Testing the Effect of Pictures on the Comprehension of Second Graders

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Abstract

The purpose of this study was to investigate the effect of pictures, used to accompany basal reader stories, on the comprehension of below average, average and above average second grade readers. This study was unique in that simple line drawings were designated picture types and the Bormuth standard cloze procedure was used to measure comprehension.

The subjects, one hundred and thirty second-graders from a rural primary school, were divided into two main groups: (1) story with no pictures and (2) story with pictures. Each group was composed of an equal number of below average, average and above average readers.

The Laidlaw Placement Test for Primary Grades, a modified cloze test, was administered to all subjects to indicate placement in one of the three reading achievement levels. Final Cloze Test Stories, half with pictures and half without, were devised by the researcher and administered to each group of subjects. Stories were taken from the Laidlaw Reading Program, a basal reader program, and pictures were simple line duplicates of the original pictures accompanying the stories.

A series of t tests and an analysis of variance were used to analyze the resulting comprehension scores at the .05 level of significance. The results indicated
that for all second grade subjects, the picture groups performed significantly better than the no-picture groups. Additionally, all three achievement levels of picture groups received higher comprehension scores than the three comparative no-picture groups. However, only the below average picture group scored significantly higher than the below average no-picture group.

Recommendations for classroom use of pictures and the cloze procedure at the primary school level, as well as recommendations for future research, were given.
# Table of Contents

<table>
<thead>
<tr>
<th>List of Tables</th>
<th>iv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td><strong>I. Statement of the Problem</strong></td>
<td>1</td>
</tr>
<tr>
<td>Purpose</td>
<td>2</td>
</tr>
<tr>
<td>Need for the Study</td>
<td>2</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>4</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Summary</td>
<td>6</td>
</tr>
<tr>
<td><strong>II. Review of the Literature</strong></td>
<td>8</td>
</tr>
<tr>
<td>Purpose</td>
<td>8</td>
</tr>
<tr>
<td>The Perception of Pictures by Young</td>
<td>8</td>
</tr>
<tr>
<td>Children</td>
<td>8</td>
</tr>
<tr>
<td>Simple Line Drawings</td>
<td>12</td>
</tr>
<tr>
<td>The Effect of Pictures on Reading</td>
<td>14</td>
</tr>
<tr>
<td>Comprehension</td>
<td>19</td>
</tr>
<tr>
<td>The Cloze Procedure as a Measure of</td>
<td>23</td>
</tr>
<tr>
<td>Reading Comprehension for the Primary Grades</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td>23</td>
</tr>
<tr>
<td><strong>III. The Research Design</strong></td>
<td>24</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>24</td>
</tr>
<tr>
<td>Methodology</td>
<td>25</td>
</tr>
<tr>
<td>Analysis of Data</td>
<td>29</td>
</tr>
<tr>
<td>Summary</td>
<td>30</td>
</tr>
<tr>
<td><strong>IV. Analysis of Data</strong></td>
<td>31</td>
</tr>
<tr>
<td>Purpose</td>
<td>31</td>
</tr>
<tr>
<td>Analysis of the Findings</td>
<td>31</td>
</tr>
<tr>
<td>Interpretation of Data</td>
<td>36</td>
</tr>
<tr>
<td>Summary</td>
<td>40</td>
</tr>
<tr>
<td><strong>V. Conclusions and Implications</strong></td>
<td>41</td>
</tr>
<tr>
<td>Purpose</td>
<td>41</td>
</tr>
<tr>
<td>Conclusions</td>
<td>41</td>
</tr>
<tr>
<td>Implications for Research</td>
<td>42</td>
</tr>
<tr>
<td>Implications for Classroom Use</td>
<td>43</td>
</tr>
<tr>
<td>Summary</td>
<td>44</td>
</tr>
</tbody>
</table>
# Table of Contents (Continued)

<table>
<thead>
<tr>
<th>Bibliography</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendices</td>
<td></td>
</tr>
<tr>
<td>A. Sample Cloze Exercises for Day One........</td>
<td>52</td>
</tr>
<tr>
<td>B. Laidlaw Placement Tests for Primary Grades (Levels 6, 7 and 8)........</td>
<td>54</td>
</tr>
<tr>
<td>C. Final Cloze Test, with pictures (Level 6)</td>
<td>58</td>
</tr>
<tr>
<td>D. Final Cloze Test, with pictures (Level 7)</td>
<td>65</td>
</tr>
<tr>
<td>E. Final Cloze Test, with pictures (Level 8)</td>
<td>71</td>
</tr>
</tbody>
</table>
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Readability Levels of Laidlaw Trial Passages</td>
<td>27</td>
</tr>
<tr>
<td>2. Mean Comprehension Scores of Final Cloze Tests</td>
<td>31</td>
</tr>
<tr>
<td>3. Analysis of Variance for Control Groups</td>
<td>34</td>
</tr>
<tr>
<td>4. Analysis of Variance for Treatment Groups</td>
<td>36</td>
</tr>
<tr>
<td>5. Bormuth's Percentage Scores for Reading Levels (Bormuth, 1968) and Percentage Scores for Subjects</td>
<td>37</td>
</tr>
<tr>
<td>6. Number of Pages and Pictures of Final Cloze Tests</td>
<td>37</td>
</tr>
<tr>
<td>7. Percentage of Sentences Having Picture Cues in Final Cloze Tests</td>
<td>38</td>
</tr>
<tr>
<td>8. Types of Responses Needed in Final Cloze Tests</td>
<td>39</td>
</tr>
</tbody>
</table>
CHAPTER I

Statement of the Problem

Pictures have been used extensively throughout the history of education. Use of pictures in the United States can be traced back to as early as 1729 when the New England Primer incorporated pictures with text (Samuels, 1970). Since then pictures have been accepted as natural accompaniments to books and stories for primary school children. However, the ability of young children to interpret and integrate pictorial information with written text has been questioned. Exactly how does the appearance of pictures influence the comprehension of written passages at an early age?

