

Logophors in Possessed Picture Noun Phrases

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1. Background

1.1. Picture Noun Phrases

There have been two main approaches to "picture" NPs (PNPs) containing pronouns and reflexives like (1):

- (1) a. John saw a picture of him on the wall.
- b. John saw a picture of himself on the wall

The "standard" Binding Theory (BT) view (e.g., Chomsky 1981, 1986) claims that pronoun and reflexive reference in PNPs is constrained by the same structural principles that constrain NP reference in other positions, such as in (2):

- (2) a. John saw him.
- b. John saw himself.

BT Condition A, the principle constraining reflexives, requires that reflexives be bound (=coindexed with a c-commanding antecedent) in some minimal domain D (=the minimal phrase containing a referential specifier). BT Condition B, for pronouns, requires that pronouns be free (=not bound) in D.

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The mixed "logophor"¹ view (e.g., Pollard & Sag 1992, Reinhart & Reuland 1993) claims that reflexives in PNP's are logophors whose reference is constrained by nonstructural factors; pronoun reference in PNP's, on the other hand, is constrained by (a version of) structural BT Condition B. The need for a "mixed" approach to account for binding in PNP's is illustrated in examples like (3) in which structural constraints do not seem relevant since the reflexive is not even in same sentence as its antecedent. The difference between (a) and (b) can be linked to differences in pragmatic factors (in this case "point of view"; see, e.g. Pollard & Sag 1994, Kuno 1987 for discussion):

- (3) a. John was going to get even with Mary. That picture of himself in the paper would really annoy her, as would the other stunts he had planned.
 b. *Mary was taken aback by the publicity John was receiving. That picture of himself in the paper had really annoyed her, and there was not much she could do about it. [Pollard & Sag 1994, p. 270]

Other cases thought to involve logophors and the pragmatic factors thought to be relevant include the following (from Kuno 1987):

Awareness:

- (4) a. John_i knows that there is a picture of himself_i in the morning paper.
 b. *John_i still doesn't know that there is a picture of himself_i in the morning paper.

Indirect Agenthood:

- (5) a. I hate the story about himself_i that John_i always tells.
 b. *I hate the story about himself_i that John_i likes to hear.

1. We follow Reinhart & Reuland's (1993) use of "logophor" to refer to reflexive elements that are not constrained by structural BT; Pollard & Sag (1992) use the term "exempt" anaphor.

Focus:

- (6) a. John_i didn't tell MARY that there was a picture of himself_i in the post office; he told SAM.
 b. *JOHN_i didn't tell Mary that there was a picture of himself_i in the post office; SAM did.

1.2. Possessed Picture NPs

Both the standard BT and mixed logophor view of PNPs assume that "possessed" picture NPs (PPNPs) as in (7) are constrained by structural BT: the reflexive must be bound by the possessor (7a), and the pronoun must not be bound by the possessor (7b); note that (7) represents the standard judgments found in literature:

- (7) a. John_i saw Bill_j's picture of himself_{*i/j/*k}
 b. John_i saw Bill_j's picture of him_{i/*j/k}

However, there have been some hints in the literature that PPNP reflexives do not obey standard BT: they may not always be constrained to take the possessor as antecedent. Kuno (1987) and Reinhart & Reuland (1993) provide the examples in (8), acknowledging some speaker variability

- (8) a. ^{ok/?/??}Mary_i isn't interested in anybody's opinion of herself_i. [Kuno 1987, p. 169]
 b. ^{*/?/}Lucie_i liked your picture of herself_i [Reinhart & Reuland 1993, p. 683]

Reinhart & Reuland admit, "This is the place to note that the judgments on NP anaphora are much less clear than the linguistic literature tends to assume. Ben-Shalom and Weijler (1990) report that in their informal empirical testing of judgments, speakers did not agree even on the basic facts, for example, that a contrast exists in [(8b)]." Reinhart & Reuland, p. 683.

