THE UNIVERSITY OF ALBERTA

LINGUISTIC SEGMENTATION PATTERNS OF YOUNG CHILDREN

By

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ABSTRACT

The purpose of this exploratory study was to investigate the nature and extent of children's categorizations of words, syllables and phonemes and to explore the degree of their familiarity with the terms "word" and speech "sound" prior to the formal introduction of reading in Grade One.

The test sample, selected by stratified random sampling procedures, comprised thirty children enrolled in three Edmonton Public School Board kindergartens.

Each child's facility in dealing with the terms and units under consideration was investigated by means of the Segmentation Test designed for the study.

Data treatment consisted of computation and classification of results according to nature and extent of definitions and segmentations.

The findings obtained from the data indicate that test children's explicit perception of words, syllables and phonemes and of the terms "word" and speech "sound" often differed substantially from adult norms but that the identification of certain types of terms and units and the segmentation carried out in conjunction with concrete aids were usually more satisfactory than others. Since a child's perception of the terms and units probably reflects his ability to deal with them, an instrument such as the Segmentation Test may provide information regarding each child's readiness to identify such terms and units and may thus influence the selection of teaching and learning strategies for establishing relationships between the code of oral language and the written code of language presented in Grade One.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE PROBLEM

Many young readers lack the sophisticated modes of perceiving words, syllables and phonemes required in certain approaches to early reading instruction. If children could deal with words, syllables and phonemes as familiar linguistic categories, then such categories could be used as essential tools for imposing order and system upon the processes of learning to decode the printed page. But many beginning readers perceive such linguistic units at a very primitive level (Reid, 1966; Downing, 1970), and whenever such units are included in existing reading programs without prior investigation of children's readiness to perceive them, they are unlikely to increase the efficacy of reading instruction. They may even complicate the learning process by adding another dimension to the chaos of unsorted visual and auditory stimuli which the child has not yet brought into focus.

A child's competence in perceiving words, syllables and phonemes is in large measure a function of his developmental stage and experiential background (Vygostky, 1962). If, as a result of the combined effects of such factors, his perception of the reading task differs significantly from the anticipated level, dissonance may result, and this dissonance may underlie some of the difficulties encountered in the teaching and learning of reading. However, little information is presently available which describes the nature and extent of the beginning reader's understanding of words, syllables and phonemes. This is a fundamental problem, requiring investigation.

I. PURPOSE OF THE STUDY

The primary purpose of this exploratory study was to investigate the nature and extent of the ability of kindergarten children to categorize words, syllables and phonemes in the familiar linguistic code of oral language and to identify the terms "word" and speech "sound" prior to the formal introduction of the visual code of language in Grade One. The more specific purposes were:

(1) To describe the abilities of kindergarten children to segment speech utterances into words, syllables and phonemes.

(2) To determine any regularities or patterns which may exist in such segmentations.

(3) To ascertain children's perception of the meaning of the terms "word" and speech "sound".

While the main purpose of the study was to determine children's word, syllable and phoneme categorizations and their knowledge of terminology, a secondary objective increased in importance and interest as the work progressed. Studies of children's readiness for reading do not appear to have dealt extensively and systematically with children's ability to explicitly perceive words, syllables and phonemes. Consequently a major goal of the present investigation was to devise an approach to studying this problem and to assess the feasibility of this approach.

II. DEFINITION OF TERMS

For purposes of this investigation the following definitions were employed:

Segmentation: the identification of words, syllables or phonemes within speech utterances, carried out in accordance with the definitions employed in this study.

Word: a speech utterance which consists of a base form, and which may or may not be accompanied by one or more affixes. Such a speech utterance symbolizes a particular meaning and may not be subdivided without losing this meaning.

Syllable: a part of a word which retains all the basic pronunciation properties of that part of the word and which cannot be further subdivided without losing them. It may consist of only one vowel alone, or of a syllabic consonant alone, and may or may not be preceded or followed by one or more consonant sounds.

Phoneme: the smallest segment of speech that distinguishes one utterance from another.

Allophone: an accoustic and articulatory variant of the same phoneme. For example, the aspirated /t/ of tab and the unaspirated /t/ of stab are allophones of the phoneme /t/.

Second-Formant Transition: one of several accoustic elements of most consonants which is considered to provide the most important cue regarding the nature of consonants.

Non-segmenter (NS): a child who is unable to carry out any linguistic segmentations.

Partial Segmenter (PS): a child who can extract one or more of the required segments from an utterance.

Complete Segmenter (CS): a child who can segment all utterances into words, syllables or phonemes as these are defined in this study.

Low Ability: the intellectual potential of a child whose full scale intelligence quotient scores tested below 100 as measured by the California Short Form Test of Mental Maturity, Level 0.

Average Ability: the intellectual potential of a child whose full scale intelligence quotient scores tested between 100 and 119 as measured by the California Short Form Test of Mental Maturity, Level 0.

High Ability: the intellectual potential of a child whose full scale intelligence quotient scores tested above 119, as measured by the California Short Form Test of Mental Maturity, Level 0.

Low socio-economic status (L): lower social and economic position relative to others in the community as determined by school officials.

Middle-low socio-economic status (ML): intermediate social and economic position relative to others in the community as determined by school officials.

High-middle socio-economic status (HM): upper social and economic position relative to others in the community as determined by school officials.

III. RESEARCH QUESTIONS

The study, concerned primarily with an investigation of how children perceive words, syllables and phonemes and how they understand the meaning of the terms "word" and speech "sound", was guided by three research questions:

(1) To what extent are pre-Grade One children able to segment speech utterances into words, syllables and phonemes?

(2) What regularities or patterns occur within such segmentations?

(3) What meaning do pre-Grade One children assign to the terms "word" and speech "sound"?

In order to investigate these research questions it was necessary to select some means of externalizing children's perceptions of the linguistic terms and units for purposes of assessment. An investigative instrument, the Segmentation Test, was accordingly devised to meet this requirement. This raised the problem of whether the test accomplished the desired task in a serviceable way. Thus an evaluation of the test--although not explicitly stated as a research question--became part of the concern of this study.

IV. OVERVIEW OF THE STUDY

The subjects, fifteen girls and fifteen boys, were selected from three kindergartens situated, according to local school officials, in three diverse socio-economic areas of the city of Edmonton. An attempt was made to include representatives of various ability levels

for each of the sexes, and in each of the socio-economic areas.

Two instruments, the California Short Form Test of Mental Maturity, Level 0, and the Segmentation Test were employed in the investigation. The California Short Form Test of Mental Maturity served as a means of assessing children's intellectual potential. The Segmentation Test was used as a device for examining their explicit perception of words, syllables and phonemes, and their knowledge of the meaning of the terms "word" and speech "sound".

A pilot study was conducted in order to refine the items and procedures of the Segmentation Test.

All data were transcribed in writing and recorded on tape. Later the data were calculated, classified, tabulated and analyzed by the investigator.

V. LIMITATIONS

The findings of the study are subject to the following limitations:

(1) The kindergarten population is not a cross-section of the preschoolers in the city of Edmonton.

(2) The small size of the sample limits the degree of generalizability of the findings.

(3) The number of exemplars of linguistic units investigated in the study is not sufficient to yield definitive conclusions about children's perception of words, syllables and phonemes, so that the findings should be

interpreted as characterizing only some aspects of this perception.

(4) No evaluation was made of other factors, such as motivation and emotional adjustment, which might affect children's perception of speech at the explicit level.

VI. ASSUMPTIONS

It is assumed that an accurate perception of words, syllables and phonemes and the understanding of terminology on the part of primary students is a prerequisite for certain approaches to beginning reading.

VII. SIGNIFICANCE

Reading is "...a specialized and complex skill involving a number of more general skills..." (Smith, 1971, p. 1). It requires many prerequisites, including the knowledges and skills essential for ascertaining the basic structural units of English (Strang, McCullough & Traxler, 1967). Since the most basic structural units of English are words, syllables and phonemes, the knowledges and skills necessary for their identification may constitute the most fundamental prerequisites for beginning reading.

As the beginning reader's explicit perception of words, syllables and phonemes may reflect his ability to deal with them, his perception of the units should be investigated prior to their inclusion in programs for beginning readers. Yet little information is currently

available regarding such perception, even though numerous teachers of reading have stressed the need to establish screening programs at the end of kindergarten in order to identify pupils not yet ready for certain kinds of programs for learning reading. Putnam (1971) sums up contemporary concern regarding this issue by stating that it is,

> ...a false assumption that all children can and will learn to read by the same method and approach. We give lip service to individual differences, yet schools adopt a basal reader or reading system and process all children through it in the same way... It would be ideal if we could determine by pretesting which methods and approaches would be most successful with each child...(p. 9).

This study represents an attempt to draw some tentative conclusions regarding children's explicit perception of words, syllables and phonemes and their knowledge of the terms "word" and speech "sound". It also explores the possibility of eliciting this information by means of the Segmentation Test. It is hoped that the determination of beginning readers' perception of the linguistic segments commonly employed in certain reading programs may enable educators to obtain a child's perspective of this facet of language, and thus may influence future content and methodology of reading instruction.

SUMMARY OF THE CHAPTER

This chapter dealt with an explanation of the problem, a description of the purpose, a brief outline of the procedures, a discussion of the operational definitions, the limitations and assumptions and a statement of the significance of the study.

CHAPTER II

BACKGROUND TO THE STUDY

Words, syllables and phonemes are not novel for primary school children, who, having learned the implicit systematic structure of their native tongue in the course of language acquisition, use them freely even before kindergarten (Brown & Fraser, 1963). What is new and frequently required in many phases of early reading instruction, is the ability to view such linguistic units in their explicit form. However, theoretical and experimental data concerning children's word, syllable and phoneme perception, discussed in this chapter, suggest that this may be an unrealistic expectation.

The discussion is divided into five sections. The first four deal with the factors which may obscure the presence of the segments for beginning readers. The fifth contains a summary of some research already conducted on this topic.

I. WORD PERCEPTION

Although the preschool child indicates by speaking correctly that he is aware of words at the implicit level, he may nevertheless experience problems when required to consciously separate the words within an utterance (Stone & Church, 1968). There may be several factors contributing to this problem.

One such factor may be the residual effect of the perceptual attributes of early childhood. The data on the linguistic development of children indicate that during the early stages of language learning

children respond to speech syncretically (Vygotsky, 1962; Berry, 1969). At such stages, speech utterances form part of a vast array of largely undifferentiated and interwoven components of experience. Like its other components such as objects, people, events and feelings they are distinguishable only in a most rudimentary fashion. This may produce two principal consequences. One is that speech utterances cannot be readily segmented into words, because not words but the sound contours and intonational patterns of entire sentences are the carriers of meaning at this level (Piaget, 1959). Whether dealing with the holophrastic one-word sentences of the infant or with the multiple-word utterances of the preschooler, the child tends to perceive them both as if they were inseparable units (McNeill, 1966). Thus children tend to be unaware of the individual meaning of words and are oblivious to their existence as independent entities. The other consequence is that at this stage of primitive perceptual development verbal material is tightly interwoven with the situational and affective elements of the child's experiential array (Piaget, 1959; Vygotsky, 1962). From this mixed experiential array and on the basis of the features which the child himself considers as their significant characteristics, he constructs his own primitive perceptual schemata (Bruner, 1967; Lewis, 1965). This results in syncretic associations of "heaps of objects assembled under one word meaning..." in which "...the child tends to merge the most diverse elements into one unarticulated image on the strength of some chance impression." (Vygotsky, 1962, p. 60). Because of their syncretic origin such percepts are unstable and subject to continual modification. As a result of the combined effects of his efforts to adapt his own

perceptual schema to the existing conventional schemata, and his increasing ability to adopt the culturally determined relevant features of the adult schemata, the child will gradually refine and differentiate his perceptions. Words, therefore will become progressively more distinguishable as separate units, but this process of categorization may not be complete when the child commences reading in Grade One.

Since certain words may be more easily extracted from the amorphous context of early perceptions, the process of establishing "word" as a perceptual category will not proceed at the same pace for different word classes. According to the conception of Vygotsky (1962) the child's syncretic phase of thinking is not immediately replaced by the conceptual phase. Between the syncretic and the conceptual levels lies the level of thinking in complexes which predominates in the thinking of preschool children. At this level the child's analysis of experience is frequently made merely on the basis of "factually present", "pseudo-conceptual" characteristics rather than on the basis of the conventional attributes characteristic of concepts. In experiment this happens whenever a child "...surrounds a sample with objects that could just as well have been assembled on the basis of an abstract concept." (p. 66). For instance, a child who chooses all the triangles when given a yellow sample may appear to do so because he has the general idea of a triangle. But in fact he

> ...is guided by the concrete, visible likeness and has formed only an associative complex limited to a certain kind of perceptual bond. Although the results are identical, the process by which they are reached is not at all the same as in conceptual thinking. (p.66)

The child is alerted to categorizations by the words which are suggested

to him by adults and may acquire a particular word around which he may form a complex. But he cannot at once imitate the thinking process which would enable him to grasp the concept symbolized by it. As a result, the child may not only misinterpret the semantic components of a word, but also misidentify its syntactic function.

Words whose referents represent less easily acquired conceptual or syntactic categories, such as conjunctions, are learned less rapidly and perceived less readily than others (Robertson, 1968; Slobin, 1966). Although the child may appear to use, and to respond to, such words quite accurately in many common situations, he may not fully realize the general concepts which these words embody. He may merely include them in his speaking schema and may encounter problems in dissociating them from their environmental and/or linguistic matrix (Shishkin in Slobin, 1966). In fact, there is considerable evidence that children, up to the age of ten, do not understand all words and interpret statements by relating them to their general speech schemata (Berry, 1969). Therefore, children at the time of entry to Grade One may be able to identify some words as words, but may fail to recognize others.

Finally, since phonological rules operate across word boundaries, the separation between words in speech is frequently unclear. In the words of Alston (1964), "We are so accustomed to the rather rudimentary analysis of our speech, which is involved in our writing system, that we are likely to think of it as an immediately obvious feature of the nature of things." (p. 60) Although the spaces left between words in traditional orthography might seem to represent clearly identifiable correlates in spoken language, they are in reality based upon semantic, syntactic and conventional units, and only

in part upon identifiable pronunciation units (Lefevre, 1964; Hockett, 1958). As the pre-literate child has to depend upon pronunciation units as a means of analyzing speech into word segments, his idea of word boundaries in many cases may not coincide with the boundaries set by the orthographic conventions. It is possible that children's perception of the category "word" may differ from the adult standard. And this "...may be a factor in beginning reading difficulties, since the division of words on a page may not correspond to the sound groupings the child hears and uses." (Stone & Church, 1968, p. 406).

Summary

Although manifest proficiency in spoken language suggests that functional mastery of words has been attained, the child's explicit identification of words as a category may not coincide with expectations.

The level of the child's psycholinguistic development and the extent of his experiential background may limit his ability to identify words as separate segments. Thus such factors as verbal syncretism, tendency to think in complexes, differential accessibility of words, and the operation of phonologic rules across word boundaries may complicate explicit word identifications for beginning readers. In turn, inaccurate perception of words may contribute to difficulties in beginning reading.

II. PHONEME PERCEPTION

The young child only gradually realizes the systematic nature of the phonology of English. His early words, transformed in phonemic shape by assimilation to his rudimentary phonemic schemata, may bear only an approximate resemblance to adult models (Lewis, 1965; Winiz, 1969

Progress toward mastery of the phonemes of English is achieved slowly by continued modification and refinement of the child's phonemic schemata in constant attempts at adaptation to adult phonemic patterns. This process of phoneme acquisition, or more accurately of the assimilation of groups of distinctive features which comprise such phonemes, may require from five to seven years (Jacobson & Halle, 1956; Fry, 1966).

The phonemes which the child learns rarely occur separately in his own speech. As a number of linguistic studies have indicated, phonemes may lack perceptual or articulatory correlates and may exist only as abstract psychologic entities (Savin & Bever, 1970). Usually the child can perceive them only within the orbit of the syllable in which they appear and by which they are influenced. For example, if a recorded syllable, such as /d/, is progressively cut from the right in an attempt to produce /d/ alone, no discrete phoneme /d/ will emerge. The diminishing syllable will be perceived as /d/ together with either a vowel or with a non-speech sound. This is so because the second-formant transition, considered by some linguists to be the most important accoustic cue for the perception of almost all consonants, carries important information both about the consonant and the vowel, which are transmitted and perceived in parallel within a syllable (Liberman and others, 1967). Before he can formulate explicit phoneme paradigms, the child must perform a number of complex operations.

For instance he must divest phonemes of the variable characteristics arising out of their position within a word or syllable,

since not the phoneme, but its various allophones appear in different word environments. He must also dissociate phonemes from co-articulation effects with other phonemes which modify them. It is difficult for an adult to recapture the prephonemic level of language competence and thus to understand that a child may need to circumvent some serious obstacles in order to assign the positionally or co-articulatorily determined allophones to the same class of phonemes. For the child the identification of an allophone as a particular phoneme may be complex, since (a) certain consonants which occur in voiced form in initial word positions (/l/, /r/, /m/, /r/), become devoiced after voiceless consonants (the /w/ in way changes to a devoiced form in sway), (b) consonants in word initial positions are of greater duration than in other positions (the /m/ in mat is longer than the /m/ in tam), (c) consonants in final positions are longer than medial consonants (the /t/ in meet is longer than the /t/ in meets), (d) the pronunciation of initial voiceless consonant stops (/p/, /t/, /k/) is accompanied by aspiration, which is considerably reduced whenever the stop is preceded by /s/ (peach versus speech) and (e) vowels and diphthongs are longer in final positions than in other locations (the /u/ is longer in shoe than in should) (Stageberg, 1971). In fact so much difference is possible among the allophones of a single phoneme, that one hypothesis regarding the nature of phonemes states that the basic unit of speech production, and probably of speech perception, may be a "context-sensitive" allophone instead of a context-free phoneme (Wickelgren, 1969). Clearly both positional and co-articulation variability of phonemes would tend to

complicate the task of establishing explicit phoneme identities by beginning readers.

The child must also weigh the unequal amounts of information in different parts of the syllable. In the opinion of Fry (1966), the "...information loading of vowels is lower than that of consonants and there is less pressure on the child to learn to make vowel distinctions." (p. 195). This observation would likely also apply to vowel perception, rendering the identification of vowels more difficult than that of consonants.

The preceding factors, together with children's limited need to deal with separate phonemes, may complicate the process of explicit phoneme identification, so that the child will have a tendency either not to perceive phonemes as separate elements of language or to equate parts of the syllable with its most potent component. As a result problems may occur in early reading, since the child may experience "...difficulty with the analysis of words in phonetic elements, and some number of children read at first simply by memorizing the words that go with certain letter combinations." (Stone & Church, 1968, pp. 406-407).

Summary

The child only gradually becomes aware of the existence of phonemes currently believed to occur as abstract psychologic entities rather than as articulatory or accoustic phenomena. Problems in phoneme identification may stem from a number of sources. They may include the special characteristics of allophones, uneven loading of information in consonants and vowels and limited opportunity to make explicit phoneme identifications in normal conversation.

Such factors may impede the identification of phonemic segments required in certain approaches to beginning reading and may thus contribute to reading disabilities.

III. SYLLABLE PERCEPTION

During the very early process of speech acquisition the child also learns patterns of syllabication which, according to some biolinguists (Meander, Muyskens & Weller, 1962), occur as a result of correlating breathing with the work of articulatory organs within the framework of the speech sounds of a particular language. In the opinion of Jakobson & Halle (1958), syllables, constructed by joining 'simultaneous bundles" of distinctive features into sequences, form the basic units of pronunciation.

