

Reconciling Coherence-Driven and Centering-Driven Theories of Pronoun Interpretation

Andrew Kehler
UC San Diego

Hannah Rohde
University of Edinburgh

Two Approaches to Discourse Coherence

- ❖ Centering Theory (Grosz et al. 1986; 1995):

“Certain entities in an utterance are more central than others and this property imposes constraints on a speaker’s use of different types of referring expressions” ... “the use of a pronoun to realize the C_b signals the hearer that the speaker is continuing to talk about the same thing.”

Mitt narrowly defeated Rick, and campaign donors began flocking to him. [him = Mitt]

Rick was narrowly defeated by Mitt, and campaign donors immediately began to flock to him. [him = Rick]

- ❖ Semantics and world knowledge do not come into play

Coherence and Coreference

- ❖ Hobbs' (1979) Coherence-Driven Approach
 - ❖ Pronoun interpretation occurs as a by-product of general, semantically-driven reasoning processes
 - ❖ Pronouns are modeled as free variables which get bound during inferencing (e.g., coherence establishment)

Mitt narrowly defeated Rick, and he asked that the vote be certified.

Mitt narrowly defeated Rick, and he asked that the vote be recounted.

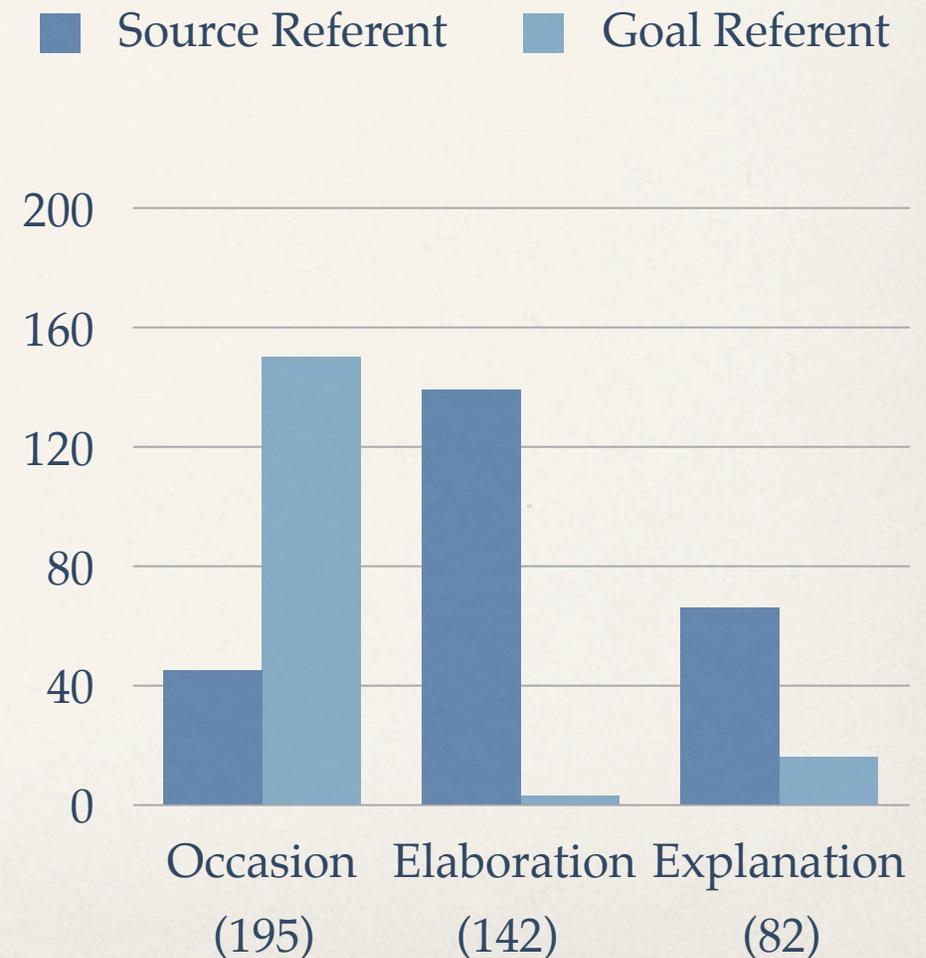
- ❖ Choice of linguistic form does not come into play

