹ (-le ⁴)	sa ³ se ¹ -na ³	sa ³ se ¹ -li ²	sa ³ se ¹ -no ⁴⁻³	sa ³ se ¹ -nai ³⁻⁴ -hi ⁴	sa ³ se ¹ -na ¹
'to dimple'	Timeless	š ² a ¹ ya ³ (-le ⁴)	š ² a ¹ ya ³ -na ³	š ² a ¹ ya ³ -li ²	š ² a ¹ ya ³ -no ⁴⁻³	š ² a ¹ ya ³ -nai ³⁻⁴ -hi ⁴	š ² a ¹ ya ³ -na ¹
'to be sleepy'	Timeless	ni ³ hñal(-le ⁴)	ni ³ hñal-na ³	ni ³ hñal-li ²	ni ³ hñal-no ⁴⁻³	ni ³ hñal-nai ³⁻⁴ -hi ⁴	ni ³ hñal-na ¹
'to ache'	Timeless	khi ³ ne ⁴⁻³ (-le ⁴)	khi ³ ne ⁴⁻³ -na ³	khi ³ ne ⁴⁻³ -li ²	khi ³ ne ⁴⁻³ -no ⁴⁻³	khi ³ ne ⁴⁻³ -nai ³⁻⁴ -hi ⁴	khi ³ ne ⁴⁻³ -na ¹
'to tire of'	Timeless	hčo ¹ ve ⁴⁻³ (-le ⁴)	hčo ¹ ve ⁴⁻³ -na ³	hčo ¹ ve ⁴⁻³ -li ²	hčo ¹ ve ⁴⁻³ -no ⁴⁻³	hčo ¹ ve ⁴⁻³ -nai ³⁻⁴ -hi ⁴	hčo ¹ ve ⁴⁻³ -na ¹
'to sneeze'	Timeless	?e ¹ nchj ⁴ (-le ⁴)	?e ¹ nchj ⁴ -na ³	?e ¹ nchj ⁴ -li ²	?e ¹ nchj ⁴ -no ⁴⁻³	?e ¹ nchj ⁴ -nai ³⁻⁴ -hi ⁴	?e ¹ nchj ⁴ -na ¹

The second morpheme of these complex independent intransitive verbs is usually obscure in its origin; occasionally, however, it can be analyzed: -nta¹ 'liquid,' tho³nta¹ 'he sweats.' The basic tonal form of the morpheme remains the same regardless of the person of the subject, so that the resultant form in fusion of the dependent subject pronominal elements to these stems may be regularly predicted by using Tables 8g (p. 110) and 10d (p. 119). The vowels and consonants may be similarly predicted. Usually there is no change of toneme, vowel, or consonant with the addition of the compounded auxiliaries, but there is one exception: vi³ya⁴⁻³ 'he dies,' koi⁴ya¹ 'he will die.'

For the full data for all the complex independent intransitive verbs in their timeless form and with complete and incomplete compounded auxiliaries, see Table 12b (p. 142).

Compounded to the complex intransitive verb hčo¹nč²oe² 'he is able to reach,' the continuative auxiliary ti¹- retains its high toneme regardless of the person of the subject. Compounded to any of the other complex intransitives, however, the ti- assumes the form with toneme 1 in the third person, but has toneme 2 in the first person singular, and toneme 3 in the second person singular or first or second person plural.

b. Independent Transitive Verbs

Nineteen simple independent transitive verbs have been found. These constitute the most frequent and most important morphemes occurring in the language, and the most irregular. In addition to appearing often as independent verbs, they form the verbal nucleus, the first main stem, of a great many personal compound verbs.

The irregularity of these morphemes is the result of the superimposition of several layers of changes: (1) a fusion of complete and incomplete compounded auxiliaries, as described earlier for compounds; (2) a fusion of the dependent subject element, as described for regular fusion to the end of personal compounds (Tables 8 and 10 [pp. 109-10, 118-19]); (3) an earlier layer of fusion of subject to stem which sometimes changes the toneme of the stem for the person of the subject, but which is different from the later layer of fused dependent subject pronouns just mentioned; (4) the fusion of some unidentified element, possibly a transitivizer, which causes sharper changes (or substitution, suppletion) of stems between persons, so that the second person singular and the first and second persons plural differ strikingly from the third persons and the first person singular.

Optionally, the transitive verbs may occur with the object-subject pronouns; the "object" pronouns should be translated by English direct or indirect object pronouns (or pronouns plus prepositions) according to the context.

(1) Independent Transitive Verbs with Fused Compounded Auxiliaries

In the timeless form of the stem no fused auxiliaries are present to interfere. Of the auxiliaries, ki³- 'complete' and koi⁴- 'incomplete' are the two which cause most difficulty when fused to the stem.

The morpheme ki³- 'complete' before the transitive stems undergoes the following changes or fusions: (1) Before stems beginning with k, it becomes kis-: ka⁴⁻³ 'he falls,' ki³ska⁴⁻³ 'he fell.' (2) Before simple stems beginning with v, the morpheme ki³- becomes ca³k- or, rarely, ki³c- or k-, and the v is lost: v²a³ 'he carries,' ca³k²a³ 'he carried.' Note the additional loss of h in vhi² 'he goes,' ki³ 'he went.' At the beginning of certain of the complex stems, however, ki³- plus v irregularly fuses to č or c: vi³sa³ 'he gets married,' či³ša² 'he got married,' vi³htaa³ 'he gets tired,' ci³hta³ 'he got tired' (alternate form hi³hta³). (3) Before verbs, irregularly and nonpredictably, but especially before verbs of 'coming' and 'going,' the ki³- becomes irregularly h- or hi³- with accompanying modification of the following stem.

The morpheme koi⁴- 'incomplete' usually has the following changes when it is fused to the transitive element, but there are some nonpredictable exceptions: (1) Before stems beginning with k, the koi- has s- substituted for it, with the toneme of the stem nonpredictable: khi⁴⁻³ 'he writes,' ski¹ 'he will write.' (2) Before stems beginning with y, the y drops, the i of koi⁴- drops, and the o of koi⁴- metathesizes with any remaining consonant of the transitive stem--but the tonemes of the stem remain unpredictable, even though certain tendencies (such as for toneme 4 or 1 to occur in third and second persons singular) can be observed: v?e¹ 'he deposits,' k?oe⁴⁻² 'he will deposit.' Irregularly, however, one finds koi⁴- plus y giving sk: v?ao³ 'he grinds,' sk?ao¹ 'he will grind.' In one instance the i of koi⁴- appears to be changed to a and a following vh is dropped: vhi² 'he goes,' koai⁴ 'he will go.' (3) Before certain stems, most of which begin with č, c, or s, the vowels and consonant of koi⁴- drop nonpredictably, but an irregular tonal influence is left on the transitive stem: čvai²⁻³ 'you (sing.) carry,' č?ai⁴ 'you (sing.) will carry'; te²⁻³ 'I dance,' te¹⁻³ 'I will dance.' Elsewhere (rarely) koi⁴- with č fuses to hč plus tonemic change: čai²⁻³ 'you (sing.) dance,' hčai⁴ 'you (sing.) will dance.' Note in the last two sets of illustrations that the same verb is illustrated, but that there are suppletive stems for certain of the persons; in such instances the rules for the fusion of koi⁴- must be handled separately for the basic stem and for the substituted stem.

For further illustrations of koi⁴- fused to independent transitive verbs see Table 12c (p. 143).

(2) Independent Transitive Verbs with Fused Dependent Subject Pronouns

Once the investigator has determined the specific stem which must accompany the specific dependent subject pronoun to be fused to a specific independent transitive verb, this fusion of subject pronoun to the stem in the timeless form is usually regular and predictable according to the formulas given in Tables 8g (p. 110) and 10d (p. 119): vhi²- 'to go' (stem for third persons or for first person singular) + -a³ 'I' > vhia³ 'I go'; ?mi²- 'to go' (same verb as above, but with suppletive stem for other persons) + -i³ 'you (sing.)' > ?mi³ 'you (sing.) go.' For further illustrations see Table 12c (p. 143).

The chief interference with the predictability of such fusions comes from the overlapping fusion of the compounded auxiliary koi⁴-: koi⁴- + vhi²- + -a³ > khoia¹⁻³ 'I will go.'

Interference develops also from other fusions: thus v? + o + V (in which "V" is any vowel) tends to give v?V, so that v?ao³ 'to grind' + -a³ 'I' > v?a³ 'I grind,' rather than *v?oa³.