The current trend in picture research seemed to indicate that ability to learn from pictures increases with age and education (Asso & Wyke, 1970; Brown, 1969; Dilley & Paivio, 1968; Mackworth & Bruner, 1970; Mandler & Robinson, 1978; Travers & Alvarado, 1970). Pictures often flood the beginning reader with irrelevant cues which have to be filtered out before appropriate information can be gleaned (Broadbent, 1965; Dwyer, 1967, 1972; Santostefano, Rutledge & Randall, 1965). Young children, when confronted with pictures, may not yet possess the ability to process them as an author/illus-
tractor intended (Ames, Learned, Metraux & Walker, 1953; Elkind, Koegler & Go, 1964; Piaget & Inhelder, 1956).

**Purpose**

The purpose of this study was to investigate the effect of simple line drawings, used to accompany basal reader stories, on the comprehension (as measured by the cloze procedure) of below average, average and above average second grade readers.

**Need for the Study**

In attempts to test the specific effect of pictures on reading comprehension, researchers have developed similar research designs presenting stories with and without pictures, ending in a final test of comprehension. These studies have produced contradictory results among various grade and achievement levels. Some studies reported that stories without pictures yielded better comprehension (Samuels, 1970; Weintraub, 1960); others that pictures made no difference in comprehension (Koenke, 1968; Koenke & Otto, 1969; Levin, 1973; Miller, 1938; Pederson, 1971) and still others that pictures accompanying stories produced comprehension gains (Matz & Rohwer, 1971; Peng & Levin, 1978; Strang, 1941). Bluth (1972), in her research, found that pictures significantly increased comprehension, but only for good readers.
No solid conclusions relating use of pictures to comprehension for beginning readers could be drawn.

One reason for results so varied could have been that researchers did not thoroughly investigate, control or describe the type of pictures used in their studies. It has been pointed out that simple line drawings seem to be more effective in the learning process (Bloomer, 1960; Dwyer, 1972; Paivio, Rogers & Smythe, 1968; Travers & Alvarado, 1970; Wicker, 1970) and that excessive pictorial detail should be eliminated. However, in their picture studies, Miller (1938) and Weintraub (1960) presented pictures found in basal readers. Cartoonlike color drawings (Levin, 1973) and black and white ink drawings (Koenke, 1968) were other types of illustrations used in picture studies.

Further research controversy could have been the result of the type of comprehension tests used--conventional multiple-choice tests, tests of recall and statement of main idea. These methods of measurement have been notably subjective. Also, they are employed after the reading of the text has taken place.

A standard cloze test using the Bormuth cloze procedure (Bormuth, 1968), could be a more objective alternative. "The cloze procedure measures the mental processes during reading that are commonly called 'comprehend-
In addition to these limitations, many of the researchers required subjects to read stories without matching the readability of the story with the reading ability of the subjects. Even though readers were often divided into groups of "good" and "poor" readers through standardized testing, they were asked to read passages at or above their grade level.

The following study was similar to past studies in that: (1) subjects were asked to read stories with and without pictures, and (2) subjects were divided into achievement levels.

However, in an attempt to clarify the effect of pictures on the comprehension of beginning readers, this study was unique in that it: (1) used simple line drawings, (2) determined the instructional levels of the subjects and matched them with reading passages at their instructional reading levels, and (3) used the Bormuth standard cloze procedure to test comprehension.

**Definition of Terms**

*Above Average Readers* were the second graders whose instructional reading level was Level 8 in the *Laidlaw Reading Program*, as indicated by the *Laidlaw Placement Tests*. 


Average Readers were the second graders whose instructional reading level was Laidlaw Level 7.

Below Average Readers were the second graders whose instructional reading level was Laidlaw Level 6.

Simple Line Drawings were dark, solid outline duplicates of the original pictures used to accompany the basal reader text.

Cloze Procedure was the technique used for measuring comprehension in which words were systematically deleted from a passage and the reader was expected to replace each deleted word while reading (Bormuth, 1968).

Limitations of the Study

The following were variables which could have limited the results of this study:

1. The nature of the subjects, since from a small rural community, may not have been typical of a normal population.
2. The placement of students by the results of only one testing situation may not have indicated the true placement of each subject as an average, above average or below average reader.
3. The range of readability levels (Spache, 1978) of the passages used to define below average,
average and above average readers was not very wide (1.7-2.1-2.5). It was also low when compared with a normal population.

4. The same numbers and types of deletions in each Final Cloze Test Story could not be controlled.

5. Although the type of picture, simple line drawing, was designated, the nature of each picture and its relation to the text could not be controlled.

6. The use of several teachers in the teaching of cloze procedure to the subjects may have resulted in better understanding of cloze by some subjects than others.

Summary

It is difficult to assess the value of the picture from research completed thus far. There has been agreement that children perceive pictures differently than adults. However, studies involving pictures and reading comprehension have not shown consistent results for or against use of pictures with the text for beginning readers.

This study proposes a new design for testing the effect of pictures on reading comprehension, using simple line drawings and the Bormuth standard cloze test.
Some of the limitations that have been presented were: the nature of the subjects used, the number of teachers involved, and the placement of subjects into groups through one testing situation.
CHAPTER II

Review of the Literature

Purpose

The purpose of this study was to investigate the effect of simple line drawings, used to accompany basal reader stories, on the comprehension (as measured by the cloze procedure) of below average, average and above average second grade readers.

The research related to this study has been divided into the following four categories:

The Perception of Pictures by Young Children
Simple Line Drawings
The Effect of Pictures on Reading Comprehension
The Cloze Procedure as a Measure of Reading Comprehension for the Primary Grades

The Perception of Pictures by Young Children

Research seemed to indicate that the ability to perceive pictures increases with age and education (Asso & Wyke, 1970; Dilley & Paivio, 1968; Mackworth & Bruner, 1970; Mandler & Robinson, 1978). Researchers suggested that the perception of pictures does not reach full development until approximately age ten (Ames, Learned, Metraux & Walker, 1953; Brown, 1969; Travers & Alvarado,
Much attention in picture studies was focused upon the differences in picture perception by young children and adults. There was strong evidence that children, when viewing pictures, had a tendency to concentrate on individual details and had difficulty bringing them together as a whole.

In a study by Elkind, Koegler and Go (1964), children were shown a picture of a display of vegetables arranged in the shape of a fish. The younger children described the picture as particular kinds of vegetables, while the older children reported the formation of a fish. Parts did not seem to be integrated into wholes until age nine in this study.

