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ABSTRACT

The relationship between specific inference as measured by a Cloze Test and broad inference as measured by a Means-End Test was investigated. Subjects were 61 New York policemen enrolled in a communication skills course at John Jay College of Criminal Justice. The relationship between specific inference and broad inference, specific inference and measures of reading achievement, and broad inference and measures of reading achievement were analyzed. The sample was divided into two groups on the basis of reading achievement. A comparison of the means and standard deviations for the two groups was completed on measures of specific and broad inference. Findings in regard to the relation of specific to broad inference were inconclusive. A significant correlation was found between a secondary measure of specific inference and the test of broad inference. Positive correlations were found between specific and broad inference and measures of reading achievement. The findings indicated that the mean performance on measures of specific and broad inference was significantly higher among subjects who obtained higher reading scores. (Author)

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AN INVESTIGATION OF THE RELATIONSHIP BETWEEN SPECIFIC AND BROAD INFERENCE

A THESIS

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BY

JACQUELYN BONOMO

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REQUIREMENTS FOR THE DEGREE

OF

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CHAPTER I

THE PROBLEM

The problem of describing the role of inference in reading has been set forth most clearly by John Carroll (1971). According to Carroll, there are two main levels of inference in reading comprehension: 1) specific inference, the determination of the meaning of a word based on the context in which it occurs and the significance assigned to it by the speech community, and 2) broad inference, the determination of the meaning of a sentence or an utterance based on its relation to a total context. This context includes the reader's accumulated knowledge. Carroll asserts the interdependence of these two levels of inference in reading comprehension.

Flexibility of inference has been cited as a characteristic of achieving readers (Kress, 1955). Laycock (1966) has described the mature reader as one who is able to infer more than one interpretation. Singer (1966) has pointed to inflexibility of inference as a possible component of reading comprehension problems.

Statement of the Problem

This study was undertaken to provide an exploratory investigation of the relationship between specific inference (the ability

to infer alternative responses for a missing word), as measured by a Cloze Test, and broad inference (the ability to infer alternative missing sentences in a context), as measured by a Means-End Test. Both tests were constructed to expose the reader's flexibility or number of inferential alternatives. In addition, the study explored the relationship between performance on these two measures of inferential flexibility and performance on a test of reading comprehension.

More specifically, the purpose of the present study was to test the following hypotheses:

1. There is a positive correlation between performance of subjects on Cloze Tests I and II and performance of subjects on a Means-End Test.

2. There is a positive correlation between performance on the Vocabulary, Comprehension, and Total on the California Reading Test and performance on Cloze Tests I and II and the Means-End Test.

3. The mean performance on Cloze Tests I and II is significantly higher among subjects who obtain higher reading scores.

4. The mean performance on the Means-End Test is significantly higher among subjects who obtain higher reading scores.

Importance of the Study

Inference is often cited as central to reading comprehension in theoretical discussions of the reading process. Few studies, however, have focused on inference apart from other skills of reading. Farr (1969) remarks that "the most pressing research need in

measuring comprehension is for a clear understanding of the nature of reading comprehension. At this time there is no conclusive evidence regarding the components of this skill [p. 64]."

The investigation of the relationship between specific inference (the ability to infer alternative words within a context) and broad inference (the ability to infer alternative missing parts of a context) may be of use in determining whether or not disability in the first instance is related to disability in the second instance. If a positive relationship is found between specific and broad inference, perhaps diagnosticians should test both broad and specific inferential reading ability when disability appears in either area.

A second important relationship is that which is found between these two levels of inference and general reading comprehension. If a positive relationship is found among these variables, evidence would be provided for the importance of the role of inferential flexibility in general comprehension.

Conducting this study with two tests that are open-ended and one that is standardized, multiple choice may be of use in providing more than one diagnostic viewpoint on the mature reading process. In addition, concurrent validity may be established for tests that clearly expose the individual's inferential repertoire.

Definition of Terms

Inference in Cloze--the insertion by the subject of one or

more syntactically and semantically appropriate nouns for one that is missing in a sentence. The sentence occurs in a narrative story.

Inference in Means-End--the insertion by the subject of one or more alternative missing means whereby the end of a story can be achieved. The subject is given the beginning and end of a narrative story.

Inferential Flexibility--the ability to provide more than one inferential response.

Reading Comprehension--as measured by the California Reading Test, Form W, Advanced, Vocabulary, Comprehension, and total scores.

Overview of the Study

A total of 61 New York policemen enrolled in a Communication Skills course at John Jay College of Criminal Justice, CUNY, were tested on three measures.

The California Reading Test, Advanced, Form W was administered to obtain a reading comprehension measure.

A Means-End Test was administered to obtain a measure of broad inferential flexibility (Appendix A).

Cloze Tests I and II were administered to obtain measures of specific inferential flexibility (Appendix B).

The scores that the students achieved on the two sections and the total of the California Reading Test were then compared to the scores on the Cloze Tests and the Means-End Test.

The mean performance on Cloze Tests and the Means-End Test of those with a total grade-equivalent score of 10 or above on the

California Reading Test was compared to the mean achievement on the same tests of those scoring below a grade equivalent of 10.

Limitations of the Study

This study is limited by the size of the sample, the absence of IQ measures, and the questionable reliability of the Means-End and Cloze Tests used.

CHAPTER II

SURVEY OF THE LITERATURE

This chapter reviews the literature about inference as it operates in experiential comprehension and reading comprehension. The tasks wherein the more generalized aspects of inference are assumed to operate are: 1) the cloze, and 2) the Means-End Test. Lexical and structural cloze tests are discussed in relation to inference, to measures of intelligence, and to reading comprehension. The Means-End Test is discussed in relation to inference in reading, to measures of intelligence, and to personality variables.

Inference in Experiential Comprehension

Inference can be defined as the deduction of relationships, information, or meanings not specifically stated, but suggested by the context of an experiential or language situation, and by the experience of the inference-maker. Stauffer (1969), in a discussion of one of Piaget's studies of non-verbal reasoning, cites an inference of cause from effect in an early experiential context:

> He put his foot under the son's rocker and began to rock it. The boy looked over the rocker, saw what was happening, and smiled... He also describes how his daughter could foresee an effect, given its cause. She wanted to get out of her playpen to continue a game, and when she was refused, she pretended she wanted to come out to take care of a bodily need. Once out of the playpen, she indicated that what she really needed to do was to resume play [p. 320].

Inference initially develops from situations requiring the understanding of relationships which can then be manipulated in problem-solving, as exemplified in the behavior of the second child. The acquisition of language, "by providing a means of encoding experience, allows behavior to become relatively independent of the immediate stimulus situation," and extends and shapes the inferential processes through the labelling of alternatives drawn from experience (Bourne, Ekstrand, and Dominowski, 1971, p. 306).

Inference in Reading Comprehension

It is the contention of Von Glasersfeld (1971) that reading comprehension requires an inferential process to construct a "conceptual situation" in which the sentence obtains its meaning. In many cases, the reader must supply the information necessary to understand a sentence from a fund of knowledge accumulated throughout life. Appropriate parts of this knowledge "may be visualized and a conceptual network mapped, thus making it possible for the reader to fill in the missing pieces of the conceptual situation designated by the sentence [p. 1]." In addition, the quality and detail of the conceptual network may influence the reader's specific and broad inferences concerning specific parts of the sentence and of the entire text he has not yet read.

For example, the sentence "The baby shakes the rattle" requires the construction of the conceptual situation represented in the following analysis offered by Von Glasersfeld. In this

analysis, he illustrates how lexical information is combined with information from experience:

> The baby shakes the rattle.
> A) a causative agent (e.g., designated by 'baby') which causes
> B) a non-causative item (e.g., designated by 'a rattle') to perform
> C) an activity (e.g., designated by 'to shake') which, in turn, causes
> D) an activity (e.g., designated by 'to rattle') (p. 6)

Von Glasersfeld further develops the complexities of inference in what seems to be a simple conceptual situation:

> In time, as experiential knowledge increases, the conceptual situation will become much more detailed. The causal nexus between A) and C) will be specified as mechanical causation (motion imparted by mechanical force, e.g., through prehensile contact); the production of noise will be specified as caused by the intermittent contact of two items; the particular acting object 'rattle' B) will be specified as a purposive instrument consisting of at least two items that can make and break contact with each other [p. 7].

Failure to understand a given sentence could be a result of deficiency in the conceptual sphere. In Von Glasersfeld's schema of inference, a deficient conceptual network could result in limited inference concerning the meaning of lexical elements and entire parts of the text which the reader has not yet read.