However, since a number of educators suggest that the syllabication pattern used in early reading instruction may have "...almost nothing to do with the actual sound patterns of English..." (Wardhaugh, 1969, p. 9), the beginning reader may often face the bewildering task of relating his own syllabication pattern to the pattern used in early reading.

Summary

Although the syllabication system of English is firmly established at the time the child begins to learn reading in Grade One, the pattern of syllabication used in early reading may differ significantly from the pattern the child uses naturally. If the child's perception of syllables differs considerably from the anticipated norm, he may be handicapped in his attempts to learn reading.

IV. COGNITIVE DEVELOPMENT

In order to identify the required linguistic units and to designate them with appropriate terms, children must be cognitively ready to perform the required classifications. According to Piaget (1966) children at the level of intuitive development (ages 4 - 7) are hindered in their attempts at classifying experience by inefficient methods of focusing upon its components. The child

> ...finds no difficulty in concentrating his attention on the whole B, or on the parts A and A^1, if they have been isolated in thought, but the difficulty is that by centering on A he destroys the whole, B, so that the part A can no longer be compared with the other part A^1 (p. 133).

By contrast, children functioning at the "concrete operations" stage of intellectual development display higher order skills in establishing categories. But at this higher stage they

> ...are usually incapable of them when they cease to manipulate objects and are invited to reason with simple verbal propositions...Thus class-inclusion is understood in the concrete problem of the beads...from the age of 7 - 8 years, while a verbal test of identical structure is not solved until much later...(p. 146).

The strengths and shortcomings of children's cognitive functioning characteristic of the various stages of intellectual development may be reflected in their approaches to the classification of linguistic units frequently used in early reading instruction. Children continuing to reason intuitively at the time of school entry will probably experience great difficulty in consciously identifying different elements of speech as separate linguistic units. Children who have reached the stage of concrete operations may need to resort to concrete mediation in order to perform such tasks. But children who are approaching the upper limits of concrete operations may be able to solve such problems in verbal terms.

Reading disabilities may result if the existence of such cognitive levels is not taken into consideration when words, syllables and phonemes are introduced in beginning reading. However, acquaintance with the requisite terms in anticipation of children's ability to perceive the linguistic segments which they symbolize is probably desirable. Children who are not yet ready to explicitly perceive such segments may be guided by adult terms in forming complexes, and such complexes may eventually lead to the establishment of the thinking strategies necessary for identifying the concepts.

Summary

Piaget's research has demonstrated that there exist a number of hierarchical intellectual levels through which children pass at different stages of their cognitive development. The level of a child's intellectual functioning may affect the extent to which he will recognize words, syllables and phonemes, and thus name the. A modification of the teaching approach, in keeping with each child's cognitive level, may assure successful initiation into reading, and may help to forestall future reading failures.

V. EXPERIMENTAL BACKGROUND

Current research dealing with beginning reading programs has not yet concerned itself extensively with children's perception of words, syllables and phonemes. Since such factors may be of specific relevance to beginning reading (Downing & Thackray, 1971), they should be systematically explored, together with the more commonly investigated other variables, such as intelligence, mental age, etc. (Chall, 1967).

The limited usefulness of phonics generalizations (Affleck, 1967) and the questionable utility of dictionary syllabication (Affleck, 1971; Groff, 1971) may in fact suggest that theories of teaching reading not based upon an accurate understanding of children's perception of the elements of language are not adequate for the task.

A number of recent studies have concentrated upon investigating children's knowledge of certain linguistic concepts, such as "word", "letter", "sound", etc. Among other topics, Reid (1966) explored the extent of children's ability to conceptualize such units by investigating their knowledge of the "technical vocabulary" required for talking and thinking about reading. One of her main findings indicated that her twelve Scottish five-year olds initially lacked the linguistic terminology to deal with the new experiences in beginning reading, calling letters "number" and words "names". However, they were able to acquire such terms as the year progressed.

Downing (1969) replicated and extended Reid's study using thirteen English five-year olds as subjects. Downing's subjects, besides being interviewed, were required to listen to an assorted randomized presentation of certain stimuli consisting of,

(a) a non-human noise (for example, bell ringing)

(b) a human utterance of a single vowel phoneme

(c) a human utterance of a single word

(d) a human utterance of a phrase

(e) a human utterance of a sentence

They were then asked to classify each auditory array by saying "yes" if in their estimation it represented a word or a sound, or "no" if it did

not. Like Reid, Downing concluded that beginning readers are uncertain about the abstract terms used in early reading instruction. None of Downing's subjects thought of a "word" as a segment of human speech usually defined as such by adults, and not a single child considered "sound" as referring to phonemes exclusively. However, Downing's subjects, like Reid's subjects, appeared to gradually acquire such terms during the course of their first year in school.

Reid's and Downing's studies represent an important step in our efforts to determine the special linguistic knowledges and skills required of beginning readers. However, as has been indicated in the preceding theoretical delineation of the study, the availability of a particular term need not indicate the presence of the concept which it symbolizes. Each term has two aspects: a sound form and a meaning. While a child may be cognizant of the sound form of a term, he may not understand its meaning. Conversely, he may be consciously aware of the existence of a particular auditory sequence as a specific category, but may lack the appropropriate term to describe it. Thus the inability to attach a particular label to a linguistic unit may not necessarily indicate the absence of the concept represented by it; and the learning of a word does not automatically result in the assimilation of the concept which it symbolizes. In studying children's perceptions of terms commonly used in early reading it is important to differentiate between their sound form and their meaning. Only then will it be possible to ascertain whether the degree of initial familiarity with the terms or of its subsequent acquisition, represents a valid measure of children's competence in understanding the meaning which the words embody.

Summary

Research results have indicated that the terms "word" and speech "sound" tend not to be accurately interpreted by some beginning readers. However, since the differentiation between a term and the item symbolized by it has not always been clearly delineated by the investigators, it is not possible to deduce whether the results of such studies indicate restricted perception of the concepts represented by the terms, or of inadequate experience with the terms themselves.

SUMMARY OF THE CHAPTER

The ease with which the preschooler can express himself in his native tongue demonstrates considerable practical mastery of words, syllables and phonemes. Nevertheless, at the time of entry to Grade One the child may not yet be capable of consciously extracting such linguistic segments from the speech stream, and may be unfamiliar with the terms "word" and speech "sound" frequently encountered in certain reading programs. Such shortcomings may interfere with the acquisition of the skills necessary for beginning reading.

The child may be impeded in adequately responding to such identification and naming tasks by a number of inter-related factors. First, his word identifications may be restricted because he may (a) view speech syncretically, (b) think in complexes, (c) exclude certain difficult words from conscious analysis, and(d) be influenced by the existence of inter-word phonologic rules. Second, he may be unaware of phonemes because of (a) the occurrence of allophones rather than phonemes in different word environments and in different phonemic

neighborhoods, (b) the greater strength of information contained in consonants than in vowels of a syllable, and (c) the rarity of independent occurrences of phonemes during normal conversation. Third, the child may be able to recognize syllabic junctures, but may be confused by the syllabication instruction used in early reading, since the rules presented may not coincide with the child's expectations. Fourth, due to the particular level of his cognitive development, the child may experience difficulties in classifying words, syllables and phonemes, or may require concrete aids in order to perform the task. Finally, as has been suggested by some researchers, he may be unable to use the required terms "word" and speech "sound' appropriately, or may be completely unfamiliar with the terms.

If as a result of such factors the child cannot respond to certain approaches to beginning reading, he may fail to gain the basic skills necessary for developing reading efficiency. It is therefore essential that his ability to explicitly perceive words, syllables and phonemes, and his understanding of the terms "word" and speech "sound" be investigated prior to the introduction of reading instruction in Grade One.

CHAPTER III

DESIGN OF THE STUDY

The preceding chapter dealt with investigative and theoretical considerations regarding beginning readers' perception of three linguistic units and two terms frequently used in early reading instruction. The general conclusion was that while presently available evidence indicates that young readers manage such linguistic units with great proficiency at the implicit level, information regarding their ability to examine them explicitly is still quite scanty, and research findings about children's familiarity with the terms are still inconclusive. This chapter contains a description of the procedures employed in an attempt to add to the existing knowlege, using an investigator-designed instrument, the Segmentation Test.

An exposition of this test occupies a major portion of the chapter. It is preceded by a description of sample selection and is followed by accounts of the pilot study and data treatment.

I. SELECTION OF THE SAMPLE

The total population from which the test sample was drawn consisted of all the pre-Grade One children attending public school kindergartens in the city of Edmonton, Alberta, during the month of May, 1972. Four kindergartens designated by school officials as serving the low, middle-low and high-middle socio-economic areas were made available for the study. Because two high middle socio-economic kindergartens were included in this set, the first was reserved for the pilot

study while the other, together with the two remaining kindergartens, provided the 120-pupil test population from which the sample was drawn.

Since a randomly selected sample may contain an undue proportion of children with one type of characteristic, stratified random sampling was used to insure that in addition to representatives from several socio-economic areas, the two sexes and different levels of intellectual ability would have a chance of being represented. Each kindergarten teacher's estimate of her pupils' intellectual functioning, later confirmed by means of the California Short Form Test of Mental Maturity, Level 0, served as a basis for dividing children's names among three ability groups--low, average and high--with a boy and girl subgroup in each. From the resulting six subgroups each alternate name was selected for the sample. Constituted in this way, the sample would have comprised fifteen boys and fifteen girls, with ten children drawn from each socio-economic district, and five boys and five girls representing each of the designated intellectual levels.

But the composition of the sample was later altered because four children were judged to be unsuitable due to excessive anxiety following playground accidents, illness preceding the main test, or insufficient experience with the English language. They were replaced by other children from the test population in order to retain the same number of pupils with a similar proportion of characteristics. However, the narrow range of children's ability levels in the kindergartens serving different socio-economic areas necessitated a slight redistribution of some sample attributes. The final distribution of sample characteristics is summarized in Table I.

Table I

DISTRIBUTION OF SAMPLE BY SES, ABILITY AND SEX

SES	Ability								TOTAL SAMPLE
	Boys				Girls				
	H	A	L	Total	H	A	L	Total	
HM	3	0	0	3	2	1	1	4	7
ML	1	2	0	3	1	3	2	6	9
L	1	3	5	9	2	1	2	5	14
TOTAL SAMPLE	5	5	5	15	5	5	5	15	30

Abbreviations
SES = socio-economic status
HM = high-middle SES
ML = middle-low SES
L = low SES

Chronological Age

The chronological ages of the subjects in the sample were taken from school records. The mean chronological age of the boys was 69.60 months, and of the girls 66.66 months.

Intellectual Ability

Full scale intelligence scores on the California Short Form Test of Mental Maturity, Level 0, served as a basis for confirming teachers' estimates of children's ability levels. The intelligence quotient scores of the boys ranged between 58 and 131 and of the girls between 88 and 142.

The California Short Form Test of Mental Maturity, Level 0, provides untimed assessment of verbal, numerical and full scale intelligence scores and/or mental age scores in selected cognitive skills. The pictorial multi-option itmes are to be marked in consumable test booklets by placing an "x" across the selected responses. Orally presented instructions and a scored first item demonstration familiarize the children with test item types and procedures. About 50 minutes are required to administer the test.

This standardized instrument, used successfully by a number of investigators to measure the intelligence of kindergarten children (Moffatt, 1970), was selected partly because it has been favorably reviewed by Stanley in Buros (1965) as an appropriate instrument for testing preschoolers, and partly because of its suitability for group administration and ease of marking. A copy of the test may be found in Appendix A.

II. SEGMENTATION TEST

This part of the chapter is given over to a description of the development of the Segmentation Test. The test is considered under four headings: Introduction, Construction, Format, Administration and Recording and Scoring.

Introduction

The Segmentation Test was designed by the investigator for use with kindergarten children. Its two objectives were to furnish individual evaluation of word, syllable and phoneme perception at the explicit level

and to indicate the availability of the terms "word" and speech "sound". Orally presented instructions, coupled with demonstrations and one or more unscored trial items, acquaint the children with item types and segmentation procedures. Provision is made for additional task and procedure clarification through the implementation of concrete aids.

Children's answers to this four-part test are recorded on test sheets, either by diagonals drawn through numbered places of segmentation, or by transcription of responses.

The test is untimed. However, it usually required between 10 to 20 minutes for administration.

A detailed description of test construction, administration and recording and scoring is presented in the following pages. Complete directions for administration, recording and scoring, together with a copy of the test, may be found in Appendix B.

Construction

For purposes of gaining information appropriate to the objectives of this inquiry it was assumed that speech utterances can be segmented into a number of more or less discrete units. From among such units and because of their special relevance to beginning reading, words, syllables and phonemes and the terms "word" and speech "sound" which designate two of the units, were selected for investigation.

Examples of the linguistic units were chosen from speech utterances whose familiarity to preschoolers might reduce the extent of cognitive strain involved in remembering or thinking about the test items. They were selected from two sources considered by a number of educators as constituting some of the linguistic units with which kinder-

garten children are usually acquainted: Johnson's (1971) vocabulary and Stageberg's (1965) sentence patterns. The following section contains a discussion of the vocabulary list and the sentence patterns, together with descriptions of how they were incorporated into the Segmentation Test.

Johnson's (1971) 306-word vocabulary represents a fusion of the selected results of two investigations. 500 of the most frequently used words from a total of 1,014,323 words furnished by the computer-assisted study of American English by Kucera & Francis (1964) served as one source. A compilation of the words most frequently encountered both in the spontaneous and the more versatile, investigator-inspired conversation of kindergarten and Grade One children was taken from the study by Murphy and others (1957). Johnson's list is a combination of the results of both studies, obtained by abstracting from the list of 500 of the first study, the words which were used at least fifty times by the participants of the second study.

For purposes of this investigation, contractions and words designated as characteristic of Grade One children were deleted from the list. The remaining 272 words formed the basis for the construction of the first three parts of the Segmentation Test.

The initial draft of the test included each of the 272 words. Following the administration of the pilot study, the number of words in the final version of the test was reduced to 87, to which 2 proper names were added to facilitate sentence construction. The words were used in the exact form presented in the list. An attempt was made to select those words which represented the greatest variety of desired features.

The nine basic sentence patterns described and illustrated by

Stageberg (1965) are considered to be known by most pre-Grade One children; they were used as models for sentence construction (Templin, 1957). English speech utterances, according to Stageberg (1965), consist of words arranged in certain specific patterns within the nine basic, and numerous subsidiary patterns. Each of the basic sentence patterns is created by arranging words in such a way that they may carry the desired grammatic meaning. The investigator fitted Johnson's words into the "home-slots" of eight basic sentence patterns, omitting the ninth, since the linking verbs necessary for its construction were not included in Johnson's list. These eight sentence patterns formed the basis for the construction of Part I of the Segmentation Test.

Up to this point discussion centered on several premises and item sources which were involved in the construction of the Segmentation Test. In the following pages the construction of each separate part of the Segmentation Test will be discussed. (Certain parts of this discussion are expanded in the "Pilot Study" portion of this chapter.)

1. Construction of Part I--Sentence Segmentation. Initially this portion of the test was developed by composing three sentences for each of the eight basic sentence types described above, using words contained in the vocabulary list. But following piloting, sentences whose length appeared to exceed the short-term memory limits of many children were deleted and from the remaining sentences one, illustrating each sentence pattern type, was randomly selected. In each sentence a variety of tenses, inflectional categories, gender, persons and word classes was included. The sentence patterns, together with examples, are summarized in Appendix C.

2. Construction of Part II--Phoneme Analysis and Synthesis.

All of the words chosen for the study were to have been piloted in order to permit an evaluation of ease or difficulty of phonemes and phoneme environments and thus to facilitate the making of decisions regarding items which should be included in the final version of the test. But since only one pilot study child could make most of the required phonemic segmentations and the other children achieved none or very few, it was not possible to weigh the relative complexity of phonemes and phoneme environments. Nor was it practical, due to time limits, to assess children's responses to all the words contained in the vocabulary list during the course of the main study. A decision was therefore made to arbitrarily reduce the number of words on the phoneme test to twenty-five, but to attempt to vary the phoneme types and their locations within different words environments. This was accomplished in the following fashion. A chart was prepared along whose y-axis were entered phonemes according to articulatory paramenter specifications (stops, fricatives, etc.) and along the x-axis were written various word positions (initial, medial, etc.). Into the resulting slots were fitted the words from the vocabulary. Whenever possible, an attempt was made to include those words which would contain each phoneme type in each word position. The words, arranged according to the number of phonemic units and alphabetically, are shown in Appendix D.

3. Construction of Part III--Syllable Identification. After investigation in the pilot study the polysyllabic words of the vocabulary list were reduced in number by eliminating some of the words which were syllabicated consistently by all of the pilot study children. All of the

inconsistently syllabicated words were retained for the Segmentation Test and were balanced by some consistently syllabicated items.

4. Construction of Part IV--Interview. A questionnaire was designed to indicate children's familiarity with the terms "word" and speech "sound". Several questions deal with each term since it became apparent in piloting that in order to elicit the required information a number of questions were necessary which would contain the same ideas in different guises. Some of the questions are aimed at either defining, accompanying or functional characteristics of the terms, others at definition by example; and some contain examples but require classification. A few questions were included to determine whether children's responses might be influenced by educational factors.

Format

In its present form the test contains four sections. The first three are intended to provide assessment of children's word, phoneme and syllable perception, respectively, while the fourth deals primarily with terminology. The order of occurence of the test sections was based upon pilot study findings. Although syllables, which were most easily segmented, might have been placed first, the techniques employed in their segmentation tended to influence the word and phoneme identification sections of the test. Consequently, word identifications, which were intermediate in difficulty, appear first. Phonemes, which proved to be most difficult, come second, and syllables were placed third. The interview, in which children were alerted to the presence of two elements treated in the preceding portion of the test, was placed last. The format of each of the four sections is described below.

1. Part I. This part contains two sets of eight identical sentences arranged in order of increasing number of words, from two to six. Monosyllabic words in each sentence are followed by bracketed numbers. Bisyllabic words are accompanied by such numbers and a bracketed "s" as well. Both the dual sentence arrangement and the bracketed symbols are designed to facilitate marking.

2. Part II. Two subsections comprise this part of the test. The first, phoneme analysis, contains twenty-five words, listed in random order and followed by blank lines for recording the results. The second, phoneme synthesis, consists of ten phonemically segmented words, which are also accompanied by blank lines on which replies may be recorded.

3. Part III. This section contains twenty-two bisyllabic, and four, trisyllabic words. Single bracketed numerals, or contiguously arranged bracketed numerals, are located at possible syllabic junctures within each word.

4. Part IV. This part of the test consists of ten questions followed by blank lines on which replies may be recorded.

Administration

In its final version the Segmentation Test was administered to the thirty subjects employed in the investigation. The time of administration, varying between 10 and 20 minutes, depended upon the skill of the subjects. The materials required were test sheets, pen or pencil, box of concrete aids and tape-recorder.

Test administration is considered under each of the following headings: 1. Introduction, 2. Parts I, IIa, and III, 3. Part IIb .

and 4. Part IV.

1. Introduction. The test was begun with a discussion of the operation and usefulness of tape-recorders. It was hoped that such a discussion would stimulate children's interest in the test which was to follow, and would allay the apprehension of any children who might not be familiar with the machine. This introduction was generally enthusiastically received by the children. They eagerly related their direct of vicarious experience with tape-recorders, watched zealously to ascertain that the tape-recorder was in operation during the entire test and, at the conclusion of testing, demanded to hear a replay of their performance. The transition from the tape-recorder to the test was made with the words: "I know a game we can play with a tape-recorder..."