With duplicate results, Ames, Learned, Metraux and Walker (1953), recording responses in identification of Rorschach Inkblots, showed a tendency of younger children to define the details of the blot, whereas the older children (approaching age ten) gave the blot as a whole a name.

Eye fixations of six year olds were recorded as they viewed blurred and sharply focused pictures (Mackworth & Bruner, 1970). The children seemed to lack an effective program for visual search for both kinds of pictures and concentrated most on the details. They seemed to show inadequate eye movement patterns in attempts to process
the whole content of each picture, exhibiting difficulty in examining fine features and at the same time testing peripheral items for relevancy.

Miller (1938) also reported that among third graders, items of a picture were seen in isolation rather than as parts of a unified whole. In a further analysis of data, he concluded that the items most important to the meaning of the pictures were not identified by these subjects.

Travers' study in 1969 confirmed the research testing part/whole relationships in pictures viewed by young children. When children (ages four through twelve) were flashed the same picture at two second intervals for ten trials, the younger children tended to latch onto one object and failed to observe others. Travers also explained that few dynamic properties in the pictures were reported by the younger children. Travers judged pictures used in the classroom as generally dynamic. That is, they showed action-filled scenes. Such action was portrayed in pictures by techniques such as blurring. It was concluded that a child should not be expected to recognize picture cues presented by dynamics until the third grade (Travers & Alvarado, 1970).

Santostefano, Rutledge and Randall (1965), in comparing good readers and poor readers (aged eight through
thirteen), used pictures surrounded by line drawings of distractors. The poor readers had difficulty holding attention selectively to the appropriate items of the picture. They took longer than the good readers to complete the picture task. When the picture was removed, the poor readers recalled a greater number of distractors than the good readers. It was inferred that poor readers may develop more slowly in their ability to select relevant information from pictures.

Other researchers demonstrated problems of young children in: (1) translating pictorial information into verbal responses (Dilley & Paivio, 1968); (2) recognizing cues in pictures presented by dimension (Brown, 1969); (3) obtaining information in pictures by integrating spatial relations (Asso & Wyke, 1970; Piaget & Inhelder, 1956); and (4) organizing unfamiliar data found in pictures (Mandler & Robinson, 1978).

In a review of picture research, Travers and Alvarado (1970) concluded that "...pictures are of doubtful value for communicating anything other than the simplest pieces of information to young children" (p. 56).
Simple Line Drawings

How does a young child cope with complex visual data? In light of the research presented on picture perception at a young age, picture complexity appeared to imply more confounding detail for the child to analyze. In processing complex visual information, it has been noted that the brain works first to categorize and then to predigest detail before it reaches awareness (Attneave, 1954; Santostefano, Rutledge & Randall, 1965). Because of this filtering process, it is uncertain whether cues relevant to picture perception ever reach active reception in the brain (Broadbent, 1965).

The brain seems only capable of utilizing minute amounts of information received, and the quality and quantity of visual information processed by young children is questionable (Ames, Learned, Metraux & Walker, 1953; Elkind, Koegler & Go, 1964; Piaget & Inhelder, 1956). Therefore, it has been cited that the simple line (black outline) drawing was the most efficient and effective visual presentation, as the lines bordering an object generally provide only the essence of information to be conveyed (Attneave, 1954; Dwyer, 1967). In short, the simple line drawing contains less confounding detail.

Although simple line drawings have been proclaimed as the most productive picture accompaniment to learning
tasks (Bloomer, 1960; Dwyer, 1967, 1972; Travers & Alvarado, 1970), there have been little empirical data to support this claim. Related studies investigated mainly picture preferences among young children and adults.

In a study by French (1952), complex and simple line illustrations were rated by teachers and elementary school students. The students consistently preferred simple line drawings up to the fifth grade. Beyond that age group, complex illustrations were preferred. It was hypothesized that "... a child prefers the most complex presentation that he is able to organize perceptually" (p.59).

Bloomer (1960), compared colored line drawings, shaded line drawings and simple line drawings among fourth, fifth and sixth graders. He found that: (1) children preferred the colored pictures; (2) color tended to distract the child away from the theme of the picture and its logical relationships; (3) color tended to stimulate the children toward fantasy; and (4) when given writing tasks, children chose to write about the simple line drawings more often and wrote more creatively and realistically when these pictures were chosen.

In thorough studies testing picture types, Dwyer (1967, 1972) presented eight categories of pictures as accompaniments to science lessons for ninth grade through
college level students. The picture types ranged from simple line drawings (included black and white, colored and shaded) to realistic photos and models (black and white as well as colored). Dwyer determined that simple line drawings (black and white) proved the most effective picture type judged by final tests of drawing and total criterion tests encompassing all phases of the lessons. The simple line drawings also served as best complement to the oral presentations as indicated by the tests of comprehension. In other test results, the oral presentation group only superceded the black and white simple line drawing group.

Much research needs to be conducted to determine which type of picture best facilitates particular learning situations for young children. However, it seemed at present, that the simple line drawing has been noted as the most beneficial visual aid so far.

The Effect of Pictures on Reading Comprehension

Concern has been voiced about the utilization of pictures to accompany textbooks (Chall, 1967; Thomas, 1976). Efforts have been made to examine the function of these expensive additives to textbooks, as they appear widely and are assumed integral parts of a book's subject matter. One aspect of study has been to investigate the
effect of pictures on reading comprehension.

Research relating pictures and comprehension gained prominence in 1936 with a study by Goodykoontz. The subjects, sixth through eighth graders, read an illustrated story, followed by thirteen questions related to the text and thirteen questions related to the pictures. The results were that the average score of the text questions far exceeded the average score of questions about the pictures. When questioned about the extent to which they had used the pictures to interpret the text while reading, 6% of the subjects reported that they had not looked at the pictures, 25% had looked at them for fun after reading and 50% had simply looked at them as they came to them. The following question grew from this study: Do readers use pictures as an integral, contributing part of text interpretation?

Miller (1938) attempted to answer this question with first, second and third graders. For one semester, half of the subjects read the original basal readers with pictures, while the other half read from the same readers with the pictures covered up. In tests of comprehension and through standardized testing, it was determined that there was no significant difference in reading comprehension between the picture and no-picture groups. However, it was noted that the tests of comprehension were unusual,
testing mainly word recognition, sentence completion and sequence.

