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The Differential Effects of Visual and Auditory Information in Determining Meanings of Derived Words at Third and Fifth Grade Levels

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THE DIFFERENTIAL EFFECTS OF

VISUAL AND AUDITORY INFORMATION IN

DETERMINING MEANINGS OF DERIVED WORDS

AT THIRD AND FIFTH GRADE LEVELS

THESIS

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Abstract

The primary purpose of this research was to investi-
gate the differential effects of visual (graphic) and
auditory (phonetic) information in accessing meanings of
derived words which are variant at the surface phonetic
level, but retain in their orthography a relationship to
the deeper lexical level. These effects were examined
developmentally at the third and fifth grade levels using
a researcher-designed multiple-choice test. The test in-
strument consisted of derived words not typically found
in basal series at the grade levels under consideration
and also met the criteria of pronunciation shift while
retaining orthographic similarity to the base word. The
test was presented in two forms at each grade level in a
suburban western New York school district. The Visual
Form was presented to 105 third grade and 127 fifth grade
subjects. The Auditory Form was presented to 94 third
grade and 96 fifth grade subjects. The secondary purpose
was to examine relationships between ability to determine
meanings of derived words in each modality and performance
on a standardized reading measure, the Metropolitan Achieve-
ment Test. A two-way analysis of variance and a product-
moment correlation study were employed to test the hypoth-
eses at the .01 and .001 level of significance. The data

confirmed that children at both grade levels can utilize graphic information to determine meanings of derived words. The data also indicated a relationship between reading achievement and performance on the Visual Form of the test at the third and fifth grade levels, and the Auditory Form of the test at the third grade level. A study focusing on the fifth grade level was recommended.

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Chapter I

Statement of the Problem

Purpose

The primary purpose of this study was to investigate the ability of children to determine meanings of derived words which have undergone a pronunciation shift while retaining a close orthographic relationship to their base words. The ability to determine meaning using graphic information (the written word) was compared to ability to determine meaning using auditory information (the spoken word). This ability was examined developmentally in each modality by examining the performance of third graders and fifth graders. The relationship between the child's ability to determine meaning and his/her performance on a standardized reading measure was also examined.

The following questions were posed:

1. Is there a significant difference in performance on a multiple-choice definition test between third-grade students who receive the derived words graphically and third-grade students who receive the same words via the auditory modality?

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2. Is there a significant difference in performance on a multiple-choice definition test between fifth-grade students who receive the derived words graphically and fifth-grade students who receive the same words via the auditory modality?

3. Is there a significant interaction between grade level and mode of presentation?

4. Does performance in each mode of presentation (i.e., visual, auditory) correlate significantly with performance on a standardized reading measure at the third grade level?

5. Does performance in each mode of presentation correlate significantly with performance on a standardized reading measure at the fifth grade level?

Need for the Study

In recent years there has been increased emphasis on the role of language in the process of reading acquisition (C. Chomsky, 1970, 1972, 1979; Goodman, 1968, 1969a, 1969b, 1972b, 1976; Smith, 1973, 1978, 1979). Language may be represented in both speech and print, thus words have both phonetic and orthographic properties. The relationship of these properties and consequent implications for reading instruction is a continuing and controversial issue.

A great deal of the discussion in the area of read-
ing is concerned with phoneme-grapheme (sound-symbol)
correspondence. The question of the regularity (or
irregularity) of this correspondence is a major area of
concern. Beginning reading instruction which deals with
letters and sounds, whether it is based on phonics, the
linguistic method, or any other method, tends to treat
phonetically consistent spellings as regular in the
language and phonetically inconsistent spellings as ir-
regular.

Linguists (N. Chomsky, 1970; Chomsky & Halle, 1968;
Reed, 1965, 1970; Venezky, 1967, 1970a, 1970b; Weir &
Venezky, 1968) have presented theories concerning the
relationship between the writing system and spoken
language. These theories require a reconsideration of
the function and efficiency of English spelling.

The English writing system is frequently described
as alphabetic with an orthography characterized by a
relationship (though imperfect) to speech sounds rather
than to meaning. However, in an analysis of the English
sound system, Chomsky and Halle (1968) asserted that
English orthography does not reflect the sounds pro-
duced when words are actually spoken (phonetic represen-
tation), but rather reflects the underlying forms of the

meaningful units making up these words (their lexical representation).

In an elaboration of aspects of this theory which have potential utility for reading and spelling, C. Chomsky (1970) specifically states that the conventional spelling of words corresponds more closely to this underlying abstract level than to the surface phonetic form which words assume in speech. This is based on the theory that the speaker of the language has at his disposal an internalized grammar (set of rules) which includes a lexicon containing information about the phonetic representation (pronunciation), syntactic function, and meaning of words, and their relationships to each other. The representation of every word in this internal lexicon is its "abstract underlying form" and each form has a "lexical spelling" which conveys meaning.

Partly as a consequence of the invention of the printing press, there has been little substantive change in the writing system in the last five hundred years (Haas, 1969). There have, however, been extensive changes in the phonology. Furthermore, from the 13th century to the present, there has been extensive borrowing of lexical items, together with their spelling or a

rationalized adaptation thereof, from Latin, French, and Greek (Furness, 1964). In addition to being resistant to historical change and reflecting etymological history, conventional English orthography functions as a reasonably adequate system for a wide range of English dialects. The pronunciation shifts which occur over time and dialectical differences, for the most part, stem from adjustments in phonological rules, rather than differences in lexical spellings.

In addition, the "irregularity" of the phoneme-grapheme correspondence of English words is often a product of a pronunciation shift when suffixes are added (e.g., nation/national, declare/declaration, Canada/Canadian). In a lexicon incorporating a phonetic or phonemic transcription, these pairs of words would each receive a different spelling and become separate lexical items. Chomsky and Halle (1968) argue that speakers of the language have internalized the phonological rules governing such instances and use these rules automatically in production and comprehension of spoken language. English orthography conveys the relationship of such words despite surface phonetic differences.

A general principle of English is that phonetic variation is not indicated in the spelling when it is

predictable by general rules (Chomsky & Halle, 1968; Venezky, 1967). Thus, "conventional orthography, by corresponding to lexical spelling rather than phonetic representation, permits immediate direct identification of the lexical item in question, without requiring the reader to abstract away from irrelevant phonetic detail" (C. Chomsky, 1970, p. 291). The conventional orthography represents deeper similarities which have a semantic function in the language.

Consider, for example, the word photograph. Notice the stress shift and vowel alternations in the derived forms photographic and photography. This stress shift is a general rule that applies to many words in the English language. The reduction of unstressed vowels to a neutral schwa is also a regular rule followed automatically by native speakers. For these words there is a single underlying form in the internal lexicon and the conventional orthography captures this relationship more closely than does the phonology.

Chomsky's theory and theories of a similar nature are often discussed in the literature which considers reading as a psycholinguistic process (Ehri, 1978; Francis, 1970; Gillet & Temple, 1978). Research tends to support the psycholinguistic view that mature readers

use orthographic information to access meaning during the reading process (Lazerson, 1974-75). It cannot be assumed that young readers function in a like manner. However, recent research has strongly suggested that children enter school with a fairly sophisticated linguistic competence, i.e., the young child has internalized many of the phonological and syntactic rules of his language (C. Chomsky, 1969, 1971; Read, 1971, 1975). The question raised, therefore, is whether young children who have had relatively limited experience with written language are able to utilize the lexical information contained in derived words which have undergone a pronunciation shift. Furthermore, is there evidence that this ability occurs developmentally as experience with the written language is increased; and, finally, is this ability related to reading proficiency?

Research Design

To examine this question, a researcher-designed test instrument was used. Derived words were chosen which had a base or root word included in the core reading vocabulary at or before the third grade level (Harris & Jacobson, 1972). In addition, words chosen met the criterion of surface phonetic variation (i.e., vowel alternations--wide/width, consonant alternations--fact/factual,

interrelated features of stress shift and vowel reduc-
tion--telephone/telephonic). A representative sample
at each grade level was given the multiple-choice test
with the printed derived word followed by four defini-
tion choices for each item. A similar sample was given
a test with the same format, except that the printed
form of the derived word was omitted and replaced with
an oral representation.

Definition of Terms

This study utilizes several terms and concepts that
warrant clarification.

Phoneme-grapheme correspondence is the relationship
of a significant language sound (phoneme) to a letter
(grapheme) or letters. The orthography consists of the
written symbols (graphemes) arranged to form words.
Graphic information consists of the visual information
which is conveyed by graphemes and their ordering in
the formation of written words. Auditory information
consists of the acoustic information conveyed by pho-
nemes and their ordering to form spoken words. A
morpheme is the minimal meaning unit of language, and
may be "free" (e.g., cat) or "bound" (e.g., -es, -s,
denoting plurality).

Semantic, in this study, refers to the definition of a word and the association of this meaning with auditory and/or graphic forms of the word. Etymology deals with the origin and derivation of words. Derived words are composed through the process of adding prefixes or suffixes to already existing root or base words (e.g., atomic is a derivation of atom).

Chomsky's model of linguistic competence consists of three systems of rules referred to as the phonological, the syntactic, and the semantic components; in addition, there is a lexicon which contains the stock of abstract lexical units or words which make up the language (N. Chomsky, 1957, 1965, 1967). A lexicon is the total stock of morphemes in the language. The internal lexicon can be viewed as a mental dictionary which consists of the information a language user has acquired about the words of his language; in addition to information about the meaning of a word, the lexicon contains information about spelling, pronunciation (phonology), and morphological and syntactic properties of words.

Limitations of the Study

The subjects in this study were limited to third and fifth grade levels. An attempt was made to choose

a representative sample of these two grade levels, but
any conclusions will necessarily be limited to third
and fifth graders.

There was no attempt in the testing procedure to
control for "decoding to sound" or subvocalization by
the group presented with the graphic form of the test
instrument. It is conceivable, therefore, that this
group could be utilizing auditory information instead
of, or in addition to, graphic information. Based on
the assumption that these words are not typically found
in children's expressive vocabulary (Moskowitz, 1973),
and that these words are "irregular" at the phoneme-
grapheme level of correspondence, one could predict
that any vocalization may be incorrect.

Any number of words could have been included in the
test instrument. It is conceivable that different words
would produce different results, depending on the popu-
lation tested, their background and experiences.

