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FREEING POSSESSED NPs FROM BINDING THEORY*

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The assumed complementarity of pronouns and reflexives in possessed "picture" noun phrases (NPs), e.g., *Bill_i's picture of him_{i/*j}/himself_{j/*i}*, has led to the standard analysis that the Binding Theory (BT) is responsible (Chomsky 1981; Pollard & Sag 1992, 1994; Reinhart & Reuland 1993). This article questions this assumption and in particular argues that the reflexive in this NP is a BT-exempt reflexive, building on recent analyses of the reflexives in possessor-less picture NPs developed by Pollard & Sag (1992, 1994) and Reinhart & Reuland (1993). Empirical motivation comes from a series of eye-tracking studies reported by Runner, Sussman & Tanenhaus (2003) showing that although the pronoun in this construction behaves as predicted by BT, the reflexive can sometimes take the sentence subject as its antecedent, contra BT. In favor of treating these reflexives as BT-exempt is the observation that they are a type of "coreferential" rather than just "bound variable" anaphora, revealed by their behavior in the *only* and ellipsis constructions. The analysis developed builds on Davies & Dubinsky's (2003) NP classification based on argument-taking possibilities. Picture NPs, argued to lack an argument structure, provide precisely the type of context where a BT-exempt reflexive is predicted to appear.

1. Introduction

Given the commonly assumed complementarity of pronouns and reflexives in "picture" noun phrases with possessors such as those in (1), the standard approach has been to suppose that the structural constraints of the Binding Theory account for their distribution (e.g., Chomsky 1981, Pollard & Sag 1992, 1994; Reinhart & Reuland 1993):

- (1) a. John_i saw [_{NP} Bill_j's picture of himself_{j/*i}]
b. John_i saw [_{NP} Bill_j's picture of him_{i/k/*j}]

This article questions the assumption that pronouns and reflexives are in complementary distribution in this construction; and in particular, it argues that the reflexive in (1a) is a Binding Theory-exempt reflexive. This proposal builds on recent analyses of the reflexives in picture noun phrases without possessors developed by Pollard & Sag (1992, 1994), who call them "BT-exempt anaphors", and Reinhart & Reuland (1993), who call them "logophors". This background is discussed in Section 2.

The primary empirical motivation for the claim that pronouns and reflexives are not in complementary distribution in NPs such as (1) is outlined in some detail in Section 3. It comes from a series of eye-tracking studies reported by Runner, Sussman & Tanenhaus (2003), who show that although the pronoun in (1b) cannot take the possessor as its antecedent, as predicted

* This paper is a snapshot of my still developing thinking about the Binding Theory from about 2003. My views have evolved since then and continue to do so. A somewhat reworked version of this paper is currently in progress. I would like to thank Mike Tanenhaus, Rachel Sussman and Elsi Kaiser for playing a huge role in shaping my thinking about these issues. Of course, the views and errors presented here are mine alone. This research was partially supported by NSF grant BCS-010776.

by Binding Theory, the reflexive in (1a) can take the subject as its antecedent, contra Binding Theory.

The arguments in favor of treating these reflexives as BT-exempt rather than structurally bound reflexives are laid out in Section 4, and come from the observation that they are a type of "coreferential" rather than "bound variable" anaphora; this is revealed by their behavior in the *only* construction, as well as in VP ellipsis and NP ellipsis constructions. Further empirical support for this claim comes from an eye-tracking study reported by Runner (2003), which also found that in NP ellipsis constructions participants interpreted these reflexives as coreferential anaphora.

