

Coherence-Driven Effects in Relative Clause Processing

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Modeling sentence comprehension

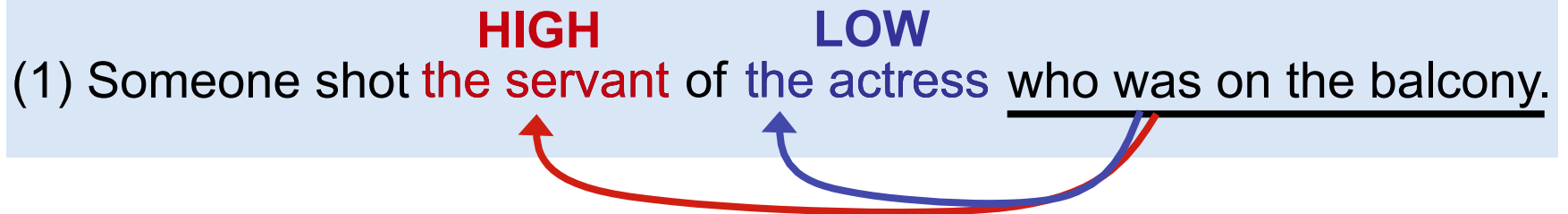
- Combine words to form a sentence
- Combine sentences to form a coherent discourse

QUESTIONS:

- Do comprehenders bring expectations from the discourse level to bear on the resolution of syntactic ambiguity?
- Do these expectations impact online processing?

Relative clause attachment ambiguity

- Previous work on RC attachment suggests that low attachment in English is preferred (Cuetos & Mitchell 1988; Frazier & Clifton 1996; Carreiras & Clifton 1999; Fernandez, 2003; but see also Traxler, Pickering, & Clifton, 1998)



- RC attachment is primarily analyzed in consideration of syntactically-driven biases.

Discourse biases in RC processing

- Previous work: discourse context is referential context
 - RC pragmatic function is to modify or restrict identity of referent
 - RC attaches to host with more than one referent (Desmet et al. 2002, Zagar et al. 1997, Papadopoulou & Clahsen 2006)

(2) There was a servant who was working for **two actresses**.
Someone shot the servant of the actress who was on the balcony.

(3) There were **two servants** working for a famous actress.
Someone shot the servant of the actress who was on the balcony.

A different type of discourse bias

- Observation #1: RCs can also provide an explanation

(4) The boss fired the employee who always showed up late.

→(cancelable) implicature that employee's lateness is the explanation for the boss' firing

AP News headlines with explanation-providing RC

(5) "Atlanta Car Dealer Murdered 2 Employees Because They Kept Asking for Raises" [article headline]

(6) "Boss Killed 2 Employees Who Kept Asking for Raises" [abbreviated news summary headline]

Biases from implicit causality verbs

- Observation #2: IC verbs are biased to explanations
→ in story continuations, IC verbs yield more explanations than NonIC verbs (Kehler, Kertz, Rohde, Elman 2008)

(7) IC: John detests Mary. She is arrogant and rude.

(8) NonIC: John babysits Mary. Mary's mother is grateful.

- Observation #3: w/explanation, IC have next-mention bias
→ in sentence completions, IC verbs like *detest* yield more object next mentions (Caramazza, Grober, Garvey, Yates 1974; Brown & Fish 1983; Au 1986; McKoon, Greene, Batcliff 1993; *inter alia*)

(9) IC: John detests **OBJ** Mary because **she** is arrogant.

(10) NonIC: John babysits Mary because he/she/they

Proposal: IC biases in RC attachment

#1 Relative clauses can provide explanations

#2 IC verbs create an expectation for an upcoming explanation

#3 Certain IC verbs have a next-mention bias to the object

(11) NonIC: John babysits the children of the musician who ...

expected

unexpected

(a) is a singer at the club downtown. (low)

(b) are students at a private school. (high)

(12) IC: John detests the children of the musician who ...

expected

(a) is a singer at the club downtown. (low)

(b) are arrogant and rude. (high)

- Discourse Hypothesis: IC verbs will increase comprehenders' expectations for a high-attaching RC
- Null Hypothesis: Verb type will have no effect on attachment