2. Parts I, IIa, and III. The same procedures were employed to begin each part of the test. After the transitional statement mentioned above, the investigator would say: (1) "First I am going to say something and you say it back to me." At this point the appropriate demonstration item for each of the three sections of the test was given by the investigator and was repeated by the child. If necessary, this was reiterated. Next, the administrator would say: (2) "I can say (the same demonstration item) in parts. Listen carefully!" (3) A new demonstration item was then given according to the procedure outlined in (1) above, and the child was invited to "say it in parts" as the investigator had demonstrated in the previous example (4).

If at this point the child was unable to carry out the required segmentations, the first demonstration item was re-segmented for him--this time in conjunction with concrete aids. In this case the

investigator would say: (5) "I can say (the same demonstration item used in (1)) in parts and put a chip* down for each part". The child was encouraged to imitate the procedure with the second demonstration item (5). If he appeared puzzled, a third demonstration item with concrete aids was presented (5).

As soon as it became apparent that the child understood the nature of the required task, he completed as many items of the part in question as he could. If at any stage of his work on one part of the test he was clearly unable to proceed beyond a particular point in spite of using concrete aids, testing on that part was discontinued, and the next part was introduced. However, if a child who had previously worked without concrete aids appeared to experience difficulty with certain test items in that part, he was given the concrete aid demonstration item (5). If successful, he was allowed to complete the part with concrete aids. Children were free to discontinue using concrete aids at any point during the test, or to employ them if they wished.

3. Part III. The investigator would state: "I am going to say something in parts, and you tell me what I said." Each of the words in this subsection was pronounced separated into phonemic units, and the children were encouraged to synthesize them in order to identify the words which they embodied.

4. Part IV. The questions were posed in turn, and the children were invited to respond. Unless answers be too repetitive, in which case children were guided into the next question, each child

*colored bingo chips were used as concrete aids.

developed his ideas without interruptions. (Question 10 required a repetition of a word which the child could either spell, write or illustrate in response to the preceding questions of the interview.) A detailed copy of administration instructions is included in Appendix B.

Recording and Scoring

Since it was the purpose of the investigation to determine the child's notions of the linguistic terms and units under consideration, there were no "right" or "wrong" responses to the segmentation tasks and all answers were recorded. For the first three parts of the test scoring consisted of calculating the total number of responses the child gave in the non-segmenting, partial segmenting and complete segmenting categories for each linguistic segment, differentiated according to the presence or absence of concrete aids. For the fourth part of the test, scoring consisted of classification of responses.

Several procedures were employed in recording the results of the various portions of the test. Each part is discussed under the appropriate subheadings below.

1. Sentence Segmentation. Results were recorded by means of diagonals drawn through the appropriate bracketed numerals at each clear pause between the words, and through the brackted "s" after each pause within words. Responses given following verbal instructions were recorded within the first set of eight sentences; answers given after the introduction of concrete aids were recorded within the second set.

2. Phoneme Analysis. Definite pauses between utterances were considered to be the points of demarcation, and the material

separated by such pauses was transcribed phonemically or graphemically on the appropriate blank lines.

3. Phoneme Synthesis. Words synthesized correctly were checked, words synthesized incorrectly were recorded graphemically if they were real, or phonemically, if they were nonsense words or speech sounds.

4. Syllable Identification. Diagonals were drawn through single numerals at each clear pause within words, or through two contiguous numerals if the sound at the end of one syllable was reiterated at the beginning of the next syllable. "VCA" (verbal instructions and concrete aids) was written after items which were syllabicated in conjunction with concrete aids.

5. Interview. The results of the interview were recorded verbatim on the appropriate blank lines.

III. PILOT STUDY

During the month of May, 1972, a pilot study designed to refine the content and approaches of the Segmentation Test was conducted. The findings of this study demonstrated that the proposed techniques and item types of the test would yield information regarding children's perception of the specified terms and linguistic units. Pilot study outcomes also provided some guidance for the final design of the Segmentation Test. A discussion of the pilot study is presented in the following pages.

Pilot Study Test Sample

Since two of the four kindergartens made available for the study by the Edmonton Public School Board were located in similar socio-economic environments, one was set aside for the preliminary investigation so that the remaining kindergartens would represent a range of socio-economic areas. Nine children, four girls and five boys, each in the opinion of their teacher representing a different level of ability, participated in the study. Ability levels were later confirmed by means of the California Short Form Test of Mental Maturity, Level 0, administered by the investigator. Scores gained from the test indicated that the total intelligence scores of the girls ranged between 113 and 135 and of the boys, between 93 and 125. The mean chronologic age was 69.8 for the boys, and 69.2 for the girls.

Pilot Study Segmentation Test Items

Using as source the materials described in the test "Construction" portion of this chapter, the initial test draft was organized under four headings: 1. Phonemes, 2. Syllables, 3. Sentences and 4. Interview. Each topic is discussed below.

1. Phonemes. All of Johnson's (1971) words were transcribed phonemically using Gleason's (1955) transcription and in keeping with the pronunciation standards of a local native Canadian. The words were assembled in groups under each of the separate initial phonemes, arranged in ascending order according to the number of phonemic units, and each phoneme was color coded. These words were then presented to pilot study children.

2. Syllables. All of the 56 polysyllabic words to be found in Johnson's list were divided into three groups: two bisyllabic groups --one with primary stress on the first, the other with primary stress on the second syllable--and one trisyllabic group. These were then presented to pilot study children. The words, divided among the three groups appear in Appendix E.

3. Sentences. Using the words in Johnson's list, three sentences were devised to represent each of the eight basic sentence patterns described by Stageberg (1965) and discussed under test "Construction" in this chapter. Sentence patterns and illustrative examples are included in Appendix C.

4. Interview. Three questions, "What is a word?" "What is a sound?" and "Do we make sounds when we speak?" formed the basis of the interview. Supplementary questions designed to probe children's knowledge of the terms were added during the administration of the test. Those judged to be most useful for eliciting the required information were noted and were included in the final version of the Segmentation Test.

Pilot Study Segmentation Test Procedures

Test items were presented orally by the investigator and children's responses were both transcribed and tape-recorded. Three approaches were attempted in order to elicit the required response for the first three parts of the test. The first involved performance of the task following verbal instructions. The second was accomplished in conjunction with concrete aids. And the third required segmentation in keeping with rhythmic tapping by the investigator.

In the fourth part of the test each of the two main questions posed to students was expanded until it was felt that as much information as possible, regarding children's knowledge of the terms, had been secured.

Pilot Study Findings and Implications

Pilot study findings pointed to a number of conlusions regarding the organization of the final version of the Segmentation Test. An account of the findings, together with a discussion of their implications for the choice of test items and procedures, follows:

1. Word, Syllable and Phoneme Identification. The nine pilot study children differed markedly in ability to identify words, syllables and phonemes. When dealing with these units they experienced the greatest problems in identifying phonemes, were more successful with words, and most successful in identifying syllables. Some children's performance improved after the addition of concrete aids and rhythmic tapping.

With respect to words, four children could segment sentences into word constituents following verbal instructions. Three of them spontaneously segmented polysyllables as well, even though word segmentation preceded the test on syllabication. Three other children were able to accurately segment sentences into words, but only with the help of concrete aids or rhythmic tapping. Two children required concrete aids before they could begin the task, but even then they managed to segment the necessary sentences only partially. One of the children in the latter group divided all utterances into phrases; the other could not separate initial determiners from the following nouns.

No child was able to divide all of the test words into their conventionally accepted phonemic units. The most skillful girl, whose sensitivity to language enabled her to divide complex syllabic clusters into separate components, could not identify most of the final consonant blends as separate entities. One boy, aided in phonemic identification by concrete aids, could detach the initial consonant, pronouncing it followed by a schwa and followed by a separate schwa, but was unable to extract the final consonant from the preceding vowel (də-ə- og). He was also unable to separate initial or final consonant blends and was unaware of the /r/ in the str cluster. Two children attempted to segment by pronouncing the initial consonant (or consonant cluster) together with the following vowel, and then repeated the vowel with the following consonant or consonant cluster (do - og). The remaining five children could not fulfil the test requirements. Some of them attempted to segment the words but, in spite of considerable effort, merely succeeded in repeating the words in their entirety. Neither rhythmic tapping nor concrete aids enabled them to make the necessary segmentations.

In view of such limited successes on the phoneme analysis test, another part, designed to test children's ability to deal with phonemes by a different method, was added. In response to this part of the test the children were required to fuse separately pronounced phonemic segments into words. Only two children were able to blend sounds in this manner.

When dealing with syllables children were considerably more proficient. Four children were able to syllabicate after verbal

instructions alone, the other five could syllabicate with the help of concrete aids. Thus all children were able to locate syllabic units.

Three of the children who syllabicated with concrete aids identified the same syllabic units as the children who worked without concrete aids and rhythmic tapping. Two boys syllabicated in a manner which was consistent for them but different from the other children.

2. Knowledge of the Terms "Word" and Speech "Sound". Children were uncertain of the meaning of the terms "word" and speech "sound". With reference to "word", some admitted complete unfamiliarity, some remained silent and two children thought of a word as a letter. When asked to suggest some words, however, most of the children were able to comply. By contrast, the children were not only unable to say what a speech "sound" was, but could not give any illustrative examples. Nevertheless, all agreed that sounds were made in speaking.

3. Test Items. The problem of segmentation proved to be most difficult in the case of phonemes, less difficult with words, and least difficult with syllables. Since more data were gathered regarding both syllable and word perception than phoneme perception, different procedures were employed in choosing items for the Segmentation Test.

The selection of phonemes and phoneme environments presented a problem because phonemes were so hazily perceived that it was difficult to ascertain which classes of phonemes were more discernible than others. Consequently, phonemes were not selected according to the criterion of ease or difficulty of perception, but were chosen according to the procedure described under test "Construction".

The choice of words was based on the finding that certain

word classes, such as determiners, were less frequently perceived independently than others. It was therefore necessary to vary word classes, inflectional categories and word locations within the sentences in the final version of the test.

Since children very easily solved the pro[illegible] of syllable identification and gave responses to all the items, it became possible to trace a preliminary pattern of syllabe perception and to draw conclusions about the test items which would be included in the Segmentation Test. Bisyllabic words with primary stress on the second syllable were divided identically and according to dictionary syllabication patterns by all children. Bisyllabic words whose primary stress fell on the first syllabe, and trisyllabic words, were dissimilarly segmented. These observations made it possible to delete a number of consistently syllabicated words from the final version of the test, retaining, however, some of the words to balance the inconsistently perceived segments, all of which were included in the Segmentation Test.

It was noted that certain questions posed during the interview appeared to be incomprehensible to children in that form, but became clearer and were answered in another. Occasionally it became apparent that the replies of some children enrolled in this kindergarten were affected by exposure to some facets of written language. The interview was therefore expanded to include ten questions, in order to investigate each of the two terms in several forms and to ascertain the extent of children's familiarity with written language.

4. Test Format. The final sequence of items, unlike the more common arrangement of items in order of increasing difficulty, was determined on the basis of pilot study findings. If the easiest test task, syllable identification, were to precede the other segmentation tasks, decisions regarding spontaneity of segmentation within word identifications could not be made. Therefore, the order of intermediate, greatest and least difficult items was set. The interview, dealing specifically with the items examined in the first three sections, was placed last.

5. Test Procedures. The procedures described in the preceding "Administration" specifications of the test were based on their effectiveness in eliciting the required information during piloting.

The two devices, rhythmic tapping and concrete aids, employed to facilitate segmentations appeared to be equally useful, but the utilization of both in one test was judged to be too cumbersome. Besides, the colorful concrete aids seemed to arouse children's interest, while the tapping sound, picked up by the tape-recorder, tended to interfere with subsequent analysis of tape-recorded data. Consequently, tapping was not included in the final version of the Segmentation Test.

Recording and Scoring. The extensive number of responses given to the syllable and word identification portions of the test made it possible to predict where segmentations might occur and to anticipate them by bracketed symbols for purposes of recording and scoring. This could not be done with the infrequently identified phonemes.

IV. DATA TREATMENT

The processing of scores obtained from the Segmentation Test is described under the appropriate subheadings below:

Data Treatment for Research Question 1

Similar procedures were employed in accumulating, classifying and analyzing the total responses of children on Parts I, II and III of the Segmentation Test. An account of the procedures follows:

First, for each of the Parts, I, IIa, IIb and III of the test two identical charts were prepared on graph paper, one for boys and the other for girls. Their y-axes bore the code numbers of the children, from 1 to 15. The x-axes contained either the number of the test item, or the item itself which was to be identified on that part of the test. The raw data, consisting of crossed numerals which represented children's recognition of junctures in Parts I and III, or of transcription of items as in the case of both sections of Part II, were entered in the appropriate location according to respondent and item type. Dashes indicated non-respondents or omitted responses.

Second, the responses in each section were examined and coded as NS (non-segmenter PS (partial segmenter) and CS (complete segmenter).

Third, the above procedure was repeated for Parts I, IIa and III, in order to set up charts for responses given after the implementation of concrete aids. Examples of such charts are given in Appendix F.

Fourth, new charts for boys and for girls were prepared. Along their x-axes appeared two columns entitled "V" (verbal instructions) and "VCA" (verbal instructions and concrete aids), with the subdivisions

"Boys", "Girls" and "Total" in each. Along the y-axes the designations NS, PS and CS were entered in the appropriate slots, differentiated according to responses for boys and girls.

Fifth, the totals for boys and girls were added and entered in the appropriate columns. An example of the chart is contained in Appendix C.

Sixth, the results were plotted in figures which appear in Part I of Chapter IV. These results were analyzed, described and are discussed in that chapter.

Data Treatment for Research Question 2

Similar procedures were employed for examining the results of the parts of the Segmentation Test necessary to investigate research question 2. They are discussed below.

First, in order to determine segmentation patterns in response to the Segmentation Test, charts were prepared along whose y-axes were written item types and along the x-axes, "V" and "VCA", with a "Boy"-"Girl"-"Total" subgroup in each.

Second, where applicable, the rank order of item occurrence was calculated for each section. The results of this calculation were graphed, analyzed and are discussed in Part II of Chapter IV.

Third, children's responses were assessed within item classes. The y-axes contained all of the exemplars of the particular segment classes under consideration, and the x-axes, "V" and "VCA". These results were also graphed and analyzed, where applicable, and are reported in Chapter IV.

Data Treatment for Research Question 3

Answers given by students were assembled under each question number. The results were classified according to categories, were analyzed and are reported in Part III of Chapter IV.

SUMMARY OF THE CHAPTER

This chapter dealt with four major topics. In the first, sample selection criteria and procedures were delineated. The second was concerned with a description of the construction, format, administration and recording and scoring of the Segmentation Test, which was designed for purposes of this investigation. In the third section pilot study strategies and findings were examined. The fourth part consisted of a brief description of data treatment.

CHAPTER IV

FINDINGS OF THE STUDY

The design of the study emphasizing a description of the Segmentation Test developed in order to investigate the research questions was considered in the preceding chapter. In this chapter, children's responses to the four parts of the test are tabulated, analyzed and discussed.

The chapter is divided into three principal parts which parallel the three research questions explored in the study. In part I, comprising three subsections, discussion centers on the nature and extent of children's word, syllable and phoneme identification activity. In the first subsection children's total scores obtained in response to the verbal presentation of instructions are discussed. The second section deals with children's responses given after the introduction of concrete aids. The third subsection consists of comparisons of children's scores obtained by the two approaches described above, but here reported separately for words, syllables and phonemes.

Part II of the chapter, which is also composed of three subsections, contains a description of the segmentation patterns which emerged following the classification of responses. In the first, children's patterns of word identification are differentiated according to frequency of response with reference to word classes and mode of categorization. The second subsection contains phoneme categorization patterns, discussed in terms of analysis and synthesis and mode of

categorization. The third section deals with children's syllabication patterns with respect to number of syllables and mode of categorization. Also in this section is a description of children's segmentation patterns which were largely consistent for them, but different from dictionary standards.

Part III is concerned with children's definitions of the terms "word" and speech "sound", and includes a classification of their answers.

I. EXTENT OF SEGMENTATION

The extent of segmentation ability of the thirty students in the sample as indicated by their scores on the first three parts of the Segmentation Test was examined and is reported in the following pages. The discussion is presented in three subsections. The first deals with children's total scores gained following a verbal presentation of instructions. In the second the effects of the implementation of concrete aids upon segmentation achievement are examined. The third subsection focuses upon an examination of children's scores presented separately for each of the three linguistic segments examined in the study and differentiated according to mode of performance.

Segmentation Test Scores--Verbal Instructions

The total scores obtained by the children while following verbal instructions on the first three parts of the Segmentation Test which consisted of identification of words and phonemes in Part I and IIa respectively, synthesis of phonemes in Part IIb, and separation of words into syllables in Part III were employed for examining children's

segmentation achievement. The theoretical data discussed in Chapter II suggested that the extent of a child's segmentation ability may be related to at least three factors: varying complexity of linguistic units, unequal suitability of segments for segmentation practice and children's dissimilar levels of cognitive development. Features inherent in each segment which might complicate its explicit perception may be reflected in the order of segment acquisition during language learning (Carroll, 1960). Syllables are mastered during the earliest stages of language learning, words are assimilated next and phonemes may not be wholly differentiated when the child begins reading in Grade One.

Opportunities for practicing explicit perception of segments as independent units are determined by the nature and/or function of each segment type. For example, syllable perception is often practiced in rhyme and song. Words, as separate entities, appear when children attempt to expand their repertoire of concepts by assigning labels to new facets of experience, or try to improve their understanding of meaning by contrasting several related but dissimilar words. But phonemes almost never occur in speech independently. Although children may consciously manifest awareness of different phonemes, they generally do so in terms of minimal pairs, not phonemes. Whereas a child may say, "Did you say pig or fig?", he will very infrequently ask, "Did you say /p/ as in pig, or /f/ as in fig?" A child may attempt to improve his perception of a phoneme by the use of minimal pairs, but such minimal pairs will not of necessity help him to extract phonemes from their word environment. Therefore the order of complexity of explicit segment perception may

persist for a considerable period of time.

Children's unequal levels of cognitive development, particularly as these influence their skill in dealing with the tasks of classification have been noted with reference to several fields of intellectual endeavor. Such dissimilar levels may also exist in children's ability to classify linguistic phenomena.

All preceding factors may affect the extent of linguistic segmentations on the part of children. As a result, children's scores on segmentation tasks should be distributed among the non-segmenting, partial and complete segmenting categories.

Children's responses to each of the first three parts of the Segmentation Test were totalled, coded according to extent of segmentation (NS, PS and CS) and are summarized in Figure 1.

The data presented in Figure 1 indicate the total number of children segmenting in response to verbal instructions for each of the first three parts of the test. Examination of the results given in this figure shows that the extent of segmentation varied with different children and with each of the three linguistic segments. Among the children, three types of respondents may be distinguished: the non-segmenters, the partial segmenters and the complete segmenters. Certain children, described as non-segmenters, could not isolate any segments. Others, the partial segmenters, were able to carry out one or more segmentations. Still others, the complete segmenters, succeeded in identifying all of the required segments as these are defined in this study.

With respect to the linguistic segments themselves, a difference in extent of segmentation of each segment type may be noted. When dealing with syllables, three respondents were unable to isolate any segments, fourteen could achieve partial segmentations and eleven succeeded in identifying all the syllables. In the case of words*, there were sixteen non-segmenting respondents, eleven partial segmenters and three complete segmenters. Phoneme analysis was impossible for fifteen children, phoneme synthesis for ten; there were fifteen partial segmenters and twenty partial synthesizers. None of the children could identify or blend all of the phonemes to reach the level of complete phoneme segmentations or of complete synthesis.

