

Background

Binding Theory (BT)

- since the 1960's researchers have tried to determine the structural constraints on the distribution of pronouns (*him/her*) and reflexives (*himself/herself*)
- important observation: their distribution appears to be highly sensitive to syntactic structure
- another important observation: they appear to be in complementary distribution
- Binding Theory (e.g. Chomsky 1981) defines the syntactic constraints on pronouns and reflexives and ensures their complementarity

Issues

- the current basic assumption is that constraints on pronouns and reflexives are structural
- explicit judgments are then used as evidence in favor of particular syntactic configurations and various levels of representation (Belletti & Rizzi 1988, Larson 1988, Chomsky 1995)
- conclusions drawn depend crucially on the correctness of the characterization of the distribution of pronouns and reflexives

Questions

- to what extent are pronouns and reflexives in complementary distribution?
- to what extent can their distribution be explained solely by syntactic constraints like Binding Theory?
- what are the relevant data?

This Study

- this study focuses on picture NPs, a type of construction often used to argue for particular syntactic structures/levels of representation (Belletti & Rizzi 1988, Chomsky 1995), by monitoring eye movements of participants listening to spoken instructions to manipulate dolls in front of a display arranged with pictures of the dolls
- sample instructions include picture NPs of two sorts: *Have Ken touch a picture of him/himself*; *Have Ken touch Joe's picture of him/himself*
- we measured latency of looks to target (picture touched) as well as target choice and number of looks to each of the pictures in the display
- this yields the following types of data:
 - how the instruction is interpreted (=we elicit a "judgment" without having to ask for an explicit judgment about the grammaticality of a particular reading)
 - how long it takes to resolve the interpretation under various conditions
 - what pictures other than the target are considered under the various conditions

Display



Binding Reflexives and Pronouns in Real Time Processing

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Experiment 1

Picture Noun Phrases without Possessors ("subjects")

Question

- can eye movements be revealing about binding preferences for pronouns and reflexives?

Binding Theory (BT)

- a reflexive must find its antecedent in a local domain (D)
- a pronoun must not take an antecedent within D

Sample Instruction:

Look at Ken. Have Harry touch a picture of him/himself

domain (D) where reflexive must find antecedent and where pronoun must not

Binding Theory predictions:

- pronoun (him) condition:** only pictures of dolls not mentioned in D should be considered
- reflexive (himself) condition:** only pictures of dolls mentioned in D should be considered

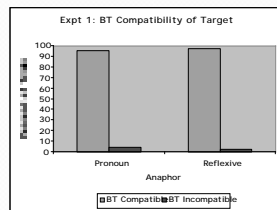
Instructions:

Look at Ken. Have Harry touch a picture of him/himself

Results

Anaphor	Lead-in (Ken)	Subject (Harry)
Pronoun (him)	95.12%	4.88%
Reflexive (himself)	2.38%	97.62%

The results are exactly as predicted by Binding Theory:



Conclusions

- Binding Theory can be probed using eye-tracking methodology
- it is possible to embed binding in further on-line tasks

Experiment 2

Picture Noun Phrases with Possessors

BT and Picture NPs with Possessors

- most versions of BT assume that a picture NP with a possessor forms the structural domain in which a reflexive must find an antecedent and a pronoun must not
- there have been a few hints in the literature suggesting that this assumption is not always correct (Kuno 1987, p. 169; Reinhart & Reuland 1993, p. 683)

Questions

- what are the facts? do listeners take the NP with a possessor as the domain for binding?

Sample Instruction:

Look at Joe. Have Ken touch Harry's picture of him/himself

domain (D) where reflexive must find antecedent and where pronoun must not

BT Predictions

- pronoun condition:** only pictures of the dolls not mentioned in D should be considered (e.g. Joe & Ken)
- reflexive condition:** only pictures of the dolls mentioned in D should be considered (e.g. Harry)

We tested these predictions with two conditions.

- Different Lead-in:** doll mentioned in lead-in ("look at X") sentence is different from the doll mentioned as subject of action sentence
- Same Lead-in:** the lead-in doll and subject doll are the same

Different Lead-in Instructions

Look at Joe. Have Ken touch Harry's picture of him/himself

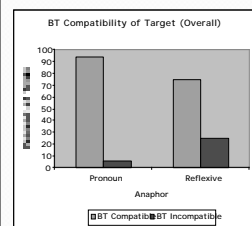
Same Lead-in Instructions:

Look at Ken. Have Ken touch Harry's picture of him/himself

Results

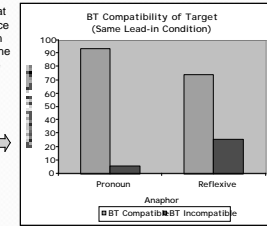
Anaphor	Different Lead-in Condition		
	Lead-in (Joe)	Subject (Ken)	Possessor (Harry)
Pronoun (him)	73.42%	21.52%	5.06%
Reflexive (himself)	1.20%	24.10%	74.70%

Anaphor	Same Lead-in Condition	
	Subject/Lead-in (Ken)	Possessor (Harry)
Pronoun (him)	93.83%	6.17%
Reflexive (himself)	25.93%	74.07%



Results show that pronoun reference is consistent with BT while 1/4 of the reflexives violate BT.

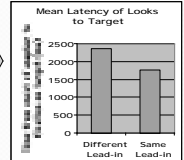
Even in the Same Lead-in condition, with equal number of potential antecedents, 1/4 of reflexives violate BT.



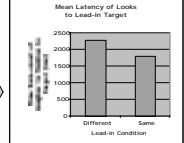
- interaction between compatibility with BT and type of anaphor is reliable as are all contrasts: reflexives violate BT significantly more than pronouns do

Competition

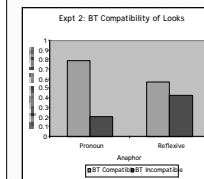
- in Different Lead-in condition there are more potential antecedents available to pronoun
- a "competition effect" is observed: latency is significantly longer than in the Same Lead-in condition



- even in trials when participants choose the lead-in there was significant competition from the subject referent



BT Compatibility of Looks



- target choice hints that BT is not correctly predicting choice of antecedent for reflexives (see graphs in previous column)
- participants' looks even more revealing: they regularly considered referents incompatible with BT for reflexives, but not for pronouns

Conclusions

- BT correctly predicts target and looks in pronoun condition
- BT does not completely account for reflexives data

Conclusions

Summary Table

BT Compatibility	Pronoun		Reflexive	
	Compatible	Incompatible	Compatible	Incompatible
Experiment 1	95.12	4.88	97.62	2.38
Experiment 2	94.37	5.63	74.39	25.61

1. Real-time tasks can be used to probe binding preferences.

2. In picture NPs with a possessor, subject of sentence weakly competes with possessor to be potential antecedent of reflexive.

3. While further research is needed, our results point towards the conclusion that the syntactic domains relevant to the binding of pronouns and reflexives are not the same. This is in conflict with most current structural Binding Theories.

The Future

- embed this methodology in contexts that manipulate pragmatic variables hypothesized to affect reflexive-binding
- further probe question of where complementarity between pronouns and reflexives breaks down