Cornell University
East Asia Papers
Number 9

The Chinese Syllabic Final: Phonological Relativity and Constituent Analysis

by Timothy Light

THE CHINESE SYLLABIC FINAL:

Phonological Relativity and Constituent Analysis

Timothy Light

China-Japan Program

Cornell University

Ithaca, New York 14853

The Cornell East Asia Series is published by the Cornell University East Asia Program (distinct from Cornell University Press). We publish affordably priced books on a variety of scholarly topics relating to East Asia as a service to the academic community and the general public. Standing orders, which provide for automatic notification and invoicing of each title in the series upon publication, are accepted.

If after review by internal and external readers a manuscript is accepted for publication, it is published on the basis of camera-ready copy provided by the volume author. Each author is thus responsible for any necessary copy-editing and for manuscript formatting. Address submission inquiries to CEAS Editorial Board, East Asia Program, Cornell University, Ithaca, New York 14853-7601.

Number 9 in the Cornell East Asia Series

ISSN 1050-2955 (formerly 8756-5293)

ISBN-13 978-1-933947-79-2 / ISBN-10 1-933947-79-9

Preface

This essay is based on my Cornell University Ph.D. dissertation (1974). Work published subsequent to that time certainly has a bearing on the subject.[1] However, I have chosen to leave the present essay fairly much a copy of the original, believing that, if it makes any contribution to the understanding of Chinese phonology in the light of phonological theory, it will do so best cast in the Chinese-centered framework it originally had.

The dissertation was supervised by Professor John McCoy, to whom I am very grateful for continuing instruction, and ideas on Chinese phonology. Professors Nicholas C. Bodman and Tsu-lin Mei kindly served on my dissertation committee, and if there is merit in what follows, most of it is owed to them and Professor McCoy. I wish also to thank Professor William S. Y. Wang for helpful discussions of various aspects of this work. I also thank Ron Walton and Mike Sherard for happy discussions, and especially Bill Baxter for so many things.

Gary K. McCone and Michael Carr have graciously proofread and corrected this essay. The Chinese characters were written by my wife, Joy C. Light.

The errors and stupidities are my own doing.

Most of all, I wish to thank my family for patiently enduring my time in graduate school when it would have been easier for us to be doing almost anything else.

The publication of this essay has been subsidized by a grant from Vice President for Research, University of Arizona, and by the China-Japan Program, Cornell University. I wish to express grateful acknowledgment for their support.

---

[1] For example, The Chicago Linguistics Society Parasession on Natural Phonology (1974), Thurgood and Javink's acoustical study of a rime change in Lisu (Journal of Phonetics 3.161-65. 1975), E. J. A. Henderson's 'Feature shuffling in a South East Asian language: or how big is a segment?' (read to the 8th Conference on Sino-Tibetan Linguistics, 1975), and various papers on Tonogenesis read to the Conference on Sino-Tibetan Linguistics.

For

Joy

with love

TABLE OF CONTENTS

		Page
I:	Introduction	1
1.1	The Aim of this Essay.	1
1.2	Summary of the Argument.	4
1.3	Plan of the Essay.	12
II:	Three Types of Analysis of Three Chinese Dialects.	14
2.1	Introductionr.	14
2.2	Phonemic Analysis of Mandarin.	15
2.3	Generative Studies of Cantonese.	40
2.4	A Quasi-Prosodic Analysis of Shanghai.	49
2.5	Towards Relativism in Phonological Descriptionr.	57
III:	Constituent Analysis, the Syntagmatic Axis, and Language Typology	59
3.1	Introductionr.	59
3.2	Some Previous Approaches to the Syntagmatic Axis, Relativism, and Phonological Typology.r. . r	62
3.3	A Relativistic Approach to Phonologyr.	74
IV:	Constituent Analysis, the Middle Chinese Phonological Model, and an Analysis of the Cantonese Final	80
4.1	The Middle Chinese Phonological Model.	80
4.2	Rimemic Analysis: A Modernized Version of the Middle Chinese Division of the Syllable . . .r.	90
4.3	A Rimemic Analysis of Cantonese.	101

TABLE OF CONTENTS (Continued)

		Page
V:	Attempted Rimemic Analyses of Four Chinese Dialects: The Spectrum of Dialects	109
5.1	Introduction	109
5.2	Hakka.	110
5.3	Amoy	120
5.4	Mandarin	130
5.5	Lungyen.	144
5.6	The Spectrum of Chinese Dialects	157
VI:	The Implications of this Study	166
6.1	Summary.	166
6.2	Rules, Features, and Arrangements of Phonological Data . . .	168
6.3	Historical and Comparative Implications of this Study. . . .	173
6.4	Areas for Further Research	202
Bibliography		205

TABLES

		Page
2.231:	Mandarin Finals Arranged According to Principal Vowel and Final Combinatory Possibilities	25
2.232:	Mandarin Finals on the First Squeeze.	26
2.233:	Mandarin Finals on the Second Squeeze	26
2.234:	Mandarin Finals on the Third Squeeze.	27
2.235:	Mandarin Finals on the Last Squeeze	27
2.31 :	Generative Model for Analysis of Cantonese (T. Chengr1968.7) . . . . .r.	41
2.41 :	Shanghai Nasal-ending Finals from Sherard's Inventory of Syllable Nuclei (Sherard 1972.75). . .r.	53
2.42 :	Sequence Structure Conditions Specifying Some of the Nasal-ending Finals in Shanghai (Walton 1971.88-9).	
3.231:	Possible Syllable Combinations of p, a, t	75
3.232:	Occuring Syllables of p, a, t	75
4.11 :	Sample of an Initial-Final Writing System for Cantonese . .	86
4.31 :	Cantonese Rimemes	107
4.32 :	Features for Final Segments in Cantonese.	107
4.33 :	Cantonese Rimemes with Blanks Specifiedr.	108
4.34 :	Cantonese Rimes (= Cantonese Phonetic Finals)	108
5.21 :	Hakka Rimemesr.	112
5.22 :	Feature Specifications for the Hakka Rimemic Vowels	112
5.23r:	Hakka Rimemes Preceded by Medials	114

TABLES (Continued)

		Page
5.24 :	Hakka Rimemic Finals . . . r	114
5.25 :	Hakka Rimemes with Blanks Specified.	115
5.26 :	Hakka Phonetic Finals.	118
5.31 :	Amoy Rimemes	121
5.32 :	Feature Specifications for Amoy Rimemic Segments	126
5.33 :	Amoy Rimeme Vowels Preceded by Medials	126
5.34 :	Amoy Rimemic Finals.	127
5.35 :	Amoy Rimemes with Blanks Specified	128
5.36 :	Amoy Phonetic Finals	129
5.41 :	Mandarin Rimemes	132
5.42 :	Feature Specifications for the Phones in Mandarin Rimemes.	132
5.43 :	Mandarin Rimeme Vowels Preceded by Medials	133
5.44 :	Mandarin Rimemic Finals. . r	135
5.45 :	Mandarin Rimemes with Blanks Specified	135
5.46	Mandarin Phonetic Finals	139
5.47	Underlying Forms in Chin-chuan Cheng's Analysis.	140
5.48 :	Chin-chuan Cheng's Underlying Finals	141
5.51 :	Lungyen Rimemes.	147
5.52 :	Feature Specifications for the Phones in Lungyen Rimemes	147
5.53 :	Lungyen Rimeme Vowels Preceded by Medials.	149
5.54 :	Lungyen Rimemes Preceded by Medials.	149

TABLES (Continued)

		Page
5.55 :	Lungyen Rimemes with Blanks Specified	150
5.56 :	Lungyen Phonetic Finals	154
5.57 :	Revised Phonemic Finals of Lungyen.	155
5.61 :	The Five Dialects Discussed in This Study Arranged to a Typological Spectrum.	157
5.62 :	The Chinese Typological Crescent.	160
5.63 :	The Chinese Dialect Spiral.	161
5.64 :	Correlation of Direct Descent of Rimemes with Tonal Perturbation.	163
5.65 :	Some Typological Features of Cantonese, Shanghai, English	165
6.231:	Sample of Arrangement of Dialect Material in Rows According to Onglides and Columns According to Ending Segments	174
6.232:	Sample Arrangement of Dialect Material in Rows According to Principal Vowel or Onglide, and Columns According to Ending Segment.	175
6.233:	Sample of Arrangement of Phones by Privilege of Occurrence with All Other Phones	175
6.31 :	English as a Two-Vowel Language	179
6.321:	Tibeto Velar Endings Corresponding to Chinese Alveolar Endings	188
6.322:	Partial Merger of 真 and 耕 Rimes after Old Chinese . .	190
6.323:	Some Hupeh Dialects Illustrating Merger of ŋ and n After Front Nonlow Vowels	191
6.234:	Partial Merger of 真 and 耕 in Szeyap Yueh Dialects . .	192
6.325:	Front and Back Consonantal Endings and Their Distribution Among Cantonese Nonlow Phonetic Vowels.	196

TABLES (Continued)

Page

6.326: Front and Back Consonantal Endings and Their Distribution Among Mandarin Nonlow Phonetic Vowelsr. 196

6.327: Front and Back Consonantal Endings and Their Distribution Among Hakka Nonlow Vowels 199

6.328: Front and Back Consonantal Endings and Their Distribution Among P'u Ch'i Nonlow Vowels. 199

Chapter One

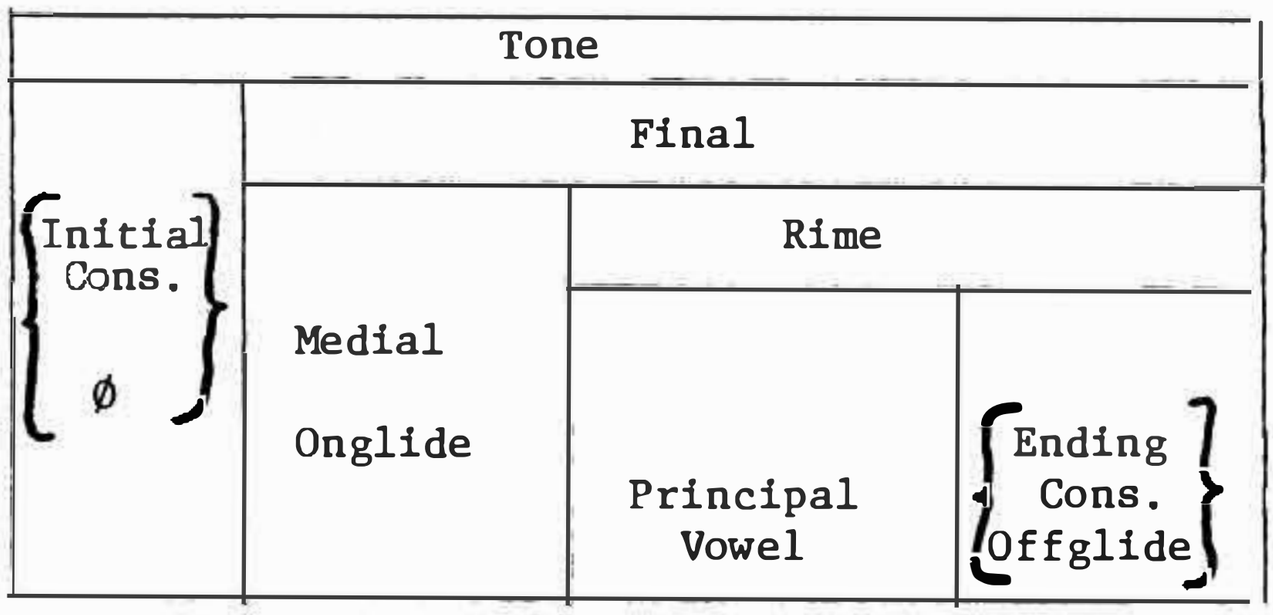
INTRODUCTION

1.1 The Aim of this Essay

In this essay I shall propose a method for analyzing the Finals of one type of Chinese dialect. This method borrows from both autonomous phonemic methodology and from generative methodology, and it differs from strict versions of both. It also reflects the traditional indigenous understanding of Chinese phonology dating from at least fifteen hundred years ago.

One purpose in proposing this method for analyzing the Finals of some Chinese dialects is to provide a rationale for various analytical steps which have long been implicit even in modern descriptions of Chinese sound systems. Another purpose is to attempt to justify in modern terms aspects of the traditional Chinese method of analysis which I believe have not generally been given their due in the study of Chinese phonology. A still wider purpose is to suggest that differences in language typology call for differences in the components and emphases of linguistic description.

The analysis that I shall propose is called a 'Rimemic' analysis. The term 'Rimeme' will be formally defined in 4.2. At the outset, it is only necessary to know that Rime (韻) is a phonological category in the traditional Chinese analysis which divides the Chinese syllable into the following hierarchical framework:



Although there are crucial differences among Chinese dialects in the natures of their word-level phonologies (cf. 2.4), this division of the syllable is generally adequate to account for the major constituents of the syllables in most or all dialects.

These major constituents are Initial, Final, and Tone. Modern studies of Chinese have explicitly recognized the separability of the Initial (a consonant or [Ø] onset) and the Tone from the rest. Most modern studies, despite a common use of the diagram just reproduced, do not provide any explicit reason for treating the whole Final as a constituent on a par with the Initial and Tone. Yet no study that I have seen has been able to avoid separate treatment of the consonants which fill the Initial slot and the collection of vowels and consonants which fill the Final slot. A question is therefore evident: What is there about the Chinese language which justifies the division of the Chinese syllable into three commutable units, one of which is segmental in size (the Initial) and another of which may contain up to three segments?

Within the Final, the Medial and Rime are the major constituents. The Rime consists maximally of a principal vowel plus either an ending consonant or an offglide. One may ask a similar question to that asked about the Final: What justifies the treatment of this two-segment stretch as somehow a unit?

Both of these questions are more than curiosities. The Chinese themselves have insisted for centuries that their syllables berdivided in this fashion. We know in linguistics that we defy native speakers' intuitions at our peril. An imperative question in any approach to Chinese should be: Does the traditional analysis have an internal justification which might conflict with a concept of analysis brought from the outside?

Of crucial importance to Chinese historical linguistics is the Rime portion of the syllable. Owing to the nature of the Chinese script, historical reconstructions cannot be directly mapped from a text onto a phonological representation, as our methods suggest is possible with alphabetical records. Various alphabet-free characteristics of written texts have therefore become particularly important in the study of Chinese historical phonology. No single textual source is more important for the history of Chinese than the extensive use of end-rime in Chinese poetry over the past two and a half millenia. Long ago Chinese scholars discovered that earlier practices in riming could be described by the grouping of commonly interriming words into Rime categories and that sound changes could be described by shifts among Rime categories. Since poetic rime, like Linguistic Rime, involves the principal vowel and endingr segment (where one occurs) discussions of sound change in this framework inherently refer to disegmental changes rather than to the monosegmental changes of more common alphabetical discussions. This fact leads to an interesting irony present even in the most modern discussions of historical Chinese linguistics. Scholars writing in English or other European languages describe Chinese sounds segmentally with their clear first goal being the reconstruction of an alphabetical representation of earlier forms. Some scholars (whose training in, and understanding of, modern linguistics can in no way be challenged) writing in Chinese describe Chinese sound changes in terms of splits and mergersr

of Rimes and use alphabetical representations only for reference points.

Again a question is pertinent: Is there any inherent reason why Chinese scholars prefer the traditional mode of discussion to the ostensibly more universal alphabetical mode?

The questions raised up to now are fundamentally typological questions. They ask whether Chinese is sufficiently different from languages like English in the nonInitial portion of its segmental syllables that a form of analysis that would be inappropriate to English is called for in the case of Chinese.

The thrust of this essay will be to answer the general typological question with a qualified 'yes'. That is, I claim that there is a general and simple explanation of the Initial-Final distinction on the segmental level. I claim further that for some dialects there is a reasonable explanation of the traditional emphasis on Rime as a linguistic category. By limiting the usefulness of the concept of Rimeme to some dialects, I am explicitly claiming that within the general typology of Chinese there are significant typological differences among dialects concerning the structural role of Rimes. Finally, I claim that historically there is good reason to discuss some sound changes in terms of the splitting and merging of Rimes as well as in terms of the splitting and merging of segments.

In the following section I shall give a brief summary of the argument I shall follow in succeeding chapters. To close this chapter, I shall outline the plan of the essay.

1.2 Summary of the Argument

The diagram of the Chinese syllable given in 1.1 can be rewritten in a set of formulae:

$$\text{Syl.} = \#I \quad \overset{T}{F}\#$$

T = a pitch and contour

I - a consonant (incl. Ø)

F = (M) R

$M = V_1$

$R = V_2 \quad (\overset{C}{V_3})$

Syl. 'syllable'; I 'Initial'; F 'Final'; T 'Tone'; M 'Medial'; R 'Rime';

V_1 = a set of onglides; V_2 = principal vowels; V_3 = a set of offglides; C = a set of ending consonants.

If [Ø] is recognized as an Initial, none of the fillers of any of the V slots will be the same as any of the fillers of the Initial slots. That is, the Initial fillers are limited to consonantal elements. The fillers of the Medial, the principal vowel and the offglide slots are all vocalic. The distinction between consonant and vowel here is articulatory. Consonants are articulated with an oral or glottal closure; vowels are articulated without such a closure.[1]

---

[1]The reader will note that the Rime formula is not quite accurate. In many dialects there are syllables consisting solely of a syllabic nasal (e.g. [m ŋ] in Cantonese). A formula which states that the Rime consists of a principal vowel and an offglide or consonant does not account for such syllables. Obviously one could easily add an exception:

$$R = \left\{ \begin{matrix} V_2 \\ N \end{matrix} \right\} \left(\left\{ \begin{matrix} C \\ V_3 \end{matrix} \right\} \right)$$

For this essay however, the syllabic nasals will be ignored. Since they are segmental in size, syllabic nasals cause no problem in any analysis. They do not need to be further segmented or cut into immediate constituents. A single letter or column of features may be used to reflect them. They stand on a par with any other type of segment. The problem for Chinese is stretches of more than one segment which behave as one segment. The traditional notions of Final and Rime were designed to handle such stretches. I shall concentrate on such stretches in this essay and not take up the simpler cases of syllablic nasals.

The only nonInitial syllable position where the fillers may be the same as the Initial is the ending consonant. However, in modern dialects of Chinese there is generally a maximum of six (or seven) consonant articulations at the syllable coda. These articulations are:

m n ŋ

p t k (ʔ)

Of these seven, the stops are all unreleased in syllable coda position. In syllable onset position (Initial) stops are released. Consequently in phonetic terms, there is a consistent difference between all but three of the Initial fillers and ending fillers.

The fact that there is so little overlap between the fillers of the Initial position and the Fillers of the postInitial position is the general (pandialectal) reason for distinguishing between Initial and Final. No matter what phonological exercises are performed on the data, the overwhelming bulk of the fillers of postInitial positions will remain both phonologically and phonetically separate from the fillers of Initial positions. Note well that if the unreleased stops of the syllable coda are phonemically grouped with one set of Initial released stops (there are at least two sets of Initial stops in dialects of which I have seen records), then the phonetic fact of nonrelease must be treated in the morphology because it signals syllable end. So phonemicization at this point does not really resolve the function of phonetic difference.

Within this general justification for the Initial-Final distinction, there is a further justification, the realization of which is dialect-specific. That is, in Chinese principal vowels generally assimilate to the succeeding consonant (Chin-chuan Cheng, 1973. 14 ff.). Consequently, there is a perceptible 'tie' between principal vowel and ending consonant that is almost completely absent between any vocalic element and the Initial fillers. To be sure, there

are constraints governing the distribution of Initial consonants among succeeding elements (Medials or principal vowels). But these constraints are in no way as general as the assimilation constraints within the Final itself (cf. 2.2 and 5.3 below).

For dialects with only one articulatory consonantal ending position (e.g. [-n] or [-ŋ]), there is, of course, no discernable assimilation of vowel to following consonant because there is no contrast among consonants. But the structural character of these dialects is just the same as those with the full complement of consonantal endings. Where there is only one consonantal ending, then there is only one filler for the whole postInitial portion of the syllable which can possibly be the same as a filler of the Initial position. Consequently, the Final remains an isolable unit.

But within the Final, the distribution of units differs among dialects. For dialects with three articulatory positions for Final consonants, the extent of assimilation by the vowel to the Final consonant is such that one can conveniently treat the combination of principal vowel and Final consonant as a unit. This unit is the Rime of the diagram and formulae given above. For such dialects (e.g., Cantonese, Hakka, and, to a lesser extent, Amoy) I use the term 'Rimeme' to denote this portion of the syllable. The relationship of Rimeme to surface Rimes is roughly comparable to that between autonomous phonemes and phonetic representation, and for every Rimemic segment there is a surface segment.

For dialects which lack the full set of ending consonants, the Rimemic analysis is unsuitable. On the one hand, Peking Mandarin illustrates the kind of assimilation which the 'Rimemic dialects' also illustrate. But the most convenient statement of that assimilation requires an underlying set of vowels so abstract that an underlying vowel may be represented by [Ø] on the surface.

Furthermore, the underlying combinations of principal vowels and ending consonants show no distribution between vowels and consonants, as does the phonological level of the Rimemic dialects. On the other hand, the Lungyen dialect (Spoken in Kiangsi; cf. 5.5 below) has only one ending consonant, and in the absence of relative assimilation to ending consonants, the Rimemic analysis is irrelevant.

I shall propose a method for accounting for the Rimemic dialects and shall also demonstrate that this method does not work for dialects like Peking Mandarin and Lungyen, where different kinds of analysis are more appropriate.

The isolability of the Chinese Final is an important typological fact. The isolability of the Rime in some dialects is also an important typological fact. Taken together, these facts suggest that, regarding the nonInitial portion of the segmental syllable, Chinese as a whole differs in nature from a comparable portion of the syllable in languages without an Initial-Final distinction, and Rimemic Chinese dialects differ from Chinese dialects without a clear Rime unit.

Such typological facts have implications for analytical approaches to different types of languages. I have already demonstrated that for Chinese in general an immediate constituent (IC) cut must be made between Initial and Final prior to setting up distinctive units. This single step alone qualitatively distinguishes the analysis of Chinese from, say, the analysis of English. The appropriateness of a Rime unit to some dialects, but not all dialects, qualitatively distinguishes the analysis of the Rimemic dialects from those where this unit is of no use.

By qualitative distinctions among analyses, I mean that among the components generally available to linguists for the analysis of all languages, there should be some selection of those components most appropriate toe

the language being analyzed at the moment. Correspondingly there should be explicit exclusion of those components which are either not relevant or marginally relevant. In the arrangement of the description, those components of description which account for the large bulk of the phonology should be explicitly stressed, while those which account for a lesser portion should be explicitly placed in an inferior role.

These suggestions naturally imply a certain relativism within phonological description. The bounds and application of that relativism will be made more explicit in the discussions that follow. But note here the main points that the succeeding discussions will attempt to justify: 1) The use of a common analytical unit, like the phoneme, to describe the concatenating phonological units of all languages has an inherent problem. For, if the phonemes of English and Mandarin are analyzed through the same set of procedures, the sets of phonemes in the two cases do not carry comparable information. That is, the phonemes of Mandarin and English are at least partially different structural units within the contexts of their languages. Therefore, it is at least partially deceptive to use the same term to name both sets. 2) The components in a strict generative phonology, although all required for the analysis of English, are not all needed, or not all equally needed, in the analysis of all Chinese dialects. The attempt to describe Cantonese, for example, in a strict generative framework skews that language so that the processes which seem to determine the bulk of the phonology are treated as marginal and vice versa. 3) For various typological reasons, no single analytical approach is adequate to analyze all the dialects of the Chinese family in a way which highlights the most notable characteristics of each dialect.

Clearly it is possible to do a phonemic analysis of any language. It is equally possible to do a systematic phonemic analysis of any language.

Neither possibility is being challenged here. Rather, the question being raised concerns the relative meaning of the results of analyses of fundamentally different languages according to the same model. My claim is that the replication for a Chinese dialect of an analysis used on English will tend to obfuscate the very features of Chinese that distinguish Chinese typologically from English. Similarly, even within the Chinese family, the replication of analysis from dialect type to dialect type may be misleading.

In the broadest linguistic terms, the typological differences among languages to which I have referred up to this point are comparative differences in the relative roles which the syntagmatic and paradigmatic axes play in different languages. The major units of English are the 'letter-sized' chunks of sound (cf. Hockett 1968. 32) which are so widely distributed that we are forced to treat them separately. It is these units that we describe in both phonemic and systematic phonemic analyses. The major syntagmatic concatenations are understandable as regular grouping of these letter-sized units, e.g., certain consonant clusters and such diphthongs as /ai, au, oi/. The major paradigmatic units of Chinese are the Initial, Final, and Tone because these units are distributed among each other with comparative freedom. A major--if not the major--syntagmatic concatenation in Chinese is the regular grouping of units in the makeup of the Final. On a nonTonal level, the typological difference between English and Chinese is that in Chinese regular concatenation--i.e., syntagmatic arrangement--does not involve units that are paradigmatic units within the makeup of the syllable.

While the existence of both syntagmatic and paradigmatic planes is generally accepted in linguistic thought, in American theory little attention has in fact been given to the syntagmatic plane. Our fundamental units in both generative and structuralist linguistics are entirely paradigmatic. In the

analyses of given languages we employ these units in a manner that will subsume as many syntagmatic characteristics under the paradigmatic framework as possible. Only as an afterthought do we attempt to account for syntagmatic relations through phonotactics (in a phonemic analysis) or morpheme structure rules (in a generative analysis) which put the concatenation of phones on a par with the constraints which keep the device for analyzing languages from generating wild segments.

Nor have we paid much attention to the possibility that typological differences may involve different relative emphases on the syntagmatic and paradigmatic planes. The problem with a linguistic description which requires the determination of phonemes prior to the statement of phonotactic constraints is that it suits English so well. In the description of English phonology it is possible to make a logical and tight phonemicization and then state phonotactic constraints because the phonotactic constraints involve but a small portion of the phonology. In Chinese this sequence of analysis does not work because it excludes explicit recognition of what makes the fillers of the Final different from the fillers of the Initial. But note that this difference is again relative. In English, although it is generally the case that phonetic segments are best represented as phonemic segments on a one-to-one basis, the structural function of a few combinations of English vowels and offglides is so similar to the paradigmatic function of single phones that these few combinations can be considered as single units <u>in the English context.</u> Thus, in Pike's system we find the following (Pike 1947. 45):

	phonetic	phonemic
	[iy]	/i/
	[i]	/ɩ/
	[ey]	/e/
	[e]	/ɛ/
But:	[au]	/au/
	[ai]	/ai/

The fundamental linguistic problem raised by considerations like the foregoing is: How can these relative differences be incorporated in a linguistic analysis without abandoning the analysis to a completely unrigorous relativism which treats each language as a separate phenomenon? I shall attempt to answer this question for the small group of dialects that I shall call Rimemic dialects. Although I shall not attempt to provide an answer beyond that limited field, I shall offer some speculations on the ways that typologies can be charted out.

Finally, if there are among languages relative differences with regard to the syntagmatic and paradigmatic planes, it is conceivable that language histories should reflect this fact. I shall conclude this essay by discussing two types of sound changes which are inherent in the Rimemic type of language. It is not expected that these types of sound change will not be found elsewhere, but just that they are typical of the Rimemic type.

1.3 Plan of the Essay

In the following chapter (II) I shall attempt to show that some approaches to phonology are unsuitable for some Chinese dialects and that therefore no one of these approaches to phonology is suited to analyzing all Chinese dialects.

I shall discuss phonemic analyses of Mandarin, generative analyses of Cantonese, and a prosodic analysis of Shanghai.

In Chapter III I shall discuss some previous proposals for incorporating syntagmatic information into paradigmatic statements of phonological units. Building upon these previous attempts, I shall propose a use of the syntagmatic and paradigmatic axes that is essentially relativistic.

In Chapter IV I shall attempt to use the viewpoint arrived at in Chapter III to construct an analysis suited to the Rimemic dialects. That analysis will be applied to the Cantonese dialect.

In Chapter V the Rimemic analysis will be applied to four other dialects. The results of the application will be increasingly less satisfactory so that at the end of the chapter it will be necessary to discuss gradients of dialect typologies.

In Chapter VI I shall draw my conclusions from this exercise and suggest some historical implications that arise from these conclusions.

Chapter Two

THREE TYPES OF ANALYSIS OF THREE CHINESE DIALECTS

2.1 Introduction

In this chapter I shall attempt to justify my claim that types of phonological analysis are of relative usefulness with regard to the specific languages to which they are applied. This claim of relativity involves two assertions: 1) The replication on languages of one typology of analyses which were basically developed through work on languages of another typology may not be very informative. Specifically, the units used in any given analysis may not necessarily carry the same information from language to language. 2) Because a given analysis may be particularly inappropriate for at least one Chinese dialect, none of the types of analysis considered here is equally suited to the analysis of all Chinese dialects.

I shall attempt to justify these assertions through discussions of a phonemic analysis of Mandarin, two generative analyses of Cantonese, and a quasi-prosodic analysis of Shanghai. My aim will be to show that phonemic analyses of Mandarin and generative analyses of Cantonese are not wholly suited to their objects. The syllable-based quasi-prosodic analysis of Shanghai proposed by Sherard (1972) seems particularly well suited to that language, and, just for that reason, inappropriate for the analysis of Cantonese and Mandarin.

At the outset of this chapter, it is necessary to reiterate that the focus of this essay is on the Chinese Final and its components. The reason for

this focus is that the paradigmatic units Initial and Tone seem to have been fairly satisfactorily treated in phonemic, generative, and prosodic analyses, within their respective frameworks.r The problem in previous analyses has been with the role of the Final and the kind of paradigmatic unit that can be assigned to it. In this chapter I will examine two types of paradigmatic assignments. The phonemic and generative analyses that I shall discuss use the segment as the paradigmatic prime for the whole nonTonal syllable. The quasi-prosodic analysis that I shall discuss uses the syllable as the paradigmatic prime of the phonological word. In the following chapter I shall consider ways of accounting for the syntagmatic plane while still retaining a clear and identifiable paradigmatic unit.

2.2 Phonemic Analyses of Mandarin

In this section I shall ask the question: In analytic terms, does the Mandarin distributional phoneme provide the linguist the same information as the English phoneme? That is, although we call them by the same name, and apparently arrive at them through application of the same procedures, are the English and Mandarin phonemes comparable units simply in different languages, or are they essentially different units because they are in fundamentally different languages?[1]

---

[1]In a sense, this question is also raised by Hockett in his manual of phonology. In that work, the notion of phoneme is used throughout but in an avowedly relativistic sense. As an illustration of Hockett's viewpoint, consider what he has to say on the persistent problem of unit phoneme vs. cluster, a problem current not only in the time that Hockett was writing his book, but at the time of this writing as well (cf. Campbel 1974). In discussing whether an alveolar affricate in Fox should be interpreted as a unit phoneme /c/ or a cluster /ts/, Hockett lists several considerations and possible answers to the question, and then concludes:

> The writer's own preference, within the limitations of the 'phoneme or cluster' approach, is to settle for a unit

This question is explicitly comparative and it regards English as the base language. Discussions of typology are comparative discussions and there is no way to discuss typology except to question openly the fundamental concepts that are thought to apply to all languages. The use of English as the explicit base language will, it is hoped, highlight the differences between what is expected of any phonemic analysis and what is achieved by a phonemic analysis of Mandarin. To a considerable degree, any linguistic analysis of a foreign language is comparative and contrastive, and the analyst's native language, or the native language of the theorist followed by the analyst, is the base language to an extent very seldom acknowledged. It is my belief that the remarkable correlation between phonemic analyses of English and English riming, English writing, and that which we sense to be psychologically 'real' about

---

> phoneme /c/. Another possible answer is 'it doesn't matter.' This answer is not bad if it is given after the examination of the possibilities and what they imply; it is bad if it is given in advance and shortcuts the investigation. For, in a way, what counts is not so much the interpretation which one accepts as the evidence on which that interpretation is based. The most fruitful aspect of the lengthy discussions of the 'phoneme or cluster' problem in the literature has been the careful examinations of distributional facts which were undertaken; they have posed as a byproduct, but only because we were really asking the wrong question (Hockett 1955.165. See also section #242; and Hockett 1968.29-37).

The difference between Hockett's approach and that of the present essay is that I believe it is heuristically better to reserve the term 'phoneme' for fairly specific uses, which do not include combinations of vowel and consonant such as the Rimeme, a unit to be defined in 4.2. The difference is more than terminological. For it seems to me that typologies are not well depicted except through descriptions that are drawn from the evidence of the language type being described. This approach and Hockett's are both relativistic. The relativism of the present approach extends further than Hockett's. But my debt to Hockett is immense.

our language is too striking to be coincidental. I shall discuss such phenomena together with more traditional linguistic considerations in order to demonstrate that in their postInitial segmental components, English and Mandarin are fundamentally different in a way that makes equivalent analyses of them misleading.

I shall begin the discussion of Mandarin with a brief examination of the Initials. Although this essay focusses on the Final, it is useful to consider the Initials first because the Initial fillers are apparently the linguistic units in Mandarin that are the most like English phonemes. Nevertheless, I shall show that even the Initials in Mandarin have one characteristic which makes them different from English phonemes.

In addition to Ø , there are 21 phonetic Initials in Mandarin:

p	p'	m	f	
t	t'	n		l
k	k'		x	
c	c'		s	r
ç	ç'		ş	
tɕ	tɕ'		ɕ	

Minimal pairs can be found to distinguish all these series of Initials exceptr

c	c'	s	
k	k'		x
ç	ç'	ş	
t	tɕ'	ɕ	

Of these, two may be set up as constituting the allophones of a single phoneme, and the remaining series must be considered separate sets of phonemes. For the present discussion, I follow Cheng (1973) in allying the velar series with the palatal series and stating that for the phonemes /k,rk', x/ the allophones

[tɕ, tɕ', ɕ] occur before high front vowels, and the allophones [k, k', x] occur elsewhere.

I follow Cheng on this point because I think that his analysis is most sound. For the present purpose, however, the distinction between the velar, palatal, dental, and retroflex series is not very important. One need only notice that nonuniqueness in phonemic solution is not peculiar to Chinese and notice also that one may not simply take the fact of nonuniqueness here as justification for abandoning phonemic theory in analyzing Mandarin.

Allowing for this case of nonuniqueness, there is no way in which the Mandarin Initial consonants are systematically different from English consonants, except that the Mandarin Initial consonants (with the exception of [n]) occur only initially. That is, the Mandarin Initial consonants form a believable articulatory pattern. Given a single allophonic statement covering the relation of two sets of phones consisting of three phones each, the Mandarin consonantal phones are all distinguishable in terms of minimal pairs and so are fully distinctive in the normal linguistic usage of that word. The Mandarin Initial consonants are not highly restricted in privilege of occurrence. Where a given consonant does not occur before certain vowels, there is no consistent pattern that would allow us to draw sweeping phonotactic statements or morpheme structure rules. In general, the Mandarin consonants are all commutable within the same segmental syllables.[2]

---

[2]This is a further point on which I differ from Hockett. In his manual, Hockett uses positional occurrence as one of the criteria for determining the phonemes of a given language. While I agree with the need to pay attention both to positional restrictions and to distribution, it seems to me that positional restrictions may imply morphological information, and certainly they do in Chinese. Furthermore, it seems to me that positional and distributional restrictions combined can sometimes be best described through the use of sequence statements which do not even refer to the phoneme at all.

In short, except for their restricted position at the beginning of the syllable, the Mandarin consonants are in every respect phonemes just as are their English counterparts.

However, this positional exception turns out to be of some importance. Consider the phonemically anomalous position of [ŋ] which occurs only at the end of syllables. The only ending consonants in Mandarin are [n] and [ŋ]. [n] occurs initially as well, and so there is no ground for not terming [n] a phoneme /n/ wherever it occurs. But [ŋ]eis in complementary distribution with all the Initials other than [n]. Looked at from the front of the syllable, the nonoccurrence of most Initials in ending position does not seem anomalous, since [n], which occurs freely, is the unique case. Looked at from the end of the syllable, the nonoccurrence of [ŋ] initially means that 50% of the final consonants do not occur initially, and under other circumstances, such a ratio would require the effort of a linguist in allying that 50% to initially occurring consonants through an allophonic statement. Since finding a suitable allophonic mate for [ŋ] among the initial consonants is rather difficult, we might, using standard linguistic reasoning and parlance, argue that all consonants but [n] are neutralized to [ŋ] in ending position. Such a statement would be quite in line with the reasoning that permits us to talk of neutralization of English voiced and voiceless stops in /s-/ clusters.

It seems to me that the whole exercise of finding an allophonic relationship for [ŋ] among the initial consonants and talking of neutralization in final position is absurd in the case of Mandarin, for all the exercise proves is that by sleight-of-hand we can make Mandarin (or any other language presumably) look like English. But there is a serious point behind raising this absurdity. Even with the Initial consonants--and the final consonants as well--which otherwise seem so akin in nature to English consonantal

phonemes it is impossible to talk of phonemes in their proper sense. For, with the exception of [n], Mandarin consonants are phonemes only so long as one commutes them in a single position. As soon as one widens one's scope and considers the syllable as a whole, one finds that the consonants--because of their very positional restrictedness--serve to carry morphological information. The occurrence of [ŋ] always indicates the end of a syllable. The occurrences of all consonants except [n] and [ŋ] indicate the beginning of a syllable. As Henderson has shown in the case of Thai stops, this kind of morphological information-bearing is of considerable importance in the characterization of segmental units in languages of restricted distribution such as Chinese (Henderson 1949). Thus, if one is to talk of consonantal phonemes, one must specify the position in which they occur as part of their phonemic nature. If one does not specify the position, then one must state generally that certain classes of phonemes carry special morphological information. In either case, the resultant product is quite unlike the English consonantal phoneme which can largely be arrived at without appeal to extraphonological information and which does not need to be described in terms of morphological functions.

I have begun with a discussion of Mandarin consonants because it would seem superficially that, if any group of phones were susceptible to a phonemic analysis, this group would be. I have shown that this is not the case. In the remainder of this section, I shall discuss aspects of the nonInitial portion of the syllable. In discussing Initials, it has been unnecessary to refer to a specific analysis, since analyses of the Initials differ only on the question of assigning allophonic relationships to the palatal, dental, retroflex, and velar series. For the remainder of the discussion it will be useful to refer to the well known analysis of Mandarin segmental phonemes produced by Lawton M. Hartman III (Hartman 1944). In conjunction with discussing

Hartman's work, I shall make occasional reference to the related work of C. F. Hockett (Hockett 1947).[3]

Table 2.231 gives the Mandarin phonetic finals. I shall refer to this table throughout the discussion. The canonical shape of the Mandarin syllable is

$$(C_1)\ (V_1)\quad V2\ (\overset{V_3}{C_2})$$

where:

C_1 = Initials (as previously given)

V_1 = i, u, ü

C_2 = r, n, ŋ

V_2 = ɿ, ʅ, i, ɨ, u, ɪ, ə, ʊ, e, a, o, ɑ

V_3 = i, u

V_1 and V_3 may not be filled by the same segment in the same syllable.

If the phones which fill the canonical slots are phonemes on the English model, then there is no intrinsic reason why there should be a cut between

---

[3] In his 1947 essay, Hockett modestly acknowledges precedence of Hartman's analysis and suggests they are in the same 'tradition'. While the historical relationship is certainly clear, and while there are many elements common to the two works, it seems to me that Hockett's analysis represents an important departure from the strict concern with distribution and economy that governs Hartman's work. By using a hierarchical notion of syllables, Hockett anticipates the IC interest of his Manual and implicitly incorporates positional restrictions into his phonologization. While I find Cheng's (1973) analysis preferable because it uses the Initial and Final separations and treats the vowels according to their assimilative characteristics, I believe that Hockett's analysis of Mandarin is an important precursor to any typological work.

Initial and Final rather than between any other two segments. Indeed, Hockett--whose phonemic analysis is famous for pushing phonemic theory to its logical extreme--specifically suggests that he can find no reason other than tradition for the division between Initial and Final (Hockett 1947. 221, p. 14).[4] The burden of the following discussion of the Finals will be to show that there is good reason for making a first cut between Initial and Final, and thus that the phonemes of Mandarin are not the equivalent of English phonemes, a string of which may justify cuts between syllables but not between Initial consonant and what remains.

