

MONOGRAPHS ON LINGUISTIC ANALYSIS

No. 5

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THE LEXICON IN PHONOLOGICAL CHANGE

edited by

WILLIAM S-Y. WANG

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TABLE OF CONTENTS

CHARLES A. FERGUSON and CAROL B. FARWELL	
Word and Sounds in Early Language Acquisition: English Initial Consonants in the First Fifty Words . . .	7
ORRIN W. ROBINSON	
Rule Reordering and Lexical Diffusion	69
CHIN-CHUAN CHENG and WILLIAM S-Y. WANG	
Tone Change in Chao-zhou Chinese: A Study in Lexical Diffusion	86
MARY L. STREETER	
Doc, 1971: A Chinese Dialect Dictionary on Computer .	101
ANATOLE LYOVIN	
Sound Change, Homophony, and Lexical Diffusion . .	120
HSIN-I HSIEH	
Lexical Diffusion: Evidence from Child Language Acquisition	133
WILLIAM S-Y. WANG and CHIN-CHUAN CHENG	
Implementation of Phonological Change: The Shuāng- fēng Chinese Case	148
HSIN-I HSIEH	
A New Method of Dialect Subgrouping	159
MATTHEW CHEN	
The Time Dimension: Contribution Toward a Theory of Sound Change	197

TORE JANSON

Reversed Lexical Diffusion and Lexical Split: Loss of <i>-d</i> in Stockholm	252
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GEOFFREY GAMBLE

Nootkan Glottalized Resonants in Nitinat: A Case of Lexical Diffusion	266
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WORDS AND SOUNDS IN EARLY LANGUAGE ACQUISITION: ENGLISH INITIAL CONSONANTS IN THE FIRST FIFTY WORDS

CHARLES A. FERGUSON and CAROL B. FARWELL

0. In acquiring full control over the language of his speech community, the child must learn to deal with an enormous array of lexical and phonological elements and the complex relations among these elements which constitute the grammar of that particular language, different from all other possible languages. In addition to the machinery of the language itself he must learn when and how to use the language in accordance with his own needs and the norms of the community. And all this confronts the child not in neat, separate units but in conglomerate batches which he must largely sort out for himself. Even if the speech input to which he is exposed is restricted in scope and simplified in structure, as the talk addressed to young children tends to be, the analytic problem is severe, and it must not be expected that the child's early attempts will match with any great precision the adult's language behavior and its underlying principles of organization.

Thus, there are even greater pitfalls for the linguist in identifying analytic units in the child's speech than he meets in abstracting from the adult's speech those components at various levels which merit analytic autonomy. Looking for distinctive features, inflectional categories, syntactic rules, and all the dozens of other possible basic units in a child's linguistic system is a hazardous pastime, yet if we are to understand the processes of language development — indeed of language behavior in general — we must make the effort to do so, since it is manifestly impossible to deal with the child's language in one large undifferentiated mass.¹

Reprinted from *Language* 51 (1975), 419-430

¹ The difficulty and the challenge were neatly summarized by Chomsky:

In the present study we examine the language development of the child in terms of two putative units: "words" and "word-initial consonants". In the description and analysis which follow, no assertion is made that these units are independent of all other possible units or that if these two units are recognized that certain other possible units are not to be recognized (e.g. morphemes/formatives, syllables, sentences, prosodies, schemata, idioms, distinctive features, rules, agreement...). What is assumed is twofold: (1) "words" and "word-initial consonants" are valid units of analysis from the earliest productions of meaningful speech by the child, and (2) it is instructive to study these two units in relation to each other.

1. DATA

The data used here are a small part of those collected in a longitudinal study of seven children conducted as a part of research on the development of consonants by children learning their first language.² The children, four girls and three boys of monolingual English background, were selected for the study when they were reported by their parents to use several words. Ages at the beginning of the study ranged from 0;11 to 1;2.

1.1. *Procedure*

Each child was visited at home at approximately weekly intervals for seven to ten months, with occasional larger gaps occurring

"It seems that the attempt to write a grammar for a child raises all of the unsolved problems of constructing a grammar for adult speech, multiplied by some rather large factors... if anything far-reaching and real is to be discovered about the actual grammar of the child, then rather devious kinds of observations of his performance, his abilities, and his comprehension in many different kinds of circumstances will have to be obtained, so that a variety of evidence may be brought to bear on the attempt to determine what is in fact his underlying competence at each stage of development" (Chomsky 1964:35-36).

² The data collection and some of the analysis were carried out under the Stanford University Child Phonology Project, which is supported by National

because of illness and family vacations. Three observers participated in the project, two attending each session when possible. For about half of the sessions only one observer was present, but each child was seen consistently by the same observer.

During each half-hour visit, attempts were made by parents and observers to elicit as many of the child's words as possible by the use of picture books and things familiar to him (food, his toys, etc.). The sessions were tape recorded and notes were made by the observer(s) of the probable adult equivalent of each utterance. Utterances were considered meaningful if there was sufficient phonetic consistency to allow recognition of the form and if there was some consistency in reference or accompanying action — not necessarily exactly that expected from the meaning of the adult word. Similarly, it was not required that a specific adult English equivalent should be identified. Occasionally, it was found that a child would consistently use a form for which no probable adult equivalent could be imagined. In fact, however, such uninterpretable words occurred much less frequently than expected. They were included in the data, as well as forms which seemed to correspond to whole adult phrases rather than words, e.g. "I see you".

