DOCUMENT RESUME

ED 262 387 CS 008 177

AUTHOR Hasinoff, Shelley
TITLE The Development of Inferencing Abilities in Grades Two through Three.
PUB DATE Oct 85
NOTE 22p.; Revised version of a paper presented at the Annual Meeting of the International Reading Association (30th, New Orleans, LA, May 5-9, 1985).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Basic Skills; *Child Development; *Cognitive Development; Comprehension; *Educational Research; Grade 2; Grade 3; Literacy; Primary Education; *Skill Development; Young Children
IDENTIFIERS *Inferences; *Inferential Thinking; Numeracy

ABSTRACT

A study examined whether the basic skills performances of children in the primary grades were responsive to their inferencing abilities. It was hypothesized that the three components (informational, causal, and evaluative) of the second and third grade inferencing abilities tests would constitute a hierarchy of inferencing and that the impact of the inferencing abilities on basic skills competencies would change over time. Subjects, 217 children from 12 classes in seven schools from a cross-section of socioeconomic, rural, commuter, and urban populations were followed from the beginning of grade 2 until the end of grade 3. Literacy and numeracy achievements were assessed using the Canadian Tests of Basic Skills. Each child in the sample met individually with an experimenter in the fall of each year for a 30-minute session, of which the Inferencing Ability Test formed a 10-minute part at the beginning of the session. The child was shown a poster, given time to examine it, and then asked a set of questions (with the poster in view). In addition the child was given two sets of scrambled sequence cards to put in order, one set at a time. Results support the notion of a hierarchy of inferencing skills, and suggest that skill in inferencing may underlie and constrain achievement in literacy and numeracy in the primary grades. Measurement and evaluation of inferencing ability ought, therefore, to occur earlier to determine which children require extra assistance in their development. (Tables of findings are included.) (DF)

THE DEVELOPMENT OF INFERENCING ABILITIES IN GRADES TWO THROUGH THREE*

Shelley Hasinoff

Institute for Educational Research and Development
Memorial University of Newfoundland

October, 1985

*Author's Note: Revised version of a paper presented at the International Reading Association 30th. Annual Convention, New Orleans, May, 1985.

This paper is an outcome of a longitudinal study, The Structure of Elementary School Achievement (SESA) which is being conducted under the auspices of the Institute for Educational Research and Development, Memorial University of Newfoundland, supported by grants awarded by the Social Sciences and Humanities Research Council of Canada.

Abstract

The Development of Children's Inferencing Abilities in Grades Two through Three

The thesis is examined that the basic skills performances of children in the primary grades will be responsive to their inferencing abilities. Two inferencing abilities tests, one for grade two and one for grade three, were constructed based on a taxonomy of inferences. It was hypothesized that the three components of each test; namely, their informational, causal and evaluative dimensions, would constitute a hierarchy of inferencing; and that as children progress through the early grades, the impact of the inferencing abilities categories on basic skills competencies would change over time. In general, the results provided impressive support for the role of inferencing in the information processing theory of early literacy and numeracy.

the relative explicitness of the text. Both over-explicitness, such as that found in legal documents and under-explicitness, which makes excessive inferencing demands, limit a reader's ability to comprehend.

Research investigating developmental differences in inferencing ability has focussed on a variety of probable sources of difficulty for children. Some researchers have suggested that children lack the ability to make inferential 'bridges' (Clark and Haviland, 1977) that they may not know how to bring the relevant schema to bear on a task or how to integrate new information into their own conceptual frameworks (Bridge, Tierney and Cera, 1978). Although Paris and Lindauer (1977) found that young children do not spontaneously draw inferences, Trabasso and Nicholas (1980) found that by providing an altered task which was more age appropriate, that children do make inferences, constrained however, by their memory and semantic development.

For certain readers, the initial inferencing task of selecting the relevant and appropriate schema may be the source of considerable comprehension problems (Adams and Bruce, 1982). Research conducted by Bransford and Johnson (1972) demonstrated the powerful role of schema selection for readers who were presented with text which was virtually meaningless without the disambiguating title, with the result that these subjects had lower recalls and rated their passages as lower in comprehensibility.