Two other interfering phenomena are (1) the overlapping fusions of an older, inner layer of subject pronoun, and (2) a possible transitivizing element. These will be discussed immediately.

(3) Independent Transitive Verbs with an Older, Inner, Layer of Subject Fusion

The fusion of dependent subject pronouns to the last part of noncompounded or compounded personal verbs, to which much of the previous discussion has been devoted, seems to be a rather recent type. There is evidence of an earlier fusion of a similar kind, but one which has left traces behind in the form of tonemic changes in the stem (apart from the regular fusion of dependent subject pronouns just mentioned) which reflect the person of the subject.

The older layer of subject fusion has already been seen (p. 136), but was not labeled as such, on the auxiliary ti¹- 'continuing.' Changes of toneme occur with certain of the persons, without fusion of the regular dependent subject pronoun, when the auxiliary occurs before transitive verbs: ti¹v?a³kha¹ 'he wears (clothes),' ti²v?a³kha¹⁻³ 'I wear (clothes),'²⁰ ti³č?a³kha¹⁻³ 'you (sing.) wear (clothes).'

²⁰Had this been fused regularly to the recent layer of dependent subject pronouns, its form would have been *tia²⁻³v?a³kha¹⁻³.

Certain of the irregular tonemic characteristics of the auxiliary koi⁴- 'incomplete' may also be due to such an older layer of subject tonemic fusion, as in koi⁴nčha⁴ 'he will talk,' koi³nčha²⁻³ 'I will talk.'

Similar types of tonemic reflection of the subject may be found in the transitive verbal elements serving as the stems of independent noncompounded transitive verbs, or as the first main stems of compounds. Similar changes also occur on the second morpheme of complex transitive verbal morphemes whether noncompounded or compounded. The patterns of occurrence of all these changes are highly irregular. One of the most common has stem toneme 1 in third person, stem toneme 4-3 in first person, and stem toneme 2 in second person singular and the plurals: v?e¹ 'he deposits, hits,' v?e¹so⁴⁻³ 'he warms' (so⁴⁻³ 'warm'), v?e⁴⁻³ 'I deposit, hit,' v?e⁴⁻³soa⁴⁻³ 'I warm,' v?ai²⁻³ (in which the stem toneme 2 has added to it the subject toneme 3 of a more recent layer of fusion) 'you (sing.) deposit, hit,' v?e²soi⁴⁻³ 'you (sing.) warm.'

About a dozen other patterns occur, however, all of which are nonpredictable. Two more sets may be given here (for further illustrations see Tables 12c-d [pp. 143-44]). Note the toneme of the first main stem in: vhi²mi⁴⁻³ 'he goes up' (< vhi² 'he goes' + -mi⁴⁻³ 'upward'), vhi³mia⁴⁻³ 'I go up,' ?mi³mi⁴⁻³ 'you (sing.) go up'; ?vi⁴⁻³ya³ 'he drinks from inside something' (< ?vi⁴⁻³ 'he drinks' + -ya³ 'inside'), ?vi⁴ya³ 'I drink from inside something,' ?yo²yai³ 'you (sing.) drink from inside something.'

From these data it appears difficult or impossible to abstract the original tonemes of the old fused pronouns. It also proves difficult to correlate these tonemes with those which occur on the auxiliaries ti¹- and koi⁴-. Probably the third persons had zero toneme on the pronoun, however, since the stem tonemes are highly divergent--1, 2, 3, 4, or 4-3. The toneme of the first person singular seems to have been fairly low--say 4-3, or possibly 4 or 3. At the moment, no formula can be presented for predicting the tonemes of the various persons even though the stem toneme is assumed to be that which occurs in the third person. If the changes were at one time predictable, the conditions which controlled those changes have now disappeared, so that much irregularity exists.

On a language-learning level, it proves more practical to memorize the verbs as irregulars than to attempt to formulate rules each of which could apply to a very small number of morphemes only.

It should be noted that the later, outer layer of fused subject pronouns has vocalic fusion accompanying the tonemic fusion. The older, inner variety seems to be limited to tonemic fusion only.²¹ As has been shown in previous sections, the later variety is limited in occurrence to the last main stem of the verb, or to its enclitics; the older variety may be found on compounded auxiliaries, or on the simple first main stem of personal compounds, or on a complex first or second main stem of compounds.

(4) Independent Transitive Verbs with Suppletive Stems, Possibly Derived from a Fused Transitivizing Element

After the elimination of disturbances from fused compounded auxiliaries, late-fused subject pronouns, and early-fused subject pronouns, there remain sharp differences between the forms of a stem when the subject of an independent transitive verb is changed. Since these differences occur with the transitive verbs, but are not found with the intransitive ones, one might hazard a guess that the differences are caused by the early fusion of some transitivizing element or

²¹It is partly for this reason that in the next section the changes of vowels and consonants in the suppletive stems of the transitive are postulated as being due to a fused transitivizing element rather than to the inner fusion of some subject form. The fusion of the tonal element without suppletive stems from transitive interference may be seen in the tonemic changes of the morpheme ti¹- already discussed.

elements.²² If this is so, the conditions which controlled the fusion now seem to have been lost, since the transitivizing element cannot be isolated.²³ At the moment, no rules can be postulated which hold for all the samples at hand,²⁴ although certain general types of changes may be seen.

The transitive verbs tend to have one stem for the third persons and for the first person singular, but a substituted, though closely related, stem for the second person singular and the plurals: khi⁴⁻³-/čhi³- 'to write,' khia⁴⁻³ 'I write,' čhi³ 'you (sing.) write,' čho³ 'you (pl.) write,' čhi³⁻⁴ 'we (excl.) write,' čha³⁻² 'we (incl.) write'; coa⁴⁻³-/ntoa³- 'to hold,' coa⁴⁻³ 'he holds,' coa⁴⁻³ 'I hold,' ntoai³ 'you (sing.) hold,' ntoao³ 'you (pl.) hold,' ntoai³⁻⁴ 'we (excl.) hold,' ntoa³⁻² 'we (incl.) hold.' Occasionally a third suppletive stem must be postulated: ve³-/v²e³-/y²a³- 'to know,' ve³ 'he knows,' v²e³ 'I know,' yai³ 'you (sing.) know.'

Although the form of the suppletive stem of a transitive verb is closely related to the basic stem, the precise form of the suppletive stem is nonpredictable. Various types may be observed.

The suppletive stem, for example, often has some sort of palatalization of its consonant or consonants: te²-/ča²- 'to dance,' v²ao³-/yo⁴⁻³- 'to grind,' v²nki⁴⁻³-/nči⁴⁻³- 'to hoe.'

Occasionally there is the addition of h or n to form the suppletive stem: coa⁴⁻³-/ntoa³- 'to hold.'

A few suppletive stems differ from the nonsuppletive ones only by a change of toneme: v²e¹-/v²e²- 'to deposit, hit.'

The changes just illustrated give a false impression of predictability. Even though general types of suppletion may be noted separately for tonemes, or for vowels, or for consonants, the total cannot be organized into a single regularly functioning system. The forms have to be listed separately.²⁵ For illustrations of these verbs in timeless (basic) form and with complete and incomplete auxiliaries, see Table 12c (p. 143).

For about half of the simple independent transitive verbs two stems are sufficient as a basis for predicting all the timeless forms (though further stems must be listed for their fused form with fused complete and incomplete compounded auxiliaries). From the first of such stems is derived the third person and the first person singular; from the second--the suppletive--is derived the second person singular and the first and second persons plural; the derivation follows the formulas of Tables 8g (p. 110) and 10d (p. 119). The forms with incomplete auxiliaries sometimes entail an extra stem for the first person singular.

Certain of these changes in stems may appear to be quite insignificant, and even less serious than changes classed earlier as regular. Yet it proves convenient to regard the stems as differing by suppletion, since once the requisite suppletive stem is known, including its fused form with compounded auxiliaries, the fusion of the late dependent subject pronouns can usually

²²This probability, however, is weakened by the fact that similar suppletive stems occur for certain of those nouns that have fused possessive pronouns. Most of the noun data may be seen in Table 6 (p. 105), morphemes for 'mouth,' 'hand,' 'back,' 'stomach,' 'family'--with addition of n or loss of h.

²³It is hoped that comparative studies of the related languages will some day give the answers to certain of these problems.

²⁴The full data, however, will be presented for the transitive stems so that other investigators may use them for further descriptive or comparative study.