Finally, having settled on the claim that the reflexives in (1a) are not structurally bound reflexives, Section 5 develops an analysis of these reflexives that builds on recent work by Davies & Dubinsky (2003). They argue, based on extraction possibilities, that noun phrases divide up into several different classes, depending (roughly) on their participant/argument-taking possibilities. In particular, "concrete" nominals, such as those in (1), are claimed not to take any participants (which I will argue correspond roughly to "arguments"). I develop this observation into an analysis for why in this construction reflexives are exempt from Binding Theory. The analysis builds on Pollard & Sag's (1992, 1994) account of exempt reflexives in other contexts: a reflexive which lacks a more prominent co-argument will be exempt from Binding Theory. If my interpretation of Davies & Dubinsky (2003) is correct, then neither the reflexive PP nor the possessor phrase in (1) is an argument, in the relevant sense, of the head noun *picture*; the reflexive, then, lacks a more prominent co-argument and is exempt from Binding Theory. Support for extending Davies & Dubinsky's extraction-based dichotomy to binding comes from important observations about binding possibilities in Czech noun phrases discussed in Sturgeon (2002): reflexives in concrete noun phrases like (1) indeed behave as if they are exempt from Binding Theory; however, reflexives in "complex" nominals corresponding to *John's examination of himself* act only as structurally bound reflexives, obligatorily taking the possessor as antecedent. In Davies & Dubinsky's approach, these noun phrases do have argument participants, which combined with the analysis proposed here, correctly predicts the binding possibilities observed. Similar contrasts are also found in English.

The claim that the picture noun in (1) has no arguments has implications for the treatment of pronouns as well. I argue that although the phrases associated with the picture noun in (1) are not arguments on the argument structure list, they are "dependents" of the head noun. This claim builds on recent work by Bouma, Malouf & Sag (2001), which argues that a head is associated with two structures relevant to the phrases that combine with it: argument structure and dependents. The former is for "true" arguments, usually those semantically related to the head; whereas the latter is for these arguments plus other dependents of the head, including adjuncts and other phrases which are combined to make up the full (noun) phrase; this is where the possessor and "of" PP dependent on the head noun *picture* are listed. I will argue that the binding condition for pronouns is sensitive to this list, and that perhaps all of Binding Theory is stated with reference to the dependents list, rather than the argument structure list.

Section 6 concludes the paper with a summary of the article and a set of examples discussed in the paper and their analysis.

2. Background

2.1 Basic Binding

Consider (2)-(4):

- (2) a. [S Bill_i saw him_{j/*i}]
- b. [S Bill_i saw himself_{i/*j}]
- (3) a. [S Bill_i saw a picture of himself_{i/*j}]
- b. [S Bill_i saw a picture of him_{j/*i}]
- (4) a. John_i saw [NP Bill_j's picture of himself_{j/*i}]
- b. John_i saw [NP Bill_j's picture of him_{i/k/*j}]

Examples like these have motivated the important observation that reflexives and pronouns appear to be in complementary distribution. In particular, reflexives must find an antecedent (=must be "bound") and pronouns must not find an antecedent (=must be "free"), within (the same) local domain, roughly a clause or NP containing a possessor. The now traditional approach to accounting for the patterns illustrated in (2)-(4) is Chomsky's (1981) Binding Theory, a simplified version of which is given here:

- (5) Binding Theory
 - Condition A: a reflexive must be bound in D.
 - Condition B: a pronoun must be free in D.

D, the local domain in which binding must or must not take place given the examples in (2)-(4), is S or possessed NP. Binding is defined as follows:

- (6) Binding: A binds B iff A c-commands B, and A and B are coindexed.
 C-command: a node A c-commands a node B iff the first branching node dominating A also dominates B, and A does not dominate B.

That c-command or something like it referring to structural prominence is relevant is illustrated by (7):

- (7) a. [NP [NP John]_j's father]_i likes himself_i/him_{*i}
- b. [NP [NP John]_j's father]_i likes him_j/himself_{*j}

The NP subject of the sentence can bind an object reflexive but not an object pronoun (7a); however, an NP embedded within the subject of the sentence can bind an object pronoun not an object reflexive (7b).