It should be noted also, that the words in both the
graphic and auditory conditions were presented in isola-
tion. This is not a natural reading situation and cau-
tion should be observed in generalizing from such a task
to the task of reading connected discourse.

Summary

To examine children's ability to access meaning of derived words which have undergone a pronunciation shift, performance on a multiple-choice definition test which provided graphic information (i.e., the written word) was compared to performance on the same test with the graphic information removed (i.e., the word presented orally instead). This study examined the differential effects of having graphic information available as opposed to auditory information only. These effects were examined developmentally by testing third graders and fifth graders. An analysis of performance in each modality (i.e., visual and auditory) and relationships to reading achievement was performed.

Results of the analysis of the data were considered as they relate to theories on the psycholinguistic nature of the reading process.

Chapter II

Review of the Literature

Purpose

The purpose of this study was primarily to analyze
the differential effects of graphic and auditory infor-
mation in accessing meanings of derived words which are
variant at the surface phonetic level, but retain in
their orthography a relationship to the deeper lexical
level. These effects were examined developmentally by
analyzing third and fifth grade levels. Ability to de-
termine meanings of derived words was correlated with
reading achievement in each modality at both grade levels.

The theories and research which form the basis of
this investigation, for purposes of review, will be dis-
cussed in terms of three areas:

The Relationship of Spoken and Written Language

Access to Meaning of Printed Words

The Psycholinguistic Nature of the Reading Process

The Relationship of Spoken and Written Language

Traditionally, linguistic theories have viewed
written English as a system in which letters code pho-
nemes, albeit with much inconsistency (Bloomfield, 1942;

Fries, 1962; Hall, 1966). These "irregularities" have often been cited as a cause of difficulty in reading acquisition, generating instructional programs such as i.t.a. (Initial Teaching Alphabet), which modify the printed form of the word so that letter-sound correspondences are regularized (Harrison, 1964). However, Lee (1972), in an extensive investigation, concluded that spelling irregularity is a minor cause of reading difficulty. Furthermore, studies by Hanna, Hanna, Hodges, and Rudolph (1966) and Venezky (1967) have shown, through computer analysis, that English orthography is highly regular when main linguistic features underlying the orthography are considered.

A revolutionary theory presented by Chomsky and Halle (1968) asserted that English orthography does not reflect the sounds of words (phonetic representation), but reflects the underlying form of the meaningful unit making up these words (lexical representation). This was based on Chomsky's (1957, 1965, 1967) model of linguistic competence, consisting of three systems of rules--phonological, syntactic, and semantic. In addition, he proposed an internal lexicon which contains information about meaning, spelling, pronunciation, and morphological and syntactic properties of lexical units. As language competence

develops, the language user internalizes the rules governing these systems and increases the storehouse of information contained in the internal lexicon.

The Sound Pattern of English (Chomsky & Halle, 1968) describes the general rules by which abstract underlying forms (lexical representation) are converted into phonetic realizations. This model does not account for input from print, unless print is first transformed to speech. However, Chomsky's model is often presented in support of theories which challenge the belief that the reader needs to convert print to the phonetic level to gain meaning.

The conventional English spelling system itself seems to offer support for Chomsky's theory (Baron, 1977). Many spellings which do not code the surface phonology of words preserve a correspondence between spelling and meaning. English words undergo pronunciation shifts when suffixes are added. These shifts can include vowel alternation (nation/national, extreme/extremity, wide/width), consonant alternations (medical/medicine, revise/revision, right/righteous), and the interrelated features of stress shift and vowel reduction (photograph/photography, telegraph/telegraphy). These examples are common occurrences in English and reflect phonological rules which

are automatic and internalized in the linguistic system
of the native speaker, according to Chomsky and Halle.
Because of the regularity of these phonological rules,
the lexical spellings can ignore them, as does the con-
ventional orthography. Thus, the relationship of these
word pairs is preserved in their orthographic represen-
tation; whereas, their phonological representation masks
their common lexical identity.

The implication of this theory is that when con-
ventional English orthography is examined beyond the
phoneme-grapheme correspondence level, that is, on the
basis of morphemic and syntactic properties rather than
pronunciation, it is much more systematic than was pre-
viously thought. The orthography is viewed as bearing
an indirect rather than a direct relation to the sound
system. Spelling, rather than being arbitrary and
"irregular," is motivated and the lexical identity (the
meaning-bearing items in the language) are more apparent
in print than in speech. A writing system which employs
a strict phoneme-grapheme correspondence would obliterate
the lexical relationships of thousands of English words
(C. Chomsky, 1970; Gleitman & Rozin, 1977) and would
add unneeded phonetic detail.

Less abstract theories view the writing system as
often transcribing a level of organization somewhere

between the meaning structure (morphology) and the sound
structure (phonology) and thus forming a morphophonemic-
morphographemic correspondence (Gleitman & Rozin, 1977;
Ruddell, 1976; Venezky, 1979a). These theorists propose
utilization of this level in reading and writing instruc-
tion and argue that even young children develop an in-
sight into this organizational system of the written
language (see also, Gibson, Shurcliff, & Yonas, 1970).

A controversial aspect included in Chomsky and
Halle's theory is that morphologically related words
are not stored in the internal lexicon as separate units,
but rather are derived from a single lexical item (i.e.
histor-y, histor-ical, histor-ian). This becomes the
basis for Chomsky's statement that the orthography is a
"near optimal system" because the lexical item is con-
veyed in the English spelling of these words (N. Chomsky,
1970).

Richardson (1977) concluded, based on his experi-
ment and a review of psychological research, that there
was no empirical evidence to support the transformational
account of lexical derivation. Steinberg (1973) also
questions the assumption that words containing deriva-
tional morphemes are stored as lexical items. In addi-
tion he challenges the validity of the vowel shift rule

and the reality of Chomsky and Halle's (1968) underlying phonological representation.

Much of Steinberg's criticism is weakened by what seems a literal interpretation of the "lexical spelling" of Chomsky and Halle's "underlying phonological representation." However, in an experiment designed to test the validity of the vowel shift rule's productivity, using mature native speakers and pseudo-words, Steinberg (1973) found that there was no vowel change from the base to the derived form in over 90 percent of the cases.

The type of experimentation upon which both Richardson and Steinberg base their conclusions is open to question. Many of the psychological tasks offered as evidence do not necessarily qualify as measures of extracting meaning. It is argued that any effects of such tasks (i.e., pronunciation tasks, tachistoscopic perception, same-different comparison of words, lexical decision tasks, visual search tasks, naming latency) may be nonlexical or post-lexical. They may involve use of meaning, but do not require it (Baron, 1977; Coltheart, Davelaar, Jonasson, & Besner, 1977).

Furthermore, in determining productivity of linguistic rules, context may be an important factor. The children in Berko's classic experiment (examining, among

other features, the productivity of inflectional rules using nonsense words) were provided with text as well as pictures (Berko, 1961). Templeton (1972b) found, at grade levels six, eight, and ten, that context significantly affected correct pronunciation of derived words. Moskowitz (1973) concluded in a study of children ranging in age from five to twelve, that the vowel shift rule is acquired slowly and later as a result of exposure to the English spelling system. However, at an age when children are relatively unfamiliar with much of the relevant vocabulary, they are able to manipulate vowel shift patterns of psuedo-words and are strongly resistant to other patterns.

The emerging view that phonological competence is developed through exposure to, and is preceded by an awareness of, the orthographic representation of derivational forms (Moskowitz, 1973; Templeton, 1979a, 1979b) adds a new dimension to traditional pedogagical strategies. Templeton (1979b) specifically found that orthographic presentation of a base word significantly increased the probability of correct pronunciation of the derived word. In addition, students were able to generalize orthographic knowledge to pseudo-words while phonological knowledge was not similarly generalized. She

concluded that orthographic knowledge "may be a necessary though not entirely sufficient condition for higher order phonological knowledge" (p. 262).

Access to Meaning of Printed Words

Various lexical decision tasks have been designed in attempts to determine how the reader gains access to the word's entry in the internal lexicon furnishing him with the meaning of the word. Within the construct of an internal lexicon, reading a word for meaning consists of extracting information from the printed word and utilizing the information to gain access to the word's lexical entry.

There are two opposed viewpoints concerning access to meaning of printed words. Those who support the phonological view argue that the graphic representation must first be converted into a corresponding phonological representation which is used to gain lexical access (Gough, 1972; Rubenstein, Lewis, & Rubenstein, 1971). Those who support the second view argue that meaning can be directly accessed solely by use of graphic information (Baron, 1973; Barron & Baron, 1977; Bower, 1970; Kolers, 1970).

The use of graphemic information would seem plausible in instances such as lb., Ala., sq. (Baron, 1977),

reading numbers (e.g., 1979, 5,000), and to distinguish between homophones when the context is ambiguous (Baron & McKillop, 1975). Barron (1978) concluded that a phonetic stage is not necessary to gain meaning of single words, even for children in their first year of reading instruction; however, phonetic recoding is used when reading connected discourse as a strategy to hold individual words in memory until they are understood in context.

Rubenstein et al. (1971) used a lexical decision task in which subjects were to decide whether a word was English or not. Results indicated that negative responses were slower when nonwords had the same pronunciation as English words than when they did not have the same pronunciation. They argued that phonetic mediation is indicated by the slower response for nonwords which sound like English words. For example, brane passes an initial phonetic check and is subsequently rejected in a check of its spelling; whereas melp does not pass the initial phonetic check and is rejected more rapidly. The statistical reliability of these results has been questioned (Clark, 1973).

In addition, Meyer, Schvaneveldt, and Ruddy (1974a, 1974b) raised the issue of a confounding of phonetic and graphemic information in the words used (e.g., burd is

not only phonetically similar but graphemically similar
to <u>bird</u>). They modified the lexical decision task so
that critical comparisons were between pairs which were
both graphemically and phonetically similar (fence/hence)
and pairs that were only graphemically similar (couch/
touch). The results were interpreted as an indication
of phonetic recoding in the graphic condition. However,
Barron (1978) felt that an interpretation indicating use
of both graphemic and phonetic information is equally
plausible.

Coltheart et al. (1977) argued for use of both
graphemic and phonetic information in lexical access
based on results of their lexical decision tasks.
Generalizations from this and similar studies involving
lexical decision tasks have been questioned by Barron
(1978). In his view, semantic processing is not re-
quired in these tasks.