Identification of words was aided by parents' recognition, although observers often obtained evidence of the use of a particular word before parents noticed it. We assume that our judgment of the identity of meaningful forms is valid. McCurry and Irwin (1953) demonstrated 91 percent interobserver agreement in the determination of meaningful utterances and their referents in naturalistic settings, and our agreement in sessions attended by more than one observer was similarly high.

Child utterances were transcribed using the techniques established by the Phonetics Workshop of the Child Phonology Project (Fall 1971), and problems were referred to that Workshop.

Science Foundation Grants GS 2320 and GS 30962. The data collection was planned by Carol Molony, and carried out by her, Carol Farwell, and Carolyn Johnson. Transcriptions used in this study were done chiefly by Farwell but some also by Molony, and some of the questions were discussed in the Child Phonetics Workshop conducted by Clara N. Bush.

An expanded IPA symbol grid was used (Johnson and Bush 1972). Transcription is to a level comparable to that in Leopold (1939-1949) with narrower transcription of initial consonants and less attention to vowels.

1.2. *Subjects*

This paper reports the early stages of development of two girls, T and K, from the larger study. Utterances occurring from the beginning of the study to the week in which the fiftieth word type was recorded are included.³ In order to provide a reference point for our analysis, Hildegard Leopold (H) has been included as a third subject, since information about her development is widely known and generally available.

T was a first child and spent almost all of her time with her two parents. Her mother kept a detailed list of words T had produced during each week and conscientiously elicited new words for us at each session. T had just begun to walk when we started our study. She did not engage in much babbling and imitated only infrequently, usually words she had already produced herself. Pivot-type syntax, especially with the words *hi* and *where*, is evident from the first sessions, and two-word utterances become more common soon after the session with the fiftieth word.

K had an older brother and, possibly in self-defense, was physically aggressive and active. She spent time with both her parents and a housekeeper, and was often left alone with investigators during a taping session. Our tapes of K contain a lot of "babbling" or at least unintelligible speech, and she showed a willingness to imitate almost any word beginning with a sound at least close to one she could say. Even during the first sessions where our data are scanty, she would occasionally imitate or even spontaneously say three-word sentences, and our general impression is that she

³ In the case of K, seventy-two words were included in order to get fifty words which occurred either spontaneously or more than once in an articulated form.

is more adventuresome and less concerned with details than T and H.

H, a first child, was deliberately raised as a bilingual—her father spoke to her only in German and her mother in English. She spent two months (age 1;0 and 1;1) in Germany where even her mother spoke only German to her, and for some time on her return she did not understand English. To make the Leopold data comparable, only the words which H still said at age 1;0 were included in the study, but those words are followed from their beginnings, back to 0;10. She imitated rarely, and then always words which she understood. Until 1;5, the last month of our study, many of H's words occurred only in whispered form, although some had full voice from the beginning; a whisper/voice distinction sometimes separated homonyms. H learned to walk in the second half of 1;1, a month and a half after the beginning of the period studied here. On the whole, H was cautious: "It was characteristic of her that she generally avoided altogether any words the meaning and form of which she could not successfully cope with" (Leopold, I:172).⁴

The children and the number of sessions reported here are shown in Table 1.

TABLE 1
Period of Elicitation for the Three Subjects T, K, and H

Child	Age at Beginning	Number of Sessions	Time Span	Total No. of Words
T	0; 11	9	13 weeks	51
K	1; 2	13	13 weeks	72
H	1; 0	—	6 months	54

⁴ Leopold's comments about H are of special value because they are made in comparison with his observations of her younger sister Karla whose speech development he followed in less detail some years later. He also makes comparisons with previously published studies of child language development.

Because no natural criteria present themselves for grouping weekly sessions together, each session has been analyzed separately. For H, grouping is done month by month since Leopold tells us only the month in which each form occurred. The main effect of the use of larger time divisions with H is that fluctuations from day to day are likely to be lost in the general trend of development. This tendency, coupled with the fact that Leopold often reports only a few phonetic variants of a word during a month, while one of our children may produce as many as eight variants of a word in one session, tends to make H's progress look much smoother than that of the other two children. Far from making the two sources of data incompatible, such a difference can be put to good use: H's development can help us to recognize overall trends within the variant forms in our data, while our data can make clear the degree of simplification in the H data.

1.3. *Imitations and Other Problems.*

In a study of child phonology, as in any other phonological work, it is common to exclude certain problematic forms of data from analysis. For example, utterances in which a child imitates or echoes an immediately prior adult utterance are often separated from other, spontaneous utterances. Researchers have sometimes found that such imitations may be more accurate phonetically than the same forms said spontaneously, and imitations are eliminated in order to maximize the number of utterances processed by the child's phonological system rather than by a separate imitative ability.

There are several reasons why we have not excluded imitations from analysis in this study. For one thing, a high percentage of what a one year old says is imitated, so that there is little purely spontaneous data. Furthermore, a study of the forms collected shows that a separation of imitated from spontaneous forms, where the two can be compared, does not correspond in any straightforward way to a separation of different forms of the same word. Finally, even children this young can repeat or imitate things said

by adults at some distance of time — five minutes or more — despite considerable intervening speech, so that no simple definition of imitation is feasible. Therefore, a separation of imitated utterances was not carried out here, since it would lead to a great reduction of available data without any demonstrable gains of accuracy or homogeneity, although such a separation might be methodologically sound when dealing with older children where data is not so limited. For discussions of this whole question from different points of view, cf. Templin 1947; Olmsted 1971: 94-95; Edwards and Garnica 1973.