Two general conclusions may be deduced from these findings. First, children's dissimilar levels of achievement in differentiating the required linguistic segments may be indicative of unequal readiness to explicitly perceive such segments. Thus by their inadequate performance, both non-segmenters and partial segmenters manifest various gradations of developing readiness for perceiving linguistic units. By contrast, the complete segmenters have attained the necessary stage of readiness to fully categorize all of the linguistic units in questions.

Second, the linguistic segments differed in degree of accessibility to children. As is indicated by the scores of the complete segmenters, syllables were identified most often, words were in intermediate position and phonemes were least frequently detected.

Segmentation Test Scores--Manipulative Materials

A summary of Piaget's (1959) conclusions regarding children's

*Spontaneously syllabicated words were noted, but not included in the calculations.

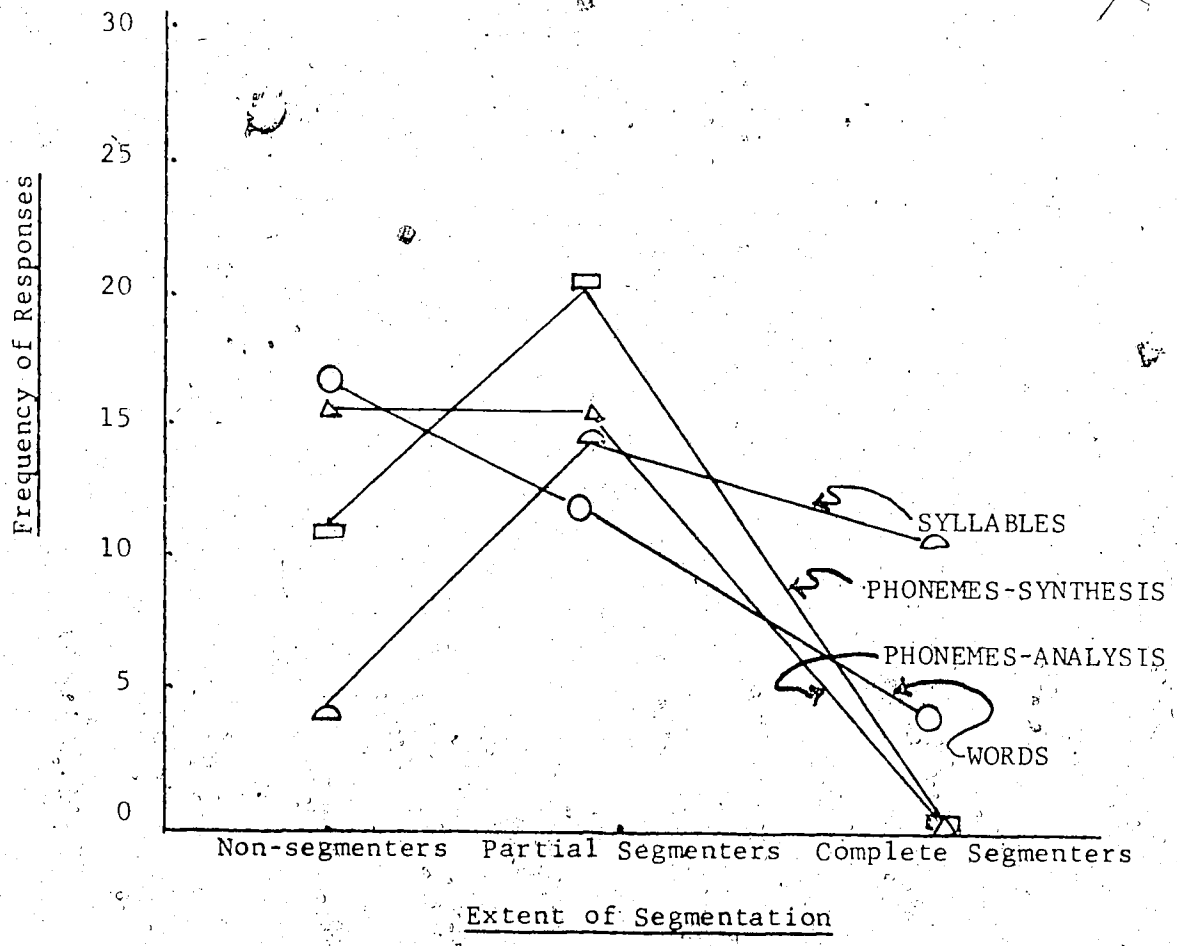


Figure 1

DISTRIBUTION OF TOTAL SCORES ON THE SEGMENTATION TEST

cognitive functioning levels as these apply to classifications was presented in Chapter II. Information considered in that chapter indicated that the implementation of manipulative materials may enable certain children to become more proficient in classifying the elements of their experience. Accordingly, under the particular circumstances and in the manner described in Chapter III, manipulative materials were introduced. The results of children's segmentations, performed after the addition of concrete materials were assessed, recorded and are summarized in Figure 2.

Figure 2 depicts children's performance on the segmentation tasks following the addition of concrete aids. It shows that when identifying syllables, no children remained in the non-segmenting category, eight continued to segment partially and twenty-three became complete segmenters. In the case of words, ~~only~~ three children remained in the non-segmenting category, twenty-two became partial segmenters five were able to segment completely. With reference to phonemes fourteen children failed to effect any identifications, sixteen became partial segmenters, but no child was able to rise to the status of complete segmenters.

These findings indicate that the implementation of manipulative materials had a pronounced effect upon the extent of children's explicit segment identifications. First, the use of concrete aids increased the number of segments which were either partially or completely identified by children, so that certain linguistic segments became more accessible to some of the children. Second, because the use of concrete aids

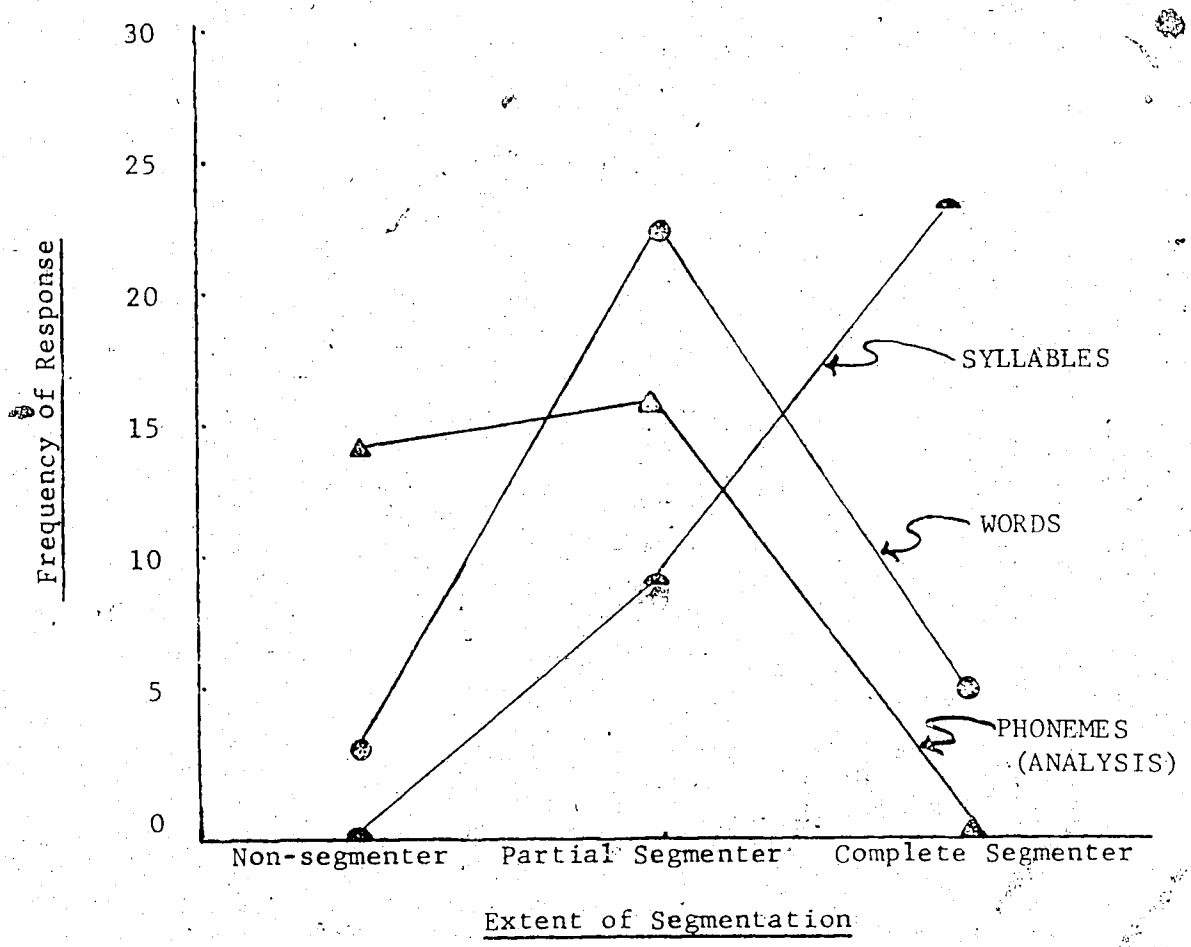


Figure 2

DISTRIBUTION OF TOTAL SCORES ON THE SEGMENTATION TEST ACHIEVED IN CONJUNCTION WITH CONCRETE AIDS

appeared to clarify the nature of the requisite task, the number of non-segmenters diminished. It thus seems that cognitive readiness to explicitly identify linguistic segments improved as a result of the implementation of concrete materials. Such results may be viewed as a demonstration of the efficacy of concrete materials being employed as a device for aiding the explicit segmentation of linguistic units.

However, it must not be overlooked that the utilization of concrete aids did not produce an increase in the number of complete phoneme segmenters.* Apparently total identification of phonemes exceeded the readiness of preschoolers to identify them at that level.

Scores on Individual Segments

The difference between children's segmentation scores is more striking if their performance with and without concrete aids is compared separately for each segment. This change in performance is discussed in three subsections below, under the following headings: 1. Word Identification, 2. Phoneme Identification and 3. Syllable Identification.

1. Word Identification. Scores obtained on the word identification portion of the test were used not only to indicate the extent of children's segmentation ability, but also to show the difference in performance with and without concrete aids. It was expected from the preceding theoretical analysis that children at different levels of linguistic-cognitive development would experience

*Concrete materials were not employed to facilitate the synthesis of phonemes.

various degrees of success in identifying words as separate entities, but that some children would manifest an improvement in word identifications after the introduction of concrete aids. Children's scores should therefore be distributed among the non-segmenting, partially segmenting and complete segmenting categories, but should improve upon implementation of concrete aids.

The scores attained by children on the word identification portion of the test while following verbal instructions and when working with concrete aids are contrasted in Figure 3.

As the lines in Figure 3 demonstrate, the total number of children in each of the three segmentation categories differed, depending on whether or not concrete aids had been employed. The original number of sixteen non-segmenters decreased to three after the introduction of concrete materials. The number of partial segmenters doubled and the number of complete segmenters increased by two. On the basis of these results it may be concluded that the implementation of concrete aids for purposes of word identification tended to increase the number of partial and complete segmenters and to decrease the number of non-segmenters. Such findings further suggest that the segmentation techniques explored by means of the Segmentation Test, together with the application of concrete materials, may prove to be a useful approach for improving children's explicit word categorizations.

2. Phoneme Identification. The total scores on the phoneme identification portion of the test were employed to demonstrate the nature and extent of each child's explicit phoneme perception.

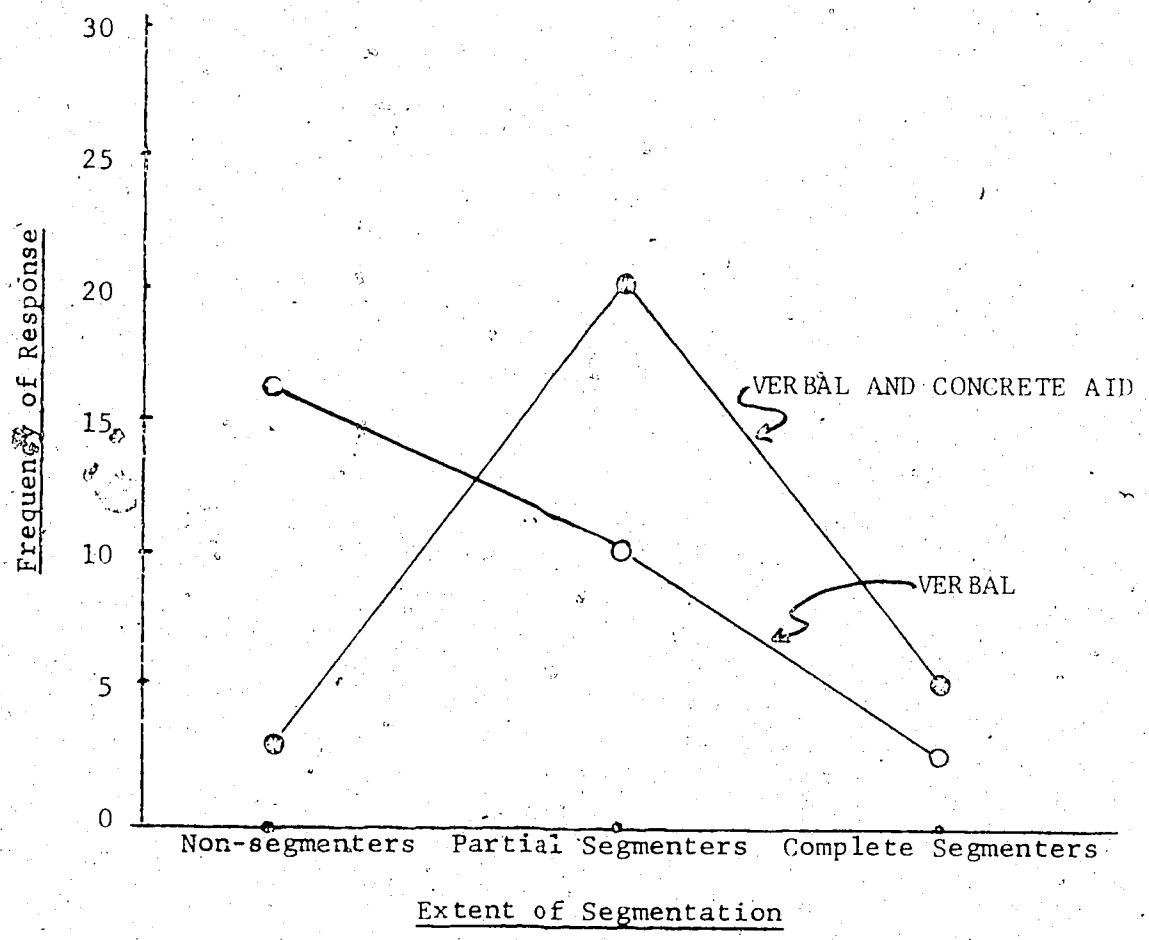


Figure 3

DISTRIBUTION OF SCORES ON THE WORD IDENTIFICATION PORTION OF THE SEGMENTATION TEST GAINED WITH AND WITHOUT CONCRETE AID

Preceding theoretical observations led to the conclusion that certain linguistic factors inherent in language, such as the level of the child's linguistic and cognitive development and the extent and quality of his experiential background might obscure the identification of the conventionally required phonemes. It was also hypothesized that the addition of concrete materials might help to improve children's performance of this task.

The total number of children responding to verbal instructions and to verbal instructions and concrete aids on the phoneme identification portion of the test are shown in Figure 4. The results produced in this figure indicate that the number of non-segmenters decreased from fifteen to fourteen, whereas the number of partial segmenters increased from fifteen to sixteen. The number of complete segmenters, however, remained at zero. Thus the addition of concrete aids helped to effect a slight decrease in non-segmenters and a small increase in partial segmenters. However, no children rose to the status of complete segmenters, for which the test subjects did not yet appear to be ready. These results demonstrate that manipulative materials were of limited utility in helping children to identify segments which they were not yet ready to identify.

3. Syllable Identification. Children's responses to the syllable identification part of the test were calculated according to the presence or absence of concrete aids, and were recorded for analysis. Previously cited review of literature suggested that

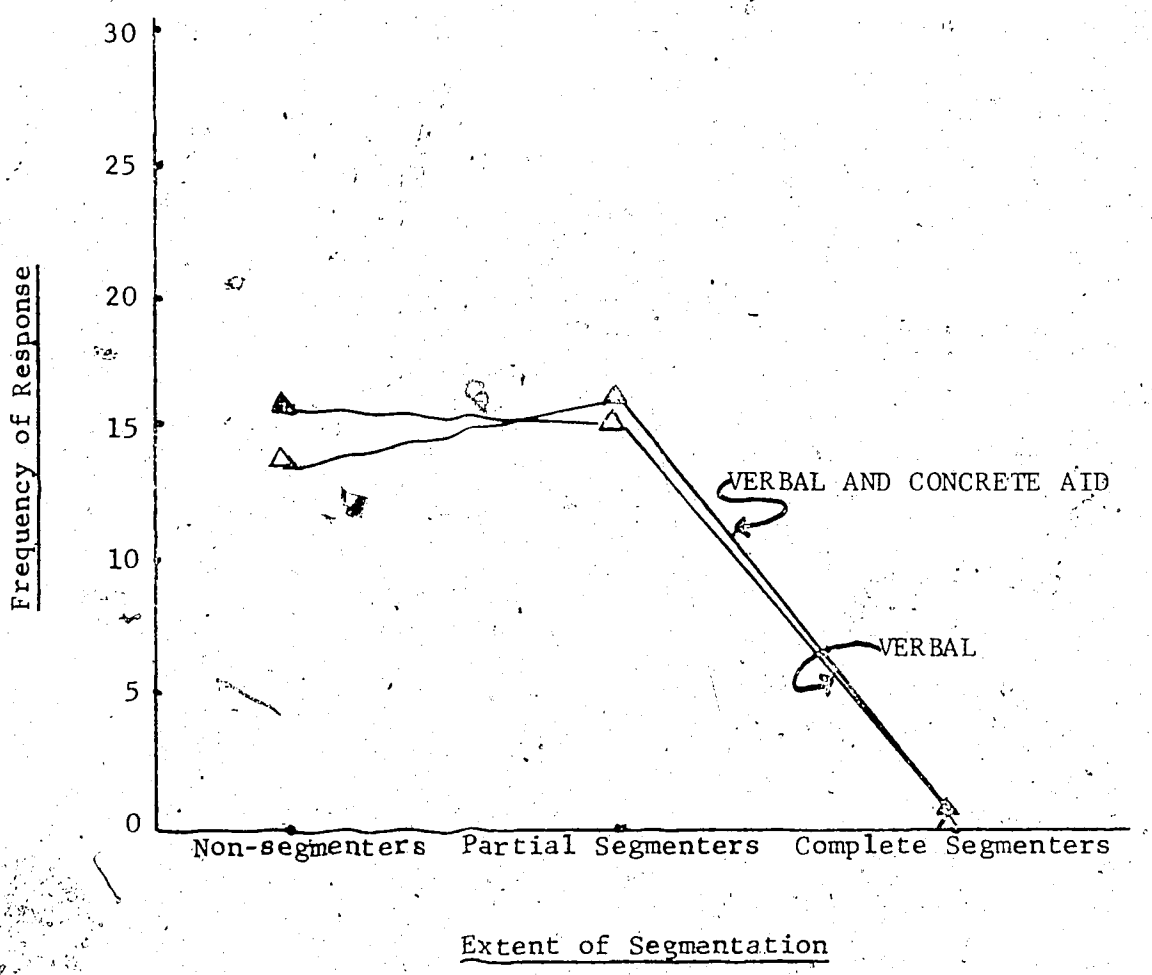


Figure 4

DISTRIBUTION OF RESPONSES ON THE PHONEME IDENTIFICATION PORTION OF THE SEGMENTATION TEST GAINED WITH AND WITHOUT CONCRETE AID

syllables might be more readily identifiable than either the word or phoneme segments. It was also anticipated that the identification of syllables might improve with implementation of manipulative materials. Children's scores on this portion of the test appear in Figure 5.