It is doubtful whether inference and related thinking processes of deduction and problem-solving can be divorced from any aspect of reading comprehension (Carroll, 1971). It does seem, however, that inference is based on a literal level of comprehension that can be distinguished from inference. In order to clarify this distinction, Carroll cites Clark (1969), who studied a

three-term inference problem. Subjects were given the following sentence to read: "John isn't as tall as Mary, but he is as tall as Tom." Clark asked each subject one of several inferential questions: "Who is the tallest?" or "Who is the shortest?" or "Who is in-between?" A subject might understand the meanings of the two clauses separately (literal comprehension) without going through the necessary inference needed to answer the questions. One may note that even the comprehension of the first clause of the first sentence in response to the question, "Who is shorter than Mary?" requires effort beyond literal comprehension. This question requires that the reader construct a concept of the relative size of the two people. The concept allows the reader to translate one verbal expression of proportion to another.

Another inference problem cited by Carroll is one by Danks (1969). This problem asks the reader to evaluate a boy's emotional response to his father's taking over the boy's appointed family duty. The reader must base his inference on suggestive information given elsewhere in the paragraph. Reference to linguistic rules on the part of the reader would be of little use in deriving an appropriate answer. Carroll (1971), like Von Glasersfeld, refers to the necessity of applying inferential processes in relating experience to reading comprehension:

> Selecting the correct answer would require a grasp of the total situation in the paragraph and an understanding of social relationships and expectations that the paragraph only partially indicates [p. 16].

In an attempt to further limit and define the parameters of inference in reading comprehension, Carroll points to Miller's remark that "the meaning of an utterance is not a linear sum of the words that comprise it [1965, p. 18]." In other words, as previously noted under the chapter heading THE PROBLEM, Carroll states that there are two levels to the problem of inference in reading comprehension:

> 1) the understanding of the linguistic element, any linguistic unit that has a meaning in the sense that one or more rules or conventions can be specified as to the relation of that unit with a concept or class of experiences as developed by members of the speech community [p. 18].
>
> 2) the understanding of the meaning of the total utterance, which has to do with the relation of a sentence to its total context...its total meaning may involve the point-to-point relations between the elements encoded in the sentence and the things, attributes, events, and relations existing in some actual or fictional reality [p. 22].

These two levels of inference seem to be bound to each other in the comprehension process. For example, in Carroll's nonsense sentence, "The Fundalan added an are to his plot," the problem of the linguistic meaning and relationships of the elements is confounded with the problem of the wider context, which remains unspecified (Carroll, 1971, p. 19). Even the formal syntactic functions of the elements cannot be exactly specified until surrounding comprehensible parts of the text are provided. Based on the meaning of the context, the reader can then infer the meaning of the elements.

Carroll concedes the paradox in trying to distinguish the

two processes of inference: "the relating of linguistic information to a wider context may indeed require processes of inference [p. 19]." According to Carroll's theory, specific inference and broad inference seem to be interdependent in reading comprehension.

Flexibility of Inference in Reading Comprehension

This survey has been limited to a discussion of the relationship of specific to broad inference in reading comprehension. In order to build a rationale for the construction of the two tests of inference used in this study, the literature concerning flexibility of inference must be considered. The literature also indicates a relationship between flexibility of inference and reading comprehension.

There is considerable theoretical discussion to the effect that high level reading is characterized by flexibility in inferring relationships, information, and meanings not specifically stated. The superior reader seems to be capable of seeing more than one possible interpretation of individual words and whole utterances.

Kress (1955) concluded from a concept formation study of school children that "achieving readers were superior to non-achievers in versatility, flexibility, and ability to draw inferences from relevant cues [Ruddell, 1970, p. 252]."

Laycock (1966) draws on Piaget's concepts of the formal stage of operations in thinking to clarify the role of flexibility

in inference. The person in the formal stage of operations is able to generate systematically all possible solutions to a problem. Laycock applies this to reading:

> It is necessary in...flexibility for a reader to be constantly aware of how all possible interpretations of a passage, for example, fit together. Past experience, various sections of the text, the purpose of reading--all these rest upon each other, and the flexible person is probably the one who most efficiently deals with their relationships [p. 144].

He goes on to state that the reader in the formal stage of operations "draws relationships among indirectly connected matters [p. 144]." Thus, inference in reading at the formal stage of operations may be characterized by the ability to infer all reasonable interpretations and to see the relationships of these interpretations.

Singer (1966) also discusses the relation of flexibility in reasoning and inference to the general comprehension process. Fixation on one meaning alternative may seriously impair comprehension:

> For example, a young child could have learned through his experience that home is a place where parental conflict exists. When he reads a story about parental relationships, he might find that the ideas in the story do not coincide with his concept of home. If he persists in this experientially determined generalization, he might not 'get it', re-read the passage to clarify its meaning, or even continue to read with the conflict still unresolved. Consequently lack of conceptual ability could adversely affect his speed and/or power [p. 128].

To be sure, it is doubtful that these and other problem-solving theories of reading, notably that of Goodman (1971) imply

that the reader brings to mind all possible meaning alternatives in reading. Indeed, it is more likely the mature reader is able to modify the extent of his inference in accordance with demands made by the text and his purpose in reading. It is likely, however, that his general range of inferential alternatives makes this flexibility possible (Singer, 1966).

In the light of these observations, the tests of specific inference (the Cloze Test) and broad inference (the Means-End Test) were both constructed so as to reveal the reader's inferential alternatives for a given missing lexical element, and for missing sentences, respectively.

Inference in the Cloze Procedure

One kind of reading test that clearly demands the resolution of ambiguity by the inference of missing elements is the cloze procedure (Taylor 1953), (Carroll, 1971). The procedure involves the deletion in a text by some rule, usually at random, or according to some grammatical category, such as "noun or verb". Bormuth (1969), in a factor analytic study of cloze as a measure of comprehension, found inference to be one of the comprehension subskills measured by cloze. This study involved a correlation between a multiple choice test measuring a variety of comprehension skills and a cloze test. In another factor-analytic study, Bormuth (1964) found that cloze tests could be used in the intermediate grades to predict scores on tests used to measure a variety of comprehension

subskills. His cloze tests predicted well the performance of subjects on such comprehension measures as seeing relationships and drawing inferences.

These studies show the relationship between cloze in general and inference. The specific cloze used in this study is a lexical (noun) cloze. Therefore, the discussion that follows distinguishes between lexical and structural (any-word) cloze in relation to inference, to measures of intelligence, and to general reading comprehension.

Inference in Lexical Versus Structural Cloze

Rankin (1957, 1959) hypothesized that two aspects of comprehension could be measured by two different types of deletion procedures. He predicted that an any-word deletion would best measure the grasp of "structural meaning", (i.e., syntax), and that a noun-verb deletion would best measure the grasp of "lexical meaning" (i.e., substantive context).

Weaver (1965) exhaustively analyzes the different demands made by the lexical and the any-word or structural cloze. In summary of his position, he states that the lexical cloze tends to draw on the broad meaning constraints of the context in which the deletion appears. That is, lexical cloze stresses the relationship of the individual word to the sentence and the context in which it appears. The responses inserted within a structural cloze tend to be less constrained by semantic as opposed to syntactic considerations (p. 120).

This distinction, according to Weaver, is based partly on the difference between structural and lexical words:

> Generally, words at the points of low information are structural words, and words at the points of high information are lexical words. One possible explanation is that structural words form restricted, short categories and thus are rapidly exhausted, while lexical words form long, practically inexhaustible categories [p. 118].

A lexical deletion within a meaningful story context is likely to draw on the meaning constraints of that context. Thus, lexical cloze deletions that appear in a larger context tend to tap conceptual as opposed to purely language relationships.

Weaver relates performance on the contextual-lexical cloze to the reasoning or "cognitive strategies" of the inference maker:

> A proper interpretation of lexical cloze then must involve some understanding of the formation and retention of concepts, problem-solving strategies, categorization, and heuristically-organized retrieval systems [p. 122].

Based on Weaver's distinction between lexical and structural cloze, a multiple-response per single deletion noun cloze was constructed as the measure of specific inferential flexibility in this study. Because a lexical word forms a long category, it would follow that a lexical cloze would more fully expose the variety of specific language alternatives an individual has for a given concept. In relation to Von Glasersfeld's schema of inference, the multiple response noun cloze attempts to expose the alternative expectations or inferences the reader has for a part of the sentence he has not read yet. These inferences are based on the complexity of the concept the word represents and the reader's

own experience with that concept. In relation to the observations of Laycock (1966), a multiple response per single deletion noun cloze attempts to measure the flexibility of specific inference (Carroll's first level of inference).