A study which more closely approximates reading for
meaning (Levy, 1975) involved reading of three sentence;
and subsequently deciding whether a test sentence was
among those read. Results indicated that accuracy was
reduced by having the subjects count out loud while
reading. Levy suggested that this condition interfered
with phonetic recoding. Baron (1977) supported these
findings.

Studies using text which had been altered visually but not phonetically (Bower, 1970; Lazerson, 1974-75) found decreased reading efficiency as measured by time, comprehension, eye movement, and oral reading miscues.

Baron (1973) required a "yes" response if a phrase sounded like it made sense. He found that response latency and errors increased on phrases like in the haul compared to phrases like in the hall. The results suggested that use of both phonetic and visual information improved performance.

Kleiman (1975) concluded that his subjects relied on visual information rather than phonetic to access meaning. This experiment required subjects to make decisions about the phonetic, graphemic, and semantic similarity of pairs of words with and without counting out loud. Specifically, he found that the time to make semantic and graphemic decisions increased a similar amount of time when counting (120 and 123 milliseconds), while the time increased by 372 milliseconds in the phonetic task. In addition, Kleiman (1975) compared items which were both phonetically and graphemically similar to items which were not phonetically similar. The time increased about the same amount in both conditions indicating subjects did not use phonetic information even when it was available.

The studies cited so far have presented mixed findings, but there is data which favors the view that fluent readers need not use phonetic information to access meaning and that visual access may be preferred. Barron and Baron (1977) attempted to examine this process developmentally. Children in grades one, two, four, six, and eight were required to make meaning and phonetic similarity decisions about picture-word pairs with and without vocalization. They found that errors increased in the phonetic condition with vocalization at each grade level. However, decision time and errors for the meaning task were not influenced by vocalization at any of the grade levels. They concluded from these results "that even children who have had slightly less than a year of formal reading instruction are able to use graphemic information to go directly to the meanings of printed words" (p. 48).

The Psycholinguistic Nature of the Reading Process

Psycholinguistic theory and research related to beginning reading is basically an attempt to understand how the written word is amalgamated and assimilated into the child's already existing linguistic system. The past decade has seen the influence of psycholinguistics in an increased attention to reading as a language process

(C. Chomsky, 1972, 1979; Ehri, 1978; Gleitman & Rozin, 1973; Goodman, 1968, 1969a, 1969b, 1972b; Goodman & Fleming, 1969; Kavanaugh & Mattingly, 1972; Ryan & Semmel, 1969; Smith, 1973, 1978).

Chomskyan linguistic influence is manifested in a greater emphasis on the two levels of language--the surface structure and the deep or underlying structure, with syntax serving as a bridge between the two levels. As the previous sections of this chapter indicate, theory and research has increasingly turned to the question of meaning--how the written word is expressed, stored, and comprehended.

Smith (1973) presented three basic insights into the psycholinguistic nature of reading:

1. Reading is not primarily a visual process (the more information the reader brings to the printed page, the less visual information he needs to read for meaning).

2. Comprehension precedes the identification of individual words (the nature of written English is such that the meaning of many words must be identified before their correct pronunciation can be ascertained).

3. Reading, therefore, is not decoding to spoken language.

Goodman (1969a) provided a description of reading as a "psycholinguistic guessing game" involving prediction

based on the sampling of grapho-phonic, syntactic and
semantic information. A proficient reader uses the
least information required to get meaning (Goodman, 1965).
Similarly, Smith (1975) views fluent reading as entail-
ing two basic skills within the competence of the begin-
ning reader: the prediction of meaning and sampling of
surface structure to eliminate uncertainty and, secondly,
the most economical use possible of visual information.

By analyzing oral reading miscues, Goodman (1965)
has demonstrated that even beginning readers use syntac-
tic and semantic information. The "errors" children
make in reading often do not violate the meaning of the
written passage. Based on a series of studies, Goodman
(1968) became convinced that word-perfect reading is in-
efficient and comprehension is decreased.

Responding to those who would reform the English
orthography, Goodman (1972a) stated that "regularity
ought not be confused with complexity" (p. 1258). In
effect, regularizing phoneme-grapheme correspondences
would create a more complex system which would not only
mask the deep or underlying structure of the language,
but would change across time and dialects. Furthermore,
Goodman (1972a) felt that instruction which places undue
emphasis on phonics teaches the processing of written

language to get to meaning, strategies which ultimately interfere with reading efficiency.

Although the beginning reader does not have a completely developed linguistic system, the young child has an implicit knowledge of the phonological, syntactic, and semantic structures of his language (C. Chomsky, 1972; Ehri, 1978; McNeill, 1970). The young child comes to the reading task with a relatively sophisticated linguistic system.

Several studies strongly suggested that pre-readers and beginning readers have little metalinguistic awareness of words as units (Downing, 1970; Ehri, 1975; Holden & MacGinitie, 1972; Reid, 1966). Ehri (1975) showed a relationship between learning to read and awareness of words as units of language, but it is not clear whether the relationship is a consequence or a prerequisite of learning to read.

Ehri (1978) presented a model of linguistic competence which represents written language as a component operating parallel to the phonological component. Output from the graphic component can be fed directly to the syntactic component for further processing. Her model included a lexicon containing orthographic, morphological, phonological, syntactic, and semantic

information about a word. She suggested that the proficient reader utilizes the graphic component which operates on written language and does not pass through the phonological component. She further suggested that the major tasks facing the beginning reader are gaining a conscious awareness of words as entities and amalgamating their syntactic and semantic identities to their graphic form. In her view, this is facilitated by programs which teach beginning readers an awareness of the full linguistic identities of words, an awareness which may be hindered or delayed by instruction that focuses on phoneme-grapheme correspondences or alters English orthography.

Gillet and Temple (1978) proposed a technique which actively involves children in an exploration of words through category-building. The relationships the child discovers will depend on his level of cognitive development. Smith (1975) suggested that this is a strong and automatic activity engaged in by children in the development of word knowledge, despite instructional methods which inhibit it. Gillet and Temple (1978) reasoned that "a child who has learned to construct a sort [i.e., category] that groups by meaning bases has reached a powerful level of generalizations for understanding

language" (p. 139) with advantages for spelling and comprehension of unfamiliar words. The strategy of looking for lexically related words to resolve spelling ambiguities is frequently advocated (C. Chomsky, 1970; Goodman, 1976; Simon, 1975).

Summary of the Chapter

This chapter reviewed the theories and research which addressed the questions of the relationship of spoken and written language and how meaning is derived from printed words. Some basic insights developed through viewing reading as a psycholinguistic process were also reviewed. Since this area of inquiry is relatively new to the field of reading, much of the information is theoretical and conclusions are necessarily tentative. However, a number of recent research studies have attempted to answer some of the questions raised and, when limitations are taken into consideration, some inferences can be drawn.

English orthography bears an indirect relationship to the sound system of the language. When words are examined beyond the phoneme-grapheme level of correspondence (i.e., on the basis of morphemic and syntactic properties) a greater regularity emerges. It is a general rule that morphological and etymological relationships are usually

not subordinated to consideration of sound-symbol cor-
respondence. It has been suggested that lexical identi-
ties of words are more easily discerned in print than
in speech and that proficient readers can use this ortho-
graphic information to access meanings of words.

The psychological reality of the storage of morpho-
logically related words as single lexical items remains
open to further investigation. There is some empirical
data to suggest that the phonological rules governing
pronunciation of many derived words are higher order
rules which are acquired late. There is an emerging
view that this phonological competence is developed
through interaction with the orthographic representation
of these forms.

Lexical decision tasks which attempt to determine
whether meaning of words can be directly accessed via
graphic information or whether words must first be "de-
coded to sound" presented mixed findings. However, a
close examination of the experiments favors the view
that phonetic information need not be used and that
even beginning readers are able to go directly from
graphemic information to meaning.

Psycholinguistic theories view the young child as
having an intuitive awareness of the underlying structure

of language. This implicit knowledge is brought to the reading task and is used as the child attempts to process written language at the level of meaning.

It is hypothesized that proficient readers are able to perceive the lexical identities conveyed in the orthography of derived words and are able to use this information to directly access meaning. What young children, who probably have had limited experience with many of these words in either spoken or written language, do when they meet these words in print requires further exploration.

Chapter III

Design of the Study

Purpose

Chomsky and Halle's (1968) theory of an underlying abstract lexical representation of words which is represented in conventional English orthography has led to the suggestion that mature readers can utilize the graphic information to gain entry to the internal lexicon and derive meaning of words. Recent studies have shown that, at least in some instances, adults and even young children can utilize graphic information alone, or in addition to phonological information, to access meaning of printed language.

The primary purpose of this study was to examine, developmentally, the ability of children to predict the meanings of derived words. One group of subjects at each grade level (third and fifth) was given a researcher-designed, multiple-choice test with the derived words presented graphically. A second group of subjects at each grade level was given the same multiple-choice format with the derived words presented orally instead of graphically.

The secondary purpose of this study was to examine the relationship of ability to predict meanings of derived words via each modality (visual and auditory) and reading achievement as measured by a standardized reading test, the Total Reading subtest of the Metropolitan Achievement Test.

Hypotheses

Main Effects

1. There is no significant difference between means of the visual test and the auditory test at the third grade level.

2. There is no significant difference between means of the visual test and the auditory test at the fifth grade level.

Interaction Effects

3. There is no significant interaction between grade level and mode of presentation.

Correlations

4. There is no significant correlation between performance on the visual test and total reading score at the third grade level.

5. There is no significant correlation between performance on the auditory test and total reading score at the third grade level.

6. There is no significant correlation between performance on the visual test and total reading score at the fifth grade level.

7. There is no significant correlation between performance on the auditory test and total reading score at the fifth grade level.

Preparatory Instruments and Procedures

Development of Test Instrument

A list of derived words was generated which met the criteria of a pronunciation shift while retaining a relationship to the base form in the spelling. In an attempt to ensure some exposure to the base or root form of the derived word, test items were selected using Harris and Jacobson's Basic Elementary Reading Vocabularies (1972). Choice of words in this publication was based on fourteen basal series (reading and content series) in wide use nationally in 1969 and with recent publishing dates. To be included in the "core list" developed by Harris and Jacobson, a word appeared in three or more basal reading series. An "additional list" included words found in four or more series including content series. The vocabulary lists generated were preprimer through sixth grade.