2.2 Problems for Binding Theory

Almost as long as researchers have been studying binding certain examples have been observed that challenge the basic generalizations encoded by the Binding Theory. First, in certain contexts there is a lack of complementarity between pronouns and reflexives. The examples in (8) were first discussed in the 1960s (Ross 1970):

- (8) a. I told Albert_i that physicists like him_i/himself_i were a godsend.
 b. As for me_i/myself_i, I_i won't be invited.

Second, probably the most notorious context in which BT seems not always to predict the correct results is in the "picture" (or representational) NP. This type of NP is headed by a noun like *picture*, *photograph*, *story*, *opinion*, etc., which may itself take one or more arguments.

As illustrated above in (3)-(4) the basic cases of picture NPs seem to fit BT:

- (9) a. John_i saw [_{NP} a picture of him_{*i}/himself_i]
 b. John_i saw [_{NP} Bill_j's picture of him_{i/*j}/himself_{j/*i}]

In (9) pronouns and reflexives seem to follow the predictions of the basic BT outlined above.

However, in other contexts the predictions of BT are not always borne out. For example, reflexives in picture NPs can sometimes be bound from outside of D:

- (10) John_i said that [_S there was [a picture of himself_i] in the post office]

In (10) the reflexive is bound outside of the local S containing it. Examples like this may not be too problematic since it is possible to clarify the definition of D to extend out of an embedded clause under the right circumstances, such as in (10) (cf., Chomsky 1986).

However, much more problematic are cases where the reflexive appears not to require c-command (Pollard & Sag 1992):

- (11) That picture of himself_i in Newsweek dominated John_i's thoughts.

It sometimes does not even require an antecedent in the same sentence (Pollard & Sag 1992):

- (12) John_i was going to get even with Mary. That picture of himself_i in the paper would really annoy her, as would the other stunts he had planned.

In addition it has also been noted, especially by Kuno (1987), that certain discourse/pragmatic factors seem to be relevant, e.g., "point of view"; compare (13) with (12) (Pollard & Sag 1992) (see also Zribi-Hertz 1989):

- (13) Mary was quite taken aback by the publicity John_i was receiving. *That picture of himself_i in the paper would really annoy her, as would the other stunts he had planned.

Some of the other discourse/pragmatic factors Kuno identified include, in his terms, "awareness" (14), "indirect agenthood" (15), "referentiality" (16), and "focus" (17):

- (14) 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.
 (15) 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.
 (16) a. Mary_i isn't interested in anybody's opinion of herself_i.
 b. *Mary_i isn't interested in John's opinion of herself_i.
 (17) 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.

In each of (14)-(17) there is a difference between the (a) and (b) examples that seems unlikely to be structural, suggesting that picture NP reflexives are sensitive to some other non-structural pragmatic or discourse factors.

To summarize, reflexives in picture NPs can sometimes take an antecedent that is not within the local domain defined by BT; the antecedent need not c-command the reflexive, and indeed, may not even be in the same sentence. In addition, certain discourse factors seem to be relevant.

2.3 *Why This is Important*

When researchers first began trying to determine the distribution of pronouns and reflexives the early observations lead them to the conclusion that syntactic structure was the main relevant factor (see, e.g., Langacker 1969; Lasnik 1976). Taking that claim as a basic and solid assumption, more recent research has used the distribution of reflexives and pronouns to diagnose structure (e.g., Larson 1988; Lasnik & Saito 1991; Chomsky 1995; Runner 1995, 1998, among others). The obvious problem, of course, is that the arguments for structure are only as strong as the arguments that the distribution of these phrases is indeed structurally determined.

For example, in an influential article Larson (1988) argues for a particular structure for VP in part using data from binding (from Barss & Lasnik 1986):

- (18) a. I showed John_i himself_i (in the mirror)
b. *I showed himself_i John_i (in the mirror)

In another important article, Belletti & Rizzi (1988) argue for a particular syntactic configuration at D-structure based in part on the distribution of reflexives in picture NPs like (19):

- (19) Pictures of himself_i worry John_i.