²⁵Morphophonemic formulas could be set up to symbolize these types but since the formulas would have to be very intricate and extensive and since each formula would serve to cover only an extremely small number of verbs, they are scarcely warranted. In learning to speak the language it has proved simpler to memorize each of the forms of the irregular verbs than to attempt to handle the data by rules for stem change.

be regularly predicted. Such predictions often would not be possible, even for the minor changes, unless the stems were treated as substitutions for each other. In other words, the inner layers of changes and fusions must first be known before the outer layer can be predicted regularly.

The stem forms apart from the late layer of pronominal fusion may be seen (1) as the first main stems of compounds, or oftentimes (2) as the forms which precede object-subject or modal enclitics, although occasional tonemic glides or fusions interfere. In the list below, most of the forms with incomplete auxiliary show an extra stem for the first person singular.

Simple Independent Transitive Verbs with Basic Stem in Third Persons and First Person Singular, but with a Suppletive Stem for Other Persons in Timeless Form

'to smoke'

Timeless: khe⁴⁻³-/čhei⁴⁻³-
 Complete: ki³ske⁴⁻³-/ki³čhei⁴⁻³-
 Incomplete: ske¹-/1st ske⁴⁻³-/čhei¹⁻³-

'to jump'

Timeless: khi²-/čhi²-
 Complete: ki³ski²-/ki³čhi²-
 Incomplete: ski¹-/1st ski²-/čhi¹-

'to write'

Timeless: khi⁴⁻³-/čhi³-
 Complete: ki³ski⁴⁻³-/ki³čhi³-
 Incomplete: ski¹-/1st ski⁴⁻³-/čhi¹- (For full fused forms see Table 12c [p. 143].)

'to take'

Timeless: khoe²-/čhoe²-
 Complete: ki³skoe²-/ki³čhoe²-
 Incomplete: skoe¹-/1st skoe²-/čhoe¹-

'to sing'

Timeless: se⁴⁻³-/hnta³-
 Complete: ki³se⁴⁻³-/ki³hnta³-
 Incomplete: se¹-/koi⁴hnta¹- (For full fused forms see Table 12c.)

'to dance'

Timeless: te²-/ča²-
 Complete: ki³te²-/ki³ča²-
 Incomplete: te¹-/1st te²-/hča⁴-

'to be'

Timeless: thio¹⁻³ (Defective, third person plural only.)

'to let loose'

Timeless: chiq³-/nhiq³-
 Complete: ki³chiq³-/ki³nhiq³-
 Incomplete: chiq¹-/1st chiq³-/koi⁴nhiq¹-

'to kick'

Timeless: chq²-/nhq²-
 Complete: ki³chq²-/ki³nhq²-
 Incomplete: chq¹-/1st chq²-/koi⁴nhq¹-

'to hold'

Timeless: coa⁴⁻³-/ntoa³-
 Complete: ki³coa⁴⁻³-/ki³ntoa³-
 Incomplete: coa⁴-/1st coa⁴⁻³-/koi⁴ntoa⁴-

'to carry'

Timeless: v²a³- (or y²a³-)/č²a²-Complete: ca³k²a³-/ki³č²a²-Incomplete: k²oa⁴-/1st k²oa³-/č²a⁴- (For full fused forms see Table 12c.)

'to grind'

Timeless: v²ao³-/?yo⁴⁻³Complete: ki³c²ao³-/ki³?yo⁴⁻³Incomplete: sk²ao¹-/1st sk²ao³-/s²io¹-

'to hoe'

Timeless: ?nk¹i⁴⁻³-/?nči¹i⁴⁻³-Complete: ca³ka³?nk¹i⁴⁻³- (or ca³?nk¹i⁴⁻³-)/ca³ki³nči¹i⁴⁻³-Incomplete: ko⁴?nk¹i¹-/1st ko³?nk¹i⁴⁻³-/koi⁴?nči¹-

Certain others of the independent transitive verbs have an additional suppletive stem, with a change of toneme (possibly due to interference from the older layer of subject fusion), for the first person singular. In one verb the consonants are affected as well as the toneme in this first-person singular stem. Most of the verbs in the preceding list have a similar change for the incomplete form but are not listed below because the change does not occur in timeless and complete forms.

Simple Independent Transitive Verbs with Basic Stem in Third Persons, a Suppletive Stem in First Person Singular, and a Further Suppletive Stem for Other Persons in Timeless Form

With toneme of first person affected

'to make'

Timeless: s²i¹-/1st s²i⁴⁻³-/n²ja²-Complete: ki³s²i⁴⁻³-/1st ki³s²i⁴⁻³-/ki³n²ja²-Incomplete: s²i⁴⁻²-/1st s²i⁴⁻³-/s²i⁴- (For full fused forms see Table 12c [p. 143].)

'to give'

Timeless: choa¹-/1st choa³-/v²ai²-Complete: ki³choa³-/1st ki³choa³-/ki³c²ai²-Incomplete: choa¹-/1st choa³-/k²oai⁴-

'to place, spank'

Timeless: va¹-/1st va⁴⁻³-/vha³-Complete: tsa³ka¹-/1st tsa³ka⁴⁻³-/tsa³kha³-Incomplete: ko⁴-/1st ko⁴⁻³-/khoa¹-

'to deposit, give birth to, hit'

Timeless: v²e¹-/1st v²e⁴⁻³-/v²e²-Complete: ca³k²e¹-/1st ca³k²e⁴⁻³-/ca³k²e²-Incomplete: k²oe⁴⁻²-/1st k²oe⁴⁻³-/k²oe¹- (For full fused forms see Table 12c.)

'to drink'

Timeless: v²i⁴⁻³-/1st v²i⁴-/?yo²-Complete: ki³c²i⁴⁻³-/1st ki³c²i⁴-/ki³?yo²-Incomplete: sk²oi¹-/1st sk²oi⁴-/s²io⁴-

With consonants of first person affected

'to know'

Timeless: ve³-/1st ?ve³-/?ya³-Complete: ca³ve³-/1st ca³?ve³-/ca³?ya³-Incomplete: skoe⁴-/1st skoe³-/hca⁴-

In addition to the simple independent transitive verbs there are about thirty-five complex independent transitive ones.

Of these, fifteen have the first stem limited to the morphemes va³- (meaning unknown) and vi³- (meaning likewise unknown). The meaning of most of the other first morphemes of complex transitive stems, also, is extremely vague or unknown. A few of the complexes, however, have identifiable first elements: choa³ke⁴⁻³ 'he loves' (choa³ 'happy') hti³ke⁴⁻³ 'he hates' (hti³ 'angry'), thao²ke⁴⁻³ 'he takes care of' (thao²- 'guarded, put away').

The tonemes of the first morpheme of the complex sometimes reflect the person of the subject: vi³tho³ 'he goes out,' vi²thoa⁴ 'I go out.'

Less frequently, the consonants or vowels of the first morpheme likewise reflect the person of the subject: ma³nka³ 'he flees,' vi³yoi⁴⁻³ 'you (sing.) flee'; va³te³ 'he cuts,' vi³čai²⁻³ 'you (sing.) cut.'

The origin and meaning of the second morpheme of complex transitive verbs remains vague. The morpheme -ke⁴⁻³, for example, seems to occur only in the three stems choa³ke⁴⁻³- 'to love,' hti³ke⁴⁻³- 'to hate,' and thao²ke⁴⁻³ 'to take care of (as of an adopted child),' and in the verb vi³hno²ke⁴⁻³- 'to laugh at (someone)' (contrast vi³hno²- 'to laugh'). Its origin and meaning have not been related to a free form, but its meaning might be defined, on the basis of these four occurrences, as 'emotion directed toward someone.' (The meanings for the first morphemes in these three complexes were given earlier in the present section.) For most of the other morphemes serving as the second morpheme in such complexes, the meaning is even more vague than for -ke⁴⁻³.

With change of subject the second morpheme of these complexes may have concomitant changes of tonemes, or consonants, or vowels. These changes are similar to those which occur in the simple transitive verbs and need not be discussed in detail here: va³ne¹ 'he washes,' va³nai²⁻³ 'you (sing.) wash,' va³ce³ 'he buys,' vi³ntai⁴⁻³ 'you (sing.) buy,' khi³ne³ 'he eats,' či³nai³ 'you (sing.) eat.'

