

**THE RELATIONSHIP BETWEEN CHILDREN'S READING
COMPREHENSION, WORD READING, LANGUAGE SKILLS
AND MEMORY IN A NORMAL SAMPLE**

**Submitted by
Deborah Goff
B BSc (Hons)**

**A thesis submitted in total fulfillment
of the requirements for the degree of
Doctor of Philosophy**

**School of Psychological Science
Faculty of Science
La Trobe University**

**Bundoora, Victoria 3086
Australia**

September 2004

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Chris Pratt, for his patient encouragement and invaluable contribution to the thesis. I would also like to acknowledge the contribution of Ben Ong who provided crucial support on matters pertaining to statistics and Molly de Lemos and staff at the Australian Council for Educational Research for their advice on the selection of appropriate tests. Thank you also to children and teachers at Mill Park and Greenhills Primary schools. The children participated with boundless energy and enthusiasm and were a joy to work with. This thesis has consumed much of my time and effort over a considerable number of years and I would like to give special thanks to my family, my husband, John and children, Sebastian and Hannah, for their tolerance and continued support through thick and thin.

CONTENTS

CHAPTER 1. PREAMBLE	1
1.1 Background	1
1.2 Research Aims	4
1.3 Thesis Outline	6
CHAPTER 2. INTRODUCTION	9
2.1 Models of Text Comprehension	9
2.1.1 Developmental Models of Reading Comprehension	14
2.1.1.1 Traditional Models such as the Simple View	14
2.2 Word Reading	22
2.2.1 Word Reading Accuracy	23
2.2.1.1 Lexical Versus Non-lexical Processes	24
2.2.2 Reading Experience And Exposure To Print	28
2.2.3 Reading Speed	34
2.2.4 Summary: Word Reading	39
2.3 Language Skills	40
2.3.1 Oral Comprehension	42
2.3.2 Semantic and Grammatical Skills	47
2.3.3 Summary: Language Skills	53
2.4 Memory	54
2.4.1 Single Resource Models of WM	56
2.4.2 Multi-Component Models of WM	58

2.4.3 Measurement of WM	62
2.4.4 WM Resources	66
2.4.5 WM Inhibition Mechanisms	69
2.4.6 WM: Conceptual and Methodological Issues	75
2.4.7 Verbal Learning And Retrieval	80
2.4.8 Summary: Memory	84
2.5 Reading Comprehension: Conceptual and Methodological Issues	85
2.5.1 Measures of Reading Comprehension	86
2.5.2 Types Of Reading Comprehension Questions	93
2.6 Summary of Aims	96
CHAPTER 3. METHOD	98
3.1 Participants	98
3.2 Materials and Administration	99
3.2.1 Reading Comprehension	102
3.2.2 Control Measures	106
3.2.3 Word reading	109
3.2.4 Language	116
3.2.5 Memory	122
3.3 Procedure	131
CHAPTER 4. RESULTS	134
4.1 Descriptive Statistics	134
4.1.1 Scoring	134

4.1.2 Internal consistency	135
4.1.3 Summary Statistics	136
4.2 Distribution Of Reading Comprehension Skills	138
4.3 Distribution of Word Reading Skills	139
4.4 Correlational Analyses	140
4.5 Controlling for Age and Intellectual Ability	142
4.5.1 Variance Accounted for by Age and General Intellectual Ability	143
4.5.2 Partial Correlations	143
4.6 Selecting the Strongest Predictors From Each Variable Type	145
4.6.1 Word Reading Variables	146
4.6.2 Language Variables	147
4.6.3 Memory Variables	148
4.7 Building a Model	150
4.8 Predictors of Irregular Word Reading	153
4.9 Evaluation of Traditional Models Such As The <i>Simple View</i>	155
4.9.1 Multiplicative versus Additive Variants of the <i>Simple View</i>	156
4.9.2 Alternative Model	158
4.10 Summary Of Results	159
CHAPTER 5. DISCUSSION	163
5.1 Word Reading	163
5.2 Language Skills	168
5.3 Memory	174

5.4 Models of Reading Comprehension	189
5.4.1 Implications For The Simple View	189
5.4.2 Alternative models	192
5.5 Development and Remediation of Reading Comprehension	195
5.6 Final Conclusions	199
REFERENCES	204
APPENDICES	230