I turn first to the means through which phonemes in Mandarin can be determined. I have already discussed the consonantal phonemes and shown that in Initial position, phoneme-like units can be determined through recognizing the single case of significant limited distribution, so long as position is included in the phonemic statement. I have further shown that the ending [-ŋ] presents an anomalous case. In the present discussion therefore, I am concerned solely with vowels. The twelve phonetic vowels of Mandarin given in Section 2.23 above are reduced by Hartman to three phonemic vowels: /i, e, a/. Hockett makes a further reduction to /e, a/. But in the present attempt to treat distributional phonemic analysis in its strict form, Hockett's analysis

---

[4]The note referred to says, 'Almost all earlier treatments of Chinese syllables (=our monosyllabic microsegments) make use of this initial-final division. The convenience of the device, however, seems not to reflect anything of a fundamental nature about the structure of the language (to the contrary: Bloomfield, Language 182).' What Bloomfield says at that point is: 'In Chinese we have the extreme of structural word-marking: each word consists of one syllable and of two or three primary phonemes: a non-syllabic simple or compound phoneme as initial, a syllabic simple or compound phoneme as final; and one of the pitch-schemes; the initial non-syllabic may be lacking; the language has no bound forms.ė Neglecting the incorrect morphological information, we can see that Bloomfield's analysis has similarities to the early Middle Chinese analysis in that the Initial is C (V_1) and the Final is $V_2(V_3)$. Note that Bloomfield seems to assign phonemic status to the combination $\overset{C}{}$ of V_2 + C.

is slightly tangential. He also gives /i, u/, but calls them semi-consonants because, where /e/ or /a/ is present /i/ or /u/ is not the syllabic peak. This different terminology is significant within the scope of Hockett's analysis, and in Hockett's manual the analytical distinction underlying the terminology becomes very significant. However, given only the criteria of strict distribution and economy of symbolism, Hartman's solution has the fewest phonemes. For this discussion, I therefore choose to work with Hartman's conclusion that the minimum number of distinctive vowels in Mandarin is three. The justification for this conclusion--and implicitly the means for arriving at it--is given in Hartman's paper, and the reader is referred thereto.

Interestingly, however, one does not need to refer to Hartman's arguments to get the same results as he does. By the applicationeof a metaphorical device which has no linguistic import and the use of which is essentially nonsensical, one can arrive at the same array of vowel phonemes for Mandarin as Hartman does. The purpose of introducing this metaphor is not to be silly or amusing, but to show that the reduction of Mandarin vowels down to three distinctive units need have no structural significance.

Referring to Table 2.231, note that the axes of the table are formed by the principal vowel of each syllable ranged against the combinatory possibilities of that principal vowel within the Final. The unfilled squares vastly outnumber the filled squares. For the moment let us simply see them as unfilled physical spaces.e Let us then set as our goal, the reduction of the table to as small an area as possible by filling in as many blanks on as few lines as possible. Let us further assume that our sole tool for this operation is an imaginary linguistic press which will squeeze the table as tightly as possiblee The only limitation of the press is the standard constraint that no two bodies can fill the same space. On the first application of the press, we can squeeze

to the results in Table 2.232. The result is a significant, but not dramatic, reduction of rows. Twelve rows, as defined by the twelve principal phonetic vowels, are reduced to seven, as defined by the seven phonetic vowels which occurs as Finals by themselves. It is obvious that the seven principal vowels cannot be further squeezed vertically. So for the moment, we shift the press one space to the right and continue to squeeze the combined groups. Having subtracted the seven single-vowel Finals, we are left with twenty-eight space fillers. These twenty-eight can easily be included in four rows, as in Table 2.233. If we now permit a checkers-like skipping of filled squares, we can eliminate the bottom row of Table 2.233 by placing its five fillers in other rows. This is done in Table 2.234. Now we return the single-vowel Finals to the squeeze. Following our principle in constructing Table 2.234, we permit skipping of filled squares to a slot which is justified by the column heading. This takes care of all of the Finals except for [ɿ, ʅ]. They can be handled by simply continuing to exert force on the press which physically causes them to spill out to the side (Table 2.235). 'Spilling out to the side' sounds absurd, not to say unacademic, but the physical metaphor simply represents in more common terms what both Hockett and Hartman do with these phonetic segments. Hockett openly allies them with the Initial consonants to which each is respectively restricted in occurrence. Hartman, emphasizing the syllabicity of the two segments, analyzes them as part of a semi-vowel cluster series, in effect making them allophones of /i/. In short, both analysts handle these two segments by removing them from their phonetic status as single vocalic finals, which, in the present metaphor, is pushing them out over the side.

The use of this metaphor is a demonstration that one can reduce the Mandarin vowels down to three distinctive vowels without any explicit reference

TABLE 2.231

Mandarin Finals Arranged According to Principal Vowel and Final Combinatory Possibilities

	Ø-Ø	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü n	-r
ɿ	ɿ															
ɭ	ɭ															
i	i								in							
ɪ										ɪŋ						
e		ie		üe	ei			uei			ien					
ɔ	ə								ən	əŋ			uen			ər
a	a	ia	ua		ai			uai	an				uan		üan	
ɑ						ɑu	iɑu			ɑŋ		iɑŋ		uɑŋ		
ü	ü								ün							
u	u															
ʊ										ʊŋ						
o			uo			ou	iou									

TABLE 2.232

Mandarin Finals on the First Squeeze

	ø-ø	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	-r
ɿ	ɿ															
ɻ	ɻ															
i	i								in	ɪŋ						
e	ə	ie		üe	ei			uei	ən	əŋ	ien		uən			ər
a	a	ia	ua		ai	au	iau	uai	an	aŋ		iaŋ	uan	uaŋ	üan	
ü	ü								ün							
u	u		uo			ou	iou			ʊŋ						

TABLE 2.233

Mandarin Finals on the Second Squeeze
(Omitting Single-Vowel Finals)

	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	-r
i								in	ɪŋ						
e	ie		üe	ei			uei	ən	əŋ	ien		uən			ər
a	ia	ua		ai	au	iau	uai	an	aŋ		iaŋ	uan	uaŋ	üan	
u		uo			ou	iou		ün	ʊŋ						

TABLE 2.234

Mandarin Finals on the Third Squeeze

	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	-r
i								in	ɪŋ						
e	ie	uo	üe	ei	ou	iou	uei	ən	əŋ	ien		uən	ʊŋ	ün	ər
a	ia	ua		ai	au	iau	uai	an	aŋ		iaŋ	uan	uaŋ	üan	

TABLE 2.235

Mandarin Finals on the Last Squeeze

	ø-ø	ø-ø	ø-ø	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	-r
i	l̩	l̩	i		u	ü					in	ɪŋ						
e			ə	ie	uo	üe	ei	ou	iou	uei	ən	əŋ	ien		uen	ʊŋ	ün	ər
a			a	ia	ua		ai	au	iau	uai	an	aŋ		iaŋ	uan	uaŋ	üan	

to features of co-occurrence simply by arranging the Finals according to principal vowel and then applying mechanical pressure and permitting skipping. In other words, phonemicization in Mandarin can be carried out successfully with little reference to the linguistic properties of the segments being phonemicized.

I submit that this is not true of English. I submit further that the reason for the difference is that the ratio of Mandarin phonetic vowels to phonemic vowels is on the order of 1:4, and the ratio of Mandarin phonetic vowels to syllable Finals is on the order of 1:3, while the English ratio of phonetic principal vowels to phonemic vowels is generally 1:1 and the ratio of phonetic vowels to possible non-Initial consonant portions of syllables is so large as never to have been determined. Therefore, the procedures we use to determine phonemes in the two languages give us radically different results. In the case of English we seldom find vowel allophones that do not reflect nondistinctive features common to all vowels, and in those dialects where there are allophonic relationships, they are simple and regular. In Mandarin, vowel allophones can be determined simply by filling empty spaces with little regard to regular phonetic relationships.

Yet another procedural question comes in the patterning of Mandarin phonemic vowels. I have said that Hartman's vowels are

i

e

a

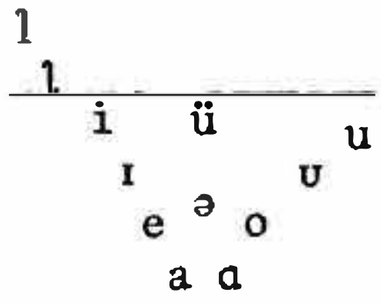
while Hockett's are

e

a

Hockett's analysis renders the question of pattern irrelevant because two of anything do not form a pattern. Hartman's pattern is most unusual, since there are no back or rounded vowels. It is particularly unusual and incongruous when

the phonetic vowels form a consistent, natural, believable, expected pattern, which is thoroughly symmetrical except for the two highest phonetic vowels already noted to be characteristic of Mandarin:



Given this array, it seems difficult to believe that the 'psychological reality' of Mandarin vowels excludes all but three central vowels. Expecially disturbing is the absence of a feature of rounding at the phonemic level, since there is nothing in the phonological environment as stated by Hartman that would permit the assignment of assimilation to account for the fact that the /i/ phoneme has two rounded allophones, both of which are phonetically simple vowels.

The disturbing thought is consequently raised that not only can Mandarin phonemes be determined in a strictly mechanical way, in fact they must be so determined. In more standard terminology, distribution is given precedence over patterning, and economy of symbols is given precedence over everything.

The absence of back-rounded vowels in the phonemic analysis of Mandarin and the simultaneous presence of such vowels in the phonetics of Mandarin raises the problem of phonetic similarity in the grouping of allophones. There are, of course, no strict criteria for the determination of phonetic similarity in the phonological grouping of phones. Moreover, something of an argument can be made for the assignment of three distinctive vowel heights separating the three phonemes of Hartman's analysis. If height is taken to be the one vital criterion of distinctiveness, then by definition all other phonetic facts must be subsumed under categories of relative phonetic similarity.

Although distinguishing phonemes by height alone is consistent, it does seem rather like a severe squeezing of the data to fit a preconceived model of what all languages look like. Outside of the framework of a system which requires the reduction of distinctive phones to the smallest possible number, it is difficult to see why the back rounded vowels should have anything more in common with the front unrounded high vowels than either set should have with any other phones in the language. It would seem that if phonetic similarity were truly given the status of an important consideration in the grouping of phones in phonemes, then phonetic similarity would militate against such a system.

In other words, one cannot be consistent with both the notion of phonetic similarity and the notion of strict distribution in assigning vowel phonemes to Mandarin. This situation, is of course, radically different from that which we find in English and similar languages.[5]

I referred above to the anomalous case of the distribution of the palatal, alveolar, alveopalatal, and velar Initial consonants. This famous case of nonuniqueness has been widely discussed and has received a number of

---

[5]Yet another objection can be raised to Hartman's analysis. Fundamentally it is not a phonologization in any sense of that word which suggests that the phonological symbolism will illustrate the system of the language to which the phonologization refers. The English phoneme /p/ has among its allophonic variants [p] following initial /s/, and [p'] elsewhere (though in fact there is considerably more variation at word-end). A statement of this sort reflects the relations of the phoneme in a way that assigns each variant to an exclusive environment. But Hartman's method does not need environments, for each phonological string represents one phonetic segment wherever that might occur with no intrinsic indication of place of occurrence. Hartman's rendering is analogous to the rewriting of decimal numbers in binary symbols, where symbols are radically saved at the expense of lengthy combinations and where no environment is needed. In other words, Hartman's system is really a transposition of the phonetics into other symbols, and the reduction of the number of symbols does not reflect any language structure. I doubt that any one would claim that the English vowel is structurally similar to the Mandarin vowel, but they can be made to look the same by sleight-of-hand. Refer to Table 6.31 and accompanying discussion.

interesting solutions. Chao (1934.46) has discussed the various problems which arise out of this phenomenon as indicative of an inherent weakness in phonemicization. For the purpose here, the importance of this case of non-uniqueness lies in the fact that the distribution of initial consonants which cannot be unquestionably grouped in the phonemes is intimately related to the problematic highest front vowels [ɿ,ʅ]. As I have shown it is only these two vowels which imbalance the highly symmetrical vowel triangle which one finds on the phonetic level in Mandarin. These two vowels must be assigned, as they are in Hartman's analysis, to the grabbag category which also includes [i, u, ü, ʊ, ɤ]. Here again one part of the phonology is in conflict with another. The highly peculiar distribution of these two vowels and their phonetic reality seem to justify Hockett's erasure of them as vowels and the assignment of their position to syllabic consonants. In Hartman's system, a syllabic vowel is assumed in every syllable. Hockett solves the syllabic problem by having a hierarchy of syllabics.[6] But this leaves him with a rather irregular canonical shape for the syllable in terms of Chinese as a whole. Hartman keeps this aspect of the canonical shape intact but carries over the problem of nonuniqueness.

A further consideration of the canonical shape comes when one considers Hartman's highly variant renderings of similar phonetic shapes. For example,

---

[6]As I understand it, the logic of Hockett's argument can be restated thus. If a Mandarin syllable has a shape $C\begin{Bmatrix}i\\u\end{Bmatrix}\begin{Bmatrix}e\\a\end{Bmatrix}\left(\begin{Bmatrix}n\\ŋ\end{Bmatrix}\right)$, then the peak is either /a/ or /e/. If the shape is $C\begin{Bmatrix}i\\u\end{Bmatrix}\left(\begin{Bmatrix}n\\ŋ\end{Bmatrix}\right)$, then the peak is /i/ or /u/. If the shape is C, then the peak is C.

Hartman's phonetic rendering for one final is [yn], and his phonemic rendering for the same final is /jwin/. This would seem to cause no problem since the individual segments are consistent throughout the system. Yet his rendering of [ɑn] is simply /an/. What this means is that when we are reading from the phonetic level and trying to project thence from the phonemic level or vice versa we do not know how many positions are supposed to be filled by a given unit. That is, in the case of the low central vowel, wherever it occurs in the phonetic level as a single segment, it will appear in the phonemic level as a single segment. Wherever /a/ appears in the phonemic level, as a single segment, it will also appear in the phonetic level as a single segment [a, ɑ]. But this is not true of the high front vowel which will appear sometimes as a single segment on both levels and sometimes as a single segment on the phonetic level, but as three segments in the phonemic level, as in the case of [y] = /jwi/. Note that this objection cannot be raised about Pike's use of single phonemic symbols to refer to the phonetically complex sequences [ei,uw] in English. Pike's practice here is dictated by the structural similarity within the whole language of these sequences to such phonetically simple sequences as /i, e, u/. Phonetic [au, ai] and [oi] do not pattern in the same wayras [ei, uw, i, e, u], and so, in contrast, they are treated as diphthongs.[7] In Hartman's analysis there is no structural difference between diphthongs and monophthongs. There is therefore no reason for not relating phonological and phonetic segments on a one-to-one basis.

---

[7] The distinction between the two types for Pike (1947.45-6) is that he recognizes a regular tense-lax difference between similar non-central vowels. This difference is distinctively reflected in the pairs /i,ɪ/ /e,E/ /u,ʊ/ and /o,ɔ/. But there is no such distinction tying /ai, au, oi/ to any other unitary or sequential peaks. Therefore, the paired phones are all written as single phonemes, while the others are written as phonological dipthongs.

Thus, in a peculiar way the biuniqueness criterion of phonemic analysis is actually violated by the very fact that the analysis remains consistent in a segmental framework. Segments are mappable either way and always give the same results throughout the system, but the numbers of segments do not remain consistent.

To me it appears as though the distribution in the analysis and the canonical shape are in conflict with one another in Hartman's analysis. It is worth reiterating here that this is not an attack on Hartman, but a necessary characteristic of any fully distributional analysis of Mandarin.

It is worth speculating on the possible psychological reality that the distributional phoneme may or may not have in Mandarin. The reader will recall that the psychological reality of the phoneme as opposed to the unanalyzed phone was suggested by Edward Sapir (1933). The empirical basis of Sapir's argument consisted very largely in an attempt to teach an informant to transcribe his own language. Sapir discovered that in one particular case the informant would consistently make a mistake in writing the phonetic transcription, but would be errorless in writing a phonemic transcription. Sapir concluded that the phonemic level was somehow easier and therefore more natural than the phonetic level.

One can clearly see that English speakers respond to phonemic distinctions and not to phonetic distinctions in exactly the way that Sapir suggested. We do not differentiate between aspirated and unaspirated stops. It must indeed be a rare occasion on which someone is puzzled as to whether a /p/ or /b/ was uttered in a word like spot. Like Sapir's experiment, our writing system quite clearly reflects this differentiation on the phonemic level only. For at this point the writing system also does not distinguish between phonetic differences, but only between phonemic differences.

Yet there is a significant problem here. For Sapir's evidence is no more than a testimony of what a 'natural' writing system might be. The consistency of English with his theory just suggested is also confirmed by the writing system. But this confirmation in the English writing system is at best ambiguous if we consider it further. While the writing system clearly does not reflect phonetic differences, it also does not always reflect only the phonemic differences. Indeed a rough generalization could be that the English writing system reflects the phonemic level with regard to those consonants which are never involved in morphophonemic alterations. But our writing system reflects the morphophonemic level for consonants which are involved in morphophonemic alternations and for all vowels. This point, it seems to me, is evident from Chomsky and Halle's analysis of English in their Sound Pattern of English (1968) and it is certain that a major result of Chomsky and Halle's study is a profound insight into the genesis of writing systems. This alone would seem to indicate an occasion for a healthy skepticism regarding the total psychological reality of the phoneme. It may well be that for certain variations writing systems tend to reflect the phonemic level and for others the morphophonemic level. In an even more extreme way, this would seem to be the lesson that we can learn from the Hebrew writing system.[8]

---

[8] If all phonemes in all languages were somehow psychologically real in a similar way to the native speakers of those languages, then it seems to me that after vowel signs ('pointing') were added to the consonantal alphabet of Hebrew that the full alphabet of vowel and consonant signs would thenceforth have been used to write contemporary Hebrew of any period. But this has not happened. The vowel signs were added to preserve canonized pronunciations of the Biblical text because sound changes had significantly altered the pronunciation of words from the time of the earliest use of the canon. But even today, in modern Hebrew the vowel signs are generally omitted because the morphophonology of the language makes them largely unnecessary.

Returning to Chinese, it seems very difficult to determine whether the vowel phonemes as reached by a distributional analysis would have any reality at all. I have been unable to replicate Sapir's experiment because, since beginning this project, I have not come across an illiterate native speaker of Mandarin. Nevertheless there are indirect indications that something closer to the phonetic level than Hartman's or Hockett's phonemes would seem to be the 'realistic' unit of segmental sound for native speakers of Chinese. For one thing, so far as I can tell, nobody has ever seriously proposed using a truly distributional analysis of Chinese as the basis for an effective writing system of that language. It is also certain that none of the alphabetical transcriptions actually used for Chinese reflect distributional strictness and rigid symbolic economy.

Interestingly as well, Y. R. Chao seems to claim in his essay The Non-uniqueness of Phonemic Solutions of Phonetic Systems that it is not the vowel alone which has any particular reality for the Chinese, but the 'Rimeme'. The Rimeme is the principal vowel plus or minus a final consonant or offglide if one occurs. Chao avowedly takes the notion of Rimeme from historical phonology. However, he uses it in a section entitled 'The Feeling of the Native Speaker' to justify the grouping of the different phones [a] and [e] where [e] occurs after [i]. It seems that most or all workers agree with Chao that the two different phones must be grouped into the same phoneme for distributional reasons, as we have seen above:

e:					ien		
a:	ia	ua	ai	uai	an	uan	
ɑ:			ɑu	iɑu		aŋ	iaŋ	uaŋ

Nevertheless, Chao's argument is not solely distributional, but rather that the native speaker feels they all belong to the same Rimeme with different medials (Chao 1934.48).

As already anticipated in the introductory chapter, I shall have a great deal to say about Rimemes later on in this essay (cf. 4.1 ff.), for I think there is a great body of evidence to show that in dialects where there is an isolable Rimeme, the Rimeme has considerable value in phonologization. At this point it is very interesting to notice that Chao uses the notion in an essay concerned with phonemics.

Poetic rime is also of some importance here. In this essay I shall consistently distinguish between the kind of rime which Chao refers to as a Rimeme, which is defined as the principal vowel plus or minus an ending consonant or offglide, and poetic rime. Henceforth, linguistic Rimes and Rimemes will be spelled with a capitale<u>R</u>, while poetic rime will always be referred to with the full phrase 'poetic rime'.

In English poetic rime is generally understood to be exact rime. Exact rime means that a similar portion of two words or units longer than word are phonetically precisely the same. This notion of exact rime is sufficiently developed in our culture for there to be very extensive riming dictionaries which one can consult to determine what words can rime with what others in the sense of an exact rime (viz. Stillman 1965). Hockett (in lectures) has pointed out that the riming portion of an English word or phrase is the primary stress and whatever follows it. Thus, <u>fetter, better</u> and <u>get her</u> all rime in my dialect:

[fé\tər]

[bé\tər]

[gè\tər]

It happens that English rime is phonemic. That means that if we wrote English out in phonemic transcription, the riming portions of words would always have the same phonemic representation, and all equivalent phonemic representations

would always rime exactly. So far as I have been able to tell, this same characteristic applies to most European languages in which endrime is a significant cultural characteristic.[9]

The case is radically different with Mandarin. If Mandarin is written in a phonemic alphabet like that of Hartman, all rimes will certainly be of only one phonemic representation. But there will be numerous cases where vocalic segments that do not rime phonetically will be given identical phonemic representation. This is, of course, a necessary consequence of there being in a strictly distributional analysis only three phonemic vowels to represent eleven phonetic vowels:

Phonetic	Hartman
ȧ ja̱ wȧ ȧj	a ja wa aj
ë jE wɔ ɥɛ	e je we jwe
z̤ z̤ i u ɥ	i i ji wi jwi

Now poetic rimes have had no status in phonology, and it is not proposed here that poetic rime be given a particular phonological status. However, poetic rime must have some indirect relation to our understanding of phonology if in some languages the riming practice is based on a phonetically exact rime which corresponds to a phonemically exact rime, while in other languages there

---

[9]This statement is made with considerable caution. I have been unable to find linguistic characterization of riming in various European languages and have resorted to asking linguists at Cornell who deal in Russian, French, German and Spanish about the correspondence between phonemic transcription and riming in those languages. While no one was able to refer me to a linguistic account of riming in any of these languages, all felt that these languages rime phonemically. Interestingly, more than one linguist to whom I have mentioned the lack of fit between exact rime and phonemicization in Mandarin has been surprised. I presume that is further indication of the cultural relativity of the notion of the phoneme.

is no such correspondence. There seems to be no correspondence in Mandarin, not only because we get phonemic representations that are identical with regard to the vowel but that do not rime, but also because poetic practice in Mandarin generally seems to have a very broad relationship to phonemic representation.

The folk poetry which I have consulted does not seem to show a pattern that is consistent with a phonemic analysis similar to that of Hartman.e[10] The modern literary poetry which I have looked at is similarly different from English.[11] And after some considerable searching to try to find if rimes would fit a phonemic analysis, a conversation with a fellow student who is a poet convinced me that riming in Chinese and in English are incomparable. After many questions as to what he could rime and what he could not rime, he finally said to me, 'Give me any two words that you want to rime and I will make them rime and it will be all right in Chinese.' It is likely that poets differ on this point. There continue to be lists of prescribed rimes for the writing of Regulated Verse (律詩), and it certainly does not seem impossible that similar rimes would be used in modern literary verse. But it is crucial to recognize that even the strict prescriptive practice in Mandarin is not equivalent to books of poetic rimes in English, though the latter are also prescriptive. In the normal English riming handbook there are but one phonetic and one phonemic representation possible for every rime given. The rimes given in a recent Mandarin rime book (China Book Company, 1965)e, show there would not only be the lack of phonetic-phonemic fit in riming vowels, but also in certain cases,

---

[10]Refer to the collections edited by Kinchen Johnson (1971) and Chi-ch'ao Liang (1970) in the Bibliography.

[11]Refer to collected works of Modern Chinese Literature published by Hong Kong Literary Research Society (1960), in Bibliographye

sequences that are phonetically different are considered to rime.[12]

It cannot be proved that the fact that there is a direct correspondence between phonemic reality and riming reality in English and similar languages has anything more to do with our discovery of the phoneme in the West than it can be proved that the pre-existence of the alphabet has determined the phoneme. But it would be hard to believe that the fact of our poetic rime as well as the facts of our alphabet have nothing at all to do with the development of the phoneme, that entity which our linguistics suggests in all languages. At the very least, the notion of the psychological reality of the phoneme appears morerculturally bound the more it is called into question.

The foregoing discussion on the phoneme has been lengthy because phonemic studies have been and still remain the most important analytical studies of Mandarin and similar dialects. The reason for this is of course the near absence of morphophonemics in these languages and the consequent fact that a generative analysis--whatever is claimed about it--really maps features from some kind of phonemic level onto a phonetic level. In the following section I shall discuss a generative analysis of Cantonese very briefly simply to show that just this claim is true. The phoneme does not give us much information in the study of Mandarin. The systematic phoneme does not give us much information in the study of Cantonese.

---

[12] Below, find the rimes from China Book Company, 1965. Note that while some imply a similar grouping of vowels to what Hartman has, there is no consistent equivalence. Note that 痕 includes u, i, ə, ü, but 庚 includes only ə and i before ŋ.r

支	ɿ_ɿ	齊	i	痕	ən	in	un	ün	庚 əŋ iŋ
歌	ə	微	ei	皆	e				兒 ər
模	u	魚	ü	侯	ou	波	o~uo		東 uŋ
麻	a	開	ai	豪	au	寒	an		唐 aŋ

2.3 Generative Studies of Cantonese

2.31 I shall discuss two generative studies of Cantonese in order to show that a strict generative approach may not be the most appropriate analytical approach for that dialect and that, therefore, while a generative analysis of some dialects may be very suitable, this form of analysis is not equallye suitable for all Chinese dialects.

There are two generative studies of Cantonese known to me. One is Teresa Cheng's The Phonological System of Cantonese (T. Cheng 1968). The other is Oi-kan Yue Hashimoto's phonology of Cantonese (O. Y. Hashimoto 1972)e These two studies contain very similar information about the Cantonese dialect. While the analyses differ at certain points it is possible, with some knowledge of Cantonese and the two books at hand, to see that the major points in the two analyses are equivalent.

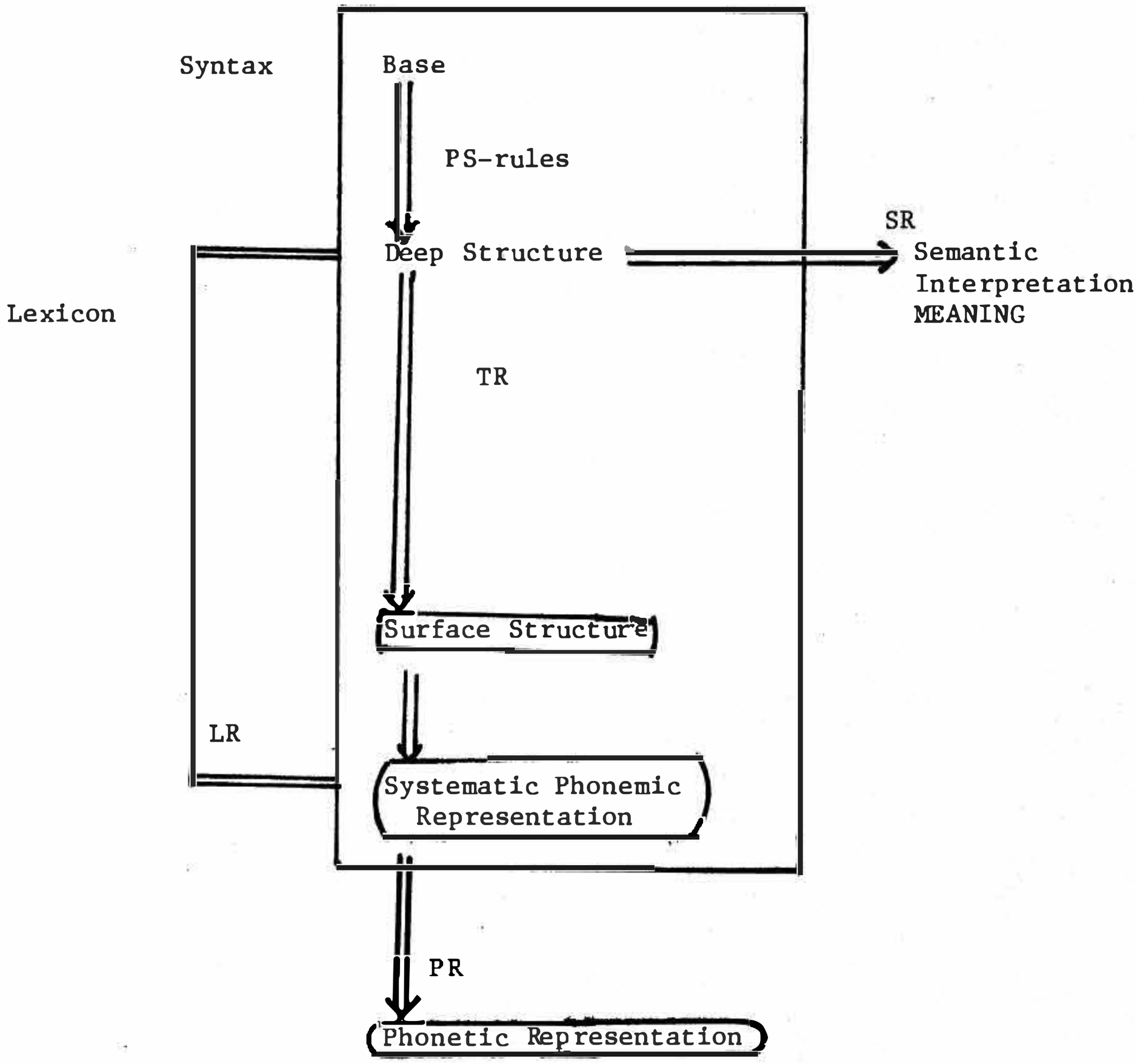
Cheng's analysis is explicit in generative terms in that a full statement of the model being used and its component parts is given, and the analysis is worked through step by step leaving very little to the reader's imagination. Hashimoto's study is avowedly more informal and the rules and statements which are given are collapsed to include only the more important ones. Hashimoto's study is historically oriented, and the bulk of her study concerns the development of Cantonese from the Middle Chinese phonological categories. In addition to these differences, Hashimoto goes to some length to discuss the analyses of earlier treatments of the Cantonese dialect, particularly in relation to the Finals, and she gives a number of comparative charts which are very helpful in interpreting the previous work in the field (O. Y. Hashimoto 1972.152-157)e

It is convenient at this point to reproduce Cheng's theoreticalediagram in order that the biases inherent in the model can be made as explicit as I attempted to make them for the distributional phonemic model:

TABLE 2.31

Generative Model for Analysis of Cantonese

(T. Cheng 1968.7)



A Model of Sound-Meaning Correlations

The circles around terms in the diagram have been superimposed by the present writer to indicate those portions which are of particular importance to a phonological discussion. The reader will notice that nothing is unusual in this particular understanding of a generative model of grammar. It is assumed that syntax somehow provides the base, and that regular rules derive syntactic surface structures from that and thereafter will derive phonetic representation from a phonological deep structure or 'systematic phonemic representation'e The lexicon is put off to the side of the essential components of the model and is made to read onto the deep structure or onto the systematic phonemic representation. What is not stated in T. Cheng (1968), but which is evidently necessary from other generative writings (Chomsky and Halle 1968; Stanley 1968, 1969), is that the major difference between the lexicon and the systematic phonemic representation onto which the contents of the lexicon are read is that lexicon is supposed to be redundancy-free. This requirement imposed on the lexicon (it is also the definition of the lexicon), is a requirement of the model and has nothing to do with language in general or with any particular language. It is interesting at the outset of this discussion to note that if any language were shown to be completely devoid of morphophonemics, then the level of systematic phonemic representation would be vacuous, and it would be logically the case that the lexicon should map directly onto the phonetic representation. Peculiarly, this would result in a kind of autonomous phonemic analysis, since the removal of redundancy in the lexicon leaves onlyeone feature distinguishing each sound from any other or each class of sounds from any other class of soundse which is the case among phonemic representations. I will not be further concerned here with the lexicon component in a generative grammar. But the point just made already casts theoretical doubt on the model as it stands.

In the discussion of a distributional phonemic analysis of Mandarin, I attempted to show that the requirements of the model force upon the language an unrealistic vowel pattern, a peculiar relation to the possible psychological reality of phonological phenomena, a serious divorce between phonemic assignment and phonetic similarity, and a very odd relationship between phonemics and riming. In the case of a generative model as applied to Cantonese, the model forces upon the analysis a picture of Cantonese which places the bulk of the language in a small and almost tangential part of the analysis and moves marginal phenomena into the forefront of attention. Moreover, the model forces upon the analyst some decisions regarding the abstract level of systematic phonemics which seem simply absurd.

Let us examine these objections in more detail. The morphophonemics of Cantonese consist in only the following phenomena:

1) Alternations between reading and colloquial pronunciations for some, but not all, (and by no means the majority of) the syllables in the language. (T. Cheng 1968.29-34; O. Y. Hashimoto 1972.189-91).

2) One class of Tone sandhi:

$$\left[\begin{array}{l}\text{Falling}\\ \propto \text{ pitch height}\end{array}\right] \longrightarrow [\text{level}] \;/\; \_\_ \left[\left\{\begin{array}{l}\text{Falling}\\ \text{level}\end{array}\right\} \propto \text{ pitch height}\right]$$

(T. Cheng 1968.34; O. Y. Hashimoto 1972.187-88).[13]

3) One type of Tonal alternation, partly conditioned by word class: 75% of yin p'ing words occur with either ˥55 or ˥53 (but not both), and of these 25% which vary, many have their nominal uses as ˥55 and their nonnominal uses as ˥53. (T. Cheng 1968.35-38.)

---

[13] T. Cheng's analysis calls for only one of the two kinds of Tone sandhi implied in this rule. Since there are two registers of Tone in Cantonese, the rule has falling Tones assimilating to immediately following level tones of the same pitch height (high or low). T. Cheng accounts for only the high register assimilation. Although O. Y. Hashimoto argues that the operation of this rule is exceptionless, there do seem to be differences among speakers on this point.

4) Semantic alternation in Tone (變音), the conditions of which may involve such semantic features as familiarity, intensity, contrastiveness, or many other things. (T. Cheng 1968.38-42; O. Y. Hashimoto 1972.183-87.)

Of these four types of alternation, items #3 and #4 depend in their operation very heavily on personal and stylistic features (O. Y. Hashimoto 1972.187), and, if they can be expressed in rules at all, may involve sociological factors, the data on which no one has yet gathered. Item #1 is clearly word-specific except possibly in a historical sense. In any case, it is impossible to claim that the variation between a speaker's colloquial and reading pronunciations is part of his phonological 'competence' unless it can be shown that this is a fundamental fact of most languages that have been reduced to writing. Linguistic studies of the connection between reading and speech have not developed that far, and such data as there are would suggest that there is an important social dimension in the difference between reading and colloquial pronunciations in at least one language (Labov 1972.122-42). These considerations reduce the morphophonemics of Cantonese to Tone sandhi.

Even if one wishes to interpret the Tone sandhi rule given in #2, this phenomenon is hardly on a par in importance to the whole language as is the Tone sandhi of Wu and Min dialects. Furthermore, as Hashimoto acknowledges, the Tone sandhi in Cantonese is essentially assimilative. We can add to that observation that it is assimilative at the extremes of the Tonal scale, which suggests an underlying phonetic constraint in this tonally rich language, a phenomenon that can hardly be the cause of the extensive Tone sandhi in, say, Amoy. It is also worth noting that Cantonese Tone sandhi has no effect on the segmental phones. Finally, as Boyle (1970) points out in her discussion of Tone sandhi in Cantonese, many speakers merge the falling and level tones at the high pitch level.

Taking these considerations together, it would seem that even the single case of predictable alternation in Tone can be best understood in terms of concatenation constraints and that there is no need to insist on a level of deep representation which requires standard phonological transformational rules to account for this phenomenon. In sum, I can see no reason other than the requirements of the model itself for analyzing Cantonese within a framework which posits the levels indicated in Table 2.31.

In T. Cheng's analysis the maintenance of this model produces one unhappy result. This is that Cheng posits at the systematic phonemic level a whole canonical position, a Medial, which must be filled for systematic phonemic syllables and then which must be erased in the derivation to the phonetic level because phonetically it exists in very few syllables. Note that this is not simply the positing of a segment or two in cases where the rest of the language has a segment in such a position. It is understood here that both generative and phonemic analyses require such 'false steps'[14] for perfectly logical reasons. What is objected to here is that the phonetic realities of Cantonese do not require a Medial except inrthe case of the labiovelars (kw,kw'). Furthermore, even Cheng's charting of distribution makes it evident that the labiovelars are so restricted in distribution they may be treated as single segments. Nevertheless, she posits a /-ŭ-/ onglide Medial, and an /-ĭ-/ onglide Medial and then proposes rules to eliminate them (T. Cheng 1968.24-26). There seems to be no internal justification for this move except that there is a deep structure level in the model which would be otherwise very underused.

---

[14]The term 'false step' is borrowed from Arnold M. Zwicky (lecture at 1972 LSA Summer Institute).

Perhaps an even more peculiar result of the imposition of the model on the language comes in the differing treatments which Cheng and Hashimoto give to the relation of vowels to their final consonants or offglides. Cheng recognizes that the phonetic vowels have a very limited distribution with regard to following consonants. She states this distribution verbally in a thoughtful series of descriptive sentences (Cheng 1968.49-50). She then uses a small series of transformational rules to formalize her verbal conclusions (Cheng 1968.50-51). These statements and rules and the similar ones which she draws for diphthongs (Cheng 1968.54-60) are equivalent to those which I propose for the analysis of Cantonese in 4.3. The problem in Cheng's analysis is that the model obscures the import of her verbal statements. These rules stand at the heart of the language because they predict all occurrences of vowel+consonant (offglide) sequences within the same syllable. That is, they predict a very major feature of the language. They can be built upon by adding a few rules to govern the co-occurrence of such vowel-consonant sequences with tones, and a few rules to govern the sequences of consonant followed by vowel or vowel plus further consonant. The model has required that Cheng place these very essential statements towards the end of her treatment and not build upon them for the analysis of the language. These important statements therefore come as a peripheral portion of the analysis even though they describe the basis of the language in question.

Despite these criticisms of the model it must be noted that Cheng's verbal description is very much on the right track. For it states what should be evident to any linguist who looks at the distribution of vowels and following segments in the Cantonese Final. Table 4.36 contains a list of Cantonese Finals. The reader will note the organization of the chart places principal vowels over against the segments with which they can occur. What Cheng's

statements indicate regarding vowels and succeeding segments is simply that one allophone of the nonlow vowels usually accompanies [-m] and [-n] and [-p] and [-t] endings, while another allophone of most of the nonlow vowels accompanies [-ŋ] and [-k] endings. Moreover, no rounded vowel is followed by any labial segments except for the single case of [ɔu]. What is terribly important about these sequences and the rules which describe them is that they are exceptionless. Unlike the relationship between tones and whole syllables or between Initials and Finals, no new Finals are made up in the language and no sequences which are not entered in Table 4.36 are ever heard in normal speech. That means that rules which are written which fully specify what occurs in this chart are the most important and the most regular regular rules of the language.

Turning to Hashimoto's account of the same phenomena, we find the distribution of vowels with succeeding consonants is taken care of in a partial way by a pair of rules which account for the distribution of tense and lax vowels (O. Y. Hashimoto 1972.152-173). These rules are:

$$\begin{bmatrix} +\text{syll} \\ -\text{comp} \\ \alpha\ \text{diff} \end{bmatrix} \rightarrow \begin{Bmatrix} [-\text{tens}] \\ [+\text{tens}] \end{Bmatrix} \quad \begin{matrix} \diagup\!\!\!\diagup \\ \text{elsewhere} \end{matrix} \quad [-\alpha\ \text{diff}]\Big\}$$

e.g. i:m, i:n
but iŋ

$$\begin{bmatrix} -\text{diff} \\ +\text{grav} \end{bmatrix} \rightarrow \begin{Bmatrix} [-\text{tens}] \\ [+\text{tense}] \end{Bmatrix} \quad \begin{matrix} \diagup\!\!\!\diagup \\ \text{elsewhere} \end{matrix} \quad \begin{bmatrix} +\text{diff} \\ +\text{grav} \end{bmatrix}\Big\}$$

e.g. ɔ:i
ɔ:n, ɔ:t

(O. Y. Hashimoto 1972.160)

There is no objection to these rules per se. Within Hashimoto's system they make good sense. However, the system that they reflect seems inappropriate to the task at hand. For these rules do not predict absence of Finals which include a rounded vowel and a labial final consonant, and apparently Hashimoto's only reference to labial dissimilation in Cantonese concerns

dissimilation between initial and ending consonant rather than between vowel and Final consonant, a dissimilation rule which is in fact not as strong as that between vowel and ending consonant (1972.187-96). Furthermore, these rules, because of the approach from which they stem, fail to place the distribution of vowels with succeeding consonants and offglides in a general context of distribution between vowels and offglides. These rules, it would appear from Hashimoto's treatment are unique specimens within the language. I shall attempt to show in 4.3 that, far from being unique specimens within the language, rules of this kind are nearly all that are needed for describing the Finals of this language.