The basic and suppletive stem of the complex transitive verbs may serve as the first or as the second main stem of personal compound verbs. In these positions the stems maintain the same changes of tonemes, consonants, and vowels that they show for changes of subject when the complex serves as an independent noncompounded verb: va³kol¹- 'to show' + -a³ 'I' > va³koa⁴⁻³ 'I show,' but suppletive stem va³ko²- 'to show' + -i³ 'you (sing.)' > va³koi²⁻³ 'you (sing.) show.' Compare the same stems in compound verbs (1) as first main stem: va³ko⁴⁻³ya²⁻³ 'I teach' (-ya³ 'inside'), va³ko²yai³ 'you (sing.) teach'; (2) as second main stem including fused ki³-: vhi³ka³kua⁴⁻³ 'I go to show' (vhi³- 'to go'), mi³ka³koi²⁻³ 'you (sing.) go to show.'

A list of complex transitive verbs, with their suppletive stems, is given immediately below.

Complex Transitive Verb Stems

With basic complex stem for third persons and first person singular but suppletive complex stem for other persons

'to flee'

Timeless: ma³nka³-/vi³yo⁴⁻³-

Complete: ca³nka³-/ca³ki³yo⁴⁻³-

Incomplete: koa⁴nka³-/lst koa³nka³-/koi⁴yo¹-

'to look for'

Timeless: va³hnki³-/vi³hnči⁴⁻³-

Complete: ca³ka³hnki³-/ca³ki³hnči⁴⁻³-

Incomplete: koa⁴hnki³-/lst koa³hnki³-/koi⁴hnči¹-

'to cut'

Timeless: va³te³-/vi³ča²-

Complete: ca³ka³te³-/ca³ki³ča²-

Incomplete: koa⁴te³-/lst koa³te³-/koi⁴ča¹- (For full fused forms see

'to buy'

Timeless: va³ce³-/vi³nta⁴⁻³-Complete: ca³ka³ce³-/ca³ki³nta⁴⁻³-Incomplete: ko⁴a ce³-/1st ko³a ce³-/ko⁴i nta¹-

'to walk'

Timeless: v⁷a³mhe⁴⁻³-/to²mhe⁴⁻³-Complete: ca³k⁷a³mhe⁴⁻³- (or c⁷a³mhe⁴⁻³-)/ca³ki³to²mhe⁴⁻³-Incomplete: k⁷oa¹mhe⁴⁻³-/1st k⁷oa³mhe⁴⁻³-/ko⁴i to²mhe⁴⁻³-

Data on plural forms of this verb are incomplete. Usually plural forms of the verb co²?va³- (same meaning) are used instead; on the other hand, the data are incomplete for the singular forms of co²?va³-. For co²?va³- the plural stems are ti³ma³-, ca³ki³ma³-, and ko⁴i ma³- in timeless, complete, and incomplete forms respectively. In timeless singular the stems are co²?va³-/1st co²?va⁴-/ti³ma³-.

With additional complex stem for first person singular

'to hate'

Timeless: hti³ke⁴⁻³-/1st hti³ke⁴-/hti³ča³-Complete: ko³hti³ke⁴⁻³-/1st ko³hti³ke⁴-/ko³hti³ča³-Incomplete: ko⁴hti³ke⁴⁻³-/1st ko⁴hti³ke⁴-/ko⁴hti³ča³-

In this verb and in thao²ke⁴⁻³- and choa³ke⁴⁻³- the forms listed for the complete and incomplete compounded auxiliaries are ko³- and ko⁴- respectively. These were not listed earlier as alternates of ki³- and ko⁴- because the relationship needs further investigation, especially since the fusion of ki³- and ko⁴- to the auxiliary ma³- also produces ko³- and ko⁴-, though with different meanings (the basic meaning of ma³- 'it is being done' [or 'to be able'] is not evident in these three verbs). The analysis of these verbs is awkward also because the -ke⁴⁻³ appears to be a directional adverb which changes form with certain persons, but contributes the second morpheme to complex independent verbs--whereas other such complexes do not occur with directional adverbs as a constituent.

'to leave (something)'

Timeless: ka³ni¹-/1st ka³nia⁴⁻³-/ča³ni²-Complete: ki³ska³ni¹-/1st ki³ska³nia⁴⁻³-/ki³ča³ni²-Incomplete: ska⁴ni¹-/1st ska³nia⁴⁻³-/ča⁴ni²-

'to eat'

Timeless: khi³ne³-/1st khi²ne⁴-/čhi³ne³-Complete: ki³ski³ne³-/1st ki³ski²ne⁴-/ki³čhi³ne³-Incomplete: ski⁴ne⁴-/1st ski²ne⁴-/čhi²ne⁴- (For full fused forms seeTable 12d [p. 144].)

'to take care of'

Timeless: thao²ke⁴⁻³-/1st thao²ke⁴-/thao²ča³-Complete: ko³thao²ke⁴⁻³-/1st ko³thao²ke⁴-/ko³thao²ča³-Incomplete: ko⁴thao²ke⁴⁻³-/1st ko⁴thao²ke⁴-/ko⁴thao²ča³-

'to walk'

Timeless: co²?va³- (See v⁷a³mhe⁴⁻³- 'to walk,' above.)

'to love'

Timeless: choa³ke⁴⁻³-/1st choa³ke⁴-/choa³ča³-Complete: ko³choa³ke⁴⁻³-/1st ko³choa³ke⁴-/ko³choa³ča³-Incomplete: ko⁴choa³ke⁴⁻³-/1st ko⁴choa³ke⁴-/ko⁴choa³ča³- (For full fused forms see Table 12d.)

'to chew (e.g. gum or sugar cane)'

Timeless: va³hnka³-/1st ma³hnka³-/vi³hnta²-

Complete: ca³ka³hnka³- (or ca³hnka³-)/1st ca³ka³hnka³- (or ca³hnka³-)/
ca³ki³hnta²-

Incomplete: ko⁴hnka³-/1st ko³hnka³-/koi⁴hnta¹-

'to burn'

Timeless: va³ka¹-/1st va³ka⁴⁻³-/va³ka³-

Complete: ca³ka³ka¹-/1st ca³ka³ka⁴⁻³-/ca³ka³ka³-

Incomplete: ko⁴ka²-/1st ko³ka⁴⁻³-/ko⁴ka³-

'to break'

Timeless: va³kha¹-/1st va³kha⁴⁻³-/va³kha³-

Complete: ca³ka³kha¹-/1st ca³ka³kha⁴⁻³-/ca³ka³kha³-

Incomplete: ko⁴kha²-/1st ko³kha⁴⁻³-/ko⁴kha³-

'to show'

Timeless: va³ko¹-/1st va³ko⁴⁻³-/va³ko²-

Complete: ca³ka³ko¹-/1st ca³ka³ko⁴⁻³-/ca³ka³ko²-

Incomplete: ko⁴ko²-/1st ko³ko⁴⁻³-/ko⁴ko²-

'to wash'

Timeless: va³ne¹-/1st va³ne⁴⁻³-/va³ne²-

Complete: ca³ka³ne¹-/1st ca³ka³ne⁴⁻³-/ca³ka³ne²-

Incomplete: ko⁴ne²-/1st ko³ne⁴⁻³-/ko⁴ne²- (For full fused forms see
Table 12d.)

'to put in a place, to throw'

Timeless: va³se¹-/1st va³se⁴⁻³-/va³se²-

Complete: ca³ka³se¹-/1st ca³ka³se⁴⁻³-/ca³ka³se²-

Incomplete: ko⁴se²-/1st ko³se⁴⁻³-/ko⁴se²-

'to stand, to be in office'

Timeless: va³se²-/1st va²se⁴-/vi³se²-

Complete: ca³ka³se²-/1st ca³ka²se⁴-/ca³ki³se²-

Incomplete: ko⁴se⁴-/1st ko²se⁴-/koi⁴se⁴-

'to thatch'

Timeless: va³te¹-/1st va³te⁴⁻³-/va³te²-

Complete: ca³ka³te¹-/1st ca³ka³te⁴⁻³-/ca³ka³te²-

Incomplete: ko⁴te²-/1st ko³te⁴⁻³-/ko⁴te²-

'to pass by'

Timeless: vha³?a³-/1st vha²?a⁴-/vi³tha⁴⁻³-

Complete: ha³?a³-/1st ha²?a⁴-/hi³tha⁴⁻³-

Incomplete: khoa⁴?a³-/1st khoa²?a⁴-/koi⁴tha¹- (For full fused forms see
Table 12d.)