Research continued in 1941 with Strang's study, which resulted in higher comprehension scores for most fourth, fifth and sixth grade subjects reading illustrated rather than non-illustrated passages. This researcher observed that when illustrations were present, the brighter students took longer to complete the tests, while the slower students took less time.

Eleven through twelve year olds read passages with and without pictures in Vernon's study (1954). No significant effect was found between the two groups on general questions after reading. A limiting factor in this study was the difficulty of the passages used.

In a final study of this era, Weintraub (1960) tested the comprehension of three groups of second graders using basal readers either: (1) with pictures only; (2) with text only; or (3) with both pictures and text. Weintraub found that the text only group scored significantly higher than both of the picture groups on multiple-choice comprehension tests.

Contradictions were apparent in these first studies and it was difficult to draw any type of conclusion as to the effect of pictures on comprehension. In summary, Goodykoontz (1936) questioned the use of pictures by stu-
dents as aids in interpretation of text. Vernon (1954) and Miller (1938) reached the conclusion that pictures had no effect on reading comprehension. While Weintraub (1960) obtained data showing that reading without pictures was better for reading comprehension, Strang (1941) demonstrated that pictures aided reading comprehension.

Later studies proved to be equally confusing in their results. However, distinct features did occur, which will be pointed out.

When testing comprehension of picture/no-picture groups, Koenke (1968) detected no significant difference even after directions were given to look at the pictures.

In a similar study, Koenke and Otto (1969) tested distinct picture types—main idea and content pictures. There were no significant differences in comprehension due to either of the two types.

Pederson (1971) tested readers working below grade level on passages written below grade level. No significant difference was found between picture and no-picture groups on tests of comprehension.

Both Matz and Rohwer (1971) and Peng and Levin (1978) concluded that picture groups scored significantly higher on comprehension tests of stories when presented orally.

Levin (1973) found that when passage groups received imagery instructions, they scored significantly higher
than those receiving the passage only.

Samuels (1970) produced results showing a significant difference in the text only condition comprehension scores for poor readers, with no difference for good readers. However, Bluth (1972) found no significant difference in comprehension scores for poor readers, but did find that use of pictures aided the comprehension of good readers.

From these studies, it appeared that pictures aided in comprehension when subjects listened to stories read orally. However, when subjects were asked to read text independently, it could only be hypothesized why there was a considerable amount of variation in the influence of pictures on comprehension.

When examining and comparing the research presented, certain variables did stand out. In particular:

1. Grouping procedures for high/low reading achievement. Poor readers were chosen through standardized testing (Bluth, 1972), based upon origins in a low socioeconomic group (Matz and Rohwer, 1971) and having reading levels below chronological grade levels (Pederson, 1971).

2. Types of pictures. Pictures used ranged from original basal reader pictures (Samuels, 1970; Weintraub, 1960) to colored line drawings (Peng

3. Range of grade levels. Grade levels tested flowed essentially from first grade (Bluth, 1972) to sixth grade (Koenke, 1968, Koenke & Otto, 1969; Strang, 1941).

4. Types of comprehension tests. Multiple-choice tests (Weintraub, 1960), statement of main idea (Koenke, 1968; Koenke & Otto, 1969) and modified cloze procedures (Bluth, 1972) were some of the different tests used to measure comprehension.

5. Readability of passages. No specific statements about how passages were matched to the reading levels of the subjects were made. Subjects read passages above their grade level (Vernon, 1954), at grade level (Samuels, 1970; Weintraub, 1960) or below grade level (Pederson, 1971).

To complement the inconsistent outcomes of picture studies, there seemed to be inconsistent methods of design possibly causing such outcomes.

The Cloze Procedure as a Measure of Reading Comprehension for the Primary Grades

The cloze procedure was introduced by Taylor in 1953. Through the years, it has progressed as an effective tool for measuring reading comprehension (Bormuth,
Cloze procedure may be defined as: A method of intercepting a message from a "transmitter" (writer or speaker), mutilating its language patterns by deleting parts, and so administering it to "receivers" (readers or listeners) that their attempts to make the patterns whole again potentially yield a considerable number of cloze units. (Taylor, 1953, p. 416)

The construction of the cloze exercise has been fairly standardized by Bormuth (1968), thus it has become known as the Bormuth standard cloze procedure. Preparation, administration and scoring of the standard cloze test involves the following procedure:

1. A passage of approximately two hundred and fifty words is selected.

2. Beginning with a word in the second sentence, every fifth word is deleted and replaced by underlined blanks of equal length (usually fifteen spaces). Fifty deletions are made, leaving the last sentence whole as was the first sentence.

3. Tests are given without a time limit, to individual or groups of students who have never read the passage before.

4. Students are instructed to write only one word which they think replaces each deletion.

5. When scoring, each response which exactly matches the original word deleted is correct. Spelling errors are disregarded.
Researchers have noted that the cloze using every fifth word deletions has provided the most valid results. Also, the method of scoring as correct, only exact word replacement, produced the most economical and objective method, again with the most valid results (Bormuth, 1965; Hittleman, 1978; Potter, 1968; Taylor, 1953).

The cloze procedure has been generally accepted as a valid method of measuring reading comprehension (Bormuth, 1962, 1969). Its construct validity reportedly has been established by Horton (1974-1975), the construct being defined as "... the ability to deal with the linguistic structure of the language" (p. 250). Thus the subject who completes the cloze, repeatedly predicts responses for deleted words according to the structure of the language upon which the passage is based. It could be inferred that his ability to grasp the written message by filling in a proportionate number of deletions correctly, is his understanding of comprehension of the passage. This task qualifies cloze as a measure of the mental processes that take place during reading commonly referred to as comprehension (Hittleman, 1978), rather than a task of either memory, learning or oral language (Guthrie, 1973).

In order to further substantiate the cloze as a measure of reading comprehension, several studies have investigated the correlation between the standard cloze
procedure and standardized as well as conventional reading comprehension tests. Researchers have reported correlations which generally ranged from .70 to about .85 (Bormuth, 1965; Gallant, 1965; Jenkinson, 1957; Ruddell, 1963).

