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A PROBLEM OF INTONATION CONTOURS IN RELATION TO GRAMMATICAL STRUCTURE

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A question of considerable importance in the present climate of linguistic debate is the relationship of phonological description to grammatical description. Viewpoints range all the way from a model which proposes the complete autonomy of phonology, to another which asserts its total dependence on grammar. This paper presents in summary form a problem of Kunimaipa intonation, showing how it is handled in relation to two different models. (Kunimaipa is spoken in the mountains of the Territory of Papua and New Guinea. It is linguistically unclassified.) First it is necessary to give some discussion of four different models which have been proposed.

1. Theoretical Models. Three current models were summarized by Pike (1958) under the headings compartmentalization (Trager, Harris, Bloch, Hockett, Welmers), abstraction (Firth, Allen, Sharp, Carnochan, Robins), and integration (Pike, Longacre, Waterhouse, Pickett, Crawford). A fourth model is that proposed by Chomsky, Halle, Lees and others which we might term dependency.

The compartmentalization view postulates a single hierarchy of language structure beginning at the lowest level with phonemics and moving up through morphology and syntax, ie. grammar functioning on a phonemic base. This has been the most commonly held view in American linguistics, and, for instance, Householder's view is an outgrowth of it. Specifically, Householder proposes (1965) a model which has (1) a sentence grammar of two parts, the first of which builds on morphemes and the second of which builds on phonemes, and (2) a phonological grammar which produces pronouncable nonce words. Hockett, similarly, has proposed that language has grammatical, phonological, and morphophonemic systems (1959, p. 137)

The abstraction viewpoint asserts that any descriptive starting point can be the right one, since it is the linguist that structures the data anyway. I take this view as postulating that the relationship of phonology to grammar is irrelevant, since all of language description is the description of meaning. I do not discuss either this or the previously mentioned view further in this paper.

The integration view is Pike's concept of language as modally and hierarchically structured. He postulates a "quasi-independence" of phonology and grammar in which no unit can be "defined without reference to its relation to other types of units in the system." (1958, p. 368) In his view, then, certain gram-

matical characteristics of a language will be explained only in reference to phonological structure just as the reverse is true. This view of the relation of phonology and grammar is a natural outgrowth of Pike's tri-modalism which regards every linguistic unit as simultaneously structured into feature, manifestation and distribution modes. For the linguistic unit language, these three modes are, respectively, lexicon, phonology, and grammar. But Pike is also aware of the kind of data required to support such a hypothesis, because he says; "The postulation of quasi-independent hierarchies can be sustained only if on occasion some of the boundaries of units of these hierarchies are non-coterminus." (1958, p. 374)

Pike's theory is also deeply rooted in the problem of the analytical situation. "Actual work on the field which deals simultaneously with grammar and phonology and meaning is reflected in the interweaving of these components reciprocally in the basic assumptions and definitions of the theory. Observed interpenetration and interdependence of levels of structure is treated as also interpenetrating and interdependent in theory, bringing empirical results and theoretical results close together." (1958, p. 371) Note that Pike has not proposed a procedural justification of grammars; rather they are justified in terms of (1) their ability to account for an unlimited corpus (this corpus includes data on native speaker intuition), (2) their conformity to the constraints imposed by the theory as a whole (eg. tri-modalism, hierarchical structure), and (3) the degree of integration holding between levels of the grammar.

A fourth view of the problem, is the dependency view of Chomsky, who has postulated a kind of grammar which begins with a single symbol and procedes via rules without let-up through grammatical description to both the phonetic realization of sentences, and their semantic interpretation. This view may be characterized as a 'dependency' view in the sense that both phonological and semantic rules operate only on the syntactic descriptions derived from the base and transformational rules. It is not a dependency view, however, from the standpoint that new and arbitrarily structured material is introduced into the grammar from the lexicon (eg. underlying phonological representations of morphemes, phonological coding structure, etc). Phonological structure is shown negatively at this point through the the specification of what have been called 'morpheme structure rules'. These rules grow out of Chomsky's evaluation critirion for grammars that requires that the simplest grammar be the preferable one. Thus morpheme structure rules specify any redundancies in the phonological structure of morphemes which make it possible to show an overall descriptive saving in the grammar.