More recently, and probably even more influentially, Chomsky (1995) uses the distribution of reflexives in picture NPs to argue for a particular syntactic configuration at LF and as part of an argument against the level of D-structure altogether (see Runner 2002 for discussion):

- (20) John wondered which picture of himself Bill took.

One important issue, then, is that if the distribution of (some) reflexives and pronouns is not determined solely structurally, then basing arguments for structural configurations on this distribution is risky at best.

2.4 A Way to Save Binding Theory?

Some researchers have proposed a way to "save" BT from the criticisms based on picture NPs. The proposal is that a picture NP reflexive is indeed locally bound--to a null pronominal possessor (PRO) in NP. Then it is possible to claim that the null pronominal possessor is what is sensitive to discourse factors, being pronominal (cf., Chomsky 1986, and more recently Davies & Dubinsky 2003).

For example, a sentence like (21a) would have a structure something like (21b), which would be interpreted roughly as in (21c):

- (21) a. John told a story about himself
 b. John told [PRO's story about himself]
 c. John_i told his_i story about himself_i

The reflexive would be locally bound by the PRO in NP, as predicted by BT; PRO would receive its reference and be susceptible to discourse/pragmatic factors as is typical for pronominals.

There are a few reasons to doubt this account. For one, possessors and demonstratives are usually in complementary distribution in English; this proposal must make empirically unsupported claims about English nominal structure:

- (22) a. That picture of himself_i in Newsweek dominated John_i's thoughts.
 b. That [PRO_i's] picture of himself_i in Newsweek dominated John_i's thoughts.
 c. *That his_i picture of himself_i in Newsweek dominated John_i's thoughts.

Of course, with more recent research into nominal structure proposing multiple layers of functional projections between the head noun and the maximal projection of the nominal phrase, it may be possible to account for both (22a) and (c).

More serious problems come from examples like (23), which need not have an interpretation requiring a possessor bound by John.

- (23) John_i showed everybody a photo of himself_i in his sister's album.

Here the photo is neither owned by John nor (presumably) taken by John, yet the use of the reflexive seems fine (see also (22a), above).

Along the same lines, (24a) is ambiguous between an interpretation in which there is a particular picture John is looking for, and one in which he just wants to find any picture. The interpretation of the same sentence containing an overt possessor has only the former reading (24b):

- (24) a. John is looking for a picture of himself to put on the class web page. [ambiguous]
 b. John is looking for his picture of himself to put on the class web page. [unamb.]

This proposal would also require a pronominal possessor in syntactic and/or semantic contexts where one is not otherwise allowed, e.g., the existential *there* construction:

- (25) a. John said that there was a picture of himself in the post office.
 b. John said that there was a/(**his*) picture of himself in the post office.

Without an independent analysis of each of these issues, the PRO-in-NP approach seems to create more problems than it solves.¹

2.5 In Search of a Binding Theory

What is needed is a binding theory that can account for basic binding as well as picture NPs. There are (at least) two such approaches in the literature: Pollard & Sag (1992, 1994) and Reinhart & Reuland (1993).

Both Pollard & Sag (P&S) and Reinhart & Reuland (R&R) argue that there are two types of reflexive in English. One class obeys a structural Binding Theory; and the other class, sometimes called "logophors", are "exempt" from Binding Theory and are sensitive to pragmatic conditions. The reflexives in possessor-less picture NPs are these logophors, or exempt anaphors.

2.5.1 Pollard & Sag's (1994) HPSG Binding Theory

The intuition guiding P&S's Binding Theory is that binding is calculated on the (lexical) argument structure associated with a predicate. The argument structure (Arg-St) is an ordered list of phrases organized in increasing order of "obliqueness" (i.e., more syntactically prominent arguments are further to the left than less prominent (=more oblique) arguments). The key assumption is that if a reflexive has no less oblique co-argument, then it is "exempt" from BT.