Bormuth (1969) compared cloze and multiple-choice tests designed to measure a series of comprehension skills, i.e. sequence of events, main idea. He concluded that cloze tests do measure "... what has commonly been labelled reading comprehension skills" (p. 358).

The correlation between cloze tests and Informal Reading Inventories was reported as significant beyond the first grade, in studies by Ransom (1965) and Kirchoff (1968).

In a comparison of cloze test scores and Metropolitan Achievement Test scores, Gallant (1965) found significant correlations among the scores when administered to first, second and third graders.

Cloze has gained wide recognition because of its quick construction, easy administration and scoring, as well as its objectivity as a measure of reading comprehension. Research indicates that the cloze has been used even at the first grade level (Kirchoff, 1968; Weaver & Kingston, 1972), but has required some modification (Hittleman, 1978). The standard cloze has been employed
as early as the second or third grade level as a valid measure of reading comprehension (Gallant, 1965; Potter, 1968).

Summary

The ability to perceive certain aspects of pictures appeared to be a skill which develops chronologically and through learning. Differences in adult/child picture perception (concept of parts/whole; use of dynamics) were demonstrated in children up to age ten. The simple line drawing was presented as the most effective picture type for young children due to their proposed ease at processing less complex visual data.

An overview of studies testing the influence of pictures on reading comprehension indicated contradictory results, possibly a factor of weak designs containing too many variables.

The Bormuth standard cloze procedure could be an alternative test of text interpretation for use in future picture studies. The cloze was described as a more objective technique for measuring reading comprehension for primary grades.
CHAPTER III

The Research Design

The purpose of this study was to investigate the effect of simple line drawings, used to accompany basal reader stories, on the comprehension (as measured by the cloze procedure) of below average, average and above average second graders.

Hypotheses

The hypotheses investigated in this study were as follows:

1. There was no significant difference in the mean comprehension scores of second grade readers between the treatment groups (pictures) and the control groups (no pictures).

2. There was no significant difference in the mean comprehension scores of below average second grade readers between the treatment group and the control group.

3. There was no significant difference in the mean comprehension scores of average second grade readers between the treatment group and the control group.

4. There was no significant difference in the mean
comprehension scores of above average second
grade readers between the treatment group and
the control group.

5. There was no significant difference in the mean
comprehension scores of below average, average
or above average second grade readers in the
control group.

6. There was no significant difference in the mean
comprehension scores of below average, average
or above average second grade readers in the
treatment groups.

Methodology

Subjects

All second grades from a rural primary school were
the source of subjects for this study.

Through placement testing and a thorough examina-
tion of the results, one hundred and thirty subjects were
selected for final picture testing. Those subjects who
were absent for any section of initial testing, those
who tested inconsistently or had any physical or emo-
tional handicaps, were eliminated from the study.

The remaining subjects were divided into two main
groups: (1) the control group-- basal reader story with
no pictures and (2) the treatment group-- basal reader
story with pictures. The treatment and the control groups
were composed of an equal number of below average readers, average readers and above average readers.

Instruments

The Laidlaw Reading Program was the basal reader program which was the source of the tests and stories used in this design. In order to determine instructional reading levels in the Laidlaw Reading Program, the Laidlaw Placement Test for Primary Grades, a series of modified cloze tests, was administered to all subjects. The first trial passages from levels six through eight were used. The results of these tests were used to indicate placement of subjects as below average (those passing level six only), average (those passing levels six and seven), or above average readers (those passing all three level tests).

Final Cloze Tests, designed to measure comprehension, were devised and given to each subject at his instructional reading level. A section of a story, approximately 250 words per story, was taken at each of levels 6, 7 and 8 from the Laidlaw Reading Program. The second trial passages from each level of the Laidlaw Placement Test were those chosen for development into Final Cloze Tests. Readability levels were checked (Spache, 1978) and it was found that trial passages one (given as placement tests) and two (developed into Final
Cloze Tests) were quite consistent at each level, although a wide range between levels was not present (see Table 1).

Table 1
Readability Levels of Laidlaw Trial Passages

<table>
<thead>
<tr>
<th></th>
<th>Passage 1</th>
<th>Passage 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 6</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Level 7</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Level 8</td>
<td>2.4</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Each story was then reproduced as a standard cloze test following Bormuth's procedure with fifty deletions, every fifth word deleted beginning with the second sentence (Bormuth, 1968). At each level, half of the stories were accompanied by pictures, half were not. The format of the no-picture text was identical to that of the picture text, allowing for the same number of pages and words per page. Pages were compiled in book form, as in the original text.

Procedure

This researcher conducted a teacher-training session for the eight second-grade teachers whose students were involved in the study. Teachers learned methods for teaching the cloze procedure. Specific written instruc-
tions were discussed and given to each teacher for introduction of the cloze procedure to their students, using sample exercises. Each teacher previewed examples of the various levels of the Laidlaw Placement Test, along with exact written instructions for their administration to students in their own classrooms.

Subjects were involved in the following procedure for three different days, approximately forty-five minutes per day, over a three week period (the first two days were completed with the aid of the regular classroom teachers):

1. **Day One**—the subjects were given instruction for completing the cloze procedure through sample cloze exercises. This was to avoid any difficulties in completing this type of task. Teachers were directed to give each individual as much attention as necessary for successful working of the three samples.

2. **Day Two**—the subjects were given a sample exercise taken from the Laidlaw Placement Test as additional practice in cloze. Then levels 6 through 8 of the Laidlaw Placement Test were administered to determine the instructional reading levels of each subject and thus his placement as below average, average or above average reader. The control and treatment groups were formed by matching those subjects within each group with
like total level test scores.

3. **Day Three**-- the subjects met in one of three different sessions with this researcher.

In the first session, the below average readers from both the control and the treatment groups met. A sample cloze exercise, along with instructions for completing the cloze procedure were discussed. The cloze test story for level 6 was introduced. Subjects were asked to complete the cloze test, although half had a test with pictures, the other half without. No special directions were given to call attention to the pictures. Students were isolated from one another during the testing situation.

In the second session, the average readers met for the sample cloze exercise and instructions, introductions to and completion of the level 7 cloze test story, with and without pictures.

In the third session, the above average readers followed the same procedure-- sample, instructions, and the level 8 cloze test story administration, with and without pictures.

