

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**AN ANALYSIS OF PERFORMANCE ON THE REY AUDITORY-VERBAL
LEARNING TEST AFTER TRAUMATIC BRAIN INJURY, AND ITS
ASSOCIATION WITH REPORTED EVERYDAY
MEMORY PERFORMANCE.**

A thesis presented in partial fulfillment
of the requirements for a degree of
Master of Arts in Psychology at
Massey University.

ROSLYN A. MCGILL

2002

ABSTRACT

The current study was conducted in two parts. Study 1 examined the Rey Auditory-Verbal Learning Test (AVLT) performance of 353 individuals who had been referred to an outpatient psychology clinic having sustained a traumatic brain injury (TBI). Individuals were divided into subgroups based on their patterns of performance on the AVLT. Individuals with low trial 1 scores were divided into three groups based on their subsequent AVLT performance. Individuals with low delayed-recall scores were divided into four groups based on their performance on preceding AVLT trials. For the TBI group as a whole, significant correlations were found between AVLT scores and age, education, and general intelligence (as measured by verbal IQ). Study 2 investigated relative ratings of everyday memory performance on the Patient Competency Rating Scale). This data was available for 82 of the individuals in the initial sample. The relationship between reported everyday memory performance and test performance on the AVLT was examined for this group. No significant correlations were found between these two variables. Low correlations were found between patient and relative ratings on the PCRS. Individuals were divided in four groups based on their everyday memory and test performance. Individuals with low everyday memory performance were found to have a similar type and number of difficulties, regardless of their AVLT performance. The results of this study highlight the varied performance of individuals after TBI, both on memory tests such as the AVLT and reported everyday memory performance. The AVLT should not be used to predict the level of difficulty in daily life as the correlations are not significant.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation for the guidance and support given to me by my supervisor, Dr. Janet Leathem. Her enthusiasm for the subject of neuropsychology is contagious.

I would also like to thank my family, especially Desmond, who smiled and nodded while I explained my thesis to them.

Many others provided me with encouragement and support, including Rosie who was always interested and always had time to listen.

And to Jeremy who supported and encouraged me to the end. Thank you for both providing me with distractions and motivating me to work harder.

TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Figures	vii
List of Tables	viii
List of Appendices	x
CHAPTER 1 – OVERVIEW	1
CHAPTER 2 – TRAUMATIC BRAIN INJURY	
EPIDEMIOLOGY	3
CAUSES OF INJURY	5
RISK FACTORS	7
MECHANISMS OF BRAIN INJURY	7
<i>Primary Damage</i>	7
<i>Diffuse Damage</i>	9
<i>Secondary Damage</i>	10
SEVERITY MEASURES	11
<i>Post-traumatic Amnesia</i>	11
<i>Loss of Consciousness</i>	12
<i>Glasgow Coma Scale</i>	13
LEVELS OF SEVERITY	13
<i>Mild TBI</i>	13
<i>Moderate TBI</i>	14
<i>Severe TBI</i>	15
POST-CONCUSSIVE SYNDROME	15
PREDICTORS OF OUTCOME	16
CONCLUSION	18
CHAPTER 3 – SEQUELAE	
INTRODUCTION	19
COGNITIVE SEQUELAE	19
<i>Attention</i>	20
<i>Neuroanatomical correlates of memory</i>	21
<i>Memory outcomes</i>	22
<i>Test performance</i>	24
<i>Functional memory</i>	25

OTHER FACTORS INFLUENCING ASSESSED OUTCOME	26
<i>Personality and emotional factors</i>	26
<i>Depression</i>	27
<i>Physical factors</i>	28
<i>Awareness</i>	28
<i>Social and family support</i>	30
FUNCTIONAL OUTCOME AFTER TBI	33
CONCLUSION	36

CHAPTER 4 – MEMORY

INTRODUCTION	37
STRUCTURAL ASPECTS OF MEMORY	37
SHORT-TERM MEMORY	39
<i>Encoding</i>	40
LONG-TERM MEMORY	41
<i>Storage</i>	41
<i>Retrieval</i>	41
DECLARATIVE AND PROCEDURAL MEMORY	42
EVERYDAY MEMORY	43
MEMORY IMPAIRMENT	44
MEMORY QUESTIONNAIRES	44
CONCLUSION	46