Biases Vary by Coherence Relation

- Stevenson et al. (1994) found a 50-50 pronoun bias in sentence completions with Source-Goal transfer-of-possession contexts:

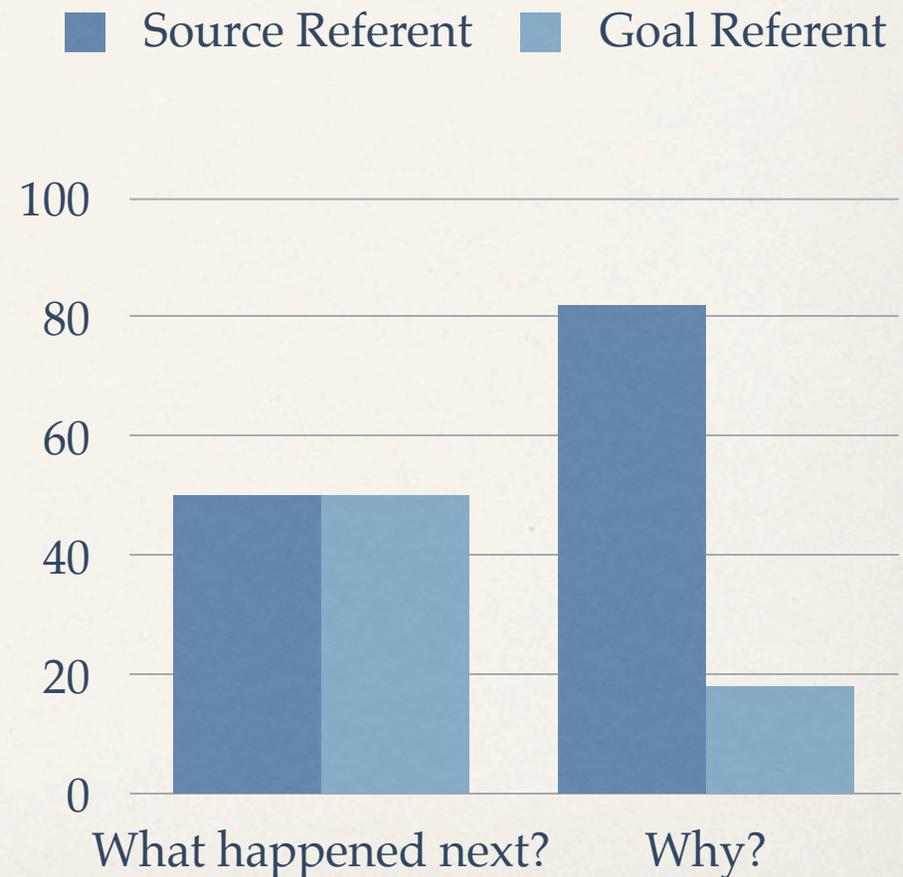
*Bush passed the speech to Cheney.
He _____*

- Rohde et al (2006) asked whether the bias varied by the type *coherence relation* between the clauses



Results

- * Rohde et al. ran the previous experiment again, except with different instructions for how to continue the passage:
 - * What happened next? (Occasion)
 - * Why? (Explanation)
- * Stimuli kept identical across conditions



The Subject Preference

- ❖ Stevenson et al's (1994) study paired their pronoun-prompt condition with a no-prompt condition:

Bush passed the speech to Cheney. He _____

Bush passed the speech to Cheney. _____

- ❖ They found a near 50/50 split in Source vs. Goal interpretations for pronouns in the prompt condition
- ❖ But in the no-prompt condition, they found a strong tendency to use a pronoun to refer to the subject and a name to refer to the object (replicated by Arnold, 2001 and Rohde and Kehler 2008)

Implicit Causality

- * Previous work has shown that so-called *implicit causality* verbs are associated with strong pronoun biases (Garvey and Caramazza, 1974 and many others)

Amanda amazes Brittany because she _____ [subject-biased]

Amanda detests Brittany because she _____ [object-biased]