Words were selected for this study which were indicated to be at or below third grade level on the core

list. A few beginning fourth grade core list words were included in the fifty words which were ultimately selected. The derived forms of these base words were used in the test instrument. An additional criterion for final selection was that the derived word was not included in the core list at or below third-grade level.

Using children's dictionaries and thesauri (see Appendix A), simple definitions and three distractors for each of the fifty derived words were composed. Again, Harris and Jacobson (1972) were used as a guide in an attempt to keep reading difficulty of the definitions and the distractors a minor issue. It was also necessary to generate definitions of the derived words without using the base form of the word itself in the definition. If multiple definitions were possible, a definition most closely related to the base form of the word was chosen.

Two forms of the instrument were developed and tested in a pilot study. The Visual Form of the test included the derived word and the four alternatives.

Example:

    1. cleanse

        a. wash

        b. water

        c. fix

        d. invent

The Auditory Form was exactly the same, except that the printed form of the derived word was omitted and was supplied orally by the examiner.

Example:

1.

    a. wash

    b. water

    c. fix

    d. invent

Pilot Study

A pilot study was conducted in June, 1979. The primary purpose of the pilot study was to examine and refine the testing procedures and the test instruments.

The subjects consisted of two heterogeneous third grade classes. One class (n=25) received the Visual Form and one class (n=22) received the Auditory Form of the test instrument.

As a result of the pilot study, some test items were eliminated and some revisions were made in the wording of definitions and distractors. Items eliminated were those found to be extremely difficult or extremely easy as indicated by a Difficulty Index (Linderman, 1967), while maintaining a range of difficulty in the remaining items. Linderman's Discrimination Index was also used

to determine those items which were good discriminators between high performance and low performance.

Subjects

This study was conducted in a middle-income suburban school district in western New York. Permission was given to administer the test instrument to all third and fifth grade classes contained in two elementary buildings. Third (n=105) and fifth (n=127) grade students in one building received the Visual Form of the test instrument. Third (n=94) and fifth (n=96) grade students in a second building received the Auditory Form of the test instrument.

Test Instruments and Procedures

Test Instruments

The final form of the two test instruments consisted of 34 test items. Thirty of the items were derived words which had their base form included in Harris and Jacobson's core vocabulary at or below the third-grade level (1972). Four of the test items were derived words which had base words included in the fourth-grade core vocabulary. One of the derived words appeared in the core list at the fourth-grade level, one appeared at the fifth-grade level, and two appeared at the sixth-grade level. The remaining thirty derived words were

not found on the core list or the additional list at any grade level.

The format of the two forms of the test (the Auditory Form and the Visual Form) was exactly the same, except for the deletion of the printed form of the derived word on the Auditory Form of the test (see Appendix B).

Results from the Metropolitan Achievement Test (Total Reading standard score), administered the preceding Spring by the school district, were used in the analysis.

Procedure

Visual Form. In November, 1979, the Visual Form of the test was administered by the researcher to all third and fifth graders housed in one elementary building.

Preceding the administration of the test instrument, the researcher explained that this was part of a scientific experiment to help us better understand how children learn words. The children were informed that the results would be confidential, but to make the experiment "count" it was important that they do their very best. They were also told that their peers in the other elementary building would be taking the test and it would be interesting to see if one group did as well as the other. It was made clear that this was an untimed test.

A sample word with four alternative definitions
was shown to the children and they were directed to
circle the letter (a, b, c, or d) that was the best
meaning of the word. The following directions were
given:

> You are going to see some more words.
> For each word you see, you are to circle
> the letter (a, b, c, or d) that you think
> is the best meaning for that word. There
> may be some words that you don't know.
> There are probably some words that you
> haven't learned yet. I want each of you
> to be a detective and see if you can find
> the best meaning for each word. Even if
> you are not sure, circle the letter for the
> meaning you think is the best. I want to
> see if you can be good detectives. It is
> important that you answer each and every
> question.

When the children completed the test, they were asked
to check to make sure they had selected an answer for
each item.

Auditory Form. In November, 1979, the Auditory
Form of the test was administered by the researcher to
all third and fifth graders housed in a second elemen-
tary school building located in the same school district.

The preliminary statements and instructions were
the same as those used during administration of the
Visual Form. The demonstration sample was also the
same, except the printed word to be defined was omitted
and was presented orally. The following directions were

given:

> I am going to say some more words. For
> each word I say, you are to circle the letter
> (a, b, c, or d) that you think is the best
> meaning for that word. There may be some
> words that you don't know. There are prob-
> ably some words that you haven't learned
> yet. I want each of you to be a detective
> and see if you can find the best meaning
> for each word. Even if you are not sure,
> circle the letter for the meaning you think
> is the best. I want to see if you can be
> good detectives. It is important that you
> answer each and every question.

Each derived word had previously been phonetically transcribed using the Thorndike and Barnhart Junior Dictionary (Thorndike & Barnhart, 1962) as the source for correct pronunciation. For each item, the derived word was read phonetically by the researcher in the following manner:

> Number one . . . exploration . . . exploration
> . . . the word for number one is . . . explora-
> tion . . . exploration.

When the thirty-four derived words had been presented, the children were asked if they needed any item repeated. Words were repeated for items requested.

Statistical Analysis

Due to limitations of sample selection a one-way analysis of variance, using the Metropolitan Achievement Test scores as pre-test scores, was required to determine if the samples were comparable. A two-way analysis of

variance was required to test the first three hypotheses.
The SPSS computer program available through the State
University College at Brockport Academic Computing
Center was selected for data analysis.

A Pearson product-moment correlation study was re-
quired to test the remaining hypotheses. Correlation
coefficients were calculated for scores on the Auditory
and Visual tests and standardized reading scores at each
grade level.

Summary

The primary purpose of this study was to investi-
gate the ability of children to predict meanings of de-
rived words which are not typically in their reading or
speaking vocabulary by utilizing graphic information.
The subjects were 199 children in the third grade and
223 children in the fifth grade.

As a matter of convenience to the schools involved,
third and fifth graders housed in one elementary building
were given the Visual Form of the multiple-choice test
and were instructed to determine the best meaning of
thirty-four derived words not typically found in the
reading vocabulary at third or fifth grade level. Third
and fifth graders in a second elementary building received

the Auditory Form of the test in which the printed form of the derived word was omitted and was instead supplied orally by the examiner. Scores from the Total Reading subtest of the previously administered Metropolitan Achievement Test were used as an indication of reading achievement.

Chapter IV

Analysis of Data

Purpose

The primary purpose of this study was to investigate, developmentally, children's ability to predict meanings of derived words which retain a close orthographic relationship to their base, while varying at the surface phonetic level. Subjects at two grade levels (third and fifth) were given a multiple-choice definition test in two forms, a visual form with the derived words presented graphically and an auditory form with the derived words presented phonetically. An analysis of variance was performed to examine effects of grade level and test form.

The secondary purpose of the study was to examine the relationship of ability to predict meanings of derived words, in both modalities, and reading achievement. Results of the Metropolitan Achievement Test, Total Reading score, and scores on the Auditory Form and the Visual Form were considered in a product-moment correlation study. The findings and their interpretation are presented in this chapter.

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Preliminary One-Way Analysis of Variance

Because of limitations in sample selection, a one-way analysis of variance was conducted to determine if the auditory and visual groups, at each grade level, were equivalent in reading achievement. The F (1,375) = 1.691 was below the critical F (1,375) = 3.84 at the .05 level of significance. On the basis of the data presented there was no statistically significant difference between means of the two groups. The means and standard deviations by group and grade level are presented in Table 1.

Table 1

MAT Means and Standard Deviations

by Group and by Grade Level

Grade Level	Visual Group		Auditory Group	
	Mean	SD	Mean	SD
Third	63.04	10.93	62.31	10.57
Fifth	77.92	12.47	76.27	12.68
Total	71.27	13.92	69.41	13.60

Findings from the Two-Way Analysis of Variance

The first three null hypotheses were tested by a two-way analysis of variance. The results are presented in Table 2, Table 3, and Figure 1. These hypotheses were tested at the .01 level of significance.

The first null hypothesis tested states that there is no significant difference between mean test scores of the Visual Form of the test and the Auditory Form of the test at the third grade level. The second null hypothesis tested states that there is no significant difference between mean test scores of the Visual Form of the test and the Auditory Form of the test at the fifth grade level. The data relevant to these hypotheses are presented in Table 2 and Table 3. On the basis of these data, the null hypotheses were rejected. The main effect had an F (1,415) = 15.865 which was above the critical F (1,415) = 6.70 at the .01 level of significance.

The third null hypothesis states that there is no significant interaction between grade level and mode of presentation of the test. The data pertaining to this hypothesis appear in Table 2, Table 3, and Figure 1. The data presented failed to reject the null hypothesis. There was no significant interaction between the grade level and the mode of presentation of the test. The

interaction effect had an F (1,415) = 1.464 which was below the critical F (1,415) = 6.70 at the .01 level of significance.