CHAPTER 5 – FORMULATION

OBJECTIVES	47
HYPOTHESES	48
<i>Study 1</i>	48
<i>Study 2</i>	51

CHAPTER 6 – METHOD

PARTICIPANTS	55
<i>Study 1</i>	55
<i>Study 2</i>	57
MEASURES	57
<i>Rey Auditory-Verbal Learning Test (AVLT)</i>	57
<i>Patient Competency Rating Scale (PCRS)</i>	60
PROCEDURE	60
<i>Study 1</i>	60
<i>Study 2</i>	62

CHAPTER 7 – RESULTS

STUDY 1	64
<i>Hypothesis 1</i>	64
<i>Hypothesis 2</i>	65
<i>Hypothesis 3</i>	68
<i>Hypothesis 4</i>	69
<i>Hypothesis 5</i>	70
<i>Hypothesis 6</i>	72
<i>Hypothesis 7</i>	72
<i>Hypothesis 8</i>	74
<i>Hypothesis 9</i>	75
STUDY 2	76
<i>Hypothesis 10</i>	78
<i>Hypothesis 11</i>	78
<i>Hypothesis 12</i>	79
<i>Hypothesis 13</i>	79
<i>Hypothesis 14</i>	80
<i>Hypothesis 15</i>	81
<i>Hypothesis 16</i>	82
<i>Hypothesis 17</i>	82
 CHAPTER 8 – DISCUSSION	 84
 CONCLUSIONS	 96
 REFERENCES	 98
 APPENDIX A KEY AUDITORY-VERBAL LEARNING TEST	 111
 APPENDIX B PATIENT COMPETENCY RATING SCALE	 112
 APPENDIX C COMPARISONS OF AVLT SUBGROUPS AND THE NORMATIVE GROUP	 115

LIST OF FIGURES**Figures**

7.1.	Comparison of mean AVLT scores of TBI group and norms . . .	65
7.2.	Comparison of AVLT scores by severity group for the Study 1 sample	67
7.3.	Comparison of AVLT scores by severity group for the Study 2 sample	67
7.4.	Mean AVLT scores across trials for males and females	70
7.5.	Patterns of AVLT performance for individuals with low STM scores	73
7.6.	Patterns of AVLT performance resulting in low delayed-recall scores	74
7.7.	Comparison of mean AVLT scores of Groups 1 and 2	82

LIST OF TABLES

Tables

2.1.	Comparison of epidemiological studies	5
2.2.	Comparison of causes of brain injury	6
6.1.	Characteristics of samples	56
6.2.	Distribution of individuals with TBI based on AVLT Performance	61
6.3.	Composition of subgroups based on AVLT performance for Study 1	62
6.4.	Composition of Groups based on AVLT performance and PCRS for Study 2	63
7.1.	T-test comparison of mean AVLT trial scores for TBI group and norms	65
7.2.	Correlations of severity and AVLT scores	66
7.3.	Correlations of education and AVLT scores	68
7.4.	Male and female means across AVLT trials	69
7.5.	Mean AVLT scores across age groups for three studies	71
7.6.	Correlations of age and AVLT performance controlling for severity, education and gender	71
7.7.	Correlation between VIQ and AVLT performance	72
7.8.	Mean digit span age-corrected scaled scores across the three low STM groups	75
7.9.	Logical Memory recall performance across the four low delayed-recall groups	76
7.10.	Mean PCRS ratings for the TBI group	77
7.11.	Mean PCRS ratings across subgroups	77

7.12.	Correlations between AVLT performance and PCRS ratings of everyday memory performance	78
7.13.	Correlations between injury severity and PCRS ratings of everyday memory performance	79
7.14.	Percentage of sample with reported everyday memory difficulties in Groups 1 and 2	80
7.15.	Percentages showing number of problems on the PCRS-R for Groups 1 and 2	81
7.16.	T-test comparison of AVLT means for Groups 1 and 2	81
7.17.	Distribution of employment status across groups	83

LIST OF APPENDICES**Appendix**

A	Rey Auditory-Verbal Learning Test	111
B	Patient Competency Rating Scale	112
C	Comparisons of AVLT subgroups and the normative group ...	115