As Kintsch and Van Dijk (1978) point out, not all inferences are equal in terms of processing difficulty; some are easily uncovered from active knowledge whereas others may require elaborate searches of long term memory or the activation of new knowledge structures. Some the relative explicitness of the text. Both over-explicitness, such as that found in legal documents and under-explicitness, which makes excessive inferencing demands, limit a reader's ability to comprehend.

Research investigating developmental differences in inferencing ability has focussed on a variety of probable sources of difficulty for children. Some researchers have suggested that children lack the ability to make inferential 'bridges' (Clark and Haviland, 1977) that they may not know how to bring the relevant schema to bear on a task or how to integrate new information into their own conceptual frameworks (Bridge, Tierney and Cera, 1978). Although Paris and Lindauer (1977) found that young children do not spontaneously draw inferences, Trabasso and Nicholas (1980) found that by providing an altered task which was more age appropriate, that children do make inferences, constrained however, by their memory and semantic development.

For certain readers, the initial inferencing task of selecting the relevant and appropriate schema may be the source of considerable comprehension problems (Adams and Bruce, 1982). Research conducted by Bransford and Johnson (1972) demonstrated the powerful role of schema selection for readers who were presented with text which was virtually meaningless without the disambiguating title, with the result that these subjects had lower recalls and rated their passages as lower in comprehensibility.

As Kintsch and Van Dijk (1978) point out, not all inferences are equal in terms of processing difficulty; some are easily uncovered from active knowledge whereas others may require elaborate searches of long term memory or the activation of new knowledge structures. Some inferences may be impossible to make from the available information and must be held ready for later explication. From a schema theoretic point of view, precedence in selection of inferences is given to those which fill empty 'slots' in a selected schema and are consistent with both prior knowledge and new information in the text.

Clearly, not all possible or even all plausible inferences can be accommodated in the interests of coherence and comprehension. AI research has raised the necessity of building in some type of control in a model of comprehension to limit the number of inferences generated by a reader. Adams and Bruce (1982) suggest that inferencing is controlled by the reader's and author's mutual trust and grasp of 'good structure', whereas Warren et al (1979) argue for a 'relevancy hypothesis' which guides the reader to adopt only those inferences which help him/her to determine what happened and why and to reject inferences which may be consistent and add color but which do not sustain the narrative flow.

Recent literature on inferencing includes attempts to classify inferences using a taxonomic approach (Fredicksen, 1979; Hildyard, 1979; Reiger, 1975; Warren, Nicholas and Trabasso, 1979). Such taxonomies provide a useful basis for comparison of developmental differences among children. The taxonomy developed by Warren et al (1979) was adapted for the purposes of the research described here since the three main categories of inferences (i) logical, (ii) informational, and (iii) value were mutually exclusive and unambiguous. Warren et al note that their first category, logical relations, includes causes, motivations and conditions which enable events and that inferences of this type are made in response to the questions: How? or Why?. For the purpose of this research the term 'causal' used earlier by Omanson, Warren and Trabasso (1978) was retained to reflect what, in our opinion, was the essence of this category.

The second category, informational inferences, serve the reader by establishing context, answering the questions: Who? What? or Where?. In our taxonomy, informational inferences were placed first, since conceptual understanding of propositions logically precedes relations between them. The final category, value inferences, are based on the reader's prior knowledge structures about events, actions and objects referred to in the text as well as the reader's value judgements about them and answer the question: So What?. For the purposes of this research, and following the useage of Nicholas and Trabasso (1980) this category has been named 'evaluative'.

The particular inferences suggested by Warren et al which exemplify each of the categories were adapted to reflect and include aspects of comprehension task taxonomies which have generally been regarded to be inferential in nature, such as finding the main idea, making comparisons and determining the sequential order of events (Johnson and Barrett, 1981). In addition, categories which were specifically related to text comprehension only, such as determining anaphoric reference were dropped for the purposes of this research. For a detailed breakdown of the adaptations made in each category, see Figure 1 below.

