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PHONOLOGICAL ACQUISITION

A Contribution Through Case Studies of Two Turkish Children

by

Şaziye Çakıroğlu

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS in the Department of Languages, Literatures and Linguistics

(c) Şaziye Çakıroğlu 1987

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ABSTRACT

The thesis is divided into three main components: (1) a general overview of the literature on child phonology, (2) a critical overview of the methodology of the field, and (3) analysis of speech data from two Turkish children taking the criticism into consideration. Although data was collected from thirteen children ranging in ages from 1;8 to 4;7, only data from two of them is included in the study. The reason for this selection of data is that as much fine detail as possible has been given of the child's utterances, of the stimuli/inputs, and of the contexts. The audio-recordings were made in the children's homes. Recordings were continuous through periods of about half an hour, and all the children's utterances were recorded either as they occurred as part of the ongoing conversation, i.e. the recordings were of "natural situations", or elicitation techniques were employed, and the subjects were asked to name toys, objects and actions depicted in pictures, books, or naturally occurring in the ambience. The selected data was then analyzed phonetically and classified according to particular phonetic procedures. The categorization yields phonetic structures that are labelled according to general classes such as 'labial', 'retroflex', 'glottal', etc. In particular, features which were observed to be spread over whole utterances were carefully noted and analyzed in accordance with notions such as the child's focus of attention, etc. In this way, we are able to account for
various renditions of so-called words, etc. Furthermore, the child’s forms are compared to those of the adult’s. As much attention as possible has been directed towards careful observation, analysis and categorization of these forms also. Thus, rather than claiming, as is general in the literature, that the child is acquiring some “full” adult forms and processes such as deletion, metathesis, etc., that “account” for the apparent distortion of assumedly invariant adult forms, specific set-subset relationships have been identified across varying contexts. What the child learns from the ‘particular’ linguistic stimuli in ‘particular’ contexts is the primary concern of the thesis.
DEDICATION

Dedicated to my beloved parents

Mehmet Çakıroğlu and Perihan Çakıroğlu
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Şaziye Çakiroğlu
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CHAPTER 1

GENERAL INTRODUCTION.

The purpose of this thesis is to make a contribution to the study of child language acquisition by examining a certain amount of data gathered for two children learning Turkish. As such, it makes no particular claims about Turkish. While, during the initial stages of the research, vain ambition persuaded me to collect material for thirteen subjects, cruel reality soon convinced me that amount should not be confused with quality, and, in the final analysis, this thesis deals with material from one child only (subject S.); with some comparison with data from subject D. in order to make the point that the approach adopted is generally applicable. During my reading and supervision, I also soon realised that, in fact, the field is suffering badly from a lack of serious attention to its own "data base", indeed to what it defines as its own subject, viz. what is going on when children acquire speech/ language. From this arose the extremely time-consuming need to present very detailed data, data, however, which I still regard as inadequate since I have, in the process of doing this work, come to realise how many shortcomings there were in my own data collecting activity.

The general approach in the study of child language acquisition is to take some prevailing linguistic theory, invariably based in one
way or another on consideration—again loose in a Rationalistically rationalised sense—of adult language.” (Roberts, 1980—). This has strong bearing on the continuity problem for "babbling" and the "linguistic stage", on the applicability of the phoneme, of generative phonology, etc. And the problem, as we shall see, is not just one of theory but also one of "techniques", in the sense that data representation using systems such as the IPA entails problems that are just as serious as the theoretic ones.

In the last few decades (from 1960 on), the amount of research in the field of child phonology has increased rapidly, encompassing related topics such as infant vocalizations (Stark, 1979; Carter, 1979), suprasegmental development (Lenneberg, 1967; Weir, 1966; Allen & Hawkins, 1980; Crystal, 1970, 1979; Allen, 1983); relationship between perception and production (Waterson, 1970 a, b; 1971; Smith, 1973; Vihman, 1981) as well as segmental development, the latter having been investigated by previous researchers as well (Jakobson, 1941/1968; Velten, 1943; Leopold, 1947). Until the 1960's, the research in the field seems to be directed to the study of the order of acquisition of phonemes (Jakobson, 1941/1968; Velten, 1943; Shvachkin, 1948/1973), which can be attributed to the influence of Jakobson, whose work published in 1941 (English translation 1968). In his work, Jakobson postulates some hypotheses which have since been subjected to investigations by many researchers. While some of these have found support for some of Jakobson's views (e.g., Leopold, 1947; Nakazima, 1966; Velten, 1943; Shvachkin, 1948), recent studies claim
disconfirmations of many of his hypotheses. During 1970's, alternative hypotheses to those of Jakobson have been introduced, leading researchers to investigate issues other than the order of acquisition of phonemes (e.g. "Cognitive theory" by Ferguson, 1978 b, "prosodic theory" by Waterson, 1970 a, b, etc.).

Jakobson postulates that children acquire contrasts between phonemes at the onset of "meaningful speech". Findings of recent research suggest that this may not be the case. In the early stages, such as during the onset of "meaningful speech", children may be learning whole words (Ferguson & Farwell, 1975), or phrases (Peters, 1983), or syllables (Moskowitz, 1971). Moreover, acquisition seems to be gradual, in other words, children do not seem to pass from one stage to another suddenly (Ingram, 1976; Moskowitz, 1973; Stark, 1979), thus, it has been claimed that during the transition period from "first words" to phonemes some words may be learned as wholes simultaneous with others which are acquired as sequences of phonemes. (Peters, 1983; Stoel-Gammon & Dunn, 1984).

In another hypothesis, Jakobson postulates that there is no relationship between babbling and "early speech" and that there is a "silent" period that exists between these two stages. Furthermore, Velten (1943) claims that babbling sounds can be lost overnight. On the other hand, recent studies suggest a close relationship between babbling "repertoire" and the sound "repertoire" of "first words" (Locke, 1983; Stark, 1979; Oller et al., 1976).
Finally, Jakobson's claim for a universal order for the acquisition of phonemes has been rejected by some researchers, who cite examples from children showing idiosyncratic paths in their phonological development. It seems that when children are studied in large populations, (i.e. when they participated in a large-scale study, where percentages are taken and where individual variations are eliminated), they show a general pattern of acquisition of phonemes; whereas when only one child or a very small group of children is studied longitudinally, they show idiosyncratic (i.e., individual) paths.

Universal patterns have been associated primarily with specific sounds and syllable shapes which have been observed to occur frequently in children's speech during babbling as well as during the "first words" stage (Locke, 1983; Irwin, 1947). The order of acquisition of these specific sounds, however, has been found to show variations between children (Menn, 1976; Stoel-Gammon & Cooper, 1984, Ferguson, 1978 c).

The thesis is divided into essentially two parts:

1.a. A short overview of the phonological approaches used in the field.

b. A critical development of our methodology based on consideration of the work of Kornfeld (1971) and
Weterson (1970 a, b, 1971) and on data and theoretic work by Roberts (1969-, 1980-, 1986/7-).

2. Description of our data and conclusions.

Chapter 2 deals with the short overview of the phonological theories in the field and also gives a brief account of the studies in the literature. The focus is on the work of Kornfeld and Weterson as the former is related to the general criticism of the approaches in child phonology and the latter is related to the data analysis approach adopted in the thesis.

It is outside the scope of this thesis to provide a general overview of the field of language acquisition. Consequently, I provide no discussion of the various stages of acquisition—prelinguistic, one-word, etc.—nor of central interpretive problems such as what is the status of babbling, what the order of "sound/phoneme" acquisition, inter-child variation/acquis- tional strategies, lexical selectivity, etc., etc.

For reference only, I append in the appendix a short description of Standard Turkish phonology. As Prof. D.Ingram pointed out to me, whenever Turkish phonology is involved in a piece of work, linguists, by virtue of the fact that Turkish Vowel Harmony has been used so frequently as a paradigm example of a phonological rule in generative linguistics, expect this feature to be a central concern. However, in my material, which deals with
speakers from the area, the clear indications for natural speech are that vowel harmony is not as "patent" a phenomenon as the linguistic literature on the Standard Language leads us to believe, and that it is not a feature that is "primary" in the learning situation. Consequently, this study finds very little to say on the matter.
CHAPTER 2.
TYPES OF PHONOLOGICAL THEORIES OF LANGUAGE ACQUISITION.

SECTION A.
GENERAL THEORETICAL OVERVIEW

Several types of theories have been proposed to account for processes involved in phonological development. These can be in general classified as Behaviorist, Structuralist, Natural, Cognitive, and Biological theories. (A detailed account of these processes can be found in Ferguson & Gernica, 1975). The prosodic approach will be dealt with in detail in Section C. b.

1. Behaviorist theories

The Behaviorist Theory introduced by Mowrer (1952) offers a model for the acquisition of sounds by children, and for the "speech" behavior of "talking birds", in which the role of reinforcement is emphasized. In this theory, the first step is that the child (or the bird) identifies and attends to the caretaker. The second step is that the child (or the bird) associates the primary reinforcements such as food or care with the vocalizations of the caretaker. Then vocalizations of the child provide the secondary reinforcement values by being similar to those of the caretaker. Finally, the sounds that are the most similar to those of the caretaker's are selectively reinforced both by the child and by the caretaker.
Olmsted (1966, 1971) has attempted to extend the model proposed by Mowrer by adding two factors: frequency of input and ease of perception. According to Olmsted, the most frequent sounds that appear in speech directed to children are most likely to occur also in children's productions. Secondly, sounds whose features are perceived easier are learned earlier than those with less discriminable "components". Olmsted postulates that the features of voicing and nasality are more easily perceived than the features of friction and duration, which in turn are more easily discriminable than place of articulation. Hence, he predicts that during phonological development, children will make the greatest number of errors for place of articulation, and fewer for voicing, and nasality.

2. Structuralist theories

The Structuralist Theory proposed by Jakobson (1941/1968) attempts to explain the children's phonological development on the basis of universals of languages. According to Jakobson, the 'prelinguistic babbling period', during which a large quantity and diversity of sounds with no regular order of acquisition can be observed, is not continuous with the following period, 'meaningful speech', during which the acquisition of sounds and phonemic contrasts follow a universal order.

In Jakobson's model, the existence of an entity $V$ in a phonological system presupposes the existence of an entity $X$ in that
same system, and without $Y$, $X$ cannot be eliminated from the system. According to Jakobson, the acquisition of vowels begins with a wide vowel, usually (/a/), while the acquisition of consonants begins with a labial stop (usually /p/), the process which establishes the contrast between optimal vowel and optimal consonant. 'Consonantal-vocalic' opposition is followed by 'nasal-oral' (e.g., /p/-/m/), and then by 'grave-acute' (/p/-/t/). Jakobson postulates that stop contrasts (/p/-/t/) appear before contrasts in spirants (/l/-/s/), and that at least one liquid is acquired before the contrast strident versus mellow, e.g., /r/ or /l/ before /c/-/t/.

Amongst many others, Moskowitz (1970, 1971) attempts to extend and modify Jakobson's theory. In the model she proposes, the order of structural unit acquisition is quite different from Jakobson's. It is in fact the DOWN versus UP version. The child acquires one unit at a time during the phonological development. The child discovers the 'sentence unit' during the babbling period. Once the child masters sentence intonation, he proceeds to cope with segmental material. In this model, syllable has great importance in phonological development. The child discovers 'syllable' as a unit after he has discovered the sentence. The first syllable-word that appears in the child's speech is the CV type, and is not analyzed into segment units. Only after two syllable-words in which only the two consonants or only the two vowels are identical ('partial reduplication') appear in the child's speech, does the child discover the sound as a unit. After this point, the child's phonetic inventory grows rapidly. The order of acquisition of features but not the
acquisition of segments postulated by Jakobson is adopted by
Maskowicz, although she acknowledges the existence of variability
in the order of acquisition of segments from one child to another.

3. Natural Phonology Theory

The Natural Phonology Theory formulated by Stampe (1969)
assumes that phonological processes, which are "universal" and
"innate", are the 'natural' consequence of restrictions on human
speech capacity. During the course of phonological development,
children learn to constrain or suppress those processes that do not
occur in the ambient language, by application of operations such as
'suppression', 'limitation', and 'ordering' of the processes in
question. For example, 'final devoicing' is such a process which
children must learn to suppress if both voiced and voiceless
obstruents occur in final position in their language.

4. Cognitive Theories

The Cognitive Theory proposed by Ferguson (1978b) and Macken
& Ferguson (1983) assumes that children play an active role in the
phonological development by formulating and testing hypotheses.
According to this model, during the first-words stage, children
selectively choose some words which consist of certain phones to
include in their lexicon, while they avoid some others; they
formulate hypotheses about the sound system and then test and
revise them as a result of their experience with the ambient
language. Processes such as overgeneralization and regression of advanced forms seem to support the hypothesis-testing formula proposed by this model. During the early stages, children acquire phones on a lexical basis. As their lexicon grows, they notice the regularities and relations between sound classes consisted in the lexical items, according to which they formulate hypotheses. This theory acknowledges children as creative learners during the language development. The linguists who formulated this model do not deny the occurrence of universal or near-universal patterns in children's speech.

The 'Interactionist-discovery' model proposed by Menn (1976) and Kiparsky & Menn (1977), also attributes to the child an active role during phonological acquisition, which is viewed as a 'problem-solving' activity. In this model, the dichotomy between phonetic and phonological learning is emphasized. According to Kiparsky & Menn, the child is faced with two problems in learning phonology: In the early stages, the problem of his own limited phonetic capabilities to which the adult output must be fitted, later, the cognitive problem of learning the abstract regularities of the phonological system. Kiparsky & Menn suggest that the child's solution to these problems is a "cognitive" one that is determined by the child's ability to construct grammars. They state that

"the child devises a system of underlying representations and general rules, which operate on phonological features, to derive the output form... The child's speech reveals, in both cases, a highly plastic, active process of acquisition, with many signs of
restructuring of underlying representations and addition and discarding of rules" (Kiparsky & Menn, 1977, p. 75).

5. Biological Theories

The Biological Theory formulated by Locke (1980, 1983) emphasizes a biological component in phonology

"that manifests itself in the phonetic patterns of all humans, whether their system is developing, disintegrating, changing, or merely in use" (Locke, 1983, p. 60)

(cp. Jakobson, who rejects continuity between babbling and so-called early speech). Locke bases his model on the observations of several studies which suggest: a universality in babbling, a close relationship between the vocalizations of late babbling and the phonetic repertoire of early speech, and a relationship between the frequent sounds of babbling and the substitution frequency observed in children's productions (i.e., he claims that frequently occurring sounds of babbling serve as substitutes for infrequent babbling sounds, and that the exact substitution patterns depend on perceptual similarity between frequent and infrequent segments).

The 'selectionist paradigm' model, which is based on Mayr's (1963, see Kent & Bauer, 1985) work, is emphasized by Kent & Bauer (1985). This model views child language acquisition as a particularly human brain-behavior adaptation to varied and distinct environments. Kent & Bauer emphasize the ethological approach (Tinbergen, 1963, see Kent & Bauer, 1985) in that it puts a useful
biological perspective on emerging behavior. They point out that in the case of the child’s vocal tract, being anatomically different from an adult’s, the degree to which the units and dimensions of adult language can be used to characterize the vocalization of infants is limited. Kent & Bauer argue in parallel with Locke (1983), who claims that developmental changes in vocalizations are not necessarily evidence of language learning, but rather, that the child is demonstrating altered patterns of respiratory, laryngeal, and articulatory movements that are determined by an innate maturational schedule. However, Kent & Bauer (op. cit.) point to the importance of experiential factors on influencing behavior, claiming that the environment plays the most important role in evolutionary biology (Mayr, 1963). Pointing to the the major criticisms directed against ‘structuralist’ and ‘natural phonology’ theories viz. that they ignore cognitive developments, that the theories generally predict a gradual progress towards an adult system, when in fact phonological acquisition is characterized by both regression and overgeneralization, Kent & Bauer claim that

‘pragmatic and interactive data combined with a comparative, evolutionary perspective on language in relation to human biological adaptation completes an ethological paradigm that emphasizes selection’. Kent & Bauer point out—that the evolutionary and developmental integration of the selectionist paradigm welcomes the individual differences found in some studies’.

SECTION B.
Views on Child Perception and on the Relationship Between Child Perception and Speech-Language Production

Both individual variations and universals have been observed in studies of discrimination of minimal pairs and nonsense syllables. Edwards (1974) tested twenty-eight children between ages 1;8 and 3;11 for their discrimination of contrasts in fricatives such as /s/ versus /z/, /f/ versus /v/, /$/ versus /z/ , and /θ/ versus /ð/. She found that children as old as 3;0 did not have complete phonemic perception and that phonemic perception develops gradually and the order of acquisition shows trends towards uniformity but is not universal.

Menyuk & Menn (1979) suggest that perceptual saliency of phonemic contrasts of the syllable may account for whatever universality exists in the order of phonemic distinctions observed. Thus, for example, the distinction between /fa/ versus /wa/ might be less salient than that of /ga/ versus /da/ because of the acoustic differences between the pairs. Moreover, different measures of perception and production yield inconsistent data regarding the child’s ability to perceive and produce a phonological contrast. That is, a child may perceive according to one measure and fail to perceive the same contrast by another measure. (Strange & Broen, 1980). As Menyuk & Menn point out, perceptual saliency may be the case with nonsense syllables; children’s processing of spontaneous speech might be different than their processing of nonsense syllables. Menyuk & Menn suggest that one needs to take into account different vowel contexts (i.e., co-articulation effects on acoustic
Menyuk & Menn point out that, even though an analysis by synthesis strategy, which would lead to determination of the largest meaningful unit and then further analysis of this unit in terms of its content and context of utterance, might be universally applied by children, there are some factors which might lead to individual differences. These factors involve the chunking strategy of the child, the lexical repertoire and the state of the knowledge of the child at the time of the sampling. The chunking strategy of the child is related to the issue of whether children store larger units or only words. Menyuk and Menn point out that some children appear to chunk-together larger units than words (compressed sentences, Brenigan, 1977), and work on those for further analysis, whereas others work on words. These two different strategies would lead to differences in the sequence of acquisition of phonemic contrasts. Lexical repertoire involves the matter of word familiarity. According to Menyuk & Menn, if it is the case that a lexical look-up strategy is used by children in minimal pair discrimination tasks, then those pairs that contain the familiar lexical items for the child would be distinguished first. Since children will vary in their lexical repertoire, individual differences will be observed. Another factor postulated by these investigators, which may lead to individual differences in the order of development of phonemic contrasts, is the state of the knowledge of the child at the time of the sampling. Since different children may be working on different
problems at a given time, they might be attending to different aspects of the phonological system.

Studies of speech perception indicate that:

(1) Children are capable of fine discriminations as early as 1 month old and perceive speech sounds along the voicing continuum (Eimas et al. 1971).

(2) Infants seem to discriminate stops both according to their place of articulation and voicing. Some studies suggest that infants can discriminate a voicing contrast in final stops when both voicing and vowel-duration cues are present (Eilers et al. 1977). It has also been suggested that 6-8 month-olds can discriminate between some fricatives while they fail to discriminate between others (e.g. /t/ versus /θ/ initially) (Eilers 1977). On the other hand, another study suggests that children as old as three do not have complete "phonemic" perception and that the order of acquisition shows individual variations (Edwards, 1974).

These discrepancies in results seem to be related to the methodology of the studies. For example, the Eilers et al. study involves synthetic stimulus, whereas the Edwards study involves both minimal pairs and nonsense syllables.

In most of these studies, only discrimination experiments involving one class, (for example, fricatives or stops) have been carried out. There are not any experiments on distinguishing for example [ta] versus [sa]. However, saliency of features may be playing an important role in infants' and older children's perceptions. As Menyuk & Menn (1979) suggest, the distinction
between /fa/ versus /wa/ might be less salient than /ga/ versus /da/ because of the acoustic differences between the pairs. Moreover, children's processing of spontaneous speech might be different than their processing of nonsense syllables. As suggested by the same authors, one needs to take into account different linguistic contexts in attempting to determine the perceptual saliency of contrastive syllables. Social/situational context should be added as a factor in the variations found in children's perception and production (Menyuk & Looney, 1972). Moreover, different measures of perception and production yield inconsistent data. That is, a child may perceive a contrast according to one measure and fail to perceive the same contrast by another mode of measure (Strange & Broen, 1980).

(3) It has been suggested that perceptual saliency of some phonemic contrasts might be the reason for the "universality" observed in discrimination abilities of children, while the state of the knowledge of the child and the chunking strategy the child employs might account for the individual differences found in the order of development of phonemic contrasts (Menyuk & Menn, 1979).

With respect to the age at which voicing contrasts are acquired by children, there is wide disagreement in the literature. Moslin (1976) claims that the age is about 1;3 or 1;4, Barton (1976) 1;9 or 1;11, Leopold (1947) 2;0, Velten (1943) 2;1, Major (1976) 2;4, Smith (1973) 2;8, Eilers et al. (1984) 2;0. These discrepancies can be attributed to the methodological differences between these studies or to the individual developmental patterns of the children.
Instrumental analyses have shown that a child may have a contrast but that the contrast may fall within the adult perceptual boundaries of one phoneme and thus presumably fail to be perceptible to adults (Macken and Barton, 1980a).

Although there are discrepancies about the age at which voicing contrast is acquired, there is a common agreement in the literature as to what type of stop is first used by children. The studies, including cross-linguistic ones, suggest that the first stops acquired by children fall into the 'short lag' region (i.e. voiceless and unaspirated) (Macken and Barton, 1980a; Eilers, Oller, and Benito-Garcia, 1984; Oller, Wieman, Doyle, and Ross, 1975; Oller and Eilers, 1982; Gandour et al., 1986; Allen, 1985), and the first acquired stop voicing contrast is the contrast between short-lag and long-lag stops (Clumeck et al., 1980; Macken and Barton, 1980a; Gilbert, 1977).

Studies conducted on babbling infants have also shown that the VOT values of these infants' stop productions fall in the short-lag region (Preston, Yeni-Komshian, and Stark, 1967; Eilers et al., 1984). Eilers et al. studied seven English- and seven Spanish-learning children longitudinally from age 0;8 to 1;2 and 2;1 to 2;6. They found that both groups showed no evidence of acquisition of a voicing contrast in stop productions and that mean VOT values for infants fell in the short-lag range. However, by 2;0 acquisition of the VOT distinction in stop consonants appropriate for their native language was observed. These results contrast with those of
Macken and Barton (1980a) who observed voicing contrast being learned as early as 1;5 in American English-learning infants. However, Macken and Barton also point out that it may take up to eleven months before children's productions improve to the point that the contrasts that the children are making are perceived by adults. As Eilers et al. (1984) suggest, although children seem to acquire voicing contrast by 2;0, it may be many more months before children acquire sufficient articulatory skill to consistently produce adult-like voicing (also Zlatin and Koenigsknecht, 1976).

Gandour, Petty, Dararaphana, Dechongkit and Muknogoen (1986) studied the acquisition of voicing contrast in Thai. Their subjects included seven three-year-old, seven five-year-old, seven seven-year-old children, and seven adults. Thai has a three-way opposition of stops in word initial position at the bilabial place of articulation ([b] [p] [ph]) and alveolar place of articulation ([d] [t] [th]), and a two-way opposition at the velar place of articulation ([k] [kh]). The investigators measured the VOT productions associated with stops in all subjects. They found that three-year-olds have acquired all voicing contrasts except /b/ versus /p/ and /t/ versus /d/ (i.e. the voice lead stop was not acquired by this group). Furthermore, although five-year-olds demonstrated evidence of acquiring all voicing contrasts, they still could not produce /b/ or /d/ in an adult-like manner.

In summary, all these studies indicate that the first stops acquired by children fall into the short-lag region, which supports
Jacobson's claim that voiceless (i.e. unaspirated voiceless) stops are acquired before voiced stops, and that although children show evidence of acquiring voicing contrasts by 5;0, their productions of at least lead stops do not seem to develop to an adult manner until later and that lead stops present difficulty for children. Some studies have been undertaken which reveal certain strategies used by children to circumvent the difficulty of producing the contrast between lead stops and long lag stops (e.g., Macken & Barton, 1980b, Allen, 1985).