Table 2

Source Table for the Two-Way Analysis of Variance

of Test Scores on Two Forms by Grade Level

Source	df	SS	MS	F
Form	1	543.562	543.562	15.865*
Grade	1	4,931.429	4,931.429	143.939*
Form x Grade	1	50.159	50.159	1.464
Error	415	14,218.170	34.261	
Total	418	19,901.473		

*p < 0.01

Table 3

Mean Test Scores and Standard Deviations

Grade Level	Visual Form		Auditory Form	
	M	SD	M	SD
Third	19.87	6.29	16.85	5.02
Fifth	26.12	6.00	24.49	5.93
Total	23.31	6.87	20.71	6.69
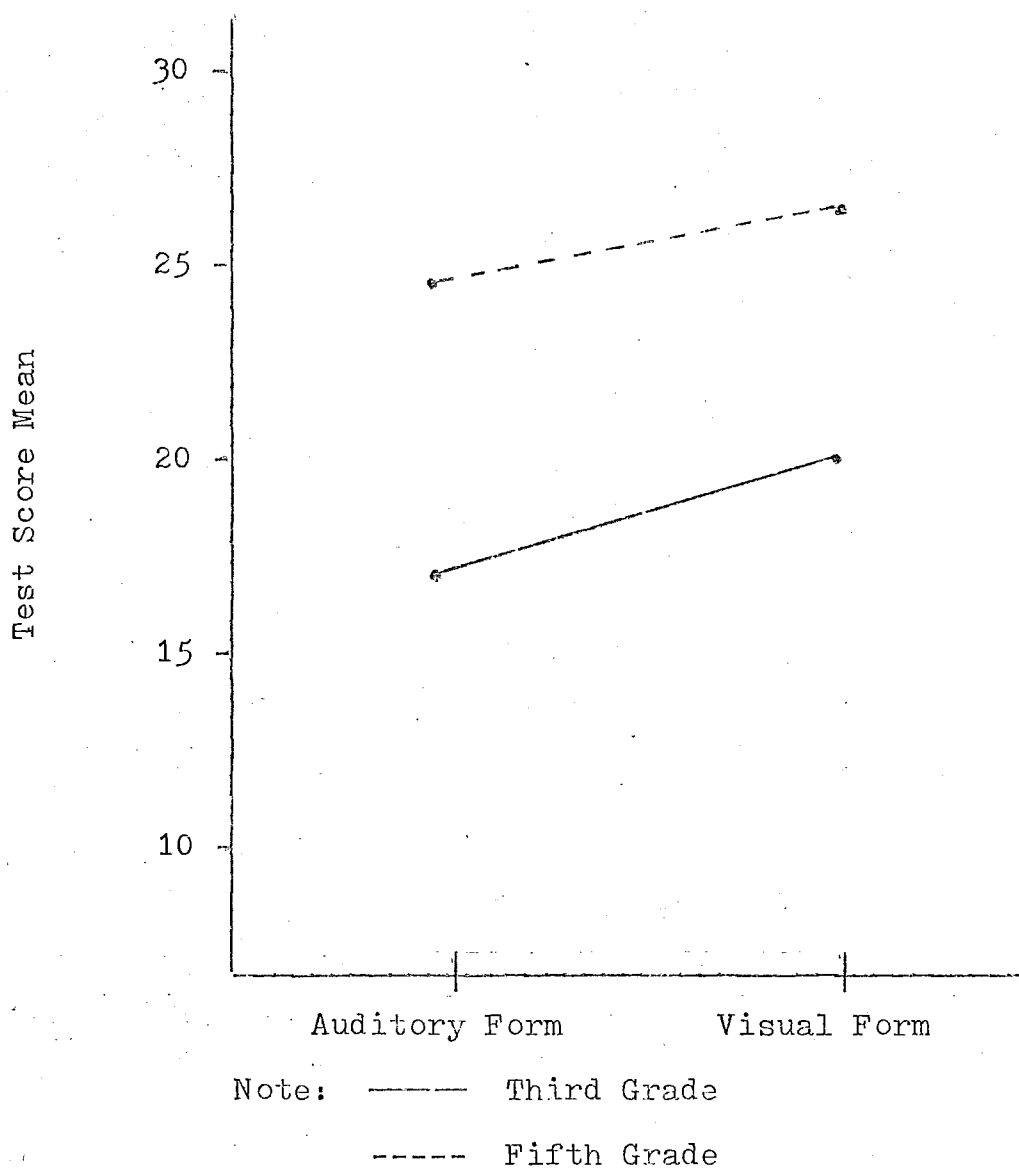
Figure 1. Graphic Representation of Mean Test Scores
by Form and Grade Level

Interpretation of the Data from the Analysis of Variance

The first and second null hypotheses, dealing with Test Form main effect were rejected. The mean test scores for the Visual Form of the test were higher than the Auditory Form of the test at both the third and fifth grade level and the differences were statistically significant. The mean difference was greater for third graders than for fifth graders.

The data failed to reject the third null hypothesis, which dealt with the interaction effect. It can be interpreted that the mode of presentation had a similar effect at each grade level. As would be predicted, mean test scores for fifth grade were significantly higher on both forms of the test than third grade mean test scores.

Findings from the Correlation Study

A correlation study was employed to test hypotheses four through seven. Data pertaining to these hypotheses appear in Table 4. Correlation coefficients were calculated between the variables of grade level (third and fifth) and test form (Auditory and Visual), and the Total Reading standard scores from the Metropolitan Reading Achievement Test. Since MAT reading scores were not available for 42 of the subjects (21 third graders; 21 fifth graders), they were not included in this analysis.

Table 4

Correlations between the Test Scores and

Metropolitan Achievement Test, Total Reading Scores

| | Test Scores | |
Reading Scores	Visual	Auditory
Third Grade	0.7411*	0.5406*
Fifth Grade	0.7243*	0.1537

*p < .001

The fourth null hypothesis tested states that there
is no significant correlation between performance on the
Visual Form of the test and Total Reading score at the
third grade level. This hypothesis was rejected. There
was a significant positive correlation between perform-
ance on the Visual Form of the test and reading achieve-
ment as measured by the Metropolitan Achievement Test,
Total Reading score at the third grade level, r = 0.7411,
p < .001.

The fifth null hypothesis tested states that there
.is no significant correlation between performance on the
Auditory Form of the test and Total Reading score at the
third grade level. This hypothesis was rejected. There

was a significant positive correlation between perform-
ance on the Auditory Form of the test and reading achieve-
ment as measured by the Metropolitan Achievement Test,
Total Reading score at the third grade level, $r = 0.5406$
$p < .001$.

The sixth null hypothesis tested states that there
is no significant correlation between performance on the
Visual Form of the test and Total Reading score at the
fifth grade level. This hypothesis was rejected. There
was a significant positive correlation between perform-
ance on the Visual Form of the test and reading achieve-
ment as measured by the Metropolitan Achievement Test,
Total Reading score at the fifth grade level, $r = 0.7243$,
$p < .001$.

The seventh null hypothesis tested states that there
is no significant correlation between performance on the
Auditory Form of the test and Total Reading score at the
fifth grade level. The data failed to reject this hypoth-
esis. There was no significant correlation between per-
formance on the Auditory Form of the test and reading
achievement as measured by the Metropolitan Achievement
Test, Total Reading score at the fifth grade level,
$r = 0.1537$.

Interpretations of the Data from the Correlation Study

The fourth null hypothesis was rejected. Therefore, it can be interpreted that there was a relationship between performance on the Visual Form of the test and reading achievement at the third grade level. In this study, ability to determine meanings of the derived words, when the words were presented graphically, had a relatively strong positive relationship to reading achievement at the third grade level.

The fifth null hypothesis was rejected. Therefore, it can be interpreted that there was a relationship between performance on the Auditory Form of the test and reading achievement at the third grade level. In this study, ability to determine meanings of the derived words, when the words were presented orally, had a positive relationship to reading achievement at the third grade level.

The data indicate that performance on both forms of the test (Visual and Auditory) is related to reading achievement at the third grade level. However, the correlation between the Visual Form and reading achievement was higher than between the Auditory Form and reading achievement. A trend may be suggested wherein better readers were more able to determine meanings of the

derived words when they could see the words than when
they heard the words.

The sixth null hypothesis was rejected. Therefore,
it can be interpreted that there was a relationship be-
tween performance on the Visual Form of the test and
reading achievement at the fifth grade level. In this
study, ability to determine meanings of the derived
words, when the words were presented graphically, had a
relatively strong positive relationship to reading achieve-
ment at the fifth grade level.

The data failed to reject the seventh null hypoth-
esis. Therefore, it can be interpreted that there was
no relationship between performance on the Auditory Form
of the test and reading achievement at the fifth grade
level.

At the fifth grade level, performance on the Visual
Form of the test was related to reading achievement, while
there was no relationship between performance on the Audi-
tory Form of the test and reading achievement. It may be
hypothesized that there was a developmental difference
between third and fifth grade subjects. While ability
to access meaning of the derived words, both visually
and auditorily, was related to reading achievement at the
third grade level (albeit, the relationship was stronger

for visual processing), at the fifth grade level the relationship existed only for visual processing and not for auditory processing.

Summary

The primary purpose of this study was to compare the ability of children to determine meanings of derived words using graphic information with the ability of children using auditory information. This comparison was examined developmentally by using subjects at the third grade level and at the fifth grade level. The results were correlated with a standardized measure of reading achievement.

The first and second hypotheses were rejected. The analysis of variance revealed that there was a significant difference between the means of the Visual Form and the Auditory Form of the test. The mean of the Visual Form of the test was higher at both third and fifth grade levels. However, the mean difference was greater at the third grade level than at the fifth grade level. The data failed to reject the third hypothesis. There was no interaction effect.

The correlation study investigated the relationship between reading achievement and performance on the Visual and Auditory forms of the test. The fourth, fifth, and

sixth hypotheses were rejected. The data failed to reject the seventh hypothesis. There were significant relationships between reading achievement and performance on the Visual Form of the test at the third and fifth grade levels. There was a significant relationship between reading achievement and performance on the Auditory Form of the test at the third grade level, but not at the fifth grade level.

Chapter V

Conclusions and Implications

Purpose

The primary purpose of this study was to investigate the effects of graphic and auditory information on children's ability to access meanings of derived words which are variant at the surface phonetic level, while retaining a lexical correspondence to the base words in their orthography. A secondary purpose was to explore the possible relationships between ability to determine meaning in each modality and performance on a standardized reading achievement test.

Conclusions

The conclusions reached in this chapter are applicable specifically to the sample of third and fifth grade subjects and to the test instruments and testing procedures used in this study. Any generalizations need to be viewed in light of these factors.

Differential Effects of Auditory and Visual Information

Data from this study favor the view that children can utilize graphic information to determine meanings of words. Both third and fifth grade subjects were better able to determine meanings when the derived words were

received visually than when the same words were received auditorily.

Based on the analysis of variance, the following conclusions were drawn concerning the differential effects of graphemic (visual) and phonetic (auditory) information in accessing meanings of derived words which are variant at the surface phonetic level while retaining their lexical identity in the orthography:

1. Third and fifth grade children were better able to determine meanings of selected derived words when they could see the word. Those children who heard the words only, all else held constant, were less able to determine correct meanings.

2. The superior performance, when the words were presented visually (compared to auditory presentation), was greater for third graders than for fifth graders. The mean difference between the two third grade groups was greater than the mean difference between the two fifth grade groups.