FIGURE 1

Taxonomy of Inferences[1]

A. Informational Inferences.

1. Spatial - Temporal Inferences
2. Inferences involving the provision of specific details.

B. Causal Inferences.

1. Inferences involving cause and effect relations.
2. Inferences required to derive the main idea.
3. Inferences involving relationships based on comparisons (of attributes, for example).
4. The inference of event sequences.

C. Evaluative Inferences.

1. Inferences involving the determination of cataphoric references and predicting outcomes.
2. Inferences requiring value judgements (including judgements of normality, morality, and significance).
3. Inferences involving identification of character traits, and emotional states.

---

[1] Adapted from Warren, Nicholas and Trabasso (1979).

An Inferencing Ability Test

A review of the literature (Paris and Lindauer, 1976; Paris and Upton, 1976; Omanson, Warren and Trabasso, 1978; Anderson and Pearson, 1984) and indeed, our own experience with children, especially reticent readers, suggested that children would generate more inferences in response to probe questions than would be expected spontaneously. In addition, a set of probe questions, theoretically based, can provide a means of developing a systematic, consistent method of coding responses so that meaningful comparisons can be made among different groups of children.

Since the grade two sample consisted of a significant number of non-readers and a wide range of ability amongst those who could read, it was decided that a reading based instrument would not be appropriate. Due to the confounding role of auditory memory, a listening passage was also rejected as a basis for measurement. Finally, visual displays in the form of posters and sequencing cards were selected (see Appendix A) on the assumption that a parallel cognitive task is demanded by stories whether they are in written or visual form.

In both written and visual stories, the 'reader' must select a relevant and appropriate schema, fill in missing data slots, assign default interpretations where necessary and occasionally form conclusions on the basis of insufficient evidence (Anderson and Pearson, 1984). Furthermore, in both cases, the reader must connect propositions within the story (Fredriksen, 1977), form inferential bridges (Clark, 1977) make predictions (Rumelhart and Ortony, 1977) and determine a central causal chain of events (Warren et al, 1979). Explicitness of detail affects both the reader of visual and printed stories in reconstructing a model of the author's 'presumed intended meaning'.

Indeed, in using the inference taxonomy of Figure 1 for the generation of the eighteen questions which formed each of the Inferencing Ability Tests[2] the explicitness of detail of each picture determined the assignments of questions to categories. In the same manner that authors of mystery stories, for example, may choose to heighten suspense through the manipulation of spatio-temporal details, creators of picture stories may include or exclude details so that questions of context are more properly categorized as evaluative since the reader must make judgements of significance or normality. Consequently each picture was analyzed individually to ensure that each question was appropriately classified.

In the second year of the testing two causal items which proved to be extremely weak were replaced with the results of two subtests of the Canadian Cognitive Abilities Test (CCAT) (Thorndike and Hagen, 1982) which evoke similar sequential and comparison type of inferences. In the Number Series subtest of the CCAT Quantitative Battery, students were asked to determine which number came next, having inferred the pattern of numbers presented to be sequentially descending, ascending, alternate, etc. In the Figure Analysis subtest of the CCAT Non-verbal

---

[2] Inferencing Test Manual, Shelly Hasinoff, Institute for Educational Research and Development, St. John's, Newfoundland, in preparation.

Battery students were asked to complete a second pair of figures based on the inferred relationship between the figures of the first pair.

Sample and Method

The sample consisted of over two hundred (217) children from twelve classes in seven schools from a cross-section of socio-economic, rural, commuter and urban populations. Children were followed from the beginning of grade two until the end of grade three.