In addition, Keller & Asudeh (2001) and Asudeh & Keller (2002) collected systematic judgments from naïve speakers using the magnitude estimation technique. That study found that participants accepted equally reflexives and pronouns in PPNPs bound to the subject of the sentence, e.g., "Hanna found Peter's picture of herself/her".

In light of this uncertainty, one of the goals of this project is to empirically clarify the data set.

2. Data Collection

Our goal was to develop an empirical base on which to rest claims about the appropriate theoretical treatment of PPNP pronouns and reflexives.

We had native English speakers follow instructions to look at and/or pick up one of a set of dolls and have the doll touch a photograph belonging to one of the dolls. We presented instructions containing PPNPs with reflexives and pronouns and collected a kind of "judgment": which picture they have the doll touch indicates how they interpreted the instruction. We also monitored participants' eye movements using a head-mounted eye-tracker.²

(9) Display



"Have Joe touch Harry's picture of himself."

The instructions included two types of phrase: (1) a "lead-in" phrase instructing the participant to either pick up or just look at one of the dolls; and (2) an "action" phrase containing either a pronoun or a reflexive. (9) is what the display looked like and (10) is a sample instruction.

2. Some details: we ran two experiments with basic and unambiguous binding to verify task. In addition we ran two experiments with PPNPs; the results reported here are combined from the latter two experiments. The 32 participants from the University of Rochester community were divided into two groups, each of which was part of one "basic" experiment and one PPNP experiment. See Runner, Sussman & Tanenhaus (under review) for further details.

(10) Pick up/look at Joe. Have Joe touch Harry's picture of him/himself.

3. Results

The standard BT and mixed approaches both assume PPNPs follow structural BT. So, on the pronoun condition (Have Joe touch Harry's picture of him) participants are expected to have the doll touch the relevant picture of the subject of the sentence or the doll in the lead-in, crucially they should not touch the picture of the possessor. On the reflexive condition (Have Joe touch Harry's picture of himself) participants should have the doll touch the relevant picture of the possessor, not the picture of the subject or any other picture.

Our results only partially support the standard BT and mixed approaches (see Figure 1). On the pronoun condition participants followed BT: they chose a PPNP-external antecedent in more than 90% of trials. However, on the reflexive condition, participants frequently violated BT: they chose the possessor as antecedent in less than 70% of the trials, violating BT by choosing the subject as antecedent in over 30% of trials.

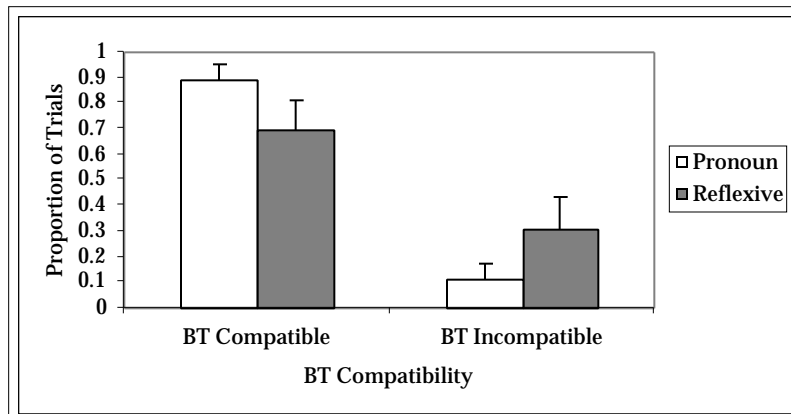


Figure 1: Proportion of trials with target choices consistent with Binding Theory for reflexives and pronouns

In addition to participants' final interpretation (Figure 1) we also monitored participants' eye-movements using a head-mounted eye-tracker. Eye movements to objects are closely time-locked to referential expressions in an unfolding utterance (Cooper 1974, Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy, 1995). This way, besides basic judgments we can learn about the time course of reference resolution. We can see if participants are considering only the referents allowed by BT. We can also learn about the

interaction of BT and on-line reference resolution. In particular, from our data we can evaluate a kind of 2-stage model that attributes the BT "violations" to a later pragmatic level of analysis. Figure 2 focuses on trials in which participants chose the subject of the sentence as the target (the trials in which BT is violated). Proportion of looks are on the Y-axis and time in ms. on the X-axis. Looks to each type of picture (the relevant picture of the doll mentioned in the lead-in phrase, picture of the possessor, and picture of the subject) are graphed. As Figure 2 shows there is no early stage of processing in which participants only consider BT-compatible referents:

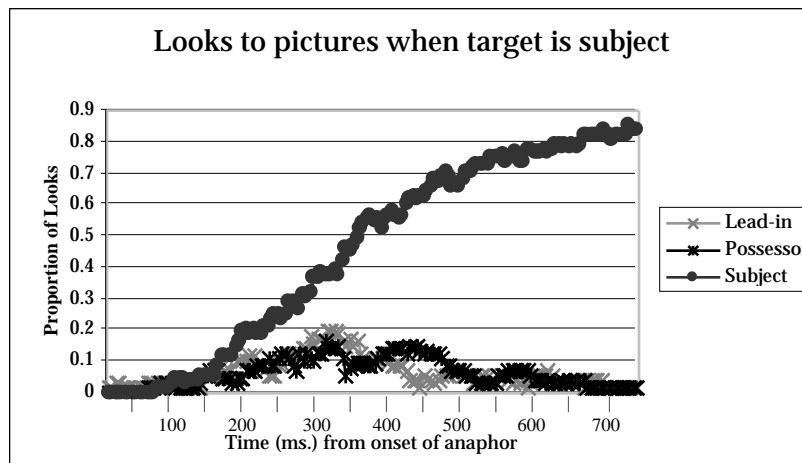


Figure 2: Proportion of looks to the Lead-in, Subject and Possessor in 33 ms time slices beginning with the onset of the anaphor for the reflexives when the Subject was chosen as the target

There are two noteworthy results from this study that require an explanation: reflexives in PPNPs violate standard structural BT and the complementarity between reflexives and pronouns breaks down in PPNPs. Our interpretation of these results is that whereas PPNP pronouns must not take the possessor as antecedent, as predicted by BT, PPNP reflexives can take either the possessor or the subject as antecedent, though preferring the possessor. The rest of this paper will be devoted to providing an analysis of these facts.

4. Analysis

4.1. Two hypotheses

The question, then, is how to treat PPNP reflexives? Two possibilities seem plausible. The STRUCTURAL VIEW is that PPNP reflexives are structurally constrained anaphors whose domain is the whole sentence, not just the PPNP. The LOGOPHOR VIEW is that PPNP reflexives are logophors, just like PNP reflexives in the mixed approach outlined above. Both possibilities deny the complementarity of pronouns and reflexives in PPNPs, accounting for the data observed.

Let's spell out the two hypotheses. On the structural view, pronouns and reflexives in PPNPs are both structurally constrained. The domain in which the pronoun must be free is the PPNP itself; and the domain in which the reflexive must be bound is S/IP (i.e., the whole sentence). On the logophor view, pronouns in PPNPs are structurally constrained, as on the structural view (they must be free within PPNP); and reflexives in both PPNPs and PPNPs are logophors.

The predictions of these approaches differ. On the structural view PPNP reflexives should behave like other structural reflexives in all relevant respects. On the logophor view PPNP reflexives should differ from structural reflexives; they should behave like logophors. One possible difference between logophors and reflexives which we will explore in the rest of this paper is the following: like pronouns, logophors can be interpreted as either bound variables or "coreferential" anaphora; however, structural reflexives can be interpreted as only bound variables (cf. Reinhart & Reuland 1993).

