Early Mastery of Constraints on Binding and Coreference

Eri Takahashi, Anastasia Conroy, Jeffrey Lidz and Colin Phillips

Department of Linguistics, University of Maryland, College Park

Introduction

- Claimed that 4-6 year olds violate Principle B (*Delay of Principle B Effect,* DPBE; [1][2]) with referential antecedents (2), but not quanitfication al (1) ones. (*Quantificational Asymmetry*, QA; [3][4]).

1) Every reindeer brushed him
2) Bert brushed him

- We show that QA is the result of design flaws.
- When methodological concerns are corrected, children obey Principle B with all types of antecedents.

Background

- Asymmetry in acceptance of coreference by antecedent (over various studies)

Quantificational	Referential
0-25%	30-70%

- QA taken as evidence for Reinhart's theory of binding: that binding constraints apply only to bound variables [5].
- Grodzinsky & Reinhart [3] argue children always obey Principle B, but fail with coreference mechanism in (2).

Truth Value Judgment Task

- Bound variable reading must be TRUE and accessible
- Referential reading reading must be FALSE but nevertheless accessible

- These basic assumptions should be met in the same fashion in referential & quantificational conditions alike.
- These assumptions result from 3 basic criteria:

1) **Equality of Readings**: The BV and referential antecedents must be equally accessible.
2) **Plausible Dissent**: Both readings must be available during the story [7].
3) **Condition of Falsification**: Falsification event must be the same in both conditions [7].

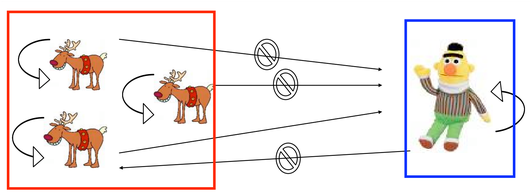
- Elbourne [6] raised concerns about some tests of QA; our review suggests that even the basic tests of the DPBE raise concerns.
- 14 previous TVJT-type tests of Principle B, including 6 tests of QA: we find most failed to satisfy these requirements.

Previous Experiments

Example story from Thornton & Wexler (1999):

- Metaanalysis shows similar stories used in many other experiments (including Avrutin & Wexler [8], etc.)

Bert needs to be brushed off. Bert asks 1st and 2nd reindeer, who refuse and brush themselves off. Bert asks 3rd reindeer, who brushes him. Bert says "thank you, I wish I could help you back, but I need to finish brushing. Bert brushes himself.



(1) Every reindeer brushed him
(2) Bert brushed him

Equality of Readings not satisfied.

- QA obtained if pronoun replaced with most salient character (*Bert*) (Elbourne [6])
  - Every reindeer brushed Bert FALSE
  - Bert brushed Bert TRUE

Plausible Dissent not satisfied.

- Referential reading relies on considering Bert's brushing of 3rd reindeer: not an equally salient consideration to a child

Condition of Falsification not satisfied.

- Target sentences concern different events (**red** vs. **blue**)

Current Investigation

Is the QA an artifact of experimental design?

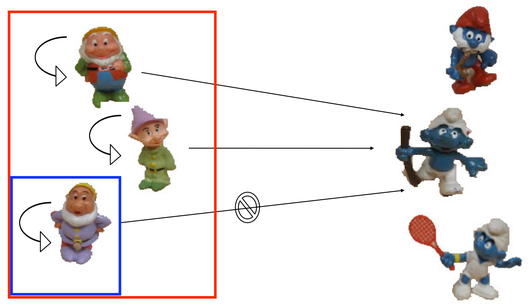
When the experimental flaws are removed, how will children perform with referential antecedents?

- 3 new TVJT experiments
- Satisfy the assumptions
- Use identical scenarios for referential and quantificational conditions.

Will DPBE and QA persist once TVJT requirements are satisfied?

A revised story:

Everyone needs to get painted to go to a party. Hiking Smurf forgot his paint. HS asks Happy and Dopey to paint him. Happy and Dopey first paint themselves, then paint HS. Grumpy is in a bad mood and does not want to go to the party. Grumpy gets painted after other dwarves convince him. HS asks Grumpy to paint him. Grumpy cannot since he used up all of his paint. Tennis Smurf offers to paint HS.



(3) Every dwarf painted him
(4) Grumpy painted him

Equality of Readings satisfied.

- QA could not be an artifact of replacement
  - Every dwarf painted Hiking Smurf FALSE
  - Grumpy painted Hiking Smurf FALSE

Plausible Dissent satisfied.

- Clear referent for referential interpretations (Hiking Smurf)

Condition of Falsification satisfied.