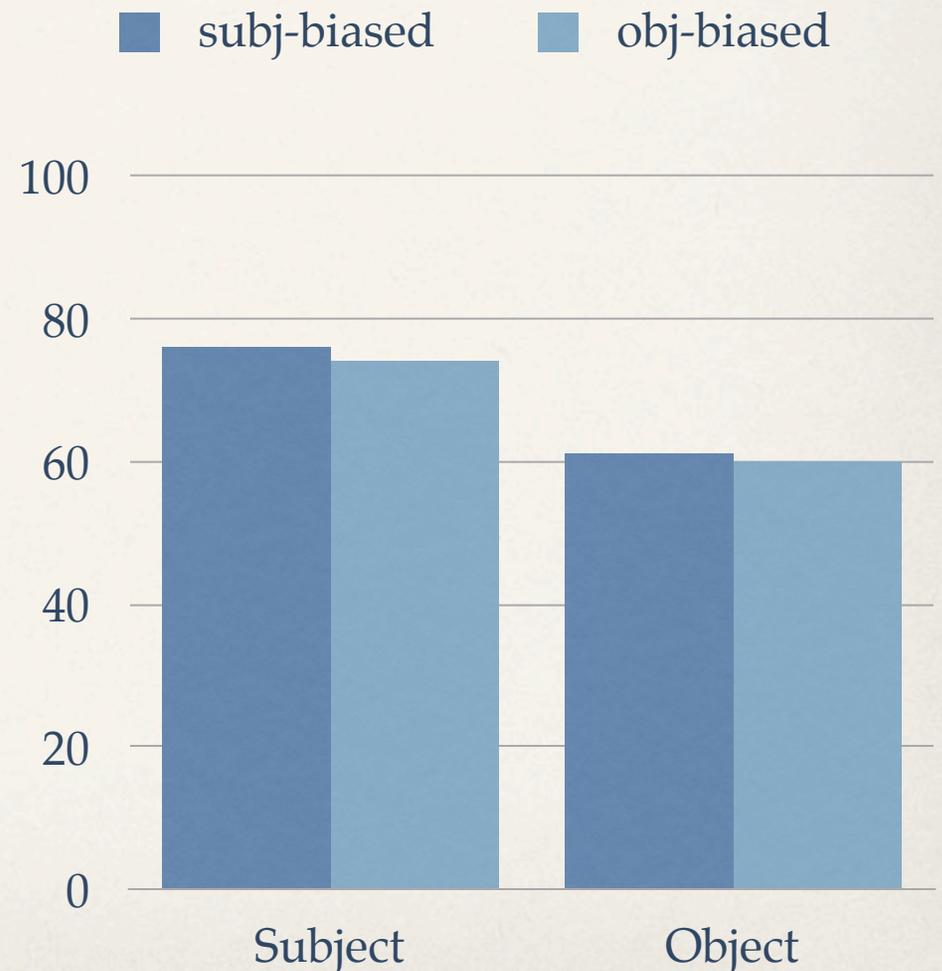
- * Therefore, the subject-biased v. object-biased IC verb distinction provides a basis to test whether interpretation biases affect pronoun *production*

IC Manipulation (Fukumura and van Gompel, 2010)

- * Contexts:

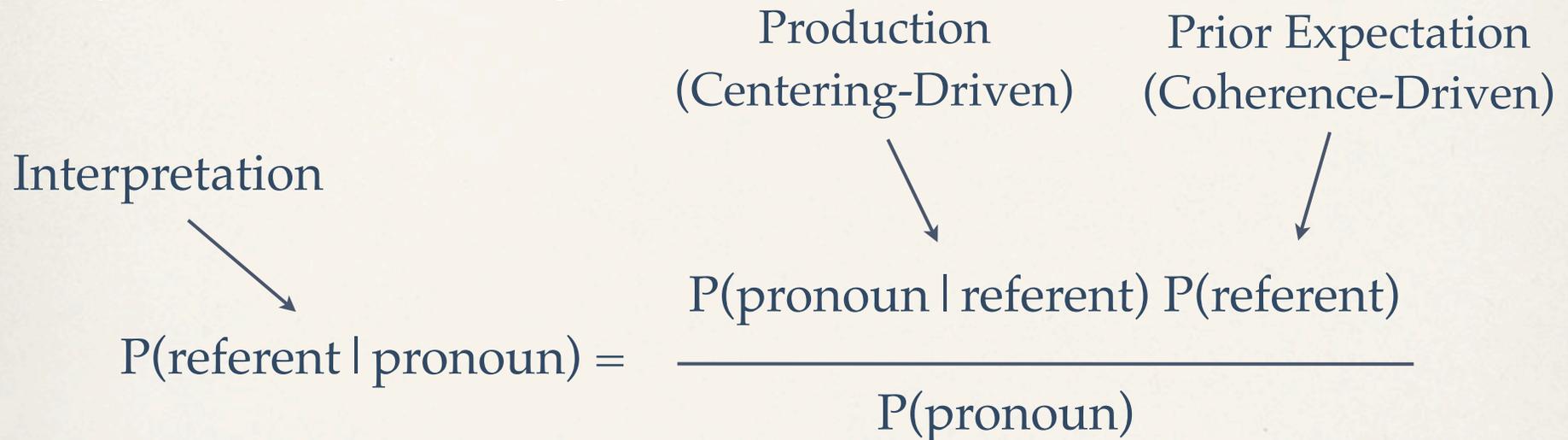
- * Gary *scared* Anna after the long discussion ended in a row. This was because... [subject-biased]