4.2. Bound variable vs. coreferential anaphora

Grodzinsky & Reinhart (1993) and Reinhart & Reuland (1993), among others, have suggested that pronouns and logophors can be interpreted as both bound variable and coreferential anaphora, whereas true structural reflexives can be interpreted only as bound variable anaphora. If this is true, then we have a testing ground for our PPNP reflexives.³ If they are structural reflexives only a bound variable interpretation should be available

3. Sells (1987) and Sells et al. (1986) point out that in some cases apparently structural reflexives can receive a coreferential interpretation under VP ellipsis; though we do not explore the issue here we would like to suggest that in these cases the apparently structural reflexives have a logophoric use. Determining which predicates and under what circumstances this is allowed will be left to future research.

to them; if they are logophors then both a bound variable and a coreferential interpretation should be available.

To illustrate the difference between a bound variable interpretation and a coreferential interpretation, consider a sentence like (11):

- (11) Alfred_i thinks he is a great cook.
 a. Alfred ($x(x$ thinks x is a great cook)) = bound variable
 b. Alfred_i ($x(x$ thinks he_i is a great cook)) = coreferential

The bound variable interpretation can be paraphrased as, "Alfred is the x , such that x thinks x is a great cook." The coreferential interpretation can be paraphrased as, "Alfred is the x such that x thinks Alfred is a great cook."

The sentence in (12) contains a structural reflexive:

- (12) Lucie_i praised herself_i.
 a. Lucie ($x(x$ praised x)) = bound variable only
 b. Lucie_i ($x(x$ praised herself_i)) = coreferential (not available)

The reflexive gets only the bound variable interpretation. (12) can be paraphrased as, "Lucie is the x such that x praised x ." It doesn't seem to have the interpretation, "Lucie is the x such that x praised Lucie."

This distinction is probably most famously illustrated by VP ellipsis. Consider (13):

- (13) a. Alfred_i thinks he is a great cook, and Felix_j does [e], too.
 b. Lucie_i praised herself_i, and Lili_j did [e], too.

(13a) is ambiguous in a way that (13b) is not. Besides the irrelevant reading in which the pronoun picks up its reference from something prior in the discourse, (13a) can be understood as, "Alfred thinks that Alfred is a great cook, and Felix thinks that Felix is a great cook." Or it can be understood as, "Alfred thinks that Alfred is a great cook, and Felix thinks that Alfred is a great cook, too." This ambiguity can be explained by the claim that pronouns can be either bound variables or coreferential anaphora. If VP ellipsis involves the replacement of the antecedent VP into the position of the elided VP, in cases where the antecedent VP contains a pronoun, there are two possibilities: a VP containing a pronoun read as a bound variable, or one containing a pronoun read as coreferential. (14) illustrates the two possibilities:

- (14) Alfred_i [thinks that he is a great cook] and...
- a. Felix (x(x thinks x is a great cook)) = bound variable
"...Felix thinks Felix is a great cook"
 - b. Felix_j (x(x thinks he_i is a great cook)) = coreferential
"...Felix thinks Alfred is a great cook."

The claim that the reflexive can only be interpreted as a bound variable explains the non-ambiguity of (13b). Consider (15):

- (15) Lucie [praised herself], and...
- a. Lili (x(x praised x)) = bound variable
"...Lili praised Lili."
 - b. Lili (x(x praised herself_i)) = coreferential (not available)
*"...Lili praised Lucie."

Reflexives in plain PNPs, which are claimed to be logophors, seem to be ambiguous under VP ellipsis. This has led to the claim that logophors can be interpreted either as bound variables or as coreferential anaphora. This is illustrated in (16):

- (16) Lucie_i [liked a picture of herself], and Lili_j did [e], too.
- a. Lili (x(x liked a picture of x)) = bound variable
"...Lili liked a picture of Lili"
 - b. Lili_j (x(x liked a picture of LOG_i)) = coreferential
"...Lili liked a picture of Lucie"

4.3. VP Ellipsis with PPNPs

Recall the two views of PPNP reflexives we are comparing. On the structural view, these reflexives should receive only the bound variable interpretation. On the logophor view, both the bound variable and coreferential interpretations should be possible. (17) provides an example:

- (17) Joe_i saw Ken_j's picture of himself, and Harry_k did [e], too.
- a. Harry (x(x saw Ken(y(y's picture of x/y))) = bound variable
"...Harry saw Ken's picture of Harry/Ken."
 - b. Harry_k (x(x saw Ken_j(y(y's picture of LOG_{i/j}))) = coreferential
"...Harry saw Ken's picture of Joe/Ken."

