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.
Continuous Speech Recognition: An analysis of its effect on listening comprehension, listening strategies and notetaking

A thesis presented in part fulfilment of the requirements for the degree of Doctorate in Education

Massey University

Tom McIvor
2006
Declaration

I declare that this thesis is all my own work except for those references that I have acknowledged in this study and that this material has not been included in a thesis or report submitted to Massey University or any other university for a degree or other qualification.

............................

Tom McIvor
Candidate for EdD
Abstract

This thesis presents an investigation into the effect of Liberated Learning Technology (LLP) on academic listening comprehension, notetaking and listening strategies in an English as a foreign language context (L2). Two studies are reported: an exploratory study and subsequent main study. The exploratory study was undertaken to determine L2 and native speaker (L1) students’ perceptions on the effectiveness of the technology on academic listening and notetaking. The main study took a more focused approach and as a result, extended the exploratory study that was done in an authentic lecture context in order to gather data to measure listening comprehension and notetaking quality.

The participants in the main study comprised six L2 students: five of whom intended to go to university. The methodology was a multi-method one: data was gathered from notetaking samples, protocol analysis, email responses and a questionnaire.

Results indicated that continuous speech recognition (CSR) has the potential to support the listening comprehension and notetaking abilities of L2 students as well as facilitate metacognitive listening strategy use and enhance affective factors in academic listening.
However, it is important to note that as CSR is an innovative technology, it first needs to meet a number of challenges before its full potential can be realized. Consequently, recommendations for future research and potential innovative uses for the technology are discussed.

This thesis contributes to L2 academic listening and notetaking measurement in two areas: 1. the measurement of LLP-supported notetaking; and, 2. the measurement of LLP-supported academic listening comprehension.
Acknowledgements

The completion of this thesis is due to the assistance of four sets of people. Their contribution is gratefully acknowledged.

Firstly, I would like to thank Associate Professor Pat Nolan for his support and advice. Secondly, I need to acknowledge the participation of Massey University English Language Centre Manager Mr Greg Tong without whom this study would have been impossible to complete. In addition, I would like to thank the students of the language centre for the zeal and enthusiasm they showed during their participation in this study.

Thirdly, I offer sincere thanks to both Associate Professor Ken Ryba of the College of Education and Dr. Linda Selby for their interest, encouragement and humour during the supervisory period. I really appreciated their input into the various drafts of the thesis that I prepared.

Finally, I would like to thank my partner Kerre for her unwavering support and tolerance during the period of the investigation.
## CONTENTS PAGE

Declaration ......................................................................................................... Page i
Abstract ............................................................................................................. Page ii
Acknowledgments .......................................................................................... Page iv
Table of contents ............................................................................................. Page v
List of tables & figures .................................................................................. Page ix

### Chapter 1
1.1 Statement of the problem ................................................................. Page 1
1.2 Significance of Study ........................................................................ Page 2
1.3 Research Questions ............................................................................. Page 6
1.4 Organisation of thesis ........................................................................ Page 6
1.5 Researcher Role ................................................................................... Page 8

### Chapter 2 Literature Review
2.1 Introduction ............................................................................................ Page 9
  2.1.1 Working memory ................................................................... Page 10
  2.1.2 Listening stages ...................................................................... Page 11
  2.1.3 L2 students’ listening problems ........................................ Page 12
  2.1.4 Metacognition ......................................................................... Page 15
  2.1.5 Listening strategies ................................................................ Page 16
2.2 Cognitive load theory ........................................................................ Page 20
  2.2.1 Dual Processing Theory ....................................................... Page 23
  2.2.2 Multimedia in language learning ....................................... Page 28
  2.2.3 Liberated Learning ................................................................. Page 35
Chapter 2 Lectures

2.3 Lectures ................................................................................................... Page 40
2.3.1 Lecture Mode ........................................................................... Page 41
2.3.2 A comparison of authentic lectures
      and textbook lectures ........................................................................ Page 41
2.3.3 Discourse markers .................................................................. Page 43
2.3.4 Cohesion in lectures .............................................................. Page 49
2.3.5 Lecture schematic structure ................................................ Page 51
2.3.6 Lecturing styles ....................................................................... Page 52
2.3.7 Lecturing strategies ................................................................ Page 53

2.4 Academic notetaking ........................................................................ ..Page 55
2.4.1 Notetaking behaviour ........................................................... ..Page 60

2.5 Summary ............................................................................................ Page 63

Chapter 3 Liberated Learning Exploratory Study

3.1 Introduction .......................................................................................... Page 64
3.2 Method ................................................................................................... Page 64
3.3 Measures ................................................................................................ Page 68
3.4 Results .................................................................................................... Page 70
3.5 Discussion ............................................................................................. Page 84
3.6 Conclusion and Practical Recommendations ........................................... Page 88