Macken and Barton (1980b) studied three monolingual Mexican-Spanish children for seven months from age 1;7. In another study, they recorded four monolingual children at age 3;0. Instrumental analysis of stop productions revealed that the children did not consistently distinguish between voiced and voiceless stop cognate pairs, not even by age 3;10. The voiced stops in Spanish have two allophones, a stop and a voiced spirant at the same place of articulation. Analysis revealed that children relied on the spirantization for a voice distinction. Although children could not produce 'lead' voicing, they produced their allophones in order to maintain the "voicing" contrast between 'short lag' (voiceless) stops and voiced 'lead' stops.

The Allen (1985) study of six French children aged 1;9 to 2;8 has also shown that lead voicing is more difficult than long-lag stops for French children. The strategy used by the children to circumvent this difficulty was to add a voiced sound (e.g. a nasal) or
a vowel) before the prevoiced stop. These children approached the problem of prevoicing phonemically voiced stops by embedding those stops in a voiced context.

Fricatives appear to be acquired later than vowels, stops, nasals, and glides (Templin, 1957; Ingram et al., 1980). Ingram, Christensen, Veach, and Webster (1980) studied the acquisition of word-initial fricatives and affricates in English by 73 children ranging in age from 1;10 to 5;11, by using elicitation, sentence-completion, and sentence-recall. They found that, in parallel with the findings of Templin (1957) and Wellman et al. (1931), /f-/ was by far the earliest acquired fricative, followed by alveopalatals /s/-, /ç/-, /ʃ/-, /s/-, /z/-, and /v/- were next, with /z/- and /θ/- being the most difficult. They also noticed individual variations when children were studied individually. Ingram et al. found consistent substitution patterns for all sounds: /s/- for /f-/, or a stop [p]- or [b-]; [b-] for /v-/, /ʃ-/-, /θ-/, /ʊ-/- for /z-/ or [s-] and "a distorted" form of [z-]; [s-] for /s-/- or a slightly palatalized form; [t-], [s-], and [ts-] for /ç-/-; [d-], [ts-], and [dz-] for /ʃ-/. Phonetic variations in children's productions of a target sound have been observed across words as well as within the same word, which may be dependent on several factors. According to some investigators, the occurrence of variations across words is due to the lexically-based organization of the sound system, where each word has a phonological existence of its own (e.g., Ferguson &
Farwell, 1975; Menn, 1976; Shibamoto & Olmsted, 1978; Leonard, Newhoff & Mesalam, 1980). Thus, a word such as *purse* may be produced with word-initial [*p*], while *paper* may be produced with initial [*ϕ*]. Leonard et al. excluded Smith's (1973) proposal of the operation of 'phonological rules', applying in this case optionally, from being an alternative explanation for inter-word variation in the subjects they observed, because those 'exceptional' words usually constituted the child's first attempts at words with particular sounds. For example, *puppy* was S13's first attempt at a /p/-word, and *kitty* at a /k/-word. In their words: "It does not seem appropriate to speak of phonological rules being marked as optional if the words presumably exempt from these rules have been used before similar words presumably derived from the rules".

As the child's lexicon approaches 50 words, intra-word variability is more often attributed to factors such as simplification processes becoming optional in a child's speech (Braine, 1976) and the presence of more than one process that may operate on the same aspect of the child's speech (Edwards, 1979).

Variability has been observed also as a 'trade-off' when more than one aspect of the word is in a state of instability in the child's speech (Garnica & Edwards 1977). For example, a sound produced in simplified form in one production might become more adult-like in another utterance, in which some other sound is simplified instead (Garnica & Edwards, 1977). Klein (1979) found evidence of these 'trade-off' effects when the child was attempting words with
several syllables suggesting that syllable shape also may play a role in intra-word variability.

Leonard, Rowan, Morris & Fey (1982) investigated the conditions under which intra-word phonological variability occurs. They collected spontaneous speech and unsolicited imitation (i.e., if the child's production immediately followed the experimenter's presentation) samples from 24 children ranging in age from 1;9 to 2;9 in three experiments. The same authors also observed 'trade-off' effects when more than one aspect of the word was in a state of instability. They consider the variability to be a result of a competition between unstable aspects of the child's phonology, where an accurate rendition of a target consonant or word shape was achieved with a simplification of another unstable aspect of the word. The investigators consider an 'overload effect' as another possibility in explaining the variability, where more than one unstable aspect in the word may have created excessive phonological demands on the child, resulting in the simplification of one or all unstable aspects.

They further observed variability also when a word contained only one unstable aspect. They observed variability in such words to take two forms. In one form, which was seen mostly in spontaneous speech, the child showed an accurate production of a word in one production, and an existence of a simplification process in another. The second form of variability was seen when two productions of the same aspect of the word were inaccurate with respect to the adult target, but differed in their particular form. This was
attributed by the investigators to that aspect of the word being subject to a variety of processes that may apply singly or in combination consistent with the findings of Edwards (1979).

Leonard, Rowan, Morris & Fey (op. cit.) further note variability when the children attempted to produce target words containing one unstable aspect and one aspect never accurately produced by the children. They attributed most of this variability to the presence of optional processes or the presence of more than one process applicable to a given aspect of a word. However, the investigators observe that several words show a different type of variability which seem to be an alternation between two different types of production of the words. One is a production of a limited portion of the word, often a single syllable, with accurate production of the target consonant, the other involves a word shape that approximates the structure of the target word with inaccurate rendition of the target consonants. This alternation seemed to be a type of trade-off between consonant approximation with inaccurate syllable structure and syllable structure approximation with inaccurate consonant production.

The authors also observe less variability with words containing one unstable aspect and two aspects never produced accurately by the children. The variability of these words is similar to that of words with one unstable aspect both in degree and in nature. Leonard et al. came up with two explanations for the lesser variability seen in the production of this type of words. According to their work, one possibility is that the non-acquired aspects of these words are deleted or substituted for through the application
of output rules to the child's phonological representation of the
nonsense word. An alternative explanation is that the deletion or
substitution of these remaining aspects was the product of the
perceptual factors affecting the child's phonological
representation, due to the dissimilarity of these forms to the
child's existing schemas.

In summary, their findings indicate that variability can be
attributed to (1) the presence of optional simplification processes,
(2) the presence of more than one process applicable to a specific
aspect of the word, (3) competition between two aspects of the
word for accurate surface realization, and/or (4) competition
between consonant shape approximation and word shape
approximation.

It has been suggested that variation in children's perception
and production is largely dependent on both linguistic and
situational context (Menyuk & Looney, 1972; Menyuk, 1980; Menyuk &
Menn, 1979). Menyuk & Looney (1972) note a variation in the types of
errors observed in the productions of a consonant in each position
for both normally developing and language-disordered children. They
also observe that the grammatical role of a segment or a morpheme
has a marked effect on the accuracy of reproduction for both
groups, but especially for the language-disordered group. For
example, there is a tendency for the language-disordered group to
omit final consonants when they are grammatical morphemes. The
investigators argue that both phonological perception and
production by children can vary depending on the context (both
linguistic and situational) in which the behavior is sampled. Menyuk
(1980) proposes a model of language processing in which processing on the phonological level is dependent on higher level categories and relations which are pragmatic, syntactic and semantic in nature.

It has also been suggested that one source of the phonetic variability in the child’s productions is the child’s active hypothesis-testing attempt in approximating the adult model (Fey & Gandour, 1981a). Fey and Gandour noted a dialogue between a child and an adult, in which a child’s awareness of the mismatches between the adult’s phonological systems and his own and the dynamic nature of the child’s struggle to arrive at a better match with the two systems can be observed. The child in the Fey & Gandour study applied a postnasalization rule for a period of four months, applied optionally afterwards, as the child was learning to control the production of final voiced stops. In the dialogue, the child is aware of a need for a new output and attempts a new form alternating with the old one comparing the two outputs. The same authors suggest that children carry out active comparisons between the adult input and their output, and when they realize their errors in production, they actively test alternatives to their familiar phonological rules. They further suggest that this alternation between the old and the new not only represents a major component of transition but is also a major source of phonetic variability.

In the literature, lack of attention to vowels and to co-articulation effects in the studies of phonological development has
been pointed out by some researchers (e.g., Menyuk & Menn, 1979; Stoel-Gammon, 1983). Stoel-Gammon (1983) cites several examples in which conditioning of a consonant by a following vowel can be observed. For example, Stoel-Gammon (1980) observed a child, D, who, at 1;2, produced a labial as an alveolar when the labial was followed by either a front vowel or a diphthong, in spite of the fact that the child showed some evidence of a bilabial–alveolar contrast. For instance, the child's bottle [babu], bubble [babu], daddy [dædə], light [dai] show that he has a /b/-/d/ "contrast" initially. However, when the bilabial sound is followed by a front vowel or diphthong in the adult form, it was produced as an alveolar as can be seen in the examples, bye bye [daidai], baby [didi]. Stoel-Gammon observed the pattern to apply to a larger set of words at 1;4: bubble, bottle, ball and balloon began with [b], while pee-pee, baby, Big Bird and beep-beep began with [d]. Stoel-Gammon cites Jakobson (1968) and Braine (1974) who noticed similar effects of the vowel on the preceding consonant. The children they observed could not produce a labial before front vowels.

Local (1983) notes vowel conditioning in the data from a Tyneside boy. He analyzed the child's productions at the ages 4;5, 5;0 and 5;6 in order to investigate the variant realizations of the stressed /i/. Local observed that [ɪə/ɪ], for example, preceded, at all ages, a relatively palatalized alveolar and that the [y] variant, at 4;5, was preceded by a labial consonant. He interprets the latter occurrence as an indication that the child may be treating the syllable-initial labiality as a syllable prosody (Waterson, 1971).
Local observes the [y] variant to be stylistically determined at 5;0 and 5;6. He concludes that some of the variants of the stressed /l/ were phonetically/phonologically conditioned, while some others were stylistically determined, adopted by the child for affective purposes. Local considers the instability of the model to be one factor causing the variability in children's productions.

Studies on the production of voicing contrasts in children therefore appear to suggest the following;

(1) The first stops acquired by children seem to fall into the short lag region (Macken and Barton, 1980a; Eilers, Oller, and Benito-Garcia, 1984; Oller, Wieman, Doyle, and Ross, 1975; Oller and Eilers, 1982; Gandour et al., 1986; Allen, 1985). The production of lead stops appears to be difficult for children (Gandour et al., 1986; Allen, 1985).

(2) Children may be making voicing contrasts as early as 1;5, but it seems to take many more months before their productions improve to the point perceptible by adults (Macken & Barton, 1980 a).

(3) Children seem to rely on various strategies to achieve the voicing distinction between the lead stops and long lag stops, such as usage of spirant allophones in the place of lead stops by Spanish children (Macken & Barton, 1980b), and embedding the prevoiced stops in a voiced context by French children (Allen, 1985).

(4) Fricatives appear to be acquired later than stops, nasals, vowels and glides (Ingram et al., 1980).

(5) During the early stages of phonological development (the first-words stage), inter- and intra-word variations seem to be
dependent on the lexically-based organization of the sound system (Shibamoto et al., 1978) and on the context in which the sound occurs (Menyuk & Menn, 1979).

(6) According to some investigators, the occurrence of variations across words is due to the lexically-based organization of the sound system, where each word has a phonological existence of its own (e.g., Ferguson & Farwell, 1975; Menn, 1976; Shibamoto & Olmsted, 1978; Leonard, Newhoff & Mesarich, 1980). Thus, a word such as *purse* may be produced with word-initial [pʰ], while *paper* may be produced with initial [ϕ]. In most studies, the input is not specified. Therefore, the effect of the input on the output/variants can not be determined. It should also be noted that the linguistic context of [p] in *purse* is different from that in *paper*. An important factor in variations seems to be the context in which the sound occurs. (Roberts and Babcock, 1975).

In our Turkish data, inter-form variations have been observed to be related to several factors. These can be summarized as follows: (i) Variations in the input. The adult speech is not constant throughout all utterances of the same form. (ii) The child's focus of attention. The child seems to shift her attention to different features involved within a form in different utterances, not necessarily salient features all the time, and sometimes not to pay attention at all. (iii) Social context. Tense/ness involved in adult input results in a varying production of a certain form (all these points are dealt with in detail in Chapter 3).
(7) Inter-word variations seem to be also a result of co-articulation effects due to conditioning effects of one sound on another (Stoel-Gammon, 1983; Local, 1983), and to be determined stylistically (i.e., idiolectically) in some cases (Local, 1983).

The relationship between perception and production is an unresolved issue in phonological development. There are contradicting views on whether production precedes perception, whether they develop simultaneously, or whether perception is prior to production. Various hypotheses on this issue are summarized below:

(1) The child's production precedes and facilitates his/her perceptive skills (Shvachkin, 1973). According to Shvachkin, a child who can produce some sounds can discriminate them faster than a child who has not mastered the same sounds.

(2) The child's perception is complete before s/he starts producing the sounds (Smith, 1973). In this model, the child is assumed to perceive all phoneme contrasts in the same way adults do. However, many contrasts that are perceived are not produced. For example, Berko & Brown's (1960) subject, A, has been cited in literature several times for his famous [fis] example. Adam, who says [fis] for fish, corrects the adult when imitated by stating: "not [fis], [fis] !". In this notion, rewrite rules are used to account for the discrepancies between the adult model and the child's form. Smith concludes that the child's perception is complete before he begins to speak.

(3) The child produces only the contrasts that s/he
perceives. In other words, the child who produces *wake* and *drake* as [weik] does not perceive the difference between initial consonants of these words (Garnica, 1971, as cited in Strange & Broen, 1980). However, the child might be making fine distinctions which adults can not perceive. (Roberts, lecture notes; Priestly, 1980; Locke, 1979). Children have been observed 'to go out of their way' to make the distinction more forcefully than usual to prevent a misunderstanding by the adult. Priestly cites examples from his own son (then aged three), from Lebrun (1976), and from Grunwell (1975). Priestly's son resorted to lip rounding to make the distinction between *light* and *wight* when Priestly said 'Turn off the wight [waıt]', imitating his son's production of *light* as [waıt]' His son replied 'not wight, wight'. Priestly, who was watching his son's lips during his utterance, noticed a difference in the accompanying lip rounding. The child had rounded his lips in attempting to produce *wight* but had a more or less neutral lip position in attempting *light*. (This example is given by Roberts, DLLL SFU seminar and lecture notes, 1971-2). Priestly cites another example from Lebrun (1976) in which *grip* was pronounced as [gip] by the child. In the example, the adult repeatedly produces [gip] in the child's manner, and each time, the child attempts to correct the pronunciation, but fails to achieve a contrast. Finally, the child 'goes out of his way' and produces the contrasting form, [gʰip]. In a similar situation, the child corrects the adult's imitation of [wut] (the child's form for *foot*) to [hwut]. Later when the child is sure that the adult has understood the meaning, he reverts to his
Strange and Broen (1980) studied the perception and production of approximants (/r/, /l/, /w/) in 21 children between the ages of 2;11 and 3;5. They found evidence providing support for the view that both perception and production of phonemic contrasts develop gradually, but perception of contrasts normally precedes their production. The investigators, moreover, extend this hypothesis to include the concept of "intentional, coordinated perception", which is comparable to production as the articulation of lexical items with the intent to communicate linguistically. In their words,

"phonological perception in this active, purposive sense includes more than one simple detection of acoustic-phonetic differences. It views the listener as an active participant involved in the extraction of the identity of phonetic units from a completely structured stimulus array to recover the lexical intent of the speaker" (p. 150).

In this model, phonetic perception is viewed as perceptual learning or "educational selective attention", in which the ability to extract information and to filter irrelevant stimulation is developed. The investigators point to the necessity of experimental work in which the development of the ability to abstract invariant relations and patterns are investigated, while ignoring the irrelevant acoustic, phonetic, and higher-order linguistic variation.
SECTION C.

CRITICAL SELECTION OF METHODOLOGY

a. KORNFELD'S GENERAL REVIEW OF CHILD LANGUAGE STUDY METHODOLOGY

As can be seen from an overview of the literature, there appears to exist a large amount of "data" on phonological development in children. Questions arise, however, as to the scientific value of these observations/data. There are crucial methodological problems in this area considered as a subpart of the general field of linguistics that require extensive, serious examination.

The major methodological issue is the general one of the interrelationship between observation and theory-construction. For various reasons, this appears to be a more problematic issue in the so-called social sciences than in the so-called hard sciences such as physics, chemistry, etc. Roberts (1980- in prep.) argues that "the database of Linguistics, and, hence of all its ancillary sub-areas and of its using other disciplines is observationally/methodologically/theoretically inadequate to the point of futility. This is largely due to the fact that the latter deal more at a distance with their subject matter and understand and (thus, can) apply the methodological principle of Relativity more appropriately and consistently, while the former deal with a subject matter of which the analysts and the analysists' own behaviour are more immediately a part, thus requiring a more careful and complex methodological approach, and understand and apply the methodological principle of Relativity less appropriately."
and consistently, so that the proper identity of linguistic units or elements and behaviour, generally or developmentally, fails on both conceptual and practical grounds. These difficulties then have adverse effects on the manner in which the discipline approaches the tasks of data isolation, selection, collection – i.e. observation – and, simultaneously, interpretation, theory construction. The Chomskyan characterisation of the various linguistic theoretic adequacies (1964:62–) has had the unfortunate consequence of continuing the state of hypostasis of so-called explanatory and descriptive adequacies separately from observational adequacy. The crucial, binding relationship between the three is sadly hidden in a somewhat perfunctory 6 point pica footnote (loc. cit.: fn.8). This is, however, typical of Rationalist approaches, wherein "data"/"observation" is treated as being of a much lower "intellectual" order than the "creative" theory construction, i.e. "explanatory", level. At the same time, however, the Behaviourist Structuralists, the so called methodological Empiricists, are equally typically guilty of this intellectual casuistry. The result, clearly, is that such an attitude yield for the discipline a data base that is jejune if not fantastic.

In this thesis, we do not claim to provide a solution to this major problematic issue. Rather, we wish to make some small contribution towards making a more appropriate statement of observing language-speech acquisition and thereby towards explaining the process.
An extremely important contribution to methodology was made by Kornfeld (1971), following up on the work of Menyuk and Klatt (1968). Kornfeld examines the various methodologies of available language-acquisition studies and concludes that essentially these are classifiable into two basic hypotheses, with variations. The hypotheses are specifically about "the child's system" (Kornfeld, op. cit.: 454), both perceptual and productive, and about the relationship between the child's and the adult system. The so-called null hypothesis $H_0$, implicit in most developmental studies as can be seen from our overview, states that "the adult system of phonological distinctions determines the child's system" (loc. cit.). The assumption here is that "the child perceives speech in terms of adult phonological distinctions, yet he has motor problems in producing a phonetic copy of adult speech." In other words, there is a "mismatch" between the child's perception of adult speech and the child's production. The alternative hypothesis $H_A$, novel in the literature in 1971, as Kornfeld claims, states that "the child perceives and produces in his own system, which need not bear a simple relationship to that of the adult" (loc. cit.).

Each hypothesis makes predictions about a child's "overt language behavior". $H_0$ recognizes the "mismatches" between adult and child outputs and assumes that they are the result of the child's imperfect control over his vocal apparatus. Within $H_0$ there are two possible explanations proposed for this "imperfection" of the child's motor control. $H_{01}$ claims that constraints on the child's motor mechanisms result in the child's "distortions" of adult speech, which are assumed to be due to random phonetic errors. One such
constraint is the "sluggish articulation" due to underdevelopment or lack of practise/use of the vocal tract. Putative evidence for the "sluggish articulation argument" is derived from observations that children (may) speak more slowly than adults do (op. cit.: 455). However, noted differences are not necessarily explanations. Roberts (op. cit.) cites this type of argument as "an indication of the lack of understanding amongst linguists of the concept of Relativity; what may be "slow" relative to adult behaviour is not slow relative to the overall behaviour of the child. Furthermore, the "slowness" feature is determined relative to a phonetic description system (segmentation-classification) based exclusively on the observation of adult speech, and child and adult speech are compared on a phoneme to phoneme-sized bit basis. However, children must not be assumed apriori to make "sounds", i.e. "phonemes" in exactly the same way that adults do, or that their perception-production of adult speech is the same as that of the phonetician-linguist; the abstraction process can be quite different, in fact different enough for the speed of the child's production to be at least equivalent to the adult's in "contrast/phonemic feature/information" content, but different in what might be termed phonetic finesse."

Roberts (1969-72,1972-) notes how CR made consistently clear distinctions between white, light, right, Vive, between jelly and Jerry, between staple, paper, tape, Leggo, paper, Pippa, etc. by lip configuration variation, how these labial configurations were present in adult speech, how the child clearly learned speech habits very much by watching, i.e. visually, and not just auditorily as is generally assumed, and how this fact correlates with what is known
about child visual perception from the neonate stage on, and how vision is a crucial component in the child's process of acquiring speech.

Kornfeld (op. cit.: 455) argues further that this hypothesis allows for random phonetic errors but not for the observed regularity between child and adult speech. Roberts (loc. cit.) states that

"to argue that regularity derives from randomness is equivalent to saying that continuity in (a) speech (community) is an accident. According to the randomness hypothesis, a child could just as easily end up speaking any one (or more?) of at least the possible number of languages, and the odds against all the (normal) children in an English environment, for example, ending up speaking English (of some sort) are then astronomical. The randomness hypothesis then is incompatible with the empirically correlated fact of linguistic continuity."

H₀₂ on the other hand, claims that children's speech is regular, even though it may differ from that of the adult. For example, according to this argument, a child who produces [gel] for clay can be expected to produce [bel] for play, etc. According to H₀₂, "constraints on the child's motor mechanisms... limit him to producing features "only in a certain way"; i.e. a given constraint on the vocal tract will result in a given phonetic mismatch" (Kornfeld, op. cit.: 455). The regularities in the child's output are explained by proposing a set of phonological and phonetic rules (readjustment rules) where adult segments are taken as "input" and the child's
utterances as output or "distortions" of the adult model. Rules such as "Substitution", "Assimilation", "Deletion", etc., are intermediate processes by means of which the adult segments are (partially) "distorted" by the child. Furthermore, such rules are assumed to have a property of "predictiveness" - a term which Roberts (op. cit.) relates to the continuity- regularity hypothesis. Studies such as those of Velten (1943), Leopold (1947) and Smith (1973) can be cited as examples of works in which this type of approach has been adopted.