There are several kinds of data which we have excluded, however. In order to make the three children comparable, forms which Leopold himself questions or which H “seemed to repeat once” have been excluded, as well as exclamations which probably would not have been collected from our children. Some of H’s words have been included several months later than Leopold first lists them. Similarly, marginal forms such as *mmm*, *hm-m*, *tsk-tsk*, etc., as well as onomatopoeic words in which imitative qualities obscure the segmental phonology have been left out in all three children. However, H’s *sch-sch* has been included because of its conventional referential meaning, although it is extremely marginal phonologically, the [ʃ] being syllabic and not occurring before a vowel, like other consonants.⁵

Finally, there are certain forms which have been included even though they present problems for the analysis of word-initial consonants. A short listing of three cases in which this takes place may help to explain some of the variation observed:

(a) Backgrounding — the word-initial consonant is deleted or drastically reduced when the child is working on another part of the word (for full discussion of “trade-off” phenomena in phonological development, see Edwards and Garnica 1973). One example from our data shows two forms of a word:

T IX *milk* ʃʌʔ, ʌk-

⁵ At a slightly later period H had [ʃ] as a favorite syllable-final sound, where it represented any fricative of the adult model and was used frequently.

(b) Assimilation and syllable deletion — cases in which a word-initial consonant is affected by a phonological rule. Such cases are familiar from the literature. One example of each follows:

K IX *fish* ʃɪʃ kʰɪʃ
 K IV *thankyou* ˠkʲũ⁶

(c) Prosodic phenomena — cases in which the child treats the whole word as a phonological unit rather than its segments. Two examples are:

T III *shoe* gutɕɪ, gutʃɪdi
 T IX *feet* ʔfi⁷

1.4. *Phone Classes and Phone Trees*

One way to proceed in the analysis of the initial consonants in the data would be to group together all recurrences of the same phonetic symbols used in transcription. Such a structureless listing is unilluminating for several reasons. First, it simply does not show which different symbols might be regarded as variants of one another, i.e. which sounds are in some structural sense related and which

⁶ In this case the pronunciation may be due not to syllable deletion but to adult renditions with suppressed initial syllable: pronunciations like [ŋkju] and [mke] are fairly common among adults for *thank you* and *OK* respectively, although they were not observed from the adult in this study.

⁷ One example of prosodic treatment of a word was so radical that it was not included, but it is interesting in itself. In K IV, the new word *pen* received the following forms in this order in a one-half hour session:

1. mǎ⁹ (imitation)
2. ʋ̃λ (imitation)
3. dɛ^dɳ
4. hɪn
5. ˠbõ
6. pʰɪn
7. tʰɳtʰɳtʰɳ
8. ba^h
9. ɖʰau^N
10. buã

K seems to be trying to sort out the features of nasality, bilabial closure, alveolar closure, and voicelessness.

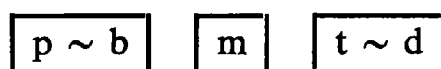
are not. How similar must two sounds be for the analyst to decide they belong together? Second, it does not allow the likely possibility of overlap in the phonetic value of different structural units or features. The phone represented by a given phonetic symbol may be a production at times of one phonological unit and at other times of another. Finally, this procedure offers no satisfactory way to relate the phones of one session with those of another session. If one of a child's speech sounds has changed sufficiently between one session and the next to be reported with a different symbol, how does the analyst recognize this fact? Or if a child has nine phones (i.e. different phonetic symbols) at one session and twelve at the next, how is one to relate the two systems?

What is needed is a way to determine which phones belong together or correspond to one another, and the most obvious way is to use the word as the framework for phone identification and classification. This is hardly a new idea, since it is implicit in much of the phonological analysis of child language but it seems never to be made explicit. For example, Francescato (1968) criticizes Jakobson and others for not making explicit use of the word although he himself does not offer analysis of this kind.

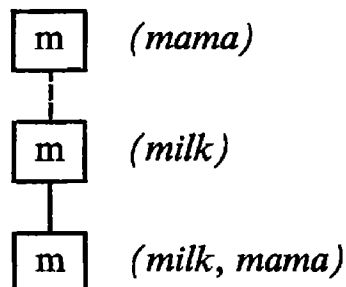
By using the word as the basis of comparison it is possible to establish the notion of correspondence or corresponding phones, similar to the notion of sound correspondence in comparative linguistics. For the purposes of our study, in which we are dealing only with initial consonants, we may define corresponding phones essentially as any two consonants which begin the same word in different utterances of the word, whether at the same session of observation or different sessions. This definition must be modified to exclude instances of omission or assimilation which may put noncorresponding phones in initial position.

The procedures followed in our analysis were as follows. For each session, all the renditions of a given word were grouped together, and all variants of the initial consonants in those renditions were noted. Then all words beginning with the same phone or set of variant phones were put together. The set of initial consonant variants of each of these groups of words constitutes

a phone class and is represented by the appropriate phonetic symbols in a box. Thus a phone class $\boxed{d \sim t^h}$ consists of the initial consonants of all those words whose initial consonant sound varied between [d] and [t^h]. All the phone classes of one child at one session were represented by boxes in a horizontal row, arranged roughly in order of place of articulation. For example, a child might show three phone classes of initial consonants at a particular session:



After this, phone classes in different sessions were connected according to the occurrences of the same word. With each session making up a horizontal level, solid vertical lines were drawn between successive phone classes if they contained the same word. If successive phone classes did not contain the same word but were connected with phone classes which did, dotted lines were drawn connecting them. For example, in T's *m* class:



In addition, and especially in the case of K, dotted lines were used to connect phone classes which were each well-motivated and were phonetically close or identical but shared no words in common (see especially K's $\boxed{b \sim p}$ classes IX to XII).⁸

Diagrams of this kind which connect corresponding phone classes of successive stages constitute phone trees. The phone trees constructed for T, K, and H appear as Tables 2, 3, and 4.