Lexical Versus Structural Cloze in Relation to Measures of Intelligence

In a study of inferential reading, it may be hypothesized that performance on the lexical deletion noun cloze is a function of intelligence factors. Several studies show correlations between both random cloze and IQ measures, but the lexical cloze appears to be less influenced by intelligence as measured by IQ tests.

Studies by Hafner (1964), Jenkinson (1957), and Taylor (1957), showed substantial correlations (.73, .69, and .72) between pre-cloze, any-word deletion tests and tests of intelligence among young adults.

Schneyer (1965) explored the effects of two types of cloze on the reading comprehension of sixth grade pupils. One type of cloze was built on every 10th word deletion, the other on noun-verb deletion. The total results of the two types of cloze were correlated with the results of the California Test of Mental Maturity and the Gates Reading Survey. Both cloze tests correlated significantly with language IQ results. The 10th word deletion system was much more highly related to IQ than was the noun-verb deletion system (.63 vs. .42, respectively). This seems to substantiate Rankin's earlier contention that the every nth deletion system

is more related to intelligence (Jongsma, 1971, p. 10). Guice (1969), using a concept deletion pattern on college students, found only a moderate (.40) relationship between IQ and cloze. These studies would indicate that the lexical cloze as a measure of specific reading inference is less influenced by intelligence factors that structural cloze. Hence, it was assumed that the lexical cloze was more suitable for the present investigation of reading inference. None of these studies used conceptual cloze requiring more than one response per deletion.

The Cloze Procedure and General Reading Comprehension

Numerous studies have found significant correlations between achievement on various sections of standardized multiple choice reading comprehension and lexical and structural cloze. Taylor (1956) correlated pre- and post-test any-word cloze scores with multiple choice comprehension test scores of a group of Air Force men. Correlations between multiple choice comprehension test scores and cloze test scores ranged from .70 to .80. In two studies, Rankin (1957, 1959) compared two kinds of cloze to the Diagnostic Reading Test-Survey Section. For the pre-cloze, any-word deletion cloze, he obtained correlations of .29 with Story Comprehension, .68 with Vocabulary, and .60 with Paragraph Comprehension. Correlations between a post-cloze, noun-verb deletion test and the same test were .65 with Story Comprehension, .45 with Vocabulary, and .59 with Paragraph Comprehension. Kingston and Weaver (1970)

conducted a correlational study between cloze and standardized reading tests using the multiple choice, lexical cloze. This form of cloze resembles in concept the multiple response per single deletion noun cloze used in the present study. They examined the use of cloze-like tasks in teaching culturally disadvantaged first graders. Students were introduced to cloze by having lexical items deleted from their stories and having to suggest all words that would make sense for their deletions. Four types of standard achievement tests with reading subsections were administered during the year. Jongsma (1971) describes the test administered and the outcome of the study. Four types of cloze tests were used:

> 1) "any-word deletion" based on every -nth deletions with a total of 50 deletions.
> 2) multiple-choice, structural cloze-deletion of function words with the deleted words paired with distractors of the same grammatical class.
> 3) multiple-choice, lexical cloze--every fifth deletion of nouns, main verbs, or adjectives using a similar multiple choice format.
> 4) aurally-read cloze based on a random, every -nth deletions. Various test scores were entered into a test-wise regression analysis using the California Reading Test as the criterion variable. The multiple choice, lexical cloze test was the best single predictor (multiple R-, 68) of first grade reading achievement. It was superior to even the standardized reading readiness test (p. 17).

Across broad age differences and in both its lexical and structural forms, cloze has been found to correlate well with standardized reading comprehension tests.

Inference in the Means-End Test

Means-end thinking is defined as the ability to infer means

to reach a stated goal. A means is defined as "any new relevant unit of information designed to reach the goal or to overcome obstacles [Schure and Spivack, 1972, p. 349]." In a Means-End Test, the subject is given the problem situation and the ending, a successful resolution of the problem. He is then required to generate "what happens" between the time the character in the story has the problem and the time when he resolves it. On the basis of face validity and the theories of inference discussed thus far, the Means-End Test seems to be a procedure which directly measures broad inference.

Within Carroll's (1971) framework of the two levels of inference, the Means-End Test would require the subject to infer meaningful alternative parts of the context (sentences) based on the understanding of the total context in which the sentences would appear. In Von Glasersfeld's schema of inference, the reader would have to map the incomplete information given by the beginning and end of the story onto his conceptual framework and fill in alternative missing parts based on his fund of experiential knowledge. The Means-End Test as a test of broad inference is parallel to the Cloze Test as a measure of specific inference, because sentences as opposed to words are missing in a story context. No literature exists relating the Means-End Test to reading ability. A measure of means-end thinking which might be suitable to a study of flexibility of inference is the counting of the number of alternative means to a given end.

This conclusion is based on a non-experimental observation of the developmental theoretician Heinz Werner (1957) who states that :

> Development from a lower to a higher type of action--in terms of differentiation--is marked by the appearance of circuitous approaches, that is, means of action....This means that if an activity is highly hierarchized, the organism, within a considerable range, can vary the activity to comply with the demands of the varying situation [p. 55]..."

The Means-End Test requires that the reader vary a hypothetical activity. The number of these approaches may constitute the range of his broad inferential alternatives based on his experience.

In a 1972 study by Schure and Spivack of normal versus disturbed adolescents' ability to generate alternative means to an end, the effect of social class alone did not significantly affect the number of means generated. The means-end scores were related to differences in measured general intelligence. The groups measured were normal middle class, disturbed middle class, normal lower class, and disturbed lower class. When an adjustment was made for the effect of IQ, there were still differences in means-end thinking between these adjustment levels. This may indicate a personality variable in means-end inference. On the other hand, as Schure and Spivack hypothesize, these results may indicate a problem in the sphere of inference among ill-adjusted adolescents. It is difficult to disassociate interpretive flexibility in the area of broad inference from evaluative processes based on experience as pointed out earlier by Singer (1966).

Place of This Study in the Literature

The theoretical problem of the place of inference in reading comprehension has been pointed out by Carroll (1971) and Von Glasersfeld (1971). Carroll designates two basic levels of inference: 1) specific inference, the determination of the meaning of a word based on the sentence in which it occurs, and 2) broad inference, the determination of the meaning of a sentence or utterance based on the total context in which it occurs. Carroll asserts the interdependence of these two levels in reading comprehension. Von Glasersfeld (1971) adds that failure to resolve either lexical or contextual ambiguities can be bound up in inadequate conceptual structures. The conceptual structure provides necessary information from experience to determine the meaning of a text. It is the source of inferential alternatives. These theoretical observations would indicate a need to investigate the connection between specific inference concerning missing concept words in a sentence as measured by a noun Cloze Test, and broad inference concerning missing sentences in a context, as measured by a Means-End Test.

Kress (1955) in a study of sixth-graders, found that high achievers in reading were characterized by versatility, flexibility, and "the ability to draw inferences from relevant cues [Ruddell, 1970, p. 252]." Laycock (1966) stated that the mature reader is probably one who can see more than one possible interpretation of a passage, and how these interpretations are related. Singer (1966)

observed that the tendency to fixate on one meaning of a passage could impair comprehension.

This study attempts to provide an exploratory investigation of these observations by comparing performance on two tests requiring more than one inferential response to performance on a standardized test of comprehension. There is some evidence that specific inference of the sort demanded by a conceptual cloze is positively correlated to performance on both Vocabulary and Comprehension measures of a standardized reading test (Rankin, 1957, 1959; Kingston & Weaver, 1970). The present study is unique in that performance on a noun cloze requiring more than one inference for each deletion was compared to performance on a standardized reading test. Another purpose of this study was to devise a test of broad inference parallel to the cloze test in the study, and to investigate its relation to reading comprehension. This test was a Means-End Test (Schure & Spivack, 1972).

CHAPTER III

PROCEDURES

This chapter describes the selection procedures, the sample, tests, and scoring procedures for the tests used in the collection of data. It also contains a description of the administration of tests and the methods of data analysis.

Selection Procedures

Permission was secured from Dr. Charles Bahn, Director of the Prelect Program at John Jay College of Criminal Justice, CUNY, N. Y., N. Y. to conduct a study using as subjects the New York policemen enrolled in the program. A meeting was held with three other instructors besides the experimenter to explain the timing and instructions for test administration.

Description of the Sample

The sample consisted of 61 students enrolled in five different sections of a Communication Skills course. After a review of the results of an initial screening test, the Nelson Denny (Nelson and Denny, 1960), and an analysis of class placement, the experimenter determined the heterogeneity of classes.