A few words must be said about the adult "input" taken as the standard against which the child's forms, outputs are compared. In the large majority of studies, "the best known or most commonly used description of a language, which is usually the description of the "standard dialect", seems to be taken as representing the input for the child, no matter where the child is from within the politically defined community of the speakers of that language. In other words, the so-called "adult input" is generally not the speech of the adult(s) in the child's immediate environment but rather the standard language which represents the generalised language-speech of some social group of adults, or which adults, in some sense, "should be speaking". So-called Phonetic Systems/Charts are not only adult-speech based and oriented but, at the same time, have as their overt purpose the invariant phonemic representation of speech, and covertly of standard-representing adult speech. From this it follows that there is an apriori social-sociological and prescriptive aspect in the comparison standards for analysing child language. What adults actually do, what their actual performance-behaviour is in the
child's context(s over time-space) is hardly ever attended to. The child's form - also usually cited as if it were invariant (or, usually incidentally, as involving "(a small subset of) underlying representations" (Smith, 1978:261), with the bracketed restriction not further considered or analysed) - is compared to an adult's input represented in various "phonological" representations ranging in the grossest analytical terms from orthographic to Underlying Representations (systematic phonemic) to Phonemic (Structuralist or Systematic Phonetic) - all derived from a statistically generalised "language form". However, careful observation reveals that child speech forms manifest a large amount of variation; just as importantly, so does the speech of adults in whose ambiance the child is acquiring language-speech. So-called stylistic variation is generally ignored in the field, that is to say the child-adult linguistic relationship is not studied as a unique situation. The common argument that this is (too) time-consuming (cp. Kornfeld, op. cit.: 461 for similar arguments) etc. is merely a rationalisation of laziness or of academic practice. Moreover, it must be stated that the obsession with invariance is one of the most unfortunate legacies of the prescriptivist, Social Statics Saussurean "langue" tradition inherited from the works of Comte and Durkheim, and this obsession is basic to all systems of Linguistics, Structuralist as well as Transformationalist, and even Prosodic Polysystemic. It is even endemic in the field of Sociolinguistics, where phonetic variation of forms is most studied, since variation is handled generally by the intervention of variable rules and statistical probability theory, and also in Lexical Diffusion Theory, where phonological variation of lexical forms is the prime concern." (Roberts, 1980- in pre)
Thus, if the study involves a child from English-speaking community, the input is generally provided only as an orthographic gloss, apparently assuming that the speech is consistent across all speakers of the language. In fact, in most studies, it seems to be assumed that the adult form of a word is rendered in the same way among all speakers of a language and in all linguistic contexts. However, it has been pointed out many times that the pronunciation of words may vary due to regional and social differences and differences in speech style (e.g. "slow" versus "fast" speech). There seems, therefore, "to exist within the field a confusion of 'type' and 'token' and of 'idiolact' vs. 'dialect' vs. 'language'." (Roberts, 1980- in prep.) Furthermore, the child's outputs of a form are assumed to be consistent across all his utterances. "Variations seem to have received little consideration in these studies, apparently being viewed as irrelevant or not important or to be totally neglected on the same basis." (Roberts, 1971-; 1983; 1980- in prep.; 1986/7) MS-in prep. All these problems are related to the approach used in the observation process and data analysis, i.e. they are fundamental methodological problems. If one approaches the data with some "theory" in mind, such as "structuralist phonemics" for instance, then individual variations are bound to be considered as irrelevant or redundant (vide Roberts, 1983, Chap. 9 and the discussion of Joos' views there). Thus, when contrasts are looked for, the variations of one form can be omitted as being irrelevant to the "phonemic" contrasts. The literature clearly shows that the majority of approaches take "phonemic" representations in those descriptions of
a language as the base against which the children's utterances, often themselves "phonemically analysed", are compared, and on the basis of which statements about the process of acquisition are derived. What one understands from the "phoneme" is crucially important, especially when data from children is concerned. There are questions such as how the data is handled in terms of distributions, classification, etc., what the relationship is between the "phonetic" and the "phonemic" representations - in what sense are our traditional phonetic systems "phonetic" (vide Roberts, 1986/7). Thus, there is tremendous unclarity in the field of Linguistics in general as to what phonology is, and certainly in child phonology when a "theory is applied whose conceptual and empirical bases are, to say the least, expressed in the most obfuscatory manner" (Roberts, 1980-). Moreover, "phonetic systems are clearly based on the concept of the phoneme and thus are nothing more than phonemic typologies (Roberts, 1980-, 1983-). So, in much that we claim to be phonetic observation or analysis, what we really do is a kind of one-to-one matching between aprioriistically conceived phoneme types and phonetic details are not considered important." (Roberts, 1983, 1980-). In some studies (e.g. Menyuk and Klatt, 1968; Kornfeld, 1971, in particular, as early examples), it is emphasized that we have to be very finely detailed about the child. However, "no one seems to stress the important factor that fine details about the varying adult speech input must be afforded equal attention" (Roberts, 1983, 1980-).

"There is a further aspect of invariance that must be addressed, perhaps particularly in the field of Language Acquisition.
One tacit assumption that appears constantly to be made is that the
language-acquiring child invariably pays total attention to the
speech activity that is either directed towards him or that is in his
ambience. This may very well appear to be the case in so-called
laboratory situations or in elicitations; it may equally well reflect
a confusion of equation of total observational, analytical attention
on the part of the analyst and/or parent. A parallel situation is
often the Phonetics Dictation class, where students supposedly pay
complete attention to the instructor mouthing the dictation
exercise, upon the duplication-on-paper of which so much of the
students' final marks may depend. Further examination, however,
shows that, in general, children pay less than total and varying
attention to ambient speech, even that directed towards them.
Another important aspect is related to what is read into analytical
statements or representations.Lexical data derived by elicitation
techniques concentrate on phonological contrasts, i.e.
phones/phoneme segments in one sense or another; this is even
ture of the phonematic aspect of the Prosodic approach, in such a
linear symbolic representation, the conceptual and graphic
equidimensionality of the symbols create a false impression of
speech, perception, or phonetic "equidimensionality". No or at least
insufficient attention is paid to the temporal (articulatory,
rhythmic, intonational, etc.) relationships and differences
correlating with the equidimensional symbolic representation, and
the effect of this on perception, attention variability, etc. The
problem is greatly aggravated when the lexical items are
extrapolated from syntactically longer utterances, the hearing of
which is very largely a matter of redundancy for native speakers,
and the transcription-analysis of which is extremely difficult even
for the most dedicated and talented linguists; in such situations one should then certainly make allowances for the child who, as a non-native speaker, has no-to-minimal redundancy to fall back on, although he may be a far more innately talented analytical linguist! Some linguists account for the “attention feature” in terms of preset biological perceptual rules or filters (vide Smith, op. cit. 260-261, comparing his model of LA to that of Ingram (1974:) and that of Menn (1978:)). However, very little attention is paid to the notion of attention itself, and William James’ statement (1890:) “My experience is what I agree to attend to.” is generally not allowable for infants. Yet, clearly, if the child’s attention is treated as invariable, then it must follow that any lack of matching between adult and child speech must be biologically, i.e. physically, perceptually (= auditorily), (pre-)determined and follows some maturational order, i.e. the null hypothesis, Kornfeld’s H0 follows automatically. From this we get not only invariant attention but also invariant (static) acquisition stages and invariant progression of acquisition states. Clearly, it is more difficult to handle two variables such as attention and a process of acquisition; the application of statistical techniques such as ANOVA, ANCOVA, and Multiple Regression Analysis would also not be an easy matter. However, this difficulty is no more acceptable methodologically or as a methodological excuse than the time-consumption one. Moreover, anyone experienced in observing linguistic activity is aware that there is a variation in attention, attention direction, attention span, etc. Considering the amount of linguistic noise in a child’s ambience, one might conclude that paying total attention would soon lead to sensory overload with similar schizophrenia-inducing consequences as those of sensory deprivation.
Furthermore, the work reported in Aslin, Pisoni and Jusczyk and in Banks and Selapetek in Mussen (1983) shows clearly that the structure of the child's perceptual ability is far larger and far more capable than is generally assumed, while, at the same time, the comparison of child and adult speech performance suffers from misconceptions about the process of making identifications and establishing identities relativistically, as I have shown elsewhere. Attention and perception, as well as articulation, must be considered separately. Perceptual salience and attention do not always match in a nice one-to-one manner, and variable attention can account for this. Similarly, perception and speech for adults and children do not match in a nice one-to-one manner, but this does not mean a huge quantitative/ difference in perception and speech performance between the two, but rather a relatively large qualitative one; but qualitative differences looked at in an appropriate relativistic manner do not equate with essential quantitative, structural, theoretical differences, except within a highly Empiricist metaphysic. (Roberts, 1986/7).

In this work, I shall be citing a large number of variants of Turkish utterances—such as in the donkey example given here. The variants are identified as such according to the combined criterion of phonetic and contextual-referential similarity that can only be accounted for by paying attention to and specifying the ambient conditions. Where known or recoverable, the variations will be correlated with variations in salience ("categorial", by place in sequence (e.g., in word-, sentence- etc.-sized utterances), attention, etc.).
The donkey example. (Seven variants have been noted with this form):

\[ \text{[act\textsuperscript{Jät\textsuperscript{sh}}]} \sim \text{[e\textsuperscript{Jät\textsuperscript{sh}}]} \sim \text{[t\textsuperscript{Jät\textsuperscript{sh}}]} \sim \text{[e\textsuperscript{th\textsuperscript{sh}}]} \sim \text{[e\textsuperscript{th\textsuperscript{sh}}]} \sim \text{[e\textsuperscript{th\textsuperscript{sh}}]} \sim \text{[es\textsuperscript{K\textsuperscript{sh}}]} \frac{\text{"donkey"}}{}

A hypothesis such as Kornfeld’s H\textsubscript{0.2} which claims that the adult’s constant, invariant system of "phonological distinctions" determines the child’s phonological system assumes that there is one system for the child and that the child is always consistent, ready to listen to the adult and to respond mechanically. However, the evidence is not supportive of such a static system. In fact the evidence points to the fact that the child’s performance is highly variant and that his system is "dynamic". In several studies, children have been observed to show inter- or intra-word variation in their productions. In one such study with 13 two-year-olds, Kornfeld (op. cit.) one child was found to produce English thing (note the orthographic representation of the input here!) as [t\textsuperscript{J}], [t\textsuperscript{h\textsuperscript{J}}] and [\textsuperscript{J}], three as [t\textsuperscript{J}], [t\textsuperscript{X\textsuperscript{J}}] and [(\textsuperscript{J}(w)\textsuperscript{J})], throw as [t\textsuperscript{J}], [t\textsuperscript{h\textsuperscript{J}}] and [\textsuperscript{J}(w)\textsuperscript{J}], yet throat "correctly", though in exactly what sense is not made clear! Note again that detailed information about the inputs is not provided in the Kornfeld study, although this, as Roberts (op. cit.) generally emphasises will certainly help to determine the factors playing a role in the variation, nor is it at all clear, despite the putative "phoneticity" of the cited examples what is represented from the point of view of speech activity by the alphabetic symbols [t], [h],[\textsuperscript{J}] , [\textsuperscript{J}] and [\textsuperscript{J}]. The latter is one which should certainly bring to mind the old and famous but hardly ever learnt lesson of wabbit'.
As Kornfeld argues, such examples obviously raise serious doubts about the validity of the "motor constraints" hypothesis. Roberts' argument (op. cit.) is that "such examples show that adult speech variation must be studied carefully and recorded, that adult 'phonological forms' are not 'phonetically' static, and that a large amount of the variation in child speech arises from variation in attention and of analysis across time to different speech aspects of adult 'phonological elements'. It must not be assumed that the [0] in *thing* is the same (for the child, who does not speak English, or who has not been learning English for so long!) as the [0] in *three*, etc. (Roberts and Babcock, 1975:).

The alternative hypothesis $H_A$ as classified by Kornfeld (op. cit.:456) "views the child as having better motor control than is allowed by $H_{02}$" and does not consider the "mismatches" as phonetic errors, but rather as signs that the child's set of "distinctive features" is not equal to that of the adult. In other words, according to this hypothesis, the child does not produce phonetic copies of the adult utterances. $H_A$ is further divided into two versions, relative to the accounting provided for why the child should not copy the child.

$H_{A1}$ states that "the child's perceptual system is a subset of the adult's" (Kornfeld, 1971:456). Thus, according to this position, phonologically, "the child's set of distinctive features is a proper subset of the adult's. $H_{A2}$, on the other hand, claims, in its most extreme form, that "the child's perceptual system is not a subset of the adult's", and "the child may hear speech in a different way and
may mark distinctions that the adult would not" (Kornfeld, loc.cit.).
Kornfeld illustrates each of the two hypothesis variants in terms of
differential interpretations of a particular example. A child who-
produces at time t [ghel] for clay, [bhel] for play, and [dhel]
for tray, has according to \( H_A \), "perceptually selected a subset of
the adult's phonological features that comprise the plosive-liquid
clusters /kl, pl, tr/. (sic - in slant/phonemic bracketts!)". Thus, it
must follow that "there should be some adult-features of these
clusters that the child has not chosen; in the example above, one
such feature is the [-voicing] of the plosive that has gone
unmarked." (op.cit.:457). According to \( H_A \), "1. the child does not
produce a feature-by-feature copy of the adult utterance; 2. he may
be selecting a subset of the adult's features; AND ALSO 3. He may be
marking distinctions not in adult adult's system." (loc.cit.).
According to Kornfeld; "initial singleton-plosives are aspirated in
English, but initial plosive-liquid clusters are not." Where this
claim originates, what is meant by English, whether the adults in
the children's ambience were speakers of this purported kind of
English, etc. is never made clear. According to Roberts (s.v.
Exponence 1980-).

"I am aware of no form of English where stops before liquids
are unaspirated while single voiceless stops are aspirated....
Ladefoged (1975:35) notes that they are "voiceless", and this must
mean at least breathiness; in stylistic speech tension variation such
words are generally \([k^h\] , \([p^h\]) and \([t^h]\) and show every indication
of having aspiration/ breathy glottal configuration."
Kornfeld's (loc. cit.) interpretation of the child data, in accordance with HA is that "it is reasonable to suppose (LSC/WR) that the child has first perceived a subset of the adult's features (that make up initial clusters); he has further treated this subset as a singleton-C; and he has then added a distinction he knows about initial singleton-plosives in English, viz. they are aspirated, as compared to [-asp] plosives in plosive-liquid clusters.

"With this kind of "sloppy" phonetics, one cannot be certain even of Kornfeld's transcription of child speech, although she herself does strongly and justifiably make the point about the scant and unreliable nature of phonetic records of child speech (op. cit.:461). Note, for instance, that in Kornfeld's article, the voice-bar indication for the child's [g] in [gœs] in Fig. 2 (:485) is very different (continuous) from the one for the [g] in [gwœs] (discontinuous), and the latter is very much like those for [sw] in "cor-rect"swimming and for [fw] in [fwiplsleep in Fig 3.

Furthermore, a standard sampling technique was used (loc. cit.) - samples from spontaneous speech of children at play in the same lab.playroom for a 40 mins. period every 3 weeks... handling the same toys, seeing the same pictures, etc. "in order to have some sort of behavioral control on these comparisons". The data then consisted of a combination of "transcriptions" made during sessions and afterwards from audio tapes. Having tried this technique myself, I can show that it is not satisfactory - primarily "because it relies so much on impressionistic phonetic "transcription"... and as such is... extremely arbitrary and non-scientific...." (Roberts, 1986/7)
Another question that must be raised is whether the distinction singleton:cluster is a valid one at any level of linguistic statement. Roberts (op. cit.) shows conclusively that

"the singleton:cluster dichotomy can be reduced to, i.e. made a predictable function of, feature hierarchy, as is the voicing distribution/VOT aspect (cp. Roberts, 1972 a., b., and the references there to the ideas of Firth, Hofmann, Hoard, and others on this issue.) Voicing in so-called [k] etc. vs. [k] is a parameter value one and not one of categorical choice of "this X" (e.g. /+/) or "that -X (e.g./-).... In fact it is impossible (in Linguistics as elsewhere) outside of a highly empiric (in Conant's sense) and thus highly qualitative metaphysic to establish truly categorical classes as opposed to parametric (single or n-tuple) values, e.g. polar, median, etc."

If it is the case that, at some higher, more general level of analysis c^1, say, is a "lateral(ised) k, then the child's not choosing a feature such as [-voicing] would not be the issue, since there is some voicing in the lateral k, namely as a predictable VOT specification involved in the lateral k. That is to say, the issue is only a priorily a categorical rather than a parametric value one. Note that this view provides more direct support for HA^1 than does Kornfeld's argument (op. cit.: 468) about child cluster-reduction by selection from two DF matrices into one. Moreover, the fact that HA^2 can account for the same phenomenon as interpreted by Kornfeld, with the additional proviso that the child can add non-adult DF's, in this case [+asp], becomes unnecessary under Roberts' proposal of a single matrix of hierarchically ordered DF values, since it would interpret the [h] as a substitution (of a higher
degree, lower placement of this feature value in the matrix, and therefore rightward "temporal sequencing" of [n], comparable to the automatic rightward "temporal sequencing of the higher degree, lower placement and therefore rightward "temporal sequencing" of [l]) of the related [-voice] feature, cooccurring with deletion of [+lat]". Kornfeld (op. cit.:463) uses a similar argument of feature-hierarchy to account for the difference between (s)/-C and (s)/-V types (l = word boundary), corresponding to an order of acquisition. The proposal that sc's be regarded as assimilated C's was made by Firth in the 1930's. However, neither can predict the "temporal sequencing" of the features in the manner Roberts' model can. In fact, his suggestion is that the "s" in sc's, within the so-called standard alphabetic-segment model, should be treated as V Os, for this allows Vs sequences to be treated phonologically as single, [+strident] segments, while at the same time accounting naturally for historical phenomena such as Lat. (s)/C ->, for instance, Sp.esC, and for child forms such as [a/i /()Sc-]. Furthermore, Roberts (1969-72) notes instances of [hʌnɔu] and [hʌnɔu] in the speech of CR very early (1:6), which allows him to link "s" and aspiration, comparable to the historical relationship between these in the Romance and other languages.

Furthermore, H A 2, specifically according to Kornfeld, claims that the child's perceptual system is not a subset of the adult's. Roberts (op. cit.) interprets this as implying that there is no necessary perceptual relationship between the adult and the
child. However, if the child learns from the adult, there must be
assumed to be continuity - but the continuity is a productive, speech
one and not a perceptual one, i.e. there is no direct relationship
between perception and production, although, according to Kornfeld,
$H_{A1}$ claims that the child's perceptual system is a subset of the
adult's and, phonologically, this means that the child's set of
distinctive features is a proper subset of the adult's, meaning that
distinctive features are interpreted primarily by Kornfeld as being
perceptual in nature. But if it is assumed, as per $H_{A2}$ that there is
no perceptual relationship between the child and the adult, but there
is (progressive) productional similarity, then speech (community)
continuity is a function of a same effect emanating through non-
same perceptions/perceptual processing-capabilities! The
"perception" referred to here is clearly "auditory" if the claim
made by Roberts (supra cit.) about the role of visual perception in
Language-Speech Acquisition is correct, then it must follow
according to $H_{A2}$ that

"there is no relationship, no underlying sameness in visual
perception principles between individuals. Yet, all the evidence
points to the contrary for all the sensory modalities, and this
interpretation of [hypotheses such as $H_{A2}$ ] follows only from an
apriori inductive, empiricist approach. "Why then would a child say
[ghel], for example, and not something else which would be "more
like" the adult form? The point is that ... similarity measures are
saddly lacking in Linguistics/Phonetics. Preference is always given
to the appearence of differences - a priority that clearly
follows from the assumption of the central role in Linguistic
statement/Theory of (phonemic) CONTRAST interpreted in the context of an apriori inductive, empiricist approach" (Roberts, 1986/7).

Once a similarity can be noticed between the adult stimulus and the child's output, and the similarity between [g\textsuperscript{hel}] and clay is obvious even at this gross level of speech representation, then there must be a set-subset production relationship, and the assumption of perceptual no-subset relationship is arbitrary and unproven. Roberts (1986/7) demonstrates that the problems of (lack of) correlation across articulatory (physiological), perceptual, and acoustic phonetics is putative and arise from attaching priority to impressionistic phonetic notions/terms which are in fact metalinguistic rather than linguistic ones, and thus from the fallacy of comparison of incomparables. A similar situation can be observed in syntactic work where the data used for/as a basis for inductive establishment of a Theory of Syntax is native speaker judgements/native speaker "considered"/"analysed" sentences, and the data is therefore metalinguistic rather than (primary) linguistic just for being "considered" judgements about sentence tokens."

Kornfeld appropriately points to the adult bias in observing data from children. In her study with thirteen subjects between one-and-a half and two-and-a half years of age, she observes alternations of /l, w, r/ in her subjects in words like glass, play, truck, etc. She notes that, although in the kind of phonetic
transcriptions generally provided /l, w, r/ \textsubscript{ADULT} often appear as \( /w/ \textsubscript{CHILD} \), spectrograms show that children do not producing "real w's". For example, one child produced what sounded like [\textipa{gwaes}] for both glass and grass, yet spectrograms showed consistent F2 differences for the child's "w" made for the adult's /r/ and the "w" made for /l/. Kornfeld notes that although a simplification of adult clusters occurred in all 13 subjects, there were remarkable differences between the singleton consonants produced for an initial cluster and those corresponding to non-cluster consonants in the same environment. For example, if initial position two-consonant cluster was simplified to a singleton consonant as in [\textipa{bu:}] for blue, that consonant was not the same as the initial consonant in words with the same environment as in [\textipa{bu:}] for BOO. Kornfeld also observes that if both segments in a cluster are produced, they are separated by a schwa as in [\textipa{balu:}] for blue. She notes further that none of the children produced both split clusters at a given time. If a child used both strategies, the 'reducing' strategy always appeared first. These findings suggest to Kornfeld that adults do not always perceive distinctions that the children make and thus, children's acoustically distinct forms may be shown as having no difference in the transcriptions. It could also follow that, while it seems to be assumed that "[\textipa{u:}]"s in these two forms are the same, they also could be different. The question then becomes one of whether there is available at this time a way of comparing the forms of the adult and of the child that is clearly appropriate.

In the same study, all subjects were observed to have more difficulty with strident clusters than with non-strident ones. Even
when a child could produce all (adult) non-strident clusters, he still had problems with the strident ones. In addition, a child who could produce /s/ in see, had difficulty in producing a comparable /s/ in /ski/ producing, in fact. /z, c, s, t/ (sic) alternations. Note that Fig. 4 (:468) reflects a much more varied and complex situation of five subjects ranging in age between 20 and 24 months. In spectrograms, the /s/ appeared as a fricative noise for /s/-stop clusters, but was not the same segment as 'singleton-/s/' in a word like sock. In transcriptions, the 'cluster-/s/' is recorded as a 'noisy onset' to the following stop (e.g. [(s)te:z] for stairs). Kornfeld claims that the adult 'ST-cluster' is reanalyzed by the child as an initial singleton consonant [+strident] and is therefore produced as such. This proposition is consistent with the HA hypotheses, particularly HA1, which claims that the child's perceptual system is a subset of the adult's and that the child may be abstracting (selecting) a subset of the adult's features. The same hypothesis proposes that the child perceives and produces in his own system, which need not have a simple relationship to that of the adult. However, if the child's system is a subset of the adult's, then it can not be his own and it can only be in a set-subset relationship. Moreover, the fact that the "s" in /-c/ is different from the "s" in /-v/ follows from the concept of the allophone, and Kornfeld here, in particular in treating the "s"-type sound is confusing systematic phonemic with phonetic/allophonic items. (cp. statements made earlier above for different interpretations of this kind of situation). The whole issue of treating skw, skr, etc., as single segment involves only one particular type of approach. It is
the phonemic procedure of identity that requires one to say that [s] in *stairs* is the same as [s] in *parse* (cf. Roberts, 1972 b:passim). Phonemics does not usually accept the notion of a pre-affricated stop, generally because phonemics requires the inventory to be economical, but again we do not know for certain about the reality of economy, the minimization of inventory and so forth as phonological criteria, and more crucially, we do not know that people act, behave or develop in that particular economic way. Kornfeld claims that adult initial clusters are (re)analyzed by the child as an initial singleton (segment) and also produced as such, although neither of these situations is particularly required by the HA hypothesis. The problem with such a proposition is that again we do not know for certain that the adult has in any clear, linguistic sense, two segments. If something is a cluster in the adult's form, but a singleton in the child's, how do we really determine this? The answer (Roberts, 1972a,b;1986/7:passim ) is related to what we are doing in theory-construction. When we say that the child is changing a cluster to a singleton, it is because we have made a theoretical statement about adult speech-phonology and are transposing it to child speech-phonology, without a clear Linguistic Theory and, therefore, no clear process or basis of comparison. There is no clear evidence that st in *stay* is in fact linguistically one, two, or even three or more "segments" (Roberts,1981-).