- * Gary *feared* Anna after the long discussion ended in a row. This was because... [object-biased]



Centering and Topichood

- ❖ Bayesian formulation again:



- ❖ The original Centering rule says to pronominalize the *topic* (with subject position being a weak indicator of topichood in active voice)
- ❖ Therefore, a manipulation that increases the likelihood that a referent is the topic *should* influence pronoun production

IC and Passivization

- * We used subject-biased IC verbs to test several predictions:

Amanda amazed Brittany. She _____

Brittany was amazed by Amanda. She _____

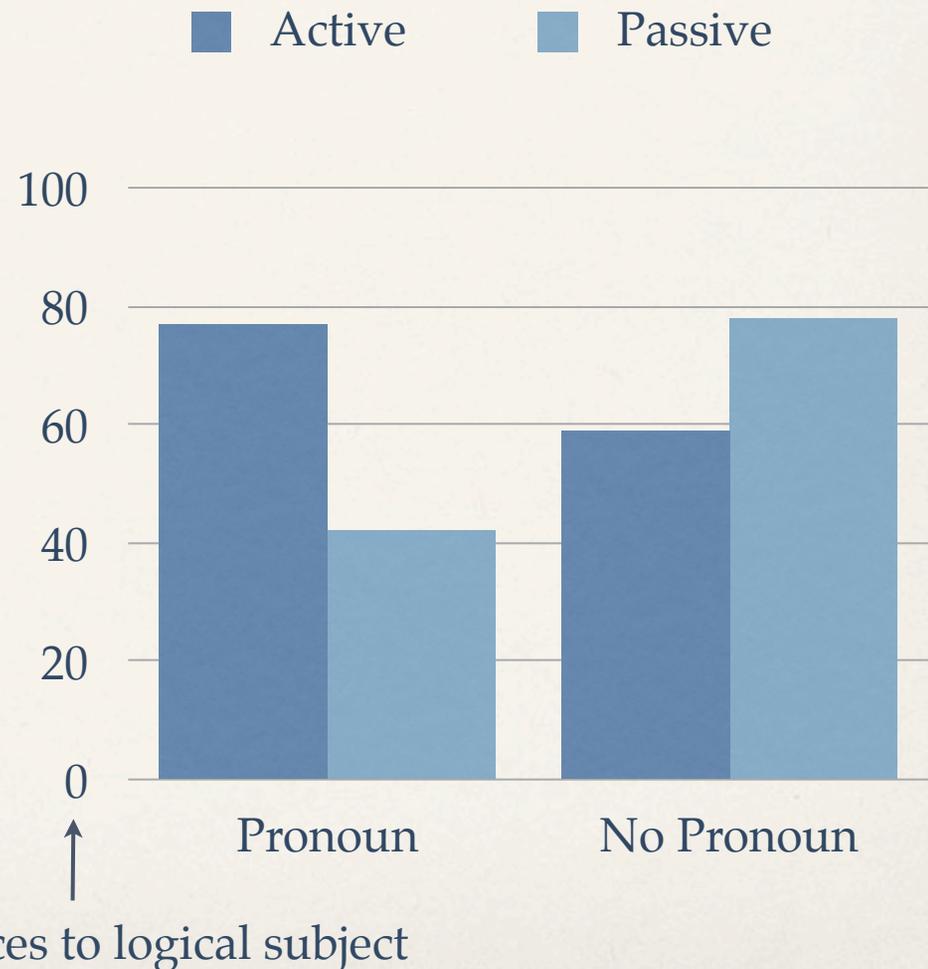
Amanda amazed Brittany. _____

Brittany was amazed by Amanda. _____

- * Question 1: Does passivization change the pronoun interpretation bias?
- * Question 2: Does passivization change the pronoun production bias?