Chapter 4 Main Study Conceptual Framework

4.1 A Conceptual Framework for LLP ...................................................... Page 92
### Chapter 5 Method

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Method</td>
<td>100</td>
</tr>
<tr>
<td>5.1.1 Trial</td>
<td>101</td>
</tr>
<tr>
<td>5.1.2 Analysis of Practice Effects</td>
<td>103</td>
</tr>
<tr>
<td>5.1.3 Main Study</td>
<td>106</td>
</tr>
<tr>
<td>5.2 Method</td>
<td>107</td>
</tr>
<tr>
<td>5.3 Measures</td>
<td>109</td>
</tr>
<tr>
<td>5.3.1 The Questionnaire</td>
<td>109</td>
</tr>
<tr>
<td>5.3.2 Protocol Analysis</td>
<td>112</td>
</tr>
<tr>
<td>5.3.3 Email discussions</td>
<td>116</td>
</tr>
<tr>
<td>5.3.4 The Course</td>
<td>116</td>
</tr>
<tr>
<td>5.3.5 Notetaking scoring method</td>
<td>119</td>
</tr>
</tbody>
</table>

### Chapter 6 Results

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Notetaking Scoring results</td>
<td>122</td>
</tr>
<tr>
<td>6.2 Email Responses</td>
<td>130</td>
</tr>
<tr>
<td>6.3 Protocol Analysis</td>
<td>135</td>
</tr>
<tr>
<td>6.4 The effect of LLP Technology on strategies</td>
<td>147</td>
</tr>
<tr>
<td>6.5 The results of the questionnaire responses</td>
<td>154</td>
</tr>
</tbody>
</table>

### Chapter 7 Discussion

Page 164

### Chapter 8 Reflective Evaluation on Research Journey

Page 190

### Bibliography

Page 200
Appendices

Appendix A  Exploratory study information sheet ..................... Page 214
Appendix B  Exploratory study informed consent form ............... Page 216
Appendix C  Exploratory study survey questions ....................... Page 217
Appendix D  Notetaking framework ......................................... Page 220
Appendix E  Nicotine lecture ...................................................... Page 221
Appendix F  Question sheet for trial stage .................................. Page 226
Appendix G  Informed consent sheet ......................................... Page 227
Appendix H  Questionnaire .......................................................... Page 230
Appendix I  Notetaking template for scoring ............................... Page 233
Appendix J  Strategy list adapted from Goh (2000) ...................... Page 235
Appendix K  Full transcripts from interviews .............................. Page 236
Appendix L  Complete data on matches, spelling & vocabulary Page 267
Appendix M  Raw data from notetaking analysis ......................... Page 269
# List of tables and figures

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1</td>
<td>Ratings of speech display use</td>
<td>75</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Access to streamed text and audio files</td>
<td>76</td>
</tr>
<tr>
<td>Table 3.3</td>
<td>Ratings of the extent to which students used the streamed files</td>
<td>77</td>
</tr>
<tr>
<td>Table 3.4</td>
<td>Perceptions of the effectiveness of the LLP System</td>
<td>80</td>
</tr>
<tr>
<td>Table 3.5</td>
<td>Thematic analysis of advantages, problems and suggestions for improvement</td>
<td>83</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Trial scores</td>
<td>103</td>
</tr>
<tr>
<td>Table 5.2</td>
<td>Practice effect scores</td>
<td>105</td>
</tr>
<tr>
<td>Table 5.3</td>
<td>Crosswalk matching methods to questions</td>
<td>107</td>
</tr>
<tr>
<td>Table 5.4</td>
<td>The origin of the questionnaire items</td>
<td>111</td>
</tr>
<tr>
<td>Table 5.5</td>
<td>Notetaking sample scoring</td>
<td>121</td>
</tr>
<tr>
<td>Table 6.1</td>
<td>Main study scores for Benny</td>
<td>123</td>
</tr>
<tr>
<td>Table 6.2</td>
<td>Main study scores for Resa</td>
<td>123</td>
</tr>
<tr>
<td>Table 6.3</td>
<td>Main study scores for Makiko</td>
<td>123</td>
</tr>
<tr>
<td>Table 6.4</td>
<td>Main study scores for Amber</td>
<td>123</td>
</tr>
<tr>
<td>Table 6.5</td>
<td>Main study scores for Stephen</td>
<td>124</td>
</tr>
<tr>
<td>Table 6.6</td>
<td>Main study scores for Arina</td>
<td>124</td>
</tr>
<tr>
<td>Table 6.7</td>
<td>Main study average notetaking scores</td>
<td>127</td>
</tr>
<tr>
<td>Table 6.8</td>
<td>Main study total scores for matches, spelling, and improved vocabulary and phrases</td>
<td>130</td>
</tr>
<tr>
<td>Table 6.9a</td>
<td>Email responses</td>
<td>131</td>
</tr>
</tbody>
</table>
Table 6.9b  Email responses........................................Page 133
Table 6.9c  Email responses........................................Page 134
Table 6.10  Variety of strategies used by participants during protocol
            interviews ......................................................Page 146
Table 6.11  Questionnaire ............................................Page 157
Figure 1    Stand alone Liberated Learning System ...............Page 37
Figure 2    Conceptual framework diagram for LLP ...............Page 94