Each of Chomsky's three components of a grammar (syntactic, phonological, and semantic) contains rules of a fundamentally different type. In defining the relationship between his syntactic and phonological components Chomsky says. "The phono-

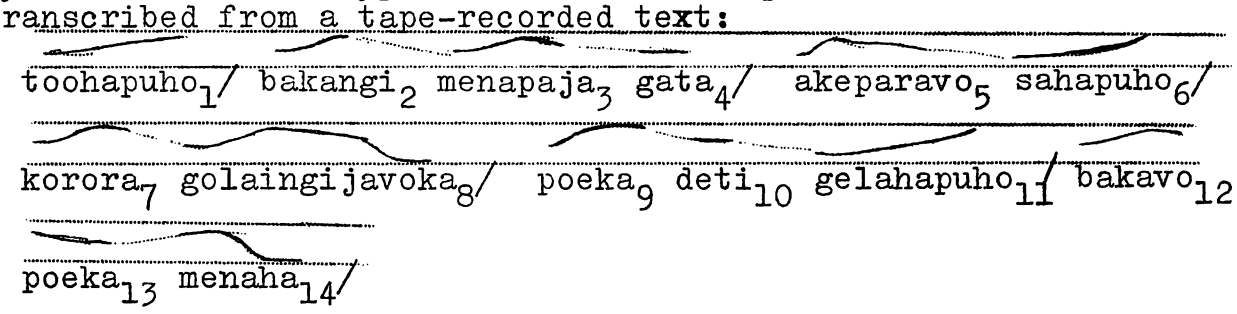
logical component embodies those processes that determine the phonetic shape of an utterance, given the morphemic content and general syntactic structure of this utterance. As distinct from the syntactic component, it plays no part in the formulation of new utterances, but merely assigns to them a phonetic shape." (1963, p. 307)

Chomsky's phonology, then, is integrated into a total grammar and does not signify anything except in relation to some sentence. His view results from his requirement that a grammar should generate sentences with their structural descriptions, and do it in the most efficient way. This generating capacity he regards as an analog of the way in which a speaker of the language produces utterances.

By way of contrast it is worth while pointing out some of the contrast in underlying assumptions that make Chomsky's and Pike's grammars vastly different. (1) Pike describes language behavior, Chomsky describes language competence; (2) Pike sets up a grammar of well-defined units, Chomsky sets up a grammar of rules; (3) Pike validates grammars by reference to their ability to account for an unlimited corpus of the primary data, by their conformity to constraints imposed by observed characteristics of language behavior, and by the degree of formal integration of sections of the grammar, Chomsky validates grammars in terms of their ability to generate an unlimited corpus, by their ability to provide intuitively correct structural descriptions in terms of a specified grammatical theory, and in terms of their value in relation to some evaluation criterion; (4) Pike requires that procedures and theory not clash, Chomsky regards procedures as totally irrelevant to theory. It is worthy of note that Pike's insistence on a behavioral base, but combining with it factors of psychological significance, extends his corpus well beyond that which Chomsky is attempting to account for. However, tagmemics is unformalized in the mathematical sense and thus not clearly interpretable at some points.

2. Kunimaipa Problem. I have analyzed Kunimaipa phonology from two different standpoints: tagmemic and transformational (see bibliography). A comparison of an aspect of phonology as treated in these models may shed light on the controversy described above.

For purposes of discussion I will here consider alternant analyses of a rather typical intonation sequence. The following is transcribed from a tape-recorded text:



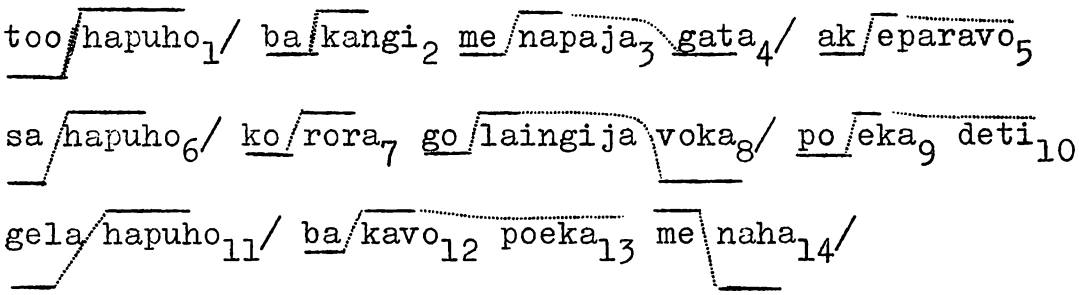
"While doing (this)$_1$, thinking$_4$ he would set$_3$ traps$_2$, he went$_6$ up there$_5$ to (the place of the birds) Koro and$_7$ Golai$_8$. There$_{9,\ 13}$ having climbed$_{11}$ up$_{10}$ he set$_{14}$ a trap$_{12}$."