The predicted readings for the two views are the following. On the structural view only the bound variable interpretation should be possible, as in (17b) only. On the logophor view both the bound variable and coreferential readings should be available, as in both (17a) and (17b).

Both views predict that the elided VP can mean "Harry saw Ken's picture of Ken" and "Harry saw Ken's picture of Harry". The crucial reading that distinguishes the two is a coreferential reading where the anaphor takes the antecedent subject (Joe) as antecedent:

(18) Joe saw Ken's picture of Joe, and Harry bought Ken's picture of Joe.

We believe that an appropriate context makes this reading quite salient. Consider the following:

(19) Context: A Gallery containing only portraits of Madonna by various photographers. It's the gallery opening so Madonna herself showed up to check the photos out and see if she wanted any. The Leibowitz photograph of Madonna was causing a great stir--it was really quite impressive--and many of Madonna's fans were interested in it. But when Madonna saw the Leibowitz photo she really loved it and knew she had to have it; she could imagine where she'd put it in her Manhattan apartment.

(20) So Madonna bought Leibowitz's picture of herself before anyone else had the chance to.

The availability of this reading supports the claim that the PPNP reflexive can receive a coreferential interpretation, which supports the view that it is a logophor, not a structural reflexive.

4.4. NP Ellipsis

Another type of ellipsis where the predictions of the two views can be tested is NP ellipsis. Consider (21):

- (21) Joe_i bought Ken_j's [picture of himself] and then he bought Harry_k's
- a. Joe_i(x(x bought Harry_k(y(y's picture of x/y))
"...Harry's picture of Joe/Harry"
 - b. Joe_i(x(x bought Harry_k(y(y's picture of LOG_{i/j}))
"...Harry's picture of Joe/Ken"

Again the predictions of the two views are as follows: on the structural view, only the bound variable reading should be possible. On the logophor view, both the bound variable and coreferential readings should be possible. The crucial reading predicted to be possible only by the logophor view is in (22):

- (22) Joe bought Ken's picture of Ken, and then Joe bought Harry's picture of Ken.

Once again, we believe an appropriate context makes this reading quite salient:

- (23) Context: The Kennedy mansion is having an estate sale. For sale are the personal photos and prints of the members of the Kennedy family. Since these items actually belonged to the Kennedys the prices were very high. A museum down the street, due to budget cuts, was going out of business and had to sell all of their photos, including their extensive collection of Kennedy prints. My friend Jimmy had always liked a particular photo of JFK and was pleased to find the one that JFK had owned at the Kennedy estate sale. He didn't know that the same print was available at the museum sale or he would've bought that one since he is on a tight budget.

- (24) Jimmy bought JFK's picture of himself for \$500 not realizing he could've bought the museum's for just \$100 in its going out of business sale.

Again, the availability of the coreferential interpretation for the reflexive in a PPNP supports the view that it is a logophor and not a structural reflexive.

4.5. 'Only' construction

Another construction which illustrates the difference between a bound variable and coreferential interpretation is the 'only' construction. Consider (25):

- (25) a. Only Alfred thinks he is a great cook.
b. Only Lucie praised herself.

(25a) has two interpretations. It has a bound variable interpretation: "Alfred is the only x such that x thinks x is a great cook." And it has a coreferential interpretation: "Alfred is the only person x such that x thinks Alfred is a great cook." The bound variable interpretation entails that nobody other than Alfred thinks of him or herself as a great cook. The coreferential interpretation entails that nobody other than Alfred thinks that Alfred is a great cook.

The same ambiguity is not present with the structural reflexive in (25b). This only has a bound variable interpretation: "Lucie is the only x such that x praised x ." This means nobody other than Lucie praised himself

or herself. It does not have an interpretation paraphraseable as, "Lucie is the only x such that x praised Lucie," the coreferential interpretation. That would mean that while other people may have been praising each other or themselves, none of them besides Lucie herself praised Lucie.