(26) HPSG Binding Conditions

- A. A locally o-commanded reflexive must be locally o-bound.
- B. A pronoun must not be locally o-bound.

(27) Obliqueness: Y is less oblique than Z if Y precedes Z in an argument structure list.

- Local o-command: Y locally o-commands Z if Y is less oblique than Z.
- Locally o-bound: locally o-commanded by a coindexed XP.

Let's illustrate the P&S approach with some examples. The (simplified) argument structures for the underlined heads are given on the right:

¹ An additional potential problem for this PRO-in-NP analysis is the so-called PRO theorem, which requires that PRO not be "governed"; the problem is that PRO is in complementary distribution with an overt possessor phrase, presumably governed and Case-marked. This may not be a problem given that the notion of government has been replaced in current theorizing. A more current technical problem for this approach is the claim that PRO receives "null" Case and that null Case is only checked by certain kinds of (non-finite) T. For PRO to appear in this type of construction would seem to require the assumption that certain Ns (or Ds) can check null Case; these same heads would presumably have to be able to check genitive Case given the fact that on this hypothesis PRO is in complementary distribution with an overt genitive Case-marked possessor. Essentially, this account would need to produce an independent explanation for the distribution of PRO that does not depend on government or null Case-marking.

- (28) a. Bill_i saw himself_i
 [Arg-St <NP₁, NP₂>]
 b. John_i saw [Bill_j's picture of himself_{j/*i}]
 [Arg-St <NP₁, NP₂>]
 c. John_i saw [a picture of himself_i]
 [Arg-St <NP₁>]
 d. John_i said that there was [a picture of himself_i] in the post office.
 [Arg-St<NP₁>]

In (28a) the predicate *see* has two arguments, *Bill* and *himself*. Since the reflexive does have a more prominent ("o-commanding") co-argument, it must be locally o-bound, which in this case it is. In (28b) the picture noun *picture* is the relevant predicate; it has two arguments, *Bill* and *himself*. Again, the reflexive does have an o-commanding co-argument--the possessor--and thus must be locally o-bound. This requires the reflexive to take *Bill* as its antecedent and not the NP-external *John*.

In (28c) and (28d) the relevant predicate is again the picture noun *picture*; here, though, the predicate has only one argument, the reflexive *himself*. Since that reflexive lacks a more prominent co-argument--there is no possessor--it is exempt from BT; in other words, BT does not constrain its reference. While Pollard & Sag (1992, 1994) do not explicitly spell out all of the pragmatic conditions on these picture NP reflexives, their BT does correctly single them out as exempt from structural BT. This is a large step in the right direction since, as pointed out above, it has often been observed that it is precisely these NP reflexives which seem not to follow BT and seem to be sensitive to some pragmatic or discourse factors (see discussion above from Kuno 1987).

2.5.2 Reflexivity Theory

Another approach to BT that exempts reflexives in sentences like (28c) and (28d) above is that of Reinhart & Reuland (1993), called "reflexivity" theory.

- (29) Reflexivity Binding Conditions
 A. A reflexive-marked (syntactic) predicate is reflexive
 B. A reflexive (semantic) predicate is reflexive-marked
 (30) A predicate is reflexive iff two of its arguments are coindexed.
 A predicate (formed of P) is reflexive-marked iff either P is lexically reflexive or one of P's arguments is a SELF anaphor.

Using the examples in (28) again to illustrate, in (28a) the predicate *see* is reflexive because two of its arguments are coindexed; in addition it is reflexive-marked because one of its arguments is a SELF anaphor. Thus the Binding Conditions are satisfied: the reflexive-marked predicate *see* is reflexive (A); and the reflexive predicate *see* is reflexive-marked (B). Below, we will focus on the "syntactic" vs. "semantic" part of the definitions.