Literacy and numeracy achievements were assessed using the Canadian Tests of Basic Skills (King, Lindquist and Hieronymus, 1974) which was administered to whole classes in the Fall and Spring of each year. Each of the children in the sample met individually with an experimenter in the Fall of each year for a thirty minute session of which the Inferencing Ability Test formed a ten minute part at the beginning. The children were shown each poster singly and given time to examine it thoroughly before the set of questions were posed. The poster remained in view so that the child could refer to the picture in formulating answers. All answers were transcribed on the test form which included sample answers and space to write any inferences the children provided but which did not appear on the form. Children who were not disposed to elaborate or who were reticient were asked specific probes on informational questions to elicit as many inferences as possible. Reder's (1980) suggestion that variability in performance is noticeable in favor of children who tended to elaborate spontaneously was noted in this study and credited. Coding of answers to determine a score was based on the individual child's ability to establish a central causal chain rather than being diverted by peripheral elements (Warren et al, 1979). A code sheet with suggested acceptable answers was used as a guideline for scoring but any justifiable and consistent inferences were accepted.

In addition to viewing the poster, each child was given a sample set of scrambled sequence cards to put in order for practice. Once the experimenter was certain that the child understood the task, two other sets were presented, one set at a time, and the child was given as much time as required to order them.

Hypotheses

The purpose of the Inferencing Ability Test was to promote an inquiry into the extent to which the basic skills in the primary grades were responsive to changes in children's inferencing abilities. Drawing on the theory of inferencing developed above, the following hypotheses were derived for test purposes:

(1.0) that inferencing ability underlies literary and numeracy skills; and in particular,

(1.1) that the basic skills of grade two children will be responsive to their inferencing abilities; and

(1.2) that the basic skills of grade three children will be responsive to their inferencing abilities;

(2.0) that the impact of inferencing ability categories on the basic skills will change over time; and in particular,

(2.1) that the impact of informational inferencing on reading comprehension will decline over time, whereas

(2.2) the impact of evaluative inferencing on reading comprehension will increase over time.

Results

Correlations between the three types of inferencing abilities and measures of literacy and numeracy were highly significant (see Table 1 below). Furthermore, performances in basic skill areas such as punctuation, capitalization and language use were also highly correlated with total inferencing scores. Using multiple regression analyses, the three types of inferencing abilities emerged as separate and highly significant predictors of achievement in literacy and numeracy (see Table 2).

The ability to make causal inferences was most highly related to achievement in areas requiring reasoning ability, such as reading comprehension, mathematics concepts, and language usage. Ability to make informational inferences was found to be most highly related to areas most commonly referred to as being rote skills: spelling, punctuation and capitalization. Though not as highly correlated, in general, the ability to make evaluative inferences was nevertheless significantly related to all of the same areas and from the grade three regression analysis results it can be seen that the impact of evaluative inferencing increased over time. As might be expected, once reading becomes more automatic, the importance of making informational inferences seems to decrease with time.

The results support the notion of a hierarchy of inferencing skills in which informational inferencing ability precedes causal and

TABLE 2

Proportion of Variance Explained
Ordinary Least Squares Regression Results
(N = 217)

Independet Variable	Dependent Variable Y = Reading Comprehension			
	Y_1 = CTBS1	Y_2 = CTBS2	Y_3 = CTBS3	Y_4 = CTBS4
X_1 = TOTI2	9.3 (.001)	9.3 (.001)	11.7 (.001)	10.0 (.001)
X_2 = TOTC2	25.3 (.001)	21.4 (.001)	23.8 (.001)	23.3 (.001)
X_3 = TOTE2	5.2 (.001)	4.3 (.005)	5.4 (.001)	4.4 (.005)
X_4 = TOTIN2	25.7 (.001)	23.8 (.001)	28.2 (.001)	24.5 (.001)
X_5 = TOTI3			9.3 (.001)	8.7 (.001)
X_6 = TOTC3			16.9 (.001)	20.1 (.001)
X_7 = TOTE3			3.5 (.005)	7.6 (.001)
X_8 = TOTIN3			18.2 (.001)	23.9 (.001)

F Test Significance Levels Reported in Parentheses

Key to the mnemonics:

TOTI2 = TOTAL SCORE, INFORMATINAL ITEMS, GRADE 2
TOTC2 = TOTAL SCORE, CAUSAL ITEMS, GRADE 2
TOTE2 = TOTAL SCORE, EVALUATIVE ITEMS, GRADE 2
TOTI3 = TOTAL SCORE, INFORMATIONAL ITEMS, GRADE 3
TOTC3 = TOTAL SCORE, CAUSAL ITEMS, GRADE 3
TOTE3 = TOTAL SCORE, EVALUATIVE ITEMS, GRADE 3