Sentence completion study

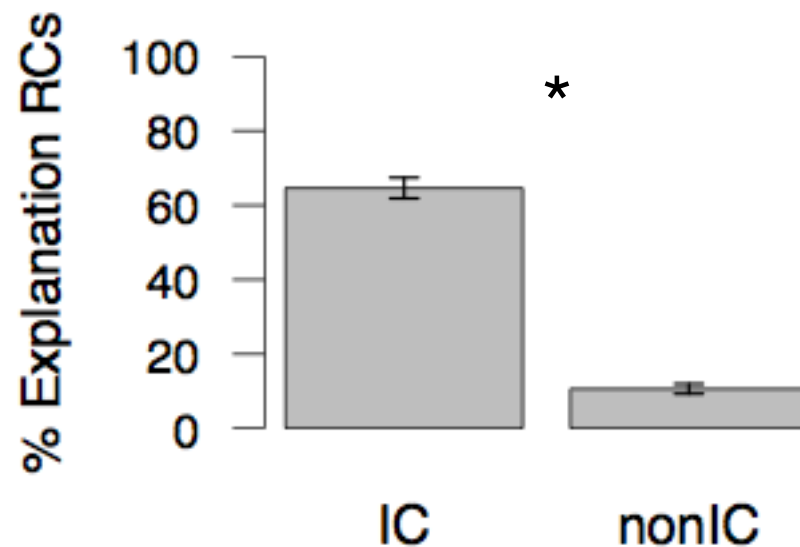
IC: John detests the children of the musician who ...

NonIC: John babysits the children of the musician who ...

- Web-based experiment
- 52 monolingual English-speaking UCSD undergrads
- Instructed to write a natural completion
- 2 judges annotated responses:
 - RC function: 'only restrict' vs. 'restrict AND explain'
 - RC attachment: 'high' vs. 'low'
- Analysis only on trials with unanimous judge agreement

Completion results: RC function

More explanation-providing RCs following IC than Non-IC

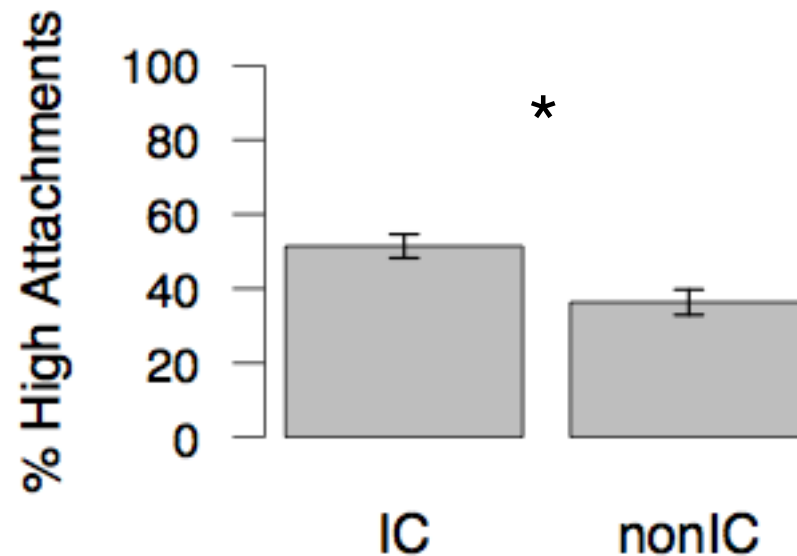


IC: John detests the children of the musician who ...

NonIC: John babysits the children of the musician who ...

Completion results: attachment

More high-attaching RCs following IC verbs than NonIC



IC: John detests the children of the musician who ...

NonIC: John babysits the children of the musician who ...

Summary: sentence completion

- Evidence that expectations about upcoming explanation-providing RCs influence RC attachment
 - Evidence in support of the discourse hypothesis
 - ✗ Null Hypothesis : low attachments across the board
 - ✓ Discourse Hypothesis: more high-attaching RCs following IC verbs than NonIC verbs
- Question: are people using these discourse-level expectations in their online processing?

Online processing

- For online effects to emerge, comprehenders must be implicitly aware that:
 - #1 Relative clauses can provide explanations
 - #2 IC verbs create an expectation for an upcoming explanation
 - #3 Certain IC verbs have a next-mention bias to the object
- combine these discourse-level biases and expectations to make an online syntactic decision

Online reading study

IC: John detests the children of the musician who ...
(low) is generally arrogant and rude.
(high) are generally arrogant and rude.