In (28b) the predicate is *picture*. Once again it is reflexive since two of its arguments are coindexed; and it is reflexive-marked because one of its arguments is a SELF anaphor. So, as in (28a) the Binding Conditions are satisfied.

Turning to (28c) and (28d) we can see how picture NPs without possessors behave differently. The predicate is once again *picture*. However, this time it is not reflexive since it does not have two coindexed arguments. Thus, for the Binding Conditions to be satisfied the

reflexive *himself* cannot be a SELF anaphor, since that would require the predicate to be reflexive, which we have already seen it is not. Thus, R&R, like P&S, recognize a second class of reflexives that do not follow BT, and they call them "logophors". The *himself* in (28c) and (28d) is an instance of a logophor.

There are two important similarities between the P&S and R&R approaches. First, BT is stated over "arguments" and "predicates" rather than tree structures; and secondly, possessor-less picture NP reflexives are not constrained by BT, but by other (non-syntactic) factors. Thus, both approaches provide a way of characterizing the basic observations that motivated Binding Theory in the first place (cf., (2) and (4), above), while also being able to account for some of the contexts where BT seems to break down (cf., (8) and (10)-(17)).

2.6 Possessed Picture NPs: a Problem?

Both P&S and R&R assume a distinction between picture NPs without a possessor (reflexives contained within them are "exempt" from BT) and possessed picture NPs, which are assumed to form the relevant sort of predicate and are constrained by BT (see discussion above of (28b)). There are several observations from the literature that bear on this assumption. For example, Kuno (1987) offered the following examples, both of which should be ruled out by both P&S's and R&R's BTs:

- (31) a. Mary_i isn't interested in anybody's opinion of herself_i
 b. ok/?/?/?Mary_i isn't interested in John's opinion of herself_i

In addition, R&R, themselves, provide the following examples and the quote that follows:

- (32) a. Lucie liked [a picture of herself]
 b. */?Lucie liked [your picture of herself]

"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 [(32)]." Reinhart & Reuland (1993), p. 683.

In addition, more recently the assumption that possessed picture NP reflexives are constrained in the same way as typical object reflexives has been challenged by Keller & Asudeh (2001)/Asudeh & Keller (2001) and Runner, Sussman & Tanenhaus (2003). Runner et al. will be discussed in detail below. The Keller and Asudeh study used the "magnitude estimation" technique to collect data on possessed picture NPs in a world wide web-based on-line study and found that, as hinted above by Kuno and R&R, speakers do not always obligatorily take the possessor of the picture NP as the antecedent for the reflexive.

To summarize, then, P&S and R&R propose Binding Theories that allow for the special behavior of picture NPs by dividing the class of reflexives into argument reflexives and BT-exempt, or logophoric, reflexives. For them, reflexives in possessed picture NPs are not assumed to be logophors/BT-exempt. However, there are some hints in the literature that reflexives in possessed picture NPs do not behave as predicted by BT.

3. A Probe for Binding Theory

How robust are the observations of Kuno, Reinhart & Reuland, and Asudeh & Keller, pointed out above, that a reflexive embedded within a possessed picture NP need not take the possessor as its antecedent? Considering the R&R quote above as well as our own observations, what we need is a way to probe reflexive binding that is sensitive enough to allow us to get reliable "judgments" on the relevant examples. The approach should also allow us to manipulate the discourse context in order to investigate the influence of the discourse/pragmatic variables discussed by Kuno (1987) and others.

In a series of experiments, Runner, Sussman & Tanenhaus (2003) looked at these questions within the "visual world" paradigm, which uses the head-mounted eye-tracking methodology developed in the Tanenhaus lab at the University of Rochester (see Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy 1995 for an overview). In what follows I will draw on those studies.

What Runner et al. did was monitor the eye movements of participants who were listening to spoken instructions to manipulate dolls in front of a display arranged with pictures of the dolls (see Figure 1).

