Structural constraints on pronoun resolution: Distinguishing early and late sensitivity to illicit antecedents

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Online pronoun resolution

• Which elements are considered as potential antecedents?

• What is the role of **structural constraints** in determining the set of candidate antecedents?
Antecedent retrieval

Is the **initial** antecedent retrieval process

*structure-sensitive*

or

*structure-insensitive?*
Paradigm for studying antecedent retrieval

INACCESSIBLE

Jane thinks Bill owes him another chance.

ACCESSIBLE

+ MALE
+ SINGULAR
Interference effects

• Dependent measure: sensitivity to features

• “Interference” = sensitivity to the features of a NP that is not an acceptable antecedent
  – John thinks Bill owes him another chance.
    John thinks Beth owes him another chance.
Not all interference effects are created equal.
Our claim

• Antecedent retrieval for pronouns is **structure-sensitive** in its early stages.

• Sporadic interference effects are due to **late repair mechanisms** when no acceptable antecedent is available.
Pronouns

• Principle B: a negative constraint
  – John$_1$ thinks Bill$_2$ owes him$_{1/*2}$ another chance.

• Syntactic vs. pragmatic dependencies
  – John$_1$ is upset. Dave$_2$ thinks Bill owes him$_{1/2}$ another chance.
Our claim

• Early structure-sensitivity is a descriptive generalization that any model must capture.

• We’re NOT arguing for:
  – Particular retrieval mechanisms
  – Particular cues or features involved in retrieval
Paradigm for studying antecedent retrieval

John thinks Bill owes him another chance.

Jane

INACCESSIBLE

Beth

ACCESSIBLE
Structure-insensitive retrieval

- Successful when **any NP** matches the pronoun in features.

- Fails when **NO NP** matches the pronoun in features.

→ Increased processing costs only when NO feature-matching NPs are available.
Structure-insensitive retrieval

✓ John thinks Bill owes him another chance.
✓ John thinks Beth owes him another chance.
✓ Jane thinks Bill owes him another chance.
✗ Jane thinks Beth owes him another chance.

Gramm. Ungramm.

Predicted pattern

Facilitative interference
Structure-insensitive retrieval: Agreement

The **musician** who the reviewer praises...
The **musicians** who the reviewer praises...
The **musician** who the reviewer praise...
The **musicians** who the reviewer praise...

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**Post-verb region**

Wagers et al. (2009), Exp 2

**Verb region**

Dillon (2011), Exp 2
Structure-sensitive retrieval

- Successful when a structurally accessible NP matches in features.

- Increased processing cost when no structurally accessible NP matches in features.
Structure-sensitive retrieval

✓ John thinks Bill owes him another chance.
✓ John thinks Beth owes him another chance.
✗ Jane thinks Bill owes him another chance.
✗ Jane thinks Beth owes him another chance.

![Predicted pattern](image_url)

- Processing cost

- Gramm.
- Ungramm.
Comparing predictions

Accessible match / inaccessible match
Accessible match / inaccessible mismatch
Accessible mismatch / inaccessible match
No match

Structure-insensitive retrieval

Processing cost
Gramm. Ungramm.

No match

Structure-sensitive retrieval

Processing cost
Gramm. Ungramm.
Experiment 1: Overview

**Accessible Match / Mismatch**

{Ethan / Paige} revealed that …

1a  {Ronald / Marissa}

1b  the {producer / dancer}

1c  the {producer / dancer} who was involved in the show … had doubted *him* even after several successful performances of the show.

**Inaccessible Match / Mismatch**
Predictions

Accessible match/inaccessible match
Accessible match/inaccessible mismatch
Accessible mismatch/inaccessible match
No match

Structure-insensitive retrieval

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<th>Gramm.</th>
<th>Ungramm.</th>
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Structure-sensitive retrieval

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Experiment 1a: Proper Name

\{Ethan/Paige\} revealed that \{Ronald / Marissa\} had doubted **him** even after several successful performances…

![Graph showing reading time](image)
Experiment 1b: Common Noun

{Ethan/Paige} revealed that the {producer / dancer} had doubted **him** even after several successful performances…
{Ethan/Paige} revealed that the {producer / dancer} who was involved in the show had doubted him even after several…
Experiment 1c: Common noun w/ modifier

{Ethan/Paige} revealed that the {producer/dancer} who was involved in the show had doubted *him* even after several…
Late inhibitory effects in other studies

Kennison (2003) 
Carl / Susan watched him

Sturt (2003) Exp 1 
She / he remembered that the surgeon had pricked herself
but not always…

Exp 1a
Proper Name

Exp 1b
Common Noun

Lee & Williams
(2009)
Interpretation of the late inhibitory effects

• Initial search fails to retrieve a grammatical antecedent.

• In order to interpret the anaphor, (late) repair processes consider structurally inaccessible antecedents.
What about the *grammatical* sentences?

Sensitivity to inaccessible antecedents *when a grammatical antecedent is available*
What about the *grammatical* sentences?

Inhibitory effects that are NOT attributable to repair processes

→ Absent in our Exp 1

Badecker & Straub (2002) Exp 1

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Experiment 2: Direct replication study

\{John/Jane\} thinks \{Bill/Beth\} owes \textbf{him} another chance.

Badecker & Straub (2002) Exp 1

Experiment 2
John thinks {Bill/Beth} owes him another chance.
Robust grammaticality effect

Main effect of grammaticality at post-pronoun region

Difference in reading times (ms):

- Exp. 1a
- Exp. 1b
- Exp. 1c
- Exp. 2
- B & S (2002)
Summary

• Consistent, early main effects of grammaticality suggest a structure-sensitive initial antecedent retrieval for pronouns.
Summary

• Sporadic inhibitory interference in ungrammatical conditions may reflect late repair processes.
Remaining questions

• Sporadic inhibitory interference in ungrammatical conditions
  – When should we see repair processes?
• Inhibitory interference effects in grammatical conditions (reflexives; visual world eye-tracking)
  – Mis-retrieval? Alternative explanations?
Thank you!

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