The results reported in Figure 5 indicate that when dealing with syllables the children tended to be more successful than when working with either words or phonemes. The data also show that the addition of concrete aids in the case of syllable identifications effected a decrease in the number of both the non-segmenters and the partial segmenters, and led to an increase in the number of complete segmenters. Without the use of concrete aids three children were non-segmenters, fourteen were partial segmenters and eleven, complete segmenters But with the addition of concrete aids no respondents remained in the non-segmenting category, eight became partial segmenters and twenty-two became complete segmenters. As was the case with words, and in part, with phonemes, the introduction of concrete aids was instrumental in improving children's performance in syllable categorization.

Summary

The data gathered from the first three sections of the Segmentation Test were explored and analyzed to determine the nature and extent of children's segmentation skills and to evaluate the effect of employing concrete aids during such segmentations. The outcome of this investigation was presented in the preceding section. It indicated that the test subjects varied in ability to perceive syllables,

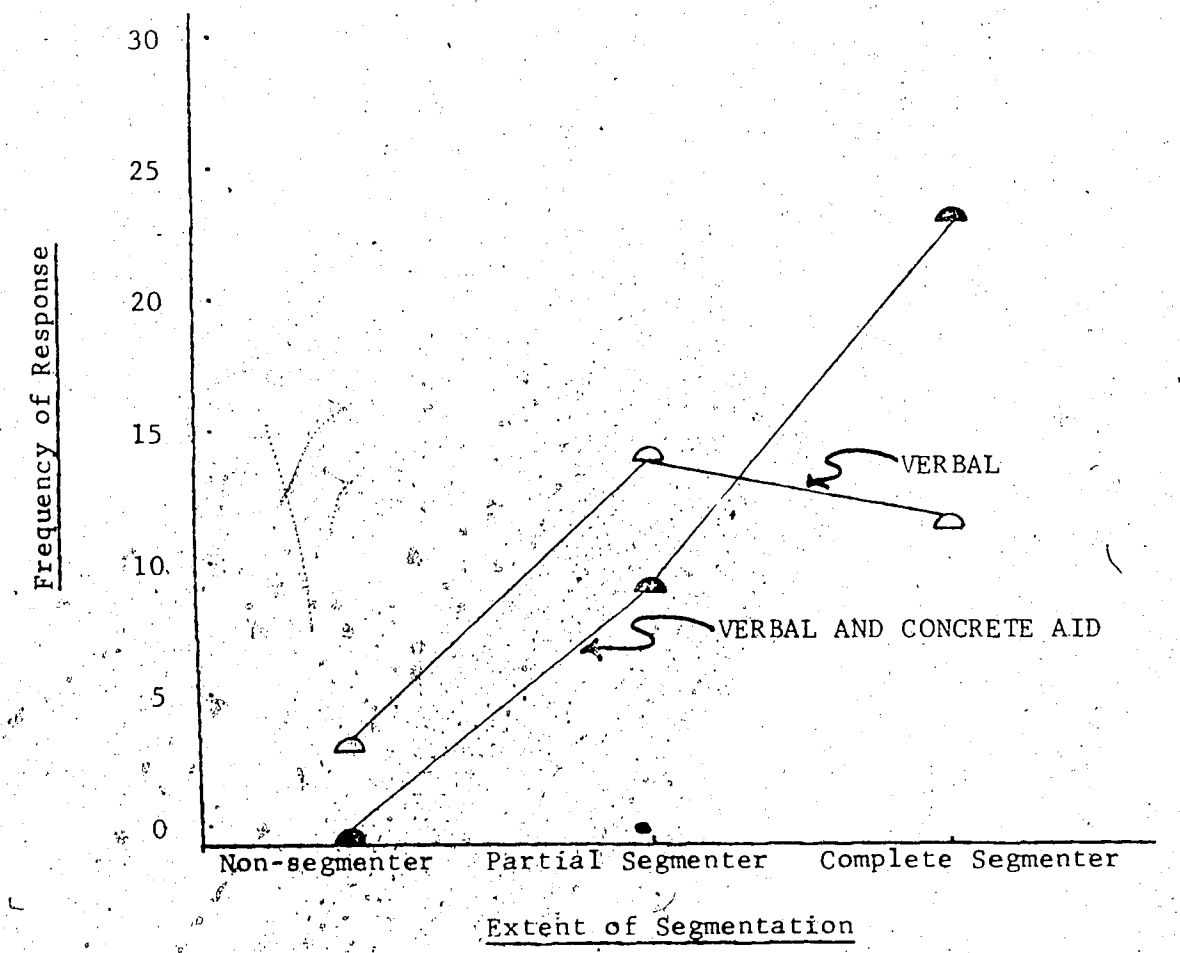


Figure 5

DISTRIBUTION OF RESPONSES ON THE SYLLABLE IDENTIFICATION PORTION OF THE SEGMENTATION TEST GAINED WITH AND WITHOUT CONCRETE AIDS

words and phonemes. Syllables were perceived most readily, words less so and phonemes least of all.

The usefulness of concrete aids in improving segmentation performance was demonstrated.

The same general pattern was observed in item identification complexity accomplished with and without concrete materials. However, whereas the number of complete segmenters increased after the addition of concrete aids in the case of both word and syllable identification, it did not result in a comparable improvement in children's phoneme identifications.

II. PATTERNS WITHIN SEGMENTATIONS

The data available for analysis from the first three parts of the Segmentation Test were also utilized for the purpose of examining patterns which might become apparent within each type of segment. The words, phonemes and syllables contained in the test were classified, and children's responses to each class were then analyzed and tabulated.

An account of the patterns observed within the segmentations appears in the following pages. It is subdivided into three sections: 1. Word Identification, 2. Phoneme Identification and 3. Syllable Identification.

Word Identification

Several factors which might hinder explicit word identifications were discussed in Chapter II. Among them were verbal syncretism, thinking in complexes, variable difficulty of words and the

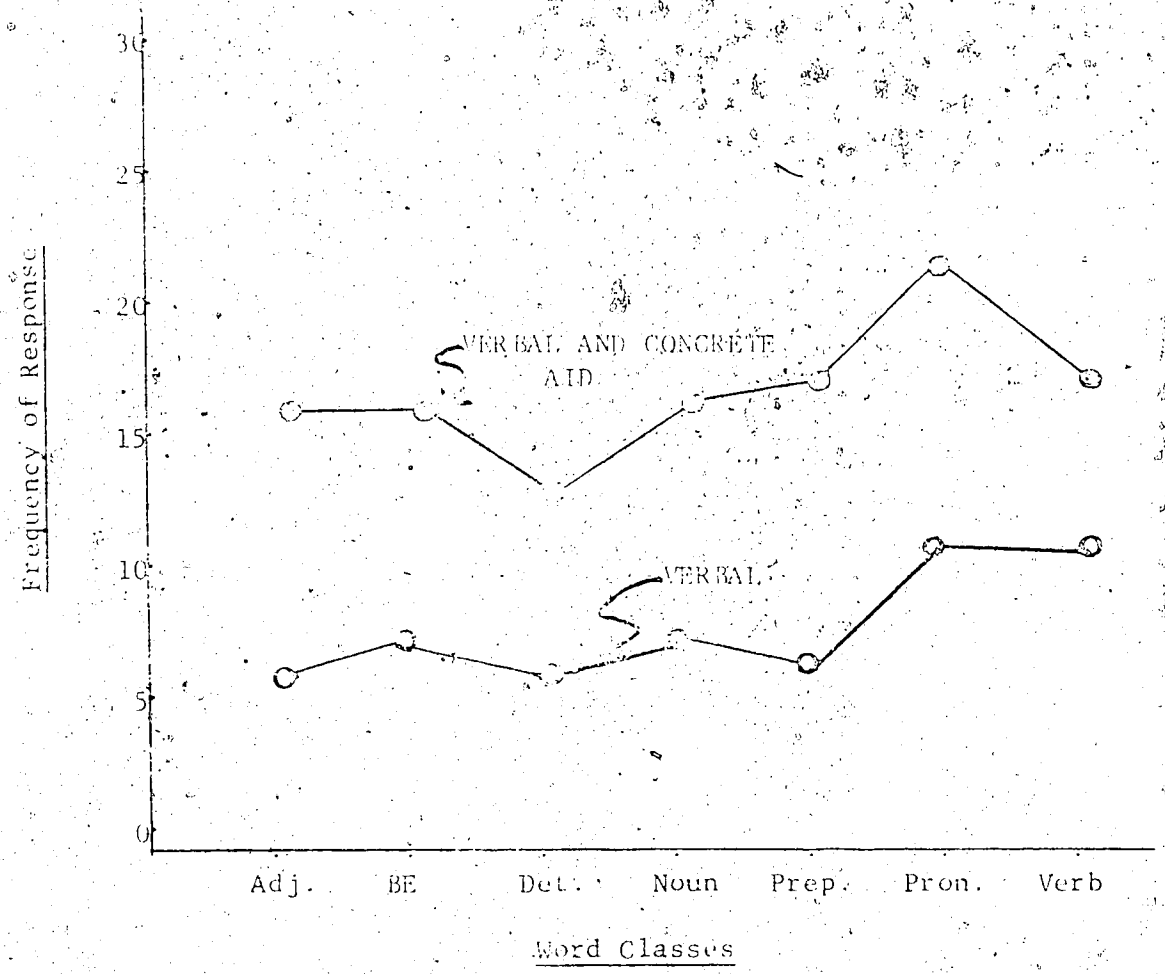
existence of cognitive levels which might necessitate a special approach to the task of segmentation. In the preceding part of the chapter it was demonstrated that all words were not equally well identified by the children. In this part children's ability to identify words within different word classes will be examined.

For purposes of analysis children's responses to each word class were added, averaged and differentiated with respect to mode of identification. The results are summarized in Figure 6.

Figure 6 indicates that children's level of performance differed with respect to various word classes and the presence or absence of concrete aids. Following verbal instructions verbs, variants of the verb "to be" and pronouns were more often identified as separate units. Other word classes were less frequently distinguished; this latter group included determiners, adjectives, nouns and the preposition.

That determiners and prepositions might be less easily discerned was expected on the basis of the theoretical considerations reviewed above. The former have no concrete referents and are frequently subject to elisions, whereas the latter sometimes exceed the conceptual capability of young children. Thus determiners and prepositions are less likely to be distinguished as separate elements of speech ("hisbooks" "onthe").

The fact that adjectives were tied to either the determiners and/or nouns might mean that they too are not fully comprehended ("theoldman"). Since determiners and adjectives are generally associated with nouns, nouns did not frequently emerge as separate units.



Abbreviations
Adj. adjective
Det.=determiner
Prep.=preposition
Pron.=pronoun

Figure 6

AVERAGE FREQUENCY OF RESPONSES WITH REFERENCE TO WORD CLASSES AND THE PRESENCE OR ABSENCE OF CONCRETE AIDS

In sum, when following verbal instructions, the subjects segmented certain word classes less well than others.

The addition of concrete aids produced an improvement in segmentations. It enabled children to identify a greater number of words in all word classes. Nevertheless, the word classes, with one exception, retained the approximate degree of difficulty relative to each other. Thus determiners, adjectives and nouns, even after the implementation of concrete aids, remained in the lower reaches of the scale. This finding suggests that such word classes were consistently less apparent to the test subjects. The exception in relative standing occurred with respect to the preposition, "on". The addition of concrete aids led to a striking increase in its frequently of isolation. The clarification of children's perception of this spatial preposition might have occurred as a result of a coincidence. While segmenting the sentence containing this preposition in conjunction with concrete aids the children placed the chips on the table. It is this enaction which might have improved the identification of this preposition.

The implementation of concrete aids produced an additional advantage. On examining the lines in Figure 6 representing performance with and without concrete aids it becomes apparent that there is less difference in the levels of identifications of words, identified without concrete aids than of words distinguished in conjunction with concrete aids. This may mean that certain word classes are on the verge of becoming evident to children, but require a more concrete approach for their identification.

A differentiation of responses in order to assess children's facility in identifying different words within word classes was undertaken. The results of the analysis are considered in three sections: 1. Nouns, 2. Determiners and 3. Other Word Classes. (The responses given to Sentence 1 were not included in this set, since segmenations, consisting of two units might have been accomplished by imitation.)

1. Nouns. Some categories of nouns were identified more easily than others as shown in Figure 7. Figure 7 indicates the distribution of responses with reference to categories of nouns. Of the nouns tested in this part of the test, proper nouns* were usually identified more readily either with or without concrete aids. Animate nouns were in intermediate position and inanimate nouns were least efficiently segmented. Better performance resulted following the implementation of concrete aids and the same rank of word difficulty was observed in word identifications accomplished with and without concrete aids. These results may suggest an order of difficulty of classes of nouns and may point to the sequence in which noun differentiations might be attempted.

2. Determiners. Determiners, like other words, were more easily distinguished with than without concrete aids, with a similar order of difficulty observed for the two approaches. Figure 8 depicts the distribution of responses with respect to the identification of determiners.

The results shown in this figure indicate that "his" and "the" were consistently less well identified than "a" and "some". This may, in

*"Mother" was considered to be a proper noun.

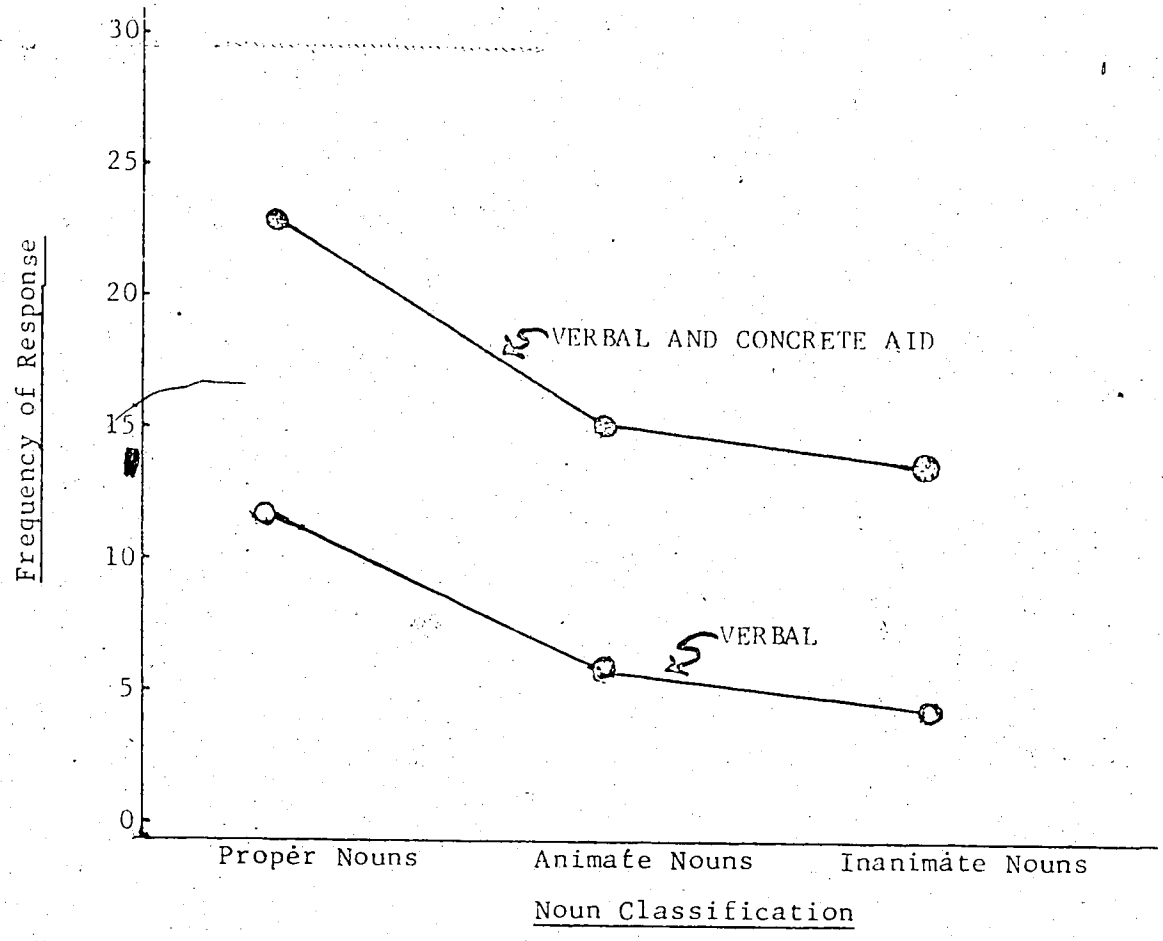


Figure 7

AVERAGE FREQUENCY OF RESPONSE WITH REFERENCE TO TYPES OF NOUNS AND THE PRESENCE OR ABSENCE OF CONCRETE AIDS

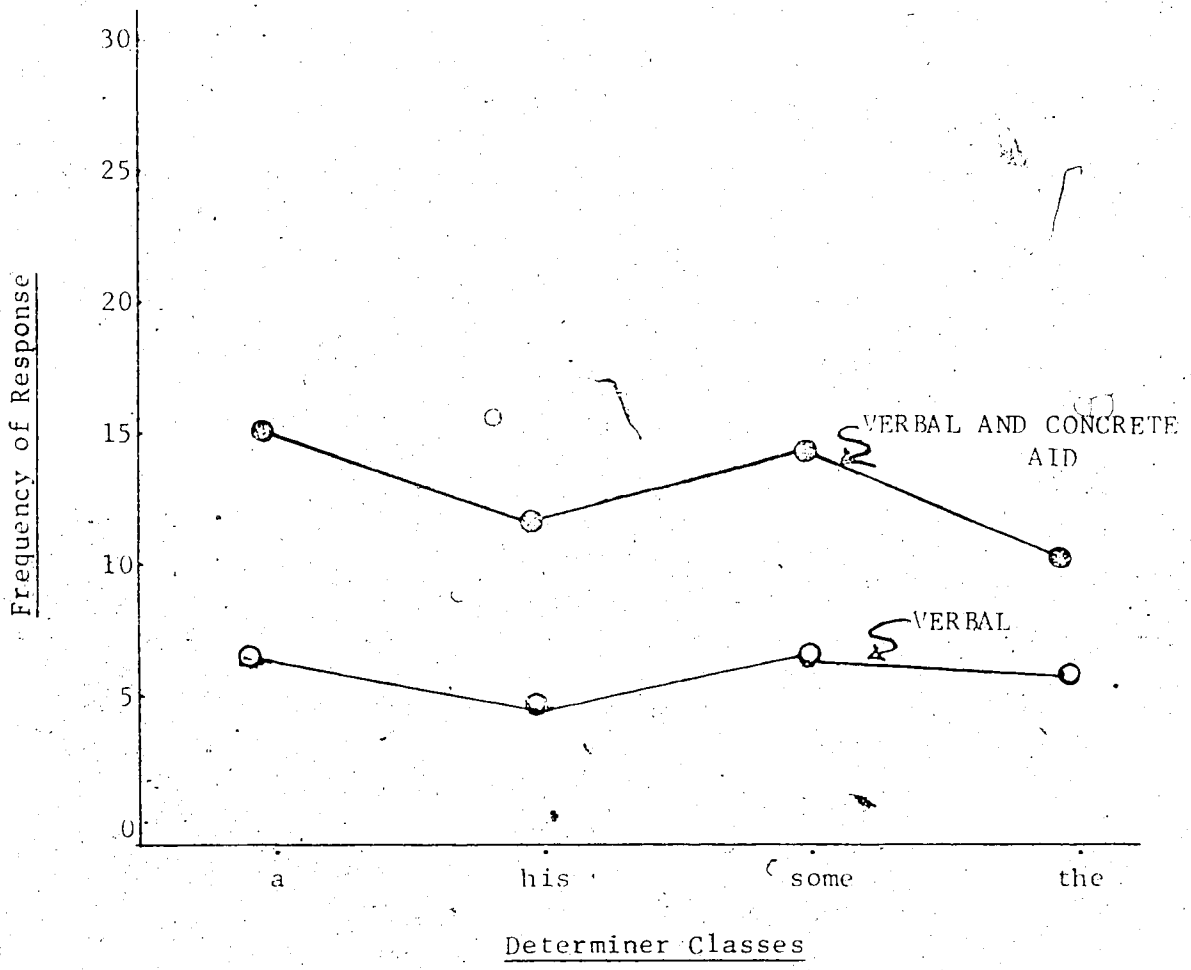


Figure 8

AVERAGE FREQUENCY OF RESPONSE WITH REFERENCE TO TYPES OF DETERMINERS AND THE PRESENCE OR ABSENCE OF CONCRETE AIDS

large part, be the result of the operation of phonologic rules across word boundaries. A special effort should therefore be made in order to clarify the segmentation of such words for beginning readers.