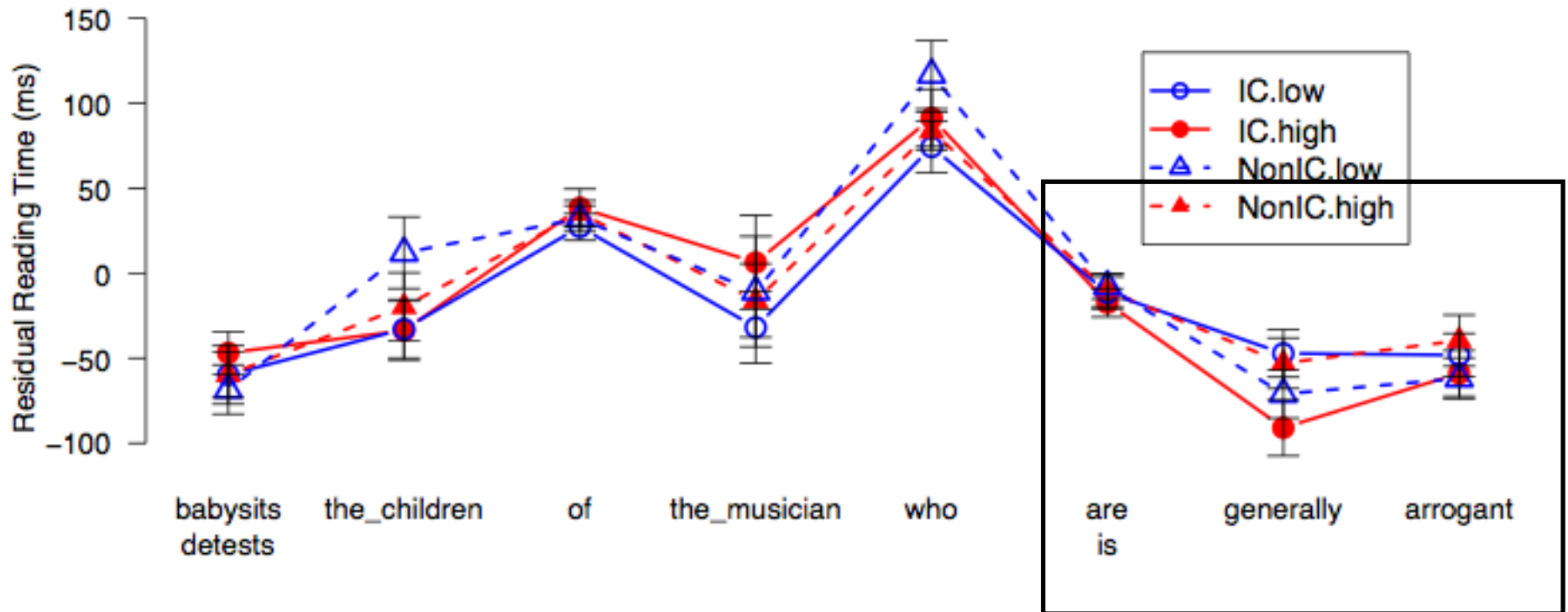
NonIC: John babysits the children of the musician who ...
(low) is generally arrogant and rude.
(high) are generally arrogant and rude.

- Null Hypothesis: main effect of attachment height
 - low-attaching RCs easier to process than high-attaching RCs
- Discourse Hypothesis: verbytype x attachment interaction
 - high-attaching RCs easier in IC condition than in NonIC condition
 - low-attaching RCs harder in IC condition than in NonIC condition

Reading time study

- 58 monolingual English-speaking UCSD undergrads
- DMDX self-paced moving-window software
- Press button to reveal words & answer questions
- Analyses:
 - Reading time
 - Comprehension-question accuracy

Online results: residual reading times



IC.low: detests the children of the musician who is generally arrogant...