Kornfeld argues that feature abstraction and the order of acquisition of these features are determined by linguistic constraints, in that highly predictable features are acquired last.
For example, she asserts that /s/ in a 's-stop cluster' is acquired last, since an initial segment must be, i.e. is redundantly /s/ in English if it is followed by a plosive. Note that this links with what I have said earlier about attention and salience, which can obviously be related to the notion of redundancy. Kornfeld also argues for feature hierarchy, claiming that the order of acquisition may correspond to the place in the hierarchy, and redundancy with low placement in that hierarchy. Stridency was the last distinction to be acquired by the children, a feature which is ranked last in the SPE feature system by Chomsky and Halle (1968:). However, Kornfeld does not make a really clear distinction or relationship between segment and sequence redundancy. In /-V position, /s/(vs. /f/ vs/x/ etc.) is learnt quite early by many children, as is the cluster /ts/ (or /tʃ/?) in medial and final position (cp. CR in Roberts, 196-1972:1979:). It is /s/ in clusters/sequence that is redundant and late acquired, just as are /l/ and /r/, the three items which, with nasal and glide (particularly /w/) combine to yield clusters in English. However, noting that there is a possible hierarchical/combinatorial relationship involved between these sounds is an important contribution by Kornfeld.

One of the most important points that Kornfeld emphasises (also made, for example, by Menyuk & Klatt, 1968) is the whole question of observation/data collection involved in methodology. Stoel-Gammon & Dunn (1984) also point to several variables involved in data collection such as the number of subjects,
frequency of data collection, techniques for obtaining the data, size and nature of the corpus, methods of recording and transcribing the data. Data is collected either from a single child or from a group of children varying in size. Longitudinal studies follow the development of a child or a group of children over a period of time, while cross-sectional studies make observations of data from a child or from a group of children at a single point in time. Usually, if the sample size is large, data is cross-sectional (i.e. collected only once); if the sample size is small, data is collected at frequent intervals, which vary according to studies. The technique used in obtaining the data is one of the major variables in studies on phonological development. Methods of data collection are classified as ranging from being “informal” observational techniques to “formal” or “highly structured” methods (Stoel-Gammon & Dunn, 1984). In studies in which informal techniques are used, the vocal productions of the child are not elicited, but recorded or noted down as they occur as part of the “natural” interaction between the subject and person(s) in the environment. Certainly, when it comes to recording the data, the degree of naturalness of the situation decreases due to the existence of a taping recorder. The awareness of being recorded affects people’s – including children’s – behaviour in a particular ways that are not easy to identify, describe, or control. Mothers may become worried that their children will not talk, or if they do, whether they will say the “right thing” and, thus, reveal that they are not progressing “normally” – much to the sahem and chagrin of the parents, relatives, etc – and possible to the delight of
outsiders. Therefore, change in natural behaviour are probably certainly involved in overtly recorded situations.

One form of informal technique is to keep a diary or to note down the child's speech acts at certain - usually regular - intervals (every two days, so many weeks, etc.) since a progression is expected during this time. This method is used mostly by parent linguists. In diary keeping, one has to be selective as to what to note down. Roberts (1986/7) points out that when the method of checking at certain intervals is adopted by the parent linguist, there is an expectation of certain progress which is supposed to happen according to the "norms" of development. This also happens if the informant is an adult, where the spouse may be the worried party. As a parent, the linguist may be more concerned with observing whether the child is fulfilling the norm of development, rather that with unbiased observation of the child from a linguistic point of view. It is questionable whether as a parent linguist one is in fact being a linguist, an honest observer, a worried parent who tries to make sure that the child is (or is not!) progressing normally, i.e. is not (or is!) a pathological case, or an anticipating parent observing whether the child is progressing beyond his level towards being a genius. Thus, the observation becomes more of a social activity rather than of a linguistic one.

Recording data at certain regular intervals (by a parent or a non-parent linguist) involves another problem which might be called the "fallacy of direct reconstructibility" (Roberts, 1986/87). This
type of data collection involves an assumption that by recording/observing data every day (cp. on Waterson, 1971 below), every week, every two weeks, etc., there is nothing to miss in between, that is, the stage in between can be reconstructed, which is based on another assumption that every child behaves in essentially the same way over essentially the same time and over essentially the same range. On the other hand, "unique" types of strategies — or at least unique tokens of types of strategies have been observed by some investigators. Roberts (1979:137-) describes a crucial strategy in the process of development from CV to CVCI word types that covered only a period of less than one day. It is demonstrated there that such strategies are important to discover and compare in order to see if there is a common series which must be followed, after however long (extremely short-to-long) in the progress of acquiring speech-language, particularly in the acquiring of longer and longer pieces, e.g., words.

It would also be interesting, as a matter of the sociology of methodology, to find out how often the claim to a uniqueness of strategy has been made by a parent linguist, with an anticipation of the child's being or being made unique, as opposed to by non-parent linguists. If the strategy is unique, then essentially the process of acquisition of a language can not be universally the same. There is a final pattern of "samenesses" but the strategies of acquiring the same pattern are arbitrarily different. Thus, in many studies, there are many ad hoc decisions made in relation to these strategies and there are many social types of evaluations made that impinge on the methodology and the theory.
In the "formal" or "structured" type of methods, elicitation techniques are used, by means of which the subject is prompted to produce, either spontaneously or in imitation of a predetermined set of utterances. Elicitation involves at least two aspects. In the 'elicited naming' process, the child is asked to name an object or an action in a picture. In the 'elicited imitation' process, the child is asked to repeat a list of words produced by the experimenter. Other elicitation methods such as 'sentence completion' and 'sentence recall' have also been used. In the 'sentence completion' method, the child is asked to provide a word in a picture, which is previously described by the experimenter (Ingram et al, 1980). In the 'sentence recall', the child is asked to describe a picture as the experimenter has described it. The major problem involved in the 'imitation task' is that the child's production of the word may be based on the immediately prior modelled form (i.e. the experimenter's) and may not be representative of the child's usual or spontaneous production of that word. In addition, it is difficult to determine whether a word elicited by immediate imitation is in fact present in the child's active vocabulary.

A further major issue in data collection is the type of sample gathered (i.e. the corpus). The data may consist of a sample of single-word productions which is obtained through spontaneous naming or imitation tasks or a corpus of continuous speech gathered during naturally occurring conversational interactions. It has been
pointed out that the advantages in collecting a sample of single-word productions through spontaneous naming or imitations tasks are that the procedure is relatively fast and that the elicitation technique can be designed to allow "phoneme" production in all positions. This type of technique involves a particular type of approach. In other words, if one is looking for "contrasts", then one designs a list to allow "phoneme" productions in all positions. However, pointing to the inter- and intra-word variations that a "phoneme" may show in children's word production, Stol-Gammon & Dunn (1984) assert that realization of one phoneme in just one word is not representative of the child's phonological system. In fact, if we look at these variations, the occurrence of one "phoneme" is not consistent at the same position (e.g. in initial position) across words, and sometimes even within the same word. There are several factors to account for this variation. One is that the production of some sound may be/is affected by the following sound(s) within the word. In essence, this is the allophonicness argument cited earlier. Another is that the input is not consistent. Finally, the child's focus of attention may be on different features within a form at different times. A major problem involved in using the single-word procedure in assessing and establishing a child's phonological system - whatever this term really means - is that it does not provide data on the child's speech as it occurs as part of a naturally occurring conversational interaction. On the other hand, the advantage in using a continuous-speech sample in the assessment of the phonological system is that it is representative of a child's speech as it occurs naturally at some particular time.
and in some particular context. However, even this is only "representative" of the child's speech at one particular time, context, etc. When it comes to evaluation, the major question that has to be handled is: is a phonological system constant or is it in fact variant as to time, context and space (Roberts, 1980-)? If we assume that the input varies as to time, context and space, the child's phonological "system" must also vary similarly and can not be constant; i.e. as yet, we cannot handle what is usually called stylistics when it comes to child speech-language. That makes the whole process of evaluation difficult no matter which technique is used in data analysis.

In concluding this section, I must state that, although I have criticised the methodology of the field here, I cannot apply those criticisms as positively as I would like to my own material. This is for the simple reason that I went and gathered my data in the full innocence of ignorance over a year ago, and only afterwards learnt and/or realised the methodological problems discussed here! Unfortunately, I could not go back to "undo" my "data", so in this thesis I have attempted to do my best with the recordings and notes made during my field-trip to Turkey.

SECTION C

b. THE PARTICULAR APPROACH OF N. WATERSON TO CHILD LANGUAGE STUDY
The inappropriateness of the Phonemic approach for making revealing statements about the process of language acquisition, particularly about the relationship between adult and child language speech, has been amply demonstrated. This view is related to conclusions that it is at least probable that the child's perception of spoken language is different from that of the adult (e.g. Bellugi and Brown, 1964:113; Ingram, 1966:218), and that children should be treated as having their own independent linguistic systems (e.g., amongst the earliest, Carroll, 1961:332; Fry, 1966:194). However, most studies still adopt versions of the segmental approach, as can be seen from the first part of our review.

Prosodic phonology, starting with the work of J.R. Firth in the 1930's, and culminating in Firth (1948; 1957), is a non-phonemic approach which essentially divides the description of sounds into two types of systemic relationships - the phonematic and the prosodic (for a critical overview see Roberts, 1972). Phonematic units are sounds having as their scope only one unit of structure, expressed as C or V, and have systemic membership only at those singular units regarded as places in structure. Prosodic units are of two types: they either have extension over sequences of C's and V's, which sequences, in turn, constitute other levels of structure, or over units such as syllable, word (differentially treatable relative to grammatical function), piece, phrase, etc., or they have relevance, e.g. demarcative function, for/within linguistic units, e.g. they occur only in word-initial, word-final, word-medial position, etc..
Waterson (1970 a; 1971) attempts to apply the fundamental features of Prosodic Phonology (henceforth PP) to the study of child language. True to the prosodic approach, she makes no claim universality for her description of her subject's speech, nor for the descriptive categories that she establishes, which, for her, "arise from the material under investigation, i.e. those required to describe [my emph: SC] the particular forms of the child and adult at the time the child was approximately 18 months old." (1971:179).

Her specific aim is "to show by means of a non-segmental type of analysis that the child's language has its own independent system which, though different from the adult system, is closely related to it even when the child's forms appear to be quite unlike the adult's," and then to answer general questions such as the following (loc. cit.):

1. What governs the choice of sound that the child will use as a 'substitute' for the adult sound?

2. Why does the child 'drop' certain sounds of the adult form or 'substitute' for them when he is already capable of making such sounds and is in fact using them in some other contexts? (cp. 1970:2).

It should be noted that in order to apply PP to this particular task, Waterson must in fact modify some of its notions, particularly
that of polysystemicity, which in fact forecloses on phonological, particularly prosodic, comparative statements of the kind involved in comparing child and adult forms. It is for this reason that her comparisons must within the context of PP be treated as comparison of exponents (see Roberts, 1972; 1987 in prep), and that her work is very descriptive – impressionistic taxonomic ("abstract") rather than directly general linguistic theoretical; indeed, we should take very seriously her statement (183) that what she states are indeed "correlations at the phonetic level" [my emph: SC]. W.S.Allen (1953:) was the first to adopt such a 'deviationist' approach in his attempt to apply polysystemic phonematic PP to historical comparative linguistics. In fact, Allen concluded (personal communication to Prof. Roberts) "that PP is in fact more of a better alternative phonetics than a real phonological theoretical alternative". We adopt the same spirit in our approach, in order to emphasise our basic points that

"the field of child language acquisition suffers seriously from a lack of real concern with what the data is like, with the observation of what is really happening in the language acquisition situation", that this is due largely to the particular phonemic-contrast apriori approach with which linguists, psychologists, etc. generally come to the task, although we do not advocate the impossibly purist inductivist approach but agree that there is no choice but to have some kind of pre-set – though not rigidly so – theoretical approach", and "that the situation is a continuously fluxional one, and that there is constant variation on the part of the participants such that, given the variables of Attention, the relation of this to Short and Long Term Memory, the
Watson's assumption, essentially equivalent to Kornfeld's H0, that a child "does not perceive language forms in the same way as the adult" (1970:2) and "perceives ....only certain of the features of the adult utterances and produces only those that he is able to cope with" (my emph.: SC) (Watson, 1971:181; cp. 179, 182, 189, 198, and passim) we regard, as we have argued above, as premature, and Watson's claim (1970:2) to "have suggested (sic! SC) how [the child] does this ... in Watson 1971" to be entirely unsubstantiated. The evidence cited in Aslin et al. (1980; 1981; 1983) from the work of Eimas and others seems to indicate very clearly that actual perceptual abilities, i.e. perception defined as by Webster as "the act, state, or faculty of receiving knowledge of external things by the medium of the senses" in children is extremely fine, for instance in relation to VOT discrimination. As also pointed out above,

"the whole question of (perceptual and productive) "same" or "different" must be properly considered within a more appropriately conceived notion of identity/identification than the one(s) being presently applied, and taking what is known about adult perception, in amount, kind and category and adjudicating the child in accordance with this potentially if not certainly involves the fallacy of comparison of incomparables .... Interestingly in the case of Watson's work on child language acquisition, Prosodic Phonological Theory, whose very cornerstone is the principle of
Waterson's study is based on daily recordings of her eldest son P. and the data is cited from the 1.5–1.8 age period. At this time, Waterson estimates that P. had a vocabulary of about 155 words (104 monosyllabic, 48 disyllabic and 3 (or so) trisyllabic). The following must be pointed out:

1. The data analysed is a selection - actually 21 items. No mention is made as to whether the rest of the data fits the particular description of the 21 given. In this thesis, the number of words recorded for S. over a period of 1/2 hour was 168 and the analysis here applies to all of them. Note that Waterson provides no information about the contexts for the variants of the child P. (e.g. for a 'finger' (2), 'fish' (2), 'fly' (2 as 1;5; 3 at 1;6), 'flower' (2), 'Rooney' (2), 'hymn/angel' (3) but cites the Firthian notion of meaning as context: sound correlation as the criterion of identity of variants as the "same word". The analysis of the data was not carried out until "some years later" - a dangerous thing to do, especially using impressionistic phonetics!

2. The issue of adult variation is handled rather dismissively. The statement (181)

"Deviances from the norm in the speech of adults, whether phonological or grammatical, generally do not occur frequently
enough in the same form for a child to pick them up and remember them. One may expect that he would be far more likely to pick up the forms that keep coming up regularly and occur in the same sort of situation, and it therefore seems reasonable to consider that most of the forms used by the child are his own creations made on the basis of regular, non-deviant adult forms."

On this, Roberts (1986/7) remarks

"the "logical" presumptions contained in this statement are obvious; their empiricability, however, are highly suspect, as is also the conclusion about the child's "ability to create". One wonders whether Waterson is making a scientific claim or a self-satisfying comment on the creative genius of her own offspring! Descriptively, PP principle emphasised the unique and denies the general, denies comparability. Yet, interestingly, Waterson tries on the one hand to argue for her son's "own, self-created phonological system" while, on the other, effectively showing parallelisms, comparabilities between adult and child, something which can only leave us wondering as to what "own independent, self-created system" means in the context of that comparability which can surely only indicate continuity and (degrees) of sameness, as Waterson herself is actually at pains to show. Clearly, Waterson is carrying on the essentially Scanstromian stream of systemics wherein "a system in a system is a system" taken to its logical conclusion in PP as non-comparability of systems."

Beyond the above stated general criticisms of Waterson's theoretical approach, we find her descriptive scheme useful, and, in this thesis, we extend it to handle the fullest possible description
of short continuous samples of natural child speech. The kind of data Waterson analyses is exemplified as follows (op. cit.: 181):

<table>
<thead>
<tr>
<th>Child's forms</th>
<th>Adult's forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>finger</td>
<td>[\text{n}\ddot{e}\text{-n}\ddot{e}/\text{n}\ddot{e}\ddot{-n}\ddot{e}] (i.e. two forms were in use)</td>
</tr>
<tr>
<td>window</td>
<td>[\text{n}\ddot{e}\text{-}\text{n}\ddot{e}]</td>
</tr>
<tr>
<td>another</td>
<td>[\text{n}\ddot{e}\text{-}\text{n}\ddot{e}]</td>
</tr>
<tr>
<td>Randall</td>
<td>[\text{n}\ddot{e}\text{-n}\ddot{e}]</td>
</tr>
</tbody>
</table>

(n.b. in the original text, \[\text{w}\] is a diacritic on the preceding phonetic symbol.)

It is clear from these examples that:

a.) the adults' forms are treated as invariant. In fact, from Waterson's account of her procedure, only written records of the child's speech were kept and none of the adults.

b.) child's variants are noted as they occur over a period of time (a month? , cp. op. cit.: 183), and the phonetic transcriptions indicate that the record kept was impressionistic IPA-type, "typical of PP, which conveniently forgets the phonemic basis of the IPA."(Roberts, 1983). A few of the standard common or basic
"allophonic" features are diacritically marked, e.g., labiality [w] on [p] and [r], nasality on vowels.

In her statements for her subject of "correlations at the phonetic level" (requoted to reemphasise the point made above), Waterson describes the child's and the adult's forms by reference to "various features of articulation such as nasality, sibilance, glottality, stop (complete closure), continuance, frontness, backness, voicing, voicelessness, labiality, rounding, non-rounding. (= the basic features)"; 2. "grade of vowel opening", 3. "the syllabic structure of the words" and 4. "the prominence of syllables" (op. cit. 183).

In this manner, she is able to show closer degrees of correspondence between child and adult forms. It also becomes very clear that the differences between the two kinds of data lie very much in the area of temporal organisation. We note "that all these features are categorial and not related hierarchically / parametrically, although Waterson does mention the fact of the inclusion of labiality within rounding" (Roberts, 1986/7).

Moreover, the notion of prominence is defined à la Daniel Jones as "(possibly) due to inherent sonority ... to length or to stress or to special intonation or to combinations of these." This relates to the notion of perceptual and correlatively productive salience, a property of

"(1) features that are already established in his repertoire and (2) the most strongly articulated features and features that are reinforced in the utterance, i.e. those that occur in more than one
place in the utterance, and also broad distinctions rather than the fine" (Waterson, op. cit.:198, cp. 196; 1970:4 sqq).

While we accept most of this since the descriptive scheme allows us to show the greater closeness between adult and child speech forms, in this thesis we emphasize also the role of memory, the role of emotive force (e.g. the mother's moods, tenseness, etc., the child's attentiveness / interest), and the role of sound and referential "similarities" (from the point of view of analysis of adult speech) in both (1) and (2), and there are times when what appears linguistically to be most salient is not what happens to catch the child's attention or ear at a particular moment of reception, nor to be reproduced in his speech. Waterson herself notes (1970 a: 3)

"when the child is concentrating on the physical perception and production of sounds..... he is much more free to put his efforts into making a more accurate rendering of what he hears, and it is possible that he hears more also" but not so when "the operation of language as a system is involved".

Thus she concludes that there is something innately different about language learning compared with imitation. However, it is just as possible that a child simply gets bored with learning language much more quickly than with games, including sound imitation games, and that the variable is only attentiveness. The same point applies to age differences relative to utterance length differences, and Prof. Roberts has pointed out to me that, "while"
'Necessity' may be the mother of invention, 'Necessity' is also the mother of necessity." We have discussed extensively above the fact that children of the same age as Waterson's subject are in fact capable of perceiving and reproducing - but not in exactly the adult way - a very large range of very fine phonetic distinctions, both basic and differential (= structural and "phonematic" differences) features (op. cit.:184). Roberts (passim) points out that child:adult speech-language comparison applies a most crude and naive notion of linguistic sameness.

Waterson's analysis of P.'s "fly", "barrow" and "flower" words as belonging to the LABIAL STRUCTURE illustrates her technique very clearly, and raises issues that we address also in our description.

<table>
<thead>
<tr>
<th></th>
<th>fly</th>
<th>barrow</th>
<th>flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>[wæ/bθæ]</td>
<td>[wæwæ]</td>
<td>-------</td>
</tr>
<tr>
<td>1.6</td>
<td>[θæ/væ/bθæ]</td>
<td>[bʌwʌ]</td>
<td>[væ/væwæ]</td>
</tr>
</tbody>
</table>

These words have the following features in common: syllable onset labiality, continuance, syllable onset and syllable coda voice, broad degree of openness of the vowel, prominence of one syllable (not marked: SC). The features that differentiate the words are: friction [bθ, θ, v], non-friction [w], affrication [bθ], bilabiality [w, θ, bθ, b], labiodentality [v], stop [b], syllable centrality [bʌ] vs. frontness[-æ], and syllable rounding and backness [w]. Waterson demonstrates that
in both categories and number of features, the child and adult forms are very much alike (op. cit. 188-). Waterson does not note, as she should (Roberts, op. cit.), facts such as the relationship between adult [r] in barrow and the presence of [ʌ] in the child's form, nor do we have any information as to shifts in lip configuration for "[w]" between [ʌ] and [ʊ], aspects of data and analysis, we consider very important. Thus, in terms of what we quoted earlier from Roberts (presented in the DML/DLLL in 1971-72) about the role of vision and the differential lip configurations used to distinguish sounds like [w r l v] and the spectrographic analysis of Kornfeld, one is less than confident about the reliability of the data/transcription. Kornfeld's and Roberts' arguments suggest the possibility of different [w]'s for fly and barrow, and different [v]'s for fly and flower, yet none of this is recoverable from records such as Waterson's, as Kornfeld has forcefully pointed out. Nor can we set much faith about the actual "meaning" of the symbol [æ]. In the descriptions provided in this thesis, we provide as finely, detailed a set of transcriptions as possible, provide the tape recordings for the record, and recognise the need in future analysis for much more detailed and attentive transcription of the data than is demanded by the IPA - or the IPA trained, for video-taping, and for acoustic analysis. In relation to the latter, note that Waterson states (1970:2) that "Acoustic studies too point to a non-segmental approach as it has not been found possible to segment the acoustic forms into phonemes." - nor, we may add, into IPA-type phonetic symbols!
Waterson's results and conclusions do demonstrate in principle that a comparison of child and adult in finer, so-called over-specified, PP terms yields a picture of greater similarity between child and adult utterances than does a phonemic comparative analysis. This is important in several ways, amongst which we can state at least the following:

1. The similarity between child and adult speech is less or greater relative to the "phonological" framework applied in the analysis.

2. PP phonetics shows that the child's speech is more similar to adult speech at an earlier age than Phonemics does.

We intend in this thesis to apply the general points raised by Kornfeld and Roberts and to add support to the above listed specific points collated from Waterson and, in so doing, to provide evidence that the child's perception and production is much finer than that envisaged by Waterson (op. cit.: 210). Ironically, we do this by paying a great deal of attention to contextual analysis, which is claimed to be one of the most prominent features of Firthian Linguistics.
CHAPTER 3
DATA ANALYSIS AND CONCLUSIONS

SECTION a.

Data collection

The data in this study are collected from thirteen children ranging in age from 1;8,24 (year; month; day) to 4;7,22. All subjects are from middle-class families living in a town situated in the north-western part of Turkey. Data from only two children (S.(1;8) and D.(1;10)) are included in the analysis, with primary concentration on S. because of the time constraints involved in the completion of the thesis. The data consists of continuous speech samples and samples of spontaneous naming obtained through the 'elicited naming' method. As not only the speech of the child, but also the speech of the adult(s) had to be analysed and considered in this thesis, and is given in fine detail, together with social context specification, it was at least twice as time-consuming as analyzing only the children's speech. However, as I have argued that these factors are crucial in the analysis and accounting of the data, they have to be specified in fine detail. Moreover, since I aim to provide as much detail as possible, I had to be very selective in the number of the subjects included in the study.