Continuous lines give a rough indication of the pitch contours as they occur on the tape. Word-final vowels, even though written in this transcription, are all deleted in actual pronunciation. Slant line (/) indicates pause.

My tagmemic analysis sets up three final contrastive levels of pitch: high (last pitch of word 1), mid (pitch of word 4), and low (last pitch of word 8). Contour final sequences of these pitches occur in various contrastive patterns, and in addition four different types of contour pre-final patterns were observed.

Prefinal	Final
step	high
rising	mid
falling	low
level	high-low
	high-mid
	mid-low
	mid-high
	mid-high-low
	high-high-mid
	mid-low-mid

The sentence which I have extracted shows only the step and rising prefinal contours, and the high, mid, and low final contours. Thus it would be tagmemically structured something like the following:



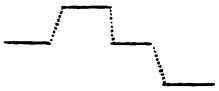
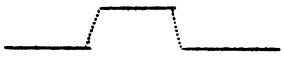
It is worth noting that rising prefinal contour usually precedes a high final, and step precedes a variety of items; however, my text-based analysis showed examples where rising also preceded a number of different items, and thus I set up the prefinal and final patterns as independent variables. Note also that there may be more than one prefinal contour before a single final contour (see words 2 and 3).

My transformational analysis of these contours proceeds on a very different basis. Stockwell has suggested (privately) that

it may be possible to generate intonational phenomena (at least for English) as totally dependent on grammatical structure. Following this we might postulate that for each clause identified by an S node in the surface structure, one final contour and one or more prefinal patterns may be generated. A prefinal contour is generated on each word of the utterance (or may even be part of its inherent phonological structure); a final contour only on the last word of the clause. My grammatical analysis of Kunimaipa postulates a final derived P-marker for the test sentence like that shown on the following page.

A contour analysis of Kunimaipa intonation in terms of distinctive features has not been done in detail, however, in broad outline, it would be something like the following. (1) distinctive prefinal contours would be incorporated into final contours. (2) nondistinctive prefinal contours would be generated for each word either by a rule or as part of the inherent phonological structure of that word. (3) Final contours would be divided into those which end a total sentence (terminal), and those which may only close one of the included clauses of a sentence (nonterminal). (4) I would set up at least three terminal final contours and two nonterminal final contours as charted below:

Final Contours

Terminal	1.		(word 14)
	2.		(not illustrated)
	3.		(not illustrated)
Nonterminal	1.		(word 1)
	2.		(words 3 and 4)