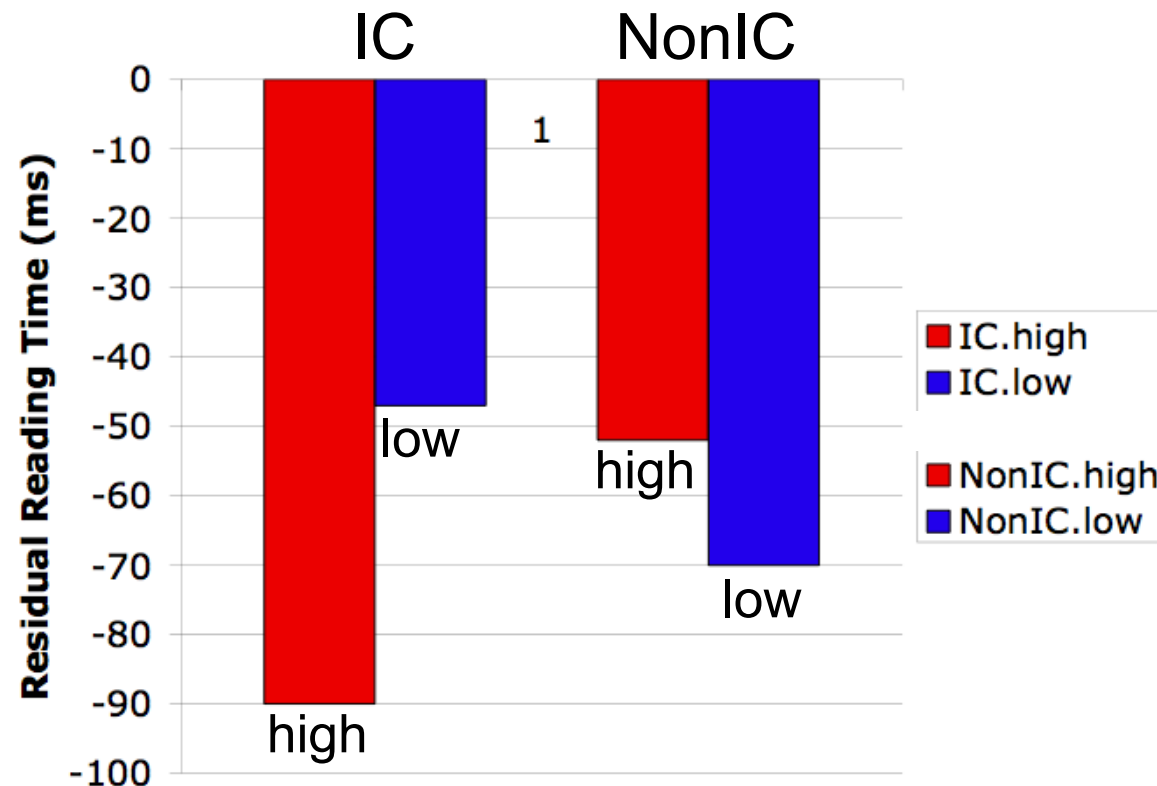
IC.high: detests the children of the musician who are generally arrogant...

NonIC.low: babysits the children of the musician who is generally arrogant...

NonIC.high: babysits the children of the musician who are generally arrogant...

Online results: critical region

Spillover_1:



IC.low: detests the children of the musician who is generally arrogant...

IC.high: detests the children of the musician who are generally arrogant...

NonIC.low: babysits the children of the musician who is generally arrogant...

NonIC.high: babysits the children of the musician who are generally arrogant...

Summary: online reading

- Online results are consistent with offline results: bias to high attachments emerges following IC verbs
- As predicted, high-attaching RCs were read faster than low-attaching RCs in the IC condition, while the reverse was true in the NonIC condition → Crossover interaction
- Effects persist in comprehension-question accuracy
 - Significant crossover interaction by subjects
 - Low-attaching RCs in IC condition yielded worst accuracy

Summary & Conclusions

- 3 Observations

- #1 Relative clauses can provide explanations

- #2 IC verbs create an expectation for an upcoming explanation

- #3 Certain IC verbs have a next-mention bias to the object

- Do people use discourse-level expectations and biases as they resolve local syntactic ambiguity?

- YES, in RC processing

- Where else might comprehenders be using discourse-level expectations...?

- Models of sentence processing need to incorporate these types of discourse-driven expectations.

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