USE OF THESES

This copy is supplied for purposes of private study and research only. Passages from the thesis may not be copied or closely paraphrased without the written consent of the author.
Short term implicit memory in lexical processing

Elinor McKone

A thesis submitted for the degree of Doctor of Philosophy
of the Australian National University,
Canberra, Australia

July, 1995
Declaration

The work presented in this thesis is entirely my own.

Elinor McKone
Acknowledgements

I wish to thank supervisors Dr. Judith Slee, Dr. Michael Cook and Dr. Brendan Weekes for valuable advice on content, methodological issues, writing, and the process of completing a PhD in general. Judy and Michael deserve particular thanks for meticulous attention to detail during a somewhat prolonged write-up stage. My understanding of my own data has improved substantially following their comments on the best way to present it to others.

I also wish to thank the various academics working within the fields of memory and word recognition who have provided me with feedback on my work. These include journal reviewers, and people who have asked pointed questions following conference presentations and other talks. Several of the most fundamental ideas contained in this thesis would never have developed without this feedback.

The Division of Psychology at ANU has provided a supportive environment in which to study. In particular, I have appreciated the background knowledge I have obtained from meetings of the Cognition Group, and the opportunity to teach in a wide variety of undergraduate courses.

My friends deserve thanks for being ready and willing to drop their own study or work commitments on a regular basis to accompany me on sanity-saving ten-day bushwalks in Tasmania. Thanks also to Jenny Andrews for the use of her coast house.

Finally, I wish to thank Judy Slee and Michael Cook (again) for allowing me entry to the Psychology honours program in 1991 without several of the "essential" prerequisites. Without their confidence in me, I would still be programming computers.
Publications arising from the thesis

Experiments 2.1, 2.2, 3.2 and 4.1 will shortly appear in the following article:

Abstract

A single recent presentation of an item can lead to substantial improvement in speed or accuracy of processing when that item is presented subsequently, a phenomenon referred to as repetition priming. This empirical finding has been considered within two general frameworks. The first can be termed a "perceptual" approach, in which the perception of the target occurs more easily due to a transient change in the state of the target's internal representation. The second can be termed a "memory" approach, in which priming is seen as an example of implicit memory, that is, as arising from subconscious, nondeliberate access to a trace of an earlier event.

This thesis examined repetition priming for words and nonwords from both perspectives. A review of priming within a word recognition framework suggested that transient modifications of lexical representations might be able to endure for several seconds, allowing a short-lived priming effect for words and word-like nonwords. A review of priming within a memory framework suggested that there might exist a short-lived implicit memory form, with a duration similar to that of explicit working memory.

Empirical work examined priming over short lags (generally 0–23 items intervening between repeats) using lexical decision and speeded naming tasks. A novel short-lived repetition effect was apparent, superimposed on standard long-lived priming. For words, this effect endured until lag 3 (8 seconds). More rapid decay was apparent for nonwords, producing a lag × lexicality interaction.

Short term priming was distinguished from long term priming on the basis of decay rate, the effects of word frequency, and the effects of the proportion of repeated items in the list. Short term priming was distinguished from explicit working memory on the basis of the effects of lexical status and overall differences in speed and accuracy.

Finally, short term priming was shown to decay through the effects of both spontaneous trace loss and interference. The effect of interference on nonword priming was particularly severe, and the relative effects of interference were shown to be responsible for the form of the lag × lexicality interaction.

The results are interpreted as showing that (a) short term priming reflects the operation of a novel memory form, namely, short term implicit memory, (b) this memory arises (for lexical items) within the perceptual system responsible for word recognition, possibly through transient modification of
orthographic representations, and (c) the word recognition system therefore retains a number of partially-active words simultaneously. It is suggested that short term implicit memory might exist to allow the integration of successively-presented stimuli across a short time window of perceptual processing.
# Short term repetition priming

2.0 Introduction .................................................. 53

2.1 Short lag priming in lexical decision: Experiment 2.1 .......... 53

2.1.1 Method ................................................... 54

2.1.2 Results and discussion .................................... 56

2.2 Short lag priming in naming: Experiment 2.2 ................. 60

2.2.1 Method ................................................... 61

2.2.2 Results and discussion .................................... 61

2.3 Conclusions .................................................. 65

# Distinguishing short term priming from long term priming

3.0 Introduction .................................................. 67

3.1 Decay rate of long term priming: Experiment 3.1 .......... 68

3.1.1 Method ................................................... 68

3.1.2 Results and discussion .................................... 70

3.2 Short lag priming for high frequency words: Experiment 3.2 75

3.2.1 Method ................................................... 76

3.2.2 Results and discussion .................................... 76

3.3 Combined analysis of Experiments 2.1, 2.2 and 3.2 .......... 80

3.4 Conclusions .................................................. 84

# Short term implicit memory

4.0 Introduction .................................................. 87

4.1 Short term explicit memory: Experiment 4.1 ................. 89

4.1.1 Method ................................................... 90

4.1.2 Results and discussion .................................... 90

4.2 Reducing the proportion of close repeats: Experiment 4.2 94

4.2.1 Method ................................................... 95

4.2.2 Results and discussion .................................... 96

4.3 Conclusions .................................................. 102

# Unpacking lag: Spontaneous trace loss or interference

5.0 Introduction .................................................. 105

5.1 Varying time delay or number of intervening items: Experiment 5.1 106

5.1.1 Method ................................................... 107

5.1.2 Results and discussion .................................... 110

5.2 Patterns of decay with and without interference: Experiment 5.2 114

5.2.1 Method ................................................... 116

5.2.2 Results and discussion .................................... 118

5.3 Conclusions .................................................. 127
6 General discussion 131

6.0 Summary of results ..................................... 131
  6.0.1 Results pertinent to short term priming .............. 132
  6.0.2 Order effects: A possible methodological problem .... 134
  6.0.3 Results pertinent to long term priming ................ 136
  6.0.4 Results pertinent to general methodological issues ... 137

6.1 Theoretical interpretations of short term priming: Introduction 138

6.2 Interpretations within a memory framework ................. 140
  6.2.1 Short term implicit memory ........................ 140
  6.2.2 Historic or ahistoric traces? ....................... 142
  6.2.3 Generality across domains .......................... 143

6.3 Interpretations within a perceptual framework .............. 144
  6.3.1 A lexical-level effect .............................. 145
  6.3.2 Locus within the functional architecture of word recognition 145
  6.3.3 Mechanism of lexical state changes .................. 146
  6.3.4 Form of orthographic representation ................ 147
  6.3.5 The process of interference ....................... 148
  6.3.6 Retention of multiple words: A time-window of lexical processing 149
  6.3.7 Prediction of generalised proactive influences ....... 151
  6.3.8 Implementing a time window in computational models .... 151

6.4 Future research ........................................ 154

6.5 Concluding remarks .................................... 156
  6.5.1 The functional role of short term priming ............ 157
  6.5.2 Use of short term priming as an experimental technique ... 158

References 161

Appendices 175
  A Study-test mismatches in visual form .................... 175
  B Trial order and items used in Experiment 2.1 .......... 187
  C Proactive influences of lexicality .................... 197