No IQ scores were obtained for the group. However, a criterion IQ of 90 is a minimal requirement for entrance to the Police

Academy. In addition, achievement on the California Reading Test, a measure used in this study, is highly correlated with the California Short Form Test of Mental Maturity (Tiegs and Clark, 1963a, p. 12). Hence, it was not considered essential to this study to obtain additional measures of IQ. The subjects tested ranged from upper lower class to middle class. Many were former skilled and unskilled laborers. They represented a broad spectrum of races and ethnic background.

Description of Tests

The California Reading Test, Advanced, Form W, was used as the measure of reading comprehension in this study. The Reading Test consists of two major sections, Vocabulary and Comprehension. The Comprehension section divides into two major sections, Vocabulary and Comprehension. The Comprehension section divides into three sections entitled "Following Directions", "Reference Skills", and "Interpretations", respectively. The Vocabulary section consists of 60 items, the Comprehension, of 87 items. Charts for the conversion of raw scores on each section to grade equivalent scores are provided on the back of self-scoring answer sheets.

Farr (1968), in a correlational study of several standardized reading tests, found the discriminant validity of the subtests lower for lower level readers (9th grade) than for higher level readers (11th and 12th grade). Hobson in Buros (1953) concurred with Farr's conclusions. The authors of the test manual caution

against the use of the smaller sections for diagnosis "because of the limited number of test items (15-60) [Tiegs and Clark, 1963a, p. 8]." In general, for all grade levels tested, the total test score is more reliable than the small item number subtest scores (Farr, 1968).

The test manual reports high reliability of measures and illustrates for a single grade, Grade 11 (n=361). For that grade, reliability coefficients obtained for Vocabulary, Comprehension, and Total were .91, .91, and .95 respectively (Tiegs and Clark, 1963a, p. 8). Flanagan in Buros (1953) stated that 100,000 cases formed the basis of standardization at each level. The 1957 norms were updated in 1963.

The test correlates highly with a test known to predict school achievement, the California Test of Mental Maturity, Short Form. At Grade 10, coefficients of correlations for the Vocabulary, Comprehension, and Total were .75, .81, and .83, respectively (Tiegs and Clark, 1963a, p. 12).

A Means-End Test was used as the measure of broad inferential flexibility. A Means-End story based on a theme by Schure and Spivack (1972) was constructed. The beginning of the story described a new college student who was lonely and without friends. The ending, the reversal of this situation, was described. The middle, to be filled in by the Subject was missing. A practice Means-End story preceded this.

The Cloze I passage of 135 words was constructed by the

experimenter. Systematic deletions of every other noun were then made to form a cloze passage of fifteen deletions. As determined by the use of a graph for estimating readability (Fry, 1968), the reading passage was at the third to fourth grade level of readability. The Cloze II passage consisted of additional responses for the deletions in the Cloze I passage. For each of fifteen deletions, eight additional responses were possible on the Cloze II answer sheet.

The cloze passage was constructed at a low level of readability so that the measure would test specific lexical inference as opposed to broad contextual inference. Taylor (1957) suggests a fifty item cloze provides a sufficient sample for a stable score when the type of cloze used is any-word. Mechanical selection for deletion tends to produce a sizeable number of non-discriminating items that tend to reduce reliability. The cloze used in this study, however, was a "hard-word" cloze requiring fewer items. The Cloze I Test was constructed primarily for the purpose of acquainting the subject with the entire story before returning to construct alternative responses in the Cloze II Test. As such, it was considered to be a criterion measure, and not the main measure of specific lexical inference in this study. The maximum possible raw score for the Cloze II Test was 120.

Scoring Procedure for Cloze Tests I and II

Raw scores and weighted scores were obtained for Cloze Tests I and II. The raw score for both tests consisted of the total

number of syntactically and semantically correct responses. No points were given for partially correct answers. The weighted scores were arrived at by assigning one of three scores for correctness. A semantically and syntactically correct response received a score of two. A score of one was assigned to a semantically correct response with a syntactic error of number, e.g., "boy" for "boys". No points were given to semantically and syntactically incorrect responses. The scores for each response were then added to obtain a weighted score for each of the two Cloze Tests.

Research done in the area of cloze scoring has found little difference in validity or reliability between the synonym scoring and exact-word scoring system. Rankin (1957, 1959) found correlations of .86 and .92 between cloze scores based on objective and synonym scoring systems for two different cloze tests. He also found no significant differences in test reliability or validity for the two scoring systems. The scoring system used in this study is essentially a synonym scoring system.

Scoring Procedure for the Means-End Test

The Means-End scoring procedure was based on a simplification of the scoring system used by Schure and Spivack (1972). According to these authors:

> A mean is defined as any new relevant unit of information designed to reach the goal or to overcome the obstacle. When the strategy involves one plan with several steps within that plan, credit is given for each step. When statements of different plans are used, credit is given for each different plan [p. 349].

Since the determination of what can be considered a step within a plan was not the concern of this study, this aspect of the scoring procedure was eliminated. Since flexibility of broad inference was to be measured, the experimenter developed a scoring system of Means-End inference that counted only different plans used. Subjects were required to number each new different plan to reduce subjectivity of scoring.

The raw score for the Means-End Test consisted of the total number of complete different means toward the end. The weighted score was derived by assigning a score of two, one, or zero, based on the following criteria. A score of two was assigned to a specific behavior that would bring the character in the story into direct social contact or into a social activity with other people or another person. A score of two was also given to a means that brought about a stated positive social response. A score of one was given to a means that was a step in a process, such as an attitude change, advice-getting, or behavior that implied a positive social response, e.g., "He improved his appearance." A score of zero was given for a repetition of a solution, or for a "distractor means" that would not bring the character into direct social interaction. Some examples of distractors were "reads books, goes clothes shopping, takes a trip".

Administration of Tests

The subjects were tested as groups. Based on an examination

of reading levels as determined by an initial departmental screening device, The Nelson Denny Test (Nelson and Denny, 1960), it was determined that subjects ranged from 7th through 12th grade in their reading level. Based on an examination of the distribution of scores within classes, the experimenter determined the heterogeneity of classes. The California Reading Test was administered to all subjects using the standardized instructions and time limits for all subsections. On another day, the Means-End Test and the Cloze Tests were administered. On the Means-End Test, the subjects were directed to work on a sample Means-End story. Possible solutions were discussed. On the actual Means-End Test, subjects were instructed to write down as many different ways as they could think of for the person in the story to solve his problems. They were also told to keep on thinking of alternative solutions until the time was up. The time limit for the Means-End Test was fifteen minutes.

In the same testing session, Cloze Tests I and II were administered. For Cloze I, subjects were required to read the entire story with the deletions before returning to the beginning and inserting responses. This was to insure awareness of the entire context of the story. Nonsense responses were not accepted. The time limit for the Cloze I Test was ten minutes. After the completion of Cloze I, the tester instructed the subjects to return to the same story and to fill in as many meaningful responses as possible for each blank within a time limit of fifteen minutes.

Treatment of Data

The results pertaining to Hypotheses 1 and 2 were analyzed according to the Pearson Product Moment Correlation. The scores of the total group on Cloze I and II, Raw and Weighted, were correlated with scores on the Means-End Test, Raw and Weighted. Scores of the total group on the California Reading Test for each section, Vocabulary, Comprehension, and Total, were correlated with scores on Cloze Tests I and II, Raw and Weighted, and the Means-End test, Raw and Weighted. Based on total scores obtained on the California Reading Test, the group was divided into Groups I and II. Group I (n=37) obtained a score below ten; Group II (n=24) obtained a score of ten or above. A t-test was used to compare the mean performance of Group II and Group I on Cloze Tests I and II, Raw and Weighted. A t-test was used to compare the mean performance of Group II and Group I on the Means-End Test, Raw and Weighted. Standard deviations for raw and weighted versions of all measures were obtained.

Summary

Sixty-one New York policemen from five sections of a Communication Skills course at John Jay College of Criminal Justice were used as the subjects for this study.

Reading comprehension scores were obtained using the California Reading Test, Advanced, Form W. A noun-deletion Cloze I Test and an accompanying multiple response Cloze II Test formed the measure of specific inferential flexibility. A Means-End Test

was used as the measure of broad inferential flexibility.