TABLE 1

Correlation Matrix of Inferencing, Literacy and Numeracy Variables[a]
(N = 217)

	CTBS1	CTBS2	MATH2	CTBS3	VOCAB2	WORDAN	SPELL2	CTBS4	VOCAB3	SPELL3	CAPS	PUNC	USE	MATH3	TOTIN2
CTBS2	.837														
MATH2	.626	.658													
CTBS3	.828	.871	.629												
VOCAB2	.802	.823	.638	.817											
WORDAN	.647	.651	.563	.673	.700										
SPELL2	.676	.668	.514	.696	.740	.637									
CTBS4	.785	.814	.622	.790	.745	.594	.622								
VOCAB3	.741	.772	.621	.781	.769	.617	.647	.802							
SPELL3	.728	.715	.575	.728	.756	.577	.773	.726	.707						
CAPS	.588	.608	.552	.606	.605	.535	.579	.627	.642	.699					
PUNC	.565	.592	.502	.599	.595	.546	.533	.640	.617	.622	.679				
USE	.739	.725	.569	.722	.718	.575	.599	.789	.760	.733	.665	.576			
MATH3	.684	.767	.653	.706	.703	.609	.583	.763	.755	.645	.640	.605	.685		
TOTIN2	.510	.491	.453	.534	.464	.369	.332	.499	.508	.387	.358	.386	.420	.479	
TOTIN3	.474	.461	.382	.432	.449	.341	.403	.493	.510	.426	.429	.481	.499	.450	.432

a All correlations are significant at the .01 level

CTBS1 = Reading Comprehension Subtest (RDGCOMP) Canadian Tests of Basic Skills (CTBS) (Level 7, Fall, Grade 2)
CTBS2 = RDGCOMP (CTBS) (Level 8, Spring, Grade 2)
MATH2 = Mathematics Concepts (CTBS) (Level 8, Spring, Grade 2)
CTBS3 = RDGCOMP (CTBS) (Level 8, Fall, Grade 3)
VOCAB2 = Vocabulary (CTBS) (Level 8, Fall, Grade 3)
WORDAN = WORD/ANALYSIS (CTBS) (Level 8, Fall, Grade 3)
SPELL2 = Spelling (CTBS) (Level 9, Spring, Grade 3)
CTBS4 = RDGCOMP (CTBS) (Level 9, Spring, Grade 3)
VOCAB3 = Vocabulary (CTBS) (Level 9, Spring, Grade 3)
SPELL3 = Spelling (CTBS) (Level 9, Spring, Grade 3)
CAPS = Capitalization (CTBS) (Level 9, Spring, Grade 3)
PUNC = Punctuation (CTBS) (Level 9, Spring, Grade 3)
USE = Language Usage (CTBS) (Level 9, Spring, Grade 3)
MATH3 = Mathematics Concepts (CTBS) (Level 9, Spring, Grade 3)
TOTIN2 = Total Inferencing Score, Grade 2
TOTIN3 = Total Inferencing Score, Grade 3

evaluative inferencing and causal inferencing ability develops prior to evaluative inferencing in their importance to literacy and numeracy achievement. The results suggest that skill in inferencing may underly and constrain achievement in literacy and numeracy in the primary grades. If this is the case, measurement and evaluation of inferencing ability ought to occur at even earlier grades to determine which children require extra assistance in developing inferencing techniques and abilities. The strength of the causal inferencing variable as a predictor of achievement in literacy and numeracy suggests that more time might be profitably spent in helping children to make higher order inferences once literal low level informational inferences are being effectively made. Having determined which inferences children are making and what the developmental trends appear to be, it remains to specify how children infer and how improvements may be made in developing the skill.

References

Adams, M. and Bruce, B. Background Knowledge and Reading Comprehension. In J. Langer and T. Smith-Burke, (Eds.), Reader Meets Author/Bridging the Gap. International Reading Association, Newark, 1982, 2-25.