LIST OF TABLES

Table 3.1	Mean, Standard Deviation, and Range of Chronological Age, Reading Age (in years and months) and IQ for each Grade	99
Table 3.2	Summary of Tasks	100
Table 3.3	Types of Comprehension Question	105
Table 4.1	Mean, Standard Deviation, Range, and Possible Range of measures of Reading Comprehension (PAT B), Word Reading, Memory, and Language	137
Table 4.2	Pearson's Correlation Coefficients between Reading Comprehension (PAT B) and measures of (a) Word Reading b) Memory and c) Language	141
Table 4.3	Partial Correlation Coefficients between Reading Comprehension (PAT B) and the Predictor Variables, after Controlling for Age and General Intellectual Ability	144
Table 4.4	Hierarchical Regression Predicting Reading Comprehension with Irregular Word Reading, Nonword Reading, Neale Errors, Neale Speed and the TRT, Entered in the Second Step, after Controlling for Age and General Intellectual Ability (N =177)	146

Table 4.5 Hierarchical Regression Predicting Reading Comprehension with PPVT-III, Oral Comprehension and the TROG Entered in the Second Step after Controlling for Age and General Intellectual Ability (N =177)	148
Table 4.6 Hierarchical Regression Predicting Reading Comprehension with RAVLT Delay, RAVLT Intrusions, 1 st Trial on the RAVLT, Forward Digit Span, Backward Digit Span, Triplet Number Span, Corsi, and Triplet Block Span Entered in the Second Step after Controlling for Age and General Intellectual Ability (N =177)	149
Table 4.7 Pearson's Correlation Coefficients between Variables Selected as Making an Independent Contribution to Reading Comprehension	150
Table 4.8 Hierarchical Regressions Predicting Reading Comprehension with Word Reading, Language and Memory measures after Controlling for Age and General Intellectual Ability (N =177)	152
Table 4.9 Hierarchical Regression Predicting Irregular Word Reading with Nonword Reading, Neale Speed, TRT, PPVT-III, TROG, Backward Digit Span, Forward Digit Span, RAVLT Delay Entered in the Second Step after Controlling for Age and General Intellectual Ability (N =177)	155

Table 4.10 Hierarchical Regressions Predicting Reading Comprehension with Nonword Reading and Oral comprehension as predictor variables (N =177)	157
Table 4.11 Hierarchical Regression Predicting Reading Comprehension with Irregular Word Reading and Oral Comprehension as predictor variables (N =177)	158

LIST OF FIGURES

Figure 4.1 Distribution of Raw Scores on PAT Reading Comprehension	139
Figure 4.2 Discrepancy Between Reading Age and Chronological Age in the Sample	140

SUMMARY

The current study aimed to develop a model of reading comprehension for children in middle primary school. As part of this overall aim there was a particular focus on the contribution of different types of memory to reading comprehension. The variables selected for consideration were identified from the child and adult literature and were of three types: word reading, language, and memory. The sample comprised 180 primary school children in grades 3-5 recruited from two primary schools. Their ages ranged from 8 years 7 months to 11 years 11 months.

The reading comprehension measure was in a multiple-choice format with the text available when answering the questions. The five word reading measures were phonological recoding, orthographic processing, text reading accuracy, text reading speed, and a measure of exposure to print and reading experience. It is recognised that, although exposure to print is closely associated with word reading skills, it is not a direct measure of word reading. The language measures were oral comprehension, receptive vocabulary and receptive grammatical skills. The memory measures included measures of verbal and visuospatial short-term memory, measures of verbal and visuospatial working memory, a measure of the ability to inhibit irrelevant information from working memory and a measure of longer term verbal learning and retrieval. Correlational and hierarchical multiple regression analyses were used to extrapolate the relationships between and among these variables.

The results revealed that, after controlling for age and general intellectual ability, the word reading and the language variables had a much stronger relationship with reading comprehension than the memory variables. The strongest independent predictors of reading comprehension were orthographic processing and oral comprehension. An additive combination of these two variables provided a more parsimonious model of reading comprehension than other models under consideration. It was concluded that for the age range in this study, language and word reading skills are the main predictors of reading comprehension and that the different types of memory do not make major contributions to reading comprehension.

STATEMENT OF AUTHORSHIP

Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis or any other degree or diploma.

No other person's work has been used without due acknowledgment in the main text of the thesis.

This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

All research procedures reported in the thesis were approved by the Faculty of Science, Technology and Engineering Human Ethics Committee (FHEC Application 00/R13).

Deborah Goff

Date