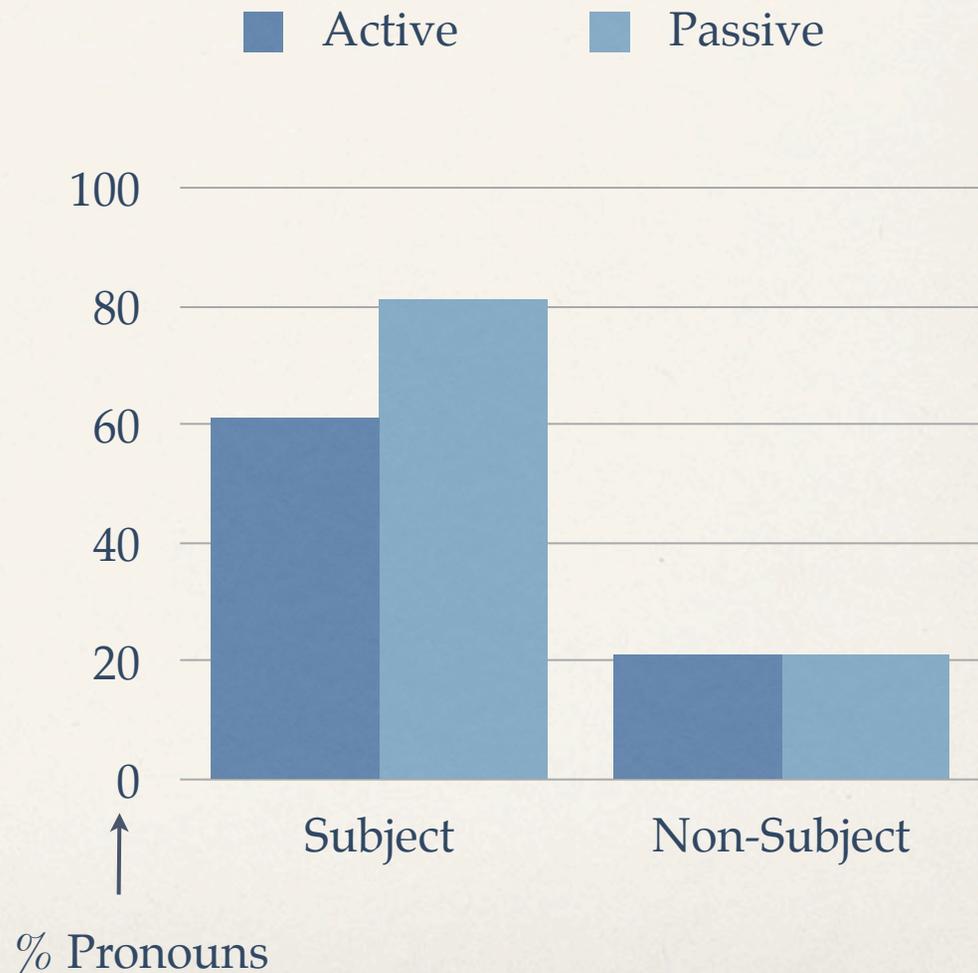
Results: Mentions

- * Preference for causally-implicated referent ($p < .001$)
- * Subject bias for pronouns ($p < .001$)
- * Interaction: Reduced bias for causally-implicated referent in passive / pronoun condition ($p < .05$)



