

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



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# VP Ellipsis

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

# VP Ellipsis

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- 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

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

# Antecedent Complexity

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- Example:
- John read a science fiction. Mary did too.

# Antecedent Complexity

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

# Antecedent Complexity

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- 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

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- Two proposals:
- 1. “Copy” mechanism
  - Murphy 1985



# Literature on Complexity and VP Ellipsis

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- 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

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- Two proposals:
- 2. “Pointer” mechanism (or “Copy- $\alpha$ ”)
  - Frazier & Clifton 2000, 2001; Martin & McElree 2008; Paape et al. 2017

# Literature on Complexity and VP Ellipsis

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- 2. “Pointer” mechanism (or “Copy- $\alpha$ ”)
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  - 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- $\alpha$ ”)
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  - Ellipsis site contains a pointer that points to the antecedent
  - Found no effect of antecedent complexity on the processing difficulty at the ellipsis site
- Problem:
  - The null effect of complexity in ellipsis is inconsistent with effective findings from other filler-gap dependencies

# Complexity in Other Filler-Gap Dependencies

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- Complexity effect in relative clauses
  - Hofmeister 2011; Hofmeister & Vasishth 2014; a.o.

# 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

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- Complexity effect in pronoun resolution
  - Karimi et al. 2018; a.o.

# Complexity in Other Filler-Gap Dependencies

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- 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



# Back to Ellipsis

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- 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

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- 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

# Martin & McElree 2008

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- 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

# Paape et al. 2017

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- 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?

# Paape et al. 2017

- 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

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- 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

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- 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

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- 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

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- **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

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- **Simple Plausible:**

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- 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

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- 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

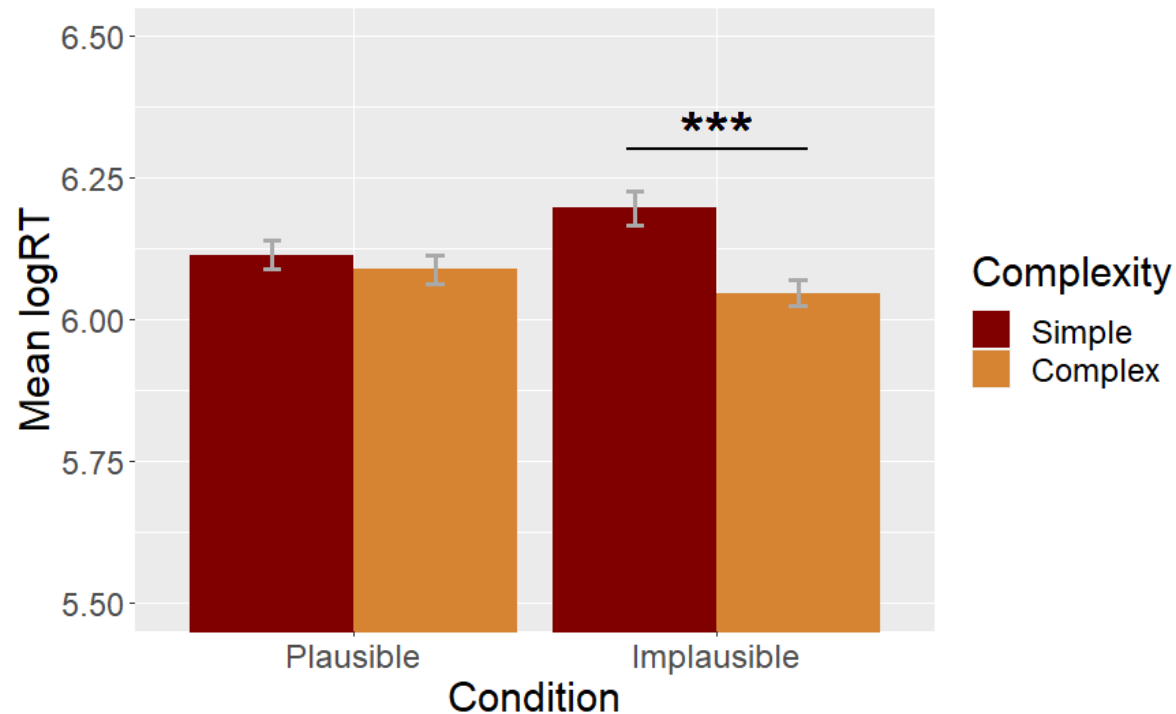


Figure 1. By-condition logRT on “did too”