3. Other Word Classes. Because so few examples of the remaining word classes were included in the Segmentation Test, only one illustration of their distribution was prepared. It appears as Figure 9. This figure shows that the addition of concrete aids facilitated the identification task for all word classes, and that certain words within each word class could be more easily identified than others. Among adjectives "old" was least well identified and "new", which had been used as a complement, was most easily distinguished. The present tense of the verb "to be" was better identified than the past tense prior to the introduction of concrete aids, but was equally well identified after the introduction of such aids. "Like" was more easily distinguished than transitive verbs without concrete aids, but was isolated less well than transitive verbs after the addition of such aids. Thus within all of the preceding word classes certain words proved to be more difficult than others.

The foregoing discussion centered on pinpointing words which might be difficult to distinguish as separate elements. It also served to demonstrate that the addition of manipulative materials to facilitate word identifications might prove to be a useful device both for testing and for teaching.

Phoneme Identification

As was indicated in Part I of this chapter subjects experienced

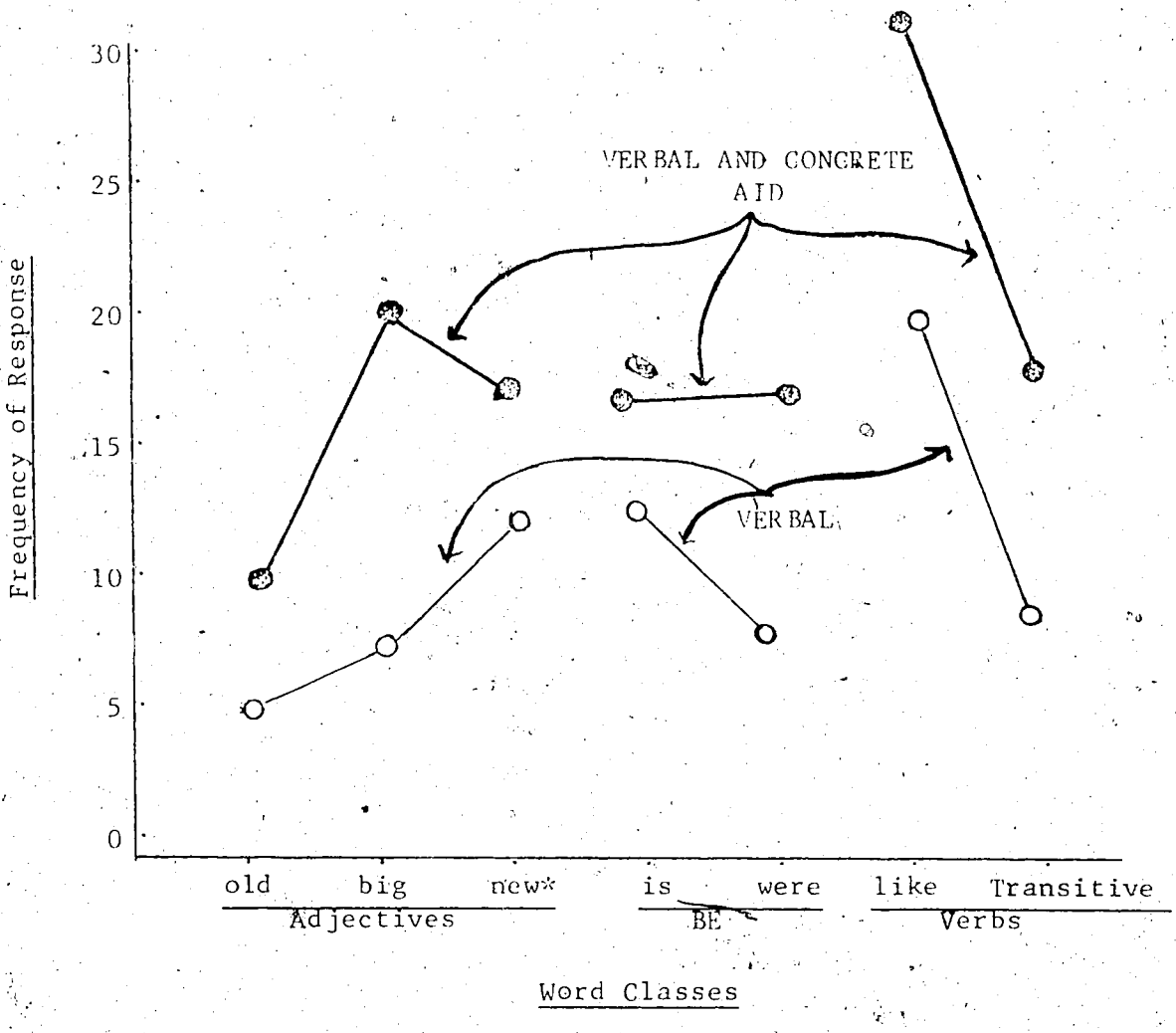


Figure 9

AVERAGE FREQUENCY OF RESPONSE WITH REFERENCE TO ADJECTIVES AND VERBS AND THE PRESENCE OR ABSENCE OF CONCRETE AIDS

difficulty in accomplishing phoneme identifications. Moreover, whereas most children worked dilligently and willingly on all the other portions of the test, they were reluctant to undertake this part. They tended to approach the task with wary silence, sudden extraneous conversational digressions and either undisguised incredulity or angry denial regarding either the existence of any parts or of their ability to locate them. Some children obligingly attempted one or more segmentations, but then balked. [redacted] of such an adverse reaction to this portion of the test, the conclusion may be drawn that this task exceeded children's readiness to perform it. Nevertheless, from the few responses that were gathered, a number of phoneme identification patterns became apparent. These patterns are discussed below and are differentiated according to 1. Phoneme Analysis and 2. Phoneme Synthesis.

1. Phoneme Analysis. Five patterns emerged following the classification of children's attempts to perform phoneme identifications.

(1) The first was the pattern of the non-segmenters who were unable to effect any segmentations. They either remained silent, or, in spite of concerted efforts to segment a word, succeeded only in repeating it in its entirety.

(2) A second pattern involved responses in which one consonant was separated from the remainder of the word, but the word was nevertheless pronounced intact (/m/-mud, or /mmm/-mud).

(3) A third pattern involved responses in which one consonant was separated from the rest of the word, as above, but

this time the remainder was pronounced as a separate unit. The isolated consonant was occasionally separated from the word initial position, and at other times from the word final position (/m/-ud, or pu-/t/). In either case, the children rarely pronounced the consonant as a separate unit, but rather as the dominant portion of a new second syllable, with a schwa for a vowel. If the segmented portions of the word were to be reunited, a new bisyllabic word unit would emerge (/mə/ud).

(4) A fourth pattern involved identifying the vowel, first with one, and then with the other consonant of a Consonant-Vowel-Consonant word (mu-ud, bla-ack).

(5) In the fifth pattern the child was able to identify the medial vowel as a separate component, but a vowel remained attached either to the initial or to the final consonant, or to both (/m/- or /mə/-u -ud).

Both the preceding patterns of phonemic identifications and the restriction in the number of successful phoneme distinctions described earlier may be related to a number of factors which may affect phoneme identification by preschoolers. Such factors were described in Chapter II. They include difficulties in making explicit phoneme identifications due to the effects of cognitive or linguistic immaturity, problems in detection of certain phonemes because of different information loads carried by vowels and consonants, the varying characteristics of allophones which may not be easily related to phonemes and the confusion of phonemes due to their change in quality in different word positions.

The preceding discussion indicated that certain segmentation patterns could be discerned within children's phoneme identifications. Analysis of these patterns indicated that the children, a few months prior to enrolling in Grade One, were still identifying phonemes at a very primitive level.

2. Phoneme Synthesis. In a preceding portion of the chapter it was shown that, as was the case with phoneme analysis, phoneme synthesis was not generally undertaken successfully by the children. In this part the results of sound synthesis which differed from the required word are collated and analyzed in order to determine how children dealt with phonemes when these were identified for them by the investigator. The following pattern of responses was noted.

(1) Responses which indicated that children failed to understand the function of the exercise. Such responses involved attempts to equate the sounds offerred for synthesis with certain natural phenomena (f-a-r = "wind blowing").

(2) Responses which showed that some children concentrated on, or remembered, the last spoken sound and offerred a new word beginning with that sound (h-a-n-d = "don", f-a-r = "run").

(3) Responses which suggested that some sounds were difficult to identify in certain word positions. Voiceless stops (/p/), glides (/h/) and laterals (/l/ were among the sounds which could not be readily distinguished initially (l-igh-t = "polite", "right", "kite"). Other sounds were

difficult to identify in word final posi ons (r-oo-m = "run", "rock").

(4) Initial consonant blends were sometimes omitted "g-r-ea-t = "ate", or reduced to one consonant (p-l-ay = "pay").

The results of this assessment pointed to some misapprehensions regarding the phonemic elements in sound blending. Such findings may indicate an area requiring further research.

Syllable Identification

The review of literature in Chapter II indicated that a number of educators expressed doubts regarding the usefulness and the wisdom of teaching dictionary syllabication to beginning readers. The syllabication patterns to be found in dictionaries is believed to be at variance with children's patterns and may thus have little practical utility in helping children to unlock the printed word. The results of the syllable identification portion of the Segmentation Test were therefore collated, tabulated, analyzed and subsequently compared to the syllabication patterns employed in Webster's Third New International Dictionary (1968). In the pages that follow, information regarding children's syllabication is discussed under each of these headings: 1. Syllabication Patterns; 2. Children's Versus Dictionary Syllabication and 3. Differences between Children's and Dictionary Patterns.

1. Syllabication Patterns. Responses to the bisyllabic and trisyllabic word segmentation patterns were calculated, summarized and entered in Figure 10.

The results shown in Figure 10 indicate that children were

able to identify the syllabic junctures within bisyllabic words successfully, but were less proficient with trisyllabic words; both types of segmentations improved after the addition of concrete aids. When working with bisyllabic words and following verbal instructions five children could not detect any syllables, five were able to identify certain syllables only, and twenty recognized all the syllables as defined in this study. But after the implementation of concrete aids no children remained in the non-segmenting and partially segmenting categories, identifying all of the syllables within bisyllabic words. Trisyllables proved to be somewhat more difficult for the children. Without concrete aids there were five non-segmenters, twenty-three partial segmenters and two complete segmenters. With concrete aids no children remained in the non-segmenting category, fifteen became partial, and fifteen more became complete segmenters.

The difference between children's achievement on the bisyllabic and trisyllabic segmentations might have been minimized, were the scores not affected by two unforeseen circumstances. The first was that one of the trisyllabic words, "idea", was often pronounced, and thus probably perceived as a bisyllabic word by some children. Their version of this word began conventionally, but ended with /i/ and an offglide. Were this not the case, fourteen more children might have become complete segmenters. The second circumstance which might have adversely affected children's identification of syllables in trisyllabic words was the fact that these words were inadvertently placed after the twenty-two bisyllabic entries. Most children appeared to work out a particular rhythmic pattern which they used throughout the bisyllabic segmentations. It

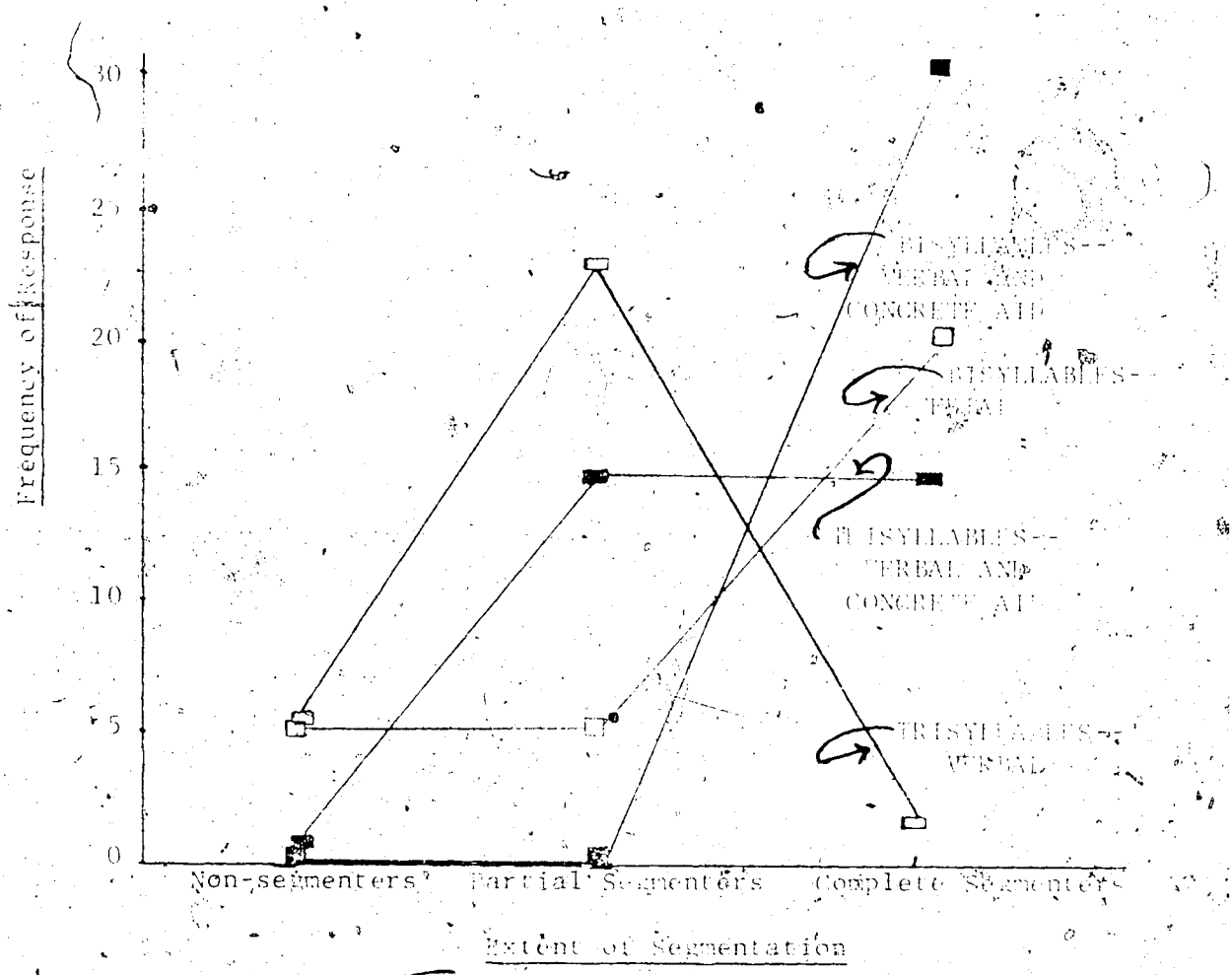


Figure 10

TRISYLLABIC AND BISYLLABIC PATTERNS OF SEGMENTATION ON THE SEGMENTATION TEST

might have been difficult for them, after establishing this bisyllabic rhythm, to readjust to a new, trisyllabic one.

The findings regarding children's syllable identifications, reported in response to the first two research questions, represent a fusion of scores on both the bisyllabic and trisyllabic word divisions. In view of the preceding reservations about the results of the trisyllabic test, children's explicit perception of syllables may more closely parallel their scores on bisyllabic word divisions shown in Figure 10 and thus may be far more efficient than previously stated.

2. Children's Versus Dictionary Syllabication. The results of a comparison between children's and the entry words of dictionary syllabication patterns are summarized below and are reported in detail in Appendix H.

10/26 words were syllabicated as in the dictionary

1/26 words, "idea", was ideosyncratically articulated by many children, as a bisyllabic word

15/26 words were syllabicated in a manner which differed from that suggested in the entry words of the dictionary. These differences are discussed more fully below.

3. Difference between Children's and Dictionary Patterns. The type of words in which children's and dictionary syllabications differred are summarized in the following section. With a few exceptions, (which are noted in Appendix H) children's syllabication patterns correspond to the patterns described below:

(1) Inflected words whose base form was preserved in the entry words of the dictionary differred from children's syllabication, if,

(a) the base form ended in two dissimilar consonants

(Dictionary = want-ed; Children = wan-ted)

(b) the base form contained a Consonant-Vowel-Consonant structure and the vowel was pronounced "long" and was symbolized by a final "e" in spelling

(Dictionary = mak-ing; Children = ma-king)

(2) Words with double consonants,

(Dictionary lit-tle; Children = li=ttle)

(3) Words which preserve their root structure which terminates in a consonant cluster,

(Dictionary = morn-ing; Children = mor-ning)

(4) Words containing medial consonant letters which in the children's perception could occur as shown, below,

Dictionary = nev-er; Children = ne- er).

The preceding discussion indicated that with respect to certain words there was consistency in syllabication between dictionary entry words and children's patterns. But with reference to a large group of words the children's patterns differed from dictionary entry word standards.

The findings regarding children's syllable identification described in the three preceding subsections suggest several conclusions. First, most beginning readers not only have implicit knowledge of

syllabication, but are generally able to bring such knowledge under explicit scrutiny--even though some children may require concrete aids in order to achieve the task. Second, it may be possible to modify the methodology of teaching syllabication for optimum results.