Still another problem with these rules is that in them Hashimoto depends on the controversial distinction between tense and lax or long and short vowels. I shall discuss this distinction and the implications of it in 4.2. For the present chapter, it is enough to note that while there is a measurable distinction between the two sets of vowels, this distinction seems to operate in conjunction with other distinctions in the language and the long-standing argument over the character of the two sets of vowels is largely vitiated by giving attention to the pairing of the variables involved.

What I have attempted to show in this section has been that the generative model as applied to Cantonese makes Cantonese look very suspiciously like English or some other European language in that, for anyone who does not know the language, it would appear that there are reasons for positing underlying forms of a morphophonemic depth from which phonetic realities can be derivede In contrast, the facts of the language would seem to indicate that for the vast bulk of the sounds of Cantonese, underlying forms of such depth are quite unnecessary, and alternations provide but a very small proportion of the phonological behavior of Cantonese.

This section cannot be concluded without noting that O. Y. Hashimoto's careful comparison of her analysis with the analyses of workers in the phonemic model very clearly indicates that her decisions are actually based on reasoning which does not need a generative model for economical expression. One would ask, why, if a phonemic solution carries the information of a generative analysis, a phonemic solution--even if expressed in terms of distinctive features--is not to be preferred. It must be carefully noted at this point that there is nothing at all in phonemic theory which would prevent the statement of phonemes in terms of distinctive features and there is considerable historical justification for doing just that where a language would so require. I shall attempt to show in Chapter 4 that I find a rather different solution for the analysis of Cantonese to be more in keeping with the facts of the language. My solution is based on a concept of the use of immediate constituent analysis which will be outlined in Chapter 3. Despite the differences, however, my analysis is, like a phonemic analysis, one which works openly with the surface phonetic data and tries not to posit any underlying level except where such a level is absolutely required by the language itself.

2.4 A Quasi-Prosodic Study of Shanghai:

The British school of prosodic analysis, under the influence of J. R. Firth, has produced analyses of a few Chinese dialects and a number of languages which are typologically similar to Chinese. Prosodic analysis has three major characteristics which distinguish it radically from the American tradition in phonology.[15]

---

[15]The following discussion of prosodic analysis is based on the works noted in the Bibliography by Firth, Robins, Halliday, and Henderson. Readers are especially directed to Robins' essay Aspects of Prosodic Analysis in his collection, Diversions of Bloomsbury (1970)e The interpretation given to prosodic analysis is entirely my own, particularly the judgment that the lack of consistent paradigmatic units across languages is a weakness in the system.

1) Workers in prosodic analysis consciously distinguish between the syntagmatic and paradigmatic planes in phonology. They insist that both planes are operative in phonology and that both must be described in an effective analysis of a language's sound system. The point at which this seriously differs from American phonology is that our emphasis is placedevery heavily on the paradigmatic plane. That is, the prime of our phonology is the segment, and our phonological units are defined in terms of systematic segments. A systematic segment in a phonemic analysis is one whose definition reflects the distributional pattern of the phones subsumed under that systematic segment. The systematic phonological segment in a generative analysis is one which includes both the strictly phonological data and morphophonemic data in the statement of the segment itself. In both cases, certain classes of syntagmatic information are subsumed within the description of a paradigmatic commutation. However, not all the syntagmatic information is statable in this way. The outstanding example of syntagmatic information which is not statable in terms of phonemic or systematic phonemic analyses is the determination of which consonant clusters (in languages which permit consonant clusters) are grammatical and which ones are not. Therefore, in both the phonemic and the generative models a separate section of the analysis has to be devoted to a second level of syntagmatic analysis after the first has been taken care of in the phonemic statements. But, as we shall see in Chapter 3, the role of this separate level of analysis is very tenuous in both phonemic and generative models.

In prosodic terms the two types of units are the phonematic and the prosodic. While phonematic statements are always paradigmatic descriptions which may include some allophonic syntagmatic data, the prosodic units are always syntagmatic descriptions. Thus, tones, intonations, and the Final stops in languages like Thai and Cantonese are indicated as being prosodic

units because functionally each of them spans a stretch which is longer than the segment (Henderson 1949).

2) Prosodic analysis insists that each language must be analyzed in its own terms and that no single analysis is suitable for all languages. Now this 'no single analysis' means no single model of linguistic analysis is adequate, not simply that the number of phonemes found in one language will not be the same number of phonemes found in others. The prosodic claim is very boldly that some languages will contain fundamental elements which other languages simply do not contain. This claim is at serious odds with the American tradition which has consistently assumed that all languages are built up of phonemes or systematic phonemes.

3) Because of the considerable relativity implied in No. 2 above, and because of the concern for explicitly stating the syntagmatic and paradigmatic phonemena of a language, prosodic analysis has no consistent units which one can use in comparison across languages to see what are the differences among languages. This is the weakness of the system. The phonematic and prosodic units are in no sense clearly defined, and therefore one cannot look at the prosodic descriptions of two languages and have a very clear idea of how the two languages differ. Now the problem of not being able to see how two languages differ by looking at similar descriptions is true also in the American tradition, but for just the opposite reason. In the American tradition, it is too easily assumed that similar units are equally applicable across languages, so what we call 'analysis' is very often the remolding of one language into the shape of another. In the prosodic analysis framework, a language is sometimes rendered so unique that it is difficult or impossible for the non-initiate to see what, if any, basis of commonality lies between it and any other language (viz. Halliday's treatment of Mandarin in Halliday 1959).

The relativism of point No. 2 seems to me to be a very positive contribution of prosodic analysis, and one which is clearly required for the remedy of the defects noted in the previous sections of this chapter. The major feature of the relativity of language descriptions is the proportional weight which different languages place on the syntagmatic and paradigmatic planes. Therefore, the emphasis of point No. 1 above is also accepted as being a very positive contribution to linguistic science. However, the lack of consistent units with which to work seems to be such a defect in the system that I simply cannot accept it.[16] Rather, with the leaven of prosodic relativism, I shall attempt to seek a type of linguistic description which will give us some units which can be used across Chinese dialects with a notion of combining those units into components which will be relative to the facts of given languages. The theory which underlies this last statement will be explained in some detail in Chapter 3. In this section it will be of interest to take a brief look at one study of a Chinese dialect by an American considerably influenced by prosodic analysis.

This study is that of Sherard (1972) on the phonology of the Shanghai dialect. The syntagmatic units with which Sherard works are the Tonal contour, and the phonological word itself. Unlike a strict prosodic analysis, however, Sherard's study uses the syllable as a consistent unit which could be sought

---

[16] For this reason, therefore, Firth's analysis of a Hunanese dialect syllable is almost impenetrable from any viewpoint which seeks to place that analysis in the context of linguistic analyses in general (Firth 1957.76-91). Nevertheless, when worked through, this study is extraordinarily informative about the structure of Chinese monosyllables. Although stated in totally different terms from traditional Chinese phonological categories, and worked out independently, Firth's analysis is effectively the closest approach to the traditional analysis that I have seen.

in other languages and which therefore is a satisfactory candidate for a possible unit of comparison across languages. Sherard's study is, therefore, one example of a possible combination of the positive emphases of prosodic analysis with the stress of the American tradition on common paradigmatic units.

It seems to me that Sherard's analysisris ideally adapted to Shanghai. By the same token, this analysis is no more adaptable to most other Chinese dialects than is a strict phonemic or strict generative analysis.[17] There are two reasons for this. First, Sherard does not make any systematic cuts below the syllable level, and therefore does not demonstrate that his paradigmatic units are the smallest ones which need to be isolated for the language. Second, other Chinese dialects do not have the strikingly pervasive syntagmatic Tonal contours that in Shanghai justify the initial commutation of syllables within such contours.

Let us look at these reasons in somewhat greater detail.

The absence of more discrete cuts within the syllable in Sherard's analysis is particularly noticeable if we examine two different accounts of segmental phonology in Shanghai. The first is that of Sherard and the second is that used by Walton (1971).

TABLE 2.41

Shanghai Nasal-ending Finals from Sherard's Inventory of Syllable Nuclei (Sherard 1972.75)

(Type 1, 2, 3)	yŋ əŋ aŋ oŋ ɔŋ

---

[17]To suggest that Sherard's analysis is not applicable to other types of dialects is in no way a denigration of his work. He makes no claim in that direction.

TABLE 2.42

Sequence Structure Conditions Specifying Some of the Nasal-ending Finals in Shanghai (Walton 1971.88-9)

If: # [+Cons]

$$\begin{bmatrix} -\text{Cons} \\ -\text{Back} \end{bmatrix} \Rightarrow \begin{bmatrix} +\text{High} \\ -\text{Round} \end{bmatrix}$$

$$\begin{bmatrix} +\text{Cons} \\ -\text{Continuent} \\ +\text{Back} \\ +\text{Nasal} \end{bmatrix}$$

That is, in any CVC sequence where the final C is /ŋ/ and the preceeding V is nonback, the V is redundantly high and round i.e., /i/.e Thus while /Ciŋ/ is permissible, sequences such as */Cuŋ/, */Ceŋ/, */Coŋ/, and */CEŋ/ are not.

If: [+Cons]

$$\begin{bmatrix} +\text{Cons} \\ +\text{Back} \end{bmatrix} \Rightarrow [-\text{High}]$$

$$\begin{bmatrix} +\text{Cons} \\ -\text{Continuant} \\ +\text{Back} \\ +\text{Nasal} \end{bmatrix}$$

That is, in any CVC sequence where the final C is /ŋ/ and the preceding V is a back vowel, this vowel is redundantly nonhigh. Thus, while sequences such as /Caŋ/, /Cɔŋ/, /Coŋ/, and /Cɔɡ/ are permissible */Cuŋ/ is not.

As I have suggested in the Introduction (1.2), it is fairly evident that at the very least some kind of cut between the Initial and Final is justified throughout Chinese. In Shanghai, of the phones which occur in the Final, only one, [ŋ], occurs as an Initial, and furthermore, the Initials are generally widely distributed across the Finals while the units of the Final are very narrowly distributed.

Without such a cut between Initial and Final, it is difficult to project the result of Sherard's study onto any other language or even any other Chinese dialect, since comparatively the unit of syllable means almost nothing when our data for other languages is expressed in terms of segments.

Now by saying this I am in no way suggesting that for Sherard's purpose there should have been lower level cuts in the syllable. Sherard's contribution to the understanding of Shanghai phonology and the implications thereof to the understanding of the doing of phonology are terribly important. For, no matter what subsyllable cuts one wishes to make, it must be evident from what Sherard has done that the major units of Shanghai phonology are the syllable itself and the Tonal contour. Simply the fact that this can be stated carries us a long way towards understanding how different languages are and therefore how different our descriptions of them must be. However, to guage this difference in terms of other languages which have been analyzed otherwise, the subsyllabic data must be analyzed as closely as possible. Walton (1971) has shown that the subsyllabic analysis of Shanghai segments can be easily expressed in terms of a small number of sequence structure rules. What this means in effect is that the variation within the segmental syllable is slight and the distribution of elements within the syllable is largely transparent. For comparative purposes, understanding Sherard's analysis as the macrotypology of Shanghai and Walton's as the microtypology of Shanghai will enable us to place that language alongside of most others, an exercise which will enable us to see its typological

similarities with, and differences from, other languages.

Turning to the second objection torthe use of Sherard's model of analysis for the study of all Chinese dialects, it seems fairly evident that it is impossible to find an exact equivalent to the Shanghai Tonal contour in all Chinese dialects. There are fascinating suggestions of similarity in other dialects. Whether the word-based Tonal contour which Sherard posits for Shanghai could also be posited for languages with heavy Tone sandhi is impossible to tell at this point. But, clearly, the operation of rules like Bodman's Tone circle (Bodman 1955) or Wang's revision thereof in Tonal alpha rules (W. Wang 1967) would have to be considerably modified for there to be a similarity to the phenomena in Shanghai.

Chao's description of the phonological word in Mandarin suggests that he senses in Mandarin a phenomenon which is certainly analogous to that of Sherard (Chao 1968.136-55). However, Chao's criteria for the discovery of the phonological word in Mandarin ultimately depend upon a grammatical correlate, since Chao's criterion of potential pause is insufficiently precise to allow the prediction of most words. Because Sherard explicitly states that his Tonal word coincides sometimes but not always with the grammatical word in Shanghai, the comparison cannot be forced too quickly (Sherard 1972.91-2).

The work of George Kennedy would suggest that at least in other Wu dialects there is a similar phenomenon to Shanghai. For Kennedy's insistence on the polysyllabic character of Chinese must have come from the influence of his native language--a Wu dialect--upon his analysis of the language as a whole (Kennedy 1942; 1953).

But in all of this, there is no absolute equivalent to Sherard's notion of a Tonal-based word.r Moreover, in the Cantonese dialect--and one suspects in other similar dialects--there is no phonological analogue whatsoever

to the polysyllabic word. In Cantonese, the only criteria for determining what is a word and what is not are the syntactic privileges of occurrence. This means that it is impossible to use Sherard's type of analysis for all Chinese dialects. It means further that in Cantonese--and in many other Chinese dialects--the highest phonological unit which can be regularly isolated is the syllable. Thus, whereas in Shanghai, the syllable is a prime within a phonologically-defined word, in Cantonese there is no phonologically defined word, and whatever primes one looks for must be isolated below the unit of syllable. However, the syllable is a useful unit in both types of language, and useful comparisons for historical purposes and perhaps synchronic purposes can be made by comparing syllable structures. It is this fact which has made the traditional emphasis on dialect fieldwork through the use of the pronunciations of isolated characters a possible and worthwhile enterprise.r However, we must not be deceived by the phonological relevance of isolated character readings. The fact that we can compare isolated character readings in Cantonese and Shanghai is important, but equally important is the fact that the syllable in the two languages plays a much different part in the total phonology of each language.

2.5 Towards Relativism in Phonological Description

In the foregoing paragraphs I have demonstrated that a strict phonemic analysis is not felicitous for the understanding of Mandarin phonology. Neither is a strict generative analysis suited to Cantonese. While a syllable-prime analysis is highly suited to Shanghai and similar languages, that analysis makes little sense in Cantonese where the syllable is the highest phonological unit rather than the lowest phonological unit.

The conclusion that I draw from these discussions is that our ideas of phonological analysis should be considerably relativized. While it is necessary in any systematic linguistics to have units and concepts that can be applied across languages, it is also necessary to have a flexibility in the analytical components to which they relate so that one language type will not be forced into the mold of another type through the predilections of the analyst.

In 1.2 I suggested that differences in typology can be understood as the different uses that different languages make of the syntagmatic and paradigmatic planes. In this chapter I have been almost wholly concerned with paradigmatic units (phoneme, systematic phoneme, syllable). In the next chapter, I shall discuss some theoretical attempts to incorporate syntagmatic considerations into phonological analysis and from that discussion attempt to draw some conclusions regarding a relativistic model of phonological description.

Chapter Three

CONSTITUENT ANALYSIS, THE SYNTAGMATIC AXIS, AND LANGUAGE TYPOLOGY[1]

3.1 Introduction

In the previous chapter it was demonstrated that no single model of phonology is adequate to describe the phonology of all Chinese dialects. The paradigmatic units of models which posit equivalent segmental units for the analysis of all languages do not give the same information in regard to each language. The components of models which imply, or overtly require sequences of components from which are generated correct surface utterances are not all realistically applicable to all languages. In short, the selection of analytical models and tools is, to some degree, determined by the typology of the language being analyzed at any given time. Models and tools are (to some degree) of relative applicability, not universal applicability.

The most pressing problem raised by the acceptance of this assertion of relativism is: How can relativity be incorporated into a general linguistic

---

[1]Although in the Acknowledgements I have expressed my gratitude to the many people from whom I have received help in this project, I would like to note here my considerable debt for aid with the theoretical considerations taken up in this chapter. The initial work on this essay was a Rimemic analysis of Cantonese, which was undertaken with no theoretical underpinning except for the Middle Chinese Rime sources. While no one but myself is responsible for the point of view taken here, I have received much beneficial instruction from several people. Bill Baxter introduced me to Sinal (1971) and Stanley (1967; 1968) and has continued to help me articulate the ideas that are presented here, even when he opposes them, Ron Walton lent me his study of Shanghai (1971) and offered many suggestions. Professor William Wang urged the crucial importance of Pike and Pike (1947) and Hockett (1955). Steve Wallace offered helpful and stimulating discussion and lent me his very important paper on phenomena in Germanic similar to those discussed in this essay (Wallace 1974).

approach in a way that will not make the analyses of different languages so incomparable as to render linguistics an utterly incoherent discipline? I have shown that by talking merely about paradigmatic units we do not begin to resolve this problem. A simple listing of the paradigmatic units that occur in various languages tells us nothing about those languages, and in any case, the units themselves, though they may be called by the same name, are essentially different across languages.[2]

It is proposed that relativity can be accountably incorporated into a linguistic approach by factoring into the approach the syntagmatic arrangements of paradigmatic units at a level appropriate to the language being analyzed at any given time. Now this statement sounds so obvious that it should hardly need recording on paper. Linguistics has long taken account of both the syntagmatic and the paradigmatic axes of linguistic arrangement. Linguistic theory has always stressed the need to incorporate both axes in a description of a given language. However, as Wallace (1974.25) also points out, the attention given to the syntagmatic axis in lingusitic theory has taken a noticeable second place to that paid to the paradigmatic axis (except, of course, in prosodic analysis).[3] The syntagmatic plane, where it has been discussed, has generally been allocated a subordinate place in the analysis of languages (phonotactics in phonemic analyses; redundancy rules in generative analyses).

---

[2]This is, of course, the underlying insight of the relativistic approach taken in Hockett's Manual.

[3]Wallace's discussion of the development of Germanic in terms of both the syntagmatic and paradigmatic axes is important, too, because it suggests ways in which the development of stress-related morphophonemics in languages like English may parallel the development of tones in tonal languages.

A realistic solution to the problem presented by the relativity of linguistic description must provide for an integration of the syntagmatic description with the paradigmatic description. That integration can be effective only if the analyst assigns the respective roles of the syntagmatic and paradigmatic descriptions according to the requirements of the specific language he is discussing.

At the end of this chapter I shall propose a general approach (sic: not a 'model' or 'theory') to phonological description which will use phonological features which are mapped onto a phonetic level from a phonological level and which are selected according to the requirements of the language at hand. Features will be used for the common sense reason that they are the lowest common denominator among paradigmatic phonological units known to the writer. They therefore have the widest usefulness of any paradigmatic units known to the writer.

The approach to be presented at the end of this chapter has been worked out during a series of attempts to analyze the phonology of some Chinese dialects in a manner that would 1) be consistent with basic trends in modern American linguistics; 2) preserve the insights of indigenous Chinese phonological analyses; 3) illustrate the typological characteristics of the dialects being analyzed. My hope has been to take the insights of earlier workers and to apply them to the problems faced in working with Chinese dialects. If there are any merits in this approach, they are there because the approach itself is merely an extension of the work of others. Because new linguistic work always seems to reflect much more continuity with the past than may be recognized in the heat of 'discovery', the first half of this chapter will be devoted to discussing four important contributions to the linguistic understanding of syntagmatic relations among paradigmatic units and linguistic

relativity. These contributions are works by Benjamin Lee Whorf, Kenneth L. Pike and Eunice V. Pike, Charles Hockett, and Richard Stanley. In the following section, I shall take up these works.

3.2 Some Previous Approaches to the Syntagmatic Axis, Relativism, and Phonological Typology.

3.21 Post-phonemic immediate constituent analysis. Two well-known essays illustrate the use of immediate constituent analysis on syllables after the constituents of the syllables have been determined to be autonomous phonemes. These essays are Benjamin Whorf's Linguistics as an exact science (Whorf 1940), and Pike and Pike's Immediate constituents of Mazateco syllables (Pike and Pike 1947).

Whorf's essay contains his famous analysis of the possible concatenation of phonemes in an English monosyllable. Whorf reduces the possibilities to a rather complex formula (see Whorf 1940.223). What is important for the present purpose is his isolation of the possible word-initial consonant clusters that may occur in English monosyllables. The longest is three members which have the following restrictions upon their co-occurrence:

	k	w
S ±	t	r
	p	l

Whorf does not use the term 'immediate constituent' in his essay, but it is clear from the little that has been shown above--and certainly from the whole formula--that IC cuts would have to be drawn to isolate the cluster from the succeeding vowel and then (as in fact Whorf does) to isolate the third member from the first two. Because Whorf assumes phonemic analysis has already been done, he does not state one of the strong reasons for cutting between the second and third member, namely the allophonic shape of the stop member of the cluster

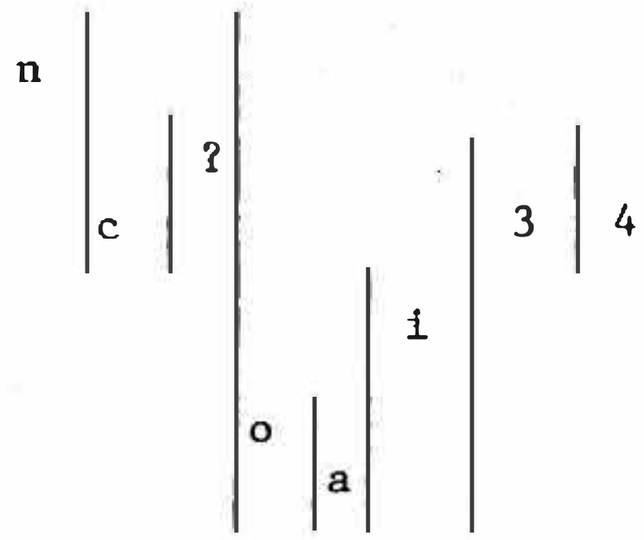
is determined by its following the /s/. This is an important point because clusters of two members can be formed out of the second and third members of these clusters, so, except for the allophonic restriction imposed by the presence of /s/, it would seem perfectly reasonable to make the cut between the /s/ and whatever follows.

I submit that we learn the following things from Whorf's analysis.

1) Unlike the phonemic analysis which Whorf presumes as a prerequisite to his effort, the IC analysis provides a statement of the syntagmatic structure of the syllable. To state this another way, phonemic analysis subsumes syntagmatic information under a paradigmatic statement. The IC analysis then goes on to state those aspects of syntagmatic arrangement which are not subsumed under the phonemic statement.

2) In this case at least, the IC analysis is designed for phonemes, but, in fact, depends upon phonetic information in determining where to make the first cut within the 3-member cluster. This means that the IC analysis is not actually carried out on an already phonemicized stretch of speech. In other words, for a syntagmatic analysis it would seem that all the syntagmatic information must be available and not subsumed under a paradigmatic analysis.

The Pikes' essay on the Mazateco syllable is similar to Whorf's in assuming that the material is already phonemicized. The Pikes conclude their essay with the following interesting formula (Pike and Pike 1947.91):



This formula is intended to isolate the first three consonants into one group, the three vowels into a second and the two tone numbers into a third group. Within each of these groups the constituents are further divided with the lowest one being the principal member and relative height being proportional to relative subordination. The notion of subordination is important here. For it operates in the indigenous Chinese analysis as well (cf. 1.1-2; 4.1-2)e The Pikes do not define subordination. But it seems clear that that which is least subordinate has the widest distribution and vice versa.

A second important insight that comes from the Pikesé essay is their understanding of the effect of such an IC analysis on the analysis of syllable constituents. I shall quote the relevant paragraph in full because it has a direct bearing on the exercise in the present essay:

> It [immediate constituent analysis of a syllable] may ultimately explain various problems in which phonetic sequences of sound appear to have simultaneously both phonemic unity and phonemic complexity. In English, for example, [ai], [au], [ɔi] are phonetically complex. Because of their contrasts with each other, and for other reasons, it seems best to consider them sequences of phonemes, i.e. /ai/, /au/, /ɔi/. On the other hand, they act in distribution much like [eᵉ], [oᵘ], [iⁱ], [uᵘ], which may best be analyzed as single phonemes, i.e. /e/, /o/, /i/, /u/. The explanation of this apparent dilemma appears to be that the phonemic sequences /ai/, /au/, /ɔi/ constitute vocalic nuclei; these phonemicly complex nuclear elements have a distribution which is similar to that for the phonemically simple nuclei /e/, /o/, /i/, /u/ (Pike and Pike 1947.91).

Although the IC analysis of the Pikesé effort follows the exercise of phonemicization, it is evident from this quotation that IC analysis may well affect one's selection of phonemes because of the distribution of units larger than a phoneme (cf. also 1.2 above). This raises a crucial possibility for phonology. That is, in a strictly distributional analysis of segmental phones, units which would have to be analyzed as two separate phonemes may,

under an IC analysis, be reduced to a single emic unit, which is in fact the source of the differences between Pike's (1947) analysis of English vowels and that of Trager and Smith, who treat all of the vowel and glide sequences as sequences of phonemes (Trager and Smith 1957).

3.22 Prephonemic IC analysis: Hockett's Manual of Phonology. The Pikes' conclusion suggests that there may be varying relations between phonetic units and phonemic units. Phonetically complex stretches of speech may be analyzed as phonemically simple units because of the requisites of the language under review at a given time. This conclusion implies that the phoneme will be relative in signification according to the language being analyzed. Of course, in the Pikes' essay, the relativity is not terribly extensive.

Hockett (1955) pushes that notion of relativity to its logical conclusion, and he overtly states that the notion of phoneme is relative to the language being described.

> The phonemes of a language fall into various structural classifications, based on similarities and differences of privilege of occurrence. It is impossible to supply any general classificatory frame of reference from which terms can be drawn in a completely consistent way for the discussion of every individual language. But some approach to this can be attempted. In a language which has only simple syllable peaks, it is usually important to know whether a given phoneme occurs only as a peak, only otherwise, or as a peak in some environments and otherwise in others. Instead of "otherwise," we can say "as margin," which is then shorthand for occurrence as, or as part of, either onset, coda, or interlude. General terms for the possible types of phonemes in such a case are the following:

	occurs as: peak	margin
vowel	yes	no
consonant	no	yes
semivowel	yes	yes

> Fijian phonemes are all vowels or consonants; Sendai has also semivowels /m n n^y ŋ/ (Hockett 1955.e75; underscoring added).

The context for this relativism is a schematic phonological typology based on an overt application of hierarchical IC analysis. Within that scheme, Hockett would not in principle object either to the Pikes' analysis of English vowels or to the traditional Chinese division of Chinese syllables.[4]

The word 'syntagmatic' does not appear in Hockett's typology. What I have referred to as the 'syntagmatic plane' is accounted for by Hockett through classification of various arrangements in languages of the elements within syllables. Thus, peak and margin (=onset, coda, interlude) are the major segmental positions of syllables, and the fillers of these positions are vowels, consonants, and semivowels, categories defined by their privileges of occurrence in the syllabic positions. Typology--which I have defined as the relative emphases of given languages on the syntagmatic and paradigmatic axes--is then described through the listing of the types of fillers that various syllabic positions may have. Including suprasegmental positions, the major classes in Hockettés typology are then subsumed under the following headings: juncture types, accentual types, peak types, margin types. Within each of these major classifications, Hockett describes the relevant consonants, vowels, and semivowels of the languages which he uses as examples. In this system, languages which have similar juncture typologies may have different peak typologies, those with similar peak typologies may be different onset typologies, and so on; so the typology consists of lists of languages under increasingly discrete subtypological categories.

---

[4]Note that Hockett's position on this point changed between his analysis of Mandarin phonemes (1947) and his Manual (1955). Professor Hockett has confirmed this point in conversation.

Although I shall immediately below offer reasons for not accepting Hockett's scheme of typology, I must note beforehand that Hockett's Manual provides the greatest help available at the present time to anyone interested in phonological typology. At least to the present writer, it seems evident that any future phonological typology must in some sense be a revision of Hockett's work.

My reasonsefor not adopting Hockett's scheme for the present study are as follows:

1) If the phoneme is to be relativized to the extent that seems logically necessary in Hockett's scheme, I wonder why it would not be better either to eliminate the term altogether or to restrict it to a more limited usage, finding other terms for phenomena outside that limited usage. In a sense, Hockett has partly taken this step. In his Manual he uses 'phoneme' to refer only to the segmental phonemes. Other terms are used to refer to the suprasegmentals. To the present writer it seems easiest to reserve 'phoneme' to refer to the distributional phoneme of Pike (1947), and in the analysis of languages where that concept is not very appropriate, other terms should be used. In the present essay, the term 'Rimemeé will be introduced (see Chapter IV) as one such term.

2) Hockett's analysis avowedly works 'from the top down'. In fact, the sequence of any phonological analysis will probably follow that order, since the ultimate constituents of a phonology will be the last items to be isolated. However, in a presentation of the analysis that aims to integrate the syntagmatic and paradigmatic axes, it is sometimes more convenient to be able to work 'from the bottom up'. In a hierarchical constituent analysis that uses phonemes (albeit of relative definition) as fundamental units, it is difficult not to separate the statement of paradigmatic units from the

statement of their potential for concatenation. To the present writer, it seems that the sequence of such statements should be determined by the language at hand. Consequently, I prefer to use an arrangement that is flexible in the sequencing of statements of paradigmatic units and syntagmatic concatenations.

3) While Hockett's 'ultimate constituents' are the equivalent of 'distinctive features' in a Jakobsonian or a generative treatment, I prefer to use distinctive features because their previous use makes their employment in a 'bottom-up' description expected and convenient. There is no reason at all that they cannot also be used for a 'top-down' phonemic analysis in languages that call for that arrangement. The wide acceptance in the field of the distinctive feature as a paradigmatic subunit makes it very convenient to use distinctive features in both types of analysis.

4) The notion of components of an analysis is a contribution identified with generative linguistics and is subsequent to Hockett's typological scheme. While I have already shown that the use of purportedly universal components does not help in the analysis of languages which do not require all of such components, the idea of components can be of considerable aid in the delineation of phonological types. I prefer to use components and the relative arrangement of syntagmatic and paradigmatic statements as against Hockett's use of syllable position placement as a basis for listing types because I think that the general differences and the continuities along languages can be made clearer with the former. Furthermore, should one wish to relate phonological typology to morphological and syntactic typology, the use of components can be of some help.[5]

---

[5]Working beyond the scope of this essay, I have tried to integrate the general phonological typology of Chinese with the morphological and syntactic typology. In Standard Average European, morphology is the quintessential

3.23 The syntagmatic plane in a generative grammar. In the previous section I have proposed using certain tools usually associated with generative grammars in preference to certain tools usually associated with 'structuralist' grammars. I have specifically advocated the use of distinctive features and components of analysis. I have implicitly suggested that in the analysis of some languages a sequence of 'mapping' features onto the phonetic level from a phonological level is to be preferred to a constituent analysis in which phonemes are taken to be basic paradigmatic units.

All of these proposals have been made for pragmatic reasons. The tools which I have suggested using seem to me to have a great potential for flexibility. At the same time, they are precise enough that, if used with clarity, they have some value in cross-language comparison. In short, I propose to use these tools borrowed from the common generative stock, but I shall use them within the relativistic viewpoint of Hockett's Manual.[6]

---

paradigmatic study. For that reason, it is often thought that Chinese has very little morphology, and what it does have is of the very simplest sort. However, if morphology is the building of words, then there is a great deal of morphology in Chinese, for grammatical words are very often (perhaps mostly?) built out of morpheme combinations. These combinations are syntagmatic combinations of roots, not paradigmatic alternations of the members of closed classes. The bulk of Chao's massive grammar (Chao 1968) concerns morphology in this sense. Syntax in Chinese is a direct extension of Chinese morphology in that the basic combinations of morphological types are reflected in the syntactic rules. While this subject is not directly pertinent to the essay in hand, there is an important point for the present discussion. In general, the whole Chinese language employs the syntagmatic axis more than the paradigmatic axis. I suggest that it is this fact and its contrast with other types of languages that Sapir (1921) was referring to in his general typological discussions.

[6]With respect to the intellectual history of linguistics, it is necessary to recall that there is neither a monolithic structuralist phonology nor a monolithic generative phonology. The immense amount of ink spilled in controversy between 'structuralist' and 'generative' linguistics has flooded only a few matters of important difference between them, principally the role that morphophonemics should play in an analysis. Away from the heat of debate, however, it seems to the present writer that fundamentally Bloch and Trager (1942) and Hockett (1947) have more in common with Chomsky and Halle (1968)

The reason for this mixture is fairly simple. The wider generative posture in phonology has given us a number of tools and concepts that have enabled sensitive analysts of specific languages able to present their insights with a generality and elegance that is less well illustrated when only the stock of tools of phonemic analysis is available. However, the generative posture has in general failed to give much weight to syntagmatic considerations. And, while the presence or absence of a given rule in a language is certainly a mark of its type, where the operation of rules is understood to be from a common (or simply undefined) phonological level to a phonetic level, the comparison of such rules across languages obscures information in the same way as does the use of lists of phonemes in language comparison.

To be sure, generative phonology has a place for syntagmatic statements. That is in the statement of 'redundancy rules,' a term that generally subsumes 'sequence structure rules' and 'morpheme structure rules' and 'segment structure rules'. Richard Stanley (1967; 1968) has discussed the types of such rules and the roles that they play in a generative phonology. Stanley distinguishes two major types of redundancy rules, segment structure rules and morpheme structure rules. Segment structure rules are those rules that indicate which combinations of distinctive features do not occur; given that systematic phonemes are specified with distinctive features, segment structure rules

---

than either has with Hockett (1955). That Hockett uses phonemes in his Manual does not make him any more a standard structuralist than does C. Cheng's use of distinctive features and rules make his treatment of Mandarin a standard generative treatment. It is proper to talk of strict structuralist models and strict generative models and also proper to talk of the tools generally used in each. It is inaccurate to assume that the use of these tools always reflects the strict version of either school.

indicate which systematic phonemes do not occur. There are two basic reasons for combinations of features not occurring. One is that it is logically impossible for them to occur or that it is empirically demonstrated that they do not occur. A logically impossible case is for a given segment to be marked bothr[+ anterior] andr[+ back], unless such a specification is defined to mean [+ central]. Empirical impossibility (or high improbability) is what lies behind the notion of markedness, extensive examples of which are found in Chomsky and Halle (1968.402-35). The other reason for combinations of features not occurring is language-specific. Such absences may be systematic (that a language lacks affricates, for example), or 'accidental' (that a language has labial and dental stops but no velar stops).

Morpheme structure rules are those rules that indicate which combinations of phones (systematic phonemes or phonetic segments) do not occur. Here again, there are two types of gaps: systematic (absence of clusters, for example) and accidental (st- sp- sk-, zd- zb-, but no zg-).

Stanley argues that redundancy rules properly belong in the pre-phonological portion of the grammar. That is, redundancy rules specify the segments and sequences which occur in the 'lexicon' component of a generative grammar, which is redundancy free in its entries. He further argues that redundancy rules are really statements of conditions in that they do not change features, but only predict which vertical and linear combinations of features do not occur. Finally, Stanley pays considerable attention to the problem of accidental gaps and illigitimate uses of rules to specify them.

In my view, the different parts of Stanley's analysis of the role of redundancy rules are of different value. Segment structure rules carry no linguistic value. Their real purpose is to constrain the mapping of distinctive

features onto segmental positions so that the device does not generate segments that are not found in a given language. Since languages do not have segments that they lack, sequence structure rules do not describe anything. They are needed simply because of the generative descriptive device itself. They are therefore not an essential part of a phonological description. Segment structure rules will not be discussed in this essay.

I have already argued that linguistic relativity requires that the components of our analysis of given languages should vary according to the language at hand, and that the sequence of stating syntactic and paradigmatic information should be determined according to the language at hand. Therefore, the automatic assignment of the sequence structure rules to the lexicon is abandoned. These rules should be assigned to such a component as is reasonable in terms of given languages. In any case, the lexicon component of a generative grammar is a very peculiar analytical entity. In Stanley's scheme, it serves merely as a place for redundancies to be stated. In the current state of generative syntax, it is questionable whether there is any need at all for the lexicon as Stanley and earlier generative works conceived it. Certainly in the phonological portion of the analysis, it serves only as a place to clean up the device itself.

Morpheme structure rules are to be retained here because, unlike the segment structure rules, they can serve a genuine linguistic purpose in relation to specific languages. To illustrate that fact, let us consider the very different works of Sinal (1971) and Walton (1971). Sinal describes the clusters of Greek, Latin, and Gothic. Walton describes the syllable of the Shanghai dialect of Chinese. Both writers ostensibly work in the model that Stanley provides, and both trouble to give rules for both segmental and morpheme structure redundancy, though in neither work do the segmental redundancy rules affect the analysis of the language. Sinal's analysis mainly concerns the

consonant clusters of the languages he takes up. While there are predictable sequences of words and consonants, these are comparatively few. The reason for this limitation is obviously that the sequences of vowel and consonant are generally so conditioned by morphophonemics that simple predictions of most occurring sequences of vowels and consonants are nearly impossible to design. In contrast, Walton's rules describe the whole structure of the Shanghai syllable. Neither writer specifically notes the implication of the difference between their works, but the typological implications are obvious. For the analysis of Gothic, Greek, and Latin, the morpheme structure rules are useful in the statement of only part of the phonology. By and large, the phonology is most easily stated through the use of standard generative phonological rules (i.e. feature changing rules). For the analysis of the Shanghai syllable, no standard phonological rules are required; only morpheme structure rules are needed. If phonological rules are required, it is for the statement of Tone sandhi in the concatenation of syllables, though one wonders if these phenomena too could not be stated through the elimination of nonoccurring sequences rather than through the use of feature changing rules.

Metaphorically, morpheme structure rules serve to eliminate from the possible combinations of all of the phones of a given language those combinations which do not occur. Suppose a language with only three phones at both the phonological and phonetic levels: /p, a, t/ Table 3.231 gives all the combinations of these three phones, assuming a maximum of two segments per syllable. If there is a rule which prohibits consonant clusters, then all combinations of these phones are excluded from the table, which leaves us with Table 3.232. For a language that is sufficiently simple in structure for morpheme structure rules to predict which phones occur in which combinations, the morpheme structure rules will be of great use, for they can be employed to describe the whole

syllable structure, and anything that is not excluded by such rules will then occur. In the analysis of languages whose structure is so complex as to prohibit charting all combinations on a table like that of 3.231, the morpheme structure rules will be of less than central value.

In this essay, the generative tools of phonological features, language components, and redundancy and phonological rules will be integrated into a relativistic scheme in just this metaphorical sense. In the following section, I shall outline an approach to accomplish this.

3.3 A Relativistic Approach to Phonology

Drawing together the several threads of the foregoing discussion, I propose the following general approach to phonology. The analysis of given languages should be expressed through the mapping of phonological feature matrices onto phonetic feature matrices. While the features used for all languages will be more universal than unique, the features used for each language should be defined for that language. There should be a distinction maintained between 'universal' features, which refer to neutral articulatory characteristics and 'language-specific' features, which combine universal features in a way that is particularly characteristic of a given language (e.g., the feature [labial] in 4.2 below). While the features should be <u>phonetically suggestive</u> to the point that undefined catch-all features (e.g., [tense]; see 4.2) should be excluded, there should be no illusions about the genuine 'content' of any feature. At any level of discussion, features necessarily represent an interpretation of sound. The phonetic level is just as much an abstract selection of a few nameable elements as is the phonological level. The difference between the two levels is a difference of function. The phonetic level should indicate the ranges within which various sounds are articulated. The phonological level serves to

TABLE 3.231

Possible Syllable Combinations of
p, a, t

No. of Segments per Syllable	Combinations
1	p a t
2	pp, pa, pt, aa, at, ap, tt, tp, ta

TABLE 3.232

Occurring Syllables of
p, a, t

No. of Segments per Syllable	Combinations
1	p a t
2	pa, aa, at, ap, ta

delineate the system in which a given language organizes its sounds. The phonological level serves to distinguish a given language from other languages as well as to show points of commonality between a given language and other languages.

Heuristically, only those features which make a difference in the rules operating in a language should be used in a description of that language. While it is possible to employ all of the features of a given 'universal' stock in the description of any one language, it is not necessary to do so. The fact that in a strict generative analysis segment structure rules are needed to prevent the mapping device from generating wild segments is an indication that the device itself has been accorded far more seriousness than has been warranted. If the point of phonological analysis is to produce a description of a language that is as true to the facts of that language as possible, then it is the analyst's responsibility to choose the relevant features and not to cloud up the picture by positing features which are subsequently not functional in the rules used to describe the processes of the language.