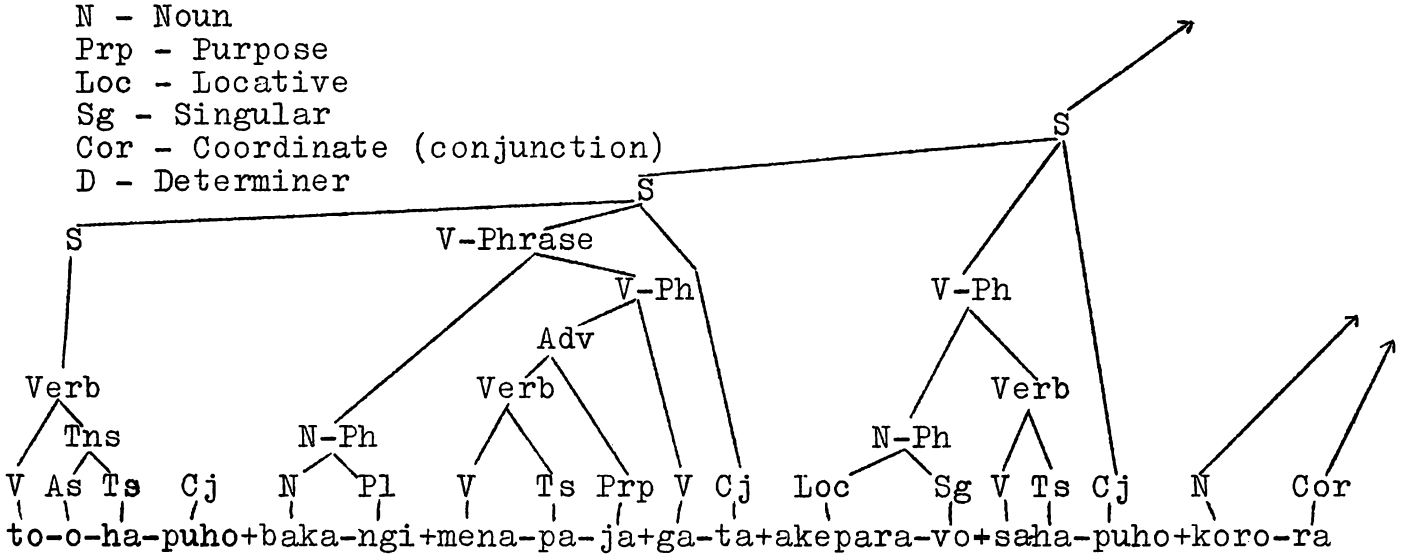
In this system, the test sentence would be structured somewhat like the following:

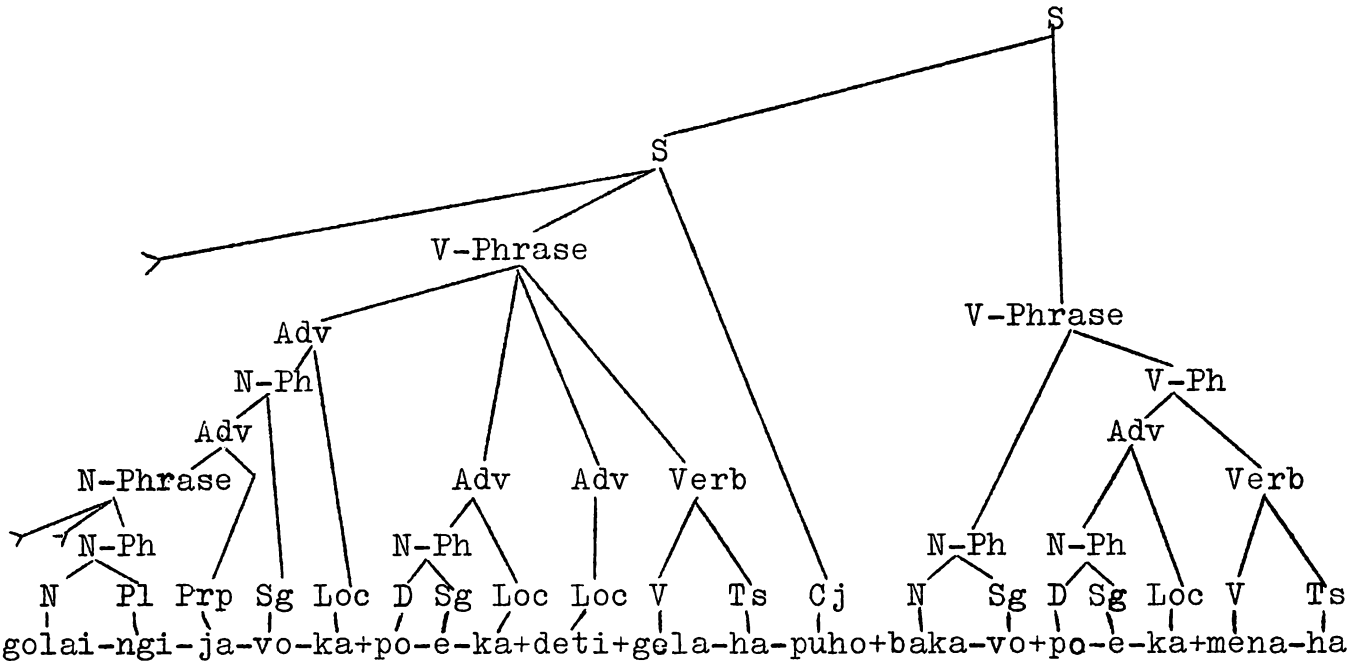
toohapuho$_1$ (NT-1)/ bakangi$_2$ menapaja$_3$ gata$_4$ (NT-2)/ akeparavo$_5$ sahapuho$_6$ (NT-1)/ korora$_7$ golaingijavoka$_8$ (T-1)/ poeka$_9$ deti$_{10}$ gelahapuho$_{11}$ (NT-1)/ bakavo$_{12}$ poeka$_{13}$ menaha$_{14}$ (T-1)/