'to arrive'

Timeless: vha³?ai³-/1st vha²?ai⁴-/vha²?ai⁴-

Complete: ha³?ai³-/1st ha²?ai⁴-/ha²?ai⁴-

Incomplete: khoa⁴?ai¹-/1st khoa²?ai⁴-/khoa²?ai⁴-

In this verb both vowels of the stem are affected by the fusion--e.g.

vha²?ai⁴ + -a³ > vhe²?e⁴.

'to arrive'

Timeless: vhi³čo¹-/1st vhi³čo³-/vhi³čo³-

Complete: hi³čo²-/1st hi³čo³-/hi³čo³-

Incomplete: khoi⁴čo²-/1st khoi³čo³-/khoi³čo³-

'to harvest corn'

Timeless: vi³čha¹-/1st vi³čha⁴⁻³-/vi³čha³-

Complete: ca³ki³čha¹-/1st ca³ki³čha⁴⁻³-/ca³ki³čha³-

Incomplete: koi⁴čha²-/1st koi³čha⁴⁻³-/koi⁴čha³-

'to fill'

Timeless: vi³nča¹-/lst vi³nča⁴⁻³-/vi³nča³-
 Complete: ca³ki³nča¹-/lst ca³ki³nča⁴⁻³-/ca³ki³nča³-
 Incomplete: koi⁴nča²-/lst koi³nča⁴⁻³-/koi⁴nča³-

'to shell' (corn--not peas--and the like)

Timeless: vi³ñá¹-/lst vi³ñá⁴⁻³-/vi³ñá³-
 Complete: ca³ki³ñá¹-/lst ca³ki³ñá⁴⁻³-/ca³ki³ñá³-
 Incomplete: koi⁴ñá²-/lst koi³ñá⁴⁻³-/koi⁴ñá³-

'to go out'

Timeless: vi³tho³-/lst vi²tho⁴-/vi²tho⁴-
 Complete: hi³tho³-/lst hi²tho⁴-/hi²tho⁴-
 Incomplete: koi⁴tho³-/lst koi²tho⁴-/koi²tho⁴-

With four stems, including a suppletive plural

'to be'

Timeless: ti¹hna³-/lst ti²hna⁴-/ti³hna³-/pl. ti³yo³-
 Complete: ca³k²e²hna³-/lst ca³ka²te⁴hna³-/ca³ki³hna³-/pl.
ca³ki³yo³-
 Incomplete: k²oi¹hna³-/lst ko²te⁴hna³-/koi⁴hna³-/pl. koi⁴yo³-

One transitive verb has a simple stem for the third persons and for the first person singular, but a substituted complex stem for the other persons: mao³ 'he mows,' vi³noi⁴⁻³ 'you (sing.) mow.' It has not been observed in compounds.

Three other verbs are similar, but have a further suppletive stem for the first person singular; note nč?oe¹ 'he hears,' nč?oe⁴⁻³ 'I hear' (with tonemic suppletion only), no²?yai²⁻³ 'you (sing.) hear' (with complex suppletive stem--observe the same stem in the plurals: no²?ya² 'we [incl.] hear'). In personal compounds these verbs act like simple transitive verbs in that they do not utilize the suppletive stems for any person when they serve as the second main stem of the compounds (but in this position they occur only following fused ki³-): ni²khi³nč?oai¹⁻³ 'you (sing.) notify' (not *ni²khi³no²?yai²⁻³).

The extra suppletive stem for the first person singular is complex in the verb for 'to have the appearance of': khi³ 'he has the appearance of,' khi²?ya⁴ 'I have the appearance of,' ti³soi³ 'you (sing.) have the appearance of,' ti³soi³⁻⁴ 'we (excl.) have the appearance of.'

Two verbs have a simple suppletive stem in the second person singular, a further simple suppletive stem in the first person singular, and a third suppletive stem--but complex--in the plurals, making four stems in all for the timeless form; note: vhi² 'he goes,' vhi³ 'I go,' ?mi³ 'you (sing.) go,' ma³nk¹⁻⁴ 'we (excl.) go.' These verbs have not been observed as the second main stem of compounds. As the first main stem of compounds all the suppletive stems are retained: vhi²kao⁴ 'he goes with,' vhi³kao⁴ 'I go with,' ?mi³koai⁴ 'you (sing.) go with,' ma³nk¹⁻⁴koai⁴ 'we (excl.) go with.'

One verb has a complex basic stem but simple suppletive stems: ca³kho¹ 'he is afraid,' ca³khoa⁴⁻³ 'I am afraid,' hkoi³ 'you (sing.) are afraid.'

For the stem forms of these related groups note the following list:

Independent Transitive Verbs with One or More Simple Stems and One Complex Stem

With simple stem for third persons and first person singular but complex for other persons

'to mow'

Timeless: mao³-/vi³no⁴⁻³-
 Complete: ki³cao³-/ca³ki³no⁴⁻³-
 Incomplete: kao⁴-/koi⁴no¹-

With further simple stem in first person

'to eat'

Timeless: khe²-/lst khe⁴-/vi³či³-
 Complete: ca³khe²-/lst ca³khe⁴-/ca³k1³či³-
 Incomplete: ko⁴khe⁴-/lst ko²khe⁴-/koi⁴či³-

'to talk'

Timeless: nčha⁴-/lst nčha²-/no²khoa⁴-
 Complete: ki³nčha⁴-/lst ki³nčha²-/ki³no²khoa⁴-
 Incomplete: koi⁴nčha⁴-/lst koi³nčha²-/koi⁴no²khoa⁴-

'to hear'

Timeless: nč?oe¹-/lst nč?oe⁴⁻³-/no²?ya²-
 Complete: khi³nč?oe¹-/lst khi³nč?oe⁴⁻³-/ki³no²?ya²-
 Incomplete: khoi⁴nč?oe¹-/lst khoi³nč?oe⁴⁻³-/koi⁴no¹?ya²-

With complex stem in first person singular

'to have the appearance of'

Timeless: khi³-/lst khi²?i⁴-/ti³so³- (Defective in the complete and incomplete forms.)

With three simple stems in singular persons but complex stems in plural persons

'to say'

Timeless: co²-/lst ši³-/si³-/pl. vi³šo¹-
 Complete: ki³co²-/lst ki³ši³-/ki³si³-/pl. ca³ki³šo¹-
 Incomplete: koi⁴co⁴-/lst ši¹-/si¹-/pl. koi⁴šo¹-

'to go'

Timeless: vhi²-/lst vhi³-/?mi³-/pl. ma³nki¹- (or mai¹-)
 Complete: ki³-/lst ki³-/k?i³-/pl. ca³nki³- (or ca¹-)
 Incomplete: koai⁴-/lst khoi¹-/k?o¹-/pl. ko⁴nki¹- (or khoi¹-)
 (For full fused forms see Table 12c [p. 143].)

With complex basic stem but simple suppletive stem

'to be afraid'

Timeless: ca³kho¹-/lst ca³kho⁴⁻³-/hk³-
 Complete: ki³ca³kho²-/lst ki³ca³kho⁴⁻³-/ki³hk³-
 Incomplete: ca³kho²-/lst ca³kho⁴⁻³-/koi⁴hk¹-

c. Independent Impersonal Verbs²⁶

Of simple independent impersonal verbs, twenty-seven have been recorded. These verbs differ from the intransitive and transitive ones in a major characteristic: they occur with zero subject (i.e. in the third person: me³ 'it is wanted,' thi¹ 'it is present'), or with object-

²⁶After the present monograph was written Eunice V. Pike brought to my attention the following verbs, which occur in the third person only. It is not certain whether they should be considered impersonal verbs or defective personal ones, or whether a separate verb group should be postulated to include these as well as the defectives listed on pp. 158-59 and 160-61. Timeless, complete, and incomplete forms are given for each: tho³, ki³tho³, tho¹ 'to drop (e.g. hair from head, fruit from a tree)'; ti⁴⁻³, ki³ti⁴⁻³, ti¹ 'to be cut'; cao³, ki³cao³, cao⁴ 'to scatter'; che³, ki³the⁴, che¹ 'to blow' (of the wind, only); vhai³, hai³, khoa⁴ 'to run' (of water, only); v?ao³, c?ao³, k?oa⁴ 'to rain'; v?ao³, ki³c?ao³, sk?ao¹ 'to be broken'; m?o¹hi⁴⁻³, ki³c?o¹hi⁴⁻³, k?o¹hi⁴⁻³ 'to mix'; vha³ne³, ha³ne³, khoa⁴ne³ 'to resound'; vhi³co⁴⁻³, chi³co⁴⁻³, khoi⁴co¹ 'to wear out.'

subject pronominal enclitics.²⁷ When they are to be translated with an English pronoun other than third person for subject, this pronoun is represented by the Mazateco object pronouns in the object-subject fused forms; the Mazateco subject form in such combinations is third person (i.e. zero): me³-na³ 'it is wanted (by) me' (i.e. 'I want'), thi¹-li² 'it is present (to) you (sing.)' (i.e. 'you have').

