Detecting the Antecedent Complexity on VPE Resolution: Effects of Semantic Plausibility

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VP Ellipsis

• Example:
• John read a book. Mary did too.
VP Ellipsis

• Example:
  • John read a book. Mary did too.

• antecedent ellipsis
• filler gap

• What is the relationship between the antecedent and the ellipsis site?
Antecedent Complexity

• Example:
• John read a book. Mary did too.
Antecedent Complexity

• Example:
• John read a science fiction. Mary did too.
Antecedent Complexity

• Example:
• John attentively read an intriguing science fiction in bed. Mary did too.
Antecedent Complexity

• Example:
  • John attentively read an intriguing science fiction in bed. Mary did too.

• Research Question:
  • Does the representational complexity of the antecedent affect the processing difficulty at the ellipsis site?

• Previous studies on this topic typically manipulates the complexity (length) of the antecedent and measures the response/reading time on ellipsis.
Literature on Complexity and VP Ellipsis

• Two proposals:
  • 1. “Copy” mechanism
    • Murphy 1985
Literature on Complexity and VP Ellipsis

• Two proposals:
  1. “Copy” mechanism
     • Murphy 1985
     • Ellipsis is processed by copying the antecedent information into the gap site. Copying more information is more costly.
     • Found a longer response time for the elliptical sentence when the antecedent VP is more complex.

• Criticism:
  • The complex VP antecedent contains structural ambiguity, which could explain the longer response time
Literature on Complexity and VP Ellipsis

• Two proposals:
  2. “Pointer” mechanism (or “Copy-α”)
    • Frazier & Clifton 2000, 2001; Martin & McElree 2008; Paape et al. 2017
Literature on Complexity and VP Ellipsis

• Two proposals:
  
• 2. “Pointer” mechanism (or “Copy-α”)
  • Frazier & Clifton 2000, 2001; Martin & McElree 2008; Paape et al. 2017
  • Ellipsis site contains a pointer that points to the antecedent
  • Found no effect of antecedent complexity on the processing difficulty at the ellipsis site
Literature on Complexity and VP Ellipsis

- Two proposals:
  - 2. “Pointer” mechanism (or “Copy-α”)
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    - Ellipsis site contains a pointer that points to the antecedent
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- Problem:
  - The null effect of complexity in ellipsis is inconsistent with effective findings from other filler-gap dependencies
Complexity in Other Filler-Gap Dependencies

- Complexity effect in relative clauses
Complexity in Other Filler-Gap Dependencies

• Complexity effect in relative clauses
  • Hofmeister 2011; Hofmeister & Vasishth 2014; a.o.
  • Self-paced reading experiments
  • Found that a more semantically elaborate antecedent NP facilitates faster retrieval at the gap in the RC, likely because it reduces similarity-based retrieval interference in working memory

• Example:
  • It was [a communist / an alleged Venezuelan communist] who the members of the club banned ______ from ever entering the premises.
Complexity in Other Filler-Gap Dependencies

• Complexity effect in pronoun resolution
  • Karimi et al. 2018; a.o.
Complexity in Other Filler-Gap Dependencies

• Complexity effect in pronoun resolution
  • Karimi et al. 2018; a.o.
  • ERP studies
  • Found that a more elaborate referent reduces Nref effect – an ERP signal for reference processing difficulty
Why does ellipsis not show any complexity effect while relative clauses and pronoun resolution do?
Back to Ellipsis

• Why does ellipsis not show any complexity effect while relative clauses and pronoun resolution do?

• A possibility:
  • Previous studies on the complexity effect in ellipsis may have not adequately controlled for shallow processing
  • Participants may not have carefully read the sentences and really understand the meaning
  • A closer look at the materials and design of previous studies
Frazier & Clifton 2000

• Material:
  • Sarah [left her boyfriend / got up the courage to leave her boyfriend] last May. Tina did too.

• Design:
  • Self-paced reading
  • Very few comprehension questions
• Material:
  The history professor [understood Roman mythology / understood Rome’s swift and brutal destruction of Carthage], but … [the overworked students / the overly worn books] … did not.

• Design:
  • Sensibility judgment after reading the sentence (stopping at “did not”)
  • Measure the Speed-Accuracy Tradeoff (SAT) of the judgment task
Martin & McElree 2008

• Material:
  • The history professor [understood Roman mythology / understood Rome’s swift and brutal destruction of Carthage], but … [the overworked students / the overly worn books] attending summer session did not.