The data was gathered in a "natural" setting in which the child's productions occurred as part of "natural" interactions with the persons and objects in the environment. (However, the existence of the tape-recorder should be taken into consideration, as
mentioned earlier). In addition, some picture books used for all the children together with each child's toys were used to encourage the children to speak. The children were asked to name toys in the environment, and objects and actions in the pictures. The recordings were carried out at children's homes with a Sony TC-110 B cassette-recorder. The children were visited at their homes twice, for at least thirty minutes each time. During the recordings, the mother and the investigator were usually present. During some of the recordings, though, other people such as guests were also present. The study took place during winter, and none of the homes involved in the study had a central heating system. Therefore, isolation of the children during the recording was not possible. As a result, the recordings took place in a highly natural, everyday-life setting which, however, involved its own disadvantages. The children's utterances are often disrupted by noises and interferences from the environment immediately before, after or during an utterance. Therefore, only the utterances which are audible on the tapes were selected for the purpose of analysis.

Subjects

The speech of two children in the study has been chosen for particular analysis here. One child, S., was aged 1;8,24, and the other D;10,8. Both of them are from middle-class homes, where Turkish is the only language spoken. Subject S. is the second child of her family. Her sister, who is 4;6, goes to kindergarten. S. is mostly taken care of by her mother, who is not employed outside the home, and who spends most of her time with the child. This child
was not eager to talk during the session. Therefore, most of the
time, she was asked to name animals and actions in a picture book.
Yet the data does consist of some spontaneous speech, which sounds
like babbling. The meaning of those utterances which sound like
babbling could not be determined either by myself or by her mother.
Nevertheless, they are included in the phonetic description classes
to which they are analyzed as belonging. Furthermore, the child's
forms are compared to those of the adult's (to those of her mother
unless otherwise stated). The comparisons have been made not
merely to point out "mismatches", but rather to demonstrate the
relationship between the child's and the adult's forms. In other
words, rather than taking the adult form as "perfection" of which
the child has putative underlying knowledge and/or capability of
repeating, but doing to this "perfect" form something "negative"
such as deleting some part or substituting some sound, etc., a set-
subset relationship has been attempted to be shown to exist
between the adult's and the child's forms. It is not accepted that the
child hears the stimulus and goes about mentally-mechanically
applying processes such as deleting, substituting, etc., which
assumes that the child is always naturally and invariantly
predisposed to receive and store everything in the stimulus. Rather,
the facts are taken into consideration that the child may not be
paying attention to what is being said and that not everything "gets
through" to or is picked up by the child. What gets through, i.e., what
the child learns at any particular time from the 'particular'
linguistic stimuli in 'particular' contexts is the primary concern of
this study. The phonological processes which are assumed to be
operating are not phonological rules. Rather so-called phonological rules are regarded as purely descriptive and to be, as a set, a function of the variables that occur in the recorded speech activity between the stimulus and the response. One of the variables is that the child does not pay attention to what is being said, another one is that the child "selects" — probably unconsciously and determinately — what to pay attention to.

Subject D. is the first child of the family. Unlike S., she liked talking. Most of her speech samples include her contribution to the ongoing conversation, her questions about the tape recorder and other objects in the environment, and also responses to adult's questions in the ambience. The same procedure mentioned above for the data of S. has been applied also for the data from D. in comparison of the child's forms to those of the adult.

Transcriptions

The speech sample from these children is transcribed by myself and by Prof. Roberts, first independently by me, later together, in order to resolve observational, "factual" and procedural discrepancies. The system of symbols employed is an adaptation of the International Phonetic Alphabet (IPA) with special symbols and diacritics, representations of which are given in the 'symbol index'. Adoption of the IPA, or any other alphabetic system implies adoption of also certain apriori segmentation decisions which we have been criticizing above. However, the adoption of the symbols used was inevitable due to the constraints imposed by what is mechanical in terms of the type-writer, word-processing system,
etc. Therefore, we have chosen basically to use the IPA with diacritics and to make statements about the extentsions which are over the structures. (See Appendix 1 for a short reference sketch of Standard Turkish Phonology and Appendix 2 for the symbol index).

**Data Analysis --Part I - FEATURES**

The data has been analysed and categorized according to a) features, relative to particular phonetic categories occurring in or over syllable-, word-, or utterance-sized units, and b) contexts.

The specification of the features is presented in terms of Generalised Phonetic Features, describes the variant exponents of the features, and lists the alternant forms occurring in subjects' utterances, primarily subject S's (1;8), with comparative reference to Subject D (1;10). The characterisation terms for the features are similar to those used in the "Generalised Structure Specification" approach commonly used in child-language description. In this thesis, I will use an application of the format developed by Waterson (1971). The terms, or features, are: 'Glottal', 'Labial', 'Palatal', 'Affricate', 'Nasal', 'Retro-fricative', and 'Laminal'. These feature labels are abstract and there is no necessary simple, one-to-one correlation between the phonetic implication of the feature terms and their exponents, i.e. features of the children's utterances. However, the match between feature label and exponent class is neither fortuitous nor "unnatural".
Several utterance-forms have been found to require analysis as belonging to combinations of these types, involving two, three or more of the feature designations. These are categorized separately according to the specific feature type combinations involved, and are given in detail following the characteristics of the singular types. Features which account for the similarity of the variants analysed as belonging to particular forms are called 'basic' features, and features which are not shared by all the forms and which account for differences between them are called 'differential' features, as according to Waterson \( \textit{op. cit.} \).

The context mode specifies and explains the variants in terms of aspects of the contexts in which the recordings were made. The following features have been examined - (1) the interrelationships between structures, (2) prosodic shift which occurs due to the shift of the child's focus of attention on a particular feature, or due to a shift in the input, (3) the effect of variant forms in the input on the output, (4) the effect of the context on the variants and (5) the interplay between structures in the subsequent utterances.

Glosses are given for the child's forms except for those ones whose meanings could not be determined in a clear way, as, for instance, when the child was talking to herself and not commenting on some commonly attended object or action. Where ambiguity may arise a small capital letter "c" is used to indicate whether the form belongs to the child, which refers to subjects S \( \textit{S} \) (the paradigm case) or D \( \textit{D} \). A small capital letter "a" designates the adult
utterances, and where necessary "A" can be further specified as "mother" (m), "analyst" (a), etc.

FEATURE 1. GLOTTAL

The term "glottal" does not refer simply to activity at the glottis. Rather it covers primarily fricative phonetic activity in the cavity extending, at least in the data I have, from the hard palate to the glottis. There are clearly assimilative-prosodic processes involved here in that palatal [ɔ] is related to the presence in the syllable of a "preceding" close front vowel, velar [x] to close back vowels, [X] to more open back vowels, pharyngal [攻关] to open back vowels. However, the kind of complementarity indicated by the above varies considerably and this variation can only be accounted for in terms of contextual-aspects which involve variations in the tense and intensity of the child's responses. The decision to identify the above phonetic qualities under one feature follows Roberts and is based on the the complementarity of distribution and in terms of the equally complementary contextual voice quality variation, and not on the basis of any semantic classification of the forms, either in the traditional aprioristic semantic sense or in the Firthian contextual correlation sense applied by Waterson. Note that in some cases, vowel length appears to co-occurs with glottality. However, variation of length may also be a variable associated with stress, syllable division or position in the word. Thus, we have to think in terms of coexponents of single features and single exponents of more than one feature. I have not been able to do the analysis of this
particular problem in this thesis because of limitations of scope and time.

The following forms of the child are analysed as belonging to this basic feature:

<table>
<thead>
<tr>
<th>Child(5.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish Orthographic</th>
<th>&quot;Gloss&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ʔaʔ] (178)</td>
<td>[aːt]</td>
<td>&quot;take&quot; (?)</td>
<td>al</td>
<td></td>
</tr>
<tr>
<td>[kʰâh'kʰâh] (099)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[kʰ] (240)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[aʰph ū] (256)</td>
<td>[hapusâ]</td>
<td>(used as a 'baby talk' word accompanying lifting something)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[aʰthâh] (038)</td>
<td>(038)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>[aʰthâh] (068)</td>
<td>[ešëkʰ]</td>
<td>&quot;donkey&quot;</td>
<td>eşek</td>
<td></td>
</tr>
<tr>
<td>[tʰâh'jiʔa] (016)</td>
<td>[t̪et̪'u̯m]</td>
<td>&quot;my sweety&quot;, tatlım</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ʔič'kʰâh] (133)</td>
<td>[ikʰı]</td>
<td>&quot;two&quot;</td>
<td>iki</td>
<td></td>
</tr>
<tr>
<td>[k'č'kʰâh] (214)</td>
<td>[kʰüge]</td>
<td>&quot;ear-ring&quot;</td>
<td>küpe</td>
<td></td>
</tr>
<tr>
<td>[ʔič'kʰâh] (208)</td>
<td>[lütfe̞n]</td>
<td>&quot;please&quot;</td>
<td>lütfe̞n</td>
<td></td>
</tr>
<tr>
<td>[g'âh'kʰâh] (226)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note: The meaning of this last example was difficult to determine, as the child was holding out a hair-pin towards me while she was producing the form, which might be interpreted as a request for an

---

1The numbers in the parentheses indicate the meters on the recorder.
2[~] indicates a variation
action [takʰ + onú]⁰ "put it on" or as a labelling of the object [thokʰá]⁰ "hair-pin". The stress system seems to favour the first option though.

Note that the first example [ʔɡ:ʔ] appears immediately to contradict our definition of the feature glottal given above. The initial glottal stop is a matter of articulatory tension and is therefore likely to be feature and context correlated. While it may be an exponent of glottal in various contexts, it may also be exponing stress in monosyllabic [V] word-initial. The final glottal stop may have several explanations: 1. it can be an exponent of glottal in the situation where the structure is a stressed monosyllabic, single-vowel, consonantless word, i.e.[V]; 2. it can be contextually determined as variation in articulatory tension arising from anxiety, fear, etc., also; or 3. it can be regarded as an exponent of a feature "stopness", that is as an exponent of a basic feature "glottal" and a differential feature "stopness", i.e. the lateral has a stoppage along the median line aspect and this may be interpreted by the child as unmarked stopness exponed as [ʔ] (cp. example (11) where [ʔ]⁵ correlates with [-l]⁰) while the vowel length and fronting may reflect respectively the frictionless continuance and alveolarity of the lateral.

Differential features which can co-occur with the basic feature glottal and which are shared only by some forms and which account for the differences between forms are voicelessness and stop feature at the onset of the utterance; note that the voicelessness varies from fully unvoiced to so-called whisper in example (12); broad degree of syllabic vowel openness in
[kʰɛh] (3), [aʰɛh ɑ]; broad degree of closeness in [ʔiʔkʰɛh], [ʔiʃkʰɛh];
closeness variation of mid vowel [ɛ] (8) as opposed to [æ] (6) [ɪ] (4)
vs. backness in [ʔəʔ] (1) vs. centrality in [ə] (2), [tʰɛhʰɛh].

Word structures include either one or two syllables; syllabic
structures appear confined to [PV] (4), [PVP] (8 unless interpreted
as [V] as suggested above) (1), [PVPV] (8) and [VPV] (6) (where V
stand for "vowel" and P for "Plosive"). It should be noted that
examples (8), (9), (10), probably (12), and possibly (3) show so-
called Glottality Harmony, i.e. the spread of glottal basic
feature over (both syllables of) the word, and irrespective of the
frontness/backness, closeness/openness of the vowels, e.g. (3)
(Note: if the features frontness and openness are also reduplicated,
then can be considered as 'complete reduplication', while in case
only some basic features are reduplicated, then it can be considered
as 'partial reduplication'). Example (10) and possibly (3) are
instances of Plosive-harmony, involving differential features.

It should be pointed out that there is no clear direct indication
that the child either has or has not the vowel harmony typical of
Turkish, although (3) can clearly be interpreted as such. It must be
noted here that, given the variation in phonetic vowel quality
exhibited by the subject and "faithfully transcribed" here, vowel
harmony does not leap out at the analyst, as it were, as it appears
to do in the analysis of Standard Turkish. The first syllable may
have a back vowel followed by 'front' vowel in the second syllable,
yet the first vowel may be "fronted" (i.e. [q]), and the relative status

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and character of backness/frontness, as of close/open for vowels in child speech is not immediately easy to analyse fully.

The frontness or backness in syllables and the existence of glottal stop seem to be associated with the 'tenseness' involved in the child's utterance. Although this issue is the subject of Part II, where a comparative or relational approach in which the contextual specification and a comparison of the output with the input are considered in a close examination, the 'tense' versus 'relaxed' utterances should be mentioned briefly as a general observation also in this section. The 'tenseness' is used in the sense that the child's form has the tense vowels fully fronted or backed, involves strongly articulated tense consonants. This 'tenseness' in the child's utterances is due to some sort of pressure on the child, caused by several factors. These factors can be summarized as follows: (i) the mother's threat - The mother threatens the child, for example with leaving the room without taking the child with her, or with not giving the chocolate to her, etc., unless the child performs some action which is related to the child's speaking. For example, the mother may ask the child to say something, to answer a question, to count, etc. The mother's threat creates a rejection response from the child which is associated with high pitch, with tense vowels that are fully front or back and fully open or close, and with strongly articulated consonants. The child's form [bɛˈβ]3 is one such form, which is uttered as a response to the mother's warning that she is saying [bájá]ª to her. The pitch in the child's form

3This form is analyzed as belonging to the 'Labial'-structure.
rises in the second syllable, as if the child is questioning the mother as to what she wants the child to do. (ii) Frustration of the child - The child wants to direct attention to some object, or wishes some adult to perform an action for her, which results in frustration and shouting by the child as she repeats what she wants, because of the inability of the adult to perform her wish due to a lack of understanding on the part of the adult. The 'frustration' utterances also have the characteristics of the 'tenseness' mentioned above. The child's variation-utterances of one form [aː] can be cited as an example of this type. The child holds a chocolate bar towards the adult, and wants an action performed by the adult which has not been noticed by the adult at first. That elicits a high pitch utterance from the child [ʔaːʔ] (176) (=1,1)). Successfully getting the attention of the adult causes a "relaxed" utterance from the child, in which in general the vowels are lax, centralized and mid, and the consonants are lax, and often accompanied by "tongue thickening", i.e. uttering throughout with the tongue fronted to the inter-dental/inter-labial position. She utters [æː] (179), on the vowel of which there is a rising-falling pitch, which is interpreted as a kind of contentment pitch play, showing her happiness. Apparently, she wants the adult to open the chocolate bar for her, something which the adult has not realized, and which causes another tense utterance of [ʔaːʔ] (183) from the child.

(iii) The mother's tenseness - The child's many utterances are tense responses to the mother's "tense" demands. For example, the mother wants the child to count with her, or to say something for her. When the child ignores her, the mother raises her voice and this is
associated with an utterance which involves tense articulation, and which creates the same type of response from the child. The child's form \([?i?k\text{h}^\text{h}]\) \((=1(9))\) \([\text{ikh}]\) "two" is one such form with which she starts counting after the mother, with the input being tense. Then as the mother relaxes because the child is successfully repeating after her, her tone of voice falls and so does the child's, until the child completely stops counting, because she is now interested in some object in the environment such as pencil, microphone, etc. The mother threatens the child by starting to leave the room uttering a high-pitched \([b\acute{\text{a}}]\) "bye-bye", which creates a high raised pitched \([b\acute{\text{a}}]\) questioning the mother, as mentioned earlier in the section (i).

The following forms of subject D. are interpreted as belonging to the 'Glottal' feature:

<table>
<thead>
<tr>
<th>Child (D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (13) (\text{d}^\text{h}\text{q},\text{a}^\text{n}\alpha)</td>
<td>(\text{d}^\text{h}\text{k,h}^\text{h}^\text{h}^\text{a})</td>
<td>&quot;to the store&quot;</td>
<td>dükkâna</td>
</tr>
<tr>
<td>1 (14) (\text{h}^\text{h}^\text{h},\text{h}^\text{h}^\text{h}^\text{h})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (15) (\text{h}^\text{h}^\text{h},\text{h}^\text{h}^\text{h}^\text{h})</td>
<td>(\text{m}^\text{u}^\text{m}^\text{h}^\text{h}^\text{a})</td>
<td>(a name)</td>
<td>mustafa</td>
</tr>
</tbody>
</table>

FEATURE 2. LABIAL

The term "labial" is used to refer both to the action of the lips (e.g., lip protrusion, or the lip contact), i.e. labiality, as involved in the articulation of a consonant, as, for instance in child examples containing \([b],[\beta],[\phi]\), and to the lip action, which extends over the syllable when there is a single, so-called nuclear
rounded vowel, e.g. [v], or over part of the syllable when there is
rounded diphthongisation of a front nuclear vowel, for example,
[æe] ). There are also "assimilative prosodic" processes involved in
this feature in that a back rounded [v] as exponent of the labial
feature is related to the presence of an immediately following
word boundary () (see 2(3,5), cp. 2(4) below, for example) and to the
presence of a back vowel within the "diphthongised" word-final
syllable and in the following word-initial syllable. The exponent [w]
is complementarily associated with word-medial open syllable
position, with labial vowel followed by labial consonant, followed
by non-open front vowel. The exponent [ɔ] alone cooccurs with mid
open [ɛ] in closed syllable (2(4)). Stress is not a variable in this
case. [v] in 2(3) is the exponent of the differential feature labio-
dental (present in the input), as is indicated by the fact that the [æ]
is present and the [w] exponent is absent; also the [ɔ] in 2(6) is the
exponent of the differential feature [j] in the input, although it is
possibly an exponent (also) of the basic feature palatal (see
below), for the occurrence of [v] indicates that it is not treated as a
C. Thus, it can be stated that rounding is a feature of syllable 1 and
labiality a feature of syllable 2. Interestingly, when this is noted
relative to the so-called facts of Standard Turkish Labial
Harmony, we observe a kind of mirror-image difference between
this child's phonology and that of ST in that, while rule for the
latter has a bilabial C as its focus and only the following V in the
word as its domain, this child has two facts of the order V + C.
The following forms of the child are analysed as belonging to this
feature:
The Labial feature involves the following features: non-aspiration of all consonants (plosives) in utterances, plosion at the syllable onset of syllable 1, i.e. word-initial; vowel length associated with the feature the basic feature labial. Differential features are, variably - i.e. contextually correlated - , the degrees of vowel openness, for example, broad degree of syllabic vowel openness vs closeness, e.g. [e] vs. [ɛ]; closeness variation of mid vowel [ɛ] (4) as opposed to [ɛ] (3) [ɛ] (1); frontness in [bɛ] (2) as opposed to the backness in [bá] (3) and to the centrality in [batég] (yet, some backness involved).

Word structures include either two or three syllables (only in one form); syllabic structures appear confined to [PV(1)PV] 2.(2), (3), (5), (6); [PVPVPV] 2(1), and [PV(1)PV] (4). Feature reduplication can be observed also in the forms, which is present in the adult speech. In these forms the variation of word-initial "devoicing" in two degrees (2(5 and 6) should be noted, as should the intervocalic fricativisation (β→β latter). Note, furthermore, that
the variation intervocalic [ b] (2.3) and [p] (2.5) shows that the child may be sensitive to variations in word binding, i.e. to a difference between reduplicated and non-reduplicated words. Although the rounding exponent of the feature does not occur in the second syllable, Labial feature, which includes both labiality and rounding, can be found within both syllables in all forms of two syllables. These forms can be considered as potential paradigms and/or reinforcers for the acquisition of the Labial Harmony "rule".

The subject D.'s form also belongs to this feature:

<table>
<thead>
<tr>
<th>Child (D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish &quot;Gloss&quot;</th>
<th>Orthographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. (7) [buvər-dı]</td>
<td>[buvær-dı]</td>
<td>&quot;she gave (it)&quot;</td>
<td>bu verdi</td>
<td></td>
</tr>
</tbody>
</table>

This form also involves the basic Labial feature except that it does not have length associated with labiality in the first syllable, but it has it associated with fricative-retroflexion in the second syllable. This will be dealt with more fully when I discuss the Retro-fricative feature below.

FEATURE 3. PALATAL

The term "palatal" refers to some activity in the region of the hard palate, which can be considered as exponent of some palatal sound involved in the child's form and/or in the input. It may include diphthongization of the [Vj] type, semi-vowel rounded palatal [4] (as can be found in the 'Labial + Palatal' combination feature — see
The child's following forms belong to this type of feature structure:

| Child (S.) | Adult | Eng. Trans. | Turkish | Orthographic | "Gloss"
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (1) [aːɡa] (145) (150) [abla]</td>
<td>&quot;sister&quot; (?)</td>
<td>ābla</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (2) [jeːɡa] (136)</td>
<td>[jeği]</td>
<td>&quot;seven&quot;</td>
<td>yedi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (3) [aː] (254)</td>
<td></td>
<td>ay</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note: Part of the word [hājūy] "no", as the child could not complete the utterance because of some interruption)

3 (4) [aːdajé] (070) (?)

The exponents of the basic feature in these forms are as follows: length, palatal diphthongization; to these can be added for the vast majority of the cases the following lexically distributionally restricted features: dentality, voicing and stop feature at the onset of syllable 2 (this coincides with the the onset of syllable 3 in the only trisyllabic form [aːdajé]). The palatal exponent may vary from palatal semivowel [j] to palatalized stop feature. Differential features are: broad degree of syllabic vowel openness in [aːɡa], [aːdajé]; mid degree of openness in [jeği]; centrality in [aːɡa] and [aːdajé] vs. frontness [jeːj] (2).

In some cases, e.g. (from Feature 2 : Labial above)
2 (6) [pajːˈjaː] (143) [baj ()baj] "bye-bye". bay bay

Palatality cooccurs with labiality, but at apparently a lower domain level than labiality, with the relative frontness of the vowel as its focus.
Word structures include \([V], [VPV],\) and \(VPVPV\). Example (4) is an example which should be kept in mind for the possibility of Consonantal/Plosive Harmony in the child's language, structurally coupled with the phenomenon of Reduplication.

**FEATURE 4. AFFRICATE**

The term "affricate" refers to affrication involved with stop feature. This feature consists of two types: the voiceless type includes interdental affrication \([t^\theta]\) (as can be found in the 'Glottal + Affricate' feature), dental affrication \([t^\theta]\), palatal affrication \([t^\delta]\), and voiced group includes dental affrication \([d^\delta]\), palatal affrication \([d^\delta]\) or \([d^\delta]\). It is closely associated with dentality, laminality and palatality.

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (1) ([\text{a}_{1}\text{sh}]) (012)</td>
<td>([\text{a}_{1}\text{sh}])</td>
<td>&quot;horse&quot;</td>
<td>at</td>
<td></td>
</tr>
<tr>
<td>4 (2) ([\text{ti}_1 ;	ext{sh}]) (024)</td>
<td>([\text{thu}_{1}\text{sh}])</td>
<td>&quot;hold&quot;</td>
<td>tut</td>
<td></td>
</tr>
<tr>
<td>4 (3) ([\text{ti}_{1}\text{sh}]) (026)</td>
<td>([\text{hi}\text{sh}])</td>
<td>&quot;yes&quot;</td>
<td>evet</td>
<td></td>
</tr>
<tr>
<td>4 (4) ([\text{e}_{1}\text{sh}]) (201)</td>
<td>([\text{evet}_{1}\text{sh}])</td>
<td>&quot;nine&quot;</td>
<td>dokuz</td>
<td></td>
</tr>
<tr>
<td>4 (5) ([\text{et}<em>{1}\text{et}</em>{1}\text{sh}]) (140)</td>
<td>([\text{dokh}\text{uz}])</td>
<td>&quot;eight&quot;</td>
<td>sekiz</td>
<td></td>
</tr>
<tr>
<td>4 (6) ([\text{t}\text{s}<em>{1}\text{et}</em>{1}\text{et}_{1}\text{sh}]) (139)</td>
<td>([\text{sek}\text{h}\text{uz}])</td>
<td>&quot;nice&quot;</td>
<td>güzel</td>
<td></td>
</tr>
<tr>
<td>4 (7) ([\text{d}\text{z}<em>{1}\text{g}\text{d}</em>{1}]) (110, 286) ([\text{güz}<em>{1}\text{e}</em>{1}])</td>
<td>([\text{güz}<em>{1}\text{e}</em>{1}])</td>
<td>&quot;nice&quot;</td>
<td></td>
<td>cici</td>
</tr>
</tbody>
</table>
Example (2) was produced by the child right after the adult's input utterance [θυθςεν βυνυ]"you hold this". As can be observed, the input has a dental fricative [s] right after the final stop of [θυθ]. In phonemic representation the adult input would be shown as (taking the morpheme / word boundaries into consideration) [θυθ + σεν + βυ-νυ]. However, in fast speech, which is usually what the child hears, there are no breaks between words, and there is no reason why the child should not hear stop followed by fricative as affricate in the adult form [θυθσεν] and produce it in this way.

