P3 Amplitude indexes the Degree of similarity-based Interference in Memory Retrieval during Sentence Comprehension

Conference Paper · March 2015

CITATIONS
0
READS
141

8 authors, including:
Ina Bornkessel-Schlesewsky
University of South Australia

Andrea E Martin
Max Planck Institute for Psycholinguistics

All in-text references underlined in blue are linked to publications on ResearchGate, letting you access and read them immediately.
P3 Amplitude indexes the Degree of similarity-based Interference in Memory Retrieval during Sentence Comprehension

Pia Schoknecht 1,2, Svenja Lüll 3, Lisa Schiffer 3, Noura Schmuck 3, Phillip M. Alday 2, Matthias Schlesewsky 3, Ina Bornkessel-Schlesewsky 2,4 and Andrea E. Martin 5

1 University of Salzburg  2 University of Marburg  3 Johannes Gutenberg-University of Mainz  4 University of South Australia  5 University of Edinburgh

Introduction

Unary memory models postulate a direct content-addressable (cue-based) retrieval in working and longterm memory [1]. Cue-based retrieval suffers from similarity-based interference. It increases with increasing cue overlap [5].

* The P300 effect correlates with memory retrieval in non-linguistic tasks. Amplitude is modulated by the number of involved features [3].

* The present study
  - Is the P300 amplitude sensitive to the degree of similarity-based interference in memory retrieval during language comprehension?
  - 2 ERP experiments investigated interference in memory retrieval in sluicing constructions

Experiments

Experiment 1

* How do the different cases in German behave as features / cues involved in retrieval?
  * 2 x 2 Design: verb type (ACC / DAT) × cue case (match / mismatch)
  * 26 Ag/AgCl electrodes (impedances below 5 kΩ)
  * 24 native, right-handed speakers of German (age range 19 – 28)
  * 100 critical sentences (20 per condition), 180 fillers
  * Fixation asterisk: 500 ms, word presentation time: 300 ms, ISI: 200 ms, blank screen after last word: 1000 ms, task: 2000 ms, ITI: 500 ms
  * acceptability judgement after each sentence

Experiment 2

* How does similarity-based interference influence P300 amplitude?
  * Additional manipulation of the intervening noun phrase, using either a pronoun as in experiment 1 or a highly/lowly plausible object of the matrix verb creating high/low interference due to semantic cue overlap.
  * 3 NP type (pronoun / high interference NP / low interference NP)
  * 64 active electrodes (impedances below 15 kΩ)
  * 22 native, right-handed speakers of German (age range 18 – 29)
  * 100 critical sentences (40 per condition), 263 fillers
  * presentation times cf. experiment 1
  * task as in experiment 1

Results

Experiment 1

Er wollte jemanden pflegen, aber sie verstehen nicht, wen / * wer.
He wanted someone to.take.care.of but they understand not whom / * who, ACC

Er wollte jemandem schmeicheln, aber sie verstehen nicht, wen / * wer.
He wanted someone to.flatten but they understand not whom / * who, DAT

Results of Factorial ANOVA

- 300 – 500 ms: Main effect of verb type (red: ACC, blue: DAT)
  (midline: F (1, 23) = 8.26, p = 0.009)
  - cue case × ROI (lateral: F(4,92) = 5.26, p = 0.01)

- 500 – 700 ms: Main effect of cue case (solid line: match, dotted line: mismatch)
  (midline: F (1, 23) = 13.38, p = 0.001, lateral: F (1, 23) = 6.96, p = 0.01)

Experiment 2

Er wollte jemanden pflegen, aber die Senioren verstehen nicht, wen / * wen.
He wanted someone to.take.care.of but the elderly understand not whom / whom, ACC / DAT

Results of Factorial ANOVA

- 200 – 400 ms: NP type × cue case (F (2, 42) = 3.26, p = 0.048)
- 450 – 650 ms: Main effect of cue case (F(1,21) = 11.33, p = 0.0029)

Summary

* The easier the retrieval — i.e. the more distinctive the target — the greater the P300 amplitude.
* P300 amplitude for grammatical conditions is reduced for high interference conditions.
* These results suggest that domain-general retrieval mechanisms are indexed by the P300. This opens up the possibility of linking retrieval mechanisms to current, neurobiologically grounded theories on the P300 in language processing [5].

References