Many educators advocate the teaching of principles of syllabication. For instance, below are some excerpts from Dechant's (1964) suggestions for a "simplified" approach to teaching syllabication:

> ...the first principle to be learned is that every syllable contains a sounded vowel. At times, a vowel constitutes a syllable: a-corn...vi-o-let...cer-e-al, o-pen, i-de-a.
>
> The pupil also must learn that a syllable may contain more than one vowel. In this instance, the two vowels are usually pronounced as one, the first one being long and the second one, silent (boat).
>
> When two consonants follow a vowel, as in after, kitten, pencil, summer, and butter, the word is divided between the two consonants, and the first syllable ends with the first consonant. In instances of this kind the second consonant is silent when the consonants are the same...(pp. 306-307)

The above excerpts constitute some of the rules. These are followed by seven types of exceptions. Thus, some of the exceptions are:

> ...Not all words follow the rule. For example, planet... robin...study...present...join the consonant to the first vowel. This makes the first vowel short and the accent is on the first syllable.
>
> ...Whenever three or more consonants appear between two letters, the pupil must learn to look for consonant blends or speech consonants. These are never divided: thus, gam-bler, mi-grate.
>
> ...Sometimes it is necessary to divide between two vowels: cre-ate.
>
> ...in a compound word the division comes between the two words making up the compound...
>
> ...Prefixes and suffixes are usually set apart from the rest of the word:...hot-est. (pp. 308-309)

As shown by the Segmentation Test findings, most children, several months prior to beginning reading in Grade One, are already

capable of making syllable identifications within spoken utterances. This fact should make it possible to initiate instruction in principles of syllabication with the knowledge children possess already. For example, there may be little need to teach the following principles: (a) "every syllable contains a sounded vowel", (b) when two dissimilar consonants which are not sounded as one follow a vowel "the word is divided between the two consonants, (c) which "consonant blends or speech consonants" are not to be divided, (d) in compound words the division should come between the words and (e) occasionally a division should be made between two vowels. Most children are explicitly aware of these principles before they begin formal reading instruction, since no test subject divided the test words in any other fashion (See Appendix H).

What may be taught, however, is the fact that printing conventions dictate some syllabications which may be at variance with children's patterns. Thus it may be profitable to point out each of the following writing conventions: (a) some single spoken sounds may be represented by two letters in writing. This, however, does not affect the nature of the syllable, (b) in the case of two consonants following a vowel which are the same, the division in printing, as opposed to the division in speaking, falls between the two consonants, (c) suffixes must be separated <u>in toto</u>, in spite of pronunciation, and (d) that certain words, for one reason or another, "join the consonant to the first vowel".

In teaching syllabication it may be helpful to remember that children's explicit syllabication may be aided by implementation of

concrete aids, but may be hindered by ideosyncratic articulations of certain words by the children.

Summary

The data collected from the first three sections of the test were examined with respect to the existence of segmentation patterns within each of the linguistic units investigated in this study. The results of this analysis indicated that specific patterns could be discerned in children's segmentations and that children's segmentations did not always coincide with the expected norm. Some implications for the teaching of syllabication were considered.

III. CHILDREN'S KNOWLEDGE OF THE TERMS "WORD" AND SPEECH "SOUND"

This section describes the findings regarding children's understanding of the terms "word" and speech "sound", as measured by the fourth part of the Segmentation Test. On the basis of previously described experimental and theoretical data it was expected that children may encounter difficulties in understanding the meaning of these terms.

Since the two preliminary questions of the interview showed that none of the children has had any extensive experience with formal written language, the findings probably indicate the children's own deductions regarding the meaning of the two terms under investigation.

Children's responses to the terminological portion of the test were accumulated for each question, analyzed and classified. The findings based upon these responses are discussed below under the headings: "Children's Perception of the Term 'Word'" and "Children's Perception of the Term Speech 'Sound'".

Children's Perception of the Term "Word"

The following table represents a summary of children's responses to the questions dealing with the term "word".

Table II

SUMMARY OF RESPONSES TO THE QUESTION DEALING WITH THE TERM "WORD"

Category	Number of Respondents
don't know	12
attempted, unsuccessful definition	3
definition by example	11
letter	1
sound	1
number	1
qualifying phrase	1
TOTAL NUMBER OF RESPONDENTS	30

As the preceding table indicates, the term "word" was imperfectly understood by most of the test children. Twelve children were unable to offer any definitions. Three gave a definition which by its breadth would encompass all of the linguistic units ("word", defined as "something somebody said" would include phonemes, syllables and sentences). Eleven children defined "word" by giving examples, but since all of the examples given were nouns, the children's estimate of the term may not

be an inclusive category. One child felt that a "word" was a letter, another considered it to be a number, and one child asked defensively, "What kind of a word?"

Not constrained by the need to devise a definition, seventeen children were able to give examples in reply to the request to "Tell me some words." With two exceptions, "go" and "thank you", most of the examples consisted of nouns.

Besides corroborating the earlier observation that children's notion of the meaning of the term "word" may be quite restricted, this finding demonstrates that the concept "word" should be deliberately taught to beginning readers, if the term is to be included in the reading program. Such results also suggest that the methodology of instruction in the meaning of the term should be based upon the knowledge that beginning readers may be best able to understand questions and explanations predicated upon examples of the term's designation.

Children's Perception of the Term "Sound"

The table which follows summarizes children's responses to the question dealing with the meaning of the term "sound". It was expected from the preceding theoretical analysis and the findings regarding the perception of linguistic units investigated in this study, that since the term "word" is more frequently encountered in ordinary everyday conversation and is more available to children as a percept it would be more apparent to children than the term speech "sound". It was therefore anticipated that the term speech "sound" would be less well understood by the children than the term "word".

Table III

SUMMARY OF RESPONSES TO THE QUESTION
DEALING WITH THE TERM "SOUND"

Category	Number of Respondents
don't know	8
attempted, unsuccessful definition	3
definition by example	2
sound	1
explanatory phrase	14
noise imitating animal	2
TOTAL NUMBER OF RESPONDENTS	30

The data shown in Table III indicates that the term speech "sound" was little understood by the test subjects, and was less familiar to them than the term "word". Eight children did not attempt to compose any definition, and three, as was the case with "word", defined sounds as too inclusive a category ("When people talk"). Two children gave examples by means of a definition. And most of the respondents did not think of a sound as a human utterance.

Nevertheless in response to the question, "Do we make sounds when we speak?" most children replied in the affirmative. When asked to give examples of sounds, only two children were able to indicate some phonemes. The answers of the other children could be divided into three

broad categories: (a) non-human noises (the child roared), (b) "loud", raised voices (swearing", "screaming", "hollering") and (c) common phrases ("hello", "good bye", "see you later", etc.)

In response to the request by the investigator to indicate some sounds in the words which had been given earlier in the interview the children who could spell a few words were also able to identify all of the sounds in the words which they could spell. But the children who revealed that they did not know how to spell tended to identify only consonants. This finding suggests, once more, that consonants tend to be more obvious to young children than vowels.

Summary

The test results discussed in the preceding section showed that the subjects had a very vague notion regarding the meaning of the terms "word" and speech "sound". Although the term "word" appeared to be somewhat better understood than the term speech "sound", the children's understanding of both terms fell short of conventional expectations.

SUMMARY OF THE CHAPTER

The preceding chapter dealt with a description and discussion of the findings of the study.

Information gathered in response to the first research question suggested two major conclusions. First, test children differed in a ability to identify words, syllables and phonemes. Second, of the three

linguistic units tested, syllables were identified most frequently, words, less often and phonemes were detected rarely.

With reference to the second research question, the patterns within children's segmentations showed that within each linguistic unit type certain units were perceived more readily than others.

In examining the data for the preceding two questions it was noted that, in most cases, the implementation of concrete aids increased the extent of segmentations.

The results of the analysis of the findings for the third research question indicated that the two terms are not well understood by preschoolers, but that the term "word" appears to be better comprehended than the term speech "sound".

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter contains a summary of the study, the main findings, the conclusions drawn upon the findings, implications for the teaching of reading and recommendations for further research.

I. SUMMARY OF THE STUDY

The purpose of this study was to investigate children's explicit perception of words, syllables and phonemes and to assess their knowledge of the terms "word" and speech "sound". Although some researchers have reported that an accurate perception of words, syllables and phonemes and a clear idea of the meaning of the terms "word" and speech "sound" may be among the important prerequisites to beginning reading, information about their availability to young readers is quite scanty. In order to explore how children perceive words, syllables and phonemes and to investigate their knowledge of the terms "word" and speech "sound", the subjects were required to carry out the appropriate tasks on the Segmentation Test developed for this investigation.

In reviewing the literature it was proposed that beginning readers may experience difficulty in identifying these linguistic units and in recognizing the meaning of the terms. This may be due to the combined effects of the child's personal characteristics and the nature of language and language usage. As a result the child may be

unable to perceive the linguistic units and terms according t conventional standards. However, because of his particular level of linguistic-cognitive development he may be aided in the performance of such tasks by employing concrete materials. In order to study these conjectures, the following research questions were investigated.

First, the nature and extent of children's word, syllable and phoneme identification ability, accomplished with and without concrete aids, was explored. Three types of respondents were distinguished for each of the verbal and verbal and concrete aid approaches to the task, the non-segmenters, the partial segmenters and the complete segmenters. The child depicted as a non-segmenter was unable to identify any of the required linguistic units. Partial segmenters were considered to be children who could carry out one or more segmentations. Complete segmenters were the children who could identify all of the required linguistic units as defined in this study.

The following procedure was employed to investigate the first research question. Thirty children, fifteen boys and fifteen girls, with equal numbers representing the high, middle and low ability levels and drawn from the low, middle-low and high-middle socio-economic areas were selected for the investigation. Their responses to the word, syllable and phoneme identification sections of the Segmentation Test were recorded on test sheets, charted and reported. It was assumed that if on a particular part of the test, a child could not respond in accordance with test requirements or was only partially successful, he was not yet ready to bring his implicit knowledge of the linguistic units represented in that part under explicit scrutiny. It was further assumed that the

implementation of concrete aids might enable some children to increase their readiness to perform the task.

Second, patterns apparent within children's word, syllable and phoneme identifications were investigated. Two types of patterns were distinguished for each of the verbal and verbal and concrete aid approaches to the task, patterns of identification which paralleled conventional segments and patterns which differed from conventional segments. Patterns coinciding with conventional segments were the words, syllables and phonemes in a form usually identified by adults. Patterns which differed from adult standards were segments of speech which were given instead of adult divisions.

The approach to investigating the second research question was as follows. Responses for segments were recorded in terms of average frequency of occurrence, if the unit corresponded to conventional standards, or according to an exact report of children's segmentation for items which were different from expected norms. This procedure was also followed for the various subclasses of linguistic units within each section. Where applicable, a differentiation of performance with and without concrete aids was recorded.

Third, children's knowledge of the terms, "word" and speech "sound" was studied. Two principal types of responses were sought, manifestation of knowledge of the required terms by means of a definition or by means of a definition by example.

To investigate this question, children's responses to an interview were collated, categorized and analyzed. It was anticipated that few children would be able to respond to questions in accordance

with conventional norms, since many children would not be able to accurately perceive the objects symbolized by the terms.

II. MAIN FINDINGS

The following results were obtained:

With reference to research question 1

(1) Test subjects differed in ability to perceive words, syllables and phonemes, but were generally more successful in identifying syllables, less successful in locating words and least successful in detecting phonemes.

(2) While some children were able to completely identify the syllables and words required by the Segmentation Test, no children were able to segment phonemes in the requisite manner.

(3) The addition of concrete aids improved the identification of words, syllables and phonemes.

With reference to research question 2

(1) Certain patterns were observed in children's segmentations of words, syllables and phonemes. These patterns sometimes differred from conventional expectations.

(2) Certain classes of segments found within each of the linguistic units were identified more readily than others.

(3) The addition of concrete aids appeared to clarify the task of item recognition within each of the classes, but was most useful for the identification of certain units

within such classes.

With reference to research question 3

(1) Children's understanding of the meaning of the terms "word" and speech "sound" differred from conventional expectations.

(2) No child was able to give an acceptable definition of the required terms, but some children could define adequately by giving examples.

(3) The term "word" was better understood than the term speech "sound".

III. CONCLUSIONS

The foregoing analysis permitted the following conclusions to be drawn:

(1) Certain pre-Grade One children tend to perceive words, syllables and phonemes at a very rudimentary level.

(2) Pre-Grade One children encounter most problems in recognizing phonemes, fewer problems in identifying words and the fewest problems in detecting syllables.

(3) Concrete aids may be employed to facilitate the task of word, syllable and phoneme identification.

(4) Certain word classes, syllable classes and phoneme classes are more readily accessible than others.

(5) Concrete aids may be employed in order to improve the recognition of linguistic units.

(6) The terms themselves, "word" and "sound", are familiar to most of the children; but to many, their meaning is not entirely clear.

(7) A number of syllabic junctures which were consistently perceived by children differ from the syllabic junctures established by dictionary syllabication.

IV. IMPLICATIONS

The major findings of the study suggest some important implications for the teaching of beginning reading:

(1) Words, syllables and phonemes appear to be imperfectly perceived by pre-Grade One children. Since only a few months intervene between the time of this test and the initiation of reading in Grade One, some children, when introduced to reading, may continue to encounter segmentation problems. It is therefore imperative to identify children who operate at lower levels of linguistic analysis, prior to initiating reading instruction in Grade One. Failure to do so may produce reluctant or inefficient readers, since it may lead to the introduction of material which children are not yet ready to learn comfortably and without undue emotional strain.

(2) The Segmentation Test may be used to assess the availability of words, syllables, and possibly, if given later, of phonemes.

(3) Concrete aids may be employed to facilitate the identification and the teaching of words, syllables and phonemes.

(4) In order to reduce task complexity, those classes of words, syllables and phonemes which are perceived most readily should form the basis of beginning reading.

(5) Children who are not yet ready to perceive phonemes explicitly may experience problems in spelling. Depending upon the level of their linguistic functioning, such children may either be unable to perceive any phonemes as separate entities and thus will not know how to represent phonemes by letters, or they may fail to perceive vowels and be able to represent only consonants. They may also encounter difficulties in writing words whose phonemes must be represented by certain allophones of phonemes.

(6) Some reading problems commonly attributed to difficulties with auditory perception may, instead, stem from an inadequate or belated development of linguistic-cognitive skills. It may therefore be necessary to reconsider the types of remedial items and procedures designed to reduce the effects of such disability.

(7) Children syllabicate easily, even though some may require concrete aids in order to achieve the task. This means that there is no need to teach many facets of syllabication. It may be necessary, however, to describe and teach

the syllable patterns dictated by writing conventions. Since children's syllabication patterns may differ from dictionary patterns, unnecessary complications may arise in the process of learning to read, unless a distinction between dictionary and children's patterns is acknowledged, and differentiated for the children.

V. SUGGESTIONS FOR FURTHER RESEARCH

The following suggestions for further study are recommended:

(1) Since only thirty students participated in this exploratory study, more definitive conclusions regarding children's perception of words, syllables and phonemes and their knowledge of linguistic terms could be drawn from the findings from a larger sample.

(2) Correlation studies between children's performance on the Segmentation Test and pupil variables (such as intelligence, sex, etc.) as well as children's performance on the Segmentation Test, together with pupil variables and reading achievement at the end of Grade One, may help to establish the predictive value of the Segmentation Test.

(3) While only a few months intervene between the administration of the test at the kindergarten level and the beginning of reading in Grade One, important changes in children's ability to respond to the items on the Segmentation Test may take place. Investigation of children's performance

on the Segmentation Test at the beginning of Grade One may give a more valid measure of their perception of words, syllables and phonemes and their knowledge of the terms "word" and speech "sound". At this level, the phoneme identification portion of the test may give a greater number of linguistic segmentations.

(4) Each section of the Segmentation Test may be expanded to yield a greater amount of information, or, each section may be presented separately as individual tests, in order to concentrate on certain facets of segmentation.

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APPENDIX A

CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY, LEVEL 0

APPENDIX B

SEGMENTATION TEST

SEGMENTATION TEST

SECTION 1. DIRECTIONS FOR ADMINISTRATION

Introduction

Introduce tape-recorder by discussing its merits, function, etc. If necessary, demonstrate how a tape-recorder operates.

Part I--Word Identification

At the conclusion of the introductory discussion, say:

"I know a game we can play with the tape-recorder.

(1) First I am going to say something, and you say it back to me:

John runs."

Pause, to allow the child to repeat the sentence. Then continue:

"(2) I can say 'John runs' in parts. I'll speak very slowly and stop every time I feel I can stop. Listen carefully!

John - runs.

How many parts do you hear?" /2/

Repeat both step (1) and (2), if necessary.

"(3) And now I am going to say something else, and you say it back to me:

Jane plays."

Pause, so that the child may repeat the sentence.

"(4) This time you say 'Jane plays' in parts. Speak very slowly and stop every time you feel you can stop.

Encourage the child to try. Repeat the directions if a child

fails to grasp the required procedures.

Now introduce each test sentence in turn, using the procedure for step (3), or, if necessary for both steps (3) and (4).

Continue as long as the child either partially or completely segments the sentences into the required words. Stop after the third sentence if the child makes no segmentations (so that his score for each attempted sentence is 0).

If the child either (a) makes no segmentations, (b) has not segmented all of the sentences completely or (c) is unable to proceed after having completed some of the required segmentations, concrete materials should be introduced. The following procedure should be followed. Say:

"(5) I can say 'John runs' in parts and put down a chip* for each part. Watch carefully!"

Demonstrate. Offer box with chips.

"(6) Now <u>you</u> say 'Jane plays' in parts. Speak <u>very slowly</u> and put down one chip for each part."

Return to sentence 1 if (a) the child has failed to make any segmentations or if (b) he has not segmented all of the sentences completely; otherwise continue with the sentence in which segmentation had not been carried out. Do not repeat the sentences which the child has segmented completely.

<u>Part IIa--Phoneme Identification (Analysis)</u>

Begin this portion of the test as follows. Say:

"Here is another game we can play with the tape-

recorder.

(1) Again I am going to say something, and you say it back to me:

dog."

Pause, to allow the child to repeat the word. Continue:

"(2) This time I am going to say the same thing in parts. I'll speak very slowly and stop every time I feel I can stop:

d - o - g

How many parts do you hear?" /3/

(3) Now I am going to say something else and you say it back to me:

mud."

Pause, so that the child may repeat the word.

"(4) Can you say 'mud' in parts? Speak very slowly and stop every time you feel you can stop.

Encourage the child to try. Repeat the directions if the child fails to grasp the required procedures.

Now introduce each test word in turn, using the procedure for step (3), or, if necessary for both steps (3) and (4).

Continue as long as the child either partially or completely segments the words into the required phonemes. Stop after the third word if the child makes no segmentations.

If the child either (a) makes no segmentations, (b) has not segmented all of the words completely or (c) is unable to proceed after having completed some of the required segmentations, concrete aids

should be introduced. The following procedure should be followed: Say:

"(5) I can say 'dog' in parts and put down a chip* for each part. Watch carefully!"

Demonstrate. Offer box with chips.

"(6) Now you say 'mud' in parts. Speak very slowly and put down one chip for each part.

Return to word 1 if (a) the child has failed to make any segmentations or if (b) he has not segmented all of the words completely; otherwise continue with the word in which segmentation had not been carried out. Do not repeat the words which the child has segmented completely.

Part IIb--Phoneme Identification (Synthesis)

Proceed as follows. Say:

"(1) Now I am going to say something in parts and you tell me what I said:

m - a - n."

(Pronounce the word, "man", separated into its constituent phonemes.)

"(2) What did I just say?"

Pause, so that the child may reply to the question, then continue with the test words.

Part III--Syllable Identification

The following instructions should be presented:

"Here is another game we can play with the tape-recorder.

(1) Again I am going to say something, and you say it back to me:

paper."

Pause, to allow the child to repeat the word.

"(2) Now I am going to say 'paper' in parts. I'll speak very slowly and stop every time I feel I can stop. Listen carefully!

pa - per."

(3) This time I am going to say something else, and you say it back to me:

tiger."

Pause, so that the child may repeat the word. Continue:

"(4) Now you say 'tiger' in parts. Speak very slowly and stop every time you feel you can stop.

Encourage the child to try. Repeat the directions if a child fails to grasp the required procedures.

Now introduce each test word in turn, using the procedure for step (3), or, if necessary for both steps (3) and (4).

Continue as long as the child either partially or completely segments the words into the required syllables. Stop after the third word if the child makes no segmentations (so that his score for each attempted word is 0).