The exponents of this basic feature here are: palatality of V and C, frontness and shortness of nuclear vowel, affrication, the degree of which is related to the emphasis involved in the utterance (e.g. in 3 (1) the affrication is much stronger than in the adult form), dentality and stop feature at word-final and initial position, except when the adult initial is null-C, where the child also has null-C.

The differential features of the forms that belong to this group are: voice vs. voicelessness in non-final C's, degrees of vowel openness, i.e. broad degree of syllabic vowel openness, e.g. [aːθ]; broad degree of closeness, e.g. [tʃ], [tɹθ]; mid degree of openness e.g. [ɛtʃ], [ɛtɹθ]. Note that the [i] may reflect a combination of salient palatality with secondary labiality, i.e. the counter of the [pæθ v] 2(6) example above.

Note that the aspiration commonly present with voiceless exponent may be related to affrication or glottal features, and, in the final analysis, these, together with palatality and laminality,
May be much more closely relatable together phonetically and phonologically.

D's following form also belongs to this structure:

<table>
<thead>
<tr>
<th>Child (D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Orthographic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;Gloss&quot;</td>
</tr>
</tbody>
</table>

4 (10) [ɛ̃d̪jæ] [čičekʰ] "flower" čiček

**FEATURE 5. NASAL**

The following forms of the child belong to this structure:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Orthographic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;Gloss&quot;</td>
</tr>
</tbody>
</table>

5 (1) [áːn̥ə] (072, 074) [ánŋʔ] "mother" anne
5 (2) [áːn̥ə] (251) [ánŋʔ] "mother" (?) anne
5 (3) [ɛ̃n̥ə] (206) [oná] "he/she/it" (Dative) ona
5 (4) [ɛ̃n̥ə] (225, 227) [onů] "she/he/it" (Accusative) onu
5 (5) [ɛ̃ə́m̥a] (203) [õrm̥a] (a type of saying "no" Literally, "that can not happen") olmaz
5 (6) [n̥ãn̥ə] (237) [n̥ãn̥a] (onom. music) naynay
5 (7) [ðθ̃n̥a] (262) (?) (?)
5 (8) [t̥ẽn̥a] (222) [seːm̥a] (name) Sema
Example 5 (2) is part of an utterance, disassociated from others by a pause. The child seems to be reporting to the mother what we had been doing while the mother was out in the kitchen. The meaning of the utterance could not be determined for certain.

The exponents of the nasal basic feature in the forms 5 (1-5) that occurred in my data are: disyllabic word structure; voiced, central and front onset of syllable 1 and nasalisation of "offset" part of the vowel, associated with length; nasality at the second syllable onset and voicing and nasality at the syllable ending of syllable 2. The domain of the nasal feature can then be considered to be, for these structures, the whole of the word except at immediate word onset and offset. This structure can be symbolized as VNV (N-nasal system). Syllable division appeared easily determined as VN-NV. The main differential feature is alveolarity vs. bilabiality, and although there is indication of labial diphthongisation, this feature has only the vowel as its focus and there is no particular labiality linkable to [m]. However, there may be a difference in the diphthongal element related to the alveolarity-bilabiality of the N - viz. [ə] with [-n-] and [œ] with [-m-], although this too correlates with difference in input, viz. [o]+[n] for the former and [o]+[m] for the latter, showing that the child is extremely sensitive to fine phonetic distinctions in the input (since the difference between [o] and [œ] is not phonemic in the adult language.

Example 5(6) [ŋa ŋe], which is onomatopoeic or phonaesthetic in that it supposedly stands for any "music - performed or instrument? differs from the above example in having a nasal onset.
at word-initial position. This shares the general exponents specified for the nasal feature but it also has palatality, length and strongly "nareal" nasality of the vowel in the first syllable. Example 5 (8) [ɛɛ̃] is also very specific since it the child's name and even the mother seems to "sing it out" rather nasally as [sɛːmá] so that the child's [ɛː] is not surprising because of the saliency of the name. The child does nasalise her vowels more than her mother does. The substitution of [ɛː] for [s] is comparable to example 4 (6) [tʃɛtʃ] (139) relative to [sɛkʰz] "eight" dealt with above.

The example 5 (8) [ɛɛ̃] (262) (7) seems to have similar connotations, and is of interest in showing that S. has potential differential feature voice vs. voicelessness for dental stops in word initial position in nasal words.

D's following form belong to the structure of the first five examples:

<table>
<thead>
<tr>
<th>Child (D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (9) [ɛɛ̃]</td>
<td>[ɔn̥]</td>
<td>&quot;it&quot; (Acc.)</td>
<td>onu</td>
</tr>
</tbody>
</table>

D's form [ɛɛ̃] [ɔn̥] can be included into this structure, although there is no length involved in her form. This might be due to the fact that this child is making longer utterances, which may consist of two or more parts ('words'), while the forms of S usually include one-word and sometimes two-word utterances.

However, D's
Interestingly shows a greater complexity than anything in S.'s data, other than the unclear S(8) [d̪eːɾɪŋe].

**FEATURE 6. A. RETROFLEX/FRICATIVE STRUCTURE**

This structure can only be observed in combination with others. The reason for labelling this structure as retroflex/fricative (retro-fricative) is that in some contexts, the 'alveolar-r' is also fricativized both in the adult's and in the child's forms, and the effect of the fricativization can be observed in the following sound. For example, the stop feature gains a fricative property. During the articulation of the sound both a contact and a slight friction sound is audible, shown as [ɾ]. D's following form belongs to this structure:

<table>
<thead>
<tr>
<th>Child(D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td>G6 (1) [βɛɾdCarthy]</td>
<td>[væɾdCarthy]</td>
<td>&quot;give-PAST&quot;</td>
<td>verdi</td>
</tr>
<tr>
<td>in her utterance [bʊ + βɛɾdCarthy]</td>
<td>[bʊ væɾdCarthy]</td>
<td>&quot;this gave (it)&quot;</td>
<td></td>
</tr>
</tbody>
</table>

The form has the following basic exponents: length and retro-frication at the syllable ending, and a "simultaneity" of stop and fricative features at the second syllable onset, which can be considered as an extension of frication involved in the retroflex; alveo-dentality at the onset of syllable 2. Examples from S. that involve this feature are dealt with under Feature Combinations: Type 5. below.
FEATURE 6.B. FRICATIVE

D's following form belongs to this type of structure:

<table>
<thead>
<tr>
<th>Child (D.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish Orthographic</th>
<th>&quot;Gloss&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 (2) [ɛθd̪a]</td>
<td>[θɛlvizjɔn] &quot;television&quot;</td>
<td>televizyon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This form has fricativty over the whole word, e.g. at the syllable onsets and at the second syllable ending (which is word ending at the same time). The word-medial C is primarily fricative with a slight stop onset. The form has also mid-close vowel in the first syllable followed by an open vowel in second syllable. Nasality is another feature involved in the second syllable of the form, and is interpreted as being correlated with the final differential nasal feature of the input correlating with a basic nasal feature for the child, but in this case of lower domain than the fricativty.

FEATURE 7. LAMINAL

The basic feature of laminality is audible throughout many of S.'s forms, i.e. words, even when there is variation in place of articulation beyond alveo-dentality, e.g. [ɛθθl] (271). Also, there is a close relationship to the occurrence of relatively front vowels, which argues for linking the feature laminality to the feature of palatality. [ɛθθkʰa] (211) however does not have the whole word as the laminal domain, and clearly this may be related to placement...
relative to stress. When S produces [dæ.tə] C(S) (259), the tongue is protruded through the teeth during the whole utterance. Most of the forms produced by S, while she is talking to herself and whose meanings could not be determined have the laminality feature. These forms can be labelled as the most "relaxed" utterances of the child. This structure is usually observed in combination with other structures.

FEATURE COMBINATIONS.

As the child’s utterances get longer (i.e. consist of either a longer single word or of more than one word), they involve more basic feature combinations. Most of the forms of D, who is older than S, manifest basic feature combination structures. It appears to be the case for my data that combinations of basic features are literally that, i.e. the exponents of the combined basic features are the same as given above, and the difference lies in variation in domain within the utterance/word.

COMBINED FEATURE 1. GLOTTAL + AFFRICATE

The child’s following forms belong to this basic feature combination:

<table>
<thead>
<tr>
<th>Child (S)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
<th>&quot;Gloss&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>l (1) [k'liʔt[ʰə] (052) -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1 (2) [t?i?j] (054)  [k?i?h]  "gone"  gitti
1 (3) [thăth]f (004) -
1 (4) [hătśjål] (004)  [ḥāṭṭum]  "my sweety"  tatlım
1 (5) [khaetjé] (276)  [khaṣetē]  "cassette"  kaset
1 (6) [ahťjē] (273)  [aščam]  "I'll open (it)"  aşıcam
1 (6) [ahjäh] (038)  [ešēkʰ]  "donkey"  eşek
1 (7) [ʔeśjē] (152)  [eşēm]  "I'll drink (it)"  iççem
1 (8) [ʔeśjētsh] (040)  [eśēkʰ]  "donkey"  eşek

D's following forms also belong to this structure:
1 (9) [ʔatśhā]  [aṭṭshā]  (B T) - "(to) outside"  atta
1 (10) [kʔatśhā]  [çukhutaštshā] "chocolate"  çukulata

**COMBINED FEATURE. II. GLOTTAL + PALATAL**

The following forms can be cited as belonging to this basic feature combination:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>II (1) [hāj]</td>
<td>[hāj]</td>
<td>&quot;no&quot;</td>
<td>hayır</td>
<td></td>
</tr>
<tr>
<td>II (2) [ʔa]</td>
<td>[hāj]</td>
<td>&quot;no&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II (3) [gʻiʔi]</td>
<td>[gitme]</td>
<td>&quot;don't go&quot;</td>
<td>gitme</td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that II (1) is a very "tense" utterance. The mother warns the child if she does not say "[hāj]", then the mother will not give the chocolate. The mother's tone of voice is very high on the first syllable of the form. The child output is also
tense. The same form uttered a little more "relaxed" in the subsequent utterance.

**COMBINED FEATURE III. GLOTTAL + LABIAL**

The following forms belong to this basic feature combination:

| Child (S.) | Adult | Eng. Trans. | Turkish | Orthographic | "Gloss"
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III (1) ([\text{chkhu} \hat{\text{a}} \hat{\text{h}}]) (125, 169) ([\text{ckhu} \text{ld}a])</td>
<td>&quot;at the school&quot;</td>
<td>okulda</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III (2) ([\text{a} \text{xkhu} \hat{\text{a}} \hat{\text{h}}]) (128)</td>
<td>([\text{ckhu} \text{ld}a])</td>
<td>&quot;at the school&quot;</td>
<td>okulda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III (3) ([\text{ceckh} \hat{\text{a}}]) (263)</td>
<td>([\text{ckhu} \text{ld}a])</td>
<td>&quot;to school&quot;</td>
<td>okula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III (4) ([\text{huy} \text{b} \hat{\text{a}} \text{q} \hat{\text{h}}]) (031)</td>
<td>This form, which has been uttered very &quot;tensely&quot;, can be interpreted in two ways. It was uttered by the child right after I said ([\text{b} \text{v} \text{n} \hat{\text{a}} + \text{bakh} \hat{\text{a}} + \text{w} \hat{\text{um}}]) &quot;let's look at this&quot; while we were in the process of starting to look at a picture of a dog. Therefore the child may be saying ([\text{b} \text{v} \text{n} \hat{\text{a}} + \text{bakh} \hat{\text{a}} + \text{w} \hat{\text{um}}]) repeating after me, or may be labelling the picture as ([\text{kh} \text{Æ} \text{ph} \text{ek} \hat{\text{h}}]) &quot;dog&quot;.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III (5) \([\text{a} \hat{\text{v}}]\) (036) | \([\text{hav}]\) | (onom. dog barking) | hav |

III (6) \([\text{a} \hat{\text{v}} \text{baq} \hat{\text{i}}]\) (037). This form of the child can be interpreted two ways: either as \([\text{hav} + \text{baq} \hat{\text{h}}]\) "arf, look!" (look at arf), or as a variant of \([\text{kh} \text{Æ} \text{ph} \text{ek} \hat{\text{h}}]\)
"dog", as the form was uttered while looking at the picture of a dog.

| III (7) [eˌbaŋ] (171) (181) | [oná + báqʰ] | "look at it" | ona bak |
| III (8) [ bumper] (174) | [oná + báqʰ] | "look at it" | ona bak |

It should be noted that III (1) is a 'tense' utterance. The mother's tone of voice is high and so is the child's. III (7), on the other hand is a "relaxed" utterance.

**COMBINED FEATURE IV. LABIAL + PALATAL**

The following forms belong to this basic feature combination:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish Orthographic &quot;Gloss&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV (1) [æe̞d á] (044, 277) [e̞jle] (?)</td>
<td>&quot;that is so&quot;</td>
<td>öyle</td>
<td></td>
</tr>
<tr>
<td>IV (2) [tæe̞d á] (295) (?)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV (3) [ʃu̞d á] (167)</td>
<td>[ʃu̞d á]</td>
<td>&quot;there&quot;</td>
<td>šurda</td>
</tr>
</tbody>
</table>

**COMBINED FEATURE V. LABIAL + RETRO-FRICATIVE**

The forms that belong to this basic feature combination are:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish Orthographic &quot;Gloss&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>V (1) [æ̞d á] (051) (278) [æ̞d á]</td>
<td>&quot;there&quot;</td>
<td>orda</td>
<td></td>
</tr>
<tr>
<td>V (2) [æ̞d á] (043)</td>
<td>[æ̞d á]</td>
<td>&quot;duck&quot;</td>
<td>ĕrđek</td>
</tr>
</tbody>
</table>
V (3) [v ̞ ʃ ʔ ̄d ̄q̄ h] (034) [œ ̞ ʃ ̄k̄ ̄h] "duck" ördek

D's following forms also belong to this structure:
V (4) [nø ̞ ʃ ̄d̄ ̄] [ø ̞ ʃ ̄] "there" orda
V (5) [bøu β̄ ø ̄ ̄d̄ ̄] [bʊ ̞ ʊ ̄ ̄ ̄ ̄ ̄d̄ ̄] "this gave (it)" bu verdi

The example V (5) has the feature exponent rounding within the first part (one word) and labiality at the onset of second part (another word). The remainder of the word involves features of the feature 'Retro-fricative', i.e. voicing and length associated with a fricativized retroflexion, followed by a stop which is produced with a simultaneous friction channel.

**COMBINED FEATURE VI. LABIAL + LAMINAL**

The child's forms that belong to this basic feature combination are:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI (1) [ɛuə] (210)</td>
<td>[ɛˈvɛt]</td>
<td>&quot;yes&quot;</td>
<td>evet</td>
</tr>
<tr>
<td>VI (2) [ɛuə ̆ ̆ ̆ ̆ ̆] (049)</td>
<td>[ɛˈvɛt] / [œjɪɛ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These forms involve the feature laminality within the production of all the sounds involved. The basic exponents are laminality; frontness of syllable; labiality at the second syllable onset.

**COMBINED FEATURE VII. PALATAL + AFFRicate**

The following forms belong to this basic feature combination:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
</table>
The basic features exponents are: affrication and palatality at the syllable ending (monosyllables); palatality at the syllable ending of syllable 1, affrication at the syllable ending of syllable 2, [ɑːtʃjʊ̞ːt], centrality of syllable. Differential features are monosyllabic and disyllabic word structures; degrees of vowel openness, i.e., open, [ɑːtʃ], [ɑːtʃh]; close, [uʃ].

Examples VII (1) and VII (2) involve "tenseness" and "force".

<table>
<thead>
<tr>
<th>Combined Feature VIII. AFFRICATE + LABIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>The farms that belong to this basic combination feature are as follows:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIII (1) [Łɔyu] (156)</td>
<td>[su]</td>
<td>&quot;water&quot;</td>
<td>su</td>
<td></td>
</tr>
<tr>
<td>VIII (2) [Łɔyuʃuʃ] (193)</td>
<td>[çukʊ̞ːtʃa]</td>
<td>&quot;chocolate&quot;</td>
<td>çukulata</td>
<td></td>
</tr>
</tbody>
</table>

These forms have the basic features of affrication and voicelessness at the onset and rounding-in syllable 1; backness of syllable. Differential features are; monosyllabic word structure and
trisyllabic word structure; more close vowel in syllable 1 followed by more open vowels in syllables 2 and 3 [lęvýzęłęta]. The child's form [eødzidé:] (148) [oželéę́ ( váy] can also be included into this structure as another class of the same structure. A word boundary is involved in this utterance, which can be determined by the phonetic similarity in sounds and in pitch assignment between S.'s form and the immediately previous input form. The child's utterance is produced after the input: [gželéę́dé + váymuşı̇]. In the adult's form, the pitch rises on [d̥] and falls on [ vá], between which a word boundary is involved. The child's utterance has the same type of pitch assignment between the third syllable of [eødzidé:] and [ á]. Therefore, only the first part of the utterance, [eødzidé:], is analyzed as belonging to the combined feature structure here.

The feature exponents that are involved with the form are as follows: Rounding of syllable 1; affrication, voicing at the second syllable onset; dentality, voicing and stop feature at the onset of syllable 3; frontness of syllables (backness is involved after the word boundary).

**COMBINED FEATURE IX. GLOTTAL + AFFRICATE + PALATAL**

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
<th>&quot;Gloss&quot;</th>
</tr>
</thead>
</table>
| IX (1) [ʔl̩t̩ɡbi:d̥e] | [içinede] | "inside (it)" | içinde | |}

belongs to this basic feature combination:
The form has all the basic features that have been mentioned in 'Glottal + Affricate' structure. In addition to those features, this form also has the exponents that belong to the 'Palatal' feature. In other words, in addition to the features of glottality at the onset of syllable 1, gemination associated with pre-glottality and affrication at the syllable onset 2, this combination feature is also expounded by vowel length associated with palatality followed by another syllable with an onset which involves dentality etc. as specified for the 'Palatal' feature.

D's form [t<dynee?] also belong here. The difference between the forms of the two children is that the form of S has tri-syllabic word structure, while the form of D involves disyllabic structure. The palatal feature occurs at the syllable onset of syllable 2 in D's form and the glottality has the syllable ending of syllable 2 as its domain rather than the onset as in the form of S.

COMBINED FEATURE X. LABIAL + GLOTTAL + LAMINAL

The following S, forms belong here:

<table>
<thead>
<tr>
<th>Child(S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>X (1) [gæokhá] (211)</td>
<td>[thokhá]</td>
<td>&quot;hair-pin&quot;</td>
<td>toka</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X (2) [tʃæokhá] (195)</td>
<td>[çukhəqsha]</td>
<td>&quot;chocolate&quot;</td>
<td>çukulata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X (3) [tʃæokhá] (084) (?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X (4) [tʃæokhá] (270)</td>
<td>[uf + giţəm] (?)</td>
<td>&quot;I'll say 'uf'&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These forms have the following exponents of basic features:

Laminality throughout the production of the whole utterance.
Rounding and aspiration at the ending of syllable 1; voicelessness and dentality at the onset (except [kʰá] which has less laminality involved within). Differential feature exponents are: Dental onset in syllable 1 in [q̥e̞ahkʰá] and in syllables 2 and 3, [q̥h̥á]; [q̥h̥á] and at every syllable in [q̥h̥á]; degrees of openness of vowel, i.e. closer vowel in syllable 1 followed by more open in syllables 2 and 3, [q̥h̥á]; close in syllable 2 and by more open in syllable 3, [q̥h̥á]; mid vowel in syllable 1 followed by more open in syllable 2, [q̥e̞ahkʰá].

**COMBINED FEATURE XI. LABIAL + NASAL + PALATAL**

The utterance that belongs to this basic feature combination is:

[q̥e̞ahnáq ge̞ehnáq a̞ná] (251) (?)

This utterance seems to involve three words. The reasons for this conclusion are as follows: (i) There is a break between forms during the utterance, which is shown by intervals. Each form involves a rising in pitch at the end of syllable which bears a similarity to 'reporting' or 'counting' type of structure in the adult language. For example, if an utterance involves citing some events or counting some figures, each event, figure, etc. has a rise in the pitch at the end of its last syllable and this goes on until the pitch falls on the last figure mentioned in the citing. The pitch-rising seems to play the role of 'linking' subsequent figures to each other. The same type of 'linking' characteristics can be seen in the above-mentioned S. utterance. S. seems to be reporting to her mother, who had at the time just come into the room from the kitchen. (ii) The
form \( [\ddot{a}\ddot{n}] \) in the utterance bears phonetic similarity to the child's earlier utterance \( [\ddot{a}.\ddot{n}] \) which is used for \( [\dddot{\text{n}\text{n}}] \) "mother". In addition, the second part \( [\ddot{g}\ddot{e}\ddot{n}] \) of the utterance had been used by the child as part of another utterance a few utterances earlier, while asking the adult to put a hair-pin in her hair. The utterance is: \( [\ddot{d} \ddot{a} \ddot{k} \ddot{g} \ddot{e} \ddot{n}] \) (238) \( [\ddot{t}\ddot{h}\ddot{a}\ddot{k} \ddot{h} + \ddot{j}\ddot{e}\ddot{\text{n}}] \) "put (it) in its place". Moreover, \( [\ddot{d} \ddot{a} \ddot{k}] \) in the latter utterance had been used as part of another S. utterance in which some 'force' is involved, because the adult does not understand what S. wants. This utterance follows the one numbered as (238) \( [\ddot{d} \ddot{a} \ddot{k} \ddot{g} \ddot{e} \ddot{n}] \) mentioned above and the child almost shouts: \( [\text{d}t\ddot{a}\ddot{\times} \text{kh} \text{v}: \ddot{t} \ddot{s}\ddot{h}] \) (241) \( [\ddot{t}\ddot{h}\ddot{a}\ddot{k}] \) (\( ? \)) "put (?) on".

The feature exponents involved within each part in this basic feature combination are: First part involves voicing, rounding and nasality in the syllable 1, and nasality and dentality at the onset of the syllable 2, which are similar to the basic features found in the structure 'Labial + Nasal'. In addition to these features, in this structure, in the place of length, which is a basic feature of the 'Nasal' structure, feature exponents of dentality and nasality at the syllable ending of syllable 1 and labio-palatality at the ending of syllable 2 are involved. The second part has the following feature exponents: voicing, rounding and length associated with nasality and labio-palatality at the syllable ending of syllable 1, nasal and dental onset of syllable 2, voicing, nasality at the ending of syllable 2. The third part involves the following exponents: voicing at the onset of syllable 1 associated with length and nasality, nasality of the second syllable. The whole structure has the features of nasality, labiality and palatality extended over it.
The child's form [dʒeːn̩dʒeːvá] (228) belongs here. At least one word boundary can be determined by the pitch assignment in this utterance. There is a 'linking' pitch-rise between [dʒeː] and [vá]. The structure has the following features: voicing, rounding and length associated with nasality at the syllable ending of syllable 1, nasal onset of syllable 2, nasality and glottality at the ending of syllable 2, affrication and dentality at the syllable onset 3, voicing and labiality at the syllable ending of the syllable 3. Labiality at the onset of the second part of the utterance (syllable 4) and backness in syllable 4.