Adams, M. and Collins, A. A Schema-theoretic View of Reading. In R.O. Freedle (Ed.), New Directions in Discourse Processing, Vol. 2, Advanced in Discourse Processes, Ablex, New Jersey, 1979, 1-22.

Anderson, R.C. and Pearson, P.D. A Schema-Theoretic View of Basic Processes in Reading Comprehension. In P.D. Pearson (Ed.), Handbook of Reading Research, Longman, New York, 1984, 255-291.

Bransford, J.D. and Johnson, M.K. Contextual Prerequisites for Understanding: Some Investigations of Comprehension and Recall, Journal of Verbal Learning and Verbal Behaviour, 11, 1972, 717-726.

Bridge, C., Tierney, R. and Cera, M. Inferential Operations of Children Involved in Discourse Processing. In P.D. Pearson and J. Hansen (Eds.), Reading: Discipline Inquiry in Process and Practice, Twenty-Seventh Yearbook of the National Reading Conference, National Reading Conference, Clemson, South Carolina, 1978, 68-72.

Clark, H.H. Inferences in Comprehension. In D. Laberge and S.J. Samuels (Eds.), Basic Processes in Reading: Perception and Comprehension, Erlbaum, Hillsdale, New Jersey, 1977, 243-263.

Clark, H.H. and Haviland,S.E. Comprehension and the Given-New Contract. In R.O. Freedle (Ed.), Discourse Production and Comprehension, Vol. 1, Discourse Processes; Advances in Research and Theory, Ablex, Norwood, New Jersey, 1977, 1-40.

Dehn, N. The AI Perspective on Reading Comprehension. In J. Flood (Ed.), Understanding Reading Comprehension: Cognition, Language and the Structure of Prose. International Reading Association, Newark, Delaware, 1984, 82-99.

Fredriksen, C.H. Semantic Processing Units in Understanding Test. In R.O. Freedle (Ed.), Discourse Production and Comprehension, Vol. 1, Discourse Processes: Advances in Research and Theory, Ablex, New Jersey, 1977, 57-88.

Fredriksen, C.H. Discourse Comprehension and Early Reading. In I.B. Resnick and P.A. Weaver (Eds.), Theory and Practice of Early Reading, Vol. 1, Erlbaum, Hillsdale, New Jersey, 1979, 155-186.

Hildyard, A. Children's Production of Inferences from Oral Texts. In Discourse Processes, 2, 1, January-March, 1979, 33-56.

Johnson, D. and Barrett, T. Prose Comprehension: A Descriptive Analysis of Instructional Practices. In C.M. Santa and B.L. Hayes (Eds.), Children's Prose Comprehension: Research and Practice, International Reading Association, Newark, Delaware, 1981, 72-102.

Kintsch, W. and Van Dijk, T.A. Toward a Model of Text Comprehension and Production. Psychological Review, 85, 1978, 363-394.

Langer, J. Facilitating Text Processing; The Elaboration of Prior Knowledge. In Langer, J. and Smith-Burke, T. (Eds.) Reader Meets Author/Bridging the Gap, International Reading Association, Newardk, Delaware, 1982, 149-162.

Lapp, D. and Flood, J. Teaching Reading to Every Child, Macmillan, New York, 1978.

Lesgold, A.M. and Perfetti, C.A. Interactive Processes. In Reading Comprehension, Discourse Processes, 1, 1978, 323-336.

Marshall, N. and Glock, M. Comprehension of Connected Discourse: A Study Into the Relationship Between the Structure of Text and Information Recalled, Reading Research Quarterly, 14, 1978-79, 10-56.

Meyer, B.J.F. The Organization of Prose and It's Effect on Memory, North Holland Publishing, Amsterdam, 1975.

Minsky, M. A Framework for Representing Knowledge. In P.M. Winston (Ed.), The Psychology of Computer Vision, McGraw-Hill, New York, 1975.