In this essay, features will be listed in segment-sized columns. This suggests no prescription of sanctity for the segment. However, just as the feature is the smallest paradigmatic unit known to the writer, so the segment is the smallest grouping of features known to the writer. The segment is used for its descriptive flexibility. For some dialects of Chinese it is important to show that two segments in one order are systematically two units (phonologically two segments), whereas in another order they are a single unit. In Cantonese, for example, the sequence [ni:] (with a proper tone contour) operates as two units, Initial and Final, each with a single segment filler. But the sequence [i:n] is systematically a single unit, a Rime. (For further analysis of Cantonese, see 4.3 below.) If the latter sequence is assigned a unitary symbol, the

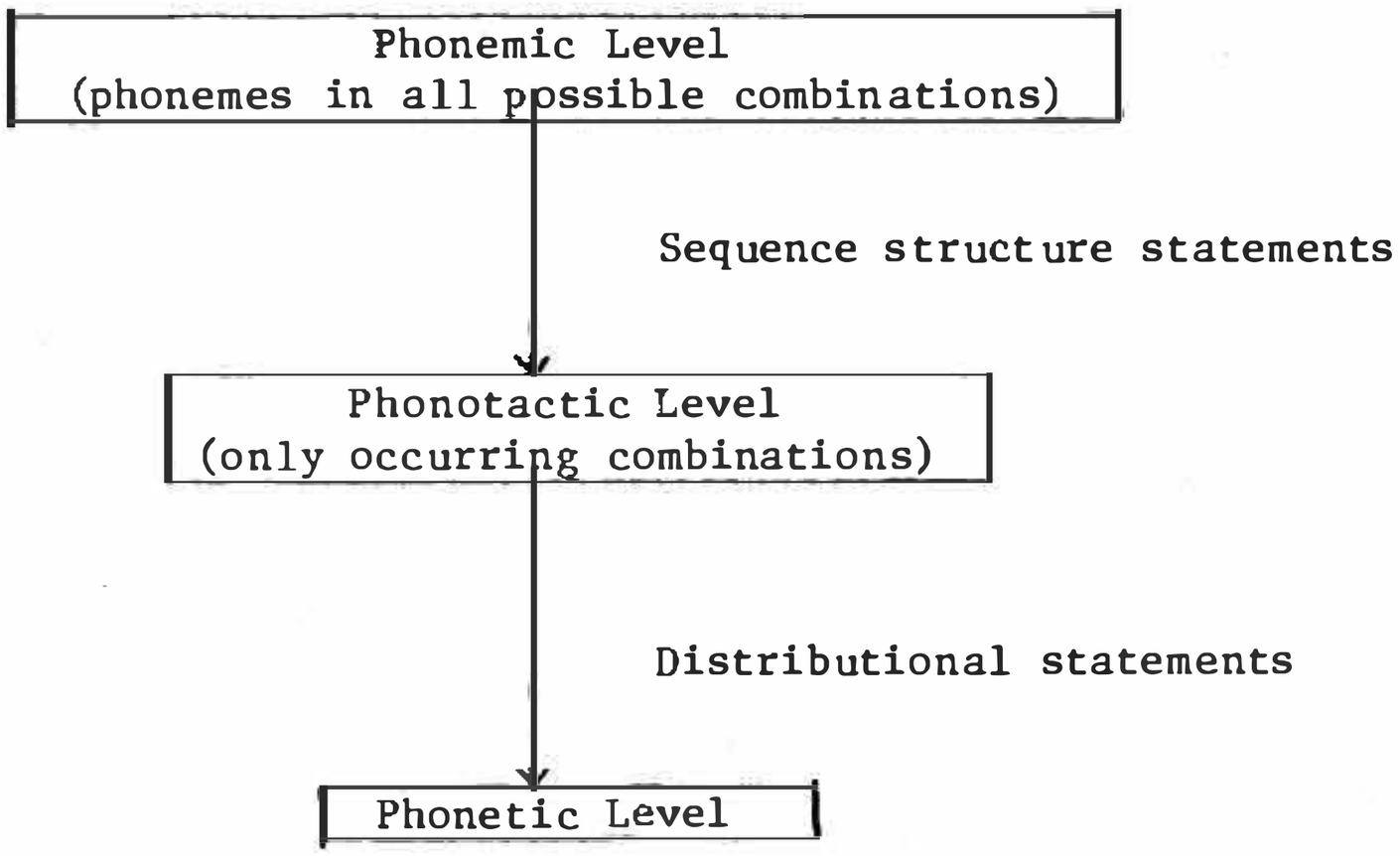
commonality it shares with the former sequence will be obscured, and so the functional differences will not be evident. Hence, for this essay, Rimemes will be given two columns of features and assigned two segments. The rules that describe them will make it clear that they are functionally a single unit.

In the analysis of other languages this step may be inappropriate, and the syllable, or a portion of the syllable longer than the segment, might be the appropriate unit for a single column of features. The choice is a language-specific decision.

The phonological level should be specifically defined for each language to be analyzed, and the type of rules to be used in the mapping from the phonological level to the phonetic level should be stated at the outset of the analysis. This means that the components of analyses will differ from language to language. The writer is aware that this use of 'component' differs radically from that used in a strict generative model (e.g., T. Cheng 1968). The difference is deliberate. The phonological levels of languages differ hugely. It is obfuscating to give them all the same level.

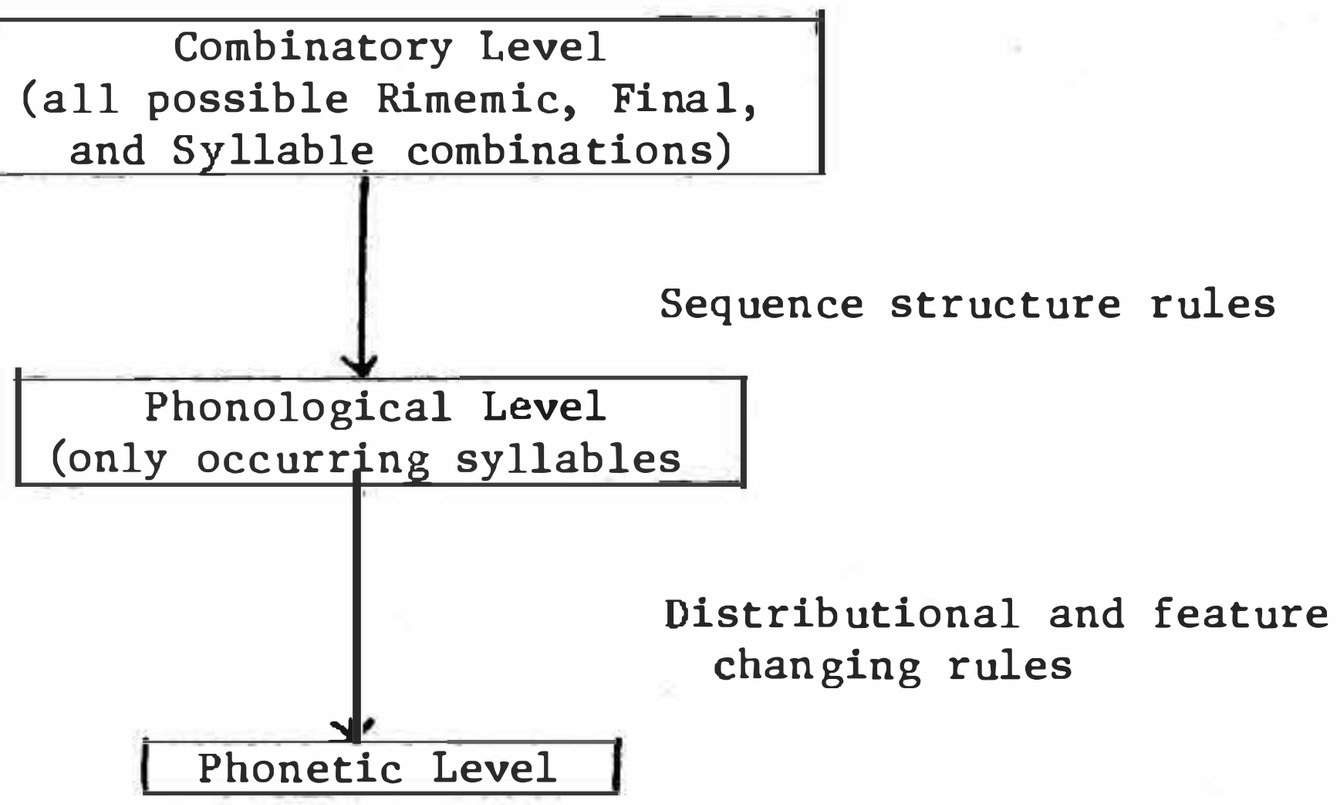
Consider two examples. The Lungyen dialect of Chinese (see 5.3 below) seems ideally to fit a fairly strict phonemic approach. So the components of an analysis of Lungyen are: a phonemic level, a phonetic level, and a phonotactic statement that tells which combinations of phonemes occur. Because Lungyen, like all kinds of Chinese, has a very small number of syllables, and an extremely small number of postInitial stretches, it is revealing to state the phonotactics prior to the statements of distribution that map the phonemic level onto the phonetic level. Schematically, this is:

Lungyen components



In Hakka and other Rimemic dialects of Chinese, the relative strength of the syntagmatic axis requires a hierarchical statement of combinations prior to the phonological rules.

Hakka components



In sum, phonological description is envisaged here to include those components which are motivated by given languages, with each level of the analysis being defined for the language under analysis itself and with the types of rules and their function being defined according to the language under analysis. In the next chapter, I shall use this relativistic approach to phonology to suggest a model of analysis specifically designed for one type of Chinese dialect.

Chapter Four

CONSTITUENT ANALYSIS, THE MIDDLE CHINESE PHONOLOGICAL MODEL, AND AN ANALYSIS OF THE CANTONESE FINAL

4.1 The Middle Chinese Phonological Model

The earliest indigenous device for the systematic graphic representation of Chinese sounds was the fan ch'ieh 'spelling' system. The fan ch'ieh date from the second century A. D. The fan ch'ieh represent a division of the syllable into the Initial consonant (including ∅) and whatever remains. Thus, a canonical shape for the Chinese syllable was assumed to be as follows:

Syl. = I F

Two things are of crucial importance in this analysis of Chinese sounds. First, there is a concentration on the syllable. One might say that the emphasis on the syllable in traditional Chinese phonology was simply an extension of the writing system. However, such an argument would be as pure a case of cultural bias as could be invented in the study of linguistics. To show that the traditional Chinese focus on the syllable for further analysis is inaccurate, one would have to show that the writing system's alliance of syllable and morpheme is both morphologically and phonologically misleading. It has long been recognized that the writing system represents a substantial morphological truth (Chao 1968.137). As for the phonological truth, there is ground for dispute with regard to the Wu dialects. I have shown in Chapter III that Sherard's analysis of Shanghai isolates a suprasyllabic level, that of

the phonological word, which is defined by an extended tonal contour. It was certainly a similar phenomenon to which George Kennedy was referring in his famous analysis of his native Wu dialect as being polysyllabic in nature (Kennedy 1953). However, so far as I know Kennedy never questioned the importance of syllables in Chinese, but only the notion that the minimum free form was generally coterminus with the single syllable.

In all other studies which I have seen, the syllable is in effect the primary unit of focus. It therefore seems eminently reasonable to accord the fan ch'ieh analysis with considerable insight in its first assumption, the validity of focusing on the syllable.

The second very important aspect of the fan ch'ieh analysis is its implicit assumption that there is phonological ground for isolating the Initial from what remains and thereafter treating each of these stretches of speech as a unit. Here again it would be mere cultural bias that would suggest that it was only the absence of the alphabet in Chinese literary tradition which prevented the Chinese from dividing the syllable more discretely on the first cut. (In fact, as I shall show below, the Chinese did divide the syllable more discretely but not in a way which would correspond exactly to the divisions of an alphabet.) There is a cultural bias inherent in our own Western tradition, since the alphabet preceded the concept of the phoneme and systematic phoneme, that is, forms of segmental analysis. A cultural bias also lies very much with our failure to perceive what the Chinese phonologists must have perceived about their own language. That is, the mutual relationship of the various phones which are concatenated in a single syllable is not best expressed by assigning a single symbol to each phone.

Consider some interesting numbers that are drawn from Cantonese and which are paralleled in most other dialects, so far as I know. The morphological

fit of morpheme to syllable, which on a 1:1 basis in most kinds of Chinese, has phonological significance when we notice that the proportion of phonetic vowels to Finals in Cantonese is 11 vowels to 52 Finals (excluding the syllabic nasals) which is on the order of 1:5. Interestingly, only the central vowels /a: ə/ can combine with all ending glides and consonants, and so when the 18 Finals made up with these two vowels are subtracted, the remaining Finals number 34, which leaves a proportion of one vowel to 3.7 Finals. Given these numbers alone, it would seem that a syllable-based analysis might be appropriate for Cantonese. However, note that the ratio of Initials to Finals ranges from 1:47 on down, but no Initial combines with fewer than 16 Finals, and the lowest case concerns the labiovelars, while the other Initials combine with over 30 Finals each.

Consider similar numbers for Mandarin. The ratio of phonetic vowels to finals in Mandarin is 11:35. Of the 35 finals, those with the peripatetic low unrounded vowels [a, a] number 12. Subtracting these, we have a proportion for the remaining vowels of 10:22 or 1:2.2. As we have seen above, except for the restricted Initials, [c, c', s; k, k', x; ʨ, ʨ', ɕ; tʂ, tʂ', ʂ], Mandarin Initials are fairly well distributed among the Finals. For Mandarin, as for Cantonese, the general distribution of the Initials is much less restricted than for the single phones within the Finals. For both dialects, then, it makes considerable sense to make a first cut between the first consonant and what remains and to treat the two as separate units.

Note that the fact of the vast difference in distributional privileges of occurrence between the Initials as a class and the phones in the Final as another class remains despite the phonologization that one chooses to apply to Chinese. Furthermore, this fact is what renders askew any phonologization which does not take account of the need to make a cut between Initial and Final

at the phonetic level. The skewed phonology which results from ignoring this fact is the kind which I have discussed in Chapter II above.

There is another kind of phonological fact that parallels the numbers which I have just quoted. This is the kind ofrconstraint which governs the possible concatenations of vowels with various consonants and glides. For Cantonese, as for most dialects which retain the full complement of final stop and nasal endings of the Middle Chinese period, there is an absolute constraint prohibiting the occurrence of a rounded principal vowel and an ending labial consonant. This is, of course, the well-known labial dissimilation constraint which is referred to in the rime group change of words like the word for law (法 , Anc.*b'iwǽp) which in the Middle Chinese period changed from a*-p final word to a -t final word, apparently under pressure from the Initial which was a labial. Now because of the historical development of such words, the labial dissimilation in Chinese could be stated as being the nonoccurrence of labial Initials with Finals which are ended by a labial consonant. While largely accurate, this statement would be insufficiently general for Cantonese and there are exceptions to it in colloquial speech as we can see in the following three examples:

pəm˨ yat˥ seŋ˥	'suddenly'
pəm˥	'pump' (English loan)
pəp˥ pəp˥ t'iu˨	'jump, flutter'[1]

---

[1] The second of these examples is a loan word, and the third is onomatopoetic reduplication. The first may be onomatopoetic in nature, too. It is not common in linguistics to base conclusions regarding the system of a language on loans and onomatopoetic material because such material may reflect a conflicting subsystem and not be representative of the language as a whole. The citation of these examples is not intended to violate this sound stricture. However, onomatopoetic and loan words are legitimately useful in helping to determine the outer limits of the phonology of a languager In the present instance the occurrence of a few syllables beginning and ending in labial consonants indicates

Furthermore, there is no constraint which prohibits labial Initials from co-occurring with rounded vowels. Thus the following are all attested syllables:

抱	p'ou˩	'carry'
煲	pou˧	'boil'
浮	fau˩	'float'
虎	fu˧	'tiger'
冇	mou˩	(negative)

But there are no occurrences that I have ever found of a labial vowel being followed by a labial consonant in the same syllable.

Similarly, among the non-low vowels (for definition of vowel features, see 4.2) there is a rule that pairs high vowels with front consonants (m, n, p, t) and nonhigh vowels with back consonants (ŋ, k).

By stating these two constraints alone, one accounts for the pattern of occurrence of all closed Finals in Cantonese. While there is in each case a similar constraint relating Initials to Finals the constraint on that level is very limited.

Consider again that the only general Tonal constraint is that checked or short Tones (˥˧) occur only with Finals ending in stopped consonants. This correlation between Tone and Final is unaffected by the Initial.

What these facts show when taken together is that there is a relatively closer relationship between the elements of the phonetic Final than there is between the Initial and any element of the Final. And this fact is accounted for by the fan ch'ieh system of phonological analysis.

---

that Cantonese is at least tangentially receptive to such syllables. But that is the outer limit. There are no instances that I can find of a rounded vowel being followed by a labial consonant.

Interestingly, a language with this construction is not most economically written with an alphabet which assigns a single symbol to each segment-sized unit. This fact has long been known to the Chinese themselves, and the only wholly indigenous writing system invented in this century takes advantage of this fact and is more economical than an alphabet. This writing system is the National Phonetic Alphabet (注音符号). To show why this type of writing system is more economical, let us consider the simplest case: a possible writing system for the Cantonese dialect. Now obviously the most economical use of symbols--that is the system which uses the fewest symbols--will be a segmental alphabet. This fact, apparently true for every language, is amply demonstrated in Pike's book Phonemics (Pike 1947), and is expressed in the subtitle of that book: A Technique for Reducing Languages to Writing. But, if one's criterion in setting up a writing system is total economy, an alphabet is not suitable in the Chinese case. Unlike English, a phonemic alphabet for Cantonese, while saving on symbols, increases the number of redundant combinations that must be written, since the syllable Final combinations are in so many ways predictable. To save on both combinations and symbols, then, the solution must be to assign a different symbol to each of the distinctive Initials, Finals, and Tones. A fragment of a writing system for Cantonese is given in Table 4.11. This system assigns a symbol to each of the Initials. The Tones are termed either long or short only. Pitch and other contours can be ignored because they have no direct relationship to the segmental portion of the syllable. The Finals are represented by characters. The characters for the syllables which end in stop consonants are the same as characters that end in the respective homogranic nasals, and the assignment of Tones accounts for the difference.

TABLE 4.11

Sample of an Initial-Final
Writing System for Cantonese

Let phonetic symbols stand for initials: T K L

Let characters of open syllables or with nasal final consonants stand for Finals:

亞 (a:)　　地 (e:i)　　萬 (a:n)　　王 (ɔ:ŋ)

Let L=Long Tone; S=Short Tone. Pitch and contour disregarded here.

K(L)亞 ('Family'家)　　L(L)地 ('come'離)　　L(L)萬 ('lazy'懶)

K(L)王 ('river'江)　　L(S)萬 ('peppery'辣)　　K(S)王 ('each'各)

Naturally, this writing system is not intended to be taken as a serious proposal for the transcription of Cantonese. It is the fact that such a system is possible which is important. For this system is essentially the fan ch'ieh system rendered economical.

I have used Cantonese in this writing system demonstration simply because it contains no Medials and therefore the case is simpler than in other dialects. But as I have suggested above, a fully worked-out system has long ago been developed in China for Mandarin, and that system does account for the Medials in a manner which is totally more economical than any alphabetical system which has been devised or which could be devised for Mandarin.

Now if we consider all of the facts just discussed in comparison with English and similar languages, we can easily see that the native Chineser tradition has a peculiar relevance to the Chinese languages. Clearly a Chinese style writing system would not be in any way adequate for English. Not only is there the lack of fit in English between syllable and morpheme that there is in Chinese, but on the phonetic level the predictable combinations of phones represent so small a proportion of the possible strings of phones which occur that units larger than the segment are unworkable in the writing system. Moreover, and very importantly, most of the predictable combinations of phones as there are concern consonant clusters.

Similarly, it seems impossible to do more than guess the rough magnitude of the elements that follow a principal vowel in an English syllable. In Cantonese the most widely distributed vowel may be followed by one of only eight succeeding elements. In English, the most widely distributed vowel may be followed by numerous elements.

If the foregoing attempt to justify the traditional Chinese division of the segmented syllable into Initial and Final is accepted, it is then a fairly simple matter to consider the further refinements of this system which were brought with the T'ang and Sung dynasties. The full-fledged use of the fan ch'ieh system in the Ch'ieh Yun dictionary of 601 A. D. implied some sophistication beyond that of the simple division of Initials and Finals. As Y. R. Chao has shown, the selection of spellers manifesting 'medial harmony' meant that the overwhelming proportion of spellers shared a common Medial (Chao 1940). That is, the Initial for a given word which contained an onglide would be a character representing a word which also contained that onglide and the speller for the Final would be similarly representative. This means that there was considerable awareness that the syllables being described were of a more complex nature than could be described by a pair of symbols. It also means, of course, that a 2-member symbolic system could indicate this fact only by incorporating it redundantly into both of the symbols. The existence of Medials was accounted for with greater sophistication in the Sung Dynasty rime tables by the addition of the "divisional" categories and the 'open/closed mouth' categories to the original fan ch'ieh cut. Schematically, the kind of syllable which was described in the Ch'ieh Yun and then later in the rime tables must have looked something like this: $(C)\ (V_1)\ V_2\ (^{C_2}_{V_3})$.

Now what is extremely interesting and of the utmost importance about this type of syllable and its indigenous representations is that the principal vowel and final consonant or offglide were not subdivided. Moreover, except for the apparently prescriptive purposes of the rime tables, even the division of Final into Medial-plus-remainder was not maintained. Dictionary practice, even into the twentieth century, has found it quite convenient and economical to explain the pronunciation of Chinese syllables through the use of fan ch'ieh.

These lexicographical facts further justify the IC analysis suggested above and also point to the need to understand why the principal vowel and final consonant or offglide were considered a unit. We can graphically symbolize this latter point in the traditional analysis with the following formulae:

$$\text{Syl.} = \text{I F}$$

$$\text{F} = (\text{M})\text{R}$$

$$\text{M} = \text{V}_1$$

$$\text{R} = \text{V}_2 \begin{pmatrix} \text{C} \\ \text{V}_3 \end{pmatrix}$$

In the main, these formulae are still useful to describe the vast bulk of the Chinese language. If that is so, it means that an analysis of Chinese dialects should be able to demonstrate that there is some reason understandable through the use of constituent analysis for the recognition of the Rime as a coherent unit which is somehow tighter than the Final as a whole, while the Final itself must be demonstrated to remain a unit which is somehow more closely bound internally than is the whole syllable consisting of Initial and Final.

In fact, it is not the case that all Chinese dialects can be seen to have Rimes of the strict sense just discussed. Dialects which have the phonologically tightest Rimes are those which retain the full complement of Middle Chinese ending consonants. Other dialects have a weaker Riming structure.

In the remainder of this chapter I propose to show for the simplest case, that of the Cantonese dialect, that the rime is a coherent unit. In Chapter V, I shall show that the other dialects can be placed on a spectrum with regard to whether they manifest a coherent Rime or not.

4.2 Rimemic Analysis: A Modernized Version of the Traditional Division of the Syllable

4.21 In this and the following chapters, the analysis that will be used to describe the nonTonal Finals of five dialects of Chinese will be a 'Rimemic' analysis. The term 'Rimeme' is taken from Y. R. Chao's famous essay, 'The non-uniqueness of phonemic solutions of phonetic systems' (Chao 1934). Chao introduces the term in reference to the traditional She (攝 'Rime grouping') and also in reference to the National Phonetic Script. 'Rimeme' is used to cover the patterning of such Mandarin phonetic Finals as:

iEn

an aŋ iaŋ

where analysis would group the En, occurring only after a high front onglide, together with the an and call them one Rimeme.

'Rimeme' is also used by Chao to cover such cases as the varying sounds of /ə/ in the following phonemic Finals of Mandarin, which range from phonetic [ə] to [u] to [Ø] (zero):

əi əu ən əŋ

iəu iən iəŋ

uəi uən uəŋ

yən yəŋ

Chao's argument is that the phonetic realization of these Finals is so complex that any direct correspondence between a phonemic rendering of them (as above) and any phonetic rendering of them is inadequate because they assume too many phonetic shapes under different conditions.

Chao's observation on the behavior of these Finals is, I believe, emminently sound. However, discovered by C. Cheng 1973 (cf. 5.3 below), the phenomena that Chao is describing essentially call for a deeply underlying abstract vowel that can assume many shapes (including [Ø]) rather than for a two-segment unit as a prime of analysis. For this reason, in adopting the term 'Rimeme', I shall restrict its use to cases like the correspondence of [an iEn] and exclude cases like the complex operation of /ə/.

In this essay a Rimeme will be defined as:

> A distinctive unit consisting of a principal vowel and a following consonant or vowel (where either occurs); whether consisting of simply a vowel or a vowel plus consonant or vowel, the Rimeme will be considered a single unit at all levels of the phonology, and at all levels of the phonology it will have the same canonical shape.

Formulaically, this means that the Rimeme will consist of:

$$V \quad \begin{pmatrix} C \\ V \end{pmatrix} \quad \#$$

on any phonological level (no matter how deep) and on the phonetic level. The implication of this definition is that the Rimemic vowel will never turn up as [zero] on the phonetic level. The wider implication of this definition is that there will not be any very great 'depth' in the phonological analysis. Obviously, the function of the Rimeme is to account for distributional constraints between the principal vowel and ending consonant or offglide.

With a Rimemic analysis, the sequence constraints between the principal vowel and ending consonant or Final vowel will be understood as being central to the syllable, and these will be described first. The concatenation of medial onglides with Rimemes will also be described with reference to sequence constraints.

The rules used to describe the concatenation of principal vowels and ending consonants or glides will be called Sequence Rules and will be abbreviated 'Seq' with a dialect abbreviation prefixing them and a number following. Thus:

HkSeq 1)

means 'Hakka Sequence Rule #1'.

The rules which derive specific phonetic shapes from Rimemic vowels (as in: an iEn) will be called 'Rimemic Rules' and they will be abbreviated:

HkRme 1)

meaning 'Hakka Rimeme Rule #1'.

Both Sequence and Rimemic Rules will operate on feature matrices. The features to be used will be described below. The Sequence Rules will be unordered. Unless otherwise stated, they will be negative rules. The purpose of using negative rules is to take advantage of the small number of Finals in Chinese dialects (ranging from 20-odd to 70-odd). The comparative paucity of postInitial syllable parts is typologically and linguistically significant. Among other things, this smallness of numbers and the extraordinary rarity of discovering new Finals after a short acquaintance with a Chinese dialect make it possible for us to list all Finals and compare them with the combinations of segments that never occur in a given dialect. The mechanism for this comparison in the present essay will be to chart the theoretically possible combinations of Finals and to eliminate those that do not occur by stating negative rules.

It will be noted that the reason for using negative rules here is typology-specific. The device is chosen for the languages at hand, and its parts do not arise from the exigencies of the device itself. The Rimemic Rules will be ordered only when so stated.

The definitions of Rimeme and Final used so far assume that there are certain canonical shapes, the slots of which are filled with selected sets of phones. For each dialect discussed below the specific canonical shape will be given, and the fillers of the canonical slots will be stated. Because of this slot-and-filler arrangement the rules can be stated under general headings of V (vowel) and C (consonant) and features of [voc] and [cons] will not be necessary. Nor will it be necessary to exclude combinations of vowel and consonant that do not fit the standard Final order of $(V_1)\ V_2(\overset{C}{V_3})$.

Aspects of other formal analyses which are not required for the specific description of the operations of the dialects to be described will be excluded. Specifically excluded will be segmental redundancy rules. I have shown in Chapter III that Stanley groups such rules together with morpheme structure rules ('Sequence Rules' here). Because morpheme structure rules are requiredr by the languages to be described, while segmental redundancy rules are merely required by the descriptive device itself, the two are not considered in the same category of importance, and only the morpheme structure rules (Sequence Rules) will be included.

Also excluded will be all phonological and phonetic features that are not specifically required for the rules governing languages being described.

Reference to Initials and Tones will also be excluded. However, it should be noted prior to describing any dialect that all of the descriptions that I have seen detailing the influence of Initial and Tonal constraints on each other or on Finals are of the sort that affect either Sequence Rules or Rimemic Rules, and so the device could simply be extended to include these phenomena were a full description of a given dialect contemplated.

4.22 The features that will be used in the analysis will now be described.

Binary vs. multivalued features. Phonological and phonetic features are metaphorical suggestions of the articulatory motions and positions that lie behind the pronunciation of various sounds. Some features seem to be inherently binary in nature. For example, a consonant can be reasonably said to be stopped or not stopped, with the exclusion of any intermediary state. To be sure, affricates [ts, dz] seem to reflect both a slight stoppage of the air stream and then a continuation thereof. Attempts to deal with this fact have produced arguments about the unitary or binary nature of such sounds, and some traditions of feature inventories have used the feature [obstruent] to cover the articulatory characteristic shared by [t, d] on the one hand and [ts, dz] on the other. However, no matter how one divides the data, there is no argument as to whether there is stoppage in such cases.

In contrast, some features seem to be inherently multivalued. Such a feature is that of vocalic height. Although we can easily express the levels of height in a strict binary framework by positing extra features, the end result of such activity is that we have described an articulatory characteristic that is not either present or absent. Thus, in a system which allows for [±Hi] [±Mid] in describing a language with three degrees of vowel height, the following combinations have these equivalents:

[+Hi, -Mid]	=	Highest Level
[-Hi, +Mid]	=	Second Level
[-Hi, -Mid]	=	Lowest Level
[+Hi, +Mid]	=	Nothing, and the device must be constrained to reject such a combination.

Similar results will come from using [±Hi] [±Lo], and so on.

It seems to me that it is linguistically important to recognize the difference between binary and multivalued features. This is not, of course, an original observation. The system of features proposed by Ladefoged (1971.92-4) attempts to incorporate his own and others' work on the difference between the two types. The value of Ladefoged's features is that they state clearly where it is the mere presence or absence of an articulatory characteristic which makes a difference, and where it is graduations of a more pervasive articulatory characteristic that make the difference. The problem with Ladefoged's features and with any multivalued features is that rules written with them become terribly complex and very difficult to write.

I propose to distinguish between binary and multivalued features here. Not only does this distinction preserve the linguistic insight to which I have referred, but also it draws the generative stock of tools closer to the structuralist stock and thereby gives a device which is more appropriate to an approach which explicitly recognizes the need for an autonomous phonemic level in the description of some languages and a systematic phonemic level in the description of other languages. Phonemic charts (the vowel 'triangle' or 'quadrangle' and consonantal articulatory charts) regularly assign at least three levels of height to vowels, and three lateral positions (front, central, back) for vowels. These distinctions make considerable sense especially in the description of Chinese, and there is no reason to exclude them simply because the recent use of distinctive features has come from an approach to linguistics which has tended to use binary features.

The problem of designing rule conventions that can use multivalued features is important. I certainly do not suggest that any rule conventions of my own invention will solve problems that have remained unsolved by others.

However, it seems to me that some ad hoc conventions which render multivalued features useable are not necessarily more awkward than the conventions needed to make binary features representing multivalued articulatory characteristics useable within a strict binary framework. The following ad hoc conventions will be used here.

1 Hi	=	Lowest level of Height
2 Hi	=	Second lowest level of Height
1,3 Hi	=	Vowels with either the third or the first degree of Height
> 1Hi	=	Vowels with degrees of Height greater than the lowest
< 2Hi	=	Vowels with degrees of Height less than the second level.

Obviously, 'alpha' rules which pair binary feature values cannot be used with the plain multivalued features. But alpha rules can be used with the 'greater thané and 'less than' symbolism because these give binary divisions of the several values.

Universal vs. language-specific features. It is implicitly (if not explicitly) assumed in most linguistic theories that any articulation that is required for a single language must be considered part of a universal stock of articulatory possibilities, and that the distinctive features motivated by that artéculation must be considered a part of a universal stock of features. This assumption makes obvious sense. Unless a universal stock includes all of the features that one needs to drawn on to describe any language, the term 'universal' makes no sense. All of the features needed for the description of any language should therefore be able to be drawn from a universal stock.

However, it is useful to recognize specific combinations of features for specific languages. In the case of Chinese, it is more illustrative of the operation of the language as a whole to recognize that vowel rounding and consonantal labial closure are a common feature that it is to differentiate between them because the two gestures are physically quite different though they both employ the same articulatory organ. The reason for this is the labial dissimilation constraint mentioned earlier, which prohibits in most dialects a Final with a rounded principal vowel and a labial consonant. In this treatment,r the feature [Labial] will be used to describe this special Chinese characteristic. The features to be used here will now be described.

Front. Abbreviated F Applies to both consonants and vowels.

Multivalued: 3 degrees:

3 F = Front

2 F = Central

1 F = Back

The application of these three degrees of lateral position is normal With regard to vowels, and will be followed here. The application of these degrees of Frontness to Final consonants will be as follows:

3F		1F	
m	n	ŋ	
p	t	k	(?)

The reason for this division is that the four Front consonants generally follow the same vowels, while the back consonants follow other vowels.

Labial. Abbreviated Lab. Binary. Applies to both consonants and vowels. For vowels, this feature will be used to describe consonants with a labial closure. In the dialects taken up below, this is only a binary feature. All segments are either labial or nonlabial. But in some dialects not to be treated here (e.g., Po Pei Cantonese), it is necessary to recognize three degrees of labiality because Rimes such as ɔm,ɔp are permissible and even Initial-Final combinations like fɔm are permissible in some (e.g., some dialects of Hakka). In such cases, there needs to be a recognition of complete labiality, partial labiality, and no labiality.

Nasality. Abbreviation Nas. Binary. Applies to consonants and vowels. In reference to consonants, this feature will be used to distinguish the sets

m n ŋ

from the homorganically articulated

p t k

In reference to vowels, this feature will be used to distinguish distinctive nasalized vowels from oral vowels.

Height. Abbreviation Hi. Applies to vowels only. Multivalued: 4 degrees. In fact, three degrees would be sufficient for the analysis of the dialects undertaken here. However, as Height requires 4 degrees for the analysis of some languages and thus 4 degrees are part of the universal stock (Ladefoged 1971.93), it is convenient to keep the fourth degree (highest) especially reserved for the vowel [ɿ] which must be given Rimemic status in Hakka.

Phonetic Height. One of the many problems in talking about any 'phonetic' level of linguistic description is that allophones of a given phonological unit may be described as differing in fractional degrees of a feature which is defined with absolute quantities at the phonological level. Whether one uses binary or multivalued features, a phonological statement will distinguish all phonological units by absolute quantitative differences in respect of the relevant features. But, even though the phonetic level is also an abstraction, these absolute differences may disappear.

A relatively simple instance of this phenomenon occurs in a language where there are distinctive nasalized vowels so that

V	V
[-Nas]	[+Nas]

contrast. If in that language, there is a tendency for vowels to be partially nasalized in the immediate environment of a nasal consonant, then there can be two results. If there is no distinction between nasalized and non-nasalized vowels in the environment of a nasal consonant, then there is an ordinary case of neutralization. But if there is a distinction, then phonetic degrees of nasalization become important, for it is necessary to indicate phonetically the difference between

/mã/ ⟶ [mã] and /ma/ ⟶ [mã]

A more complex case comes in relation to vowel height. Although there may be only three distinctive vowel heights, a given language may have many phonetic levels of height. In the present system, where only those features which are needed to describe the processes of a given language will be used, it is common for the phonetic versions of various phonological vowels to differ only in terms of height variation. This problem can be avoided by adding

another feature to the system which specifically accounts for such phonetic variation. However, the addition of such an extra feature is simply an avoidance of the implications of the decision to operate within only the needful features. To solve this problem, I choose to indicate relative differences that fall between absolute phonological quantitative differences by adding a 'plus' or 'minus' after a given level. Thus,

[3Hi] ⟶ [3-Hi]/ ....

means that a phonological vowel is reflected by a lower variant on the phonetic level under certain conditions.

The feature Tense. In the list of features that I have just given, I have not posited any feature [Tense]. This frequently used feature is immensely helpful in distinguishing vocalic segments and sometimes is even used to distinguish consonantal segments (e.g., in Walton 1971). For the present essay, to posit a feature [Tense] would be a great convenience. In the analysis of Cantonese, such a feature would serve to distinguish all the phonetic variants of phonological vowels. While in the other dialects, it would be less widely used, this feature would incorporate many characteristics that are expressed less economically in the present system. Unfortunately, however, I cannot figure out what 'tenseness' means. In Cantonese, tenseness is obviously correlated with length, as Kao (1971.43-58) shows experimentally. But, whether regarded as length or tenseness, this feature is never the sole difference between vowels even on a phonetic level, for there is always a 'paired' (term borrowed from W. Wang 1968) difference in height, and perhaps a difference in frontness (McCoy 1966.122-24). Consequently, although the relative length is easily ascertained, it is difficult to ally this characteristic with a common feature; whereas, in contrast, the relative difference in height, which is already needed in the description, is clearly there.

In other dialects there seem to be tense and lax vowels implied in the orthography of the recordings (e.g., Lo 1955). But, in the absence of a clear articulatory definition of tenseness, it is difficult to determine if the symbols represent any concrete difference.

Ladefoged (1971.96ff) justifiably criticizes Chomsky and Halle (1968) for using this feature to cover a multitude of unrelated articulatory gestures. In contrast, Ladefoged himself attempts to give a precise definition to the term 'tense': 'tongue hollowed/no intrinsic tongue contraction/tongue bunched (1971.93)'.

I have been unable to single out a common characteristic among all the vowels that might be called tense in the dialects to be described here. It is not in the spirit of this kind of analysis to posit a feature which serves as a collection of disparate characteristics simply to render the device elegant. For this essay, I shall not use any feature of tenseness. However, I suspect that further refining work should make this feature a valuable one in Chinese linguistics in the future.

4.3 A Rimemic Analysis of Cantonese

The Cantonese dialect as spoken in Hong Kong is a peculiarly simple example of the dialects that are amenable to Rimemic analysis. In contrast to the majority of Chinese language, Cantonese can be analyzed as having no medials. While there is a prevocalic [w-] in some syllables, this phone is restricted to occurring only after velars [k, k'], and with no initial [Ø]. To preserve a canonical shape which totally excludes medials, it is useful to assume that among the Initials of Cantonese there are the following two:

kw-

kw'-

Assuming these labiovelar Initials, we can state the canonical shape of Cantonese as follows:

$$\text{Syl.} = \overset{T}{I\ F}$$

$$I = \text{a set of consonants, or [Ø]}$$

$$F = R$$

$$R = V_1\ (C^{V_2})$$

$$V_1 = a{:},\ ɔ,\ i{:} \quad u{:},\ œ{:}\ ɔ{:},\ e{:}y{:}$$

$$V_2 = \breve{i},\ \breve{u}$$

$$C = m,\ n,\ ŋ,\ p,\ t,\ k$$

Table 4.31 gives the Rimemes of Cantonese. There are 52 Rimemes, excluding the syllabic nasals ([m̩ ŋ̩]) which will not be considered in any dialect. Of the 52, one [ə] may be questioned. It certainly occurs as a full Final, but only in sentence-final particles like

[lə˧]

[tsə˧ma˨˩]

[lə˧ ma˨˩]

[ə˧ ma˨˩]

It is common to treat the instances of [ə] in such forms as variants of /a:/. However, since it is necessary anyway to set up separate /ə/ vs. /a:/ (often written as /a/ vs. /aa/), such a rendering is not phonemics, but morphophonemics, and it assumes that somehow the [ə] in such forms and only in such forms, derives from an underlying /a/. In the absence of much more information about sentence-final particles than is now available, it does not seem wise to exclude the Final [ə] from a phonology of Cantonese.

It is useful to note at this point that excluding the Final would provide a phonological nicety which is otherwise absent. If [ɵ] is not allowed as a full Final, then the single-vowel Finals are:

a:	u:	y:
ɔ:	œ:	
i:	e:	

all of which are demonstrably longer in all occurrences than are the remaining phonetic vowels:

ɔ	u
i	ɵ

A rule predicting open syllables could therefore be written which would state simply that only longer vowels occur in open syllables. Since it has been decided not to use length or tenseness as a phonological feature in this treatment, such a rule would be out of place. That [ə] does in fact occur as a Final is additional reason for not using the feature.

Table 4.32 gives the features for Final segments in Cantonese. The following sequence rules specify the Rimemes, with Table 4.33 indicating which rules eliminate which possible combinations of vowels and consonants.