COMBINED FEATURE XIII. NASAL + GLOTTAL + LABIAL

S.'s form

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

Orthographic

"Gloss"

XIII (1) [kʷn̩ŋgáː báx] (234) [güzæ̝̊l + bákʰ] "nice, look" güzel bak belongs to this type. A morpheme boundary is involved in the above form of the child, which can be determined by the 'linking' pitch assignment and by the phonetic similarity to the immediate
preceding input of the adult. The adult makes a comment on the child's ear-rings:

[ne de güzälmiş buhrğá bəçjıɛ]a "how nice these are".

There is a pitch play on the [güzälmiş] and [bəçjıɛ], and a rising pitch on the last syllable of the penultimate form of the utterance, which falls on the first syllable of the last word. S.'s response to this stimulus is her form [k'wŋ̊ɛ: bá̚]. It has a rising pitch on the second syllable, which falls on the last syllable ("word"). This utterance has the features of glottality, labialization and nasalization at the syllable onset of the syllable 1, which can be considered as the extension of all the combination features involved in this structure. Other features involved in the structure are: nasality and syllabiccit of the ending of the syllable 1; labiality and stop feature at the second syllable onset; voicing and length at the second syllable ending; openness of vowel; second part of the utterance has the feature of labiality at the onset; backness and broad openness of the vowel; and velar aspiration (/glottality) at the ending.

**COMBINED FEATURE XIV  LABIAL + RETRO-FRICATIVE + NASAL**

The form that belongs here is

<table>
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<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
</tr>
</thead>
</table>

4 The word boundaries are indicated with intervals between forms, although there is no such break in the original speech directed to the child.
This structure has fricative ending at the ending of the syllable 1, flap onset and labiality, retroflexion, friction and nasality at the syllable ending of the syllable 2; frontness of each syllable; closer vowel in syllable 1 followed by more open vowel in syllable 2; the second part involves the features of voicing, rounding and nasality at the syllable onset, labiality and retroflexion associated with length at the syllable ending of syllable 1; closer vowel in syllable 1 followed by more open vowel in syllable 2.

**COMBINED FEATURE XV. PALATAL + LABIAL + GLOTTAL**

The child’s form

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
<th>Orthographic</th>
</tr>
</thead>
<tbody>
<tr>
<td>XV (1) [k'okʰuːɾd̪a]c (130) [okʰuːɾd̪a]</td>
<td>&quot;at the school&quot;</td>
<td>okulda</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Belongs here. It has the following features and feature exponents:
glottality at the onset of the syllable 1, rounding in syllable 1, glottality, labiality at the onset of syllable 2, voicing and length associated with labiality at the end of syllable 2, dentality at the onset of syllable 3; closer vowel in syllable 1 followed by more open.
vowel in syllable 2 and in syllable 3; backness in syllable 1; 
centrality of syllables 2 and 3.

**COMBINED FEATURE XVI. LABIAL + LAMINAL + GLOTTAL**

The child's forms that belong to this feature combination are:

<table>
<thead>
<tr>
<th>Child (S.)</th>
<th>Adult</th>
<th>Eng. Trans.</th>
<th>Turkish</th>
</tr>
</thead>
<tbody>
<tr>
<td>[daʔqʰ]c (019)</td>
<td>[tauʔqʰ]a</td>
<td>&quot;hen&quot;</td>
<td>tavuk</td>
</tr>
<tr>
<td>[ɛaʔtʰ]c (170)</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

The basic features exponents are laminality, voicing and stop 
feature at the onset, rounding of syllable, glottality at the syllable 
ending. Differential features are: velarity at the syllable ending [q],
dentality at the syllable ending [t].

**COMBINED FEATURE XVII. LAMINAL + GLOTTAL + PALATAL**

The form that belongs here is [θaʔtʰwjjum]a (ʔ).

This form has the following feature exponents and characteristics:
tri-syllabic word structure; aspiration, voicelessness of the first 
syllable; palatality and dentality at the onset of second syllable; 
laminality at the onset of the third syllable; openness of vowel.

This form is a "relaxed" utterance during which none of the features 
or exponents are emphasized.

It is clear from the data and analysis—description presented 
above that the relationship between child and adult speech forms is 
not a simple one. A simple examination of the phonetic symbols 
used indicates that the child forms contain "sounds" that are not in
the adult input forms. The question that arises then is whether this provides support for Kornfeld's $H_A$ hypothesis. Roberts (1980-) states:

"Descriptions of child speech data can contain "sounds"/symbols not present in those of adult speech, specifically immediate adult input speech or general speech. On the surface...[this]... might appear to provide confirmation of Kornfeld's $H_A$ hypothesis. However, it is clear that the child's variance shows a(n adult speech) cause and (child) effect relationship. This being the case, i.e. that there is a continuity, there is no justification for assuming a categorical difference between child and adult speech sounds at the explanatory level of identity. Phonetic sound-symbol/symbolisation differences must not be assumed apriori to be proof of linguistic (phonological) differences. The child's "different" sounds are epiphenomenal to/syncategoromastic with the adult's and the difference is accountable for in terms of variables such as development (age-difference, etc.), feature saliency, and contextual features. The concept of sameness in linguistics is not a well thought-out one."

Data Analysis --Part II-- CONTEXT

1.00 The role of context in accounting for variation in child speech has been emphasised consistently in this thesis. In this section, I intend to do a detailed analysis of one small part of the recorded data -- in fact only the first nine utterances on the S. tape. From this I will demonstrate the contextual variables involved in this
small part of the session and their consequences. The four main foci are:

1. the child's (pre)disposition
2. the adult's (pre)disposition
3. the analyst's (i.e., my) (pre)disposition
4. the form—prearranged or spontaneous—of the process of my directing the child, and the issues that arise from the phonetic and semantic aspects of this and which become a crucial component of the context in determining the child's responses, the interpretation of the responses and understanding of the acquisitional process involved.

In order to make the account clear, I talk in terms of the interrelationships between stimulus and response (S1A–R1C), which gives rise to another stimulus and response (S2A–R2C), etc. In other words, the child's response to S1, initiated whether by the mother or by the analyst, is responded to by the adult in a certain way, for example, by copying the child, or by commenting on what she might be saying, etc. (S2A). S2A, furthermore, stimulates another response from the child. For example, in both cases, she may repeat her original form or make a few changes (e.g., a more front or a more open/close vowel may be used by the child when compared to the R1). Therefore, the contextual relationship does not involve just a two-way relationship but it may also involve a four-way etc. interrelation.

Certainly, every conversation utterance usually shows a connection or relatedness to previous utterances and even to anticipation of following ones. I use the notion of a four-way
interrelationship here in relation to the analysis of what is interpreted to be the variable utterance of one form. For example, an elicitation question by the adult (S1) stimulates an answer from the child (R1):
e.g. adult [əʃəkʰ] "donkey" əʃək = S1A(m) elicits child [ɑʃiːtʰ]c = RC1
The analyst comments on the form:
["She said"] [ətətʰ]A(a) - RA(a) - SA(a) 2(a)
The mother imitates the child "in an adult way" and says:
[əʃəkʰ] Am = RA(m) - SA(m) 2(m)
Clearly, there is a complex relationship of S's and R's here, and the child must respond to this complexity with some utterance.
However, what is the precise basis of the child's response? How much or what has he "picked up", perceived, etc. from just the speech responses of the mother and the analyst? How much attention on the child's part is (was) involved, and towards whom/what and in what proportion(s) was it directed? What possibly recoverable segmentation of attention, speech stimuli, etc., is there in this situation, and how does the covariant relationship between them actually constitute the "next" Stimulus to the child? How far does memory, immediate Short Term, and Long Term Memory play in the child's next utterance? All of these uncertainties or intangibles patently constitute the basis for every attempt to control variables in such situations. However, total control does not appear possible without destroying the "naturalness" of the speech activity. More marvellous is that the
child succeeds in acquiring speech-language in this plethora of "goings-on".

The child's response to all of this is:

\[\text{[e]\text{t}^\text{sh}^\text{h}^\text{C}}\quad \text{(cp. first version [e]\text{t}^\text{sh}^\text{h}^\text{C} from above)}\]

The question now is "How is the analyst to account for the noted differences between S.'s earlier and present utterances?" It would be quite easy to be cavalier and say that all the child did was to copy her original form with little changes, and that the variations are not important. After all, we have the "same" structure VCVC, essentially the "same" vowels and consonants! This is the "phonemic" approach view. That the vowel in syllable 1 is closer compared to the original form, and there is less aspiration/affrication in the second than in the first can according to such a view be simply dismissed. However, if we at least consider the view that "any theory or a set of theories must provide a description/accounting for every individual event insofar as it has been determined to be a datum... then we have no choice but to try to account for every so-called variation that emerges via the process of comparison."(Roberts, \textit{op. cit.})

The part of the recorded data analysed in detail here (S.'s first nine utterances) is first presented in full as it was phonetically transcribed: note that some "things" which I could only discern as "noise" are excluded from this record. However, the possibility has to allowed that S. "picked up" some of this "noise" which I could not, and that it had some determinant effect on her speech. This we leave an open question here.
The context:

1. [المُبَّ - تُمَّ مِكَّ (م)] "Say "sweety."

2. [كَتَأَشَ - تَأَشَ] 

3. [سِنَ تَأَشَ مَسَحَّت كَرَزَّين] "Are you a sweety, my dear?" (Repeated)

4. [كَتَأَشَ - كَتَأَشَ] 

5. [نَمْ بَعَ كَرَزَّين] "What is this, my dear?"

6. [كَتَأَشَ - كَتَأَشَ] 

7. [كلَبَتُ مَا دَلَّ مَعَ عَرَبَ كَرَزَّين] "Is it possibly a sweety? Horse, horse - "giddy-up."

8. [نَمْ بَعَ كَرَزَّين] "What is this?"

9. [كَتَأَشَ - كَتَأَشَ]

10. [كَتَأَشَ مَا دَلَّ] "Is that a horse?"

11. [كَتَأَشَ] 

12. [نَمْ بَعَ كَرَزَّين] "This (is) a lion, this (is) a donkey. What (is) this?"

13. [كَتَأَشَ - كَتَأَشَ] 

14. [كَتَأَشَ دَحَلَ] "She said "atat."

15. [كَتَأَشَ - كَتَأَشَ] "[other adult's imitation of the child] "donkey" etek"

16. [كَتَأَشَ - كَتَأَشَ] 

17. [نَمْ بَعَ كَرَزَّين] "What is this?"

18. [كَتَأَشَ - كَتَأَشَ]

19. [نَمْ بَعَ كَرَزَّين] "Then what is this one?"

20. [كَتَأَشَ - كَتَأَشَ]
Section 2.00 below provides a detailed description and accounting of the context and of the utterance sequencing step-by-step as they occurred during the first few minutes of the recording of the data from S. Section 3.00 cites other examples of variations of forms from S. and D. which could be similarly accounted for.

2.00 The utterances and the social and linguistic context of these utterances during the first few minutes of the recording are as follows:

The mother, S. and myself are in the living room. It is 2:00 p.m. I am preparing the microphone, my notebook and my pencil, in all of which S. is showing a great deal of interest. The first utterance is a request by the mother for the child to say [hətʃˈwɪm] "my sweety":

[ˈhətʃˈwɪm dɛ bɑkiːm] "Say "my sweety"."

This utterance consists of three words. The first word is emphasized and separated by a hiatus after the first syllable by the mother, i.e. she "stops" at the end of the syllable [ˈhətʃ] for a moment to emphasize the word (i) to be repeated. The pitch is high on the first syllable and it falls sharply on the second stressed syllable. The rest of the utterance is uttered at a fast pace and the pitch is never raised to the same level as is raised during the production of the first word.

Various pitch patterns can also be observed in the speech directed to the child. Especially, if a certain form is emphasized, it
may be assigned the highest pitch of the utterance as in the first syllable of \[\text{thätüm}\]^a. The child’s response to this stimulus is her form: \[\text{thätüm}\]^a (004) \[\text{thätüm}\]^a (003) "my sweety". This form belongs to the ‘Glottal + Affricate’ basic feature combination structure. A comparison with the adult’s form reveals a close relationship between the forms:

S.’s form consists of two syllables which are also separated by a hiatus as in the adult’s form which occurred in the immediately preceding utterance:

- both forms have slightly aspirated dental stop onset and open vowels in the first syllable;
- the adult’s form has the features of backness of syllable, dentality, voicelessness at the onset of syllable 1 and laterality, voicelessness, stop and frication at the onset of syllable 2. S.’s form has the inter-dental fricativity, laminality and stop features at the onset of the second syllable;

The onset of the second syllable of S.’s form has the combination of the features involved in the first syllable ending and the second syllable onset of the adult’s form. In other words, the second syllable onset of S.’s form shows a combination of the features of the stop ending of the first syllable, and frication and voicelessness of the second-syllable onset of the adult form. Note that the frontness of S.’s vowel in the first syllable and the greater degree of aspiration over the syllable (= glottality) can be understood as a function of a response to the high-pitch. In Turkish, there is no contrast phonetically between say IPA [a] and [ä], and adult speech shows a variation of degrees of backness—centrality—
frontness along the open line relative to phonetic and non-phonetic contextual environment variation. There is a close relationship phonetically between higher pitch, oral frontness of articulation, and glottal structure (cp. Roberts, 1983, 1986/7). The affrication in the second syllable can similarly be correlated with the articulatory tension associated with stress. Thus, this example here shows that the "child is capable, perceptually and productively, of handling very fine phonetic detail." (Roberts, 1980-).

S.'s second form is a response to her mother's repeated question:
[sa:n thɔt=tw mwsuŋ kʰuːzum...se:mâ] "Are you a sweety my dear?" In the above adult utterance, the form [tʰatʾtʾw] is used again, but with less emphasis this time. There is no hiatus between the syllables, and it is used as a part of the question-utterance with a normal tone of voice. The pitch is raised on the first word of the utterance and is maintained high on the first syllable of [tʰatʾtʾw], which falls on the second syllable of the same form. The remainder of the utterance is again uttered at a very fast rate. Only after several repetitions of the question by the adult does S. gives a "dismissive" type of response, since she is now more interested in the microphone and the tape-recorder than in what her mother was saying. Her response [tʰatʾtʾiː] c [tʰatʾtʾwɔjum] (?) (the expected answer in the context) "I am a sweety" is a combination of the 'Glottal', 'Palatal' and 'Laminal' features. The first syllable has aspiration, dentality and stop features at syllable onset, openness of vowel and aspiration at the syllabic vowel of the first high pitch
syllable—but note that the open vowel is not as front as in the first example, and that this correlates with a difference in, i.e. a lower pitch. The second syllable has palatality, voicelessness and stop features at the onset and the third syllable has the feature of laminality at the onset and backness of vowel; a more open vowel in syllable 1 is followed by a more close vowel in syllable 2. The trisyllabic nature of S.'s form may be an instance of "disinterested multiple reduplication", i.e. a matter of attention degree. Or it may relate to Long(er) Term Memory in that the expected grammatical response is [tɛɾɛwɪjum], and S.'s form, which contains two same vowels as does the expected form, may reflect this. The fact that S.'s vowels are relatively open back may be a function of lower(ed) pitch.

The child's third utterance is a response to a 'name elicitation' question I directed to her, which involves a picture of a horse. S.'s form is [thæʔtəjɪə:], which looks so much like the earlier "sweety" that the first reaction is to associate it with that word. The variation is accounted for in terms of high tense pitch on the first syllable, leading to C- aspiration, glottalised, open front short vowel, geminated, affricated/aspirated -C-, and front open long vowel in final, falling pitch vowel. All the underlined features can be interpreted as exponents of the Glottal feature, and their specific nature with the relative higher level of pitch.

However, a closer examination reveals a possible flaw in the analyst's identification process. The Turkish word for horse is at, and this shares a large number of features with both the Turkish
word for sweety and the child's response. Therefore, is S. giving the word for sweety or a form for the word horse? Given possible variation in attention on S.'s part, the similarity may be such that without a certain amount of attention the response is very similar to the one in short term memory at the time, i.e. the one for sweety. In fact, as Roberts (op. cit.) points out "given the post facto nature of the analysis of recorded material/data [as here], it is virtually impossible to determine the precise form/meaning of the response... and this is where the analyst must apriori be extremely careful to avoid intruding such potential ambiguities into his field procedure...". If we assume that S. is actually saying "horse", then the analysis in terms of basic features still applies. What differs in the adult-child equation then is temporal order, i.e CV order/structure. It is equally possible that, at this contextual point, the child does not find it necessary and/or natural to distinguish between sweety and horse, and the manner in which information was sought of her does not make it at all clear that a categorically different response to herself as "sweety" and to the "horse" as a(nother) example of "sweety" is required. Thus, the analyst's predisposition is a crucial part of the whole context. Note that, phonetically-phonologically and non-semantically, however, a clear link can be made between the first three forms.

S.'s third response [l[^a]7[^a]J6.] as a label for "horse" causes an interference reaction from her mother, who "corrects" the child's answer asserting that it is not a "sweety" but a "horse". The "horse" is reduplicated in the mother's utterance. Reduplication is usually
used as means of emphasis in Turkish. The reinforcement from the child's mother [át\textsuperscript{sh} át\textsuperscript{sh}] a "horse horse" presents the child, in a highly directed manner, with a new syllable structure, which is a reverse of the syllable structure involved in the first forms, namely VPVP vs. PVPV. The adult's form [át\textsuperscript{sh} át\textsuperscript{sh}] is clearly high pitched and both forms of the reduplication are also stressed. Stressing and emphasizing results in slight affrication and aspiration of the stop in the adult’s form also, which are usually noted as features of the child's speech. However, "in speaking to children, adults very often use highly salient features due to increase of tension correlating with increased intensionality, direction (to the point of being minatory-)." A child... is clearly sensitive to these features and their correlations and actually very often increases the "degrees" of the features in order, perhaps, to indicate the degree of attention he has applied to listening to his mother,..." (Roberts, 1980-).

S. repeats the reinforced form with a strong articulation of the features of stop, aspiration and affrication. The child seems to start with a reduplicated form like the adult’s, but she is prevented from completing the word - i.e. she utters [át\textsuperscript{sh}áá] - when her mother interrupts for a confirmation that it is a "horse". Therefore, the last sound of the reduplicated form is lost in the following utterance of the adult. In conversational speech, this type of 'interference' or 'cutting in' occurs often. Not only do adults interfere with the child's speech, but also the child cuts into the adult's speech. There are many utterances in which, before one person's utterance is complete, another person starts to talk.
Therefore, it is not always easy to find a form 'complete and perfect' as is shown in the usual 'phonemic' description of a language. However, Roberts (op. cit.) 'speculate[s] that this kind of interference might have a role to play in learning and practising different structures, i.e. C-V combinations, syllable types, etc..' 

To the mother's request for a confirmation that it is a "horse" S. responds with [atʰ], with stronger affrication and aspiration of the stop than is evidenced in the mother's form.

The child and myself continue to look at the pictures in the book. I start introducing the names of the animals in the picture to her:

[bú as٪án bú ेेेेेेेेेेेेेेेेेे ešékʰ ेेेेेेेेेेेेेेे ेेेेेेेेे]^[a]
"this (is) a lion, this (is) a donkey, (showing the donkey) what (is) this?"

In the description, each [bú]^[a] "this" has high rising pitch which falls on the first syllable of the following word, and which is raised again slightly on the following syllable that is also stressed. S.'s response [aš٪játʰ], which again would be easy to identify with "donkey", i.e Turkish [ešékʰ], shares by "accident" or "lack of foresight", many features both with her previous two form for sweety and horse, as well as with the adult form! S.'s output has now some new features such as palatality, which makes it similar to the adult reinforcement [ešékʰ]^[a]. The adult form also has the features of frontness and openness of the syllables, and aspiration, glottality, voicelessness and stop features at the syllable ending. The feature of palatality, which is extended over the structure, openness of the vowels in syllables, voicelessness, aspiration and
stop features are existent also in the child's form, and so it is analysable as belonging to the 'Palatal + Affricate' feature combination, with the syllable structure VPVP, a sub-class of VCVC, to which [e̞ʃkʰ] also belongs.

However, it is again impossible to say categorically whether the child is repeating the word for "donkey" or whether the similarity between all the three forms presented to her is so great that there is for her no clear phoneto-semantic difference involved. Nevertheless, her responses to the adult stimuli show a clear ability to perceive and produce fine phonetic properties.

This particular response by S. initiates a four-way stimulus-response relationship. The analyst (i.e. me) comments on the child's form: "She said : [atátʰ]" Another adult imitates the child in an "adult way" as [e̞ʃkʰ]A(-m). The child responds to this new stimulus by "copying" her original form with a few changes: [a̞tʃátʰ]. Note that the vowel in syllable 1 is closer and more front, indicating perhaps that she is responding to learning the differential [e] - [a] feature. There is less aspiration involved, correlating with the low intensity of the last stimulus. S.'s form has a slight pitch rise at the end of the second syllable, which sounds as if she is questioning the adult about whether she said something wrong, though it is also possible that she is confirming what she said in her earlier utterance. In other words, one of the aspects that emerges most clearly from this analysis is that the context is not clearly analysable for the child and is, therefore, to
be that much less clear later to the analyst. Clearly, things should be done more carefully the second, third, ... n th time around.

This form, like the preceding one, also has the syllable substructure VPVP and belongs to the feature combination 'Palatal + Affricate'.

I asked S. then to give the word for "horse" again, showing the picture to her! At this point, the analyst is clearly compounding the child's and her own difficulties. Her response is [tʰaʰtʰə], in which both syllables are assigned high pitch. The pitch does not fall on the second syllable. Once more, it is difficult to determine whether the child is saying [tʰaʰtʰə] a "sweety", "horse" or "donkey". It is even possible that there is by this time a process of combination of items going in immediate memory, and even that this form is a reverse ordered variation of the reduplicated form [átʰə átʰə] a "horse horse"! The child's form, however, clearly in phonetic terms belongs to the 'Glottal' feature and has the syllable sub-structure PVPV.

I asked her to label the donkey again. Her response [tʰaːtʰəq'] seems to be a combination of her earlier forms such as [tʰoʔtʰəjə], and the form [eʃəkʰ], uttered, however, in a 'relaxed', relatively quiet, almost disinterested or tenuous manner. The feature laminality is present, and syllables have the features of centrality and openness within the vowel system, indicative of lower, non-tense pitch.
This section lists other examples in S.'s data which involve similar considerations. Time and scope limitations prevent me from presenting an analysis of them here.

1. \[t\hat{h}\hat{o}t\hat{h}[\theta]\hat{a}c\] \(-\) \[t\hat{h}\hat{o}t\acute{\varepsilon}j\acute{a}c\] \(-\) \[t\hat{h}\hat{o}t\hat{h}\acute{\varepsilon}\] \[t\hat{h}\hat{o}t\acute{\varepsilon}w\]^a "my sweetie" (discussed in the section 1).

2. \[\acute{e}t\acute{\varepsilon}t\hat{h}\hat{h}\hat{c}\] \(-\) \[\acute{e}t\acute{\varepsilon}t\hat{h}\hat{h}\] \(-\) \[\acute{e}t\acute{\varepsilon}t\hat{h}\acute{\varepsilon}\] \[\acute{e}t\acute{\varepsilon}t\hat{\acute{\varepsilon}}\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\acute{\varepsilon}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\acute{\varepsilon}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\acute{\varepsilon}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\acute{\varepsilon}\] "donkey" (the first three variations are discussed in the section 1).