⁸ There is a danger that phone classes containing the same words may not actually correspond because of an intervening reanalysis of a certain word at the input level by the child. There is evidence that such reanalysis does take place — see Smith's example of *some* and its compounds (1973:145-6). Probably, however, reanalysis of this type is relatively infrequent and in any case not directly related to the development of the sound system.

Phone Trees of T

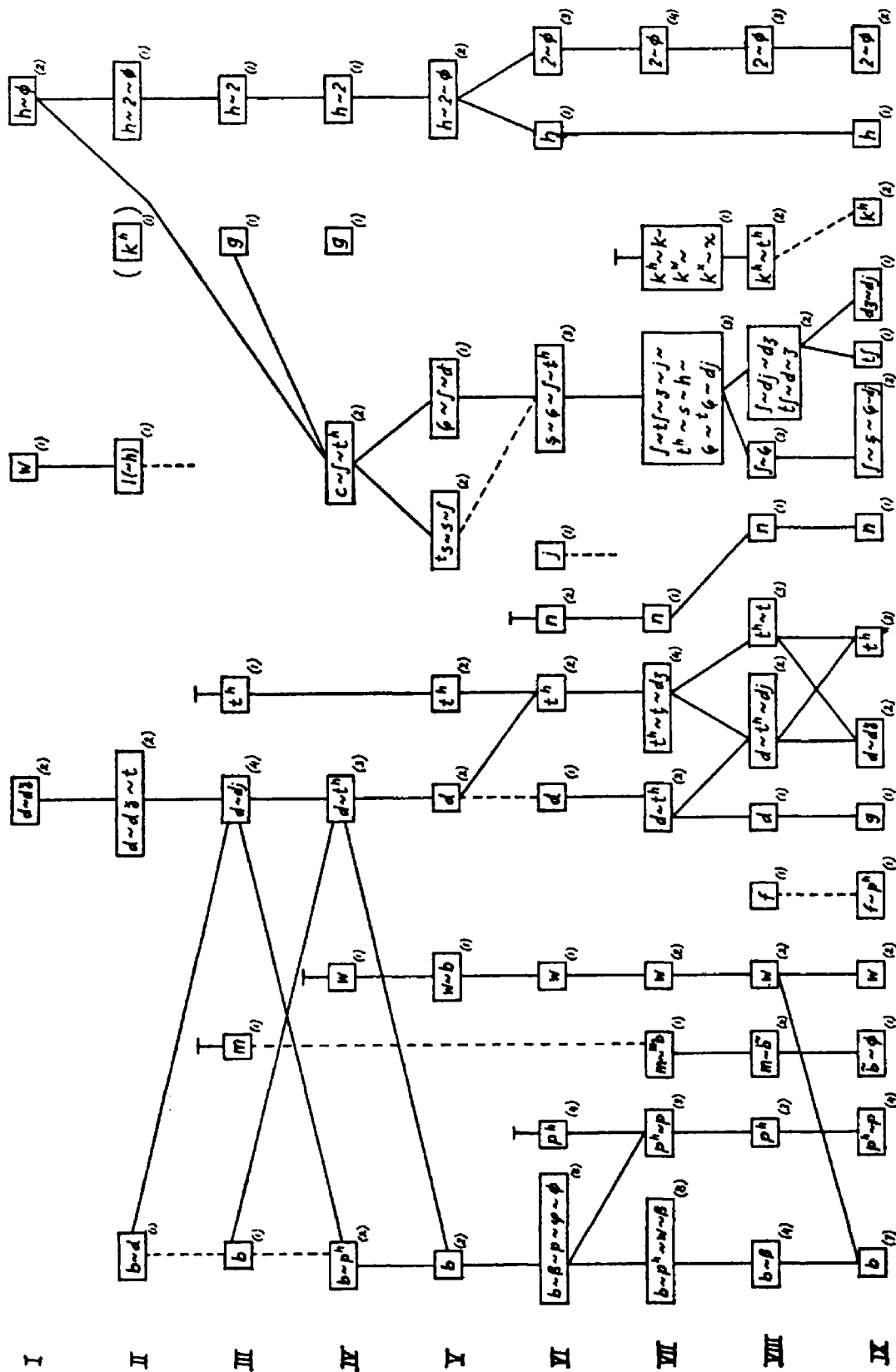


TABLE 3
Phone Trees of K

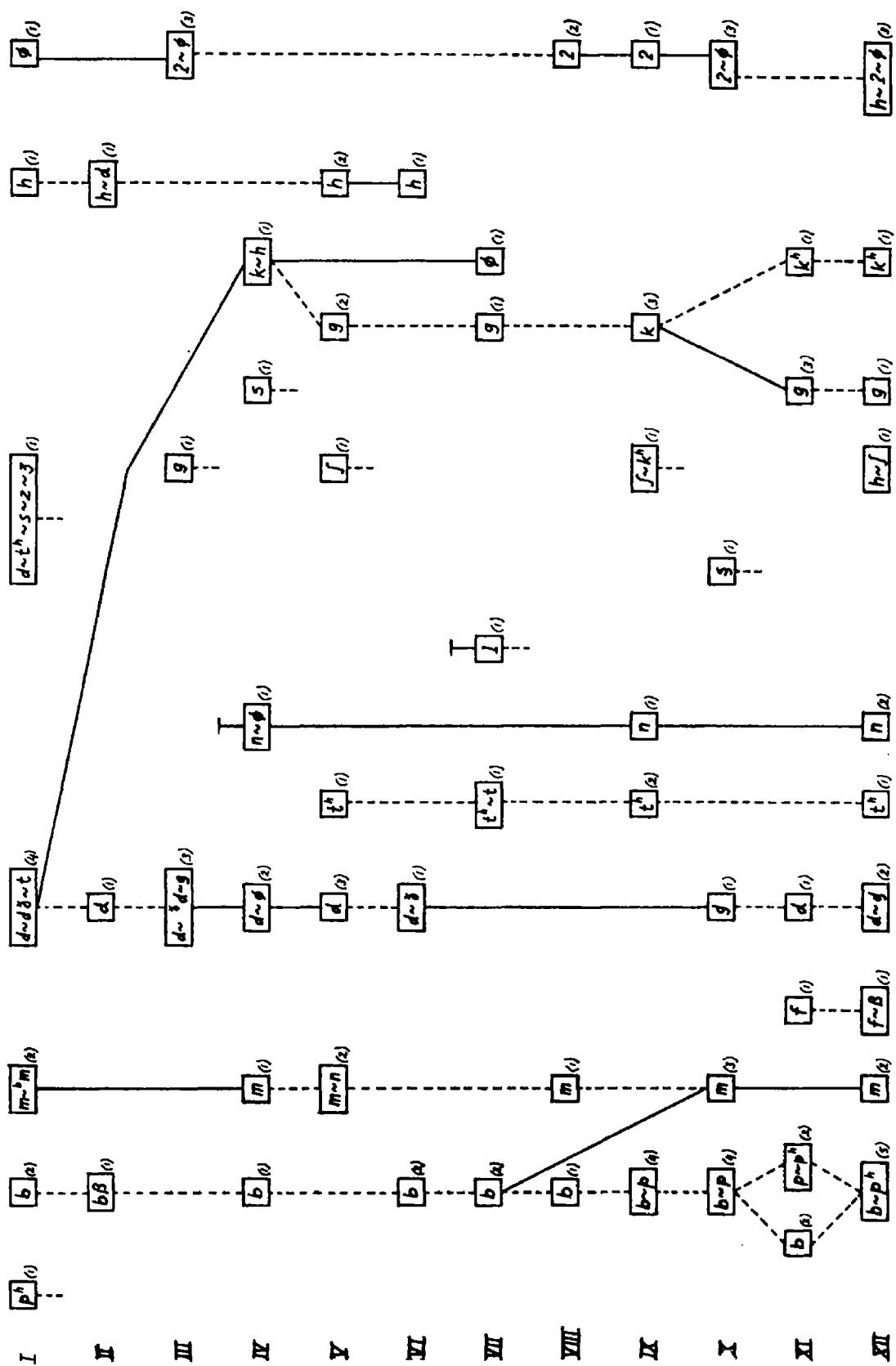
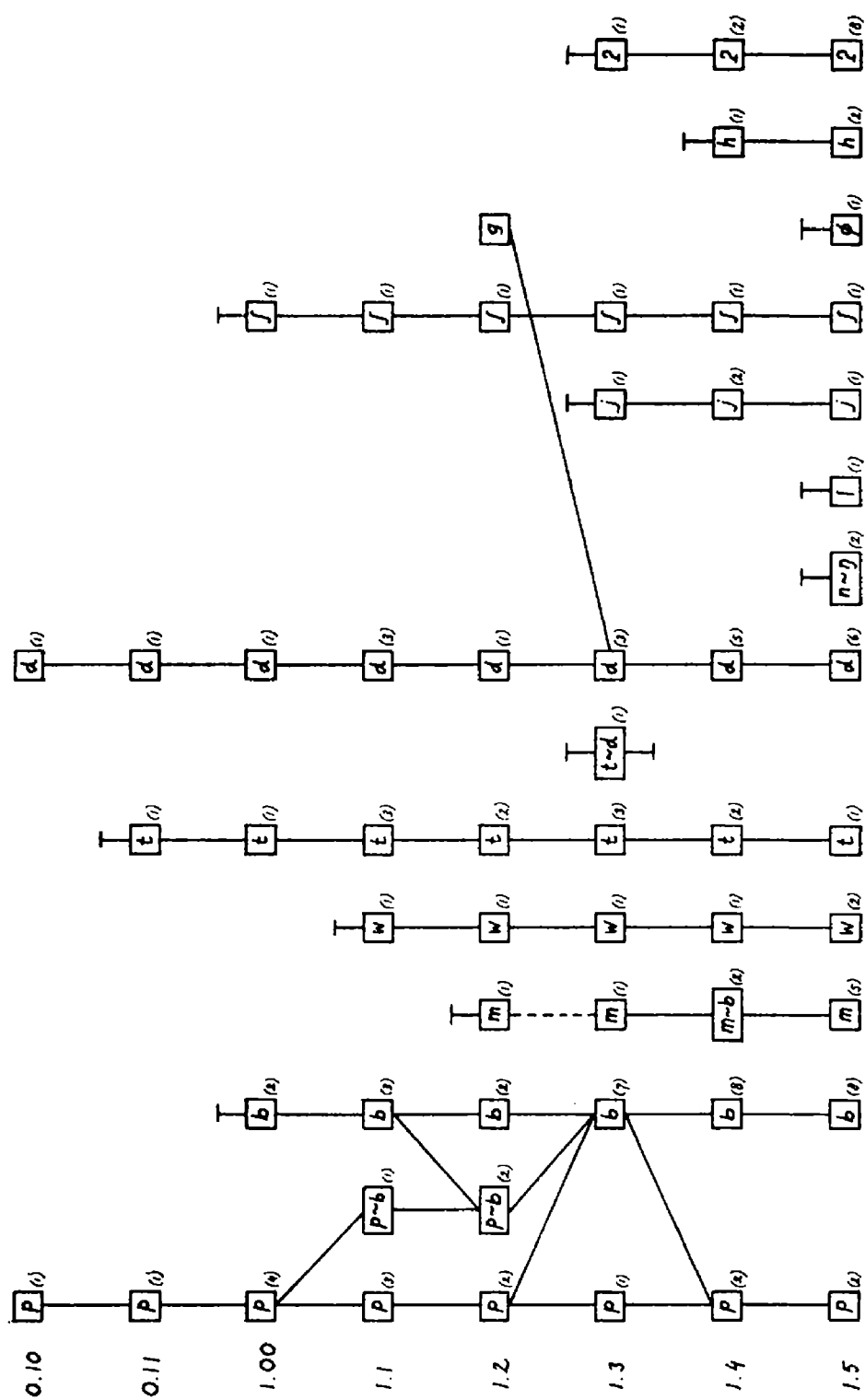


