Aspectual Effects on Pronoun Interpretation
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Abstract

Problem: Previous work identified a pronoun interpretation preference with two explanations: a thematic role bias, and an event structure bias toward focusing on the end state of an event.

Proposal: Holding thematic role constant, we manipulated end state salience by comparing perfective and imperfective forms of the verb.

Results: Pronoun interpretation varied with verbal aspect and discourse coherence. As such, the interpretation preferences are better explained at the level of event structure and discourse coherence, rather than by appeal to superficial heuristics.

1. The Question

How do People Interpret Ambiguous Pronouns?

Stevenson et al. (1994; see also Arnold 2001) used story completions to test pronoun interpretation strategies

(1) John handed a book to Bob. He ____ .

TRANSFER VERB

SOURCE (matrix subject)

GOAL (to-phrase)

AMBIGUOUS PRONOUN PROMPT

Surprising result: preference for (non-subject) **Goal**

2. Possible Explanations

Modeling

Existing Models Make Wrong Prediction
- **Subject preference** (Crawley et al. 1990, *inter alia*): predict coreference with subject → **Source**
- **Grammatical parallelism** (Smyth 1994; Chambers & Smyth 1998): predict coreference between subject pronouns and subject antecedents → **Source**

Stevenson et al. consider two possible explanations
1. **Thematic role bias** for Goals over Sources
2. **Event structure bias** for focusing on the end state of transfer events where Goal is presumably most salient

3. Our Experiment

Distinguishing Thematic Role and Event Structure Biases

Stimuli
Hold thematic roles constant, but alter event structure

(2) **Perfective**: John handed a book to Bob. He _____ .
- completed event
- compatible with end-state focus

(3) **Imperfective**: John was handing a book to Bob. He _ .
- ongoing event
- incompatible with end-state focus

Predictions
- **Thematic Role Preference** → Goal preference for (2) and (3)
- **Event Structure Hypothesis** → More Source interpretations for (3)

Methodology
- 21 stimuli: transfer-of-possession Source-Goal context sentence followed by ambiguous pronoun prompt
- For each verb, 48 participants saw perfective or imperfective
- 2 trained judges assessed intended pronoun interpretation
- 29 distractors

4. Results

Results Support Event Structure Hypothesis

Effect of Verbal Aspect
- Imperfective yields more Source resolutions (70%) than perfective (51%; p<.0001)
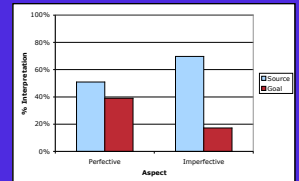- 13% judged ambiguous, but either interpretation for these still results in a significant effect

Fig. 1: Effects of aspect (conservative)

Lexical Semantics

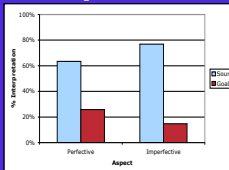Class 1: [not co-located / no guaranteed transfer]

Class 2: [co-located / guaranteed transfer]

Class 3: [co-located / no guaranteed transfer]

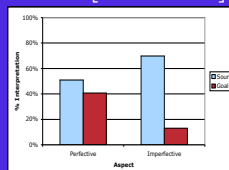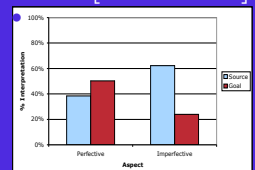Fig. 2: Source Preference for Class 1 verbs *(send, mail, ship, fax, forward, wire)* (p<.0001)

Fig. 3 & Fig. 4: No significant preference in perfective verbs for Class 2 *(hand, give, bring, pass, deliver, carry, serve)* (p<.1) or Class 3 *(throw, kick, toss, roll, fling, chuck, lob)* (p<.2)

➡ **Event Structure Influences Interpretation**

5. More Results

Results Show Effect of Coherence

Discourse Semantics
Kehler (2002): pronoun interpretation is a side effect of the inference processes used to establish coherence

(4) **Miriam sent a fruitcake to Rachel. She didn't want to eat it.**

→ Explanation Relation: *she* is Miriam
→ Occasion Relation: *she* is Rachel

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Coherence Definitions

Explanation: infer P from the assertion of S₁ and Q
from the assertion of S₂, where normally Q→P.

Parallel: infer a common or contrasting relation
p(a₁,a₂,…) from sentence S₁ for entities aᵢ and infer
p(b₁,b₂,…) from sentence S₂ for entities bᵢ where some
property i holds of aᵢ and bᵢ for all i.

Occasion: infer a change of state for a system of
entities in sentence S₂, establishing the initial state
for this system from the final state of sentence S₁.
(adapted from Hobbs 1990)
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Observation: only **Occasion** relations encode a bias toward focusing on the end state of the previous event

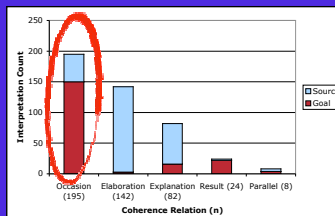**Results: Goal ~ Occasion**
Post-hoc, judges evaluated coherence

Fig. 5: Pronoun Interpretation across Coherence Relations (perfective verbs only). Goal Continuations arise primarily from Occasion relations (p<.0001)

➡ **Thematic Role Bias Limited to Certain Coherence Relations**
(cf. Arnold 2001)

6. Conclusions

Importance of Event Structure and Discourse Coherence

- Thematic-role-level Goal bias is a side effect of deeper event structure biases.
- Event structure bias is associated with only certain types of coherence relations.
- We argue that pronoun interpretation must be addressed within a broader theory of event structure and discourse comprehension rather than by appeal to superficial heuristics.

References

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