Correlation coefficients of Cloze Tests and the Means-End Test, of the Means-End Test and of Vocabulary, Comprehension, and Total of the California Reading Test, and of Cloze Tests and Vocabulary, Comprehension, and Total scores of the California Reading Test were obtained for the total group. The Total scores obtained on the California Reading Test were the basis for dividing the subjects into two groups. Group I obtained a grade-equivalent score below ten, and Group II obtained a grade-equivalent score of ten and above. A comparison of the means and standard deviations for the two groups was completed for Cloze Tests I and II, Raw and Weighted, and for the Means-End Test, Raw and Weighted. Differences between means were tested for statistical significance using the t-test.

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter contains an analysis of the data obtained for 61 New York policemen on measures of Cloze Tests I and II and the Means-End Test. Also included are measures of Vocabulary, Comprehension, and Total Reading Comprehension of the California Reading Test. The findings are discussed and related to the literature.

Findings

Hypothesis 1 states that there is a positive correlation between performance of subjects on Cloze Tests I and II and performance of subjects on a Means-End Test. The data supported this hypothesis. As shown in Table 2, the correlation between Cloze I Weighted and Means-End Raw was significant at the .01 level of confidence. The correlation between Cloze I Weighted and Means-End Weighted was significant at the .05 level of confidence. Contrary to Hypothesis 1, and as shown in Table 1, no significant correlation was found between any measure of Cloze II and the Means-End Test.

TABLE 1

INTERCORRELATIONAL MATRIX OF VARIABLES

	1	2	3	4	5	6	7	8	9
1	1								
2	.514	1							
3	.828	.894	1						
4	.192	.296	.306	1					
5	.297	.284	.346	.896	1				
6	.121	.230	.291	.136	0	1			
7	0	-.005	0	.316	.240	.253	1		
8	.211	.293	.274	.127	.189	.131	0	1	
9	.194	.283	.262	.104	.190	.14	0	.991	1

1 Vocabulary, CRT

2 Comprehension, CRT

3 Total, CRT

4 Means-End, Raw

5 Means-End Weighted

6 Cloze I Raw

7 Cloze I Weighted

8 Cloze II Raw

9 Cloze II Weighted

TABLE 2

SIGNIFICANT FINDINGS AMONG SCORES FOR VOCABULARY, COMPREHENSION, AND TOTAL READING COMPREHENSION OF THE CALIFORNIA READING TEST AND SCORES FOR CLOZE TESTS I AND II AND THE MEANS-END TEST

Variables	r	P
Cloze I Weighted and Means-End Raw	.316	.01
Cloze I Weighted and Means-End Weighted	.240	.05
Cloze I Raw and Comprehension	.230	.05
Cloze I Raw and Total	.291	.05
Cloze II Raw and Comprehension	.293	.05
Cloze II Raw and Total	.274	.05
Cloze II Weighted and Comprehension	.283	.05
Cloze II Weighted and Total	.262	.05
Means-End Raw and Comprehension	.296	.01
Means-End Raw and Total	.306	.01
Means-End Weighted and Vocabulary	.297	.01
Means-End Weighted and Comprehension	.284	.05
Means-End Weighted and Total	.346	.005

TABLE 3

COMPARISON OF MEANS AND STANDARD DEVIATIONS FOR GROUPS I AND II FOR RAW AND WEIGHTED CLOZE TESTS I AND II AND MEANS-END TEST

	Group I (N=37)		Group II (N=24)		Total (N=61)	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	t	
Cloze I Raw	14.2	1.00	14.6	.78	1.52	ns
Cloze I Weighted	28.4	3.18	29.3	1.27	1.34	ns
Cloze II Raw	32.5	12.47	43.3	15.79	2.95	.0025
Cloze II Weighted	65.3	27.25	87.2	31.82	2.87	.003
Means-End Raw	6.4	3.40	7.7	3.23	1.47	ns
Means-End Weighted	14.9	7.59	18.5	7.03	1.83	.036

Means were rounded to the nearest tenth. Standard deviations were rounded to the nearest hundredth.

Hypothesis 2 states that there is a positive correlation between performance on the Vocabulary, Comprehension and Total of the California Reading Test and performance on Cloze Tests I and II and the Means-End Test. The data supported this hypothesis. Table 1 provides intercorrelations among the variables. Table 2 shows the significant findings.

As shown in Table 2, the correlation between Cloze I Raw and Comprehension was significant at the .05 level of confidence. The correlation between Cloze I Raw and Total was significant at the .05 level of confidence. As shown in Table 1, no significant correlation was found between Cloze I Raw and Vocabulary. No significant correlations were found between Cloze I Weighted and Vocabulary, Comprehension, and Total.

As shown in Table 2, the correlation between Cloze II Raw and Comprehension was significant at the .05 level of confidence, the correlation between Cloze II Raw and Total, at the .05 level of confidence. The correlation between Cloze II Weighted and Comprehension was significant at the .05 level of confidence. The correlation between Cloze II Weighted and Total was significant at the .05 level of confidence. As shown in Table 1, no significant correlations were found between either measure of Cloze II and Vocabulary.

As shown in Table 2, the correlation between Means-End Raw and Comprehension was significant at the .01 level of confidence. The correlation between Means-End Raw and Total of the

CRT was significant at the .01 level of confidence. The correlation between Means-End Weighted and Vocabulary was significant at the .01 level of confidence. The correlation between Means-End Weighted and Comprehension was significant at the .05 level of confidence. The correlation between Means-End Weighted and Total of the CRT was significant at the .005 level of confidence.

Hypothesis 3 states that the mean performance on Cloze Tests I and II is significantly higher among subjects who obtain higher reading scores. The data supported this hypothesis. As shown in Table 3, Group I's performance on Cloze II Raw was 32.5 and the standard deviation 12.47 compared to Group II's mean performance of 43.3 and a standard deviation of 15.79. This difference was significant at the .0025 level of confidence. Group I's mean performance on the Weighted Cloze II was 65.3 with a standard deviation of 27.25 compared to Group II's mean performance of 87.2 with a standard deviation of 31.82. This difference was significant at the .003 level of confidence.

Hypothesis 4 states that the mean performance on the Means-End Test is significantly higher among subjects who obtain higher reading scores. The data supported this hypothesis. As shown in Table 3, Group I's performance on the Means-End Weighted was 14.9 and the standard deviation 7.59 compared to Group II's mean performance of 18.5 with a standard deviation of 7.03. The difference was significant at the .036 level of confidence. As shown in Table 3, there was no significant difference between Group I and

CRT was significant at the .01 level of confidence. The correlation between Means-End Weighted and Vocabulary was significant at the .01 level of confidence. The correlation between Means-End Weighted and Comprehension was significant at the .05 level of confidence. The correlation between Means-End Weighted and Total of the CRT was significant at the .005 level of confidence.

Hypothesis 3 states that the mean performance on Cloze Tests I and II is significantly higher among subjects who obtain higher reading scores. The data supported this hypothesis. As shown in Table 3, Group I's performance on Cloze II Raw was 32.5 and the standard deviation 12.47 compared to Group II's mean performance of 43.3 and a standard deviation of 15.79. This difference was significant at the .0025 level of confidence. Group I's mean performance on the Weighted Cloze II was 65.3 with a standard deviation of 27.25 compared to Group II's mean performance of 87.2 with a standard deviation of 31.82. This difference was significant at the .003 level of confidence.

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II in respect to mean performance on Means-End Raw.

Discussion

In support of Hypothesis 1, performance on Cloze I Weighted and performance on Means-End Raw was positively related. Performance on Cloze Weighted and performance on Means-End Weighted was positively related. Because of the small number of items on Cloze Test I, interpretations of the significance of this relation must remain tentative. Limited specific lexical inference in a single response per deletion cloze was positively related to broad inferential flexibility as measured by Means-End Raw and Weighted Tests.

Contrary to Hypothesis 1, no significant correlation was found between performance on Cloze Test II and performance on the Means-End Test. There was no significant positive relationship found between specific inferential flexibility and general inferential flexibility as measured by these two tests. A number of subjects who performed well on a task of specific inferential flexibility, Cloze Test II, found a broad inferential task, the Means-End Test, difficult. Interpretations regarding the relation of specific and broad inference as outlined by Carroll (1971) must be limited by the nature of the measures used in this study. Clearly, performance on a broad inference task as measured by questions about an intact passage may be positively related to performance on a task of lexical flexibility simply because the former type of measure involves the subject in specific syntactic as well as

broad contextual problems. A well-rounded program of diagnosis and remediation, however, might involve the use of more than one kind of testing instrument for inference.