3. Fifth graders, as would be predicted, were better at determining meanings of derived words in both modalities. There was no interaction between mode of presentation and grade level.

The assumption that many of the derived words chosen for this study were not in the receptive vocabulary of

third grade subjects was strengthened during administra-
tion of the Auditory Form of the test. Signs of frustra-
tion were observed by the examiner. Typical comments of
third graders were: "What?"; "That was too hard!"; "I
didn't know any of those words!"; "Are these English
words?" Since receptive competence precedes expressive
competence, it could be inferred that many of these de-
rived words were not in the oral expressive vocabulary
of many of the third grade subjects.

However, when these same words were met in their
graphic form, third grade subjects were better able to
determine the correct meanings. The behaviors inter-
preted as signs of frustration among the children in the
Auditory group were not noted among the children in the
Visual group.

A further behavior observed to be prevalent in the
third grade Auditory group was frequent vocalization and
obvious subvocalization of the derived words by many of
the children subsequent to pronunciation by the examiner,
and in spite of requests to refrain from talking. This
was an unexpected occurrence and one that differentiated
the two groups at the third grade level. The examiner
speculated that by articulating these unfamiliar words,
the children were utilizing tactile-kinesthetic cues in
the search for meaning.

During administration of the Visual Form of the test, there was opportunity for the children in this group to vocalize or subvocalize the words and thus utilize phonetic cues in addition to graphic cues in an attempt to determine meanings of the derived words. Any vocalizations by the children in this group were not apparent. Furthermore, it has previously been suggested that the phonological rules governing the derived words selected for this study are higher order rules which are acquired late and through exposure to orthographic rules (Moskowitz, 1973; Templeton, 1979b). It could be hypothesized that attempts at pronunciation by the subjects while reading the words (especially at the third grade level) would lead to incorrect pronunciation, and be of limited value in determining meaning.

Although this study did not control for "decoding to sound," it was demonstrated that subjects provided with the orthographic form of the word were better able to determine correct meanings of the derived words than those subjects who were provided only with the phonological representation of the same words. It can be inferred that the children in this study were able to utilize information in the orthographic representation of derived words to determine meanings. It can be further

inferred that these children were able to use the lexical information conveyed in the orthography of these words and that their correct responses were in fact predictions based on their knowledge of the more familiar base forms of the derived words.

The mean difference between the two forms of the test was greater for third graders than for fifth graders. Two factors could be operating here. Several years of reading instruction which emphasizes word-perfect reading may inhibit the older child's prediction of meaning through the lexical identity of words. Alternately, the lesser difference at the fifth grade could simply be an indication of an amalgamation of the graphic and phonetic representation of these particular words through greater exposure to them in written and spoken langauge.

Accessing Meaning and Reading Achievement

This study also investigated the relationship of ability to determine meanings of derived words and reading achievement. Based on the correlation study, the following conclusions were drawn:

1. There was a significant relationship between third graders' ability to determine meanings of visually presented derived words and reading achievement.

2. There was also a significant, but lesser, relationship between third graders' ability to determine

meanings of auditorily presented derived words and reading achievement.

3. There was a significant relationship between fifth graders' ability to determine meanings of visually presented derived words and reading achievement.

4. There was no relationship between fifth graders' ability to determine meanings of auditorily presented derived words and reading achievement.

The ability of the third grade subjects to determine meanings of derived words in each modality was related to reading achievement. However, the relationship was stronger for the Visual group. The ability of fifth grade subjects to determine meanings of derived words was related to reading achievement only in the visual modality. There was no relationship for the fifth grade Auditory group. It can be inferred that good readers at both the third and fifth grade levels are better able to utilize lexical information conveyed in the orthography in determining meanings of derived words. It could be postulated that the better readers are less concerned about pronunciation and are more willing to gamble to get meaning from printed language.

The fact that for third graders both the use of auditory and visual information was related to reading

achievement may be indicative of the common factor of intelligence operating at this level; however, it should be noted that the relationship was stronger for the Visual group. At the fifth grade level, one would expect that these subjects have had more exposure to the spoken form of the words selected for this study. At this level, use of graphic information retains a strong relationship with reading achievement, but this relationship is not maintained for the Auditory group. For the older children, there seems to be a divergence of the two modes of representing language in their relationship to reading achievement.

Implications for Research

This study was limited to third and fifth graders in a suburban school district. A more complete examination of this issue should include other grade levels and other populations. A longitudinal study which would follow the same groups would be able to monitor developmental stages and relationships to reading achievement.

Furthermore, subjects for each group were not randomly selected, but rather, at the request of school administration, were designated by school building. Although a one-way analysis of variance determined that there was no significant difference between groups in

reading achievement, there may have been other differ-
ences operating. The philosophies prevelant in the re-
spective buildings, as well as attitudes and behaviors
of administrators and teachers, may have had unknown
influences on the samples used in this study. To val-
idate the findings of this study it would be necessary
to employ the same procedures and instruments with sub-
jects which are randomly selected in one building and/or
with subjects which are matched on other variables in
addition to reading achievement.

Standardized reading tests have been criticized in
recent years. This study used the Total Reading subtest
of the Metropolitan Achievement Test as a measure of
reading achievement. An alternate measure of reading
ability, such as an individually administered reading
test or an informal reading inventory, may be a more
valid indication of reading achievement. Future studies
could also include a correlation study using reading
subskills, or subtests of a standardized reading measure,
to examine if some skills are more significant than
others when related to ability to determine meanings of
the type of derived words discussed in this study.

The present study raised some questions which could
be explored in future studies. This researcher felt

fairly confident that most of the words selected for this study were not typical of third grade oral expressive vocabulary. Thus, the data for the third grade level are indicative of what these third graders could do when they meet, in print, an unfamiliar word which is orthographically related to a more familiar base word.

However, this confidence does not hold for the fifth grade group. Although most of the words chosen for this study were not in Harris and Jacobson's (1972) core vocabulary for the fifth grade level, it was felt by this examiner that fifth graders had been exposed to many of these words, both in their spoken and written form. The findings for the fifth grade level are thus not as clearly indicative of what this age group may do when they meet, in print, unfamiliar words which bear an orthographic relationship to familiar base words. A future study could concentrate on the fifth grade level, selecting derived words which would be less familiar to this age group. Results from such a study would more clearly answer questions about effects of graphic information in determining meanings of derived words at this grade level.

A related question concerns the presence of a relationship between reading achievement and determining

meaning through the auditory modality at the third grade level and the absence of such a relationship at the fifth grade level. Is this truly a developmental difference, or an artifact of the particular words chosen for this study and used for both grade levels?

The behavior noted among children in the third grade Auditory group raises an additional question. What factors contributed to the seeming need for many of these children to pronounce the words themselves? Was this simply a memory device, even though the examiner repeated the words several times and upon request? Or is there something more basic operating at this age level in regard to children's interaction with language? Perhaps the "decoding to sound," so frequently discussed in the literature on reading, is not limited to interaction with written language, but rather a means by which children tap into their own linguistic system, utilizing tactile-kinesthetic information, in their search for meaning in both written and spoken forms of the language, especially if there is a burden placed on memory or comprehension. Would a similar phenomenon be noted among older children if more difficult words were chosen for them, or is this unique to younger children? A study that focused on this question should provide information relevant to reading and language development.

Finally, this study involved words in isolation. The results cannot be assumed to be applicable to reading connected text. It is hypothesized that context would provide additional linguistic cues which would aid in determining meanings of the words in question, in both the visual and the auditory modality.

Implications for Classroom Practice

In reviewing the literature and analyzing the results of this study, several implications for classroom practice emerged. The overwhelming implication is the need for teachers to be aware of, and able to reinforce, the psycholinguistic nature of the reading process. The relationship between the written language and the young reader's linguistic system needs consideration, both for reading and writing. In this light, there should be greater acceptance of the child's ability to form hypotheses and test them using a variety of inputs.

Beers and Henderson (1977) found that first graders progressed from using articulatory information to employing lexical and syntactic information in their spelling. Whether one views the lexicon as an associative network with connections between the lexical entries of semantically related words, (Coltheart, et al., 1977) or accepts Chomsky's view that the derived lexical item and

its base form have the same lexical representation (Chomsky & Halle, 1968), there is evidence to indicate that children can use the lexical information conveyed in the orthography to get to meaning.

Furthermore, recent research (Templeton, 1979b), including this study, supports the theory of a greater familiarity with the orthographic representation than the phonological representation of derived words. It is not necessary to be able to say words accurately to arrive at appropriate meanings. In fact, skilled reading may be inhibited by attempts to decode to sound. Undue emphasis on phonics and word perfect oral reading could serve to inhibit efficient and effective interaction with printed language.

Classroom practices can focus on creating an increasing awareness of the regularity of English orthography, with potential for increasing reading and writing skills, as well as language development. Too frequently children become convinced that there is no "sense" in English spelling. Many words can in fact be spelled systematically on the basis of their morphemic properties rather than pronunciation. Furthermore, a morpheme is generally spelled according to phoneme-grapheme correspondence in one of its occurrences (Russell, 1972). For

example, the second vowel of declaration, inspiration, and adoration are pronounced alike, but by utilizing the lexically related words--declare, inspire, adore--spelling ambiguities can be resolved. Likewise, the logic of silent letters becomes apparent when such words as sign, hymn, muscle, and bomb are related to signal, hymnal, muscular, and bombard (C. Chomsky, 1970; Goodman, 1976).

Etymological information about the origin and history of a word can help the child understand more fully the rationale behind the spelling. This also can provide an exciting tool for developing a sensitivity to language as a living entity with a dynamic history. Kohl (1967) offers an excellent description of such a process that began with a discussion of the word "psyches," led into discussions of etymologies, Greek myth, word meanings and relationships, and consequently opened a whole new world for the children in his class.

It is argued that systematic learning of English spelling, because it preserves the identity of morphemes, may prove a valuable aid in the development of general linguistic competence (C. Chomsky, 1970). A child's knowledge about the make-up of words can help in spelling, and exposing a child to the morphological nature of

spelling may help the child to know more about words.
The present study suggests that third grade is not too
early to begin bringing children to an awareness of lex-
ical identities of words.