Nicholas, D.W. and Trabasso, T. Toward a Taxonomy of Inferences for Story Comprehension. In F. Wilkening et al. (Eds.), Information Integration by Children, Erlbaum, Hillsdale, New Jersey, 1980, 243-266.

Omanson, R.C., Warren, W.H. and Trabasso, T. Goals, Themes, Inferences and Memory: A Developmental Study. In Discourse Processes, 1, 1978, 337-354.

Paris, S.G. and Lindauer, B.K. Constructive Aspects of Children's Comprehension and Memory. In R.V. Kail, Jr. and J.W. Hagen (Eds.), Perspectives on the Development of Memory and Cognition, Erlbaum, Hillsdale, New Jersey, 1977, 35-60.

Paris, S.G. and Upton, L.R. Children's Memory for Inferential Relationships in Prose. Child Development, 47, 1976, 660-668.

Reder, L.M. A Short Survey of the Research on Text and Story Comprehension and Retention, Review of Educational Research, Spring, 1980, 50, 5-53.

Rieger, C.J. Conceptual Memory and Inference in R. Schank, N. Goldman, C. Rieger and C. Reisbeck (Eds.), Conceptual Information Processing, North Holland, Amsterdam, 1975, 193-195.

Rumelhart, D.E. Notes on Schema for Stories. In D.G. Bobrow and A.C. Collins (Eds.), Representation and Understanding: Studies in Cognitive Science, Academic Press, New York, 1975, 211-236.

Rumelhart, D.E. and Ortony, A. The Respresentation of Knowledge in Memory. In R.E. Anderson, R.J. Spiro and W.E. Montague (Eds.), Schooling and the Acquisition of Knowledge, Erlbaum, New Jersey, 1977, 99-135.

Schank, R.C. and Abelson, R.P. Scripts, Plans, Goals and Understanding, Erlbaum, Hillsdale, New Jersey, 1977.

Stein, N. and Glenn, C.G. An Analysis of Story Comprehension. In Elementary School Children in R.O. Freedle (Ed.) New Directions in Discourse Processing, Ablex, Norwood, New Jersey, 1979.

Tierney, R.J., Bridge, C. and Cera, M.J. The Discourse Processing Operations of Children, Reading Research Quarterly, 14,(4), 1978, 537-549.

Trabasso, T. On the Making of Inferences During Reading and Their Assessment. In J.T. Guthrie (Ed.), Comprehension and Teaching: Research Reviews, International Reading Association, Newark, Delaware, 1981a, 56-76.

Trabasso, T. Can We Integrate Research and Instruction on Reading Comprehension? In C.M. Santa and B.L. Hayes (Eds.), Children's Prose Comprehension, International Reading Association, 1981b, 103-116.

Trabasso, T. and Nicholas, W. Memory and Inferences in the Comparison of Narratives. In F. Wilkening et al. (Eds.), Information Integration by Children, Erlbaum, Hillsdale, New Jersey, 1980, 215-242.

Warren, W.H., Nicholas, D.W. and Trabasso, T. Event Chains and Inferences. In Understanding Narratives, in R.O. Freedle (Ed.), New Directions in Discourse Processing, Vol. 2, Advances in Discourse Processes, Ablex, Norwood, New Jersey, 1979, 23-52.

APPENDIX A

Sources of Material Used in Inferencing Ability Test

Test Reference

Sources of Materials Used in Inferencing Ability Test

1. Fournier, R. Thinking and Writing: Description, Prentice-Hall, Inc., U.S.A., 1969, p. 76.

2. Fournier, R. First Activities in Composition: Thinking and Writing: an Inductive Program in Composition, Introductory Level, Prentice-Hall, U.S.A., 1969, Activity 20.

3. "I Wonder" Card, Peabody Language Development Kit (Level #2), American Guidance Service, 1966, W-2, W-6, W-7.

4. Sequential Thinking Concept Cards (Set 15), Learning Development Aids, Wisbech, England.

5. Advertisement for Bell Telephone, U.S.A.

Test Reference

1. King, E.M., Lindquist, E. and Hieronymus, A.N. Canadian Tests of Basic Skills, Toronto, Thomas Nelson, 1974.