CantSeq.	1)	Labial vowels are not followed by labial consonants in the same syllable.	*V [+Lab]	C# [+Lab]
CantSeq.	2)	Of the labial vowels, only the low labial vowel [ɔ:] is followed by the labial offglide [u̯].	*V [+Lab >1 Hi]	V# [+Lab]

CantSeq. 3) High front vowels are not followed by the front offglide.

*V	V#
[3Hi, 3F]	[3F]

CantSeq. 4) The mid front vowel is not followed by front consonants or the back offglide.

*V	C
[2Hi, 3F, -Lab]	{[3F], V, [1F]}

CantSeq. 5) The high front rounded vowel is not followed by back consonants

*V	C#
[3Hi, 3F, -Lab]	[1F]

The Rimemic rules which transform the Rimemes into phonetic Finals are given below. This rule maps Table 4.31 onto Table 4.34.

CantRme. 1) The nonlow, noncentral vowels are lowered before back consonants.

$$*V \rightarrow [-Hi] \;/\; \begin{bmatrix} 1,3F \\ >1Hi \end{bmatrix} \_\_\; C\#$$

CantRme. 2) The final consonants become stops under the checked tone.

$$C \rightarrow [-N] \;/\; [+N] \_\_\; T\ (\text{checked})$$

There are several implications of this analysis that need to be stated. As they are similar to concerns relevant to other dialects to be analyzed in this essay, it will be convenient to treat these matters here and not repeat them below.

Obviously, the analysis of Cantonese Finals just given is very close to a phonemic analysis, and in fact the phonological segments in this analysis do not differ from that of McCoy (1966). Why then is a traditional phonemic analysis not used? The difference between this analysis and that of McCoy is not one of 'depth'. That is, these two are equivalent in their use of distributional

data as the main criterion for assigning segmental phones. Neither, in fact, does this analysis differ significantly from those of T. Cheng and O.rY. Hashimoto, except for the refusal in the present analysis to use the length-tense distinction to distinguish sets of vowels. As I have tried to show above, both of those analyses are essentially phonemic in their results, despite the use of generative apparatus.

The difference between the present treatment and the earlier ones is that the syntagmatic arrangements of phones are considered of primary importance. The rules which specify these syntagmatic arrangements are ordered before the Rimemic rule which changes the features of the vowel phones in order to make it strikingly clear that in this language it is possible to talk of predictable combinations in a way that is not possible in other languages. In effect, this is what a Rimemic analysis is.

A very important implication of the difference between this analysis and a strict autonomous phonemic analysis or strict generative analysis is that the present analysis serves as a transpositional device rendering the Rime portion of the syllable comprehensible in a segmental framework. I use the term 'transpositional' here in two senses. First, this system obviously provides a bridge between the traditional analysis discussed in 4.1 above and the modern concern with segments. While using segments in the Rime, this analysis specifies through its Sequence Rules which Rimes occur and which do not occur because of constraints governing the concatenation of phones in the Rime. In other words, this system inherently shows why the tradition considered the Rime as a unit. Secondly, this system provides a bridge between languages for which segmental techniques were developed and a language wholly unlike those. In this sense 'transpositional' has an explicit universal meaning. All linguistic analyses are in fact transpositional in that they transpose one language into categories

which are assumed to be of universal import. My arguments against the unleavened use of segmental analyses were based on the fact that autonomous phonemic and generative analyses render all languages like those of Western Europe without accounting for typological differences in a significant way. I claim that the present analysis at least partially solves the problem. In doing so, this analysis treats the Rime as a single unit by specifying the phones and combinations of phones that occur in the language.

The final matter for consideration is simply to note that units for specifying the concatenation of Initials with Finals and Tones with Finals in syllables is necessarily expressed in reference to whole Rimes and not in reference to the individual phones within the Rimes.

TABLE 4.31

Cantonese Rimemes

	∅	-i̯	-u̯	-m	-n	-ŋ
a:	a:	a:i̯	a:u̯	a:m	a:n	a:ŋ
ɔ	ɔ	ɔi̯	ɔu̯	ɔm	ɔn	ɔŋ
i:	i:		i:u̯	i:m	i:n	i:ŋ
u:	u:	u:i̯			u:n	u:ŋ
œ:	œ:	œ:i̯			œ:n	œ:ŋ
ɔ:	ɔ:	ɔ:i̯	ɔ:u̯		ɔ:n	ɔ:ŋ
e:	e:	e:i̯				e:ŋ
y:	y:				y:n	

TABLE 4.32

Features for Final Segments in Cantonese

Vowels

	Lab	Hi	F
a:	-	1	2
ɔ:	-	2	2
i:	-	3	3
u:	+	3	1
œ:	+	2	1
ɔ:	+	1	1
e:	-	2	3
y:	+	3	3

Consonants

	Lab	F	Nas
m	+	1	+
n	-	1	+
ŋ	-	3	+
p	+	1	-
t	-	1	-
k	-	3	-

TABLE 4.33

Cantonese Rimemes with Blanks Specified

	∅	-ĭ	-ŭ	-m	-n	-ŋ
a:	a:	a:ĭ	a:ŭ	a:m	a:n	a:ŋ
ɔ	ə	əĭ	əŭ	əm	ən	əŋ
i:	i:	(3)	i:ŭ	i:m	i:n	i:ŋ
u:	u:	u:ĭ	(2)	(1)	u:n	u:ŋ
œ:	œ:	œ:ĭ	(2)	(1)	œ:n	œ:ŋ
ɔ:	ɔ:	ɔ:ĭ	ɔ:ŭ	(1)	ɔ:n	ɔ:ŋ
e:	e:	e:ĭ	(4)	(4)	(4)	e:ŋ
y:	y:	(3)	(2)	(1)	y:n	(5)

TABLE 4.34

Cantonese Rimes
(=Cantonese Phonetic Finals)

	∅	-ĭ	-ŭ	-m	-n	-ŋ	-p	-t	-k
a:	a:	a:ĭ	a:ŭ	a:m	a:n	a:ŋ	a:p	a:t	a:k
ɔ:	ə	əĭ	əŭ	əm	ən	əŋ	əp	ət	ək
ɔ:	ɔ:	ɔ:ĭ	ɔ:ŭ		ɔ:n	ɔ:ŋ		ɔ:t	ɔ:k
i:	i:		i:ŭ	i:m	i:n		i:p	i:t	
ɪ						ɪ:ŋ			ɪk
u:	u:	u:ĭ			u:n			u:t	
ʊ						ʊŋ			ʊk
œ:	œ:	œ:ĭ				œ:ŋ			œ:k
œ					œn			œt	
e:	e:	e:ĭ				e:ŋ			e:k
y:	y:				y:n			y:t	

Chapter Five

ATTEMPTED RIMEMIC ANALYSES OF FOURr CHINESE DIALECTS: the spectrum of dialects

5.1 Introduction

In this chapter I shall attempt to apply the type of analysis used for Cantonese in the previous chapter to the Hakka, Amoy, Mandarin, and Lungyen dialects. All of these dialects have Medial onglides in their Finals. All of them require some accounting for variant phonetic shapes of the Rimemic vowel. The presence of Medials and the need for two levels of description for the vowels are, of course, related. The 52 Cantonese Finals (excluding the syllabic nasals) are all Rimes. In the dialects to be discussed in this chapter, the number of Rimemes is much smaller than that of the Finals, because a given Rimeme may be included in two or more Finals.

I shall take up the dialects in the order: Hakka, Amoy, Mandarin, Lungyen. This order is determined by the relative amenability of the respective dialects to a Rimemic analysis. The Hakka dialect is, with minor exceptions, a type case of the Rimemic analysis. The Amoy dialect is clearly Rimemic in nature, but it illustrates several exceptions from the strict Rimemic analysis. While Mandarin shows several similarities to the Rimemic dialects, it is best analyzed in a system that shows no distributional differences among vowels at the phonological level, and is therefore not a Rimemic dialect. Lungyen is almost devoid of Rimemic characteristics.

At the end of the chapter I shall propose a scheme for expressing the relative differences among these dialects.

Note: The tables for each of the following discussions follow the relevant discussion. For ease of reference, the contents and numbers of the charts correspond. According to the final digit in the chart numbers, the contents are as followsr

1: Rimemes

2: Feature specifications

3: Rimemes followed by Medials

4: Rimemic Finals

5: Rimemes with blanks specified

6: Phonetic Finals.

Charts with final digits higher than 6 contain material of special reference to a given dialect. Phonetic symbols used for Hakka, Amoy, and Lungyen are taken from the source cited for information about those dialects.

5.2 Hakka

The data on Hakka are largely taken from Mantaro Hashimoto's recent study of the Hakka Dialect (M. Hashimoto 1973). I have compared Hashimoto's record of the Finals with those given in Yuan (1960), Tung (1948) and the Chinese Dialect Vocabulary List (Peking University Department of Chinese 1962). There is considerable disagreement among these sources as to the actual number of phonetic Finals in the Hakka dialect. The numbers range from 66 (Yuan) to Hashimoto's 75. I have elected to use Hashimoto's data on the grounds that they come from the most recent study of the language, and because it seems generally preferable to value a larger variety of data over a smaller variety. A further consideration has been that, if the rules for a Rimemic analysis

cover the larger variety of data, they should (with minor changes) be able to cover the smaller variety, so long as both sets show equal balance of distribution (which, in fact, they do).[1]

The Rimemes of Hakka are given in Table 5.21.[2] By a quick glance at Table 5.21 one can ascertain the basic facts of Hakka Rimemes. There are 38 Rimemes. Within the Rimemes the following sequence constraints obtain. Labial vowels do not precede labial consonants or offglides. Front vowels do not precede back consonants. Front vowels are followed by back offglides; back vowels are followed by front offglides. The vowel [ɿ] is followed by no offglide.

These observations can be formalized in simple sequence structure rules. For that purpose, the features for the phones in Hakka Rimemes are given in Table 5.22r The Hakka syllable and component parts are defined as follows:

$$\text{Syl.} = I \overset{T}{F}$$

$$F = (M)\ \text{Rme}$$

$$M = \breve{u},\ \breve{i}$$

$$\text{Rme} = V_2\left(\begin{matrix}C\\V_3\end{matrix}\right)$$

$$V_2 = ɿ,\ i,\ E,\ a,\ u,\ ɔ$$

$$V_3 = \breve{u},\ \breve{i}$$

$$C = m,\ n,\ ŋ,\ b',\ d',\ g'$$

Note: In this and the following discussions I shall use the symbol $\underline{V}$ to represent Medials in the rules, and shall add subscripts to the vowels when ambiguity might arise.

---

[1] In addition to the sources cited, I have had some hours of contact with the Meihsien dialect of Hakka in a phonology class directed by Professor William S. Y. Wang (LSA Summer Institute, 1973).

[2] I have substituted the symbol [ɿ] for Hashimoto's [ɻ] in order to indicate more clearly the vocalic character of this segment.

TABLE 5.21

Hakka Rimemes

	∅	-ĭ	-ŭ	-m	-n	-ŋ	-b̍	-d̍	-g̍
ɿ	ɿ			ɿm	ɿn		ɿb̍	ɿd̍	
i	i		iŭ	im	in		ib̍	id̍	
E	E		Eŭ	Em	En		Eb̍	Ed̍	
a	a	aĭ	aŭ	am	an	aŋ	ab̍	ad̍	ag̍
u	u	uĭ			un	uŋ		ud̍	ug̍
ɔ	ɔ	ɔĭ			ɔn	ɔŋ		ɔd̍	ɔg̍

TABLE 5.22

Feature Specifications for the Hakka Rimemic Vowels

Vowels

	Hi	Front	Lab
ɿ	4	3	-
i	3	3	-
E	2	3	-
a	1	2	-
u	3	1	+
ɔ	1	1	+

Consonants

	Lab	Nas	Front
m	+	+	3
n	-	+	3
ŋ	-	+	1
b̍	+	-	3
d̍	-	-	3
g̍	-	-	1

HkSeq.	1) Labial vowels are not followed by labial consonants or offglides.	*V [+lab]		$\begin{Bmatrix} V \\ C \end{Bmatrix}$ # [+lab]
HkSeq.	2) Front vowels are not followed by back consonants.	*V [3F]		C # [1F]
HkSeq.	3) Front vowels are not followed by front offglides.	*V [3F]		V # [3F]
HkSeq.	4) The vowel /ɿ/, is not followed by offglides.	*V [4Hi]		G #

Table 5.25 lists the Rimemes of Hakka with the blanks of nonoccurring Rimemes filled with numbers corresponding to these rules.

Table 5.23 lists the Rimemes of Hakka preceded by occurring Medials.

The following rules account for the occurrence of Medials.

HkSeq.	5) Hi Front vowels are not preceded by Medials.	*V	$\begin{bmatrix} V \\ 3Hi \\ 3F \end{bmatrix}$	$\begin{matrix} V \\ (C) \end{matrix}$ #
HkSeq.	6) Labial onglides are not followed by labial consonants or glides.	*V [+lab]	V	$\begin{Bmatrix} C \\ V \end{Bmatrix}$ # [+lab]
Note: This rule can be collapsed with HkSeq. 1).[3]				
HkSeq.	6a) Labial vocalic segments (= vowels or semivowels) are not followed by labial ending consonants or glides.	*V [+lab]	(V)	$\begin{Bmatrix} V \\ C \end{Bmatrix}$ # [+lab]

---

[3] In general I have not collapsed rules even when manipulation would allow it because a mere economy of rules (like a mere economy of symbols in an autonomous phonemic analysis) is by itself not terribly relevant to the linguistic task. The collapsing of HkSeq. 1) and 6) is simply an illustration of what can be done.

TABLE 5.23

Hakka Rimemes Preceded by Medials

	ĭ-	ŭ-
ɿ		
i		
E	ĭE	ŭE
ɑ	ĭɑ	ŭa
u	ĭu	
ɔ	ĭɔ	ŭɔ

TABLE 5.24

Hakka Rimemic Finals

	ĭ-	ŭ-	ĭ-ĭ	ĭ-ŭ	ŭ-ĭ	ŭ-ŭ	ĭ-m	ĭ-n	ĭ-ŋ	ŭ-m	ŭ-n	ŭ-ŋ
E	ĭE	ŭE		ĭeŭ				ĭEn			ŭEn	
ɑ	ĭɑ	ŭɑ	ĭaɪ	ĭɑŭ	ŭɑĭ		ĭɑm	ĭɑn	ĭɑŋ		ŭɑn	ŭɑŋ
u								ĭun	ĭuŋ			
ɔ	ĭɔ	ŭɔ	ĭɔĭ					ĭɔn	ĭɔŋ		ŭɔn	ŭɔŋ

TABLE 5.25

Hakka Rimemes with Blanks Specified

	∅-	-ĭ	-ŭ	-m	-n	-ŋ
ɿ	ɿ	(4)	(4)	ɿm	ɿn	(2)
i	i	(3)	iŭ	im	in	(2)
E	E	(3)	Eŭ	Em	Enr	(2)
a	a	aĭ	aŭ	am	an	aŋ
u	u	uĭ	(1)	(1)	un	uŋ
ɔ	ɔ	ɔĭ	(1)	(1)	ɔn	ɔŋ

HkSeq. 7) The hi labial vowel is not preceded by a Medial in open syllables.

*V V_2 #

[3Hi, +lab]

HkSeq. 8) The hi labial vowel is not preceded by a labial Medial.

*V V $V_{(C)}$ #

[+lab] [3Hi, +lab]

HkSeq. 9) The Front onglide does not precede a labial ending except before a low vowel.

*V V C #

[+F] [>1Hi] [+lab]

The unrounded low central vowelr<u>a</u> and the high back rounded vowel <u>u</u> have contextual variants, and the nasal endings become stops under the checked tone. These variants can be accounted for by the following ordered Rimemic rules.

HkRmer 1) <u>a</u> is fronted between the front glide and a front nonlabial consonant.

V V

[1Hi, 2F] → [3F] / V ____ C #

[3F] [3F, -lab]

HkRme 2) <u>a</u> is raised before front nonlabial ending consonants and off-glides.

V V

[+Hi, 2F] → [1+Hi] / {V, C} [3F, 1-lab]

HkRmer 3) <u>u</u> is lowered before back consonants.

V V

[3Hi, +lab] → [3-Hi] / ____ C #

[1F]

HkRme 4) The Final consonants become stops under the checked tone.

C T (checked

[+N] → [-N] / ____

It will be noticed that the input of HkRme.2 is not the output of HkRme.1, but that the two rules have the same input. It is important to notice this. For the fronting rule (HkRme 1.) operates only between the high front Medial and the front nonlabial consonants, while the simple raising rule (HkRme. 2.) operates for all other succeeding nonlabial front segments. Thus we get the following distribution

aĭ	ĭaĭ	an	ĭEn	ĭEd́
			ad́	

We do not get: *ĭEĭ.

The Final ĭɔd́ has been included in Table 5.26 within parentheses and with an asterisk. Hashimoto does not include this Final in his record of Chinese Finals. Yuan (1960.150) includes it with a note that it is very rare. If Yuan's data are accepted, then we can consider the arrangement of Finals to be distributionally complete. Otherwise, we must recognize one exception to the regular concatenating of Medials with Rimemes.

A further potential exception is the phonetic realization of un and ut. For Hashimoto, these Rimes are phonetically realized as: [un, ut]. I have heard them as [uən, uᵊt]. Hashimoto's record is accepted here, and it naturally makes the pattern of the Finals much more complete than if we considered [uən] and [uət] as Finals in their own right. However, the discrepancy points to a problem that recurs in the study of Chinese dialects. In some dialects high (and especially high-front) vowels when followed by a consonant are phonetically diphthongized into the high vowel plus a phonetically mid central vowel of varying strength. This problem is related to the feature of relative height which I have adopted for this study and to the feature of tenseness, which I have rejected. In my experience, among Chinese speakers who maintain a consistent phonetic distinction between vowels [i] vs. [ɪ] and [u] vs. [ʊ] (depending on the distribution in a given dialect) the relatively higher vowels,

TABLE 5.06

Hakka Phonetic Finals

	ø	ĭ-	ŭ-	-ĭ	-ŭ	ĭ-ĭ	ĭ-ŭ	ŭ-ĭ	-m	-n	-ŋ	ĭ-m	ĭ-n	ĭ-ŋ	ŭ-m	ŭ-n	ŭ-ŋ	-b́	-d́	-ǵ	ĭ-b́	ĭ-d́	ĭ-ǵ	ŭ-b́	ŭ-d́	ŭ-ǵ
ɿ	ɿ								ɿm	ɿn								ɿb́	ɿd́							
i	i				iŭ				im	in								ib́	id́							
E	E	ĭE			Eŭ		ĭEŭ		Em	En			ĭEn			ŭEn		Eb́	Ed́			ĭEd́			ŭEd́	
æ													ĭæn									ĭæd́				
a				aĭ		ĭaĭ		ŭaĭ		an						ŭan			ad́						ŭad́	
ɑ	ɑ	ĭɑ	ŭɑ		ɑŭ		ĭɑŭ		ɑm		ɑŋ	ĭɑm		ĭɑŋ			ŭɑŋ	ɑb́		ɑǵ	ĭɑb́		ĭɑǵ			ŭɑǵ
u	u			uĭ						un			ĭun						ud́			ĭud́				
ʊ											ʊŋ			ĭʊŋ						ʊǵ			ĭʊǵ			
ɔ	ɔ	ĭɔ	ŭɔ	ɔĭ		ĭɔĭ		ŭɔĭ		ɔn	ɔŋ		ĭɔn	ĭɔŋ		ŭɔn	ŭɔŋ		ɔd́	ɔǵ		ĭɔd́	ĭɔǵ		ŭɔd́	ŭɔǵ

[i] and [u], may be diphthongized before consonants and particularly before nasals, but the lower (and laxer?) vowels generally are not so diphthongized. In contrast, where this distinction is not maintained by a speaker, my impression is that diphthongization of the one vowel (ideally [i] and [u], though the phonetic variations, are, of course many) generally distinguishes the difference between ending front and back consonants. This seems to be a crossdialectal phenomenon in Chinese and has many variables which I have not studied. It would seem to have something to do with the phonetic reality behind the recurrent change in Chinese history of the velar consonantal endings *ŋ*k torn and t after high and front vowels in some dialects (cf. 6.2).

The relevance of these phonetic impressions to the Rimemic analysis is that at some point in some dialects the intrusion of a mid central vowel between the Rimemic vowel and the ending consonant should force us to establish new Rimemes, (*ən, *ət in the case of Hakka) and consider the phonetic sequences [uən, uət] as instances of these new rimes preceded by a high back Medial. Once such a step is taken, the patterning of Rimemes becomes more complex, and at a certain point the Rimemic analysis must be abandoned.

The criteria for determining whether or not to consider instances of intrusive vowels as new Rimemic vowels will be: 1) If the intrusive vowel seems to represent an instance of individual variation, the presence of the vowel will not by itself be taken as a reason for establishing new Rimemes. 2) If the intrusive vowel is matched by general lapses in the Rimemic pattern, then the presence of the intrusive vowel will be taken as a new Rimeme and it will be asked whether the Rimemic analysis is suitable to the dialect in question.

By these criteria, I will consider Hakka to be a Rimemic dialect and /un/ and /ut/ to be Rimemes.

5.3 Amoy

The information on Amoy used here comes from Lo Ch'ang-p'ei's study of the Amoy dialect (Lo 1956).[4] The well known historical distance of Min dialects from the two dialects discussed previously is reflected in the structure of the Amoy Final. There are well distinguished Rimes, and they pattern with sufficient regularity according to the features of height, frontness and labiality that we can consider Amoy a Rimemic dialect. However, the patterning of the onglides, and the nasalized vowels, complicates the picture. Obviously one must take the synchronic language as it is, and in a real analysis one cannot separate historical layers, since the analysis must reflect the whole language. However, it is useful to keep the different historical development in mind as Amoy is examined. Typologically Amoy falls somewhere between Hakka and Mandarin.

Table 5.31[5] shows a fairly regular Rimemic pattern. Obviously, there is a labial dissimilation constraint, and for the back vowels a parallel relationship of vowel height and following consonant frontness. The mid vowels

---

[4]In addition to this source, I have had some hours of contact with a related Taiwanese dialect in a dialect field methods course directed by Professor John McCoy.

[5]Table 5.21 and subsequent tables do not show any Finals ending in [ʔ], although there are such Finals in Amoy. Lo does not include these Finals in his table of Finals (1956.10,14) because he treats the final [ʔ] as the mark of the ju (˨) Tone, and therefore predictable in open syllables. However, his transcription of Amoy has a segmental indication of each Tone, so [ʔ] is indicated by q except where [-p, -t, -k] already are present. It seems to me that the elimination of glottal Finals in the linguistic record of Finals makes good sense because it represents the ju Tone as a Tone rather than as a segmental phone. HoWever, this step renders Lo's system rather inconsistant in that the ju Tone should be indicated only by Tone everywhere if it is to be so indicated for open syllables. Thus, [-p, -t, -k] endings should be indicated as [-mq, -nq, -gq]. Since it makes no difference to the Rimemic analysis not to have Tone correlations indicated segmentedly, I have followed Lo's system and not listed the glottal Finals, but have made the system consistant by treating all checked syllables as a concomitant of Tone.

TABLE 5.31

Amoy Rimemes

	Ø	-ɪ	-ʊ	-m	-n	-ŋ
i	(~) i			im	in	iŋ
e	(~) e					
a	(~) a	(~) aɪ	(~) aʊ	am	an	aŋ
u	u				un	
o	o					
ɔ	(~) ɔ					ɔŋ

Note: The symbolr(~) indicates that this Rime occurs both in a nasalized and a nonnasalized form.

o,r e take no endings, and onlyrɑ takes offglides. These observations can be incorporated in simple rules.

AmSeq. 1)	Mid vowels take no final consonants or offglides.	*V [2Hi]	$\left\{\begin{matrix}V\\C\end{matrix}\right\}$	#
AmSeq. 2)	Back vowels are not followed by offglides.	*V [1F]	V	#
AmSeq. 3)	Labial vowels are not followed by labial consonants.	*V [+Lab]	C [+Lab]	#
AmSeq. 4)	Back vowels are followed by consonants with a front feature of the same value as the height feature of the vowel.	*V $\begin{bmatrix}1F\\ \alpha 1Hi\end{bmatrix}$	C[6] [-α1F]	#
AmSeq. 5)	The high front vowel is not followed by offglides	*V $\begin{bmatrix}3F\\3Hi\end{bmatrix}$	V	#

The notation $\overset{(\sim)}{V}$ in Table 5.31 indicates that a given Rimeme occurs in both a nasalized and a nonnasalized form. Nasalization does not occur before consonants and for the back vowels occurs only with the low back vowel. Expressed in Rules, these constraints are:

AmSeq. 6)	Nasalized vowels do not occur before consonants.	*V [+Nas]	C	#
AmSeq. 7)	The high and mid back vowels do not have nasalized forms.	*V $\begin{bmatrix}+Nas\\1F\\1Hi\end{bmatrix}$		

---

[6]Occasionally it is possible to use alpha rules with multivalued features when the distribution of the segments is such that the rule in fact excludes all nonoccurring combinations. Given the extensive effect of the multivalued features, the excluded combinations may potentially be very great in number. In AmSeq. 4), excluded combinations do not in fact occur.

There is an immediate problem in the analysis when we turn to accounting for the Medials in front of the Rimemic vowels. In contrast to Hakka, the Medials do not occur with every Rimeme of a given vowel. Except for the ubiquitous<u>ɑ</u> vowel, the concatenation of glides must be constrained by reference to the ending segment. For open syllables this phenomenon is not difficult to incorporate in a rule. Glides occur before high and mid vowels only in open syllables, and the fronting feature of the glide is opposite to that of the principal vowel.

AmSeq. 8)	Glides occur before high and mid vowels only in open syllables.	*V	V	$(^{V}_{C})$	#
		[3F]	[3F 1Hi]		
AmSeq. 9)	Glides before high and mid vowels have a front feature opposite to that of the principal vowel.	*V	V	$(^{V}_{C})$	
		[1F]	[1F >1Hi]		

The difficulty comes in the two cases of glides preceding consonants when the principal vowel is not <u>ɑ</u>. These are: <u>ɪɔŋ ɪɔk</u>. These seem to be special cases, and for that reason appear tormilitate against the regularity of sequence constraints. Their condition, however, is easily stated in a rule:

AmSeq. 10)	The low back vowel takes onglides only before consonants.	*V	V	V#
			[1F 1Hi]	

The most serious problems and the genuine irregularities, however, come in trying to account for the forms of <u>e</u> and <u>u</u> with and without their respective onglides.

In Lo's recording, the front mid vowel e does not have a nasalized counterpart when the u- onglide precedes it. That is, we have

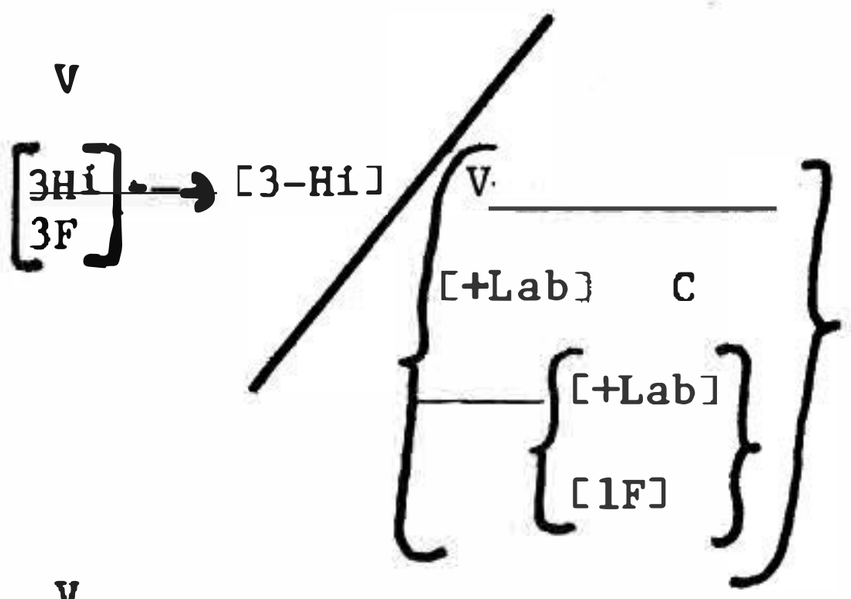
ue *uẽ .

If that is the case, there is an unresolvable gap in the pattern.

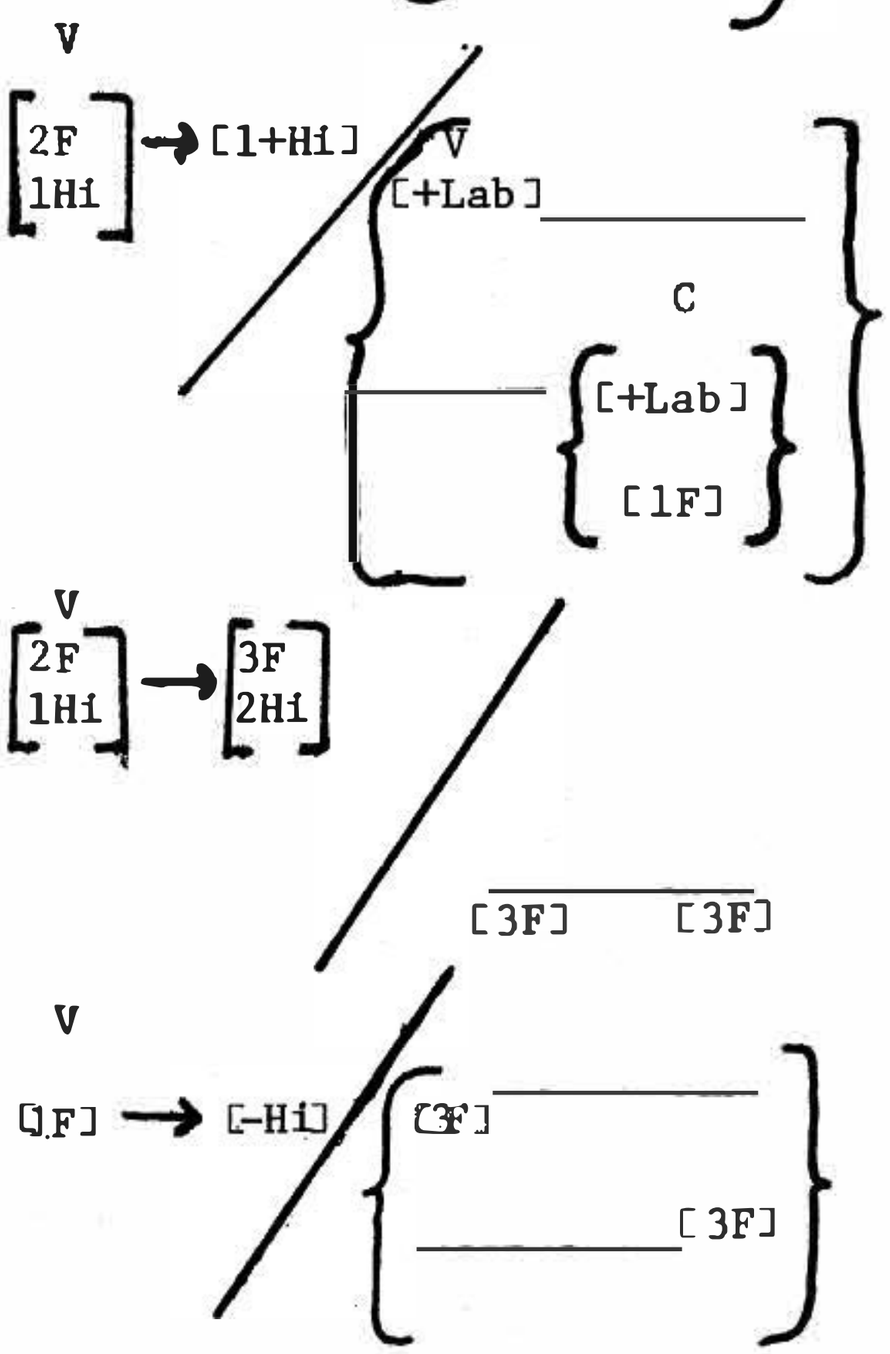
The opposite phenomenon occurs withru, where u has no nasalized counterpart, but ɪu does: ɪũ. There is no reasonable way to incorporate this fact into the Rimemic analysis.

It is when one comes to accounting for the phonetic shape of the Rimes plus medials that the Rimemic model begins to leak seriously. Rules can be written to account for the phenomena:

AmRme. 1) The high front vowel is lowered before labial and back consonants, or preceded by the labial onglide.



AmRme. 2) The low central vowel is raised before labial and back consonants, or preceded by the labial onglide.



AmRme. 3) The low central vowel is raised and fronted between two front segments.

AmRme. 4) Back vowels are lowered in the environment of a front segment.

Asrwith Cantonese and Hakka, a denasalization rule is required for the checked tones.

AmRme. 5) The Final consonants become stops under the checked tone.

$$C \quad T \text{ (checked)}$$
$$[+N] \longrightarrow [-N] \;/\; \_\_\_\_\_$$

But it will be immediately noticed that Rme 1) does not really yield the proper results for the /iŋ/ and /ik/ Rimes, which are:

[ɪəŋ] [ɪək]

This is similar to the problem discussed in the previous section with regard to Hakka. However, in Amoy there is less certainty that these phonetic versions are simply variants of ɪŋ and ɪk. I do not propose at this point to modify the rules stated so far to account for this phenomenon.

I take the two variants of i before back consonants to be genuine counterexamples to the Rimemic scheme as defined in Chapter IV. In that definition it was stated that the preconsonantal vowel is understood to be the principal vowel in a Rime. In the present case, while ɪə certainly could be a variant form of i, the extra presence of an onglide before ə makes the Rime in question a wholly new Final. Since there is no indication that this is simply a possible pronunciation among several free variants all of which center on ɪŋ ɪk, there seems to be no solution but to admit the problem which these Finals give to the analysis.

Together with the problems with nasalization and Medial placement stated above, the peculiar placement of the ɪəŋ and ɪək Finals militates against our terming Amoy a fully Rimemic dialect. Consequently, one must acknowledge the usefulness of the Rimemic analysis for the large majority of Finals and at the same time note that the Rimemic type of analysis is not wholly suitable

TABLE 5.32

Feature Specifications for Amoy Rimemic Segments

Vowels

	Hi	Front	Lab
i	3	3	-
e	2	3	-
a	1	2	-
u	3	1	+
o	2	1	+
ɔ	1	1	+

Consonants

	Front	Lab	Nas
m	3	+	+
n	3	-	+
ŋ	1	-	+
p	3	+	-
t	3	-	-
k	1	-	-

TABLE 5.33

Amoy Rimeme Vowels Preceded by Medials

	I-	U-
i		ui (#)
e		ue (#)
a	ia	ua
u	iu(#)	
o	io(#)	
ɔ	iɔ(C)	

TABLE 5.34

Amoy Rimemic Finals

	∅	ɪ-	ʊ-	ɪ-ɪ	ɪ-ʊ	ʊ-ɪ	ʊ-ʊ	-m	-n	-ŋ	ɪ-m	ɪ-n	ɪ-ŋ	ʊ-m	ʊ-n	ʊ-ŋ
i	(~) i		(~) ʊi					im	in	iŋ						
e	(~) e		ʊe													
a	(~) a	(~) ɪa	(~) ʊa		(~) ɪaʊ	(~) ʊaɪ		am	an	aŋ	ɪam	ɪan	ɪaŋ		ʊan	ʊaŋ
u	u	(~) ɪu							un							
o	o	ɪo														
ɔ	(~) ɔ									ɔŋ			ɪɔŋ			

TABLE 5.35

Amoy Rimemes with Blanks Specified

	Ø	-ɪ	-ʊ	-m	-n	-ŋ	-p	-t	-k
i	(~) i	⑤	⑤	im	in	iŋ	ip	it	ik
e	(~) e	①	①	①	①	①	①	①	①
a	(~) a	(~) aɪ	(~) aʊ	am	an	aŋ	ap	at	ak
ɑ	ɑ	ɑɪ	ɑʊ	ɑm	ɑn	ɑŋ	ɑp	ɑt	ɑk
u	u	②	②	③	un	④	⑤	ut	④
o	o	①	①	①	①	①	①	①	①
ɔ	(~) ɔ	②	②	③	④	ɔŋ	③	④	ɔk

TABLE 5.36

Amoy Phonetic Finals

	Ø	ɪ-	ʊ-	-ɪ	ɪ-ʊ	ʊ-ɪ	-ʊ	-m	-n	-ŋ	-p	-t	-k	ɪ-m	ɪ-n	ɪ-ŋ	ɪ-p	ɪ-t	ɪ-k	ʊ-m	ʊ-n	ʊ-ŋ	ʊ-p	ʊ-t	ʊ-k
i	(~) i								in			it													
ɪ			ʊɪ (~)					ɪm		ɪŋ	ɪp		ɪk												
e	(~) e		ʊe																						
E																		ɪEt							
ə																ɪəŋ			ɪək						
a	(~) a	(~) ɪa		(~) aɪ	(~) ɪaʊ	(~) ʊaɪ	(~) aʊ		an			at			ɪan										
ɑ			ʊɑ (~)					ɑm		ɑŋ	ɑp		ɑk	ɪɑm		ɪɑŋ	ɪɑp		ɪɑk		ʊan	ʊaŋ		ʊat	
u	u	(~) ɪu																							
ʊ									ʊn			ʊt													
o	o	ɪo																							
ɔ	(~) ɔ									ɔŋ			ɔk			ɪɔŋ			ɪɔk						

to this dialect without the addition of rules which go beyond the scope of a Rimemic analysis.

5.4 Mandarin

Mandarin suggests some of the symmetry in patterning that has made a Rimemic analysis possible for Cantonese and Hakka and largely for Amoy. But, on balance, the kind of Rimemic analysis that I have used up to this point turns out to be unsuited to Mandarin. The Rimemic analysis that we have used thus far has assumed Rimemes that always have a surface form. In some cases, of course, the Rimemes may have more than one surface form, as in the three variants of Hakka Rimes with underlying a as the principal vowel. But in no case does this analysis account for surface forms in which the Rimemic vowel (principal vowel) is deleted. Deletion of underlying vowels defeats the whole point of the Rimemic analysis, which is to provide a direct link between the base canonical form and the surface canonical form. It has been the contention of this essay that certain dialects of Chinese are most felicitously analyzed with this method because their patterns of distribution of principal vowel-plus-ending segment show no gaps or almost no gaps. In the analysis of Mandarin, it is found that there are gaps in phonetic distribution. It seems a general property of linguistic analysis that greater gaps in distribution must be accounted for by more abstract forms. So in Mandarin the gaps which we find are best accounted for by an analysis which posits underlying vowels of such a depth as to be incompatible with a Rimemic analysis.

It will be simplest to demonstrate this point by attempting a Rimemic analysis of Mandarin and showing that it becomes awkward in a fairly short time. From that step we shall proceed to the underlying analysis of

Mandarin Finals devised by Chin-chuan Cheng (1973), an analysis which is more suited to Mandarin than the Rimemic analysis.

The canonical information for Mandarin is as follows:

$$\text{Syl} = \text{I}\ \overset{\text{T}}{\text{F}}$$

$$\text{F} = (\text{M})\ \text{R}$$

$$\text{M} = \text{i, u, ü}$$

$$\text{R} = \text{V}_2\ (\overset{\text{V}}{\text{C}}{}^3)$$

$$\text{V}_2 = \text{i, u, ə, ɑ, ü, o}$$

$$\text{V}_3 = \text{i, u}$$

$$\text{C} = \text{n, ŋ, r}$$

Table 5.41 shows the Rimemes of Mandarin. There is, in fact, good reason for questioning the Rimemes as given here because the phonetic realization of high front vowels (i, ü) followed by either nasal may involve an intrusive central vowel (i.e., /ün/ ⟶ [uən]). But to indicate this fact in the Rimemic arrangement will destroy such symmetry as there is available for a Rimemic analysis. For the moment then, let us assume the accuracy of the Rimemes in Table 5.41 and the accuracy of the patterning it suggests.

When one tries to draw up rules to account for the Rimemes in Table 5.41, there are very few generalizations that can be incorporated in rules. Thus, as with other dialects, there is a restriction on the concatenation of high vowels with offglides, and in Mandarin, one can specify a rule which simply prohibits offglides following high vowels.