TABLE 4
Phone Trees of H



The primary data from which the phone classes and trees are derived are listed in Appendix 1. The phone classes for these three children are found in Appendix 2, together with full listing of the words grouped with each class.

Sometimes the phone classes are not as simple as the above description. For example, the phone class $b \sim \beta \sim bw \sim p^h \sim \varphi \sim \emptyset$ in T, Session VI, contains the following words and initial consonant variations:

<i>baby</i>	$b \sim \beta$
<i>ball</i>	b
<i>blanket</i>	b
<i>book</i>	$b \sim \emptyset$
<i>bounce</i>	b
<i>byebye</i>	$b \sim p^h$
<i>paper</i>	$b \sim \varphi$

One might reasonably make several phone classes out of these words, perhaps separating those in which *b* does not vary or varies only with $\emptyset$ from those in which variation is with a fricative or voiceless stop. For our purposes, they have been grouped together in opposition to the phone class p^h in which the following words occur:

pat
please
pretty
purse

all beginning only with aspirated *p*. The claim of this grouping is that it is only accidental that some words in the *b* class were found with variation of one sort and some with another, but that it is not accidental that the words in the *b* class are separate from those in the *p* class.

In fact, if we look at the corresponding classes in the next session, we find the following:

<i>baby</i>	$b \sim w \sim p^h$	<i>paper</i>	p^h
<i>ball</i>	b	<i>pat</i>	p^h

<i>bang</i>	b	<i>purse</i>	p
<i>blanket</i>	b		
<i>book</i>	b		
<i>bounce</i>	b		
<i>box</i>	b		
<i>byebye</i>	b ~ β		

From the data listings, it can be seen that *baby* occurs seven times with an initial *b*, once with a *p^h*, and once with a *w*. *Byebye* occurs three times with a *b* and once with a *β*. Therefore, it seems justifiable to group them with other *b* words and again it seems that the important split is between the *b* words and the *p* words.

The notion phone class here is similar to the notion phoneme of American structuralism in that it refers to a class of phonetically similar speech sounds which is believed to contrast with other such classes, as shown by lexical identifications. The determination of the phone classes of a particular child's speech is made by methods similar to linguists' procedures of elicitation and phonemic analysis, but largely without the benefit of minimal pairs and speakers' judgments. The purpose of the exercise (as ultimately for phonemic analysis as well?) is to locate valid behavioral units.

In general, an attempt was made to distinguish as few phone classes as possible, so that any error would be in the direction of underdifferentiation. Consider the word *dog* in T's Sessions I-VIII. It is included in phone classes with some variation even though the word *dog* itself is consistently produced with an initial *d*. By Session VIII, however, *dog* seems to belong to a phone class by itself, and perhaps it should have been separated all along.

Even with the policy of minimal differentiation, it may happen that phone classes are separated unjustly. Consider T's two classes t^s ~ s ~ ʃ and ç ~ ʃ ~ d in Session V. Although the regular criteria require their separation during that one session, the fact that they are joined in the sessions before and after suggests that the criteria are misleading in this case. A similar example is the separation of d ~ t^h and t^h classes in Sessions VIII and IX. However, since mergings are easy to see in the phone

trees, such cases have been left as originally analyzed. The lack of such phenomena in the H data is explainable by the longer time periods contained in each stage.

2. ANALYSIS

Given the organization of the observed data into phone classes and phone trees, we should be able to compare them to our general expectations of the course of phonological development as it has been previously reported. When we do this, we find certain surprising tendencies in our data. One inconsistency is the existence of a high level of variation of word forms. The range of variability plus certain regular forms of variation together make it difficult to make statements about either phonological contrasts or unique underlying forms and systematic rules, so that traditional forms of phonological analysis are not strictly applicable.