Whereas an object-subject enclitic may modify the impersonal verb when a modal enclitic is present (thi¹-šo²-na³ 'it is reported that it is present to me' [i.e. 'that I have it!']), a fused dependent subject pronoun may modify the modal enclitic itself following such an impersonal verb: thi¹-šoa²⁻³ 'I have it reported that it is present.'

In the timeless form, with no compounded auxiliary, the stem tonemes, consonants, and vowels of an impersonal verb remain stable, regardless of the subject with which the stem occurs: ci²-le⁴ 'it is absent to him,' ci²-na³ 'it is absent to me.'

With the compounded auxiliary ki³- 'complete,' changes of toneme of the impersonal stem sometimes occur: nhe³ 'it is gained,' ki³nhe² 'it was gained.' Other persons follow regularly from the third person singular, however: ki³nhe²-na³ 'it was gained by me.' Occasionally consonantal or vocalic change may occur with the addition of ki³-: che³ 'it is owed,' ki³the⁴ 'it was owed.'

The ki³- is not the only morpheme which may be used as a complete auxiliary compounded to impersonals; kog³-, also, is frequent, as may be seen in the list below. Furthermore, ca³- occurs twice in this capacity, and a zero feature (loss of v in vh) occurs once. For these stems see the appended list.

The continuative auxiliary ti¹- may occur with many of the simple impersonals, but it does not so occur with that group of verbs which have kog³- as their complete auxiliary. In every instance in which it is found with the simple impersonals the ti¹- retains the toneme 1, and is not affected by changes in the subject of the verb.

There are sometimes changes of the toneme of the impersonal stem with the compounded auxiliary koi⁴- 'incomplete,' in comparison to the timeless form: ča³ 'it is lacking,' (h)ča⁴ 'it will be lacking' (with loss of vowels and consonants of koi⁴- but with its tonal influence remaining and with the optional addition of h). Other persons follow regularly from the third person singular: (h)ča⁴-na³ 'it will be lacking to me.'

Occasional consonantal and vocalic changes are found: ?mi² 'it is named,' k?og¹ 'it will be named.'

Simple Independent Impersonal Verbs

'to be lacking'

Timeless: ča³-; complete: ki³ča³-; incomplete: ča⁴- (For related forms see Table 12e [p. 145].)

'to be expensive'

Timeless: čhi¹- (Defective.)

'to be willing'

Timeless: hyo³-; complete: kog³hyo³-; incomplete: kog⁴hyo³-

'to be unwilling'

Timeless: kai³ (Defective. For related forms see Table 12e.)

²⁷In addition, however, the impersonal verb may be accompanied by separate nonencliticized subject pronouns. These agree with the object element of the object-subject enclitic, and thereby constitute one of the chief differentiating criteria between impersonal and personal verbs (since in personals the separate nonencliticized subject would agree with the subject element of an object-subject enclitic): ?a³⁻⁴ thi¹-na³ 'I, it is present to me' (impersonal); contrast ?a³⁻⁴ choa³-le⁴ 'I, I give (to) him' (personal) and he²⁻³ choa¹-na³ 'he, he gives to me.'

- 'to be possessed (e.g. property)'
 Timeless: khi³- (Defective.)
- 'to be done, to be able'
 Timeless: ma³-; complete: kog³-; incomplete: kog⁴- (For related forms see Table 12e.)
- 'to be not thus'
 Timeless: mai³- (Defective.)
- 'to be wanted'
 Timeless: me³-; complete: kog³me³-; incomplete: kog⁴me³- (For related forms see Table 12e.)
- 'to be gained'
 Timeless: nhe³; complete: ki³nhe²-; incomplete: koi⁴nhe⁴- (For related forms see Table 12e.)
- 'to be dizzy'
 Timeless: nhiq⁴-; complete: kog³nhiq⁴-; incomplete: kog⁴nhiq⁴-
- 'to be foolish'
 Timeless: ska¹- (Defective.)
- 'to be ashamed'
 Timeless: soa⁴⁻³-; complete: kog³soa⁴⁻³-; incomplete: kog⁴soa⁴⁻³-
- 'to be obtained'
 Timeless: s?e⁴⁻³-; complete: ki³s?e⁴⁻³-; incomplete: s?e⁴- (For related forms see Table 12e.)
- 'to be present'
 Timeless: thi¹- (Defective. For related forms see Table 12e.)
- 'to be grasped'
 Timeless: thoe¹-; complete: ki³thoe¹-; incomplete: thoe¹-
- 'to be raised'
 Timeless: che²- (Defective.)
- 'to be owed'
 Timeless: che³-; complete: ki³the⁴- (or ki³che³-); incomplete: che¹-
- 'to be absent'
 Timeless: ci²- (Defective. For related forms see Table 12e.)
- 'to be grieved'
 Timeless: va³-; complete: kog³va³-; incomplete: kog⁴va³-
- 'to be hungry'
 Timeless: vao³-; complete: kog³vao³-; incomplete: kog⁴vao³-
- 'to be sad'
 Timeless: vhao¹-; complete: kog³vhao¹-; incomplete: ko⁴vhao¹-
- 'to be ending'
 Timeless: vhe³-; complete: he³-; incomplete: khoe⁴-
- 'to be washed for'
 Timeless: vhe⁴⁻²-; complete: he⁴⁻²-; incomplete: khoe⁴⁻²-
- 'to be produced (e.g. apples)'
 Timeless: ya⁴⁻³-; complete: ca³ka⁴⁻³-; incomplete: ko⁴-
- 'to be unoccupied, not busy'
 Timeless: ?a³-; complete: kog³?a³-; incomplete: kog⁴?a³-
- 'to be painful'
 Timeless: ?ao³-
- 'to be named'
 Timeless: ?mi²-; complete: ca³k?i²-; incomplete: k?qi¹-

The impersonal independent verbs include a number of complex items that are similar in form to those described for the intransitive and transitive complexes, with one main difference: there are no changes for person of the subject, since the subject is always third person. With addition of complete and incomplete compounded auxiliaries, however, tonemic, consonantal, and vocalic change on the first or second morphemes of the complexes does occur, though it is rare: vha³?a¹ 'it comes awake,' ha³?a³ 'it came awake,' khoa⁴?a¹ 'it will come awake'; vi³so² 'it erupts, sprouts, vomits,' či³so² 'it erupted,' koi⁴so⁴ 'it will erupt'; sa³se¹ 'it is enjoyed,' ki³sa³se³ 'it was enjoyed.'

Impersonal verbs, whether simple or complex, may serve as elements of impersonal compound verbs, as has already been pointed out (p. 138), and a few of them may serve as compounded auxiliaries (p. 136).

Complex Independent Impersonal Verbs

'to be physically able'

Timeless: čo¹khoa-; complete: ki³čo¹khoa⁴-; incomplete: čo¹khoa⁴-

'to be tiring, boring'

Timeless: hčo¹ve⁴⁻³- (Defective. For related forms see Table 12f [p. 146].)

'to fit'

Timeless: hčo¹ya³- (Defective.)

'to ache'

Timeless: khi³ne⁴⁻³- (Defective. For related forms see Table 12f.)

'to be sleepy'

Timeless: ni³hňa¹-; complete: kø³ni³hňa¹-; incomplete: kø⁴-
ni³hňa¹- (For related forms see Table 12f.)

'to be found'

Timeless: sa³ko¹-; complete: ki³sa³ko³-; incomplete: sa⁴ko²-
(For related forms see Table 12f.)

'to be liked'

Timeless: sa³se¹-; complete: ki³sa³se³-; incomplete: sa³se¹-
(For related forms see Table 12f.)

'to dimple'

Timeless: š?a¹ya³- (Defective. For related forms see Table 12f.)

'to be greeted'

Timeless: ti³?nta³- (familiar alternate ?nta³) (Defective.)

'to be thirsty'

Timeless: vha³ti²-; complete: kø³vha³ti²-; incomplete:
kø⁴vha³ti²- (For related forms see Table 12f.)