MandSeq. 1) High vowels are not followed by offglides.

$$*\text{V} \qquad \text{V}\ \#$$
$$[3\text{Hi}]$$

TABLE 5.41

Mandarin Rimemes

	Ø	-i	-u	-n	-ŋ	-r
i	i			in	iŋ	
ü	ü			ün		
ɔ	ɔ	ɔi		ɔn	ɔŋ	ɔr
a	a	ai	au	an	aŋ	
u	u			un	uŋ	
o			ou			

TABLE 5.42

Feature Specifications for the Phones in Mandarin Rimemes

Vowels

	Hi	Front	Lab
i	3	3	-
ü	3	3	+
ɔ	2	2	-
a	1	2	-
u	3	1	+
o	2	1	+

Ending Consonants

	Front	Nas
n	+	+
ŋ	-	+
r	+	-

TABLE 5.43

Mandarin Rimeme Vowels Preceded by Medials

	i-	u-	ü-
i			
ü			
ə	iə		üə
a	ia	ua	üa(n)
u			
o	io(u)	uo	

Table 5.45 indicates the result of applying this rule to Mandarin Rimemes. A glance at Table 5.45 will show that it is nearly impossible to design other rules which have any generality. The remaining concatenations of principal vowels and final consonants or offglides are almost all special cases. Thus, there is ou, but no other combination includingeo, and onlyeə is followed by -r,[7] and there is no əu. Now, even in Rimemic dialects, there have been special cases, as there are in all linguistic descriptions. But here the special cases outnumber the single generalization.

Unfortunately, when it comes to accounting for the Medials, the special cases increase. Referring to Table 5.43, we see that high front vowels are not preceded by Medials and that the mid central vowel is preceded only by front Medials. But the regularity stops there. The high back vowel u is preceded byei- only when the rounded offglide ends the syllable. These special cases make the writing of meaningful exclusion rules difficult, if not impossible. For, unlike the two patterning exceptions which seem to exist in Hakka (ref. 5.1), these exceptions reflect the basic structure of the Mandarin Final, and they affect a significant proportion of the number of Finals.

Ignoring these problems for the moment, it is important to notice that there is a significant kind of patterning symmetry in the dissimilation constraints of onglides and of principal vowels in the full phonetic Final.

In my experience, no syllable in Mandarin has both a front offglide and front onglide or a rounded offglide and a rounded onglide. Thus the

---

[7] Of course, many Finals are followed bye-r in the affixation of兒. I believe that the processes involved in -r placement are different from the specifications of which basic Finals occur. In traditional terms this is morphophonemics. In Cheng (1973) -r affixation is accounted for after the basic Finals are specified. The two treatments are fundamentally similar, and I can see no other way of handling the addition of -r. Hence, at this stage of the analysis, only the Final ər contains that final consonant.

TABLE 5.44

Mandarin Rimemic Finals

	Ø	i-	u-	ü-	-i	-u	i-i	i-u	u-i	ü-u	ü-i	ü-ü	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	ü-ŋ	-r
i	i												in	iŋ							
ü	ü												ün								
ə	ə	iə		üə	əi				uəi				ən	əŋ							ər
ɑ	ɑ	iɑ	uɑ		ɑi	ɑu		iɑu	uɑi				ɑn	ɑŋ	iɑn	iɑŋ	uɑn	uɑŋ	üɑn		
u	u												un	uŋ							
o			uo			ou		iou													

TABLE 5.45

Mandarin Rimemes with Blanks Specified

	Ø	-i	-u	-n	-ŋ	-r
i	i	(1)	(1)	in	iŋ	
ü	ü	(1)	(1)	ün		
ə	ə	əi		ən	əŋ	ər
ɑ	ɑ	ɑi	ɑu	ɑn	ɑŋ	
u	u	(1)	(1)	un	uŋ	
o			ou			

following sequences do not occur:

*iVi# *üVu#

*üVi# *uVu#

The first of these sequences is sometimes listed for Mandarin and is included by Cheng (1973), which makes the statement less general. Because I have never heard such a sequence, I shall leave it excluded. Sequence rules to formalize these constraints are as follows:

MandSeq. 2) Front onglides do not occur in syllables with front offglides.

$$*V \quad V \quad V \quad \# \;\Rightarrow\; \begin{bmatrix} [+F] & \cdot & [+F] \end{bmatrix}$$

MandSeq. 3) Rounded onglides do not occur in syllables with rounded offglides.

$$*V \quad V \quad V \quad \# \;\Rightarrow\; \begin{bmatrix} [+Lab] & \cdot & [+Lab] \end{bmatrix}$$

Turning to the variant shapes of the principal vowels as they occur in full phonetic Finals, the following observations can be made. The low central vowel a̲ has a mid variant whenever preceded by a front onglide or followed by any front segment (-i̲ orr-n̲), and a mid front variant when preceded and followed by a front segment. The back rounded high vowel is lowered to mid height in the environment of the back glide. The mid central vowel ə̲ is fronted in the environment of high front glides. For some speakers, the high front vowel usually has an intrusive ɔ̲ before the velar nasal ending:

iəŋ

Less common, but still heard often is an intrusive ə̲ between the high front rounded vowel and the alveolar nasal ending:

üən

Also heard, but rather rarely, is an intrusive ə̲ between the high front unrounded

vowel and the alveolar nasal ending:

iən

For some speakers the last named sequence does not occur because

[ɪ̆an] ⟵ /iŋ/

[ɪ̆n] ⟵ /in/

are contrastive Finals where it is clear that the distinctive element is not the position of the ending nasal, but the presence or absence of the intrusive ə.

These phonetic facts are important because they upset any application of the Rimemic concept to Mandarin. Rimemes have been defined as being principal vowel plus/minus an ending consonant or offglide. This definition makes obvious sense in Cantonese, and also in Hakka where the possible phonetic variants of the vowel correspond to the articulatory position of the ending consonants or glides. But this does not seem wholly to be the case in Mandarin. The individual variations in speech noted for the high front vowels followed by final nasals are paralleled by individual differences in the treatment of the low central vowel a. While all speakers apparently front and raise this vowel between two front segments (iEn), there is considerable variation in the pronunciation of these sequences: an uan uaŋ. Hence, the fine symmetry of the statements made above depends on locating a speaker whose speech is even more ideal than the consistency we expect in the other dialects under examination. In my experience, this is very hard to do. Even within idiolects there is too much variation on these points to make a consistent Rimemic analysis of the type used before.

For this reason, and because of the gaps in onglide distribution, I find Cheng's analysis preferable to a Rimemic one. For Cheng's analysis provides rules which could be constrained by individual or stylistic variation (if that is what is governing the variation just noted) in a manner that would

be awkward in the Rimemic scheme.

A very brief summary of the main features of Cheng's analysis will serve to indicate the thrust of his analysis. Table 5.47 gives the underlying forms of Cheng's analysis minus their onglides. This table is, in effect, the equivalent of the Rimemic tables given previously for Hakka, Amoy, and Cantonese. Table 5.48 gives the underlying forms of Cheng's analysis including the onglides. The data in both tables are rearranged to conform to the arrangments used previously in this essay. The underlying forms of Table 5.48 are mapped onto the phonetic Finals of Table 5.46, but, as stated before, I do not include iai among the sequences of Mandarin, though Cheng does.

The basic force in Cheng's derivation from base to surface forms is assimilation to the front or to the back for the underlying nonhigh vowels: /ɑ,ɣ/. For the lower of these, ɑ, there is a low variant before back segments and after the back onglide in an open syllable, and a front variant before a front segment or after the unrounded front onglide in an open syllable. Formalized, the rule is:

$$a \rightarrow \begin{cases} a \,/\, \begin{cases} \_\_ \begin{Bmatrix} u \\ ŋ \end{Bmatrix} \\ u \text{---} + \end{cases} \\ a \,/\, \begin{cases} \_\_ \begin{Bmatrix} i \\ n \end{Bmatrix} \\ i \text{---} + \end{cases} \end{cases}$$

(Cheng 1973.18. Rule 19a.)

For the mid vowelr ɣ, the rule stipulates that before the back offglide or after the back onglide in an open syllable, the variant is back (and rounded

TABLE 5.46

Mandarin Phonetic Finals

	Ø-Ø	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	-r
ɿ	ɿ															
ʅ	ʅ															
i	i								in							
ɪ										ɪŋ						
e		ie		üe	ei			uei			ien					
ə	ə								ən	əŋ			uən			ər
a	a	ia	ua		ai			uai	an				uan		üan	
ɑ						ɑu	iɑu			ɑŋ		iɑŋ		uɑŋ		
ü	ü								ün							
u	u															
ʊ										ʊŋ						
o			ɥo			ou	iou									

TABLE 5.47

Underlying Forms in Chin-chuan Cheng's Analysis

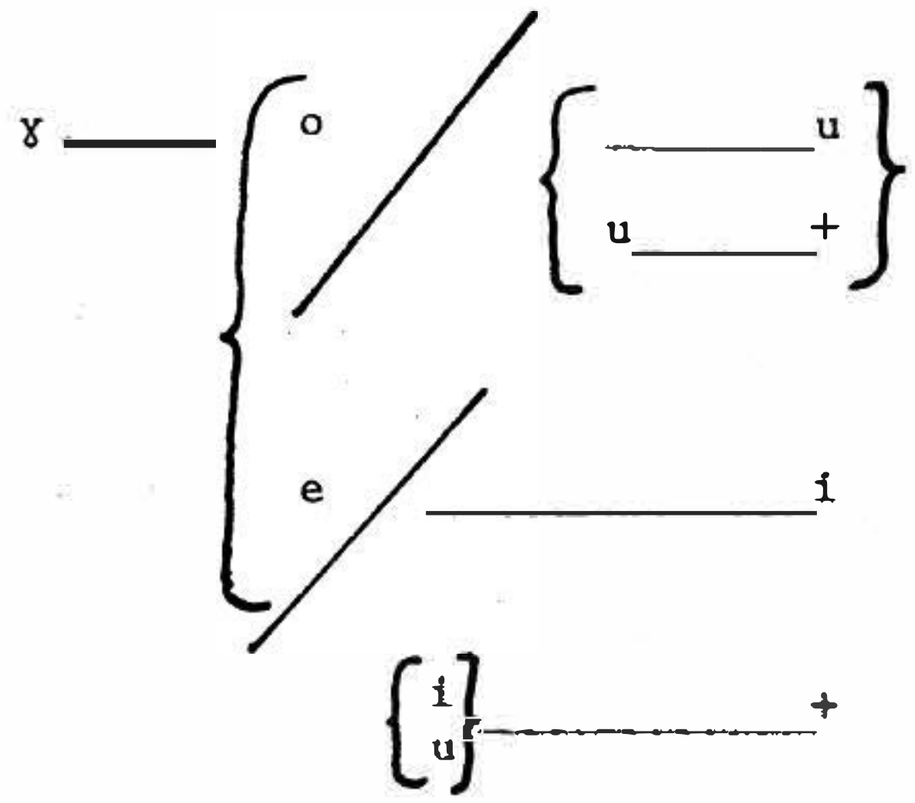
	Ø	-i	-u	-n	-ŋ	-r
ɨ	ɨ					
i	i					
ü	ü					
ɣ	ɣ	ɣi	ɣu	ɣn	ɣŋ	ɣr
a	a	ai	au	an	aŋ	
u	u					

TABLE 5.48

Chin-chuan Cheng's Underlying Finals

	∅	i-	u-	ü-	-i	-u	i-u	u-i	-n	-ŋ	i-n	i-ŋ	u-n	u-ŋ	ü-n	ü-ŋ	-r	(i-i)
ɨ	ɨ																	
i	i																	
ü	ü																	
ɤ	ɤ	ɤi	uɤ	üɤ	ɤi	ɤu	iɤu	uɤi	ɤn	ɤŋ	iɤŋ	iɤŋ	uɤn	uɤŋ	üɤn	üɤŋ	ɤr	
a	a	ia	ua		ai	au	iau	uai	an	aŋ	ian	iaŋ	uan	uaŋ	üan			(iai)
u	u																	

by universal convention): o, while before the front offglide or after either of the front onglides in an open syllable, the variant is front: e. The rule is:



(Cheng 1973.18. Rule 19b)

The major difference in patterning between a and ɣ is that the mid vowel does not directly assimilate to ending consonants. Cheng accounts for the behavior of the mid vowel with two rules, stated verbally:

(27) Within the final, a mid vowel before a consonantal ending becomes schwa ('Mid Vowel Laxing Rule').

(28) Within the final, a schwa between a front medial and a nasal ending or between a back medial which is preceded by an initial consonant and a back nasal ending is deleted ('Schwa Deletion Rule'). (Cheng 1971.18).

Given in symbols these rules operate as follows (Cheng 1971.19):

ɣŋ ⟶ Backness Rule ⟶ oŋ ⟶
Mid Vowel Laxing Rule ⟶ əŋ

iɣŋ ⟶ Backness Rule ⟶ ioŋ ⟶
Mid Vowel Laxing Rule ⟶ iəŋ
Schwa Deletion Rule ⟶ iŋ

The superiority of this analysis over the phonemic analyses of Mandarin discussed earlier is quite evident from the general preservation of canonical form at both the surface and the phonological levels of analysis. To be sure, an underlying segment is deleted through the Schwa Deletion Rule. However, this is not a dummy segment assigned to various slots to save phonemes as are the extra segments in Hartman's analysis. Both variants of ɣ actually occur on the surface and therefore are justified in the derivation. The deletion occurs in a specific environment, and the deletion occurs in a minority of strings. Moreover, because the deletion of schwa is in part a stylistic and individual matter, Cheng's deletion rule gives us an ideal device to constrain to fit actual phonetic behavior. Similarly for speakers who delete schwa in different environments as discussed above, the operation of this rule can be varied to account for specific facts without disrupting the totality of the grammar.

For the same reasons, this analysis is suitable for its object of study in precisely the way that T. Cheng's and O. Y. Hashimoto's analyses are not suited to Cantonese. In his analysis of Mandarin Chin-chuan Cheng has employed the tools made available by generative phonology creatively rather than forcing the language under study into a model determined by the previous use of those tools. Specifically, Cheng has overtly followed the traditional Chinese distinction between Initial and Final and has used the term Final as a unit in constructing his rules (as can be seen in rules (27) and (28) quoted above). Practice has meant that the obvious distributional differences between the Initial segments and the Final segments are incorporated within the rule scheme and are not handled by default through mechanism-required devices like segmental redundancy rules. In the terms that have been used in

the present essay, Cheng's approach to the Finals has overtly incorporated the principle of sequence constraints from the outset.

Cheng's assimilation rules capture for Mandarin the fundamental Chinese fact that the Rimeme analysis captures for Cantonese, Hakka, and Amoy, but in a way that the Rimemic analysis cannot do for Mandarin. That fundamental fact is that principal vowels generally assimilate to their succeeding segments. This is effectively what we have found in the dialect discussions that preceded the present one. Because of the patterning problems the assimilation cannot be expressed through Rimemes, but canrbe expressed through transformational rules.

Finally, as demonstrated in Table 5.47, though Cheng does not give a Rimemic analysis, his system of underlying forms permits one to chart a highly abstract equivalent of Rimemes. The word 'abstract' must be stressed here. The forms in Tables 5.47 and 5.48 show no distribution at the underlying level. The phonetic patterning of the actual language becomes evident only in the derivational process. Now because there is such a derivational patterning, it is not proper to dissociate Mandarin wholly from the Rimemic type of dialect. In contrast to Cantonese and Hakka, Mandarin is a quasi-Rimemic dialect or an abstract Rimemic dialect. At the end of this chapter I shall propose a possible scheme for charting these typological differences among Chinese dialects.

5.5 Lungyen

Lungyen Chinese is spoken in the northeastern part of Kiangsi Province. The data on the Finals are taken from Iovanna D. Condax' analysis of that language (Condax 1973).

I shall propose that this dialect is not suitably analyzed with the categories that have been found helpful in the analysis of Cantonese, Hakka, and (to a lesser extent) Amoy. Historically, this dialect apparently reflects an even greater distance from the MC shape in the syllable Rime than does Mandarin. A Rimemic analysis is therefore correspondingly less useful. This point can most easily be demonstrated by attempting to follow the steps in analysis used for Hakka. When these steps are taken as far as possible, I will be able to state clearly why this type of analysis is infelicitous for Lungyen.

The canonical information for Lungyen is as follows:

$$\begin{aligned} \text{Syl} &= \text{I} \quad \overset{\text{T}}{\text{F}} \\ \text{F} &= (\text{M}) \quad \text{R} \\ \text{M} &= \text{i} \\ \text{R} &= \text{V}_2(\overset{\text{V}}{\text{C}}_3) \\ \text{V}_2 &= \text{ɿ, i, œ}^8\text{, e, ɔ, a, u, o} \\ \text{V}_3 &= \text{i, u} \\ \text{C} &= \text{ŋ, ŋ ʔ} \end{aligned}$$

ŋ is a palatal nasal

Table 5.51 shows the Rimemes of Lungyen. Even from the briefest glance, it will be noted that the symmetry evident in the Cantonese and Hakka Rimeme tables is largely absent here. Not only does the highest vowelr ɿ not occur with ending segments, but the front rounded vowel œ also occurs only as

---

[8]Condax uses the symbol ø for the mid front rounded vowel. I have changed this to œ in order to avoid confusion with Ø which indicates zero in this essay.

a full Final. The low front rounded vowelrə occurs only before the velar nasal ŋ. The palatal nasal ɲ is preceded only by the low central vowel ɑ.

These patterning gaps are reflected in any rules one attempts to draw up to specify the occuring Rimemes. The features for the Rimemic segments are given in Table 5.52.

Some of these distributional characteristics can be incorporated in rules:

LYSeq. 1) High vowels take no offglides.

$$*V \quad V \quad \#$$
$$[> 2Hi]$$

LYSeq. 2) The highest front vowel and the front rounded vowel are not followed by final consonants or offglidesr

$$*V \quad \begin{Bmatrix} C \\ V \end{Bmatrix} \#$$
$$[4Hi]$$

$$*V \quad \begin{Bmatrix} C \\ V \end{Bmatrix} \#$$
$$\begin{bmatrix} 3Hi \\ +Lab \end{bmatrix}$$

But, in the format used here, it is difficult to incorporate into simple rules the facts that only the low central vowel ɑ is followed by the palatal nasal ɲ and that the mid central vowel ə is followed only by the velar nasal ŋ. As in Mandarin, the distribution presents too many special cases for a Rimemic analysis to be coherent. Table 5.55 is graphic illustration of this situation.

When one comes to accounting for the placement of Medials in front of the Rimemes, one finds a further gap. Referring to Table 5.53, we notice that there is generality in the total absence of syllables with high front medials ending in high front offglides. There is also generality in the privileges of occurrence of -i- before e, ɑ, u, in all the Rimemes of these vowels. Unfortunately, however, -i- occurs beforerɔ, only in the ɔŋ Rime.

TABLE 5.51

Lungyen Rimemes

	Ø	-i	-u	-n̩	-ŋ	-ʔ
ɿ	ɿ					
i	i				iŋ	iʔ
ɐ	ɐ					
e	e		eu		eŋ	eʔ
ə					əŋ	
u	u				uŋ	uʔ
o	o	oi			oŋ	oʔ
ɑ	ɑ	ɑi	ɑu	ɑn̩	ɑŋ	ɑʔ

TABLE 5.52

Feature Specifications for the Phones in Lungyen Rimemes

Vowels

	Hi	Front	Lab
ɿ	4	3	-
i	3	3	-
ɐ	2	3	+
e	2	3	-
ə	2	2	-
ɑ	1	2	-
u	3	1	+
o	2	1	+

Ending Consonants

	Front	Nas
n̩	+	+
ŋ	-	+
ʔ	-	-

To write rules to account for these concatenations is possible, but only because features make it possible to write rules to specify almost anything. Either an exception or a special rule must be written to show that -i- does not occur before the Rimemes o and o?. Since such rules seem to make little sense, I will not include them here.

Turning to the Finals, note that the phonetic variants of the Rimemic vowels do in fact show a clear pattern capturable in a general statement. The phonetic shape of the vowels is determined by assimilation to the ending consonant. For the nonlow vowels with phonetic variants, the lower variant occurs before glottal stop, while the higher variant occurs before the velar nasal.

iŋ	ɪʔ
eŋ	Eʔ
uŋ	uʔ
oŋ	ɔʔ

For the only low vowel with a variant, the lower and backer variant occurs before the velar nasal.

a͡n	aʔ	ɑŋ

These statements can be captured in two rules.

LYRmee 1) Nonlow vowels are lowered before glottal stop final.

$$[\,V,\ >\ 1Hi\,] \longrightarrow [\,-Hi\,] \;/\; \_\_\_\_\_\; C\ \#$$
$$[\,1F,\ -Nas\,]$$

LYRme 2) The low central vowel is raised before the palatal nasal and glottal stop.

$$[\,V,\ 1Hi\,] \longrightarrow [\,+Hi\,] \;/\; \_\_\_\_\; C\ \#$$
$$\left\{ \begin{matrix} [\,3F,\ +Nas\,] \\ [\,1F,\ -Nas\,] \end{matrix} \right\}$$

TABLE 5.53

Lungyen Rimeme Vowels Preceded by Medials

	i-	i-i
ɿ		
i		
œ		
e	ie	
ə		
ɑ	iɑ	
u	iu	
o	io(ŋ)	

TABLE 5.54

Lungyen Rimemes Preceded by Medials

	-Ø	-i	-u	i-	ɨ-i	i-u	-n◡	-ŋ	-ʔ	i-n◡	i-ŋ	i-ʔ
ɿ	ɿ											
i	i							iŋ	iʔ			
œ	œ											
e	e		eu	ie		ieu		eŋ	eʔ		ieŋ	ieʔ
ə								əŋ				
ɑ	ɑ	ɑi	ɑu	iɑ		iɑu	ɑn◡	ɑŋ	ɑʔ	iɑn◡	iɑŋ	iɑʔ
u	u			iu				uŋ	uʔ		iuŋ	iuʔ
o	o	oi						oŋ	oʔ		ioŋ	

TABLE 5.55

Lungyen Rimemes with Blanks Specified

	Ø	-i	-u	-ŋ	-ŋ	-?
ɿ	ɿ	①	①	②	②	②
i	i	①	①		iŋ	i?
æ	æ	②	②	②	②	②
e	e		eu		eŋ	e?
ə					əŋ	
u	u	①	①		uŋ	u?
o	o	oi			oŋ	o?
ɑ	ɑ	ɑi	ɑu	ɑn	ɑŋ	ɑ?

However, these are not the only variants in vocalic shape to be found in Lungyen, and the other variants would require much more specialized rules tor account for them.

The gaps that I have noted so far are not the only reason for questioning the validity of a Rimemic analysis for this dialect. Condax (1973.25-30) suggests the following phonemic vowel pattern:

ɿ

i u

e ɵ o

a ɑ

In contrast to the Rimemic vowel pattern offered above, this arrangement treats as distinctive the difference between [a] and [ɑ], and groups the [əŋ] Rime with the [u,ʊ] Rimes thus eliminating the need for a separate /əŋ/ Rime. Condax' argument for this move will be quoted in full:

> The arguments in favor of considering the difference in the vowels (i.e., [ɑ] vs. [a]) to be distinctive are the following: 1) in rapid or casual speech, as in reading long lists of homophones, a vowel plus a following nasal consonant often becomes a nasalized vowel in which the vowel maintains its normal placement; in the case of the low vowels this means that [ã] and [ɑ̃] result. No minimal pairs based on this difference could be elicited, however, as it is in precisely such a formal situation as the elicitation of minimal pairs that the consonant and not the nasalized vowel appears. 2) The nasal consonant in contact with /a/ varies slightly in position of articulation in rapid or casual speech, so that when it is not lost (in the production of a nasalized vowel) it may sometimes occur as [ŋ̈] or even [n] in addition to [n̆]. In the best of cases these three variants occur in successive repetitions of the same word. For the reasons given above it was not possible to elicit minimal pairs of the form [aŋ] [ɑŋ]. 3) Because of the general parallelism between the endings in entering tone syllables and non-entering tone endings in Chinese dialects, it seems preferable to analyze the system of Lungyen so as to reflect the same constraint. Thus if we

> find three stops in Cantonese, -p -t -k, at the end of entering tone syllables, we expect and find three nasals at the end of non-entering tone syllables -m -n -ŋ. Likewise, finding only one stop in Lungyen, we look for a single nasal, ŋ (Condax 1973.30).

I propose to accept this reasoning. And to do so, implies accepting a distributionally phonemic solution for the phonetic patterning of this dialect. The fact that I have found real symmetry in patterning only in regard to the distribution of phonetic variants before [-ŋ,-ʔ] on the one hand and [-i] and [-u] on the other adds rationale to the acceptance of a phonemic solution. By phonemic solution, I mean, of course, one that could be expressed either in terms of phonemic 'letter' symbols or in terms of features.

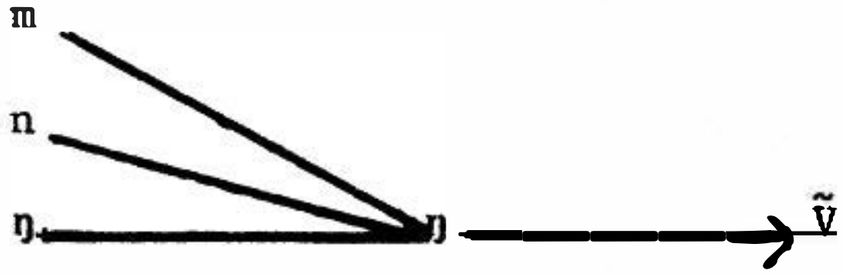
However, in admitting that a phonemic solution is best for this language, I prefer to alter Condax' phonemicization in certain places. Since a common variant of the phoneme /ŋ/ is [Ṽ] in fast speech, and since other variants include [ŋ̍] and [n], it would seem synchronically wise simply to set up a generalized nasal phoneme /N/, the allophones of which would include every nasal apparently known to Chinese except the labial nasal [m].

Parallel to this solution, the ending [ʔ] would be eliminated from the system and indicated simply by a Tonal prosody of shortness or checkedness, along the lines of the Tonal features suggested earlier for dialects which retain the entering tone.

Synchronically, such a solution would be better phonemics because it groups the largest number of surface variants under the smallest number of generalized rubrics.

Historically, this solution seems preferable to the original in Condax. On the one hand, the MC ju sheng (入聲) is now correlated with a tone, which is quite proper and thoroughly in line with all dialects that retain a

reflex of that distinction. The Cantonese segmental reflexes to which Condax refers in attempting to parallel [-ʔ] with [-ŋ] are relevant only when there are at least two such reflexes, for then the difference in articulatory placement is distinctive. But in Lungyen that is not the case. Only the Tonal features are distinctive, and the historical development should be traced to them. On the other hand, fast-speech processes may anticipate phonemic change. Thus it is at least possible that Lungyen is in the process of showing the final stage in a movement something like this.



And even if that is not the case, the number of allophonic variants makes it clear that general nasalization, and not a specific placement, is the reflex of the earlier three ending nasals. In a given utterance, [-n] may reflect an earlier *-m *-n or *-ŋ, and so may [-ŋ] or [-n̩] or [Ṽ]. Consequently to suggest that there now exists a merger of all earlier nasals in /-ŋ/ is rather misleading.

The revised phonemic solution gives an array of Finals like that found in Table 5.57

There remains one problem. I have insisted that a strict phonemic analysis is wholly unsuitable for Mandarin, and that a Rimemic analysis is preferable for Cantonese. I have made these assertions subsequent to a statement that the Initial-Final distinctions generally applies to the Chinese language family. Accepting a phonemic analysis for Lungyen raises the fundamental question: What does a phonemic analysis mean in reference to a member of the Chinese family?

TABLE 5.56

Lungyen Phonetic Finals

	Ø	-i	-u	i-	i-i	i-u	-ɳ	-ŋ	-ʔ	i-ɳ	i-ŋ	i-ʔ
ɿ	ɿ											
i	i							iŋ				
ɪ									ɪʔ			
æ	æ											
e	e							eŋ			ieŋ	
E			Eu	iE					Eʔ			iEʔ
ə								əŋ				
a	a	ai		ia		iau	aɳ		aʔ	iaɳ		iaʔ
ɑ			ɑu					ɑŋ				
u	u			iu				uŋ			iuŋ	
ʊ									ʊʔ			iʊʔ
o	o							oŋ			ioŋ	
ɔ		ɔi							ɔʔ			

TABLE 5.57

Revised Phonemic Finals of Lungyen

	ø	-i	-u	-N	i-	i-u	i-N
l	l						
i	i			iN			
œ	œ						
e	e		eu	eN	ie	ieu	ieN
a	a	ai		aN	ia	iau	iaN
ɑ			ɑu	ɑN			
o	o	oi		oN			ioN
u	u			uN	iu		iuN

No absolute answer can be given to this question. The lack of an absolute answer is the most important point that can be made on the subject.

By the absence of an absolute answer to the question of what a phonemic solution for Lungyen signifies, I mean the following. The vowel phonemes of Lungyen are rather like English vowel phonemes in that there are few regular constraints predicting which vowels will be followed by which ending segments, and the majority of the phonetic vowels are distinctive with at least two post-vocalic contexts (open syllables and nasalized endings). There is, however, a quantitative difference between the English and the Lungyen phonemic vowel. The English vowel is distinctive in many more postvocalic contextsr

The Finals of Lungyen are rather like those of other Chinese dialects. They are so few in number as to be easily listable, and the elements of which they are made up are few enough that statements can be made to indicate which combinations occur and which do not. However, the occurring combinations cannot be stated through the use of general, symmetrical rules.

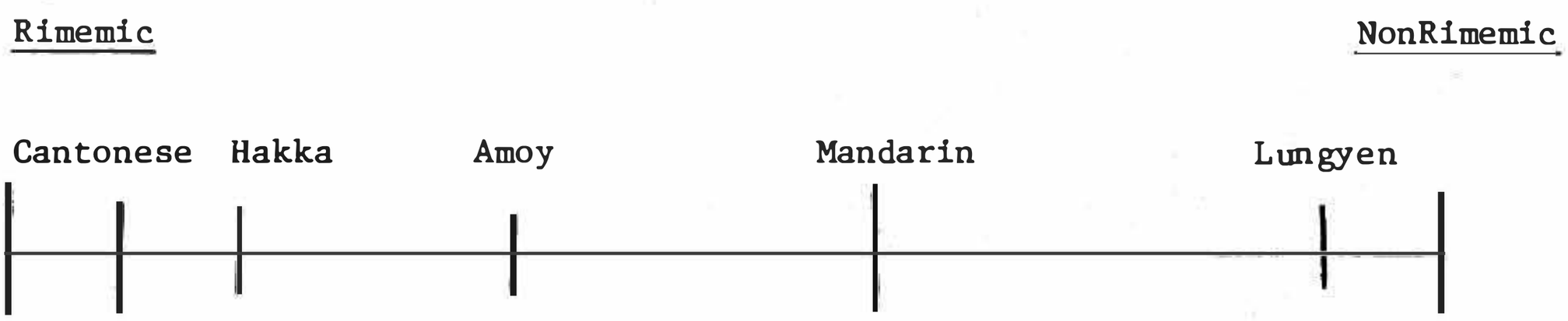
Lungyen, then, stands between other parts of Chinese, on the one hand, and English, on the other hand. The phonemic solution makes sense for the Lungyen vowels. But the phonotactics of Lungyen Finals are fully statable and could be stated. What is important about this typologically intermediary position of Lungyen is just that it shows us the striking relativity of language construction. In the following sections I shall propose some ways of charting relativity.

5.6 The Spectrum of Chinese Dialects

The analyses just given suggest considerable differences among the nonInitial segmental portions of Chinese syllables in various dialects. We can chart these differences graphically by drawing a rough spectrum as in Table 5.61:

TABLE 5.61

The Five Dialects Discussed in This Study Arranged to a Typological Spectrum



While accurate as far as it goes, Table 5.61 does not account for the fact that Lungyen may be very close to a Rimemic dialect of a slightly different sort. Any dialect with a canonical structure

$$(C) \quad (V_1) \quad V_2 \quad (V_3)$$

could be analyzed Rimemically so long as V_2 and V_3 concatenate with few or no gaps in patterning. In Lungyen, this is not difficult to imagine, since the -u is preceded only by a and e, while -i is preceded only by o and a. In its present stage, Lungyen does not have this canonical shape because of the various phonetic nasals which close syllables. But should these nasals be resolved into vocalic nasalization, there would be no reason for not including Lungyen among Rimemic dialects.

To understand this point it is well to recall the definition of Rimeme given in 4.2. The purpose of that definition is to state a functional equivalence between single syllable peaks in open syllables and systematically distributed vowel+consonant/glide. Thus in stating that a Rimeme is formulized as

$$V\ (^{V}_{C})\#$$

I am effectively saying that systematically

$$V\# \quad = \quad V(^{V}_{C})\#$$

Consequently, within this definition, a dialect whose Rimes veer close to a structure of

V#

will be essentially closer to the Rimemic dialects than to a dialect like Mandarin where the ending consonants are not distributed in a way that permits the treatment of vowel+consonant/glide as a single unit.

I have not found any Chinese dialects that have actually developed to the point where one can legitimately classify them with a full syllable canonical shape of

$$(C)\quad V_1\quad (V_2)\#$$

But a very distant cousin of Chinese, the Tibeto-Burman dialect of Lahu illustrates just this phenomenon (Matisoff 1973a).

To incorporate both the fact that Lungyen at present is typologically very far from a Rimemic dialect and also that it seems to be moving closer to a Rimemic dialect of a different sort, one may change the spectrum shape from a

straight line to a cresent which will indicate distance and closeness along both the horizontal and vertical axes. This is done in Table 5.62.

If the focus is widened to include dialects that do not have a Rimemic pattern, but whose segmental Finals can be conveniently analyzed through Sequence rules governing the whole Final, Shanghai can be included, as analyzed by Walton (Walton 1971; ref. Chap. III of present essay). To make this step the spectrum must be extended to a spiral, as in Table 5.63.

Even with this addition and with the complexity of a spiral, only the segmental Finals of some Chinese types have been charted out. The differing Tonal characteristics of these dialects have been ignored (i.e., whether most syllables in normal speech actually have an invariant Tone or not). Although not properly the subject of this essay, it is worth noting that there seems to be a rough correlation among dialects carrying Rimemes directly from Middle Chinese and having Tonal consistency throughout, while dialects that have lost Rimemes illustrate various phenomena of Tonal perturbation in normal speech. It is unlikely that this correlation is accidental. And as we study typology, it should be of value to keep this correlation in mind. It is charted in Table 5.64.

Now all these typological remarks have been limited to dialects within the Chinese family. When these dialects are compared with wholly different and unrelated languages, the problem of charting typology becomes very much more complex. But one can make inroads on the complexity by considering some of the essential differences and similarities between Chinese phonology and that of other languages. In contrast to English and similar languages, one can spend years listening to and speaking a Chinese dialect and never hear a newr Final that was not identified in the first days of contact with the language;

TABLE 5.62

The Chinese Typological Crescent

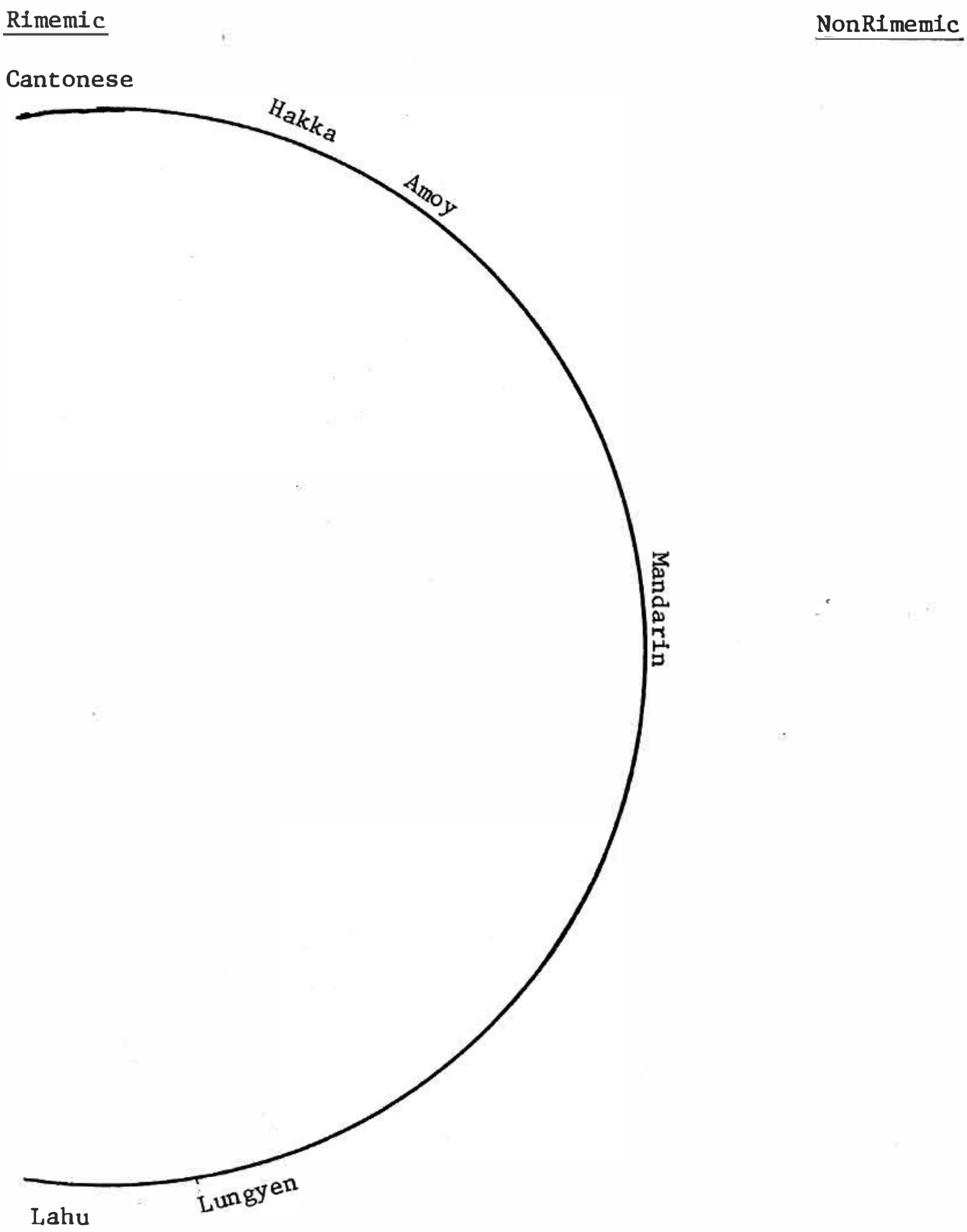
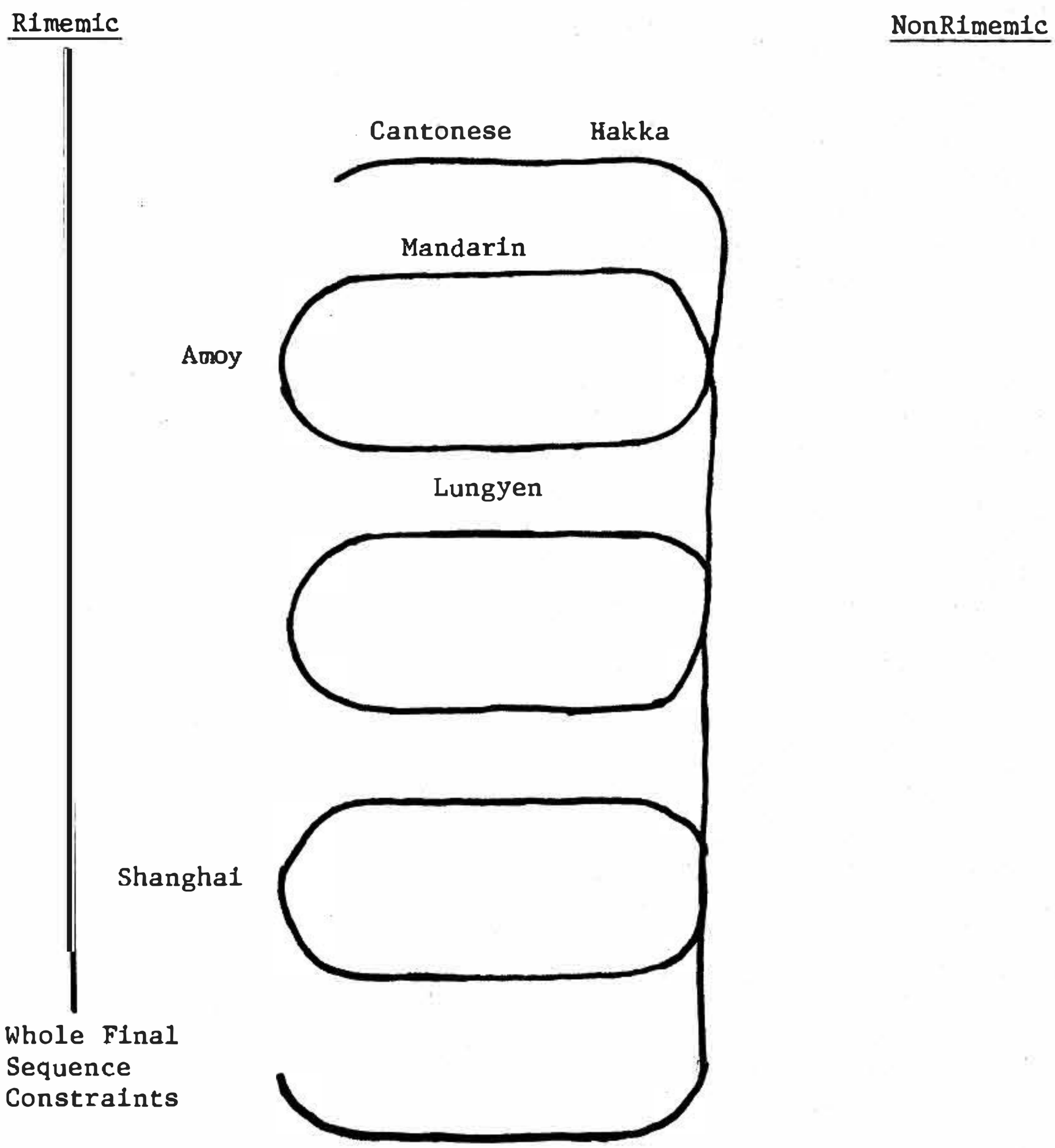


TABLE 5.63

The Chinese Dialect Spiral

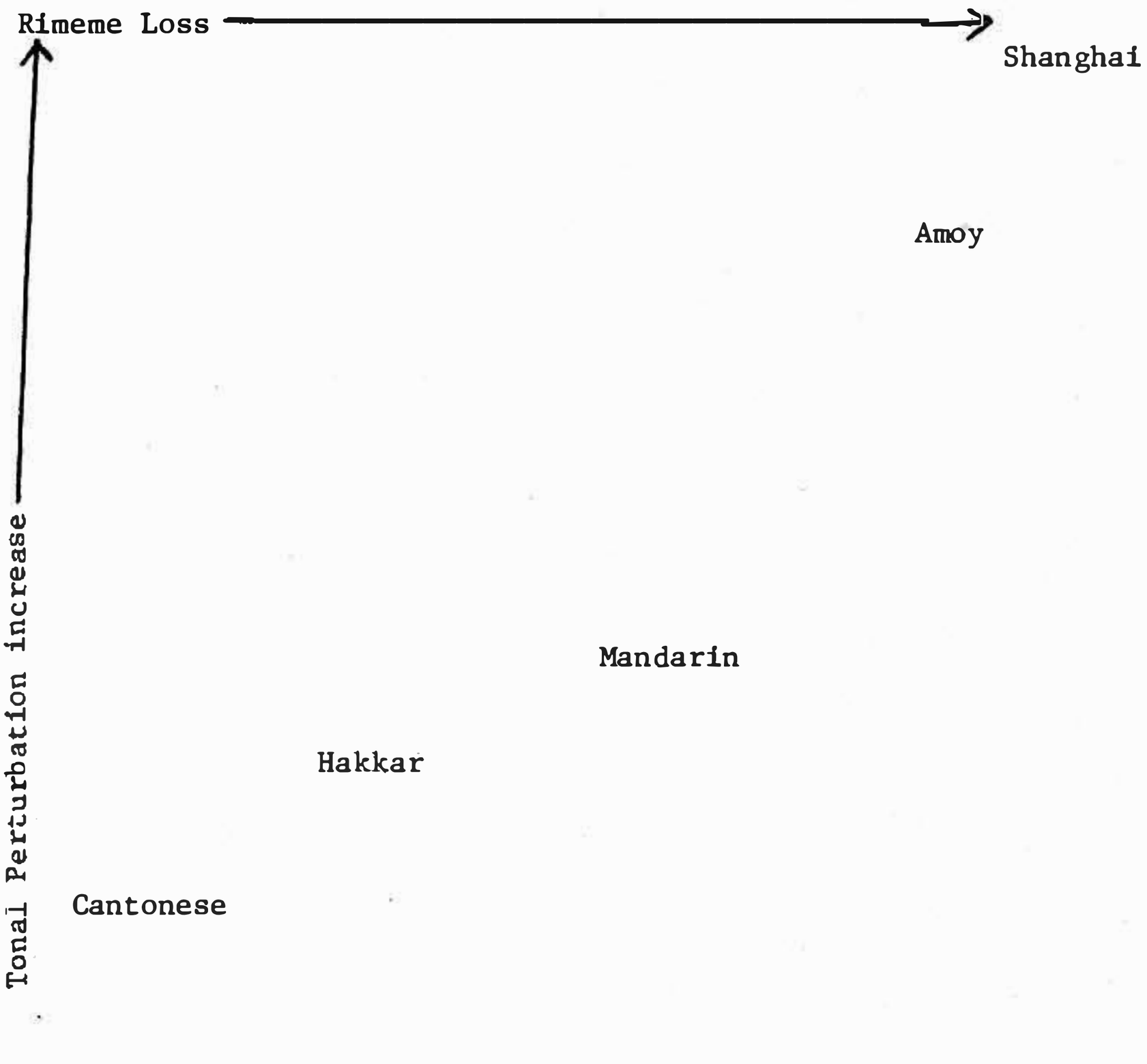


though one does hear new combinations of Initial and Final, and Tone and segmental syllable. In a rather different vein, the Tonal phenomena of dialects like Cantonese and Hakka, and to a lesser degree, Mandarin are not paralleled in any meaningful way in European languages. Yet the Tonal function in Mandarin disyllables which carry only one full Tone plus one 'neutral' Tone, or, more strikingly, in Shanghai, where the word can be said to carry a complex Tonal contour, may not be entirely different from the functions of word stress-and-pitch in English and similar languages.