Another surprise is that many words seem to have more accurate renditions at this early stage than would be expected. Furthermore, the child will sometimes reduce an earlier, more accurate form at his learning proceeds. A final and related surprise is the seeming great selectivity of the child in deciding which words he will try to produce.

All of these aspects of our data point to one principle which puts them in the proper perspective. Phonological development in children, like sound change in language, takes place on several parameters, only one of which is the phonetic. Here it is useful to consider the lexical parameter.

2.1. *Lexical Parameter in Sound Change*

In general linguistic theory, synchronic or diachronic, the goal is to find generalizations of maximum validity, and as a consequence little attention is paid to the differences in the behavior of individual words. Only the field of linguistic geography, with its slogan of "Every word has its own history", has represented

the opposite tendency (Malkiel 1967). Similarly, in the studies of child language development, both phonological and grammatical, the effort to find generalizations has tended to exclude the study of individual words. Even the large literature on child vocabulary development is mostly concerned with estimating the extent of the total lexicon at successive stages rather than with tracing the history of individual words. One exception is Leopold's account of Hildegard's vocabulary development, which in many respects is one of the most informative (Leopold 1939-1947, esp. I: 149-179).

European linguistic geographers, working with some of the same languages in which the Neogrammarians had shown regular sound correspondences, found that isoglosses marking the extent of each sound change varied from word to word and thus showed the simple Neogrammarian model of linguistic change to be inadequate in spite of impressive evidence in its favor. The dialectologists' view and the Neogrammarian model, each in several forms, tended to remain side by side in linguistic theory without integration (e.g. cf. Bloomfield 1933: chs. 19 and 20). Recent models of linguistic change such as that proposed by Wang (1969) attempt to account for both sets of facts. Wang suggests that sound change takes place on three parameters. On the phonetic parameter, the phonetic manifestation of a sound change occurs abruptly at some point, goes through a period of variation in which some words are found in two forms, and finally approaches completion, whereupon other forms may change abruptly without going through a period of variation. On the lexical parameter, sound change starts in a subset of the relevant words, determined phonetically, socially, or by other factors, and spreads gradually through the lexicon to other relevant forms. On the social parameter, sound change starts with some group of people and spreads to others, or it begins in one speech style and spreads to other styles in the same individual. For discussion of a sound change in a framework of this kind see Ferguson (1971).

Linguists have begun to acknowledge the phenomenon of variation which accompanies linguistic change, but the lexical parameter has remained largely ignored by both the American structuralists

and the present-day generativists, because they assume it is the phonological system which changes and regard words as products of the system rather than as having a phonological existence of their own.⁹

The parallels between sound change in language history and sound change in child phonology development have often been drawn; Jakobson quotes Grammont's cogent remarks of decades earlier "By collecting the linguistic peculiarities of a very large number of children, one could construct a kind of grammar of changes which have appeared and can appear somewhere in language" (1968: 18). As an example of a parallel we could draw attention to the phonologization by borrowing outlined by Jakobson using Russian /f/ in illustration (Jakobson 1949). The adult model for the child's language is the analogue of the source language in the Russian example and the full acquisition of a phoneme by the child parallels the final addition of /f/ to the Russian inventory.

Here, however, we are suggesting a rather thoroughgoing application of Wang's model of linguistic change to some of the phenomena of child language acquisition (cf. also Hsin-I Hsieh 1972 and Moskowitz 1971 where aspects of Wang's model are applied to child phonology). Of Wang's three parameters, the social seems least relevant at this early age, since sound changes are taking place within an individual and children under two have little control of different speech registers — Gleason (1973) suggests their main register split as speech vs. silence (cf. also Weeks 1971). The other two parameters, however, are fully relevant and we would like to argue that one cannot profitably study either the phonetic or the lexical parameter of child language acquisition without taking account of the other.

⁹ Two important recent exceptions should be mentioned. For a fuller discussion of different approaches to sound change and an explication of Wang's model as applied to the lexical parameter, see Chen (1972). For a typology of sound change along social and lexical parameters, see Labov (1972). In the absence of any linguistically motivated ordering principle, we assume that phonological change affects earliest child language according to Labov's Model E, "Random decomposition".

2.2. *Contrasts*

From the earliest months of language development, some words assume a relatively stable phonetic form while others vary considerably. Many times, variable words are those which have more advanced canonical forms or harder sounds, so that variation can be explained as a kind of struggle with the word. In other cases, however, relatively difficult words have early stable forms. H's word *tick-tock* which she first attempted at 0;11, assumes the form [t'i-t'a] from 1;0 on and maintains that form steadily for months. Similarly, the word *Carolyn* becomes stable for H as [da-da]. Yet some relatively simple words show variation, such as H's *ball* (1;2-1;5) or her *mama*, which gave her two months of trouble before stabilizing. Compare also the relative stability of T's *rock-rock* (V-VIII) and *book* (VI-IX) with the relative instability of *baby* (II-IX), *daddy* (I-IX), and *milk* (VII-IX).

