It Hurts Less the Second Time Around:
ERPs show anaphor resolution facilitated by valence of antecedent

Liam Clegg1, Abigail Swain1, Eric C. Fields1, Nate Delaney-Busch1, Daphne Holt1,2,3, Gina Kuperberg1,2,3

1 Department of Psychology, Tufts University; 2 MGH/MIT/HMS Athinoula A. Martinos Center for Biomedical Imaging; 3 Department of Psychiatry, Massachusetts General Hospital

Introduction

Language is often used to convey emotional states, reactions and feelings. The emotional content of words influences their storage, salience and accessibility – all factors known to influence online language processing. Despite this, there has been very little psycholinguistic work examining the impact of emotional words on the mechanisms of discourse comprehension.

Our Questions

1. Are emotional words encountered in a neutral context associated with increased lexico-semantic processing? If so, this would predict an increased N400 effect to emotional (versus neutral) words within sentences, even when these are matched on clence, frequency and other factors known to influence lexico-semantic processing [1, 2].

2. Does the emotional salience of a word lead to its being easier to link referentially, to a subsequent neutral anaphor, even across clause boundaries? If so, this would predict a reduced anterior negativity effect (reflecting reduced working memory costs engaged in referential linking, [3]) to neutral anaphors following emotional (versus neutral) antecedents.

Design

Stimuli:
The students gave the professor / enthusiastic / biling evaluations.
Their feedback was read by him, discourse-final pronominal anaphor.

Joseph’s dinner guests discussed / loved / criticized his cooking.
Their reaction was observed by him, discourse-final pronominal anaphor.

Stimuli Characteristics:

<table>
<thead>
<tr>
<th>Neutral</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (valence word)</td>
<td>1.046</td>
<td>1.095</td>
</tr>
<tr>
<td>LSA (between valence word and next context word in sentence)</td>
<td>0.126 [1.126]</td>
<td>0.144 [1.126]</td>
</tr>
<tr>
<td>Valence ratings of words</td>
<td>4.015</td>
<td>4.519</td>
</tr>
<tr>
<td>Anterior negativity (relative to neutral)</td>
<td>2.140</td>
<td>2.175</td>
</tr>
<tr>
<td>Valence ratings of entire scenario</td>
<td>2.737</td>
<td>2.806</td>
</tr>
<tr>
<td>Cloze probability of valence words*</td>
<td>0.56% [3.13%]</td>
<td>0.69% [2.62%]</td>
</tr>
</tbody>
</table>

Means are shown with standard deviations in brackets.*
Valence ratings of whole scenario* | 4.23 [0.473] | 5.26 [0.522] | 2.48 [0.542] |
Valence ratings of valence words* | 2.85 [0.674] | 4.50 [0.879] | 4.53 [0.949] |
Cloze probability of valence words* | 0.56% [3.13%] | 0.69% [2.62%] | 0.12% [0.93%] |

Presentation & Recording:

• 60 sentence-pairs per condition (30 adjective type, 30 verb type)
• Full counterbalancing & randomization
• No sentence repeated more than once
• 24 (9 male) right-handed participants (mean age 19.7, SD 1.27)
• ERPs measured with 29 active tin electrodes, continuously sampled at 200 Hz with a bandpass filter of 0.01-40 Hz

Results

Valence Words

Noun Phrase Anaphor

Discourse-final Pronominal Anaphors

Effects on neutral valence words

(a) The reduced anterior negativity effect to neutral NP anaphors in emotional (vs neutral) discourse, may reflect reduced WM costs in resolving these anaphors. The emotional salience (both positive and negative) of the antecedents may increase their accessibility for subsequent anaphor resolution, even across clause boundaries.

(b) The increased positivity effect to emotional (vs neutral) adjectives partially replicates previous findings [1]. It may reflect prolonged analysis driven by arousal associated with negative and positive words.

Acknowledgements:
This work was supported by NIMH (RO1 MH71635) and NARSAD (with the Sidney Baer Trust).

References