I have not specified the rules necessary to generate the intonation contours of this sentence; however, there are two

Final Derived P-Marker (some details omitted)

Symbols:
V - Verb
As - Aspect
Cj - Conjunction
Ts - Tense
Pl - Plural
N - Noun
Prp - Purpose
Loc - Locative
Sg - Singular
Cor - Coordinate (conjunction)
D - Determiner





problems remaining which need attention before they can be specified: (1) How are the contrastive types of terminal or nonterminal contours to be generated, (2) What specification will be made of the terminal contour which occurs in mid-clause (word 8). This contour is identical with that found on word 14, and yet it is not in final position in relation to the sentence or even in relation to a clause.

Since phonological rules in a transformational grammar are keyed by P-markers, there appear to be two options in this framework for handling the problems of this sentence. The first is to leave it excluded from the sentences generated by the grammar. If I were to choose this option, the sentence which we are studying would be marked as ungrammatical in respect to its intonation pattern. I can only speak from a partial acquaintance with the language, however, I feel that to throw out sentences of this type would be a mistake. It seems to me to be normal in every respect.

The second option which is open to the transform grammarian is to introduce some element into the grammatical description (P-marker) which will be rewritten by phonological rules into the desired contour. It might be suggested that an occurrence of a low terminal final contour in mid-sentence indicates emphasis (a hypothesis with some degree of plausibility). If this idea were to be seriourly proposed, an optional emphasis element would be introduced into the phrase structure of the grammar at appropriate places. If generated along with the locational adverb, it would be rewritten as the terminal contour of our sentence.

This solution would take care of the second difficulty but not the first, since there are several different terminal and nonterminal contours that occur in a variety of sentence medial positions (noted in a fuller corpus). To handle this it would be necessary to introduce other 'intonational morphemes' into the grammar.

There is no doubt that this device would generate the desired sentences, but it is counter-intuitive at least to the extent that it masks the parallel occurrence (clause medial and sentence final) of terminal contours.

3. Summary. A few general remarks may be made about the alternant approaches presented here.

(1) Grammaticalness. Tagmemics forces no decision as to grammaticalnnss--it simply works from a corpus as given, attempting to account for it. Even hesitations and other kinds of mistakes seem to be regarded by Pike as structured--although they may be treated at another level and not as part of the immediate speech system. This is part of a general preoccupation with taking the data as it comes, without raising the

question of grammaticalness. For example, in my early work on Kunimaipa intonation, I attempted to account for the intonation of hesitation forms. This unwillingness to edit the corpus comes out of a basic component of the theory: the rejection of the distinction between a language system and its usage (ie, langue vs parole; competence vs performance).

Transform grammar is very quick to draw conclusions about what is and what is not properly formed speech. This is true as much in phonology as in grammar and is supposed to reflect native speaker intuition. The danger is that this may be very arbitrary and thus may represent not constraints on the system but rather merely the limitations of a certain mode of generation. A great deal of caution is needed in characterizing any language utterance as ungrammatical, yet to ignore this possibility imposes an intolerable burden on the grammarian. It is hoped that a middle ground may be found between tagmemic spontaneous-data primacy and transformational model primacy.

(2) Autonomy of Phonology. The study presented here has illustrated the results attained by two different approaches to the status of phonological description in relation to a total grammar. Two extremes are seen· phonology with totally arbitrary structuring and only incidental relationship to grammar, or phonology as related only to grammatical description and in which independent generalizations are not statable. On the one hand tagmemics tended to ignore the high degree of corrolation existing between intonation and grammar and to over-specify the phonological system of intonation. On the other hand transform grammar ignored generalizations of phonological structure and had the tendency to over-specify the grammar to account for them.

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