Once again, reflexives in plain PNPs are ambiguous, like pronouns:

(26) Only Lucie_{*i*} buys pictures of herself_{*i*}.

This has a bound variable interpretation, "Lucie is the only x such that x buys pictures of x ," which means that nobody other than Lucie buys pictures of him or herself. It also has a coreferential interpretation, "Lucie is the only x such that x buys pictures of Lucie," which means that nobody other than Lucie buys pictures of Lucie.

4.5.1. PPNP reflexives in 'only' construction: subject

If the reflexive in a PPNP is a structural reflexive then only a bound variable interpretation should be possible in the 'only' construction. If it is a logophor both bound variable and coreferential readings should be possible. Consider (27):

(27) Only Joe_{*i*} bought Ken_{*j*}'s picture of himself.

- a. Joe ($x(x$ bought Ken ($y(y$'s picture of x/y)) = bound variable
"Joe is the only x who bought Ken's picture of x /Ken"
- b. Joe_{*i*} ($x(x$ bought Ken_{*j*} ($y(y$'s picture of LOG_{*i/j*})) = coreferential
"Joe is the only x who bought Ken's picture of Joe/Ken"

The only reading where the two approaches differ is (28):

(28) Joe is the only x such that x bought Ken's picture of Joe.

And again, the appropriate context makes this reading salient, as (29) and (30) illustrate:

(29) Context: Gallery exhibition of portraits and photos of Madonna.

Madonna was intrigued by the Leibowitz photo, though everyone else thought it was horrible. When Madonna saw the Leibowitz photo she really loved it and knew she had to have it; she could even imagine where she'd put it in her Manhattan apartment.

(30) Only Madonna liked Leibowitz's picture of herself; everyone else thought it was horrible.

The availability of this coreferential reading supports the view that PPNP reflexives are logophors, and not structural reflexives.

4.5.2. 'Only' on PPNP

The previous subsection looked at 'only' on the subject of the sentence containing a PPNP object; this section makes much the same argument based on examples containing 'only' on the PPNP itself, as in (31)

- (31) Joe_i bought only Ken_j's picture of himself.
- a. Joe(_i x(x bought Ken(_j y(y's picture of x/y))) = bound variable
"Ken is the only y such that Joe bought y's picture of Joe/y."
 - b. Joe_i(_j x(x bought Ken_i(_j y(y's picture of LOG_{ij}))) = coreferential
"Ken is the only y such that Joe bought y's picture of Joe/Ken."

The crucial reading to distinguish between the structural and logophor views is the following:

- (32) Ken is the only y such that Joe bought y's picture of Ken.

And finally, once again an appropriate context brings out this reading:

- (33) Context: Gallery of photos of Madonna, by various artists, including Leibowitz and even Madonna herself. My friend Jimmy was very excited because he'd always wondered what kind of photographer Madonna was so even though there were many photos of Madonna to choose from,

- (34) Jimmy really wanted to see only Madonna's picture of herself.

The availability of this coreferential interpretation again supports the view that PPNP reflexives are logophors and not structural reflexives.

5. Conclusions

Our first and strongest conclusion comes from the eye-tracking study presented in the first half of the paper: reflexives and pronouns in PPNPs are not in complementary distribution; a reflexive need not take the possessor of the PPNP as its antecedent.

A second and perhaps more tentative conclusion is that reflexives in PPNPs are logophors; this would explain the first conclusion (above) and is consistent with the fact that reflexives in PPNPs can display both bound variable and coreferential interpretations like other logophors as well as pronouns.

In future work we hope to further test the predictions of the two views discussed here using the eye-tracking methodology. We are currently running experiments testing participants' interpretation of elided NPs. We are also in the process of designing eye-tracking studies that manipulate pragmatic factors thought to be relevant to logophors and to test them on PPNP reflexives.

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