Some useful techniques for introducing children
to lexical identities of words have been presented by
C. Chomsky (1970). In discussing morphological relation-
ships among words, children are led to a discovery of
regularity in spelling existing beyond the phoneme-
grapheme level. She further hypothesizes that making
relationships among morphologically related words ex-
plicit to the child will improve reading. "In general,
connections should be brought out among words that he
already knows but may not yet have classified together,
and new words should be introduced for the purpose of
establishing new connections" (C. Chomsky, 1970, p. 302).
The results of the present study offer support for this
view as they indicate that better readers seem to have
at least an implicit awareness of morphological relation-
ships among words in their orthographic representations.
It may be beneficial, especially for less able readers,
to bring these relationships to a level of awareness.

Gillet and Temple (1978) offer a technique through
which children can develop "word recognition strategies

based on multi-level word knowledge, fostered by active exploration of words through category-building" (p. 139). They propose that this method encourages rapid growth in sight vocabulary, versatile word analysis strategies, and better comprehension, as well as affecting spelling, vocabulary growth and writing power.

It seems advantageous for teachers to become sensi-tive to regularities of the English language which may not have occurred to them before. This can take place through informed search, as well as spontaneous explora-tion of language with children when opportunities pre-sent themselves in the classroom.

References

Baron, J.   Phonetic stage not necessary for reading.
    Quarterly Journal of Experimental Psychology, 1973,
    25, 241-246.

Baron, J.   Mechanisms for pronouncing printed words:
    Use and acquisition.   In D. LaBerge & S. J. Samuels
    (Eds.), Basic process in reading: Perception and
    comprehension.   Hillsdale, New Jersey: Lawrence
    Erlbaum, 1977.

Baron, J., & McKillop, B. J.   Individual differences in
    speed of phonemic analysis, visual analysis, and
    reading.   Acta Psychologica, 1975, 39, 91-96.

Barron, R. W. Access to the meanings of printed words:
    Some implications for reading and learning to read.
    In F. B. Murray (Ed.), The recognition of words.
    Newark, Delaware: International Reading Association,
    1978.

Barron, R. W., & Baron, J.   How children get meaning from
    printed words.   Child Development, 1977, 48, 587-594.

Beers, J., & Henderson, E.   A study of developing ortho-
    graphic concepts among first grade children.   Research
    in the Teaching of English, 1977, 11, 133-148.

Berko, J.   The child's learning of English morphology.
    In S. Saporta (Ed.), Psycholinguistics: A book of
    readings.   New York: Holt, Rinehart, & Winston, 1961.

Bloomfield, L.   Linguistics and reading.   Elementary
    English Review, 1942, 19, 125-130, 183-186.

Bower, T. G. R.   Reading by eye.   In H. Levin & J. P.
    Williams (Eds.), Basic studies on reading.   New York:
    Basic Books, 1970.

Chomsky, C. S.   The acquisition of syntax in children
    from 5 to 10.   Cambridge, Mass.:   The MIT Press, 1969.

Chomsky, C. S.   Reading, writing, and phonology.   Harvard
    Educational Review, 1970, 40, 287-309.

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Chomsky, C. S. Write first, read later. Childhood Education, 1971, 47, 296-299.

Chomsky, C. S. Stages in language development and reading exposure. Harvard Educational Review, 1972, 42, 1-33.

Chomsky, C. S. Language and reading. In R. E. Shafer (Ed.), Applied linguistics and reading. Newark, Delaware: International Reading Association, 1979.

Chomsky, N. Syntactic structures. The Hague: Mouton, 1957.

Chomsky, N. Aspects of the theory of syntax. Cambridge: MIT Press, 1965.

Chomsky, N. The formal nature of language. In E. H. Lenneberg (Ed.), Biological foundations of language. New York: Wiley, 1967.

Chomsky, N. Phonology and reading. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970.

Chomsky, N., & Halle, M. The sound pattern of English. New York: Harper & Row, 1968.

Clark, H. H. Language as a fixed effect fallacy: A critique of language statistics in psychological research. Journal of Verbal Learning and Verbal Behavior, 1973, 12, 335-359.

Coltheart, M., Davelaar, E., Jonasson, J. T., & Besner, D. Access to the internal lexicon. In S. Dornič (Ed.), Attention and performance VI. Hillsdale, New Jersey: Laurence Erlbaum, 1977.

Downing, J. Children's concepts of language in learning to read. Educational Research, 1970, 12, 106-112.

Ehri, L. C. Word consciousness in readers and prereaders. Journal of Educational Psychology, 1975, 67, 204-212.

Ehri, L. C. Beginning reading from a psycholinguistic perspective: Amalgamation of word identities. In F. B. Murray (Ed.), The recognition of words. Newark, Delaware: International Reading Association, 1978.

Francis, W. N. Linguistics and reading: A commentary on chapters 1 to 3. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970.

Fries, C. C. Linguistics and reading. New York: Holt, Rinehart, & Winston, 1962.

Furness, E. L. Spelling for the millions. New York: Appleton-Century, 1964.

Gibson, E. J., Shurcliff, A., & Yonas, A. Utilization of spelling patterns by deaf and hearing subjects. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970.

Gillet, J. W., & Temple, C. Developing word knowledge: A cognitive view. Reading World, 1978, 18, 132-140.

Gleitman, L. R., & Rozin, P. Teaching reading by use of a syllabary. Reading Research Quarterly, 1973, 8, 447-483.

Gleitman, L. R., & Rozin, P. The structure and acquisition of reading I: Relations between orthographies and the structure of language. In A. S. Reber & D. L. Scarborough (Eds.), Toward a psychology of reading: The proceedings of the CUNY conferences. Hillsdale, New Jersey: Laurence Erlbaum, 1977.

Goodman, K. S. A linguistic study of cues and miscues in reading. Elementary English Journal, 1965, 42, 639-644.

Goodman, K. S. The psycholinguistic nature of the reading process. Detroit: Wayne State University Press, 1968.

Goodman, K. S. Analysis of oral reading miscues: Applied psycholinguistics. Reading Research Quarterly, 1969, 5, 9-30. (a)

Goodman, K. S. Words and morphemes in reading. In K. S. Goodman & J. Fleming (Eds.), Psycholinguistics and the teaching of reading. Newark, Delaware: International Reading Association, 1969. (b)

Goodman, K. S.   Orthography in a theory of reading in-
    struction.   Elementary English, 1972, 49, 1254-1261.
    (a)

Goodman, K. S.   Reading: The key is in the children's
    language.   The Reading Teacher, 1972, 25, 505-508.
    (b)

Goodman, K. S.   Behind the eye: What happens in reading.
    In H. Singer & R. B. Ruddell (Eds.), Theoretical
    models and processes of reading (2nd ed.).   Newark:
    Delaware: International Reading Association, 1976.

Goodman, K. S., & Fleming, J. T. (Eds.).   Psycholinguis-
    tics and the teaching of reading.   Newark, Delaware:
    International Reading Association, 1969.

Gough, P.   One second of reading.   In J. P. Kavanaugh &
    I. G. Mattingly (Eds.), Language by eye and by ear.
    Cambridge, Mass.:   MIT Press, 1972.

Haas, W. (Ed.).   Alphabets for English.   Manchester,
    England: Manchester University Press, 1969.

Hall, R. A.   Sound and spelling in English.   Philadelphia:
    Chilton Company, 1966.

Hanna, P., Hanna, J., Hodges, R., & Rudolph, E.   Phoneme-
    grapheme correspondences as cues to spelling improve-
    ment.   Washington, D. C.:   U. S. Office of Education,
    1966.   (ERIC Document Reproduction Service No. ED 128
    835)

Harris, A. J., & Jacobson, M. D.   Basic elementary reading
    vocabularies.   New York: Macmillan, 1972.

Harrison, M.   Instant reading: The story of the initial
    teaching alphabet.   London: Sir Isaac Pitman & Sons,
    1964.

Holden, M. H., & MacGinitie, W. H.   Children's conceptions
    of word boundaries in speech and print.   Journal of
    Educational Psychology, 1972, 63, 551-557.

Kavanaugh, J. F., & Mattingly, I. G. (Eds.).   Language
    by ear and by eye: The relationship between speech
    and reading.   Cambridge, Mass.:   MIT Press, 1972.

Kleiman, G. M. Speech recoding and reading. Journal of Verbal Behavior, 1975, 14, 323-329.

Kohl, H. 36 children. New York: The New American Library, 1967.

Kolers, P. Three stages of reading. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970.

Lazerson, B. H. The influence of highly variable spelling upon the reading performance of skilled readers of modern English. Reading Research Quarterly, 1974-1975, 10, 583-615.

Lee, W. R. Spelling irregularity and reading difficulty in English. London, England: National Foundation for Educational Research in England and Wales, 1972.

Levy, B. A. Vocalization and suppression effects in sentence memory. Journal of Verbal Learning and Verbal Behavior, 1975, 14, 304-316.

Lindeman, R. H. Educational Measurement. Chicago: Scott, Foresman, 1967.

McNeill, D. The acquisition of language: The study of developmental psycholinguistics. New York: Harper & Row, 1970.

Meyer, D. E., Schvaneveldt, R. W., & Ruddy, M. G. Functions of graphemic and phonemic codes in visual word recognition. Memory and Cognition, 1974, 2, 309-321. (a)

Meyer, D. E., Schvaneveldt, R. W., & Ruddy, M. G. Loci of contextual effects on visual word recognition. In P. M. A. Rabbit & S. Dornič (Eds.), Attention and performance V. New York: Academic Press, 1974. (b)

Moskowitz, B. A. On the status of vowel shift in English. In T. E. Moore (Ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Read, C. Pre-school children's knowledge of English phonology. Harvard Educational Review, 1971, 41, 1-34.

Read, C. Children's categorization of speech sounds in English (Research Report No. 17). Urbana, Ill.: National Council of Teachers of English, 1975. (ERIC Document Reproduction Service No. ED 112 426)

Reed, D. W. A theory of language, speech, and writing. Elementary English, 1965, 42, 845-851.

Reed, D. W. Linguistic forms and the process of reading. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970.

Reid, J. F. Learning to think about reading. Educational Research, 1966, 9, 56-62.

Richardson, J. T. Lexical derivation. Journal of Psycholinguistic Research, 1977, 6, 319-336.

