Male fashionistas and female football fans: how gender stereotypes affect neurophysiological correlates of speech comprehension

Angela Grant, Sarah Grey, and Janet van Hell
Department of Psychology and Center for Language Science, Pennsylvania State University, University Park, PA 16802, USA

**Background**

Language research often neglects the contextual cues common in real-world language use. Recent studies exploring the effects of context on semantic processing have found that contextual information is important for online comprehension. Few studies examined the brain’s ability to adjust its online application of cues such as world or speaker knowledge. We therefore investigated how the online formation of knowledge affects the processing of semantic incongruities. Specifically, we manipulated the stereotype congruence of the speaker identities presented.

**Questions**

1. Does the stereotype congruence of a speaker’s identity affect the processing of semantic anomalies?
2. How does this change with repeated exposure to a speaker?

**Methods**

**Participants**

28 right-handed students (14 male) Mean age=19.4

Listening Task during EEG recording

- Participants were asked comprehension questions after 1.5s of trials.
- Sentences were recorded by native speakers of American English.
- 40 sentences per condition per half.
- Critical words were presented medially.
- Spliced into incorrect sentences.
- Matched for frequency and length across contexts.

**Behavioral Measures**

- Language history questionnaire
- Handedness questionnaire
- Operation Span
- Flanker task
- Ambivalent Sexism Inventory
- Hostile and Benevolent Sexism
- Post-Experiment Questionnaire
- Sports and Fashion self-ratings
- Error identification

**Behavioral data**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Accuracy M (SD)</th>
<th>Reaction Time M (SD)</th>
<th>Rating M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>0.88 (.33)</td>
<td>3080ms (2038)</td>
<td>-</td>
</tr>
<tr>
<td>Ambivalent Sexism Inventory (ASI*)</td>
<td>-</td>
<td>2.29 (.57)</td>
<td></td>
</tr>
<tr>
<td>Benevolent*</td>
<td>-</td>
<td>2.48 (.58)</td>
<td></td>
</tr>
<tr>
<td>Hostile</td>
<td>-</td>
<td>2.43 (.72)</td>
<td></td>
</tr>
<tr>
<td>Sports Self-Rating</td>
<td>-</td>
<td>2.17 (.76)</td>
<td></td>
</tr>
<tr>
<td>Fashion Self-Rating</td>
<td>-</td>
<td>3.34 (.90)</td>
<td></td>
</tr>
<tr>
<td>Error Identification</td>
<td>0.88 (.09)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>O-Span</td>
<td>0.78 (.09)</td>
<td>2269.11ms (281)</td>
<td>-</td>
</tr>
<tr>
<td>Flanker Effect</td>
<td>-</td>
<td>53.87ms (24.07)</td>
<td>-</td>
</tr>
</tbody>
</table>

Males reported significantly more overall sexism than females, driven by benevolent sexism. There were no other significant gender effects.

**Mixed Effects Analysis of ERP data**

- Random factor: Participant
- Fixed Factors: Language
  - Congruence*
  - Correctness*
  - Participant Gender
  - Region
- Significant Interactions:
  - Congruence x Correctness*
  - Congruence x Participant Gender*

**Summary of Interactions**

Participant Gender moderates the effect of Congruence on Correctness: females show additive effects of Congruence on Correctness. In contrast, male participants appear to be more sensitive to stereotype violations than semantic violations.

**Results**

- **Fashion Correct**
  - Females
  - Males

- **Fashion Incorrect**
  - Females
  - Males

- **Sports Correct**
  - Females
  - Males

- **Sports Incorrect**
  - Females
  - Males

**Split mixed effects model**

- Same as full model, but with experiment half as a variable
- Main effects of Congruence and Correctness
- Congruence x Correctness Interaction
- Effect of correcteness enhanced in incongruent condition
- Correctness x Half Interaction
- Effect of correcteness is larger in second half

**Conclusions & Future Directions**

This research shows that semantic processing is sensitive to context effects due to both speaker and listener identity.

- Gender stereotypes affect semantic processing, and the role of these stereotypes is moderated by participant gender.
- These findings partially replicate work indicating that women are more sensitive to stereotype violations.

In addition, the effect of congruence is not moderated by exposure, although responses to semantic errors are enlarged with repeated exposure.

Future research should evaluate if empathy moderates the role of gender. In addition, more auditory studies are needed to characterize modality effects on the N400.

**References**


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Phone (002) 814-867-0779
Email amc697@psu.edu