Even this very short list of crosslingual phenomena provokes a bewildering confusion in the mind of the analyst if he tries to incorporate them as specific phenomena in a general conception of language typology. If, however, the function of each of these phenomena relative to other characteristics of the languages in which it occurs is considered, it seems to me that we may have a manageable amount of typological data with which to work. The reader will note that the scheme for analyzing the Finals of some dialects of Chinese presented in this and the preceding chapters aims at determining the function of striking typological characteristics of a given dialect in terms of the rest of that dialect's observable phenomena. The tables given in this chapter reflect such functional typology in comparative terms. It is suggested that comparative typology can be done on a much more general scale if the functions of elements in languages are considered very seriously, and (as a prerequisite to determining the function of any elements in a language) if the goal of linguistic analysis is not limited to discovering units in a newly analyzed language analogous to units which have already been found in other languages.

TABLE 5.64

Correlation of Direct Descent of Rimemes
with Tonal Perturbation



I do not propose to suggest serious typologies beyond those I have already suggested for the five dialects discussed previously. However, as a thoroughly speculative exercise, consider the comparison of Cantonese, Shanghai, and English in Table 5.65. I do not believe that any of the elements assigned to any of these languages can be seriously questioned. The functions of these elements is debatable, but the similarities and differences are in some degree unarguable. The elements of a typological continuum, of a balance among elements and function, surely are there.

TABLE 5.65

Some Typological Features of Cantonese, Shanghai, English

Cantonese	Shanghai	English
Rimemic	Nonrimemic	Not applicable
Slight morphophonemics	Tonal morphophonemics	Pitch, stress and morphophonemics
Little Tonal variation	Monosyllables have distinctive tone	Monosyllables have predictable stress and pitch
	Tone contour associated with polysyllabic words	Stress and pitch contour associated with polysyllable
Monosyllable generally associated with morpheme even in casual speech	Monosyllable ideally associated with morpheme	No relation between monosyllables and morphemes
Monosyllabic	(decrease) →	

Chapter Six

CONCLUSIONS: The Implications of This Study

6.1 Summary

I have tried in this study to propose and defend a relativistic notion of phonology. That conception of phonology gives equal weight to the paradigmatic and syntagmatic planes of linguistic relation. And within that notion of phonology, an attempt is made to ascertain the relative significance of the paradigmatic and syntagmatic planes of any language under study. It has been shown that for the Chinese language in general the traditional segmental distinction between Initial and Final is linguistically justified because the consonants of the Initial are generally substitutable among the Finals as wholes, while the phones within the Finals are much more restricted in distribution. The Initials have an essentially paradigmatic relation to one another; they can replace one another in the same context. The Finals as whole units have the same relation to each other; they can generally replace one another after the same Initials.

The relationship of the units within the Final is heavily syntagmatic. That is, the vowels, consonants and glides occur always and only in very restricted sets of combinations. The phones of the Finals are therefore not comparable to the phones which can fill the Initial position. Neither are the phones of the Initial comparable structurally to the Tones. But each of the

three units, the Initial, the Final, and the Tone, has a comparable paradigmatic function, and these three concatenate with each other in the syllable structure.

The general outline of Chinese syllable structure as just given in the previous two paragraphs seems to apply to most or all dialects.r But within the syllable there is variety of Final structures among dialects. I have demonstrated this fact through the analysis of the Finals of five dialects. For some of these dialects, which I have labelled Rimemic, the distribution of the phones of the Final is so symmetrical that one can usefully treat the ending consonant and the principal vowel as a single unit. For other dialects, such a treatment makes little sense because, even at a very abstract level, there are not completely systematic gaps in the patterning of principal vowels with ending consonants and glides.

I have charted this typological difference among the dialects studied on various types of continua. The point of the charting has been to show that linguistic typology reflects some relative differences among languages which can be understood only in terms of total function. I have endeavored, with considerable speculation, to suggest areas of correlation between other linguistic phenomena and the presence or absence of Rimemes.

At the beginning of this essay, I asserted that I would demonstrate that different models of phonology are useful for languages of different typologies. Within the bounds of the five dialects of Chinese that I have discussed, I believe that I have demonstrated the relative usefulness of various models of phonology.

This relativistic approach towards phonology and the means that I have used to demonstrate its appropriateness carry several implications for the study of the phonology of different types of languages. In section 6.2 I shall discuss several synchronic implications. In section 6.3 I shall discuss two

important historical implications, and finally I shall suggest certain areas for further research.

6.2 Rules, Features, and Arrangements of Phonological Data

The study of linguistic typology is the study of the similarities and differences among languages. While assuming that the Chinese dialects are somehow all of one basic typology, I have argued that within that broad rubric there are significant differences. I have expressed these differences in terms of the analytical tools that are best suited to explicate the phonologies of the respective dialects' Finals. Implicit in the discussion up to now are three areas of phonological concern: 1) The roles of types of phonological rules; 2) The roles of various phonological features; 3) The arrangement of phonological data and its influence on analysis.

6.21 At the conclusion of Chapter III, I argued that a linguistic model should allow for some selection among its components and for various sequences of arrangement among those components that may be common across several languages. Where the 'deep' phonological structure reflects an abstraction based strictly on phonological distribution, then that 'deep' structure is simply a phonemic level in the traditional sense, and it should be called so honestly, for it is linguistically significant that a given language may have only an autonomous phonemic level and no level of the depth of languages with extensive morphophonemics. If a language is for the most part conveniently analyzed with sequence structure rules, and transformational rules are required sparingly, this fact should be acknowledged, and the presentation and arrangement of components should be designed to show that fact.

As a general principle, that type of rule which accounts for the largest number of forms (and phrases?) in a language, and for the most frequent

ones, is the type of rule that defines the typology of a given language. And it is that type of rule which should be stressed. Rules that are required only seldom by a given language should be considered of much less importance to the typology of that language, and their status in a description should be clear.

One corollary of this principle is that no credit should be given to efforts to force a given language into an analysis based on a priori notions of what types of rules should show up in languages. In reference to Chinese, the effort to show that Mandarin has but two or three phonemes is made at the cost of abandoning all of the canonical shape of the syllable--which Mandarin has in common with other Chinese dialects--and at the cost of obscuring those common traits of concatenation of phones which Mandarin continues to share with other dialects. Mandarin thus analyzed ceases to be Chinese, just as English analyzed in a Rimemic model would cease to be English.

In the present essay, it has been shown that Cantonese and Hakka, and Amoy to a lesser extent, can be analyzed with a Rimemic analysis, but that some other dialects of Chinese cannot be so analyzed. The Rimemic analysis has been narrowly defined here. It requires a highly symmetrical pattern of principal vowels and ending consonants or glides, and it places high value on being able to express the relations among onglides, vowels and ending segments through negative sequence structure rules.r The reason for the narrowness of definition is that precision in definition makes it clear what is not a Rimemic dialect. In other words, the terms which have been used for the various dialects have been selected to fit those dialects.

With regard to linguistic description in general, the role that various types of rules play in different languages should be made explicit in the description of each language. Transformational rules across languages may be

neither of the same meaning nor of the same function in various languages. Although transformational in form, the Rimemic rules which I have given for Cantonese, Hakka and Amoy reflect differences at a nonmorphological depth. Those transformational rules in various types of Chinese which do reflect morphophonemics generally describe phenomena which are related to Tonal perturbation or the affixation of a generally concatenating particle like the Peking [ər], neither of which phenomena has a direct typological correspondent in English. And the roles that such rules play in different dialects vary widely. Both in terms of classes of phenomena governed by such rules and in terms of sheer text frequency, there is such a difference between Cantonese and Amoy regarding the functions of such rules that the overall typologies of the two languages are affected by that difference.

6.22 In 4.2 I listed and described the minimum number of phonological features necessary to the rules in a Rimemic analysis. Among those features the only one that is in any sense different from feature inventories currently in use elsewhere is the feature [Labial]. In 4.2 I justified the use of this feature on the ground of a pervasive labial dissimilation constraint between principal vowels and ending consonants. I also mentioned in 4.2 that there is an important, but slightly weaker, constraint prohibiting the concatenation of labial Initials with Finals that have labial endings. Labial dissimilation has an effect on the historical development of Chinese, as well, a fact that will be discussed briefly in 6.3.

The reasons for employing the feature [Labial] are, thus, language specific. That feature, <u>together with its function in rules,</u> represents a very noticeable characteristic of the Chinese language family. And it is both obfuscating and uneconomical <u>not</u> to indicate that fact through a pervasive feature of description.

For the very reasons that I have used [Labial] in this study, I would not propose it as a member of a universal feature inventory, unless there were many other reasons to justify such a move. There is, I believe, good reason for recognizing a difference between universal and language-specific feature categories. Universal feature categories are designed to relate articulatory acts to a number of abstract distinctions small enough to be manageable in the writing of rules. Universal feature categories are neutral and unitary in nature; they reflect a classification of articulatory acts that is shared across the distinctive sounds of many languages. Universal feature categories are not combinatory; they do not indicate the particular structural place of a given feature in a given language or the structural place of a given feature in all languages (except for the logically necessary cases such as that the highest feature and the lowest feature will not both be assigned to the same phone).

I propose that language-specific feature categories should be combinatory and reflect the structural place of a given universal feature in the description of given languages. The feature [Labial] in the present study refers to universal features of rounding (for vowels) and various types of labialized articulation for consonants. These universal features have all been combined in the present study because of the intimate structural connection between rounded vowels and consonants with any kind of labial articulation.

6.23 In this study I have used a uniform format for charting the Rimes and Finals of Chinese dialects. That format ranges the principal vowels against the possible combinations of vowels with other segments in the phonology. Of the sources I have consulted, only the Cantonese dialect is

usually so tabulated. Other dialects are tabulated by an arrangement of rows according to onglides and columns according to principal vowel and/or ending segment; or of rows according to principal vowels and/or onglides and columns according to ending segments. The two major variants are given in Tables 6.231 and 6.232.

I propose that for the tabulation of phonetic Finals and for the tabulation of phonological Finals which have a direct relation to the phonetic Finals, the arrangement used here is the more appropriate one for all the kinds of Chinese dialects I have seen. The reason for this proposal is, once again, typological. For any language for which the Initial-Final distinction is appropriate on distributional grounds, the arrangement of the phonetic Finals in this manner will show a number of combinations so limited that the combinations, rather than their parts, can be taken as units. Furthermore, among languages for which the Initial-Final distinction is valid, the presence or absence of the kind of symmetry which leads to a Rimemic analysis will also be almost instantly evident in such a tabulation. So, by contrast, will the difference between a Rimemic dialect and a phonemic dialect like Lungyen or an underlying-vowel dialect like Mandarine

This kind of arrangement of postInitial segments can be considered a typological litmus.e[1] In contrast to this litmus, the arrangement of all segments against each other--a device often taught in phonology calsses--suggests, where it is necessary, a wholly different language type. Table 6.233 illustrates type of arrangement. The arrangement in Table 6.233 is suitable for English, but it makes little sense for Chinese.

---

[1] The term is borrowed from Arnold Zwicky.

In linguistics, the arrangement of data not only presents an analysis but also influences the conclusions of analysis. Arrangements should fit the languages being studied. I presume that for languages of typologies of which I know nothing, there must be other arrangements far different from those noted here.

6.3 Historical and Comparative Implications of the Present Study

Although this study is a synchronic study, there are two important diachronic implications that arise from it. One is that certain traits of the Rimemic analysis inevitably affect how we may reconstruct earlier forms of Chinese. The other is that there are at least two types of sound change that the present analysis would lead us to expect to find in Chinese. I shall discuss these implications in order.

6.31 So far as I know, there has as yet been no systematic attempt to reconstruct an earlier stage of Chinese solely on the basis of comparative evidence. There have been attempts at the reconstruction of proto-dialects, but no proto-Chinese reconstructions that are wholly comparative. Neither have there been reconstructions that have been wholly historical in the sense that reconstructions of Chaucerian English can be based solely on texts dating from Chaucer's time. The absence of strictly historical reconstructions is dictated by the nature of the Chinese writing system. Various scholars have worked out the number of certain categories of distinctions at certain stages solely on the basis of historical evidence. But, since 'reconstruction' means a kind of phonetic alphabetization, it is impossible to work <u>directly</u> from Chinese texts to reconstruction.

TABLE 6.231

Sample of Arrangement of Dialect Material in Rows According to Onglides and Columns According to Ending Segments

(Hakka Phonetic Finals; From M. Hashimoto 1973.92)

	1	2	3	4		5		6	
I	ɑ	ɑŭ	aĭ	ɑm	ɑb́	an	ad́	ɑŋ	ɑǵ
II	ŭɑ		ŭaĭ			ŭan	ŭad́e	ŭɑŋ	ŭaǵ
III	ĭɑ	ĭɑŭ	ĭaĭ	ĭɑm	ĭab́	ĭœn	ĭœd́	ĭɑŋ	ĭaǵ
IV	ɛ	ɛŭ		ɛm	ɛb́	ɛn	ɛd́		
V	ŭɛ					ŭɛn	ŭɛd́		
VI	ĭɛ	ĭɛŭ				ĭɛn	ĭɛd́		
VII	ɔ		ɔĭ			ɔn	ɔd́	ɔŋ	ɔǵ
VIII	ŭɔ		ŭɔĭ			ŭɔn	ŭɔd́	ŭɔŋ	ŭɔǵ
IX	ĭɔ		ĭɔĭ			ĭɔn		ĭɔŋ	ĭɔǵ
X	ɿ	u	i	ɿm	ɿb́	ɿn	ɿd́		
XI			ui			un	ud́	uŋ	uǵ
XII		iu		im	ib́	in	id́		
XIII						iun	iud́	iuŋ	iuǵ

TABLE 6.232

Sample Arrangement of Dialect Material in
Rows According to Principal Vowel or Onglide,
and Columns According to Ending Segment

(Peking Mandarin, from Peking University, Department of Chinese 1962.2)

1	l	ɜ	a	ɣ	o		ai	ei	au	ou	an	ən	aŋ	əŋ	
	i		ia			ie			iau	iou	ian	in	iaŋ	iŋ	
	u		ua		uo		uai	uei			uan	uən	uaŋ	uŋ	uəŋ
	y					ye					yan	yn		yŋ	

TABLE 6.233

Sample of Arrangement of Phones by Privilege
of Occurrence with All Other Phones

Preceding Segments												Succeeding Segments									
p	t	k	m	n	ŋ	f	v	w	r		p	t	k	m	n	ŋ	f	v	w	r
x	x	x				x	x	x	x	i	x	x	x				x	x	x	
			x	x	x					ɪ				x	x	x				
x	x	x	x		x	x		x	x	œ	x	x		x		x			x	x
	x	x	x	x		x	x	x	x	ə		x	x		x	x	x			
x	x	x	x	x	x		x	x	x	a	x	x		x		x		x	x	x
x	x	x				x	x	x	x	u	x	x	x				x	x	x	x
			x	x	x					ʊ				x	x	x				
x	x			x	x		x	x	x	ɔ							x	x	x	x

Note: In this ficticious language, [ɪ,ʊ] occur only and always contiguous to a nasal consonant, while [i,u] occur elsewhere. In this situation, a phonemic solution and the present arrangement of data are both called for by the language.

Historical reconstructions in Chinese have thus up to now always rested on a mixture of historical and comparative evidence. Within this mixture, Karlgren's reconstructions have an explicit comparative emphasis, with the tables of the Etudes providing the bases for many of his decisions. In contrast, Pulleyblank's reconstructions have a relative historical emphasis with earlier Chinese and foreign texts explicitly providing the evidence for historical decisions, while the Standard Language provides most of the phonological and phonetic information. But both of these relative extremes reflect strong admixtures of that which is not stressed in their Middle Chinese (MC) reconstructions.

So far as I know, the evidence from both historical and comparative sources indicates that we must account for three articulatory positions and two classes of consonants in the MC syllable coda. That is, we must recognize as ending consonants in MC:

-m	-n	-ŋ
-p	-t	-k

This range of ending consonants is, of course, the same as that found in the dialects termed Rimemic in the present study.

Unless there were to be found very strong evidence from other dialects to show that the Rimemic characteristics we have described above are later deviations from MC, it would seem to be the case that MC was in some sense a Rimemic dialect in roughly the manner of present-day Hakka, Cantonese, and, to a lesser extent, Amoy. The analysis of the MC phonologists themselves--on whose work the present treatment was based--certainly adds weight to that assertion. By saying that MC was a Rimemic dialect, I am not, of course, suggesting that Chinese of the Sui-T'ang period spoke Hakka or, even less, Cantonese. It would be utterly against the experience of comparative work in

other languages to suggest that one language, or a similar group of languages, is in every way the most conservative of a whole family. I am therefore not suggesting that reconstruction of principal vowels or whole Finals be guided largely by Cantonese and Hakka.

But what I am suggesting is that the point on which these and similar dialects are as notably conservative be given its full value. I take the historical value of Cantonese and Hakka endings to be twofold. First, the typology of MC was in some sense Rimemic. Second, the major constraints operative in Rimemic dialects should be understood to have operated in MC as well.

The implication of the first point is that our analytical viewpoint and our presentation of that viewpoint should follow the Rimemic pattern rather than a strict phonemic interpretation or a strict generative interpretation.

The implication of the second point is that no forms should be reconstructed which violate sequence structure constraints and Rimemic rules in modern dialects, unless there is either historical or other comparative evidence to indicate that present-day constraints and rules are a late development.

The second principle has, I believe, been followed by such major workers in the field as Karlgren, Tung T'ung-ho, Wang Li and E. G. Pulleyblank in their various MC reconstructions. This constraint on reconstruction should therefore be termed an underlying principle in Chinese historical linguistics, and the present essay could be understood as one form of a rationalization for that principle.

However, I do not believe that the strong connection between the typology and the need to pay specific attention to constraints in reconstruction has been given much explicit acknowledgement. This oversight has, naturally, been much more of a problem in the West than in China itself. As a glance at Tung (1960), or Wang Li (1958) will show, the mapping of she (攝) on to

Rimes and Rimes onto the teng (等) and k'ai k'ou-ho k'ou distinction (開口合口) is the equivalent for MC of the Rimemic analysis given here.

These considerations lead me to question seriously the typological accuracy of E. G. Pulleyblank's Late Middle Chinese (LMC; Pulleyblank 1970-71). Pulleyblank's analysis is essentially a phonemic analysis under the general constraint of economy as the highest value in the grouping of phones so that it yields only two vowels for LMC. This analysis is part of a general effort at determining the vowels of languages world-wide by separating features to a point where it can be shown that a very early ancestor of human language possessed two vowels (Pulleyblank 1972). One general objection to such an exercise is that given only a very few onglides and offglides, it is arithmetically possible to devise a system showing two vocalic distinctions for any language. Consequently, the exercise necessarily shows a great deal about the arithmetical properties of combination, and does not necessarily show anything at all about language or languages. The thirteen vowel phonemes of Pike's phonemicization of English are reduced to two peak vowels in Table 6.31. The arrangements of segments in Table 6.31 are no more implausible than those of Hartman or Pulleyblank, and they tell us nothing at all about the nature of English. It is worth pointing out that in Table 6.31 one less symbol is used for English with its 13 phonemic vowel contrasts (in this dialect) than for Hartman's or Pulleyblank's Chinese with, supposedly, only two phonemic vocalic contrasts.

Turning more specifically to Pulleyblank's system.

Pulleyblank's analysis is governed by the binary oppositions in the rime tables: ho k'ou 合口 ; khai k'ou 開口 ; nei-chuan 內轉 ; wai-chuan 外轉 . Pulleyblank extends the binary notion to the articulatory placements and

TABLE 6.31

English as a Two-Vowel Language

Pike (1947)	Two-Vowel System
i	jəj
ɩ	jə
e	jaj
ɛ	ja
æ	əw
ɘ	ə
u	wəj
ʊ	wə
o	waj
ɔ	wa
a	a
a^{i}	aj
a^{u}	aw
o^{i}	wajjė

treats them as two member oppositions as well. Ch'i-ch'ih 齊齒 '"tongue level with the teeth" , i.e. "palatized"', and ts'o k'ou 撮口 '" compressed mouth" , i.e. "combined palatalization and labialization"'. The key to Pulleyblank's system is the nei-wai distinction, which Pulleyblank treats as a difference in nuclear vowels, which are respectively /ə, a/ phonemically. Pulleyblank is influenced by Hartman's and Hockett's analyses here and argues that Hartman's system comes from the MC phonology:

> Hartman's interpretation of Mandarin in terms of three vowel phonemes differing only in tongue height which may be preceded by the semi-vowels /j/ /w/ and /jw/ and modifications of his scheme by other scholars since are essentially adaptations of this traditional Chinese type of analysis (1968.230).

Although Hartman acknowledges an ancestor of his system in traditional Chinese treatments of the syllable, he also acknowledges what seems quite obvious: the major source for his analysis is the Bloch-Trager definition of the phoneme, which I have argued against using in Mandarin in Chapter II. If there is any historical connection between MC categories and a two- or three-vowel analysis of MC phonology, it is a reverse chronology. Hockett and Hartman influenced Pulleyblank's understanding of the MC categories.

The matter of reverse influence is of course not by itself a reason for rejecting Pulleyblank's interpretation of the MC categories. The real problem is that Pulleyblank's Late Middle Chinese has structural similarity to no dialect of Chinese except the Hartman-Hockett version of Peking Mandarin. It is not a sufficient defense of Pulleyblank's system to argue that LMC is a direct ancestor to Mandarin in a way that Early Middle Chinese (the language of the Ch'ieh Yün) is not, though that in itself is a well taken point (among many others in Pulleyblank's analysis). All the arguments used in Chapter II to reject this type of analysis for modern Mandarin apply here too. In addition,

there are three specific defects with Pulleyblank's own application of the scheme.

1) Consider Pulleyblank's understanding of the She 攝

I	果	/aɨ/	III	遇	/əɨ/
II	假				
IV	蟹	/aj/	V	止	/əj/
VI	效	/aw/	VII	流	/əw/
VIII	宕	/aɨŋ/ /aɨk/	IX	曾	/əɨŋ/ /əɨk/
X	梗	/aiŋ/ /aik/			
XI	江	/auŋ/ /auk/	XII	通	/əuŋ/ /əuk/
XIII	山	/an/ /at/	XIV	臻	/ən/ /ət/
XV	咸	/am/ /ap/	XVI	深	/əm/ /əp/

(1968.286)

One illustrative problem is Pulleyblank's use of the semivowel /ɨ/. Pulleyblank uses this phoneme as the ancestor of the apical vowelr̩ as nucleus, and when itroccurs postvocally, this element becomes a prosody of length by which such distinctions as the following are maintained for earlier stages of Mandarin:

/taimpuəlaj/ 他們不來 vs. /tampuəlaj/ 您不來

/kəir/ 歌兒 vs. /kər/ 根兒

If there was such a prosody, it would seem more sensible to treat it as such in a phonology. But there is reasonable question as to whether there was such a distinction very early. For it is so marginal even in Mandarin, and certainly

not reflective of dialects which retain the full complement of MC ending consonants that it seems very risky to posit a phoneme on that basis.

Also puzzling is the assignment of /u/ to the Chiang 江 She, a step which seems motivated solely by the a priori decision to be restricted to two vowels. The same thing can be said for the use of /ə/ in the T'ung 通 She, though it has already been noted that this phoneme has silence as one of its allophones.

2) As has been shown, the canonical shape of the standard Chinese syllable is: $(C)(V_1)V_2\ (^{C}_{V_3})$. This statement of shape accounts for the phonetic character of Mandarin as well as for that of other dialects. Now the distributional nature of Mandarin that Pulleyblank is responding to in his very long transcriptions has nothing to do with the length of the Mandarin syllable, but is (as in Hartman) simply a device to indicate the relatively restricted distribution of the vocalic elements. But in Pulleyblank's version the exercise does not even have the justification of Hartman's, that a rewriting in western terms is useful for contrastive purposes. Hartman's scheme is designed for an attested language, which, compared to MC and the modern dialects with the full complement of MC ending consonants, is far from rich in its syllable count. By applying the same analysis to a stage of MC, Pulleyblank is apparently assuming that the historical reduction of the ending segments of the earlier Chinese syllables and the drastic reduction of Finals and (consequently) syllables in the development to Mandarin was not accompanied by any change in the structure of the language. The comparative evidence from nonMandarin dialects certainly suggests differently.

3) But the most serious objection to Pulleyblank's analysis is that with his analysis there is no reason at all for the She or for the Rimes they

group together. The sequence constraints which govern the concatenation of principal vowels with ending segments are expressed sometimes through vowels and sometimes through offglides, and there is no consistent fit with the traditional system. Unhappily, Pulleyblank has taken the data presented in the MC analytical system and--although in handling these data he has shown more sensitivity than most workers--neglected to value the system itself.

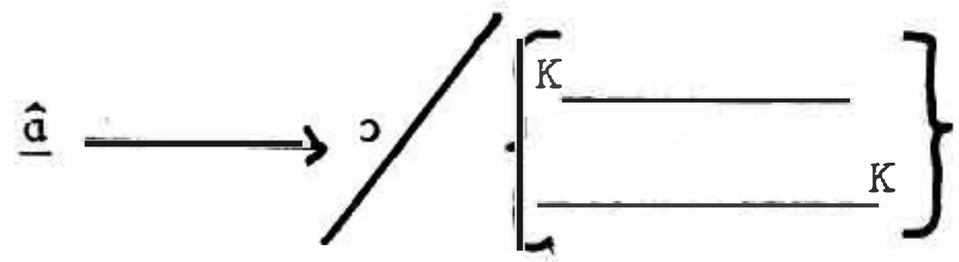
6.32 The notion of Rimemic analysis that I have used in this study includes phones with characteristic features and two types of rules showing the systematic relations between Rimemes and Finals. Given this definition, there are at least two types of sound change which should show up in Chinese as characteristic of that language. Both concern situations where a Sequence rule or a Rimemic rule is violated. The first type is where a rule either blocks a given change from occurring everywhere or alters a change which has taken place but which violates a rule. The second is where a change takes place and where a subsequent change is forced to follow because of the rule that is violated by the first change. I shall discuss one case of each of these types of change. The example of the second type of change is a recurrent change in the history of Chinese, and at the end of this section I shall suggest that the Rimemic analysis may contribute to the understanding of 'persistent rules'.

The first type of change is where a sequence rule is violated, and <u>either</u> the change that violates the rule was blocked, or the change took place and was subsequently altered because of the violation of the rules brought about by the original change. The evidence for the change which I shall use as an example does not indicate which of these sequences occurred. But it is obvious that one of them did.

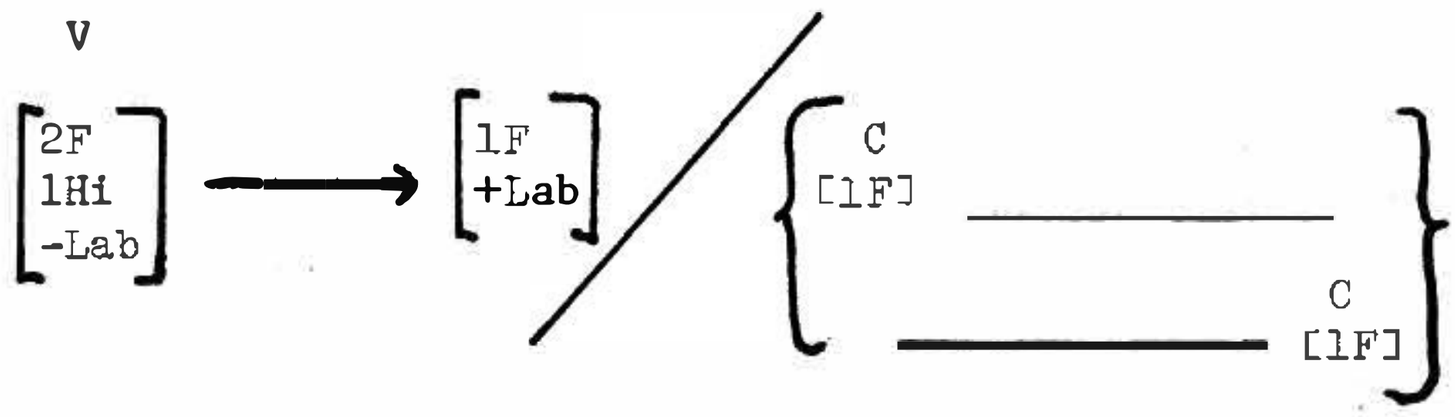
The rule that was violated by the change in question is the labial dissimilation constraint prohibiting labial vowels from being succeeded by labial consonants in the same syllable.

*V	C#
[+Lab]	[+Lab]

The change itself is the development of the second division vowel in the Han 寒 T'ang 唐 T'an 譚 Rimes into Cantonese and Hakka, among other dialects. In Karlgren's Ancient Chinese reconstruction the principal vowel of these Rimes is *â. The normal development of this vowel in the environment of a velar Initial or ending consonant is:



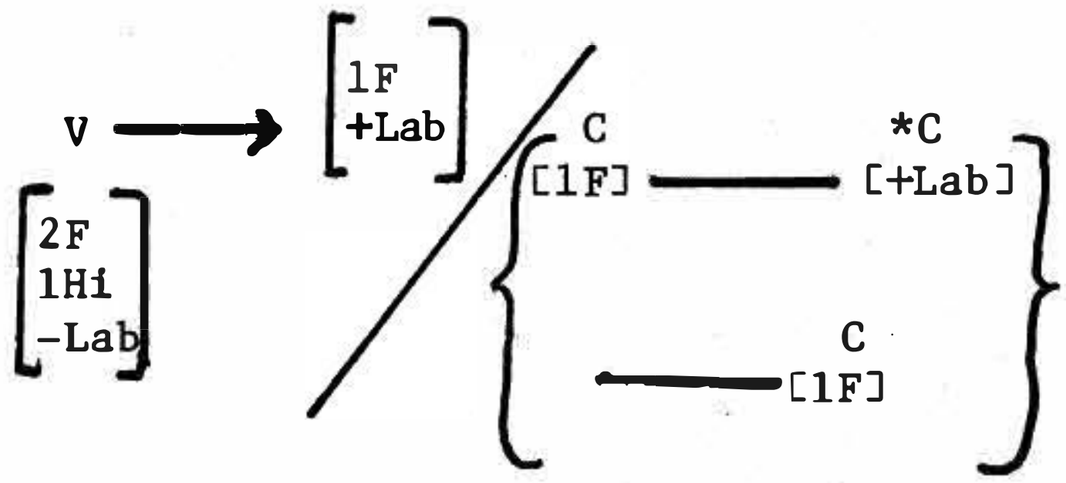
or:



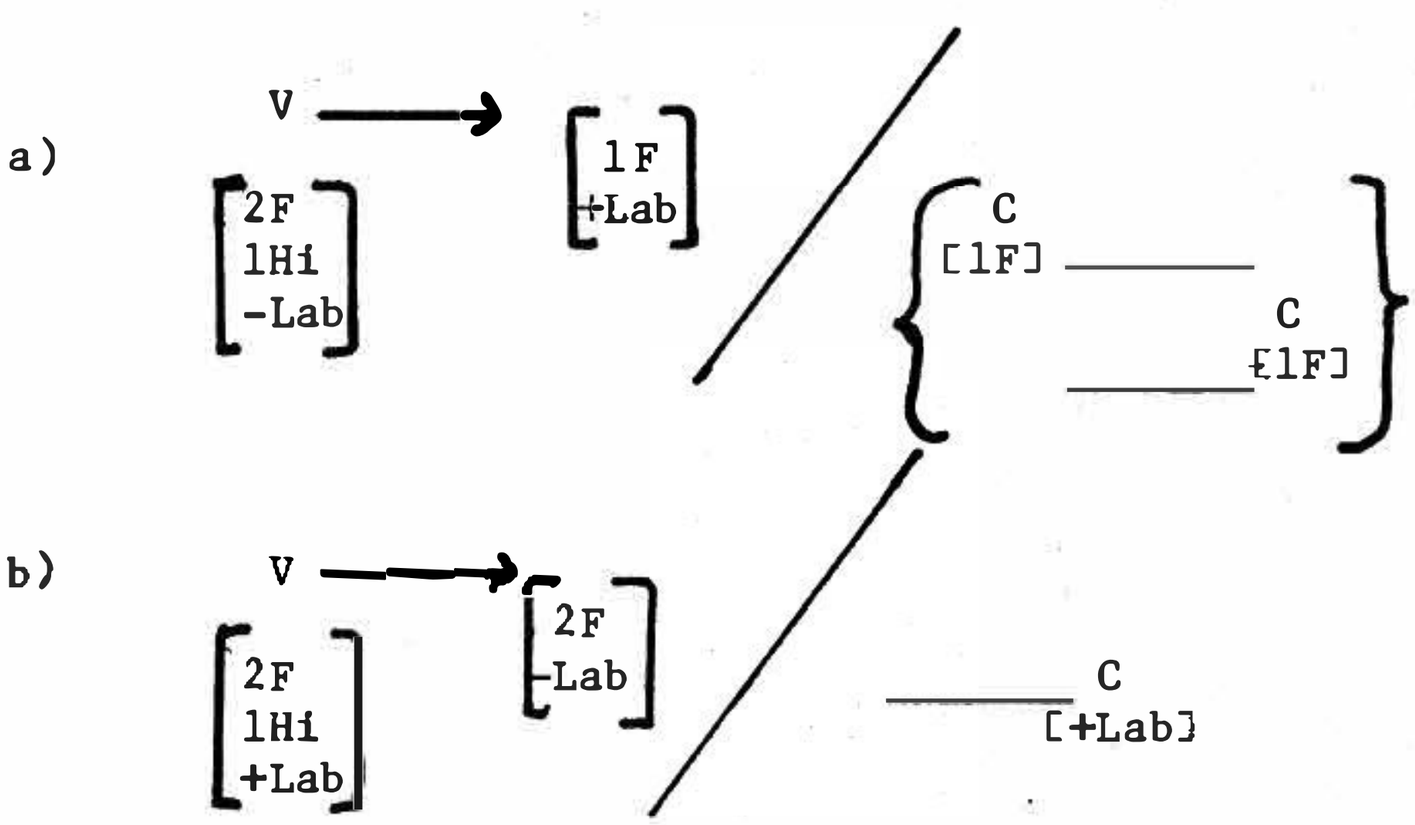
This rule yields such forms as the following:

彈	Cant.	Hak.	寒	Cant.	Hak.	唐	Cant.	Hak.
甘	$_{c}$ka:m	$_{c}$kam	干	$_{c}$kɔn	$_{c}$kɔn	幫	$_{c}$pɔŋ	$_{c}$pɔŋ
柑	$_{c}$ka:m	$_{c}$kam	肝	$_{c}$kɔn	$_{c}$kɔn	忙	$_{c}$mɔŋ	$_{c}$mɔŋ
膽	ta:m^{ɔ}	tam^{ɔ}	寒	$_{c}$hɔn	$_{c}$hɔn	湯	$_{c}$tɔŋ	$_{c}$tɔŋ
喊	$_{c}$ha:m	$_{c}$ham	看	hɔn^{ɔ}	kɔn^{ɔ}			

But note that where there is a labial ending consonant, the resulting vowel in Hakka or Cantonese is a or a:. Consequently, the rule must be rewritten one of two ways:



or:



The first expression of the rule indicates that it was blocked in operation; the second[2] suggests that the rule ran its course and then the result was altered by a subsequent rule. Both indicate the presence of the labial dissimilation constraint as a historical force.