Conversely, many subjects who could infer more than one alternative missing part of a context still had difficulty when required to infer alternative syntactically and semantically appropriate words in a limited syntax. This is understandable in view of the nature of the sample. Many of the subjects speak an English dialect that differs significantly from standard English in respect to syntax. In Von Glasersfeld's terms, this would indicate that difficulty in relating the realm of experience to the printed word may occur when the printed word appears in an unfamiliar syntax. There may be a disparity between the language structure of the conceptual network of the subjects and the specific syntax in which the reading message is communicated. Subjects could construct missing parts of the context on the Means-End Test in their own syntax without penalty.

In support of Hypothesis 2, there was a significant positive correlation between Cloze I Raw and the Comprehension and Total scores of the California Reading Test. Since the Cloze I Raw scoring system did not give credit for syntactic errors this finding indicates that subjects with a sure grasp of syntax and semantics did better on general reading measures. The correlation between exact-scored, single-response per deletion Cloze and general reading measures supported the findings of Taylor

(1956), Rankin (1957, 1959), and Kingston and Weaver (1970).

There were positive correlations between performance on the Raw and Weighted Cloze II and performance on the Vocabulary and Total of the California Reading Test. This supports the hypothesis that flexibility of lexical inference is positively related to reading comprehension measures at the advanced level. Further development of measures designed to test and exercises designed to teach this kind of versatility may be indicated in the remediation of reading problems based on specific inferential inflexibility.

Contrary to Hypothesis 2, neither of the Cloze Tests was significantly related to the Vocabulary section of the California Reading Test. A possible explanation is that the Vocabulary section of the California Reading Test does not test words in context, whereas both Cloze Tests do. In addition, on Cloze Test II, the individual is allowed to call upon whatever semantic equivalents he may possess, regardless of whether or not these equivalents match those specific words that the norms have deemed appropriate to his grade level. Even at a low grade equivalent vocabulary level, the number of semantic alternatives possessed by an individual may be quite sufficient for a high score on Cloze Test II, since flexibility within a word concept, and not sophistication of word choice, is measured. Based on Weaver's (1965) description of lexical cloze as a conceptual task, this finding may be of use in analyzing the construct validity of vocabulary

tests, and in constructing measures like the multiple response per single deletion lexical cloze to measure the lexical versatility of the subject.

It was to be expected that no significant correlation was found between Cloze I and Vocabulary. Only one semantically and syntactically correct response per deletion is necessary to achieve a perfect score on the Cloze I Test. The reading level of the Cloze I passage based on the Fry Readability Formula (Fry, 1968) is within the third- to fourth-grade equivalent range, lower than the lowest grade-equivalent reading score achieved by any subject on any section of the California Reading Test.

In support of Hypothesis 2, there was a significant positive correlation between performance on the Means-End Test and performance on the Vocabulary, Comprehension, and Total of the California Reading Test. Performance on the raw measure was positively related to Comprehension and Total sections and performance on the weighted measure was positively related to performance on all sections of the California Test. Those who produced a greater number and variety of broad inferences also performed better on all parts of the California Reading Test.

These findings gave support to the conclusions of Kress (1955) and the observations of Laycock (1966) concerning the versatility and the flexibility of the achieving reader. This data also supported Carroll's claim that it is difficult to divorce inference and other reasoning processes from any aspect of reading

comprehension. General intelligence factors cannot be discounted in assessing the meaning of the relationship between the two measures, since a variation on the Means-End Test used in this study was found to be positively correlated with the California Test of Mental Maturity (Schure and Spivack, 1972).

Nevertheless, these findings may help to build a model of how inferential intelligence operates in reading comprehension. The Means-End Test presents a "real life" problem to be manipulated on an abstract level. A possible implication of the positive correlation found between this kind of problem-solving and reading comprehension is that a personality factor of flexibility of judgement based on experience is a component of higher level reading processes, as indicated by Singer (1966). Schure and Spivack (1972) found that the number of means produced by subjects was positively correlated to adjustment measures, apart from IQ. These findings and method of testing broad inference may be of use in the investigation of cognitive and personality factors in reading.

Contrary to Hypothesis 3, there was no significant difference between the mean scores of Groups I and II on Cloze Test I. In view of the low readability of the Cloze I passage in relation to the total group reading level, this finding was to be expected.

In support of Hypothesis 3, Group II's performance on Cloze Test II, Raw and Weighted, was significantly superior to Group I's performance on the same task. The measure of the

reader's number of lexical alternatives for a given conceptual category may be important to the evaluation of reading disability rooted in specific inferential limitations. Research to establish the reliability of the multiple response per single deletion noun cloze is indicated. The relation of Cloze Test II to other cognitive measures should be studied.

Tests for significant differences between the mean scores of Groups I and II on the Weighted Means-End Test revealed that Group II's performance was significantly superior. This finding also supported Hypothesis 4. There was no significant difference between the two groups in respect to performance on the Means-End Raw measure. Those who obtained a grade-equivalent score of ten or above on the California Reading Test gave a greater variety of broad inferential responses. Among the categories of responses were those of advice-getting, attitude change, and behavior that implied a positive social response. These categories were described under the sidehead Scoring Procedure for the Means-End Test. This finding was consistent with positive correlations found between the Means-End Test and reading comprehension measures. Significant differences between Groups I and II on the Means-End Test gave further indication of the need for research investigating personality and cognitive components of higher level reading processes.

CHAPTER V

SUMMARY AND CONCLUSIONS

This chapter summarizes this study, and presents conclusions regarding the hypotheses and findings of this investigation. Suggestions for further research are also included.

Summary

This study investigated the relationship between specific inference (the ability to infer alternative responses for a missing word) as measured by a Cloze Test, and broad inference (the ability to infer alternative missing sentences in a context), as measured by a Means-End Test. Sixty-one New York policemen were tested.

The California Reading Test, Advanced, Form W, was administered to determine reading achievement on Vocabulary, Comprehension, and Total Reading Comprehension. A Means-End Test was administered to obtain a measure of broad inferential ability. Cloze Tests I and II were administered to obtain a measure of specific inferential ability.

Correlation coefficients of Cloze Tests and the Means-end Test were obtained. Correlation coefficients of Cloze Tests and Vocabulary, Comprehension, and Total Reading Comprehension were obtained. Correlation coefficients of the Means-End Test

and the same measures of reading were obtained. Total performance on the California Reading Test was the basis for dividing the subjects into two groups. Group I obtained a grade equivalent score below 10. Group II obtained a grade equivalent score of 10 or above. A comparison of the means and standard deviations for the two groups was completed for Cloze Tests I and II and for the Means-End Test. Differences between means were tested for statistical significance using the t-test.

Conclusions Regarding the Hypotheses and Findings

Hypothesis 1 was only partially supported by the findings as discussed in Chapter IV. Performance on the task of limited specific inference, Cloze I, was significantly correlated with performance on the Means-End Test of broad inferential flexibility. No significant correlation was found between the main task of specific inference, the Cloze II Test, and the Means-End Test. This study found a positive relationship between limited lexical inference and broad inferential ability. There was no relationship found however, between performance on the main measure of specific inference and performance on the broad inference task.

A statistical analysis of the relationship among the variables of performance on the sections of the California Reading Test, the Cloze I and II Tests, and the Means-End Test provided support for Hypothesis 2. Cloze I Raw correlated significantly with Comprehension and Total Reading Comprehension. Significant correlations

were found between Cloze II and all sections except Vocabulary. Significant correlations were found between the Means-End Test and all sections of the California Reading Test. Means-End Raw did not correlate significantly with Vocabulary. Thus, it can be concluded that there is a positive relationship between specific and broad inferential ability and measure of reading comprehension. There is no relationship, however, between performance on a task of specific inference of words in context and performance on a vocabulary test measuring words out of context.

The data supported Hypothesis 3, that the mean performance on Cloze Tests I and II is significantly higher among subjects who obtain higher reading scores. The lack of a significant difference between groups on Cloze Test I, as discussed in Chapter IV, was not central to this hypothesis. Significant differences in performance were found on the main measure of inferential ability, the Cloze II Test. Thus, it can be concluded that subjects with higher reading scores tend to perform better on a task of specific inferential ability.

The data also supported Hypothesis 4, that the mean performance on the Means-End Test is significantly higher among subjects who obtain higher reading scores. Although no significant differences were obtained on the Raw Means-End Test, there was a significant difference on a Weighted Means-End Test. The scoring system for this measure gave credit for more than one kind of response. Thus, it can be concluded that subjects with higher reading

scores tend to produce a greater variety of broad inferential responses than lower level readers.

Suggestions for Further Research

This study contributes information regarding the role of inference in the mature reading process; however, the size of the sample, the absence of IQ measures, and the questionable reliability of the Cloze and Means-End measures used suggest the need for similar studies to generalize these findings.