- Symmetric target sentences
- Exactly the same event (**blue**) makes the deictic reading false in both conditions

- Identical stories used for experiment 1 and 2

Experiment 1 - Principle B

- Tests referential and quantificational antecedents using revised stories and sentences in (3) and (4)

16 children (*M* 4;6, range 4;0-5;6), 16 adults (undergrads at UMD)

Experiment 2 - Control

- Gives independent measure of accessibility of BV interpretation
- Pronouns replaced with possessives (5), which freely allow coreference with a local antecedent.

5) a. Every dwarf painted his shirt
   b. Grumpy painted his shirt

16 children (*M* 4;6, range 4;0-5;4), 16 adults (undergrads at UMD)

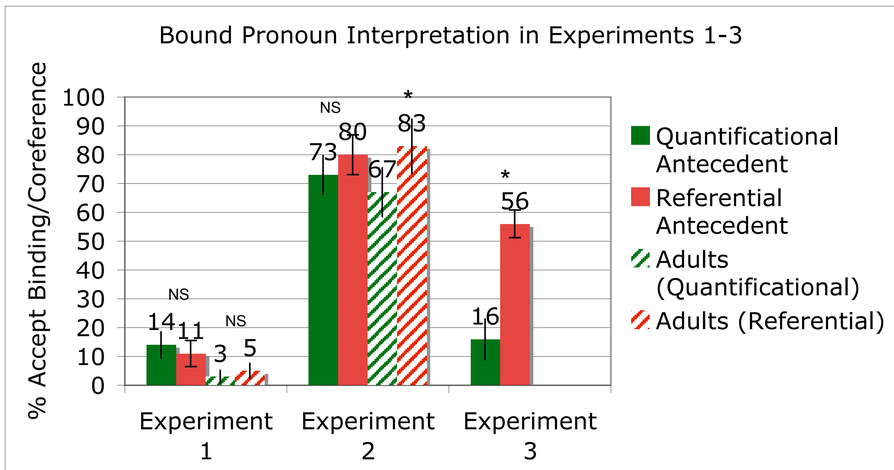
Experiment 3 - Replication

- Re-introduces imbalances found in previous studies
- Replicate the conditions for T&W

6) a. Every dwarf painted him
   b. Smurf painted him

16 children (*M* 4;7, range 4;1-5;2)

Results



- The puppet probed the child for further explanation irrespective of the child's initial response.
- Results are based on # of trials on which responses reflected an interpretation with a bound pronoun.

Experiment 1
- Children consistently rejected the ungrammatical interpretation for the test sentences in both conditions.
- No DPBE, as well as no QA.

Experiment 2
- Acceptance rates: 80%
- Children's success in Expt 1 could not have been due to insufficient salience of the bound meaning.

Experiment 3
- The QA reemerged: higher acceptance of Principle B violations in the referential condition.

Discussion

- With design improvements, no QA, no DPBE.
- Design flaws responsible for previously reported effects.

Research Implications

- We conclude that Elbourne's skepticism about the QA was warranted, but he incorrectly predicted DPBE.
- We found 4-year olds disallow coreference with both referential and quantified antecedents.
- The linguistic arguments for Reinhart's theory are unaffected by these findings, but our results remove the additional argument that was based on a developmental dissociation.

Selected References

[1] Chien, Y.-C. & K. Wexler (1990) Children's knowledge of locality conditions in binding as evidence for the modularity of syntax and pragmatics. *Language Acquisition* 1, 225-295; **[2] McKee, C.** (1992) A comparison of pronouns and anaphors in Italian and English acquisition. *Language Acquisition* 1, 21-55; **[3] Grodzinsky, Y. & T. Reinhart** (1993) The innateness of binding and coreference. *Linguistic Inquiry* 24, 69-101; **[4] Thornton, R. & K. Wexler** (1999) *Principle B, VP ellipsis and knowledge of binding*. Cambridge, Mass.: MIT Press; **[5] Reinhart, T.** (1983) Coreference and bound anaphora: A restatement of the anaphora questions. *Linguistics and Philosophy* 6, 47-88; **[6] Elbourne, P.** (2005) On the acquisition of Principle B. *Linguistic Inquiry* 36, 333-366; **[7] Crain, S. & R. Thornton** (1998) *Investigations in Universal Grammar*. Cambridge, Mass.: MIT press; **[8] Avrutin, S. & K. Wexler** (1992) Development of Principle B in Russian: Coindexation at LF and coreference. *Language Acquisition* 2, 259-306.

Acknowledgements

This work was funded in part by an NSF grant to the third author (#BCS-0418309). We thank the children, parents, and staff of the Center for Young Children at the University of Maryland, New Hope Academy, Silver Spring Presbyterian Church Children's Center, Milestone Enrichment Center, Greenwood Nursery School and Greenbelt Children's Center!