'to wake up'

Timeless: vha³?a¹-; complete: ha³?a³-; incomplete: khoa⁴?a¹-
(For related forms see Table 12f.)

'to have diarrhea'

Timeless: vha³?a³-; complete: ha³?a³-; incomplete: khoa⁴?a³-
(Homophonous and possibly cognate with transitive verb for
'to go by.')

'to be tired'

Timeless: vi³hta³- (alternate: personal class, with fused
pronouns); complete: či³hta³- (or hi³hta³); incomplete:
koi⁴hta³

'to erupt, vomit, sprout'

Timeless: vi³so²-; complete: či³so²- (or hi³so²); incomplete:
koi⁴so⁴-

'to sneeze'

Timeless: ?g¹nchi⁴- (Defective. For related forms see Table 12f.)

4. Summary of Subject Elements Fused to Verbs

Subject elements fused to verbs are of two types: (1) the later, outer, fused dependent subject pronoun, and (2) an older, inner, fused subject element.

The later, outer, fusion occurs at the end of the simple or compound personal verb or the personal verb plus modal and object-subject enclitics. These later fused elements can be isolated within the present data; with a few irregularities rules can be set up by which one may predict the various forms once the appropriate stem is given. These rules appear in Tables 8 and 10 (pp. 109-10, 118-19); data to which they may be applied appear in Table 9 (pp. 111-16), in Table 12 (pp. 141-46), and in scattered illustrations throughout the discussion of the verb. The tonemes, vowels, and consonants of the dependent subject pronouns can all be traced in the fusion.

Note the following examples of the fusion of the morpheme -i³ 'you':

After an independent transitive (here suppletive) stem: v?e²- 'to deposit, hit,' v?ai²⁻³ 'you (sing.) deposit.'

After the second but last main stem of a personal compound verb: v?e²ško¹- 'to gather,' v?e²ško¹⁻³ 'you (sing.) gather.'

After the third but last main stem of a personal compound verb: v?e²ško¹ya³- 'to fold,' v?e²ško¹yai³ 'you (sing.) fold.'

After a modal enclitic: v?e²ško¹ya³-la²- 'to probably fold,' v?e²ško¹ya³-lai²⁻³ 'you (sing.) probably fold.'

After a personal verb, but as part of a fused object-subject enclitic: v?e²ško¹ya³-lai⁴. 'you (sing.) fold it,' v?e²ško¹ya³-la²-lai⁴ 'you (sing.) probably fold it.'

The element which has caused the older, inner, layer of fusion has not been isolated within the present data; it affects the tonemes of the verbal elements to which it fuses, but not the vocalic or consonantal elements. The fusion is irregular, though there are certain tendencies in the tonemes to which it gives rise. The chief set of such tendencies is for the third person to have any stem toneme (especially 1, 2, 3, 4, or 4-3) with zero-subject fusion, the first person singular to have 4-3 (or 3, or 4), the second person singular to have toneme 3 or 2; note the first stem in each of the following words: va¹shai² 'he looks for,' va⁴⁻³she²⁻³ 'I look for,' vha³shai²⁻³ 'you (sing.) look for.' For data illustrating these tonemes see scattered illustrations in Table 9 (pp. 111-16) and throughout the discussion. For illustration of such tonemes on single-stem items see Table 12a (p. 141).

This fusion of the older subject element may occur at various places in the verb. The occurrences are essentially independent of each other, since all of them may be demonstrated in contexts where they are not influenced by any other such change. For the places of occurrence of this older, inner, fused subject element, note these illustrations:

On a compounded auxiliary, when no such fusion occurs on the following stem: ti¹?nki⁴⁻³ 'he is hoeing' (ti¹- continuing compounded auxiliary); contrast ti²?nkia⁴⁻³ 'I am hoeing.'

On the first but simple stem of a personal compound verb: si¹ska¹ 'he plays' (< s²i¹ 'he makes' + ska¹ 'it is foolish'); contrast si⁴⁻³ska¹⁻³ 'I play' and ni²skai¹⁻³ 'you (sing.) play,' where the first stem is obviously not affected by the second; contrast also, ti¹si¹ska¹ 'he is playing,' where the compounded auxiliary does not modify the toneme of the first stem.

On both parts of a complex first main stem of a personal compound verb: vi³tho³he³ 'he goes out and down' (< vi³tho³ 'he goes out' + he⁴ 'down'); contrast vi²tho⁴he⁴ 'I go out and down'; note also va³te³čoa⁴ 'he cuts to measurements' (< va³te³ 'he cuts' + čoa⁴ 'mark, symbol') and contrast vi³ča²čoai⁴ 'you (sing.) cut to measurements.'

On the second morpheme of a complex second main stem of a three-stem personal compound verb: vhi²ka³te³coa⁴ 'he goes and cuts to measurement' (< vhi² 'he goes' + -ka³te³ 'to cut' [< ki³ 'complete' + va³te³ 'he cuts'] + čoa⁴ 'mark, symbol'); contrast ?mi³ki³ča²čoai⁴ 'you (sing.) go and cut by measurement.'

Or (very rare) on a simple second or third main stem: nčoa²kq³ 'he comes up to' (< nčoa² 'he comes' + -kq³ 'point of contact'); contrast nčoa²čo¹i³ 'you (sing.) come up to.' Note also v²e¹hi⁴⁻³kq³ 'he obeys, keeps in mind' (< v²e¹ 'he deposits' + -hi⁴⁻³ 'penetrated throughout' + -kq³ 'mentally'), and contrast v²e¹hi⁴⁻³ta³kq¹2-3 'you (sing.) obey.'

In addition to the effect of the older, inner, fusion at various places in the verbal expression and of the later, outer, fusion of dependent subject pronouns at the end of such a verbal expression, a further important characteristic of the language may be noted: (1) At several places--from one to five, or possibly even more--in a single verbal combination the person of the subject may be reflected simultaneously. (2) At any one place the change of subject may be indicated by a change of tonemes, consonants, or vowels, or by some combination of these. (3) Indication of the subject at any one place functions independently of each other such indication.

In the following pair of examples note that there are five separate indications of the subject, each of which is conveyed by a tonemic difference only:

ti¹vhi²ka³ko¹ya³-le⁴ 'he is in the process of going to teach him'
ti²vhi³ka³ko⁴⁻³ya²-le²⁻³ 'I am in the process of going to teach you (sing.).'

In the following illustrations various parts of this combination are replaced or deleted in order to show that no one of the parts is dependent upon another for its toneme:

The compounded auxiliary ti¹- may be deleted without affecting the remainder: vhi²ka³ko¹-ya³-le⁴ 'he goes to teach him,' vhi³ka³ko⁴⁻³ya²-le²⁻³ 'I go to teach you (sing.).' On the other hand, the pitches of ti¹- may occur without the particular items that are found with it here: ti¹v²a³ 'he is in the process of carrying,' ti²v²a³ 'I am in the process of carrying.'

The first main stem vhi² 'he goes' may be deleted, turning the previous second main stem into a first main stem with the same tonemes as before (though the k must be replaced by v in this position): va³ko¹ya³-le⁴ 'he teaches him,' va³ko⁴⁻³ya²-le²⁻³ 'I teach you (sing.).' On the other hand, the pitches of vhi² may occur without the particular items that are here found with it: vhi² 'he goes,' vhi³a³ 'I go' (but with added vocalic fusion of the later dependent subject pronoun instead of the pure tonemic fusion of the older layer; for the earlier layer, as first main stem of a personal compound without the later vocalic fusion, note vhi²kq³ 'he goes to see someone,' vhi³kqa³ 'I go to see someone').

The third main stem -ya³ 'inside' may be deleted without affecting the remainder: vhi²ka³-ko¹-le⁴ 'he goes to show him,' vhi³ka³ko⁴⁻³-le²⁻³ 'I go to show you (sing.).' On the other hand, the -ya³ does not have its tonemes conditioned by the accompanying morphemes; compare: ko³t²a⁴⁻³-ya³ 'he studies' (ko³t²a⁴⁻³ 'he tries'), ko³t²a⁴⁻³ya²⁻³ 'I study.'

The complex transitive stem va³ko¹- 'he shows' (here in its special form with fused ki³-) may be deleted, also, leaving vhi² 'he goes,' vhi³a³ 'I go.' On the other hand, the va³ko¹ does not have its tonemes affected by the accompanying morphemes: va³ko¹ 'he shows,' va³k²a⁴⁻³ 'I show.'