The findings provided only partial support for Carroll's assertion that specific and broad inference are interdependent. No significant correlation was found between the main measure of specific inference, Cloze II, and the Means-End Test of broad inferential ability. Further experimental investigation based on Carroll's theory, however, might involve a test of the relationship between a multiple response lexical cloze and intact passage tests of broad inference. In addition, correlational studies between the Means-End Test and other tests of reading inference are indicated.

This study found a significant positive correlation between specific lexical inference and general reading comprehension. The relationship between the lexical cloze used in this study and measures of intelligence needs to be investigated. More data might serve to isolate the variables that account for problems in specific inference. Another important question is the relationship

between multiple response lexical cloze and reading comprehension at other levels.

One implication of this study is that students who are having reading problems might benefit from techniques to extend their range of inferential alternatives. Hafner (1965) suggests the use of cloze procedures in "constructing exercises through which students...will be stimulated to come to grips with meanings and concepts [p. 154]..." He recommends "a more drastic modification of cloze...to show the role of reasoning in reading [p. 154]..." The multiple response noun cloze may provide a basis for further research, diagnosis, and remediation concerned with problems of reasoning in reading.

There is a need to determine what accounts for the significant correlation found between the Means-End Test and general reading comprehension measures. Specifically, what is the relationship between the Means-End Test and other tests of broad inference and intelligence measures? How do personality variables contribute to performance on this task of inferential flexibility?

Other studies investigating the relationship between Means-End problem-solving and reading comprehension at all levels may provide a scientific basis for reading curriculum analysis and innovation. Perhaps if enough scientific data were obtained from such studies, the analysis of basal readers stories for relative sophistication of problem-solving skills would be justified. This analysis might attempt to determine if the characters in these

stories exemplify inferential skills appropriate to the age of the children who read them. The work of Piaget may yield additional criteria relevant to this kind of evaluation.

These studies may contribute to a model of reading that more clearly defines and integrates the roles of inference, intelligence, and personality variables in reading comprehension.

BIBLIOGRAPHY

Bormuth, J. R. Experimental applications of the cloze test. In J. A. Figurel (Ed.), Improvement of reading through classroom practice. International reading association conference proceedings. Newark, Delaware: International Reading Association, 1964, 9, 303-306.

Bormuth, J. R. Factor validity of cloze tests as measures of reading comprehension. Reading Research Quarterly, 1969, 4, 358-365.

Bourne, L. E., Ekstrand, B. R. & Dominowski, R. L. (Eds.) The psychology of thinking. Englewood Cliffs, N. J.: Prentice-Hall, 1971.

Buros, O. K. (Ed.) The fourth mental measurements yearbook. Highland Park, N. J.: The Gryphon Press, 1953.

Carroll, John B. Defining language competence: Some speculations. Paper presented at the Research Workshop on Language Competence and the Acquisition of Knowledge, Quail Roost Conference Center, Durham, North Carolina, March 31-April 3, 1971.

Clark, H. H. Linguistic processes in deductive reasoning. Psychological Review, 1969, 76, 387-404.

Danks, J. H. Some factors involved in the comprehension of deviant English sentences. (Doctoral dissertation, Princeton University) Ann Arbor, Michigan: University Microfilms, 1969, No. 69-2735.

Farr, R. Convergent and discriminant validity of several upper level reading tests. In G. B. Schick & M. M. May (Eds.), Multidisciplinary aspects of college-adult reading: The seventeenth yearbook of the national reading conference. Milwaukee: National Reading Conference, Inc., 1968.

Farr, R. Reading: what can be measured? Newark, Delaware: International Reading Association Research Fund, 1969.

Fry, E. A readability formula that saves time. Journal of Reading, 1968, 11, 513-516; 575-578.

Goodman, K. Reading: A psycholinguistic guessing game. In H. Singer & R. Ruddell (Eds.) Theoretical models and processes of reading. Newark, Delaware: International Reading Association, 1970.

Guice, B. M. The use of the cloze procedure for improving reading comprehension of college students. Journal of Reading Behavior, 1 (Summer, 1969) 81-92.

Hafner, L. E. Relationships of various measures to the cloze. In E. Thurston & L. E. Hafner (Eds.), New concepts in college-adult reading: Thirteenth yearbook of the national reading conference. Milwaukee: The National Reading Conference, Inc., 1964, 135-145.

Jenkinson, M. E. Selected processes and difficulties in reading comprehension. Unpublished doctoral dissertation, University of Chicago, 1957.

Jongsma, E. The cloze procedure as a teaching technique. Newark, Delaware: The International Reading Association, 1971.

Kingston, A. J. & Weaver, W. W. Feasability of cloze techniques for teaching and evaluating culturally disadvantaged beginning readers. Research and Development Center in Early Educational Stimulation, University of Georgia, 1970.

Kress, R. A. An investigation of the relationship between concept formation and achievement in reading. Unpublished doctoral dissertation, Temple University, 1955.

Laycock, F. Conceptual and personality factors underlying flexibility in speed of reading. In G. B. Schick & M. M. May (Eds.), New frontiers in college-adult reading: Fifteenth yearbook of the national reading conference. Milwaukee: National Reading Conference, Inc., 1966, 140-156.

Miller, G. A. Some preliminaries to psycholinguistics. American Psychologist, 1965, 20, 15-20.

Nelson, M. J. & Denny, E. C. The Nelson-Denny Reading Test. Boston: Houghton-Mifflin, 1960.

Rankin, E. F., Jr. An evaluation of the cloze procedure as a technique for measuring reading comprehension. Unpublished doctoral dissertation, University of Michigan, 1957.

Rankin, E. F., Jr. The cloze procedure--its validity and utility. In O. S. Causey and W. Eller (Eds.), Eighth yearbook of the national reading conference. Milwaukee: National Reading Conference, Inc., 8: 131-144, 1959.

Ruddell, R. Psycholinguistic implications for a systems of communication model. In H. Singer and R. Ruddell (Eds.), Theoretical models and processes of reading. Newark, Delaware: International Reading Association, 1970.

Schneyer, J. W. Use of the cloze procedure for improving reading comprehension. Reading Teacher, 19, (December, 1965) 174-179.

Schure, M. B. & Spivack, G. Means-end thinking, adjustment, and social class among elementary-school-aged children. Journal of Consulting and Clinical Psychology, 1972, 38(3), 348-353.

Singer, H. Conceptualization in learning to read. In G. B. Schick & M. M. May (Eds.), New frontiers in college-adult reading: Fifteenth yearbook of the national reading conference. Milwaukee: National Reading Conference, Inc., 1966, 116-132.

Stauffer, R. G. Directing reading maturity as a cognitive process. New York: Harper & Row, 1969.

Taylor, W. L. Cloze procedure: A new tool for measuring readability. Journalism Quarterly, 1953, 30, 415-433.

Taylor, W. L. Recent developments in the use of 'cloze procedure'. Journalism Quarterly, 1956, 33, 42-48, 99.

Taylor, W. L. Cloze readability scores as indices of individual differences in comprehension and aptitude. Journal of Applied Psychology, 1957, 41, 19-26.

Tiegs, E. & Clark, W. W. The California reading test, advanced, form w. Monterey, California: Mc-Graw-Hill, 1963. (b)

Von Glasersfeld, E. Reading, understanding, and conceptual situations. Paper presented at the National Reading Conference, Tampa, Florida, December, 1971.

Weaver, W. W. Theoretical aspects of the cloze procedure. In E. Thurston & L. E. Hafner (Eds.), The philosophical and sociological bases of reading: The Fourteenth yearbook of the national reading conference. Milwaukee: The National Reading Conference, Inc., 1965.

Werner, H. Comparative psychology of mental development. New York: International Universities Press, 1957.

APPENDIX A

THE MEANS-END TEST

MEANS-END TEST DIRECTIONS

The person in the story you are to read has a problem. The beginning and the end of the story will be given to you. The beginning describes Bob's problem. The end says that he solves it. It is up to you to write down as many <u>different</u> ways as you can think of for Bob to solve his problem. Number each new way to solve the problem. Keep on thinking up new ways until the time is up. Do not spend too much time describing one way he can solve the problem. Do not give magical solutions. In the example, one solution is given for Bob's problem. Can you think of any other solutions?

Example: <u>Beginning</u> Bob broke a brand new vase.

Solution #1. Bob fixed the vase with glue.

Solution #2.

Solution #3.

<u>End</u> Bob's vase looks like new.

MEANS-END TEST

Beginning Bob is a new student in college. He has no friends. Most of the time he sits in his room feeling lonely.

End At the end of the story, Bob has many friends and is no longer lonely.