The evidence for the second expression of this change (the sequential operation of two rules) consists in the fact that earlier records purporting to reflect standard Cantonese suggest distinct *ɔm, *ɔp Finals, and Wang Li's

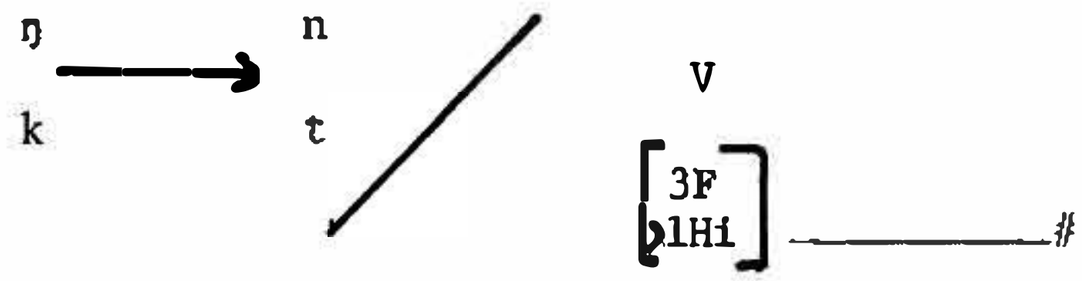
---

[2] I am grateful to Bill Baxter for the second explanation of this change.

account of Po Pei, a Cantonese dialect spoken in Kwanghsi, also has such Finals (Wang Li 1932). There are two problems with such records. First, we do not know enough about interdialectal influence or internal analogy to know if the earlier Yueh or Hakka forms really were *ɔm, *ɔp. They could easily not have been, but either vocalic borrowing or analogy on the Finals not ending in a labial could have 'regularized' a change that was blocked from occurring in the first place. Secondly, it is in just those places where we find ɔm and ɔp finals resulting from the historical *âm, *âp. Rimes that we must also admit degrees of labiality in order to account for the dissimilation constraint preventing labial finals from following 'fully' rounded vowels such as u and o, but not the half-rounded vowelrɔ (cf. 4.2). If the analysis of labiality in such dialects is accurate and stable, then it would seem that these dialects have accommodated to a revision of the absolute labial dissimilation constraint. But, if that is the case in these dialects, then why would it not have been the case in the protolanguage? And if that is the case, then the change in Cantonese need never have taken place.

For the present purpose, the sequence of this change will remain a mystery, but the causative factor seems quite certain.

The second change I shall discuss is much more complex, but also much more intriguing. Because the discussion of it will be relatively lengthy and include examples from several sources, it is useful to summarize it first. At various times and places in the history of the Chinese language there have been fronting changes of velar consonants after front nonlow vowels:



In the terms of this essay, this change is a Rimemic change. And it has been so expressed in Chinese phonological studies, so that this change reflects a merger of the keng 耕 and chen 真 Rimes (i.e., merger of *ŋ and *n into n). It is evident that this change did not take place just once, but that it has recurred. It is also evident that it does not always take place whenever there is a velar consonant following a high front vowel, since several dialects have a distinction between Rimes with velar and alveolar endings before high front vowels.

It is proposed that a recurrent change of this sort is best understood as the continuous operation of Sequence rules or Rimemic rules or their analogues in nonRimemic dialects and that such rules are best discussed withoutrreference to ordering. It is also proposed that the condition for the operation of this rule is related to a kind of phonetic balance that is inherent in the notion of Rimemic rules.

Let us begin by demonstrating that this rule has operated in many places and times.

Table 6.321 lists some probable correspondences between Tibetan or Tibeto-Burman and Chinese. The Tibetoid forms end in velars. The Chinese forms end in alveolars or dentals. The vowels are front and apparently relatively high. No date can be given to the proto-language from which these correspondences descend, and it is very possible that there is more than one Tibetoid stratum in Chinese (Bodman forthcoming). However, for the present purpose, we can say that these correspondences probably predate the Odes (800-600 B.C.) by a considerable time.

Table 6.322 lists partial mergers of the chen 真 and keng 耕 Rimes in riming sources generally thought to be of southern origin and reflecting a time span from the fifth to the second centuries B.C. Karlgren's reconstructions

TABLE 6.321

Tibeto Velar Endings Corresponding to Chinese Alveolar Endings

Sino-Tibetan

Character	Archaic Reconstruction	Tibeto-Cognate
节	*tsiet	*tsik (TB)
年	*nien	*niŋ (TB)
新	*siĕn	*Siŋ (TB)
名	*mlieŋ-mliĕn	*r-miŋ~r-min (TB)
古	*d'iat	ljags
蝨	siɛt	sig

(Sources: Benedict 1972; Pulleyblank 1960)

of the Rime group heads are given, and the presence of a front nonlow vowel is clear.

Table 6.323 lists the names of several Hupeh dialects of Mandarin where the MC keng 耕 and tseng 曾 She have merged in third division, and keng 梗 second division has split to merge either with chen 臻 or tseng 曾 (which has split in the same fashion).

M. Hashimoto (1973) discusses the partial merger of keng 耕 and chen 真 in the Meihsien Hakka, and Table 6.324 shows the partial merger of the tseng 曾 keng 耕 and keng 梗 She in several dialect of Szeyap Yueh.

The probable early date of the Sino-Tibetan correspondences suggests that this change might have occurred once in some place in China and thereafter influenced other Sino-Tibetoid dialects that came in contact with it. The evidence seems to strongly contradict such a hypothesis. Although this change seems to have been a markedly southern characteristic in the pre-Han period, and although Wu dialects reflect that change today, the independent merger of some alveolar and velar endings in northern dialects cannot have arisen from a southern source, unless one assumes that proto-Mandarin illustrated this feature. But if proto-Mandarin did have this merger, then Peking Mandarin and other types of Mandarin which do not merge these Rimes cannot be Mandarin dialects. Similarly in the Yueh case, there are Szeyap dialects spoken only a few miles apart which are distinguishable on this very point, and McCoy (1966) has had to reconstruct for Proto-Cantonese a velar ending everywhere that MC has one.

For these reasons, unless it can be shown that there was a very early major split of dialects along the lines of merger of *n and *ŋ after front nonlow vowels vs. nonmerger, and that subsequently the merging dialect influenced small areas of the nonmerging dialect contiguous with unaffected areas of the nonmerging dialect, then this change must be understood to have occurred in

TABLE 6.322

Partial Merger of 真 and 耕 Rimes after Old Chinese

I. Riming portions of Lao Tzu (老子)
(Source: Tung T'ung-ho, 1938)

OC Rime Group		Riming Contacts in Lao Tzu		
真	*t̂'i̯ĕn	芸根	垦	匪賓均
耕	*kĕng	靜令	新	名

II. Riming contacts of -n and -ŋ in Ch'u Tz'u (楚辭)

OC Rime Group		Riming Contacts in Ch'u Tz'u		
真	*t̂'i̯ĕn	均	人	天
耕	*kĕng	名	榮征	名

III. Riming contacts of -n and -ŋ in Huai Nan Tzu (淮南子)
(Source: Lo Ch'ang-p'ei and Chou Tzu-mo, 1958)

OC Rime Group		Riming Contacts in Huai Nan Tzu		
真	*t̂'i̯ĕn	天	夭	仁信臻
耕	*kĕng	情	正平生	成誠聲形

TABLE 6.323

Some Hupeh Dialects Illustration Merger of -ŋ and -n
After Front Nonlow Vowels

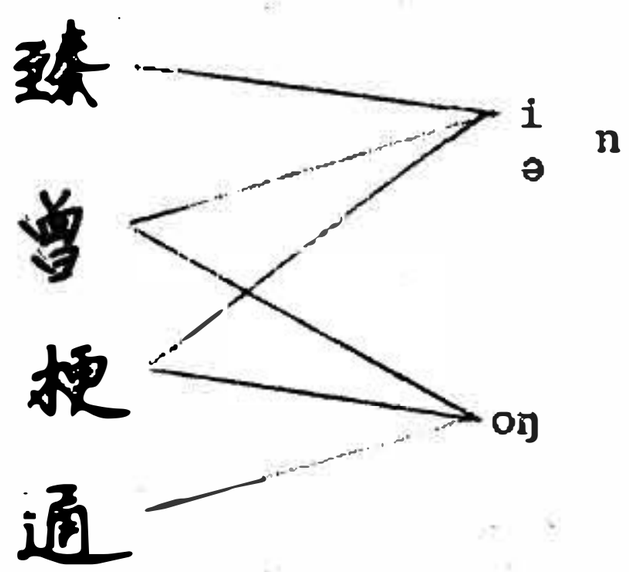
(Source: Y. R. Chao, et al. 1948)

---

1) Rule

$$\eta \longrightarrow n \;/\; V\_\_\_\_\_\# \quad \begin{bmatrix} +F \\ \geq 1Hi \end{bmatrix}$$

2) Splits and Mergers of Rimes



3) Names of somee dialects which illustrate this phenomenon,
Wu Ch'ang (武昌) Han K'ou (漢口) Han Yang (漢陽)
Pa Tung (巴東) P'u Ch'i (蒲圻) T'ung Ch'eng (通城).

TABLE 6.324

Partial Merger of 真 and 耕 in Szeyap Yueh Dialects
(Source: McCoy 1966)

字	Anc	PC	1)Toi Shan	2)Kung Yik	4) Tai Ling	11)Hoi Sum	13) Chek Ham	14)Hin Kong
力	liək	lik	let	let	let	let	let	let
直	d̂iək	tšik	tset	tset	tset	tset	tset	tset
色	ṣiək	šik	set	set	set	set	set	set
蒸	tśiəŋ	tši̯ŋ	tsen	tsen	tsen	tsen	tsen	tsen
織	tsiək	tšik	tset	tset	tset	tset	tset	tset
繩	dźiəŋ	šiŋ	sen	sen	sen	sen	sen	sen
升	śiəŋ	šiŋ	sen	sen	sen	sen	sen	sen
應	ʻiəŋ	iŋ	ien	ien	ien	ien	ien	ien
域	ɣwək	uak	(uak)	uet	(vak)	(vak)	vet	uet
兵	piwoŋ	piŋ	pen	pen	pen	ven	ven	ven
命	miwəŋ	miŋ:m:əŋ	men(iaŋ)	(mioŋ)	(men(iaŋ))	men	(mioŋ)	men
迎	ŋiɑŋ	ŋiŋ	ŋen	ŋen	ŋen	ŋen	ŋen	ŋen
鎮	liăŋ	liŋ	(liaŋ)	len	ten	len	len	(leaŋ)
精	tsiăŋ	tsiŋ	ten	ten	ten	ten	ten	ten

TABLE 6.324 (Continued)

	Anc	PC	1)Toi Shan	2)Kung Yik	4)Tai Ling	11)Hoi Sum	13)Chek Ham	14)Hin Kong
精	tsi̯äk	tsik	tet	tet	tet	tet	tet	tet
請	tsiäŋ	tsiŋ	then	(thioŋ)	(then(iaŋ))	then	tioŋ	theaŋ
淨	dzi̯äŋ	tsiŋ	ten	tioŋ	ten	ten	tioŋ	teaŋ
昔	zi̯äk	tsik	tet	tet	tet	tet	tet	tet
聲	siaŋ	siŋ	sen	(sen(iaŋ))	sen	sen	sen	sen
通	tiek	tik	let	let	let	(lek)	let	lek
定	dieŋ	tiŋ	len	len	len	len	len	len
靈	lieŋ	liŋ	len	len	len	len	len	len
星	sieŋ	siŋ	lhen	lhen	lhen	lhen	(lhen(ioɯ))	lhen
經	kieŋ	kiŋ	ken	ken	ken	ken	ken	ken
策	jiwoŋ	viŋ	uen	ven	ven	ven	ven	ven
巧	giwäŋ	khiŋ	ken	khen	ken	khen	khen	khen
營	iwäŋ	viŋ	uen	ien	ven	ien	ien	ien
訂	tieŋ	No form	len	len	(len)	(len)	len	len

TABLE 6.324 (COntinued)

	Anc	PC	1)Toi Shan	2)Kung Yik	4) Tai Ling	11)Hoi Sum	13)Chek Ham	14)Hin Kong
聽	tieŋ	No form	hen	hen	(hiaŋ)	(heŋ)	(hioŋ)	hen
停	dieŋ	"	hen	hen	hen	(heŋ)	hen	hen
艇	dieŋ	"	(hiaŋ)	(hioŋ)	hen	(hiaŋ)	(hioŋ)	(heaŋ)
敵	diek	"	let	let	let	(lek)	len	let
廳	tieŋ	"	(hiaŋ)	(hioŋ)	(hiaŋ)	(heŋ)	hen	(heaŋ)
糴	iək	"	iet	iet	iet	iet	iet	iet

Note: Circled forms are ones which keep the velar ending consonant and a relatively lower and more back vowel.

many places and at many times. To assume such an operation of linguistic change is to assume it has the arbitrary discreteness of a cyclone.

I shall assume that there has been a recurrent change.

But then the question arises: what governs such a change and what prevents it from occurring in those dialects which do not illustrate it?

I propose that the answer to this question is that a vowel shift takes place, and this vowel shift--because of sequential or Rimemic rules--requires the change of velar ending consonants to alveolar ending consonants. This vowel shift is essentially a phonetic change.

The basic change that takes place is that there is a loss of difference in relative height among the higher vowels such that the higher front vowels then tend to be followed only by front segments, while the back vowels are followed only by back consonantal segments. Now there are varying degrees to the operation of this rule, and they should be considered very carefully for the understanding of this phenomenon. Tables 6.325-8 chart four structural variants on this shift, ranging from Cantonese where the change of *-ŋ to -n does not occur, to Peking Mandarin where it occurs frequently in the variant pronunciations of some Finals, to Hakka, where there is a clear but partial split between the vocalic types that concatenate with front and back consonants respectively, to the P'u Ch'i dialect of Mandarin, which indicates a complete split between such vocalic types.

In Cantonese there has been a consistent maintenance of the relative distinction of height of phonetic vowels which concatenate with front back ending consonants. This distinction, and the rule it reflects, is much stronger than it looks on the surface of Table 6.325. For there is good reason to assume that a somewhat earlier stage of Cantonese had no *-ŋŋ, *-ɪk Rimemes and that the division of labor among front vowels was

TABLE 6.325

Front and Back Consonantal Endings and Their
Distribution Among Cantonese Nonlow Phonetic Vowels

Front Vowels			Back Vowels	
	y:n			
	y:t			
i:m	i:n	ɪŋ	u:n	
i:p	i:t	ɪk	u:t	
	œn	œ:ŋ		ʊŋ
	œt	œ:k		ʊk
		e:ŋ	ɔn	ɔŋ
		e:k	ɔt	ɔk

TABLE 6.326

Front and Back Consonantal Endings and Their
Distribution Among Mandarin Nonlow Phonetic Vowels

Front Vowels		Back Vowels	
in	$i^{(ə)}ŋ$ (ɪŋ)	un	$u^{(ə)}ŋ$ (ʊŋ)
	$u^{(ə)}n$		

i:n	i:t
e:ŋ	e:k

The ɪn ɪk words are largely paralleled by e:ŋ e:k doublets, and one can assume that the former are a 'literary' borrowing (from Mandarin?) (T. Cheng 1968.32). Given this historical development, we can see that Cantonese took the borrowed forms into the same structural arrangement that was already there. New Finals were added to the language, but these Finals have a vowel which is phonetically completely distinct from the vowel which precedes -p -m and -t -n endings. There is no merger of the velar and alveolar endings, and my own experience with Cantonese suggests that alveolar and velar endings are never regularly confused.

Consider now Table 6.326. In 5.3 I briefly discussed the phonetics of Mandarin high vowels and alveolar and velar endings. Stated very generally, an intrusive [ə] may come between a principal vocalic i or u and the ending consonant. Impressionistically, it seems that with speakers whose behavior indicates this schwa to occur in free variation and with speakers for whom there is a generally consistently heavier or louder schwa before velar endings than before alveolar endings, the distinction between the MC *-n and *-ŋ endings is maintained fairly much throughout. MC *-n and *-ŋ are merged in many cases for speakers who distinguish in from iən, but the MC Rime categories are not merged, and a phonemic suggestion that the phonemes -n and -ŋ had merged at syllable end would inaccurately reflect the history of the practice of such speakers.

So far as I have been able to tell, there are few cases of a regular merger of the keng 耕, tseng 曾, and chen 真 She in Standard Mandarin.

Turning to Hakka (Table 6.327), it is immediately obvious (as the rulesr

in 5.2 illustrate) that front vowels of a height level greater than [1Hi] do not take back vowels. It would appear that there is no corresponding phenomenon among the back vowels. But recall that the phonetic realization of um and ut may be uən, uət. So in fact there is a parallel phenomenon, and we can say that the historical merger ofr-n and -ŋ after higher front vowels is paralleled by a phonetic fronting of the high back vowel before -n and -t. This phenomenon is analogous to the phonetic differentiation between u: andru in Cantonese and the presence or absence of intrusive schwa among speakers of Mandarin who distinguish between endings through the use of this feature.

Looking at the Hupeh dialect of P'u Ch'i (Table 6.328)ę we can see an even more distinct pattern than in Hakka, wherein front nonlow vowels take only front consonantal endings and back nonlow vowels take only back endings.

Note that the low vowel(s) take all endings (except labial endings when low vowels are labial) generally in Chinese.

Interestingly, in P'u Ch'i, the merger of MC keng 耕, tseng 曾, and chene 真 Rimes has been followed by some doublets (through borrowing?) which vary not just according to ending segment (-nror -ŋ) but according to whole Rime:

I propose as an explanation of this phenomenon that there is in the dialects of Chinese that I have worked with or looked at records of an inherent principle of phonetic balance. That principle is that the velar endings will merge with the alveolar endings whenever a difference of relative height is lost among the nonlow vowels. This principle can be formalized as follows:

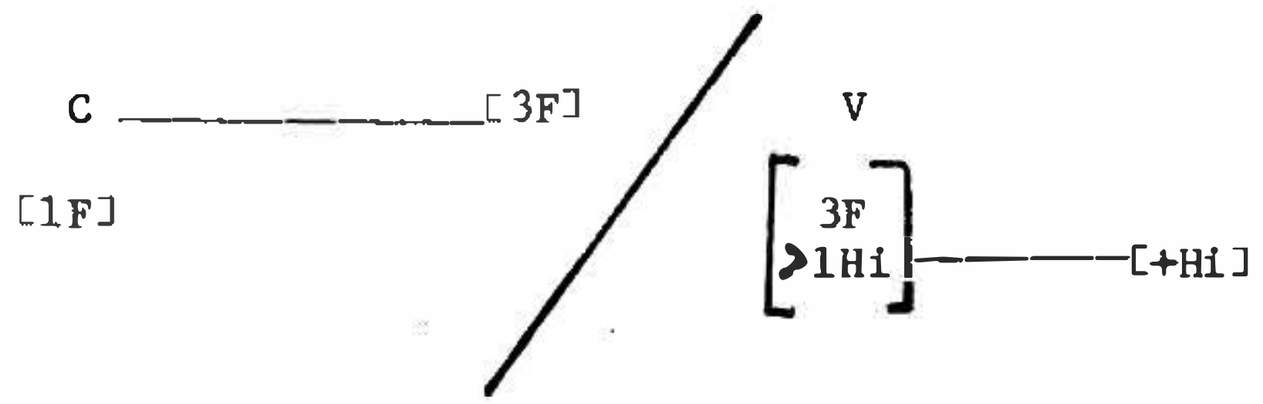


TABLE 6.327

Front and Back Consonantal Endings and Their Distribution Among Hakka Nonlow Vowels

Front Vowels		Back Vowels	
ɿm	ɿn	u(ə)n	uŋ
ɿp	ɿt	u(ə)t	uk
im	in		
ip	it		
ɛm	ɛt		

TABLE 6.328

Front and Back Consonantal Endings and Their Distribution Among P'u Ch'i Nonlow Vowels

Front Vowels	Back Vowels
in	uŋ
œn	oŋ
(i,ɥ,u)en	
ən	

冷 naŋ~nən

爭 tsaŋ~tsœn

生 saŋ~sœn

命 miaŋ~min

聽 d'iaŋ~d'in

So far as I have been able to tell, this principle does not usually expand to the merger of -n and -ŋ into -ŋ except in dialects where there is only an ending -ŋ and no -n. And, as has been shown in the discussion of Lungyen, in such dialects, structural discussions on concatenation are of no import. However the principle is expandable in the sense that if the loss of distinction between the height of vowels penetrates to a low enough depth (i.e. includes the mid vowels, too), then the result will be a pattern like that of P'u Ch'i wherein the front and back nonlow vowels simply take front and back consonants respectively.

This explanation deserves two theoretical comments. First, in modern terms recurrent change has been discussed by Chafe (1968) under the heading of 'persistent rules'. The main focus of Chafe's discussion is the ordering of such rules, and he proposes that such rules are constantly reordered so as to appear generally late in a historical sequence. If one insists that all historical phonological rules must be ordered, then Chafe's solution seems inevitable. However, in the case of Chinese, the acceptance of this solution would be dictated solely by the previous conviction that all historical rules must be ordered. In the absence of such an a priori conviction, it would seem sensible to consider such a rule one as that operates on a different plane from ordered rules. This is a rule that operates every time the condition for its operation is met, and when that condition is not met, it does not operate. In a sense this is a 'global rule' in that it operates so generally. However, at this stage, and for Chinese specifically, it would seem best to indicate its specific function by calling it a 'phonetic balance rule', recognizing that in the concept of phonetic balance lies the ultimate key to all of the kinds of rules that have been discussed in this essay.

In traditional Chinese terms, the operation of this rule would be called the merger of Rimes (e.g., keng 耕 and tseng 曾) and the split of Rimes (e.g., keng 耕 < $^{əŋ}_{ən}$). In our western segmental phonology, the Chinese discussion of the split and merger of Rimes is always interpreted as a segmental change. However, if the explanation given here has any validity, the Chinese view is more accurate. These changes are not segmental changes, but changes of whole Rimes, of both principal vowel and ending consonant. And, as we have seen in the case of P'u Ch'i, even doublet reflexes in a contemporary dialect reflects that very fact.

If the Chinese terminology is accurate for the recurrent change from velar to alveolar preceded by a high front vowel shift, that terminology is equally accurate for the sound change blocked or influenced by a violation of sequence structure constraints. For in that case, while there is not a shift of two segments, there is a shift from one Rime to another because the Rimeme to which the earlier change was directed is not permitted in the Rimeme matrix.

This terminological point is the final point to be made in this essay regarding the inherent wisdom of indigenous Chinese phonology as compared with western preconceptions as applied to Chinese. However, this point, too, has several implications for the understanding of Chinese historical linguistics. I shall close this section by simply noting two of them.

First, a conditioned sound change in the Final in Chinese usually leaves a gap in the Final inventory. Any generally conditioned sound change (i.e., one that covers a large enough class of Finals to leave systematic gaps) leaves a new sequence structure or Rimemic rule.

Second, because they leave gaps, such sound changes reduce the number of segmental syllables in Chinese, and it is for this reason that we see the oft-noted phenomenon of the predominance of mergers over splits in Chinese.

6.4 Areas for Further Research

I submit that the preceding discussions draw one's attention to the need for research in four important areas.

1) The synchronic and diachronic roles of sequence constraints need to be more deeply studied in a wide variety of languages. In both generative and structuralist studies, the syntagmatic concatenation of phones has been treated as a matter of much less importance to linguistics than paradigmatic rules of some sort or other. Yet not only does the syntagmatic arrangement of phones have a great deal to do with synchronic typology, but it may well influence linguistic change in two very important ways. First, conditioned sound changes tend to leave systematic gaps behind them which become sequence constraints on the synchronic level. The effect of such constraints on reconstruction may be enormous, especially when their source is not recognized. Secondly, to me it appears that examples of 'persistent rules' cited in Chafe (1968) indicate the operation of sequence constraints or rules analogous to Rimemic rules in this essay. If that is in fact the case there is a great need for investigation of why such rules operate at some times and places within a language family and not at other times.

2) I have proposed a notion of 'phonetic balance' as an explanation for the merger of velar and dental nasals in various types of Chinese. If this notion has any validity, then it is worth investigating the mutual implicative rules of various phones and combinations of phones in various types of languages. The phonetic quality of individual sounds by themselves is not usually considered terribly important to linguistic structure. But the phonetic quality of individual sounds in relation to other sounds in a given language is important. In a very rough way this fact has been noticed in modern linguistics through the use of vowel and consonant articulatory 'patterns'. These 'patterns',

which are really charts of articulatory classes are read in an implicative fashion such that, if there are three voice stops

b d g

and any voiceless stops, it is highly probable that the voiceless stops will include

p t k

I suggest that the mutual implications among sounds in language systems may extend far beyond this, so that it may be that certain sequences may obtain in a language only if other sequences obtain and only if phonetic properties continue to obtain. To test this hypothesis, however, will require an understanding of phonetics that treats the phonetic reality as a series of mutually dependent sounds.

3) I have suggested that MC was in some sense a Rimemic language. I have not defined that sense because the character of MC is a topic more than worthy of a much longer study than this one. However, the precise nature of this 'base' language for Chinese linguistics needs to be analyzed fully before further work on the reconstruction of MC will be very profitable.

4) I have noted above that conditioned changes result in sequence constraints. This point is particularly important in regard to languages like Chinese where a series of similar changes (loss of *-m in the environment of another labial, for example) eliminates a large proportion of an already small set of occurring segmental syllables. Conditioned sound changes plus unconditioned mergers (*-m with *-n; MC ju Tone *-p, *-t, *-k with other Tones and the loss of articulate final stops), plus the loss of canonical positions (elimination of Initial clusters from Old Chinese to Middle Chinese) all operating over a period of many centuries leaves a nonsyllabic morphemic language with very few syllables and very few segmental means of distinguishing

increasingly larger groups of homophones. It would seem from the work of Matisoff (1973b) and others summarized by him, that the origin of Tones in languages like Chinese may certainly lie in the combination of three phenomena. Matisoff's beautifully stated argument for Tonogenesis supplies a necessary, but not a sufficient cause for Tones arising from nondistinctive suprasegmental differences becoming distinctive in replacement of lost segmental distinctions. We may be able to push two steps closer to discovering a sufficient course for the origin of Tones if we recognize the following: a) Sequence structure constraints seem to prevent the development of new segmental phones. So, metaphorically speaking, there seems to be 'nowhere for a language to go' in maintaining disappearing distinctions than to a different category of distinctions--the suprasegmental category. b) While 'functional load' arguments for the cause of linguistic change in the face of overwhelming homophony are not solid because it is seldom that a single phone or feature actually distinguishes utterances in real speech, functional load arguments do make sense when one focusses on a shift from one phonological plane (segmental) to another (suprasegmental) because the loss of elements and whole categories in the former and the gains of categories in the latter are both clearly demonstrable.[3]

All of these considerations merit further study.

---

[3]These considerations have been discussed further in Light (1974)e

BIBLIOGRAPHY

Benedict, Paul. 1972. Sino-Tibetan conspectus. (Cambridge: Cambridge University Press).

Bloch, Bernard, & George L. Trager. 1942. Outline of linguistic analysis. (Baltimore: The Linguistic Society of America).

Bloomfield, Leonard. 1935. Language. (London: George Allen and Unwin Ltd.).

Bodman, N. C. 1955-58. Spoken Amoy Hokkien. (Kuala Lumpur: Government, Federation of Malaya).

Bodman, N. C. 1967. Historical linguistics. in Thomas A. Sebeok et al. ed. Current trends in linguistics, Volume II. (The Hague: Mouton & Co.).

Bodman, N. C. forthcoming. Tibetan and Chinese correspondences.

Boyle, Elizabeth Latimore. 1970. Cantonese basic course. (Washington, D. C.: Department of State).

Campbell, Lyle. 1974. Phonological features: problems and proposals. Language 50.52-66.

Chafe, Wallace L. 1968. The ordering of phonological rules. International Journal of American Linguistics 34.115-136.

Chang, Kun. 1971. Phonological aspects of Chinese dialectology (in Chinese). Tsinghua Journal of Chinese Studies NS, IX.1 & 2.192-215.

Chao, Y. R. 1934. The non-uniqueness of phonemic solutions of phonetic systems. In Joos 1957.38-55.

Chao, Y. R. 1940. Distinctions within Ancient Chinese. Harvard Journal of Asian Studies 5.203-33.

Chao, Y. R. et al. 1948. Report on a survey of Hupeh dialects (in Chinese). (Shanghai: Commercial Press, Ltd.).

Chao, Y. R. 1968. A grammar of spoken Chinese. (Berkeley: The University of California Press).

Chen, Matthew. 1973. Cross-dialectal comparison: a case study and some theoretical considerations. Journal of Chinese Linguistics 1.38-63.

Cheng, Chin-chuan. 1973. A synchronic phonology of Mandarin Chinese. (The Hague: Mouton and Co.).

Cheng, Teresa. 1968. The Phonological system of Cantonese. (Berkeley: University of California Phonological Laboratory, Project on Linguistic Analysis, Second Series.6).

China Book Co. 1965. Poetic rimes newly edited (in Chinese). (Shanghai).

Chomsky, Noam, & Halle, Morris. 1968. The sound pattern of English. (New York: Harper & Row).

Chou, Fa-kao. 1968. On the phonology of Ancient Chinese. (in Chinese) Bulletin of the Research Institute in Chinese Culture, Chinese University of Hong Kong 1.89-112.

Chou, Fa-kao. 1969. On the phonology of Archaic Chinese. (in Chinese) Bulletin of the Research Institute in Chinese Culture, Chinese University of Hong Kong. 2.1.109-79.

Condax, Iovonna D. 1973. Phonology of Lung Yen Chinese. (Princeton: Princeton University dissertation).

Egerod, Søren. 1967. Dialectology. in Thomas Sebeok et al., ed., Current Trends in Linguistics, Vol. II, pp. 91-129. (The Hague: Mouton & Co.).

Egerod, Søren. 1956. The Lungtu dialect. (Copenhagen).

Firth, J. R. 1967. Papers in linguistics 1934-51. (Oxford: Oxford University Press).

Forrest, R. A. D. 1963. The Chinese language (3rd ed.). (London: Faber & Faber).

Gelb, I. J. 1962. A study of writing. (Chicago: University of Chicago Press).

Greenberg, Joseph H. 1963. Essays in linguistics. (Chicago: University of Chicago Press).

Halle, Morris. 1962. Phonology in a generative grammar. Word 18.54-72.

Halliday, M. A. K. 1959. The language of the Secret History of the Mongols. (Oxford: Basil Blackwell).

Hartman, Lawton M. III. 1944. The segmental phonemes of the Peiping dialect. In Joos 1957.116-123.

Hashimoto, Mantaro J. 1973. The Hakka dialect: a linguistic study of its phonology, syntax, and lexicon. (Cambridge: Cambridge University Press).

Hashimoto, Oi-kan Yue. 1972. Phonology of Cantonese. (Cambridge: Cambridge University Press).

Henderson, Eugenie, J. A. 1949. Prosodies in Siamese. Asia Major, New Series 1.189-215.

Hockett, Charles F. 1947. Peiping phonology. in Joos 1957.217-228.

Hockett, Charles F. 1950. Peiping morphophonemics. in Joos 1957.315-28.

Hockett, Charles F. 1955. A manual of phonology. (Bloomington, Indiana: International Journal of American Linguistics Memoir 11).

Hockett, Charles F. 1968. The state of the art. ('s-Gravenhenge: Mouton & Co.).

Hong Kong Literary Research Society. 1960. Collected Works of Modern Chinese Literature (in Chinese). (Hong Kong: Hong Kong Literary Research Press).

Hooper, Joan B. 1972. The syllable in phonological theory. Language 48.525-40.

Johnson, Kinchen, et al. 1971. Folksongs & children-songs from Peiping, vols. I & II (in Chinese). (Taipei: The Orient Culture Service).

Joos, Martin, ed. 1957. Readings in linguistics I. (Chicago: University of Chicago Press).

Kao, Diana. 1971. Structure of the syllable in Cantonese. (The Hague: Mouton & Co.)

Karlgren, Bernhard. 1954. Compendium of phonetics. (Stockholm: Museum of Far Eastern Antiquities).

Karlgren, Bernhard. 1964. Grammata Serica Recensa. (Stockholm: Museum of Far Eastern Antiquities).

Kennedy, George A. 1942. The monosyllabic myth. in Tien-yi Li ed., 1964. Selected works of George A. Kennedy, pp. 104-18. (New Haven: Far Eastern Publications of Yale University).

Kennedy, George A. 1953. Two tone patterns in Tangsic in Tien-yi Li ed., 1964. Selected works of George A. Kennedy, pp. 213-25. (New Haven: Far Eastern Publications of Yale University).

King, Robert D. 1969. Historical linguistics and generative grammar. (Englewood Cliffs, New Jerseye Prentice-Hall).

Labov, William. 1972. Sociolinguistic patterns. (Philadelphia: University of Pennsylvania Press).

Ladefoged, Peter. 1967. Three areas of experimental phonetics. (Londone Oxford University Press).

Ladefoged, Peter. 1971. Preliminaries to linguistic phoneticse (Chicago: The University of Chicago Press).

Lehiste, Ilse. 1970. Suprasegmentals. (Cambridge: M.I.T. Press)e

Li, Fang-kuei. 1971. Studies on Archaic Chinese phonology (in Chinese)e Tsing-Hua Journal of Chinese Studies, New Series 9.1-61e

Liang, Chi-chao, ed. 1970. Types of Modern & Ancient Chinese Love Songs (in Chinese). (Taipei: The Orient Cultural Service)e

Light, Timothy. 1974. The implications of the tonogenesis theory. Paper read at the Annual Meeting of the Linguistics Society of America.

Light, Timothy. Forthcoming. The Cantonese Final. (To appear in Journal of Chinese Linguistics)e

Lo, Ch'ang-p'ei. 1955 (rev. ed.). Phonetics and phonology of the Amoy Dialect (in Chinese). (Peking: Scientific Press)e

Lo, Ch'ang-p'ei & Chou, Tsu-mo. 1958. A study of the evolution of the rime categories in the Han, Wei, Chin & North-South Dynasties (in Chinese)e (Peking: Scientific Press)e

Luh, Chih-weh. 1948. The Rhymes of the Book of Songs. (Peiping: Harvard-Yenching Institute, Yenching Journal of Chinese Studies: Monograph No. 21.

Matisoff, James A. 1973a. The grammar of Lahu. (Berkeley: University of California Publications in Linguistics).

Matisoff, James A. 1973b. Tonogenesis in Southeast Asia. in Larry M. Hyman, ed., Consonant types and tone, pp. 71-96. (Los Angeles: Southern California occasional papers in linguistics I)e

McCoy, William John, Jr. 1966. Szeyap data for a first approximation of Proto-Cantonese. (Ithaca: Cornell University dissertation).

Norman, Jerry Lee. 1969. The Kienyang dialect of Fukien. (Berkeley: University of California dissertation).

Peking University Department of Chinese. 1962. Chinese dialect vocabulary list (in Chinese)e (Peking: Literary Reform Press).

Pike, Kenneth L. 1947. Phonemics: a technique for reducing languages to writing. (Ann Arbor: The University of Michigan Press).

Pike, Kenneth L., & Eunice Pike. 1947. Constituent analysis of Mazateco syllables. International Journal of American Linguistics 13.78-91.

Postal, Paul M. 1968. Aspects of phonological theory. (New York: Harper & Row).

Pulgram, Ernst. 1970. Syllable, word, nexus, cursus. (The Hague: Mouton & Co.).

Pulleyblank, E. G. 1960. Studies in early Chinese grammar: Part I. Asia Major, N. S. 836-61.

Pulleyblank, E. G. 1972. The analyses of vowel systems. Acta Linguistica Hafnensia, XIV.1.

Robins, R. M. 1970. Diversions of Bloomsbury. (Amsterdam: North-Holland Publishing Co.).

Sapir, Edward. 1949. Language. (New York: Harcourt, Brace, and World).

Sapir, Edward. 1925. Sound patterns in language. in David G. Mandelbaum, ed. 1949. Selected writings of Edward Sapir, pp. 33-45. (Berkeley: University of California Press).

Sapir, Edward. 1933. The psychological reality of the phoneme. in David A. Mandelbaum, ed. 1949. Selected writings of Edward Sapir, pp. 46-60. (Berkeley: University of California Press).

Schane, Sanford. 1971. The phoneme revisited. Language 47.503-21.

Schane, Sanford A. 1973. Generative phonology. (Englewood Cliffs: Prentice-Hall).

Sherard, Michael. 1972. Shanghai phonology. (Ithaca: Cornell University dissertation).

Sinal, Paul A. 1971. Lexical redundancy in Greek, Latin & Gothic. (Ithaca: Cornell University dissertation).

Stanley, Richard. 1967. Redundancy rules in phonology. Language. 43.393-435.

Stanley, Richard. 1968. The formal character of redundancy rules in phonology. (Berkeley: Project on Linguistic Analysis, New Series, 6.1-31).

Stillman, Frances. 1965. The poet's manual and riming dictionary. (New York: Thomas Y. Crowell Co.).

Sung, Margaret M. Y. 1973. A study of literary and colloquial Amoy. Journal of Chinese Linguistics, 1.414-36.

Ting, Pang-hsin. 1972. Chinese phonology of the Wei-Chin Period: reconstruction of the finals as reflected in poetry. (Seattle: University of Washington, Ph.D. dissertation).

Trager, George L. & Henry Lee Smith Jr. 1957. An outline of English structure. (Washington: American Council of Learned Societies, Studies in linguistics: Occasional papers: 3).

Tung, T'ung-ho. 1938. Discussion of Bernhard Karlgren's 'Free Rime System' and the characteristics of the Archaic Ch'u Dialect (in Chinese). Bulletin of the Institute of History and Philology, 7.533-46.

Tung, T'ung-ho. 1948. A phonetic description of the Hakka dialect spoken in Liang-Shui-Ching Huayang. (in Chinese). Bulletin of the Institute of History and Philology, 19.81-210.

Tung, T'ung-ho. 1960. Historical Chinese phonology (in Chinese). (Taipei: Chinese Cultural Press).

Tung, T'ung-ho. 1961. The concept of initials and Finals and the modern theory of linguistic analysis. (in Chinese). Academia Sinica sp. Pub. 4.681-91.

Twaddell, W. Freeman. 1938. On defining the phoneme. In Joos 1957.55-80.

Wallace, Stephen. 1974. Structure, change, & typology: the case of Germanic. (Ithaca: Cornell University, unpublished paper).

Walton, A. Ronald. 1971. Phonological redundancy in Shanghai. (Ithaca: Cornell University M.A. thesis).

Wang, Li. 1932. Une prononciation Chinoise de Po-Pei. (Paris: Librairie Ernest Leroux)r

Wang, Li. 1958. Draft history of the Chinese language. (in Chinese). (Peking: Scientific Press).

Wang, Li. n.d. Chinese phonology (in Chinese). (Hong Kong: Ursa Major Book Company).

Wang, William S. Y. 1967. Phonological features of tone. International Journal of American Linguistics 33.93-105.

Wang, William S. Y. 1968. Vowel features, paired variables, and the English vowel shift. Language 44.695-708.

Wang, William S. Y. 1971. Approaches to English phonology. (Berkeley: Project on Linguistic Analysis Reports, Second Series.13)r

Wells, Rulon S. 1947. Immediate constituents. in Joos 1957.186-207.

Whorf, Benjamin Lee. 1940. Linguistics as an exact science. in John B. Carroll ed., 1956. Language, thought, and Reality. (Cambridge: M.I.T. Press).

Woo, Nancy. 1972. Prosody and phonology. (Bloomington, Indiana: University of Indiana Linguistics Club).

Yuan, Chia-hua. 1960. Outline of Chinese dialects (in Chinese). (Peking: Literary Reform Press).