Rubenstein, H., Lewis, S. S., & Rubenstein, M. A. Evidence for phonemic coding in visual word recognition. Journal of Verbal Learning and Verbal Behavior, 1971, 10, 645-657.

Ruddell, R. B. Psycholinguistic implications for a systems of communication model. In H. Singer & R. B. Ruddell (Eds.), Theoretical models and processes of reading (2nd ed.). Newark, Delaware: International Reading Association, 1976.

Russell, P. Morphology and English spelling. Los Alamitos, California: Southwest Regional Laboratory for Educational Research and Development, 1972. (ERIC Document Reproduction Service No. ED 108 228)

Ryan, E. B., & Semmel, M. I. Reading as a constructive language process. Reading Research Quarterly, 1969, 5, 59-83.

Simon, D. P. Spelling--A task analysis. Pittsburgh: Learning Research and Development Center, University of Pittsburgh, 1975. (ERIC Document Reproduction Service No. ED 102 606)

Smith, F. Psycholinguistics and reading. New York: Holt, Rinehart, & Winston, 1973.

Smith, F. Comprehension and learning: A conceptual framework for teachers. New York: Holt, Rinehart, & Winston, 1975.

Smith, F. Understanding reading: A psycholinguistic analysis of reading and learning to read. New York: Holt, Rinehart, & Winston, 1978.

Smith, F. Reading without nonsense. New York: Teachers College, Columbia University, 1979.

Steinberg, D. D. Phonology, reading, and Chomsky & Halle's optimal orthography. Journal of Psycholinguistic Research, 1973, 2, 239-258.

Templeton, S. The circle game of English spelling: A reappraisal for teachers. Language Arts, 1979, 56, 789-797. (a)

Templeton, S. Spelling first, sound later: The relationship between orthography and higher order phonological rules in older students. Research in the Teaching of English, 1979, 13, 255-264. (b)

Thorndike, E. L., & Barnhart, C. L. (Eds.). Thorndike and Barnhart junior dictionary. Chicago: Scott, Foresman, 1962.

Venezky, R. L. English orthography: Its graphical structure and its relation to sound. Reading Research Quarterly, 1967, 2, 75-106.

Venezky, R. L. Regularity in reading and spelling. In H. Levin & J. P. Williams (Eds.), Basic studies on reading. New York: Basic Books, 1970. (a)

Venezky, R. L. The structure of English orthography. The Hague: Mouton, 1970. (b)

Weir, R. H., & Venezky, R. L. Spelling-to-sound patterns. In K. S. Goodman (Ed.), The psycholinguistic nature of the reading process. Detroit: Wayne State University Press, 1968.

APPENDIX A

Dictionaries and Thesauri

Dictionaries and Thesauri

Basic Dictionary of American English. New York: Holt,
    Rinehart, & Winston, 1962.

Brown, A., & Downing, J. S. (Eds.). Pyramid Primary
    Dictionary Series, Dictionary Two. New York:
    Pyramid Publications, 1971.

Greet, W. C., Jenkins, W. A., & Schiller, A. In Other
    Words: A Beginning Thesaurus. Glenview, Ill.:
    Scott, Foresman, 1968.

The Harcourt Brace School Dictionary. New York: Harcourt,
    Brace, & World, 1968.

Macmillan Dictionary for Children. New York: Macmillan,
    1975.

The New American Roget's College Thesaurus. New York:
    The New American Library, 1962.

Schiller, A., & Jenkins, W. A. In Other Words: A Junior
    Thesaurus. Glenview, Ill.: Scott, Foresman, 1977.

Thorndike, E. L., & Barnhart, C. L. (Eds.). Thorndike
    and Barnhart Junior Dictionary. Chicago: Scott,
    Foresman, 1962.

Thorndike, E. L., & Barnhart, C. L. Scott, Foresman Be-
    ginning Dictionary. Glenview, Ill.: Scott, Foresman,
    1976.

Weston, J., & Spooner, A. (Eds.). The Oxford Children's
    Dictionary. London: Oxford University Press, 1976.

APPENDIX B

Test Instrument

Visual Form

NAME _____

CODE _____

SCORE _____

FORM _____

MAT _____

GRADE _____

1. exploration
   a. trying to sleep
   b. trying to discover
   c. building a fire
   d. having a party

2. courageous
   a. happy
   b. brave
   c. sad
   d. mean

3. studious
   a. working hard to learn
   b. being lazy
   c. looking for something
   d. having a lot of money

4. pianist
   a. an inventor
   b. a person who makes
      music on a keyboard
   c. a person who paints
   d. a person who fixes cars

5. medicinal
   a. used in food
   b. being important
   c. having a party
   d. having power to cure

6. preparation
   a. making ready
   b. taking a trip
   c. having a picnic
   d. getting bigger

7. cavern
   a. a large hollow place
   b. a castle
   c. a small hill
   d. a wide road

8. cleanse
   a. wash
   b. water
   c. fix
   d. invent

9. declaration
   a. a wise man
   b. a sea
   c. a statement
   d. a prize

10. familial
   a. belonging to parents
      and their children
   b. making jokes
   c. planting food
   d. looking for something

11. majestic
   a. kingly
   b. sunny
   c. poor
   d. cloudy

12. finality
   a. weak
   b. end
   c. begin
   d. easy

13. width
   a. distance from side
      to side
   b. at the bottom
   c. distance around
   d. on the top

14. racial
   a. playing games
   b. like a road
   c. having to do with a
      group of people
   d. made from rubber

15. managerial
   a. teaching
   b. being in charge
   c. telling a lie
   d. building a house

16. arithmetical
   a. to do with drawing
   b. to do with letters
   c. to do with numbers
   d. to do with music

17. righteous
   a. being afraid
   b. being bad
   c. being sleepy
   d. being good

18. recognition
   a. making a promise
   b. pretending
   c. listening
   d. knowing someone

19. musician
   a. a very old man
   b. someone who sings or
      plays an instrument
   c. a very strong man
   d. someone who dances

20. medicate
   a. come between
   b. feed a lot
   c. give something to
      make well
   d. fall asleep

21. knowledge
   a. waiting
   b. understanding
   c. singing
   d. acting

22. cleanliness
   a. useful
   b. kindness
   c. neatness
   d. darkness

23. heroism
   a. great beauty
   b. very funny
   c. great bravery
   d. very sick

24. totality
   a. the new math
   b. the same
   c. often
   d. the whole thing

25. decorative
    a. making pretty
    b. making sad
    c. having a party
    d. giving a speech

26. mischievous
    a. sleepy
    b. naughty
    c. saving
    d. kind

27. metallic
    a. made with iron
    b. made with rubber
    c. made with wood
    d. made with glass

28. factual
    a. sad
    b. funny
    c. big
    d. true

29. telephonic
    a. able to climb
    b. able to talk to someone
       across distance
    c. able to think
    d. on TV

30. pleasure
    a. surprise
    b. sleepiness
    c. lucky
    d. happiness

31. columnar
    a. a party
    b. money
    c. a log cabin
    d. shaped like a pole

32. vegetarian
    a. a farmer
    b. grows flowers
    c. a kind of meat
    d. eats only plants

33. linear
    a. like a ball
    b. colored red
    c. like a long narrow mark
    d. tired

34. facial
    a. for the foot
    b. a silly book
    c. the front of the head
    d. a hairy person

Auditory Form

NAME _____

CODE _____

SCORE _____

FORM _____

MAT _____

GRADE _____

1.
   a. trying to sleep
   b. trying to discover
   c. building a fire
   d. having a party

2.
   a. happy
   b. brave
   c. sad
   d. mean

3.
   a. working hard to learn
   b. being lazy
   c. looking for something
   d. having a lot of money

4.
   a. an inventor
   b. a person who makes
      music on a keyboard
   c. a person who paints
   d. a person who fixes cars

5.
   a. used in food
   b. being important
   c. having a party
   d. having power to cure

6.
   a. making ready
   b. taking a trip
   c. having a picnic
   d. getting bigger

7.
   a. a large hollow place
   b. a castle
   c. a small hill
   d. a wide road

8.
   a. wash
   b. water
   c. fix
   d. invent

9.
   a. a wise man
   b. a sea
   c. a statement
   d. a prize

10.
   a. belonging to parents
      and their children
   b. making jokes
   c. planting food
   d. looking for something

11.
   a. kingly
   b. sunny
   c. poor
   d. cloudy

12.
   a. weak
   b. end
   c. begin
   d. easy

13.
   a. distance from side
      to side
   b. at the bottom
   c. distance around
   d. on the top

14.
   a. playing games
   b. like a road
   c. having to do with a
      group of people
   d. made from rubber

15.
   a. teaching
   b. being in charge
   c. telling a lie
   d. building a house

16.
   a. to do with drawing
   b. to do with letters
   c. to do with numbers
   d. to do with music

17.
   a. being afraid
   b. being bad
   c. being sleepy
   d. being good

18.
   a. making a promise
   b. pretending
   c. listening
   d. knowing someone

19.
   a. a very old man
   b. someone who sings or
      plays an instrument
   c. a very strong man
   d. someone who dances

20.
   a. come between
   b. feed a lot
   c. give something to
      make well
   d. fall asleep

21.
   a. waiting
   b. understanding
   c. singing
   d. acting

22.
   a. useful
   b. kindness
   c. neatness
   d. darkness

23.
   a. great beauty
   b. very funny
   c. great bravery
   d. very sick

24.
   a. the new math
   b. the same
   c. often
   d. the whole thing

25.

    a. making pretty

    b. making sad

    c. having a party

    d. giving a speech

26.

    a. sleepy

    b. naughty

    c. saving

    d. kind

27.

    a. made with iron

    b. made with rubber

    c. made with wood

    d. made with glass

28.

    a. sad

    b. funny

    c. big

    d. true

29.

    a. able to climb

    b. able to talk to someone across distance

    c. able to think

    d. on TV

30.

    a. surprise

    b. sleepiness

    c. lucky

    d. happiness

31.

    a. a party

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    c. a log cabin

    d. shaped like a pole

32.

    a. a farmer

    b. grows flowers

    c. a kind of meat

    d. eats only plants

33.

    a. like a ball

    b. colored red

    c. like a long narrow mark

    d. tired

34.

    a. for the foot

    b. a silly book

    c. the front of the head

    d. a hairy person