3. \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] \[\acute{e}t\acute{\varepsilon}t\hat{h}\] "yes"

4. \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] "at the school" \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] "the school"

5. \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] \[\acute{e}k\acute{h}u\tilde{\acute{a}}\acute{h}\] "duck"

6. \[\acute{d}a\acute{x}k\hat{h}\acute{h}\] \[\acute{d}a\acute{x}k\hat{h}\acute{h}\] \[\acute{d}a\acute{x}k\hat{h}\acute{h}\] \[\acute{d}a\acute{x}k\hat{h}\acute{h}\] "put"

7. \[\acute{c}d\acute{a}\acute{d}\acute{a}\] \[\acute{c}d\acute{a}\acute{d}\acute{a}\] \[\acute{c}d\acute{a}\acute{d}\acute{a}\] "there"

Variations in the speech of D:

8. \[\acute{h}x\hat{\acute{a}}\acute{k}\hat{\acute{a}}\acute{k}\acute{h}\acute{h}\acute{a}\] \[\acute{h}x\hat{\acute{a}}\acute{k}\hat{\acute{a}}\acute{k}\acute{h}\acute{h}\acute{a}\] \[\acute{h}x\hat{\acute{a}}\acute{k}\hat{\acute{a}}\acute{k}\acute{h}\acute{h}\acute{a}\] (a name)

9. \[\acute{h}x\hat{\acute{a}}\acute{k}\hat{\acute{a}}\acute{k}\acute{h}\acute{h}\acute{a}\] \[\acute{h}x\hat{\acute{a}}\acute{k}\hat{\acute{a}}\acute{k}\acute{h}\acute{h}\acute{a}\] "television"

SECTION b.

In conclusion, a close examination of the social and linguistic context of the first few minutes of the data from S. and of the variant forms in both children's speech reveal several major facts.
about the importance of the social and linguistic context on the child's output.

"Analysis of child speech and theoretical speculation ignore these contextual features at their peril... Hypotheses such as Kornfeld's H₄ appear to arise out of such cavalier attitudes towards the data, i.e., so that we may avoid the implications of a two-language epistemological model, towards the subject." (Roberts, op. cit.).

Fine variations in adult inputs, child outputs, lexical spread, attention, etc. - all of these have to be analytically controlled to their fullest before we can get anywhere near to a conceptualisation of how speech, language, is acquired. Thus, it is clear that a great deal of work, practical and theoretical, remains to be done. I hope to have shown in this thesis some of the difficulties involved in the field and to have made some contribution towards a procedure that will lead towards more realistic results. The following points are important to keep in mind:

The adult input is not as "invariant" as it is usually considered to be. The adult's form changes according to the social and linguistic context in which it is produced. The child, "who is exposed to this variation, is not and cannot itself be expected to be invariant, and is capable of responding - perceptually and productively - to this variation to a larger extent than hitherto allowed for... so are adults for a far longer period than usually thought..." (Roberts, op. cit.). Thus, there is mutually related variation between adult and child which yields another order of variation.
The saliency of one syllable or word seems to be related to high pitch and stress assignment and also to the strong ('tense') articulated sounds involved within the production of the syllable /word. One point that should be made here regarding the tenseness of the utterance involves social context. The adult's tenseness involved in a form (which may result in high tone of voice and strong articulation of some/all sounds within the form) or emphasis of some word to drive the attention of the child to that particular word, increases the tenseness in the child and in her utterance too. As Nash (1973:) points out, the pitch assignment seems to change stylistically, which causes variations in the output.

The child does not pay attention all the time, nor even only to the salient forms (or features). Sometimes, s/he may shift her focus over different features involved in an utterance which are not necessarily salient ('self-directed attention'), while at other times s/he may not pay attention at all to the adult's speech (especially when there is something else s/he is interested in the environment). In these cases, either the child ignores the adult or she gives a 'get rid of the question' type of response which again may result in a variant form.

In phonemic transcriptions of child speech, lexical items are represented phonemically, with a few allophones occasionally thrown in. This has a "visual-conceptual effect... on linguists... [and] gives the impression that every sound = symbol is the "same size" and takes the same amount of time. However, there are rate variations in utterances/speech. As native speakers of a language, adults "know"...
a little more... what to expect, yet a child has none or little such redundancy to depend on" (Roberts, 1986/7; also Watrson, 1970).

Nevertheless, the child is exposed to the same type of speech (i.e. slow-fast) as are the adults. Therefore, the child can not be expected to respond "phonemically" or with just one form to the stimulus, which is invariably not equally salient in all its parts.

Another important fact revealed by the close examination in this thesis is that the relationship - phonetically, "semantically", etc. between subsequent utterances organised by the analyst is a crucial variable, and the linguist must be as careful to "know himself and what he does as to know his subject and what he does." (loc. cit.)

Here we deviate somewhat in our conclusions from Waterson, who finds it possible to use semantic (contextual) criteria to determine meaning, and thereby the classification of variants into words. However, the difference lies not so much in the general conclusions as in the fact that Waterson's temporal and contextual scope for data are larger than the one for this thesis, so that the difference is one of degree of specificity rather than of category. Indeed, the conditions of learning, continuity, etc. make the development towards Waterson's position necessary in the long haul and certainly appears to emerge in the process of language acquisition. What we have demonstrated here is

"the complexity of the process, and, crucially, the importance of sound and sound variation, i.e. of form and form variation,... which throws into considerable doubt the validity of the claim of semantics to status within linguistic theory - as opposed to status
As a statement of cross-subject (proper Universe segment) correlation" (Roberts, 1980-).

When these major facts are considered about the existence of variations and of the structural interplay between subsequent utterances and the importance of social/linguistic context on the speech output, it can be realized that the studies on child phonology to date are not satisfactory and need serious consideration and revolutionary changes in terms of both methodology and analysis. "In child language study, as in the study of any language activity, the Sociology of Linguistics is just as important as, if not, on occasions, more important than, Sociolinguistics!" (Roberts, loc. cit.).

Finally, as to proposals about perception and production and about their interrelationship, we find that the child’s perception appears even from our (fine) impressionistic analysis to be capable of extremely fine distinctions, as indeed are his productive abilities, and that much of what "goes in and comes out" is a matter of attention-interest, and not a matter of innate or developmental restrictions. We do emphasise, however, that there are differences between adult and child’s speech, but argue convincingly, I believe, that

"such differences are neither quantal nor categorical but are simply epiphenomenal to the contextual difference of age... [Linguists'] claim of categorical differences are generally due to their inductive-empiricist approaches... and their failure to
taxonomise, i.e. segment, classify and compare, ... according to proper canons." (Roberts, 1980-).

Waterson's approach, coupled with the methodological criticisms and proposals of Kornfeld and with the work in infant perception by Aslin and others (see esp. Aslin, et al., 1983) support us in this position, and, in turn, the work reported here justifies and extends theirs.
APPENDIX 1

SHORT REFERENCE SCETCH OF STANDARD TURKISH PHONOLOGY

1. Phonemes.

Here we provide a list of the phonemes of Standard Turkish as provided in the Stanford Phonology Archives. The symbolisation is a "natural" or "qualitative" one in that there is considerable general phonetic information contained in the symbols. We provide word examples for each phoneme. Also, some of the allophones of each phoneme are given.

Phoneme Inventory:

Consonants:

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Example</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pʰ/</td>
<td>[pʰ] [phară]</td>
<td>&quot;money&quot;</td>
</tr>
<tr>
<td>/b/</td>
<td>[b] [babă]</td>
<td>&quot;father&quot;</td>
</tr>
<tr>
<td>/tʰ/</td>
<td>[t] [thattwux]</td>
<td>&quot;sweet&quot;</td>
</tr>
<tr>
<td>/d/</td>
<td>[d] [darūi]</td>
<td>&quot;corn&quot;</td>
</tr>
<tr>
<td>/kʰ/</td>
<td>[kʰ] [kʰaḡ]</td>
<td>&quot;profit&quot; (phonemic only when it occurs preceding a back vowel in loan words of Arabic and Persian origin)</td>
</tr>
<tr>
<td>/kʰ/</td>
<td>[kʰ] [kʰaḡ]</td>
<td>&quot;snow&quot;</td>
</tr>
<tr>
<td>[kʰ]</td>
<td>[kʰim]</td>
<td>&quot;who&quot; (with front vowels)</td>
</tr>
<tr>
<td>/g/</td>
<td>[g] [gaz]</td>
<td>&quot;gas&quot;</td>
</tr>
</tbody>
</table>
[ğ]  [ğit]  "go"  (with front vowels)

/j̝/  [ğ]  [ğavu]  "infidel"  (phonemic only when it occurs
preceding a back vowel in
loan words of Arabic and
Persian origin)

/çh/  [çh]  [çhałúšh]  "wine"

/j/  [j]  [jan]  "soul"

/f/  [f]  [fil]  "elephant"

/v/  [v]  [ve]  "give"
[β]  (free variation - /v/ may become [β] medially and finally)

/s/  [s]  [kasáp]  "butcher"

/z/  [z]  [khaż]  "dig"

/š/  [š]  [khaš]  "eye-brow"

/ž/  [ž]  [garáž]  "garage"

/m/  [m]  [khum]  "sand"

/n/  [n]  [nasúfi]  "how"

/ŋ/  [anjë]  "mother"

/[ŋ]  [ánkhrara]  (the name of the capital of Turkey)

/š/  [š]  [šimən]  "lemon"

/[ʃ]  [ʃarâ]  "money"

/[ʒ]  [sežth]  "hard"
(syllable before a consonant)

<table>
<thead>
<tr>
<th>/a/</th>
<th>phonemic in Japanese words</th>
</tr>
</thead>
<tbody>
<tr>
<td>/o/</td>
<td>phonemic in Japanese words</td>
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<tr>
<td>/a/</td>
<td>phonemic in Arabic words</td>
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<td>phonemic in Arabic words</td>
</tr>
<tr>
<td>/æ/</td>
<td>phonemic in Arabic words</td>
</tr>
</tbody>
</table>

"beef" [ben] /3/
"yes" [eves] /6/
"beautiful" [gæzli] /4/
"name" [ism] /1/
"no" [nou] /4/
"snow" [sno] /1/
2. Pitch and Stress.

According to Lees (1961), the crucial factor for rules for word-stress location is the distinction between weak and strong suffix syllables (Stanford Phonology Archive). The former is unstressed; the latter stressed under appropriate conditions. The putative rule is that the syllable preceding the first weak suffix syllable of a word is stressed, otherwise the stress is word-final. A general rule is that the stress falls on the last syllable. Loan words may violate this rule. There are different claims about whether the highest pitch coincides with the primary stress within a phrase. The general agreement is that a rise in pitch denotes that the thought is not complete, whereas a fall in pitch denotes its end. Thus, the topic is uttered with a rising intonation and the predicate with a falling intonation. Swift & Agrali (1966) claim that, usually, the rising intonation coincides with the primary stress of the phrase, but they also point out that this is not always the case. Lees (1961) points to a frequent confusion of pitch with stress. He defines intonation patterns as certain recurrent sequences of relatively placed pitches which, like stresses, serve to designate certain syllables as prominent relative to others. However, he also points out that pitch prominence may or may not coincide with stress, though it is quite common in short declarative sentences for one pitch prominence to coincide with the primary stress of the sentence. He asserts that it is quite a common failure to hear the
high pitch prominence on the first syllable of disyllabic words from the strong stress prominence of the last syllable. In the following example, the high pitch and the primary stress do not coincide. For example:

\[2\text{æje} \text{ şimasa}3 \text{3gidęj}1u1\] "if it wasn't the case, she would go".

Furthermore, Nash (1973) points out that there is no restriction on pitch movement and that very few phrases of more than one word have identical pitch patterns from speaker to speaker, and that speakers often vary even their own pitch patterns in repetitions of the same text, or on phrases of similar morphological construction.

3) Vowel Harmony

Turkish has eight vowels which can be grouped into two according to the feature "backness", height and roundedness. According to "backness", they are matched as follows (the first vowel corresponds to front and the second vowel to the back cognate): \[/ɛ/-/a/\, /i/-/u/\, /œ/-/o/\ and /u/-/ũ/\ (see Underhill, 1976). These vowels are matched as follows according to height (the first vowel corresponding to the high vowel and the second vowel to the low cognate): \[/i/-/e/\, /u/-/o/\, /œ/-/œ/\ and /ũ/-/ũ\]. According to the feature "roundedness", they are matched along the following pairs (the first vowel in the pair is rounded, the second is unrounded): \[/ɔ/-/a/\, /œ/-/e/\, /u/-/w/\ and /ũ/-/i/\]. Any one of the eight Turkish vowels may appear in the first syllable of a word. But each of the following vowel is conditioned by the vowel immediately preceding it along the following rules:
(i) The following vowel assimilates to the preceding vowel in frontness, i.e., front vowels are followed by front vowels, and back vowels are followed by back vowels.

(ii) A following high vowel assimilates to the preceding vowel in rounding, i.e., high vowels are rounded after a rounded vowel, unrounded after an unrounded vowel.

(iii) A following vowel must be unrounded, i.e., /ɔ/ and /œ/ cannot appear in any syllable except the first.

There are many Turkish words that do not obey the rules of vowel harmony. Some of these are borrowed from Arabic or Persian and some are European language. In addition, there are some non-harmonic suffixes, whose vowel does not alternate. Finally, there are some nouns that contain back vowels but require front vowel suffixes (e.g., nouns with palatalized [ʃ] in the final position), some cannot be predicted at all (e.g., [saːt] - [saːtʃ] - [saatʃ]).

Vowel harmony is a complex issue with foreign words in abundance and dialectal differences. As pointed out at page 5, we have found very little to say about the acquisition of vowel harmony in the sense that it is usually described for Turkish, because:

(i) In many of the adult items, the rules of "backness harmony" does not apply, for example, [bakʃim]⁶ "let me look at it", [aʃjm]⁶ "I am going to buy/take (it)", [kʰaʃčekʰ]⁶ "(s/he/it) is going to escape", [satʃim]⁶ "let me sell (it)", etc. Many of these examples can be handled in generative framework in terms of abstract analysis using "deletion", "palatalization", etc.

(ii) We see no clear evidence in the child language that vowel harmony is a focus of attention during the period of study. There
are instances in our analysis where both consonantal and vowel effects can be observed. For instance, there are several instances where under stress, the vowel has the particular features that correspond to the adult stressed vowel, but the unstressed vowels are mostly centralized. Such a relationship between stressed and unstressed vowels is a feature of Turkish vowel harmony. The stress-related stage may play an important role in the acquisition of the backness form of Turkish vowel harmony.
### SYMBOL INDEX

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<tr>
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<td>a</td>
<td>low fronted central unrounded vowel</td>
</tr>
<tr>
<td>a:</td>
<td>long [a]</td>
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<td>stressed [a]</td>
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<tr>
<td>a</td>
<td>central low-mid [a]</td>
</tr>
<tr>
<td>o</td>
<td>low back rounded vowel</td>
</tr>
<tr>
<td>ó</td>
<td>stressed [o]</td>
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<tr>
<td>a</td>
<td>close [a]</td>
</tr>
<tr>
<td>ã</td>
<td>low central unrounded vowel</td>
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<td>low back unrounded vowel</td>
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<td>primary-stressed [a]</td>
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<td>close [a]</td>
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<td>low front unrounded vowel</td>
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<td>stressed [æ]</td>
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<td>nasalized [æ]</td>
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<td>æ†</td>
<td>open [æ] (lower than [æ] higher than [a])</td>
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<tr>
<td>æ</td>
<td>close [æ], higher than [æ], lower than [æ]</td>
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<td>[e] with secondary stress</td>
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<td>close [e] stressed</td>
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<td>\u027e</td>
<td>lax mid backened [e] (between front and central)</td>
</tr>
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<td>central [e]</td>
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<td>open [e] (higher than English [ash], lower than [epsilon])</td>
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<td>\u027b</td>
<td>high-mid back unrounded vowel</td>
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<td>close [\u027b]</td>
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<td>\u027b</td>
<td>stressed [\u027b]</td>
</tr>
<tr>
<td>\u027b</td>
<td>open [\u027b]</td>
</tr>
</tbody>
</table>
stressed [ʏ]

\( \ddot{u} \)  high back unrounded vowel

\( \ddot{u} \)  stressed [\( \ddot{u} \)]

\( \ddot{w} \)  open [\( \ddot{w} \)], lower than [\( \ddot{u} \)], higher than \( \ddot{u} \)

\( \ddot{\ddot{u}} \)  stressed [\( \ddot{\ddot{u}} \)]

\( \ddot{u} \)  close [\( \ddot{u} \)]

\( \ddot{\ddot{u}} \)  stressed [\( \ddot{\ddot{u}} \)]

\( \ddot{\ddot{\ddot{u}}} \)  central [\( \ddot{\ddot{\ddot{u}}} \)]

\( \ddot{i} \)  high front unrounded vowel

\( \ddot{\ddot{i}} \)  open [\( \ddot{\ddot{i}} \)]

\( \ddot{\ddot{i}} \)  stressed [\( \ddot{\ddot{i}} \)]

\( \ddot{\ddot{i}} \)  close [\( \ddot{\ddot{i}} \)]

\( \ddot{\ddot{\ddot{i}}} \)  stressed [\( \ddot{\ddot{\ddot{i}}} \)]

\( \ddot{i} \)  lax high front unrounded vowel

\( \ddot{\ddot{\ddot{i}}} \)  stressed [\( \ddot{\ddot{\ddot{i}}} \)]

\( \ddot{\ddot{i}} \)  [\( \ddot{i} \)] with secondary stress

\( \ddot{\ddot{\ddot{i}}} \)  close [\( \ddot{\ddot{\ddot{i}}} \)]

\( \ddot{i} \)  stressed [\( \ddot{i} \)]

\( \ddot{\ddot{i}} \)  stressed [\( \ddot{\ddot{i}} \)]

\( \ddot{\ddot{\ddot{i}}} \)  secondary stressed [\( \ddot{\ddot{\ddot{i}}} \)]

\( \ddot{i} \)  central [\( \ddot{i} \)]

\( \ddot{\ddot{\ddot{u}}} \)  stressed [\( \ddot{\ddot{\ddot{u}}} \)]

\( \ddot{\ddot{\ddot{u}}} \)  open-\( \ddot{\ddot{\ddot{u}}} \)

\( \ddot{\ddot{\ddot{\ddot{u}}} \)  stressed [\( \ddot{\ddot{\ddot{\ddot{u}}} \)]

\( \ddot{\ddot{\ddot{\ddot{u}}}} \)  stressed [\( \ddot{\ddot{\ddot{\ddot{u}}} \)]

\( \ddot{\ddot{\ddot{\ddot{u}}} \)  lax high central rounded vowel

\( \ddot{u} \)  high central rounded vowel
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>u</td>
<td>lax high back rounded vowel</td>
</tr>
<tr>
<td>ǔ</td>
<td>stressed [u]</td>
</tr>
<tr>
<td>y</td>
<td>close [u]</td>
</tr>
<tr>
<td>ū</td>
<td>stressed [ฤ]</td>
</tr>
<tr>
<td>ū</td>
<td>stressed [ฤ]</td>
</tr>
<tr>
<td>俸</td>
<td>front rounded semivowel</td>
</tr>
<tr>
<td>ǔ</td>
<td>high front rounded vowel</td>
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<tr>
<td>ǔ</td>
<td>stressed [ฤ]</td>
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<tr>
<td>ʉ</td>
<td>high central unrounded vowel</td>
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<tr>
<td>ʉ</td>
<td>secondary stressed [ʉ]</td>
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<tr>
<td>ʉ</td>
<td>secondary stressed [ฤ]</td>
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<tr>
<td>Ǆ</td>
<td>close [ฤ]</td>
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<tr>
<td>Ǆ</td>
<td>stressed close [ฤ]</td>
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<tr>
<td>ø</td>
<td>lower-mid front rounded vowel</td>
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<td>ø</td>
<td>stressed [ø]</td>
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<tr>
<td>ø</td>
<td>close [ø]</td>
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<tr>
<td>ɿ</td>
<td>stressed [ɿ]</td>
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<td>ɶ</td>
<td>open [ø]</td>
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<td>secondary stressed [ɿ]</td>
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<td>ǭ</td>
<td>mid front rounded vowel</td>
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<td>ǭ</td>
<td>high-mid front rounded vowel</td>
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<td>ǭ</td>
<td>stressed high-mid front rounded vowel</td>
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<tr>
<td>ǭ</td>
<td>open [ǭ]</td>
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<td>close [ǭ]</td>
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<tr>
<td>ǭ</td>
<td>stressed [ǭ]</td>
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<td>stressed [ǭ]</td>
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<td>Symbol</td>
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<tr>
<td>ã</td>
<td>High-mid front rounded vowel</td>
</tr>
<tr>
<td>ñ</td>
<td>Stressed [ã]</td>
</tr>
<tr>
<td>ñ̂</td>
<td>Open [ã]</td>
</tr>
<tr>
<td>ñ̃</td>
<td>Stressed [ñ̂]</td>
</tr>
<tr>
<td>ñ̄</td>
<td>Stressed [ñ]</td>
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<td>ì</td>
<td>Mid back rounded vowel</td>
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<tr>
<td>ì̄</td>
<td>Stressed [ì]</td>
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<tr>
<td>ì̃</td>
<td>Open [ì], lower than [ø], higher than [ã]</td>
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<tr>
<td>ì̃̈</td>
<td>Stressed [ì̃]</td>
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<tr>
<td>0</td>
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<td>ò̄</td>
<td>Stressed [ò]</td>
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<tr>
<td>û</td>
<td>Labio-dental semi-vowel</td>
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<tr>
<td>û̃̈</td>
<td>Semi-vowel [û] associated with length</td>
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<tr>
<td>r̂</td>
<td>Semi-vowel / Alveolar fricative [r]</td>
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<tr>
<td>r̃</td>
<td>Dental / Alveolar tap</td>
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<tr>
<td>ſ̂</td>
<td>Retroflex-fricative</td>
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<tr>
<td>ſ̃̈</td>
<td>Vi. retroflex-fricative</td>
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<td>ſ̃</td>
<td>Retroflex fricative associated with length</td>
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<tr>
<td>ʃ̂</td>
<td>Labialized retroflex fricative associated with length</td>
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<tr>
<td>û̂</td>
<td>High front rounded vowel associated with length</td>
</tr>
<tr>
<td>û̃̈</td>
<td>Low front rounded vowel associated with length</td>
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<td>High back rounded vowel associated with length</td>
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<td>ū̂</td>
<td>Rounded palatal semi-vowel associated with length</td>
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<td>ū̃̈</td>
<td>Front unrounded pal. semi-vowel assoc. with length</td>
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<td>ū̃̃</td>
<td>Rounded bilabial semi-vowel associated with length</td>
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<td>Glottal associated with length</td>
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<tr>
<td><code>V</code></td>
<td>secondary stressed V</td>
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<tr>
<td><code>v</code></td>
<td>centralised V, except [ü], [ö]</td>
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<td><code>y</code></td>
<td>close V</td>
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<tr>
<td><code>γ</code></td>
<td>open V</td>
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<td><code>ʒ</code></td>
<td>rounded C</td>
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<td>palatal Consonant</td>
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<tr>
<td><code>ç</code></td>
<td>glottalized C</td>
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<tr>
<td><code>ɕ</code></td>
<td>voiceless / devoiced C</td>
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<tr>
<td><code>s</code></td>
<td>voiced C</td>
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<td><code>ς</code></td>
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<tr>
<td><code>h</code></td>
<td>aspirated C</td>
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<td><code>h</code></td>
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<tr>
<td><code>ç′</code></td>
<td>fricativized C (usually used for stops to indicate a wide contact stop with simultaneous channel friction)</td>
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<tr>
<td><code>ç</code></td>
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<td><code>ch</code></td>
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<td><code>c</code></td>
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<td><code>ç</code></td>
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<tr>
<td><code>ỹ</code></td>
<td>non-syllabic V</td>
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<td><code>ɟ</code></td>
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<td>Adult-form</td>
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<td>falling tone  V</td>
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<td>̂b</td>
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<td>̂b</td>
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<td>̂b</td>
<td>bilabial fricative</td>
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<td>vd. alveolar/dental plosive</td>
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<td>implosive alveolar stop</td>
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<td>̂δ</td>
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<td>implosive velar stop</td>
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<td>̂t</td>
<td>vl. alveolar/dental plosive</td>
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<td>̂η</td>
<td>vd. alveopalatal nasal</td>
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