One important consequence of the existence of variable forms emerges if an attempt is made to determine phonological contrasts at these early stages. Consider the contrasts *m/b* and *m/n* in K's forms. From I on, K has something which one might call an *m* class. The *m* class includes words which start with /m/ in the adult language, as well as occasional /n/ words (*Nona* — V, *night-night* — VIII). This fact, along with the *m ~ n* variation at V, might lead us to think that there is no *m/n* contrast. At the same time, there is a *b* class which contains some forms which start with /m/ in the adult model (*moo* — VII, *mama* — XII). In all this time, there are no minimal pairs which would establish an *m/b* contrast in phonemic terms. There are simply some forms which start with *b* and some which start with *m*. From session IV on, furthermore, there is an *n* class containing only one word (*no*), which never varies with *m*. (Two sessions after XII, another word, *nose*, is added.) So again, although there may be no *m/n* contrast in the usual sense, there are words which start with *m* or *m ~ n* and other words which start only with *n*. Cruttenden (1970), in discussing a similar example, suggests that "It may be that it is only possible at first to make statements about the existence of contrast between individual

words." It does seem from our data that it is often impossible to make well-motivated claims about phonological contrasts in the usual sense at these early stages, as some might wish to do.

Often, variable forms and partial contrasts seem to correspond to a sound change in progress, as we might expect from our model of phonetic change. One example is in H's *p* and *b* classes from 1;0 to 1;3. By looking at the phone tree, it can be seen that at 1;0 there are two well-motivated phone classes, [p] and [b]. At 1;1, one of the [p] words has begun to show variation, and at 1;2, it is joined by one of the [b] words. Finally at 1;3, the third part of phonetic change is observed — the varying words join the [b] class along with a [p] word that had never shown variation, as predicted by Wang's model. Other *p* class words tend to drop out, while new *b* words are learned. At this point, the sound change is complete, leaving one residual form. The sound change that has occurred can be described as the acquisition of a rule of voicing which states that initial consonants tend to be voiced (see Ingram 1971:26). For several months after 1;3, the *b* class will be the dominant labial stop class, whereas the *p* class will contain a small number of residual or marginal forms. Note that a similar change takes place in H's *t* and *d* classes at 1;3 and 1;4, so that we may say that the voicing rule has spread to the alveolar stops.

This sound change is really quite a strange step from a Jakobsonian point of view. Rather than the learning of an opposition, this sound change results in a loss of an earlier lexical, if not phonemic, opposition. The *p* word which starts the change at 1;1 is *papa*, a word that begins with a *p* in the adult language. The data show that *papa* was first used "correctly" with a *p*, then later became variable and finally joined the group of words beginning with *b*'s. In other words, *papa* has become less like the model language in the process. That this case is not an unusual one can be seen from an examination of what have been called "progressive phonological idioms" (Moskowitz 1971; 1972).

2.3. *Phonological idioms*

The clearest example of a progressive phonological idiom is *pretty*, H's "first permanent word", occurring in almost perfect phonetic form at 0;10. At a time when other words are monosyllabic or have reduplicated consonants, *pretty* has two syllables beginning with different consonants and often a successful initial cluster. Only much later (1;9) does *pretty* become integrated into H's phonological system, taking the reduced form [piti] and even later (1;10), [bidi].

The opposite kind of phonological idiom, the regressive idiom, is not so obvious at these early stages of acquisition. A regressive idiom is a word which maintains an earlier form even though a different form would be expected given the child's phonological system. Usually regressive idioms are more reduced than forms in the current system, but in cases of change such as the voicing rule, forms which are better in terms of the adult phonology may be regressive idioms if they maintain a contrast which is no longer in the system. Thus, *pretty*, when it is not affected by the voicing change, remains progressive in terms of its total form, but becomes regressive in terms of its initial consonant.

Progressive idioms tend to give evidence that a child's perceptual and productive abilities are more advanced than the phonological system which most of his words seem to exemplify, although the extent to which they are actually more advanced is open to question. Since progressive idioms are by definition marginal or extrasystemic, a linguist searching for generalizations might want to exclude them from his data. However, determining which forms are progressive, apart from the most obvious examples, implies a prior determination of a phonological system, already shown to be a difficult or questionable task at the earliest stages of development.

One might assume that any word which changes from an earlier more phonetically accurate form to a more reduced form has been a progressive idiom until the time that it is reduced (ignoring the problems of determining what word form is more phonetically

accurate since one sound in a word may change in one way and another in the other). Given this definition, H's *papa* was a progressive idiom when it was pronounced with a *p*, but it joined the system when it was pronounced with a *b*. A generalizing approach would then simply ignore the earlier form [papa] in describing the development of the child's phonology.

It is hard to see the full consequences of this policy from our data, since the time section is so short, but another example may make the dangers clear. The word *hello* which has just appeared in the form [ʔəlo] at H, 1;5, can be used as an example. At the same time that *hello* appears, H begins to use *l*'s occasionally in other forms (e.g. *klingelingeling*), and at 1;7 she adds *alle* to her vocabulary with an *l*. *Hello* maintains the same form until 1;10, at which time it becomes [jojo] by a liquid reduction rule and reduplication, making its form more primitive. At about this same time, other words participate in the liquid reduction rule while some show variation and still others have *l*'s.

TABLE 5

Development of the lateral /l/ in H's speech during the 2nd year

	hello	alle	bottle	lie	Loch	Löscher
1; 5	ʔəlo					
1; 6			ba:I			
1; 7		ʔatə	ba:I			
1; 8		ʔajə	ba:u			
1; 9			balu			
1; 10	jojo	ʔalə	baju		lok'/jok'	
1; 11	jojo		balu	jai		loko/joke

From this account, one could claim that *hello* and *alle* were progressive idioms for several months, thus ignoring them and maintaining that *l* is acquired first as /j/ which later splits into /j/ and /l/. What actually seems to be happening, however, is that two sound changes are occurring simultaneously. One, the acqui-