Presumably, illustrations even more intricate than ti¹vhi²ka³ko¹ya³-le⁴ 'he is in the process of going to teach him' may be found, since no modal enclitic is included in this sample, nor is the first main stem complex; each of these items may have their tonemes reflect the subject as do the items illustrated. In the material at hand, however, no sample happens to include these additional elements simultaneously with the ones in ti¹vhi²ka³ko¹ya³-le⁴. Should such an item eventually be found, then the person of the subject might be reflected in as many as seven places, independently, in a single verbal expression consisting of a compound verb plus its modal and object-subject enclitics.

The present data give the impression that the compounds listed here are, historically, broken-down phrases, each word of which was followed by a subject pronoun pertinent to the phrase as a whole. Each pronoun seems to have become fused to the word it follows, and then the words appear to have become amalgamated into compounds. These processes apparently occurred in successive layers, so that some of them are at the moment more apparent than others: the earliest layer in complex stems; an old but possibly more recent layer in the simple transitive stems; and the latest layer at the end of compounds. Confirmation or rejection of such hypotheses must wait for comparative studies.

C. A Sample Text

In order to demonstrate a few of the tonal phenomena in more ample setting than could be given for single items in the previous discussion, a brief text is presented here:

A TYPICAL MARKET-DAY SPEECH OF THE MAYOR, AS REPORTED BY SOME OF HIS LISTENERS

thi¹-no⁴⁻³ khoa⁴nta⁴⁻³ ši³--na⁴ši⁴na³nta¹ ŋmi²-no⁴⁻³ hnko³ hao²
 It is present to you (pl.) grace who city it is named to you (pl.). One two
?e¹⁻³ ši³--khoa²kao⁴-no⁴⁻³ co² thi¹nka¹-na¹ ša¹va³se³⁻⁴
 word which I speak with you (pl.). He says. There is present to us (incl.) again town work
nčao³li⁴ co² k?oa⁴--t?e²-lao⁴⁻³ na⁴hml¹⁻³ čo⁴ta⁴ ši³--ci²koi³ ka²vha³?ai³ co²
 tomorrow. He says. Thus tell them story people who not arrived. He says.
k?oa⁴--s?i² ka²thi³nčoa² ša¹va³se³⁻⁴ la⁴hao⁴-vi⁴ nt?ai⁴ co⁴mil¹⁻³-vi⁴ nt?ai⁴ ši³--ma³čhe¹
 Thus it is done let them come town work. Stone here now sand here now which is needed.
co² ya⁴--ta¹ča³nio²⁻³ nt?ai⁴ ya⁴--ti¹čhe³ poe²nte⁴ ňa¹⁻³-nia¹ ši³--khi³ma³nta⁴⁻³čo³
 He says. There go leave now there is going up bridge. We are who beautify
na⁴ši⁴na³nta¹-na¹ co² k?oa⁴--s?i² nčoa²ča³nio²⁻³ ta⁴sa¹⁻³ ti⁴khi³nčao²⁻³
 our (incl.) city. He says. Thus it is done come leave monthly tax. Make to come
skoe²la⁴ ?nti¹šti³⁻⁴-no⁴⁻³ hme¹-ni³ nka³--ka²ta³ma³či⁴ne⁴-s?i¹-ni³ ka²ta³ma³-no⁴⁻³
 school your little children in order to let them become wise. Let yourselves know
khoa⁴nta⁴⁻³ nka³--li²--?i⁴--vi³ška²-hiq²⁻³ ta⁴nkip¹⁻³ ni³?ya³⁻⁴-no⁴⁻³ to⁴--k?oa⁴--thi¹
 grace that you (pl.) do not fight here. Go your (pl.) house. Only thus is present
?e¹⁻³ ši³--vha²kao⁴-no⁴⁻³
 word which I speak with you.

Free Translation

Please, citizens, there are a few things which I wish to say to you. There is communal work for us again tomorrow. Tell the people who did not come. Let them come to the communal work. Sand and stones are needed. Carry them [tomorrow] to where the bridge is being built. We are the ones beautifying our city. Bring in the taxes. Send your children to school, in order that they may become wise. Please do not fight here [today]. Go home. This is all I shall say to you.

In the preceding text, note especially the following items typical of material previously described:

The object-subject pronominal combination at the end of the first word: thi¹-no⁴⁻³ 'you have' (< thi¹ 'it is present,' impersonal independent verb, + -no⁴⁻³ 'it to you [pl.],' object-subject enclitic).

The syntactic down glide on the noun na⁴hmi¹⁻³ 'story' (< na⁴-, nominalizer, + -hmi¹ 'conversation').

The fused compounded auxiliary koi⁴- 'incomplete' in khoa²kao⁴-no⁴⁻³ 'I shall tell you about' (< koi⁴- 'incomplete,' compounded auxiliary, + vha¹-/ča²- 'to converse,' transitive verb, dependent, first main stem, + -kao⁴ 'and, with,' adverb, dependent, second main stem, + -no⁴⁻³ 'I to you [pl.],' object-subject enclitic).

The fused compounded auxiliary ti⁴- 'to order to do it,' the use of an alternate stem form mai¹- 'to go' in which the disappearance of the nasal in fusion gives nasalized vowels, the occurrence of a plural stem which differs from singular stems, the tonemic change and consonantal substitution in the first syllable of the complex second main stem ča³ni²- 'to leave (something),' and the fused subject pronoun -o³ 'you (pl.)' in: tai¹ča³nio²⁻³ 'go to leave (something)' (< ti⁴- 'to order to do it,' fused compounded auxiliary, + mai⁴- 'you [pl.] go' [< the independent transitive verb 'to go' which has timeless stems as follows: 3d vhi²-/1st vhi³-/2d vhi³-/pl. ma³nki¹- or mai¹-], here serving as the first main stem of the compound verb but fused to the preceding auxiliary, + -ča³ni² 'to leave [something]' [< the corresponding independent complex transitive verb with stems ka³ni¹-/ča³ni²-], here serving as the second--but complex--main stem of the compound verb, + -o³ 'you [pl.],' dependent subject pronoun fused to preceding complex stem]). The entire compound is preceded by the proclitic ya⁴-, which is phonologically united to it but which is not grammatically a constituent of the compound; the proclitic is in immediate construction with the entire phrase 'bring now,' not with the verb 'bring.'

The typical 2-4 tonemic pattern on the loan word poe²nte⁴ 'bridge' (< Spanish punte; the Spanish stressed syllable is given Mazateco toneme 2, the unstressed syllable following it, toneme 4; an unstressed syllable preceding the stressed one would have been toneme 3; the t with bilingual speakers would tend to remain voiceless, whereas with monolinguals the n might disappear but leave nasalization of the preceding vowel).

* * * * *

Analysis of tone languages is complicated principally by two features: (1) the relative, rather than absolute, nature of tonal contrasts, and (2) tonemes that change (a) nonphonemically when conditioned by segments, stress, quantity, intonation, or position in word or phrase, or (b) phonemically in morphology, or phonemically but mechanically in sandhi, or phonemically in syntactic constructions.

Preparatory training of the ear may be obtained by the investigator in the minute analysis of the intonation of his mother tongue, if that language is not itself tonal.

Tonemes may best be analyzed by controlling the context of utterances so as to control phonemic and nonphonemic change. This is accomplished by using substitution frames in which lists of words may be placed and heard one by one and then analyzed in reference to the pitch of the context.

Such a procedure allows the investigator to find the number, and analyze the type, of pitch contrasts in analogous positions, so as to discover the number of tonemes in the language. He can then classify any further changes within the frame in terms of morphological, syntactic, or mechanical sandhi tone change.

When a tone language has been analyzed, its tonemes fall into one of two general types: (1) a system of significant levels of pitch, with glides composed of nonsignificant transitions

between level tonemes, or (2) a system of contours having types of glides that contrast with each other (or even with one or two level tonemes), but that cannot be analyzed into units in which each glide is a composite of adjacent level significant tone units.

Substitution of tonemes is of three general types: (1) mechanical perturbations of one toneme by another, (2) perturbations of the tonemes of a morpheme to signal its syntactic position, and (3) substitution of one toneme for another as a morphological process (equivalent to suffixation, and so on). Of the three types of tonemic substitution the first two are more likely to cause trouble in analysis than is the third. Further changes of tonemes may occur when tone phonemes fuse together.

Mixteco is interesting for its tonomechanical perturbations in sandhi, and Mazateco for its intricate layerings of tonemic fusion.

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