Cognitive resources underlying three types of scalar implicatures: A subclinical study

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Introduction & Background

• The question: Is there systematic variability underlying the processing of scalar implicatures?
• The idea: Variability of processing different types of scalar implicatures results from different underlying cognitive resources.
  - Distinct encoding of some scales may require high functioning semantic memory.
  - Some scales may need to coordinate different representations and require high functioning executive resources.

Scales & Implications

Diversity of Scales

Quantifiers
Quantifier: <all, some>
Adjective: <hot, warm>
Pragmatic: <cheetah, horse>

Semantic Memory
Semantic Memory = Average of z(CCT) and z(WCAWST)

Reflection of lexical encoding of scalar alternatives.

Linear mixed effects modeling of acceptability judgments (after RT cleaning, <3% data loss).

<table>
<thead>
<tr>
<th>Scale</th>
<th>Implicit</th>
<th>Cancellation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicate</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Entailment</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Anomalous</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Acceptability Results

Subclinical Results

Adjective Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>Semantic Memory</th>
<th>Executive Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>t = -1.37, p = .242</td>
<td></td>
</tr>
<tr>
<td>Cancellation</td>
<td>t = -2.98, p = .004</td>
<td></td>
</tr>
</tbody>
</table>

Pragmatic Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>Semantic Memory</th>
<th>Executive Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>t = -1.30, p = .203</td>
<td></td>
</tr>
<tr>
<td>Cancellation</td>
<td>t = -2.30, p = .022</td>
<td></td>
</tr>
</tbody>
</table>

Summary

• Semantic Memory
  - Significant effect on quantifier and adjective scale cancellations.
  - No significant effect on pragmatic scale cancellations.

• Executive Function
  - Significant effect on quantifier scale cancellation.
  - No significant effect on adjective and pragmatic scale cancellations.

• Social Cognition
  - No significant effect on any scale cancellation.

• F-values for the interaction of clinical factor with model contrasts. (Significant F-values are highlighted)

Conclusions

Cognitive Resources in Scalar Implicature

• Quantifier and adjective scales require well-functioning semantic memory.
• Reflection of lexical encoding of scalar alternatives.
• Neuro-linguistic pragmatic scales which are built spontaneously do not burden semantic memory.
• Quantifier scales require well-functioning executive function.
• Reflection of coordination of representation between quantifier alternatives and noun phrase in working memory.
• Processing of adjective and pragmatic scales which only involves considering alternatives in their own category does not burden executive function as heavily as in processing of quantifier scales.

Variability in Scalar Implicature

• Variability in cognitive resources drawn upon may reflect differences in representation and processing of scalar implicatures.

Selected References