If the child either (a) makes no segmentations, (b) has not segmented all of the words completely or (c) is unable to proceed after having completed some of the required segmentations, concrete materials should be introduced. The following procedure should be

followed. Say:

"(5) I can say 'paper' in parts and put down a chip* for each part. Watch carefully!"

Demonstrate. Offer box with chips.

"(6) Now you say 'tiger' in parts. Speak very slowly and put down one chip for each part."

Return to word 1 if (a) the child has failed to make any segmentations or if (b) he has not segmented all of the words completely; otherwise continue with the word in which segmentation had not been carried out. Do not repeat the words which the child has segmented completely.

Part IV--Interview

Read the questions to the child and record his replies on the blanks provided.

Question 10 requires the child to identify the phonemes in words which the child gave in response to the preceding nine questions.

*Bingo chips were employed as concrete aids.

SECTION 2. RECORDING AND SCORING

Part I--Sentence Identification

1. Recording. Spaces between words in each sentence are coded numerically. Draw a diagonal through the appropriate numerals as follows:

(1) 0 - if the child makes no segmentation

(2) 1 - " " " " the first segmentation

(3) 2 - " " " " the second segmentation

(4) 3 - " " " " the third segmentation

(5) OMIT the numbers at which segmentations were not made.

For example, for a child reading "The school - is - new." mark the numerals 2 and 3; for a child reading "The school is new" draw a diagonal through 0.

2. Scoring. A child who makes all of the required segmentations is considered to be a "complete segmenter" (CS), a child who is able to carry out some of the segmentations is classified as a "partial segmenter" (PS) and a child who fails to attain any segmentations is categorized as a "non-segmenter" (NS). Examine the child's performance, select and circle the appropriate designation located in the upper right hand corner of the section and enter this designation in the appropriate column. "V", if the child was working while following verbal instructions, and "VCS", if the child was segmenting in conjunction with concrete aids.

Part IIa--Phoneme Identification (Analysis)

1. Recording. Children's replies may be transcribed phonemically or may be recorded graphemically, representing the segmented sounds by means of dashes between letters or aggregates of letters. In the latter case, however, it will be necessary to use a schwa /ə/, corresponding to the first sound in the word "about", to portray some of children's segmentation efforts.

2. Scoring. See the section on scoring on page 114.

Part IIb-Phoneme Identification (Synthesis)

1. Recording. Correctly synthesized words should be check marked, incorrectly synthesized words should be recorded phonemically, or graphemically, and unsynthesized words should be followed by a dash.

2. Scoring. See the section on scoring on page 114. No entry will be made under "VCA" (verbal instructions and concrete aids) since concrete aids are not employed in this part of the test.

Part III--Syllable Identification

1. Recording. Diagonals should be drawn through the numerals representing segmentations. The following procedure should be employed. Draw a diagonal through the appropriate numeral as follows:

(1) 0 - if the child makes no segmentation

(2) 1 - if the child makes the first segmentation

(3) 2 - if the child makes the second segmentation, etc.

(4) two contiguous numerals if one sound is pronounced both with the preceding and the following syllable.

For example, if a child says "never", a diagonal should be drawn through (0); if a child says "nev-er", a diagonal should be drawn through the numeral (2) and if a child says "nev-ver", one diagonal should go through the numeral (2), and another through the numeral (3).

2. Scoring. See the section on scoring on page 114.

Part IV--Interview

1. Recording. Decisions regarding the extent of children's knowledge of the terms "word" and speech "sound" must of necessity be made subjectively, depending upon the type of definition required by each examiner. Such decisions would be made on the basis of the recorded answers to the interview questions.

2. Scoring. Since three types of responses were sought, i. e., more or less complete definitions of the terms, partial definitions of the terms and erroneous, or no definitions of the terms, the same designations used for the preceding portions of the test, CS, PS, and NS, might be employed.

SEGMENTATION TEST

Date of Test _____

Name _____

C. A. _____

I. Q. _____

School _____

SCORE		
Part	V	VCA
I. Words		
IIa. Phonemes (Analysis)		
IIb. Phonemes (Synthesis)		
III. Syllables		
IV. Interview ("Word")		
IV. Interview ("Sound")		

PART I--WORD IDENTIFICATION

Section 1. (unaided)

Score

NS/PS/CS

1. Pat (1) came (0).
2. The (1) school (2) is (3) new (0).
3. They (1) like (2) each (3) other (S) (0).
4. Anne (1) is (2) a (3) big (4) girl (0).
5. The (1) children (S) (2) had (3) a (4) party (S) (0).
6. His (1) books (2) were (3) on (4) the (5) table (S) (0).
7. The (1) old (2) man (3) brought (4) some (5) water (S) (0).
8. Mother (S) (1) gave (2) the (3) girl (4) a (5) present (S) (0).

Section 2. (with concrete aid)

Score

NS/PS/CS

1. Pat (1) came (0).
2. The (1) school (2) is (3) new (0).
3. They (1) like (2) each (3) other (S) (0).
4. Anne (1) is (2) a (3) big (4) girl (0).
5. The (1) children (S) (2) had (3) a (4) party (S) (0).
6. His (1) books (2) were (3) on (4) the (5) table (S)(0).
7. The (1) old (2) man (3) brought (4) some (5) water (S)(0).
8. Mother (S) (1) gave (2) the (3) girl (4) a (5) present (S)(0).

---

*Although the words comprising the sentences are separated by bracketed numerals, the sentences should be read in a normal, conversational manner. Should the numerals prove to be too distracting to allow smooth reading, a duplicate copy (immediately following this page) not containing numerals may be used for administration. In either case, the first sheet should be employed for recording results.

The following copy of the first part may be used to facilitate administration:

Section 1. (unaided)

1. Pat came.
2. The school is new.
3. They like each other.
4. Anne is a big girl.
5. The children had a party.
6. His books were on the table.
7. The old man brought some water.
8. Mother gave the girl a present.

Section 2. (with concrete aid)

1. Pat came.
2. The school is new.
3. They like each other.
4. Anne is a big girl.
5. The children had a party.
6. His books were on the table.
7. The old man brought some water.
8. Mother gave the girl a present.

PART IIa--PHONEME IDENTIFICATION (Analysis)

1

Score

NS/PS/CS

1. put _____
2. did _____
3. face _____
4. red _____
5. mean _____
6. thing _____
7. saw _____
8. right _____
9. used _____
10. turn _____
11. how _____
12. where _____
13. both _____
14. black _____
15. work _____
16. not _____
17. those _____
18. should _____
19. up _____
20. group _____
21. is _____
22. came _____
23. soon _____
24. room _____
25 close _____

PART IIb--Phoneme IDENTIFICATION (Synthesis)

Score

NS/PS/CS

1. g - o _____
2. l-igh-t _____
3. ou-t _____
4. f-a-r _____
5. c-a-n _____
6. r-oo-m _____
7. u-se _____
8. g-r-ea-t _____
9. p-l-ay _____
10. h-a-n-d _____

PART III--SYLLABLE IDENTIFICATION TEST

			Score (V)	Score (VCA)
1.	people	1. peo(1)ple**	NS/PS/CS	NS/PS/CS
2.	every	2. e(1)ve(2)(3)ry		
3.	music	3. mu(1)s(2)ic		
4.	morning	4. mor(1)n(2)ing		
5.	going	5. go(1)ing		
6.	very	6. ve(1)r(2)(3)y		
7.	children	7. chil(1)d(2)ren		
8.	present	8. pre(1)s(2)ent		
9.	started	9. star(1)t(2)ed		
10.	better	10. be(1)tt(2)(3)er		
11.	outside	11. out(1)side		
12.	table	12. ta(1)ble		
13.	any	13. a(1)n(2)(3)y		
14.	under	14. un(1)d(2)er		
15.	office	15. o(1)ff(2)(3)ice		
16.	wanted	16. wan(1)t(2)ed		
17.	never	17. ne(1)v(2)(3)er		
18.	something	18. some(1)thing		
19.	little	19. li(1)tt(2)(3)le		
20.	enough	20. e(1)n(2)ough		
21.	other	21. o(1)th(2)(3)er		
22.	making	22. ma(1)k(2)ing		
23.	another	23. a(1)no(2)th(3)(4)er		
24.	idea	24. i(1)de(2)a		
25.	already	25. al(1)rea(2)d(3)y		
26.	together	26. to(1)ge(2)th(3)er		

*Write "VCA" after any segmentation requiring concrete aids.

PART IV--INTERVIEW

Score

NS/PS/CS

1. Can you write or print? _____
2. What can you write (or print)? _____
3. What is a word? _____
4. Tell me some words: _____
5. What is a sound? _____
6. Name some sounds? _____
7. Do we make sounds when we speak? _____
8. Tell me some sounds we make when we speak: _____

_____

9. Do you hear different sounds in the words you have given me? _____

_____

10. Tell me some sounds you hear in _____

_____

APPENDIX C

CLASSIFICATION OF SENTENCE PATTERNS

CLASSIFICATION OF SENTENCE PATTERNS

Sentence Patterns	Examples
NP V_i	1. Pat came.
NP Be ADJ.	2. The school is new.
NP V_t NP	3. They like each other.
NP Be NP	4. Anne is a big girl.
NP have NP	5. The children had a party.
NP Be ADV.	6. His books were on the table.
NP V_t NP	7. The old man brought some water.
NP V_t NP NP	8. Mother gave the girl a present.

KEY

NP = Noun Phrase
V_i = Intransitive Verb
V_t = Transitive Verb
Adj. = Adjective
Adv. = Adverb

APPENDIX D

CLASSIFICATION OF MONOSYLLABIC WORDS ACCORDINC TO NUMBER OF PHONEMES

CLASSIFICATION OF MONOSYLLABIC WORDS ACCORDING TO NUMBER OF PHONEMES

One-Phoneme Words

I	A

Two-Phoneme Words

AIR	DAY	IS	OF	SHE	WAY
ALL	DO	IT	OFF	SHOW	WE
AM	EACH	KNEW	ON	SO	WHO
AN	EYES	KNOW	ONE	THE	WHY
ARE	GO	MAY	OR	TO	YOU
AS	HE	ME	OUR	TOO	
AT	HIGH	MY	OUT	TWO	
BE	HOW	NEW	SAW	UP	
BOY	IF	NO	SAY	US	
BY	IN	NOW	SEE	USE	

Three-Phoneme Words

AND	FACE	HERE	NAME	SOON	TOWN
ASK	FAR	HIM	NEED	SURE	USED
BACK	FEEL	HIS	NIGHT	TAKE	WAS
BEEN	FEET	HOME	NOT	TELL	WELL
BIG	FIVE	HOUSE	OLD	THAN	WERE
BOOK	FOR	KEEP	PLAY	THAT	WHAT
BOTH	FOUR	LEAVE	PUT	THEIR	WHEN
BUT	FULL	LET	REAL	THEM	WHERE
CAME	CAVE	LIGHT	RED	THEN	WHICH
CAN	GET	LIKE	RIGHT	THERE	WHILE
CAR	GIVE	LOOK	ROAD	THESE	WHOSE
COME	GOD	LONG	ROOM	THEY	WILL
COULD	GONE	MADE	RUN	THING	WITH
CUT	GOOD	MAKE	SAME	THIS	WOULD
DAYS	GOT	MAN	SAID	THOSE	YEAR
DID	HAD	MEAN	SAYS	THREE	YET
DOES	HAVE	MEN	SEEN	THROUGH	YOUR
DONE	HAS	MIGHT	SHOULD	TIME	
DOOR	HEAD	MORE	SIX	TOOK	
DOWN	HER	MUCH	SOME	TOP	

Four-Phoneme Words

BEST	GIRL	LEFT	THINK
BLACK	GREAT	MOST	TOLD
BOARD	GROUP	MUST	THINGS
BROUGHT	HAND	NEXT	TURN
CALLED	HARD	SCHOOL	WANT
CHURCH	HEARD	SHORT	WENT
CLOSE	HELP	SMALL	WORK
FIND	JUST	STILL	YEARS
FOUND	KIND	PAST	
FROM	LAST	PLACE	

Five-Phoneme Words			
FIRST	FRONT	HANDS	STREET

APPENDIX E

CLASSIFICATION OF POLYSYLLABIC WORDS ACCORDING TO NUMBER OF SYLLABLES AND POSITION OF PRIMARY STRESS

CLASSIFICATION OF POLYSYLLABIC WORDS ACCORDING TO NUMBER OF SYLLABLES AND POSITION OF PRIMARY STRESS

Bisyllabic Words

Primary Stress on First Syllable				Primary Stress on Second Syllable	
ABLE	GOING	NOTHING	SOMETHING	ABOUT	ENOUGH
AFTER	HAVING	OFFICE	STARTED	ABOVE	INTO
ALMOST	LITTLE	ONLY	TABLE	ACROSS	OUTSIDE
ALWAYS	MAKING	OPEN	UNDER	AGAIN	TODAY
ANY	MANY	OTHER	VERY	ALONE	UNTIL
BETTER	MONEY	OVER	WANTED	AROUND	
CHILDREN	MORNING	PARTY	WATER	AWAY	
CITY	MOTHER	PEOPLE		BECAUSE	
EVEN	MUSIC	PRESENT		BEFORE	
EVERY	NEVER	REALLY		BEHIND	

Trisyllabic Words

ALREADY	ANOTHER	IDEA	TOGETHER

APPENDIX F

EXAMPLES OF CLASSIFICATION OF RAW DATA FOR RESEARCH QUESTION 1

EXAMPLES OF CLASSIFICATION OF RAW DATA FOR RESEARCH QUESTION 1

Word Identification--Boys

Child's Code Number	Mode of Identification																	
	V*									VCA*								
	Sentence Number								Extent of Segm.	Sentence Number								Extent of Segm.
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8	
6	1	23	123	124	23	24	2345	1234	PS	1	23	123	1234	23	24	234	1234	PS
7	1	23	2	-	-	-	-	-	PS	1	23	123	1 34	2 4	24	-	12 45	PS
8	-	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	-	NS
9	-	-	-	-	-	-	-	-	NS	1	2	2	23	-	-	-	-	PS
10	-	-	-	-	-	-	-	-	NS	1	123	123	1234	1234	1234	12345	12345	CS

* Verbal Instructions
** Verbal Instructions and Concrete Aids

Phoneme Identification--Girls

Child's Code Number	Mode of Identification			
	V*		VCA*	
	Type of Phoneme Analysis	Extent of Segment.	Type of Phoneme Analysis	Extent of Segment.
5	Repeated demonstration word	NS	No response	NS
6	Laughed at segmented demo. word--would not attempt segmentation	NS	No response	NS
7	Repeated demonstration word	NS	"I forgot the parts."	NS
8	/m/-/mʌd/, put/put, did/did	PS	/fə/ -ace (face) /sə/-un (sun), etc.	PS
9	/m/-mud (unable to proceed)	PS	No response	NS

Phoneme Synthesis--Boys

Child's Code Number	Words										Extent of of Synthesis
	go	light	out	far	can	room	use	great	play	hand	
5	-	-	✓	are	anton	-	you see	-	-	-	PS
6	-	polite	✓	run	cannateen	✓	✓	-	-	ant	PS
7	gall	✓	✓	✓	✓	rock	used	gate	plate	and	PS
8	-	-	-	-	-	-	-	-	-	-	NS
9	✓	-	✓	fun	✓	-	✓	✓	✓	✓	PS

Key

No response.....	-
Correct synthesis.....	✓
Partial synthesis.....	PS
Non-synthesis.....	NS

Syllable Identification--Boys

Child's Code No.	Number of Bisyllabic Word													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	1	2	2	1	2	1	2	1	1	1	1	2	1
2	1	0(1)*	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5 VCA-	1	1	1	1	1	2,3	1	1	1	1	1	1	1	1

Child's Code No.	Number of Bisyllabic Word								Extent of Seg.	No. of Trisyl. Word				Extent of Seg.
	15	16	17	18	19	20	21	22		23	24***	25	26	
1	2	1	2	1	1	2	2	1	CS/ **	3	-	1,2	1,2	PS/PS**
2	1	1	1	1	1	1	1	1	PS/CS	1,2	1	1,2	1,2	PS/PS
3	1	1	2,3	1	1	1	2,3	1	CS/	(1,2)	1(1,2)	1(1,2)	1,2	PS/TS
4	1	1	1	1	1	1		1	CS/	1,2	1,2	1(1,2)	1,2	PS/TS
5	(2)	2	2	1	2	1	2,3	2	NS/CS	3	1	-	1	NS/PS

Syllable Identification--Continued.

*Bracketed numerals on the chart indicate syllabication after the addition of concrete aids.

**Designations on the left of the diagonal indicate performance prior to the addition of concrete aids; those on the right of the diagonal indicate performance after the implementation of concrete aids.

***Word number 24 was the word "idea" which was articulated as a bisyllabic word by many of the children.

APPENDIX G

EXAMPLE OF DATA COLLATION FOR RESEARCH QUESTION 1

EXAMPLE OF DATA COLLATION FOR RESEARCH QUESTION 1

TOTAL RESPONSES TO THE WORD IDENTIFICATION PORTION OF THE SEGMENTATION TEST

Approach	Number of Respondents			Total
	Non-segmenter	Partial Segm.	Complete Segm.	
V*	16	11	3	30
VCA**	3	22	5	30

*V = segmentations accomplished while following verbal instructions.

**VCA = segmentations accomplished after the implementation of concrete aids.

APPENDIX H

COMPARISON OF CHILDREN'S SYLLABICATION PATTERNS AND THE SYLLABICATION PATTERNS TO BE FOUND IN THE ENTRY WORDS OF A DICTIONARY

COMPARISON OF CHILDREN'S SYLLABICATION PATTERS
AND THE SYLLABICATION PATTERNS TO BE FOUND
IN A STANDARD DICTIONARY*

Words	Dictionary Patterns Entry Words	Children's Patterns (N=30) Dictionary Equiv. Pats. Number	Dictionary Differing Patterns Type of Pattern		Total
PEOPLE	peo-ple	29	peop-le (1)		1
EVERY	eve-ry	23		ev-vry (5)	5
MUSIC	mu-sic	24	mus-ic (4)	mus-sic (1)	5
MORNING	morn-ing	3	mor-ning (26)	morn-ning(1)	27
GOING	go-ing	30			0
VERY	ver-y	2	ve-ry (19)	ver-ry (9)	28
CHILDREN	chil-dren	28	child-ren (2)		2
PRESENT	pres-ent	7	pre-sent (23)		23
STARTED	start-ed	2	star-ted (28)		28
BETTER	bet-ter	1	be-tter (26)	bett-er (3)	29
OUSIDE	out-side	30			0
TABLE	ta-ble	28		tab-le (1)	1
ANY	an-y	5	a-ny (17)	an-ny (8)	25
UNDER	un-der	27			0
OFFICE	of-fice	5	o-ffice (18)	off-ice (7)	25
WANTED	want-ed	5	wan-ted (25)		25
NEVER	nev-er	7	ne-ver (12)	nev-ver (11)	23
SOMETHING	some-thing	30			0
LITTLE	lit-tle	0	li-ttle (27)	litt-le (3)	30
ENOUGH	e-nough	25	en-ough ( )	en-ough (1)	1
OTHER	oth-er	2	o-ther (21)	oth-ther (7)	28
MAKING	mak-ing	3	ma-king (27)		27
ANOTHER	an-oth-er	0	a-no-ther(16)	a-noth-ther(3)	19
IDEA	i-de-a	5			0
ALREADY	al-read-y	1	al-rea-dy (24)		24
TOGETHER	to-geth-er	1	to-ge-ther(17)	to-geth-ther (3)	20

Webster's Third New International Dictionary (1968)