• Design:
  • Sensibility judgment after reading the sentence (stopping at “did not”)
  • Sensibility is solely determined by the compatibility between subject NP and the verb, not the entire VP antecedent
  • Complexity manipulation on the object NP is irrelevant to the sensibility
Material:
The advanced students [loved the afternoon session / loved the late afternoon session’s many illustrative examples], but … the mathematics lecturer did not, as …

Design:
Self-paced reading + comprehension question:
A lecturer did not love an afternoon session’s examples. True / False?
Material:
- The advanced students [loved the afternoon session / loved the late afternoon session’s many illustrative examples], but … the mathematics lecturer did not, as …

Design:
- Self-paced reading + comprehension question:
  - A lecturer did not love an afternoon session’s examples. True / False?
  - Targets the entire VP, but is just a simple repetition of the antecedent that requires no semantic integration for the meaning of the sentence
Current Study

• Research Question:
  • Does the representational complexity of the antecedent affect the processing difficulty at the ellipsis site?

• Control of shallow processing:
  • Semantic integration: Strength of Martin & McElree 2008
  • Retrieve entire antecedent: Strength of Paape et al. 2017
  • Need to combine the strengths of the two studies
Current Study

- Research Question:
  - Does the representational complexity of the antecedent affect the processing difficulty at the ellipsis site?

- Control of shallow processing:
  - Use a plausibility judgment
    - The plausibility of the elliptical sentence depends on the semantic integration of the subject and the entire VP antecedent
Design

• Self-paced reading + binary plausibility judgment

• 2x2 between-subject design
  • Antecedent complexity: Simple vs Complex
  • Sentence plausibility: Plausible vs Implausible
    • Assignments of plausibility conditions are confirmed by norming experiments.

• 41 participants, 24 experimental items + 24 fillers
Materials

• Simple Plausible:
  • The doctor handled the diagnosis. The expert specialist did too in the busy hospital.

• Simple Implausible:
  • The doctor handled the diagnosis. The young salesperson did too in the busy hospital.

• Complex Plausible:
  • The doctor skillfully handled the tragically incurable diagnosis. The expert specialist did too in the busy hospital.

• Complex Implausible:
  • The doctor skillfully handled the tragically incurable diagnosis. The trainee nurse did too in the busy hospital.
Materials

• **Simple Plausible:**
  • The doctor handled the diagnosis. The expert specialist did too in the busy hospital.

• **Simple Implausible:**
  • The doctor handled the diagnosis. The young salesperson did too in the busy hospital.

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  • The doctor skillfully handled the tragically incurable diagnosis. The expert specialist did too in the busy hospital.

• **Complex Implausible:**
  • The doctor skillfully handled the tragically incurable diagnosis. The trainee nurse did too in the busy hospital.
  • The doctor handled the diagnosis. The trainee nurse did too in the busy hospital.
Predictions

• If ellipsis processing has a “copy” mechanism:
  • A complex antecedent should increase RT on “did too”, because copying information into the gap is costly

• If ellipsis processing has a “pointer” mechanism:
  • A complex antecedent should decrease RT on “did too”, because semantic elaboration reduces memory retrieval interference
Results

Bayesian regression model
Plausibility as a categorical variable

Significant interaction between Complexity and Plausibility

Complexity speeds up ellipsis resolution, but only in the implausible condition

Figure 1. By-condition logRT on “did too”
Results

Bayesian regression model
Plausibility as a continuous variable from norming data

Weak borderline significant interaction between Complexity and Plausibility

The lower the plausibility, the greater the complexity effect

Figure 2. By-item logRT on “did too”
Discussion

• After controlling for shallow processing, we found:
  • Representational complexity facilitates the processing the VP ellipsis, but only under the presence of semantic implausibility

• Possible explanation:
  • The elaborate antecedent contains more distinctive cues for the readers to detect the semantic implausibility
Discussion

• Implications on ellipsis processing:
  • No evidence for any costly “copy” mechanism
  • Generally supports the “pointer” mechanism, but calls for a more precise definition of how the pointer works to explain for the complexity effect in the presence of implausibility
Discussion

• Implications on memory retrieval in sentence processing:
  • Some evidence for the elaboration effect in Hofmeister 2011, but the effect is modulated by plausibility
  • How does this interaction work?
Further Questions

• What is the mechanism of the interaction between plausibility and complexity/distinctiveness in our memory retrieval process in sentence processing?

• The representations of VPs in memory are different from the representations of NPs. Can the complexity effect be found in other types of ellipsis besides VPE?

• Can the studies of ellipsis processing implicate on or draw from syntactic studies of the contents at the ellipsis site?
Selected References