**Analysis of Data**

The mean comprehension scores of the below average, average, above average and total control and treatment groups were calculated. Hypothesis One (which compared
all of the picture subjects with all of the no-picture
subjects) was analyzed by a two-sample test. Indepen-
dent t tests were used to analyze Hypotheses Two, Three
and Four (which compared the picture and the no-picture
groups at each of the three levels of reading). In
analyzing Hypothesis Five (which compared the comprehen-
sion scores of all three levels of no-picture groups)
and Hypothesis Six (which compared the comprehension
scores of all three levels of picture groups), an anal-
ysis of variance was used.

Summary

One hundred and thirty second-graders from a rural
school district were tested for reading comprehension
using the standard cloze procedure. Half read with
pictures, half without. The resulting comprehension
scores were compared for below average, average and
above average readers.
CHAPTER IV

Analysis of Data

Purpose

The purpose of this study was to investigate the effect of simple line drawings, used to accompany basal reader stories, on the comprehension (as measured by the cloze procedure) of below average, average and above average second grade readers.

Analysis of the Findings

Final Cloze Tests were scored, one point given for each exact word replacement. The resulting comprehension scores of the treatment (picture) and control (no-picture) groups at each level of reading were totalled and averaged (see Table 2). Each of the six hypotheses proposed in this study was tested and analyzed using these scores.

Table 2
Mean Comprehension Scores of Final Cloze Tests

<table>
<thead>
<tr>
<th></th>
<th>Level 6</th>
<th>Level 7</th>
<th>Level 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>24.81</td>
<td>23.95</td>
<td>22.09</td>
<td>23.569</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Average</td>
<td>19.67</td>
<td>21.57</td>
<td>19.04</td>
<td>20.062</td>
</tr>
</tbody>
</table>

31
The following is a restatement of Hypothesis One:

1. There was no significant difference in the mean comprehension scores of second grade readers between the treatment groups (picture) and the control groups (no-picture).

A two-sample $t$ test was used to compare the overall mean comprehension scores of the treatment groups and the control groups. A calculated $t$ of 3.213 indicated that these two groups were significantly different at the .05 level of significance. Therefore, Hypothesis One was rejected. There was a significant difference in the mean comprehension scores of second graders between the treatment groups and the control groups, the treatment groups performing significantly better. These data seemed to indicate that pictures, in the form of simple line drawings, did aid in the comprehension of readers in the second grade.

The following is a restatement of Hypotheses Two, Three and Four:

2. There was no significant difference in the mean comprehension scores of below average second grade readers between the treatment (picture) and the control (no-picture) groups.

3. There was no significant difference in the mean comprehension scores of average second grade
readers between the treatment group and the control group.

4. There was no significant difference in the mean comprehension scores of above average second grade readers between the treatment group and the control group.

Independent t tests were used to compare the mean comprehension scores of the treatment and the control groups of below average, average and above average readers. Hypothesis Two was rejected at the .05 level of significance, calculated $t = 2.47$ greater than critical $t$, 2.021. There was a significant difference in the mean comprehension scores of the below average second grade readers between the treatment and the control group, the treatment group performing significantly better. However, the data failed to reject Hypothesis Three ($t=1.34$) as well as Hypothesis Four ($t=.8976$) at the .05 level of significance. There was no significant difference in the mean comprehension scores for the average or above average second grade readers between the treatment and the control groups.

These data seemed to indicate that pictures, in the form of simple line drawings, aided in the comprehension of below average second graders only. Pictures did not seem to significantly affect the comprehension of the
average or above average readers' comprehension on these Final Cloze Tests.

The following is a restatement of Hypothesis Five:

5. There was no significant difference in the mean comprehension scores of below average, average or above average second grade readers in the control (no-picture) groups.

Using an analysis of variance, Hypothesis Five was tested, which compared the mean comprehension scores of the three ability levels in the control groups only (see Table 3).

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of Variance for Control Groups</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Source</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Ability Group</td>
</tr>
<tr>
<td>Between Group (Error)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The calculated F-ratio .84 was not sufficiently high to cause rejection of this hypothesis. Therefore, the data failed to reject Hypothesis Five at the .05 level of significance. There was no significant difference in the mean comprehension scores of the below average, average
or above average second graders in the control groups. These data seemed to indicate that the subjects in these levels performed equally as well on the Final Cloze Tests without the presence of pictures. Thus the subjects seemed accurately placed into the control groups by means of the Laidlaw Placement Test as below average, average or above average readers.

The following is a restatement of Hypothesis Six:

6. There was no significant difference in the mean comprehension scores of below average, average or above average second grade readers in the treatment (picture) groups.

Hypothesis Six, which compared the three ability levels in the treatment groups only, was tested using an analysis of variance (see Table 4). The data failed to reject Hypothesis Six at the .05 level of significance, since the F-ratio 1.28 was insufficiently high. Therefore, there was no significant difference in the mean comprehension scores of below average, average or above average second grade readers in the treatment groups.

These data seemed to indicate that those second graders having pictures present, performed equally as well on the Final Cloze Tests regardless of level of reading ability. Reading achievement seemed to have no effect on the use of pictures to interpret text.
Table 4
Analysis of Variance for Treatment Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability Group</td>
<td>2</td>
<td>85.9</td>
<td>43.0</td>
<td>1.28 (N.S.)</td>
</tr>
<tr>
<td>Between Group</td>
<td>62</td>
<td>2086.0</td>
<td>33.6</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>2171.9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Interpretation of Data

Generally, pictures in the form of simple line drawings, acted as aids for reading comprehension of the second grade subjects in this study. The picture groups consistently scored better than the no-picture groups. Furthermore, it was noted that the mean comprehension scores of all three no-picture groups, while completing Final Cloze Tests selected at their instructional levels, fell into a range of percentage scores at their frustrational levels. Having pictures present in the treatment groups, increased the mean percentage scores for each level to those indicative of their appropriate instructional levels (see Table 5).