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

# Results

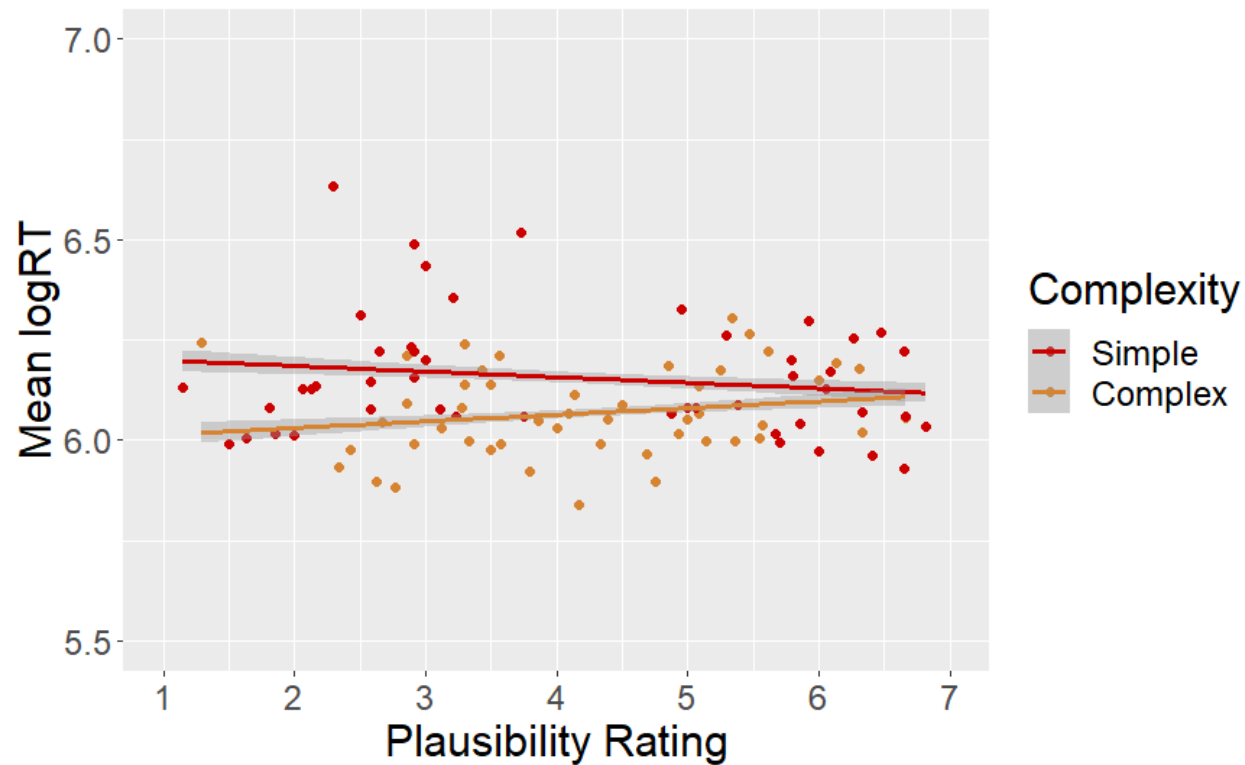


Figure 2. By-item logRT on “did too”

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

# Discussion

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- 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

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- 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

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- 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

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- 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

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