APPENDIX B

CLOZE TESTS I AND II

INSTRUCTIONS FOR CLOZE TESTS I AND II

Cloze Test I

This is a story in which some words have been left out. Read the whole paragraph first before you fill in any blank. Then go back to the beginning and fill in one word for each blank. Make sure that the paragraph makes sense. Nonsense words are not acceptable.

Cloze Test II

Using the same story, try to think of as many words as you can to fit in each blank. These words need not mean the same as the first words you filled in, but they must make sense in the sentences.

Example: The dog ran down the stairs.

boy

water

All three answers are acceptable.

IMPORTANT: Make sure the blank numbers for the story match the blank numbers on the answer sheet for Cloze Test II. Do not stop trying to find more words for each blank before the time is up.

CLOZE TEST I

Bob warts to become rich quick. He notices a valuable diamond in a 1) _____. Since Bob doesn't know how to steal the diamond, he goes to a 2) _____ for advice. She tells him, "It is your 3) _____ to become wealthy, but you must learn the ways of the 4) _____. You should first become a policeman. Then, get hired as a 5) _____ to the diamond. Later, no one will suspect that you were the 6) _____."

Bob goes to college, and soon becomes the best 7) _____ _____ of crime. He investigates a 8) _____ that steals diamonds, and learns how they break into 9) _____ without making noise. Bob gets hired to guard the 10) _____ ____. One night, he breaks the 11) _____ in which the diamond is kept. This makes no 12 _____ because Bob uses material to cover the 13) _____. He escapes on a 14) _____ to another country. There, he trades the diamond for a huge 15) _____.

CLOZE TEST II

ANSWER SHEET

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

CLOZE TEST II

ANSWER SHEET

7) _____

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8) _____

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CLOZE TEST II

ANSWER SHEET

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15) _____

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APPENDIX C

SCORES FOR CALIFORNIA READING TEST,

ADVANCED, FORM W AND

RAW AND WEIGHTED SCORES FOR

THE MEANS-END TEST AND CLOZE TESTS I AND II

GROUP ONE

Student	V	C R T C	T	Means-End Ra	Means-End Wb	Cloze I c Ra	Cloze I c Wb	Cloze II Ra	Cloze II Wb
1	9.6	7.8	8.6	8	16	15	30	57	114
2	9.6	8.3	9.0	15	30	14	28	39	78
3	10.3	7.8	8.9	12	26	14	28	23	26
4	7.5	7.9	7.8	15	10	13	28	18	38
5	8.4	10.3	9.7	8	16	15	30	36	73
6	10.5	8.6	9.6	8	21	15	30	27	54
7	7.5	7.7	7.6	9	19	14	29	70	147
8	11.1	8.6	9.9	9	22	14	28	31	62
9	10.3	7.1	8.3	4	16	14	29	58	116
10	10.0	9.8	9.9	4	10	14	28	8	16
11	11.3	8.3	9.8	2	2	15	30	38	76
12	9.1	9.5	9.6	8	16	15	30	20	40
13	6.6	9.3	8.4	10	21	15	30	33	66
14	8.2	9.0	8.6	2	6	15	30	29	63
15	9.1	7.3	8.0	2	7	14	28	36	79
16	10.9	7.4	8.9	2	4	14	28	28	56
17	8.6	9.0	8.5	3	6	12	26	18	18
18	8.0	8.9	8.7	4	8	15	30	34	70
19	9.8	9.5	9.8	10	23	15	30	32	64
20	10.5	8.9	9.8	12	30	14	29	23	46
21	9.1	7.7	8.3	4	8	14	28	17	34
22	9.8	9.0	9.6	11	23	13	26	19	41
23	8.6	7.7	8.1	0	3	15	30	46	97
24	8.6	10.5	9.9	8	16	15	30	35	70
25	10.5	6.8	8.2	6	20	15	30	44	88
26	9.3	8.1	8.7	8	22	15	30	22	44
27	11.1	7.6	9.1	5	25	11	23	35	75
28	8.9	10.0	9.7	4	9	15	30	42	84
29	9.1	7.8	8.4	3	6	14	29	30	60
30	6.8	8.2	7.7	7	15	12	12	45	98
31	9.6	9.5	9.8	9	19	15	30	39	78
32	7.0	8.6	8.7	6	14	14	28	23	46
33	7.0	7.3	7.1	3	6	15	30	27	56
34	10.7	7.9	9.2	9	15	15	30	26	52
35	8.6	9.8	9.5	5	16	14	29	32	64
36	10.3	7.8	8.9	6	12	15	30	25	52
37	10.0	8.4	9.3	5	11	13	26	39	78

[a]Raw
[b]Weighted
[c]15 possible number correct.

GROUP TWO

Student	V	CRT C	T	Means-End Raw	Means-End Weighted	Cloze IC Raw	Cloze IC Weighted	Cloze II Raw	Cloze II Weighted
1	13.3	9.3	11.6	6	16	14	28	13	26
2	13.4	14.3	14.0	13	30	15	30	58	119
3	13.6	11.8	12.6	8	24	15	30	60	120
4	11.3	10.0	10.7	10	23	15	30	69	138
5	11.9	9.5	10.8	3	9	15	30	38	78
6	11.9	13.3	12.5	7	14	13	26	57	114
7	11.9	9.2	10.4	7	22	15	30	50	105
8	12.9	12.3	12.5	6	15	15	30	16	32
9	14.6	14.3	14.4	12	27	14	29	52	104
10	9.8	9.2	9.6	13	32	15	30	27	54
11	11.5	8.9	10.3	2	10	12	26	27	54
12	10.9	12.2	11.5	6	16	15	30	44	90
13	11.7	8.7	10.3	10	20	15	30	11	22
14	11.3	10.0	10.7	10	20	14	28	54	108
15	11.9	10.3	11.2	9	19	15	30	39	78
16	11.6	10.0	11.4	5	13	15	30	36	73
17	12.3	10.3	11.4	4	8	15	30	55	110
18	11.3	10.0	11.3	12	26	15	30	44	88
19	11.3	8.9	10.2	4	10	14	28	64	128
20	11.3	8.7	10.1	12	29	14	28	49	98
21	13.4	10.3	11.4	5	13	15	30	32	64
22	11.9	12.3	12.0	7	21	15	30	43	92
23	9.6	11.3	10.5	6	13	15	30	51	102
24	10.0	13.3	11.7	7	15	15	30	49	98

[a]Raw
[b]Weighted
[c]15 possible number correct

COURSE WORK FOR MASTER'S DEGREE IN READING

		Instructor
Spring, 1972		
290:514	Introduction to Adolescent and Adult Years	Dr. Montare
299:510	Reading and Communication in Education	Dr. Shew
299:561	Foundations of Reading Instruction	Dr. Kling
Summer, 1972		
299:564	Remedial Reading	Dr. Zelnick
299:565	Lab in Remedial Reading	Dr. Zelnick
830:432	Thinking	Mr. Cheng
Fall, 1972		
290:540	Introduction to Learning	Dr. Montare Dr. Cox Dr. Gillooly
290:601	Independent Study, Psychological Foundations	Ms. Arnold
299:566	Seminar in Reading Research and Supervision	Dr. Swalm
Spring, 1973		
290:501	Introduction to Educational Tests and Measurements	Dr. Geyer
299:599	Master's Thesis Research	Dr. Kling
310:602	Readings in Sociological and Philosophical Foundations	Dr. Lewis
350:394	Literary Relations	Dr. Qualls

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AN INVESTIGATION OF THE RELATIONSHIP BETWEEN SPECIFIC AND BROAD INFERENCE

AN ABSTRACT OF A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS UNIVERSITY

THE STATE UNIVERSITY OF NEW JERSEY

BY

JACQUELYN BONOMO

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OF

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ABSTRACT

The relationship between specific inference as measured by a Cloze Test and broad inference as measured by a Means-End Test was investigated. Subjects were 61 New York policemen enrolled in a Communication Skills course at John Jay College of Criminal Justice, New York, N. Y.

The relationships between specific inference and broad inference, specific inference and measures of reading achievement, and broad inference and measures of reading achievement were analyzed. The sample was divided into two groups on the basis of reading achievement. A comparison of the means and standard deviations for the two groups was completed on measures of specific and broad inference.

Findings in regard to the relation of specific to broad inference were inconclusive. A significant correlation was found between a secondary measure of specific inference and the test of broad inference.

Positive correlations were found between specific and broad inference and measures of reading achievement. The findings indicated that the mean performance on measures of specific and broad inference was significantly higher among subjects who obtained higher reading scores.