Although the subjects having pictures present performed better in their mean comprehension scores on the Final Cloze Tests, the results were significant only as a whole group and specifically at the below average level.
Table 5

Bormuth's Percentage Scores for Reading Levels (Bormuth, 1968) and Percentage Scores for Subjects

<table>
<thead>
<tr>
<th>Instructional Level</th>
<th>Frustrational Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>44% - 57% correct</td>
<td>0% - 43% correct</td>
</tr>
<tr>
<td>Level 6 50% (treatment)</td>
<td>39% (control)</td>
</tr>
<tr>
<td>Level 7 48% (treatment)</td>
<td>43% (control)</td>
</tr>
<tr>
<td>Level 8 44% (treatment)</td>
<td>38% (control)</td>
</tr>
</tbody>
</table>

Table 6

Number of Pages and Pictures of Final Cloze Tests

<table>
<thead>
<tr>
<th>Level 6</th>
<th>Level 7</th>
<th>Level 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>Average</td>
<td>Above Average</td>
</tr>
<tr>
<td>Number of Pages</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Number of Pictures</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

A thorough examination of the Final Cloze Tests was made to gain further information. When referring to Table 6, it should be pointed out that as the difficulty of the Final Cloze Test increased, the number of pictures accompanying the text decreased. Also in the level 8 tests, the first picture was set aside from the text on a separate page, possibly causing it to be more difficult to attend to.

Not only were there fewer pictures present to aid the comprehension of the subject, but the percentage of sentences having picture cues in the Final Cloze Tests decreased at each successive level (see Table 7). It is
uncertain what the outcome would have been if pictures and picture cues had been equally distributed throughout the cloze stories at each level in this study.

Table 7:

<table>
<thead>
<tr>
<th></th>
<th>Level 6</th>
<th>Level 7</th>
<th>Level 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Sentences</td>
<td>34</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Number of Sentences with Picture Cues</td>
<td>13</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Percentage of Sentences with Picture Cues</td>
<td>38%</td>
<td>25%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Another explanation for the significant performance of below average readers only could be found in the composition of the standard cloze tests for each level. In an attempt to categorize types of deletions for each Final Cloze Test (Table 8), it was found that more deletions in the below average selection required simple repetition of what was explicitly stated elsewhere in the story. The completion of the average and above average selections required the use of more inferential thinking in filling in deletions. The selections for average and above average readers may have been more complex, causing no significant differences between picture and no-
picture groups even with the aid of pictures.

Table 8

<table>
<thead>
<tr>
<th>Types of Responses Needed in Final Cloze Tests</th>
<th>Level 6</th>
<th>Level 7</th>
<th>Level 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicitly Stated</td>
<td>14</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Implied/Inferred; Experiential</td>
<td>10</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Pronoun Referant</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Linguistic</td>
<td>17</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>No Cues</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

The below average reader did show capability of interpreting the simple line drawing along with text. It could have been concluded that the below average reader relied more on visual rather than textual cues for story comprehension if the design of the Final Cloze Tests had been more uniform among achievement levels. It should not be assessed from these results that the below average reader showed more expertise in picture perception than the average or above average readers. Statistically, there was no reason to believe that those in any of the picture groups did any better on tests of comprehension due to reading ability.
Summary

Simple line drawings did show a positive influence on the comprehension (as tested by the cloze procedure) of second grade readers. In fact, without the aid of pictures, the mean comprehension scores of the no-picture groups, fell into the frustrational range.

All three levels of readers performed better on Final Cloze Tests with pictures, although the below average picture group attained a significantly higher mean score than the below average no-picture group. The following reasons were proposed for scores less than the level of significance for average and above average readers in the picture groups. Passages chosen for those levels contained: (1) a smaller percentage of picture cues, (2) fewer number of pictures, and (3) more deletions requiring inferential thought.
CHAPTER V

Conclusions and Implications

Purpose

The purpose of this study was to investigate the effect of simple line drawings, used to accompany basal reader stories, on the comprehension (as measured by the cloze procedure) of below average, average and above average second graders.

Conclusions

Two of the six null hypotheses in this study were rejected, leading to the following conclusions about the presence of simple line drawings with text for the population studied:

1. Simple line drawings did serve to promote better reading comprehension. These subjects, regardless of reading achievement, did not appear to lack the ability to interpret and integrate this type of visual presentation with text. Furthermore, it was difficult for the subjects to read the passages with sufficient understanding without the aid of pictures.

2. Below average readers benefited most in understanding of text when simple line drawings were
present. However, factors in the design may have influenced this result, and further testing with better controls needs to be conducted.

Implications for Research

Further investigations into the effect of pictures on reading comprehension are warranted. More comprehensive research is called for:

1. To test simple line drawings at various achievement and age levels.

2. To investigate the effect of other picture types using a similar design. Variables such as color, picture size and placement in a story need further testing.

3. To determine the influence of pictures on the readability levels of the texts they accompany.

4. To demonstrate the effect of picture cues (as measured by the percentage of sentences having picture cues) on reading comprehension.

5. To examine the number of pictures and picture cues present at each successive level in basal readers.

6. To develop better controls in the research design used in this study to: (1) equalize the percentage of picture cues, and (2) measure the difficulty of cloze exercises (besides read-
ability formulas) by investigating the ease of response for various types of deletions among different age and ability groups.

**Implications for Classroom Use**

Teachers of elementary school pupils should not assume that young children possess the ability to interpret pictures. If research is accurate, the ability to interpret pictures increases with age and education. Children have shown difficulty in: (1) recognizing the main idea of a picture, (2) choosing items relevant to the theme of the picture, and (3) using picture cues such as spatial dimension or dynamics to understand its content. An effort to direct children's attention to the relevant detail in pictures, especially ones containing complex detail, may be required. When using pictures to accompany learning tasks, ones where information has been presented simply are preferable. Simple line drawings seem most effective, although more research needs to be done. Teachers should be mindful that textbooks done in splashy designs, may be presenting visual information detrimental to learning. It should never be assumed that the mere addition of pictures to text automatically enhances reading comprehension. Comprehension of text and interpretation of pictures do not seem to involve the same process, and
training in both would seem important. Beginning readers should be given the opportunity to read both with and without pictures.

**Summary**

Simple line drawings have been found effective in learning tasks. However, pictures require cautiousness when presented to young children, as research has indicated that children perceive complex pictures differently than adults. The assumption that addition of pictures to text enhances reading comprehension needs further testing. Effect of pictures and specific picture types on text interpretation need further investigation among various age and achievement levels.
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Appendix A

Sample Cloze Exercises for Day One
Billy said, "Do this! Do this!"