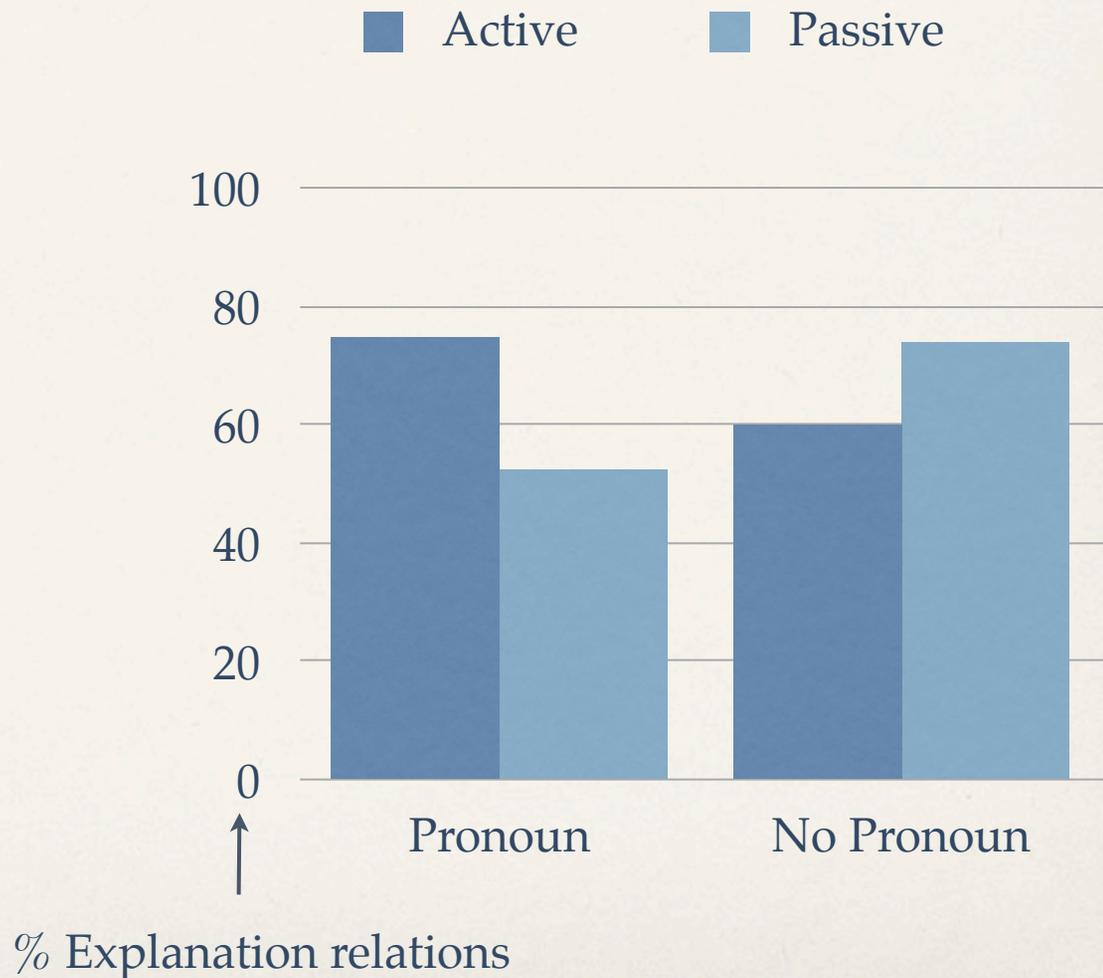
Results: Production

- * Greater rate of pronominalization to the subject than non-subject
- * Greater rate of pronominalization for passive subjects than active ones
- * No difference for non-subjects, as expected



A Third Prediction

- * Previous work has revealed a substantial bias toward Explanation continuations with prompts without *because* (Kehler et al., 2008)
- * A third prediction that arises is that passivization, by pulling pronoun references away from the causally-implicated referent, should reduce the percentage of Explanations
- * The prediction was confirmed: Fewest Explanations in Pronoun+Passive condition ($p < .001$)



Conclusions

- ❖ The data presented here suggests a potential reconciliation of coherence-relation-driven and Centering-driven theories that accords with this view:
 - ❖ Coherence relations create top-down expectations about next mention
 - ❖ Centering-style constraints yield bottom-up evidence specific to choice of referential form
- ❖ Fits within a modern view in psycholinguistics that casts interpretation as the interaction of “top-down” expectations and “bottom-up” linguistic evidence
- ❖ We have gained insight into why we see evidence for both syntactic and semantic ‘preferences’ and their emergence in different contextual circumstances
- ❖ The behavior of pronouns is thus an important source of insight into larger questions concerning the discourse processing architecture

Thank you!