Sally said, "__________, Pete. Look at us. I ___________ to do this. Can you do it?"

"Yes, I can," ___________ Pete.

SAMPLE EXERCISE TWO:

In the city, lights go on. ___________

and girls are in the houses.

The ___________ go out. "Good night."

"Good ___________ !"

SAMPLE EXERCISE THREE:

Animals have many kinds of homes. Many ___________ live in the woods. Many animals live in the ___________. One animal that lives in the ___________ is the house mouse. He is very, very small. He is ___________ a house mouse because he likes to ___________ in a house.
Appendix B

Laidlaw Placement Tests for Primary Grades

Levels 6, 7 and 8
Kim looked out the window.
There was snow all around,
and it cold outside.
This was the kind of night
to inside.

Kim's mom and had gone out
for a while. Grandma was sleeping.
The house quiet.

All at once Kim heard a noise.

"Woof! Woof!"

At first she it was the TV.
Then she the noise again.

"Woof! Woof! Woof!"

Kim went to look out the.
There in the cold snow sat a black and white.
When the family came home the __________ day, Mr. Stone said, "Look! There __________ a name on the mailbox in front of the empty __________!

Jimmy jumped out __________ the car and ran to investigate. "The name on the __________ is LANE," he said.

"Oh how nice!" said Mrs. __________.

"Someone must have moved into the house while __________ were away."

"We must make them __________ at home," said Mr. Stone.

"Yes," said his wife. "I will ask them to come to our __________ for dinner tomorrow."
It was Rocky's birthday, and Aunt Rose had planned a party.

Rocky lived with his aunt _____________ his cousins. He liked them fine. But as long as he'd known _____________, they had loved to play jokes on each _____________, He wondered if they might be planning to _____________ a birthday _____________ on him.

"Is this party going to _____________ cake, just like a real party?" he asked _____________ Rose.

"Why, of course there'll be _____________!" she laughed. "What did _____________ expect?"

"___________ not sure," answered Rocky.

"Well, you'll see," said Aunt Rose. I'll _____________ a cake and put _____________ on it. And your cousins will have gifts for you."

"Really?" asked Rocky. He wondered what kinds of _____________ he could expect from Tino and Carlo. Those two were full of tricks.
Appendix C

Final Cloze Test, with pictures (Level 6)
Once upon a time
there was a boy named Bobo.
_________ lived with his mother
_________ a small farm.

Bobo ___________ tried to do
as ___________ was told.
Sometimes this ___________ hard,
but Bobo did ___________ best.
One day Bobo's ________ had to drive into ________ city.

"Find a hen ________ dress it for our ________," she called.
"Make sure ________ is big and fat.
________ now! I won't be ________ long."

Bobo saw her ________ away from the farm.
________ he ran into the ________ to catch a fat ________.
At five o'clock
his __________ came home
from the __________.

"Did you dress the __________?"
she asked.

"Yes, I __________."
answered Bobo.

"A big __________ one.
It was hard __________ do,
but I did __________ best."

And there upon __________ table
sat a fat __________.
One night Bobo was ____________
with the dog. "Roll ____________," he said.
But the ____________ would not roll over.
__________ ran across the floor ____________ a ball.
Then round ____________ round it went
with ____________ ball in its mouth.
__________ was not far behind.

"__________ ten o'clock," called his ____________
"Get up from the ____________
and put out the ____________.
You should have been ____________ bed
long ago."
Now ___________ always tried
to do ___________ he was told.
So ___________ picked up the light
___________ put it outside.

The ___________ morning his mother asked,
"___________ is the light?
I ___________ find it."

"You told ___________ to put it out,"
___________ Bobo. "So I did."
time Bobo's mother called in from the yard.

"Take this wash to Mrs. Hopnot," she said.
Appendix D

**Final Cloze Test, with pictures (Level 7)**
There once was a poor fisherman
who lived with his wife in a little hut
not far from the sea. Almost every
right after breakfast, the
went down to the
to catch fish.
One as he was fishing looking into the clear water, he saw a fish on the end his line. The fish so big that it the fisherman's line deep into the water.

The were high, and the had trouble pulling in line. It was almost before he had the out of the water.
the man's surprise the ________ cried out:

"Fisherman, fisherman, ________ to me.
Let me ________ free, let me go ________
I'm not a real ________, but a prince, you ________.
If you pull me ________, what good will I ________?"

"A talking fish?" said ________
fisherman. "Maybe I will ________ you go.
A fish ________ talks might not be ________ to eat."

So he ________ the fish off the ________ and threw it back ________ the highest wave. Soon ________ fish
was deep down ________ the sea.
Then the ________ went home to his ________ in the hut.
"Well, __________," called the wife in __________ cross voice. "Have you __________ anything today?"

"Not to __________" he answered.

"But you'll __________ guess what I did __________."

A fish that talks! __________ said he was really __________ prince, so I threw __________ back into the sea."
"____________: no!" cried his wife.

"____________ until you made a _____________, I hope."

"I didn't ______________ a wish," said the ________________.

"What would I wish ______________?"

"What!" shouted the angry ________________.

"Go back and wish for a house."
Appendix E

Final Cloze Test, with pictures (Level 8)
Jim West was the youngest in a family of six boys. Older brothers let him with them only when needed another person in of their games. But didn't really mind.

"Football baseball are OK," he. "But I'd rather take with my camera."

Jim's was a secondhand one his cousin had given him. Jim carried the around with him most the time, since he knew when he might to snap a picture.

sent in pictures for snapshot contest he heard. Even though he had won, he kept hoping some day he might first prize.
One Monday at breakfast, Mr. West jumped up from his newspaper. "Heads to this," he said. "Village Post is going to hold another snapshot contest. Let's have a look at the prize." He handed the page to Jim.

"Hey!" the boy. "It's a outfit just like the have. I'll bet it a lot of money. I ever like to that!"

"Fat chance!" said. "Every camera bug in will send in a."
Jim was too busy about the contest to something of interest to readers of the Village. The snapshots had to be taken that week and to the newspaper office Friday night. The newsmen choose the winning snapshot, it would appear on front page of Saturday's.

Right then, Jim decided that he would take a picture of the new fountain in the center of the village.