Figure 1. Display



Have Joe touch Harry's picture of him/himself

Two experiments were designed to test the methodology by replicating the basic predictions of BT in constructions containing reflexives and pronouns as direct objects or within simple possessor-less picture NPs in unambiguous contexts. Two further experiments tested picture NPs containing possessors under varying discourse conditions. See Runner et al. (2003) for experimental details concerning participants, materials and procedures.

They recorded "target" choice (which picture or doll the participant chose) and measured latency of looks to the target as well as the proportion of looks over time to each of the pictures and dolls in the display.

This yielded the following types of data:

1. The target choice, which indicates how the instruction was interpreted. This is essentially a "judgment", but one elicited without having to ask for an explicit judgment about the grammaticality of a particular reading.

2. The latency measurement, which indicates how long it takes to resolve the interpretation. This can help us understand how much "competition" from other interpretations is present under various conditions. In cases where BT allows multiple interpretations, latency should increase since multiple readings should be available.
3. The proportion of looks over time to each of the items in the display, which reveals what items other than the target are being considered at what points during the spoken instructions, and to what degree under the various conditions. Again, when BT allows multiple interpretations, the proportion of looks should reflect some interest in the other BT-compatible interpretations.

The target choice information plays a large role in their analysis since it is the closest thing to a linguistic "judgment"; however, the latency measurement and the proportion of looks to the items in the display together can help clarify the effects of less prominent, though potentially available, interpretations, something that target choice alone cannot do. I will focus on the target choice and looks data in what follows.

3.1 "Basic" Binding

Runner et al. (2003) designed two experiments to test the basic methodology. In these, participants were seated in front of the display (see Figure 1, above) and listened to instructions containing pronouns and reflexives in completely unambiguous contexts. Participants in Experiment 1 heard instructions containing pronouns and reflexives in direct object position (33a); and participants in Experiment 2 heard them in simple unambiguous picture NPs (b):

- (33) a. Look at Ken. Have Joe touch him/himself.
 [=Experiment 1]
 b. Look at Ken. Have Joe touch a picture of him/himself. [=Experiment 2]

The predictions of BT were clear-cut: for both experiments the pronouns should take the sentence-external NP (Ken) as antecedent and the reflexive should take the sentence-internal one (Joe) as antecedent. Indeed, on over 95% of the trials in both experiments, participants chose the doll or picture consistent with BT. This was true on both the pronoun and reflexive conditions. These results suggest that the methodology can be used productively to test the predictions of Binding Theory.

3.2 Possessed Picture NPs -- Simple Manipulation

Recall that most versions of BT, including Pollard & Sag (1992) and Reinhart & Reuland (1993), predict that a picture NP with a possessor forms the structural domain in which a reflexive must find an antecedent and a pronoun must not; however, as noted above, 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; Keller & Asudeh 2001/Asudeh & Keller 2001).

Runner et al. (2003) designed an experiment to investigate possessed picture NPs. The question they were interested in was: Do listeners take the possessed picture NP itself as the domain for binding as predicted by BT, or do they allow the reflexive to take an NP-external antecedent--as hinted above--and under what conditions?

Participants were seated in front of the same display (see Figure 1, above). This time they heard instructions with possessed picture NPs containing either a pronoun or a reflexive. In

addition the initial lead-in (*look at*) sentence was varied so that the NP mentioned was either the same as (=same lead-in condition) or different from (=different lead-in condition) the NP subject of the action sentence. Here are some sample instructions (lead-in and subject underlined):

- (34) a. Same Lead-in:
Look at Ken. Have Ken touch Harry's picture of him/himself.
b. Different Lead-in:
Look at Joe. Have Ken touch Harry's picture of him/himself.

Again, the predictions of BT are clear-cut. On the pronoun conditions, a possessed picture NP-external antecedent should be chosen (Ken in (34a); either Joe or Ken in (b); not Harry); on the reflexive conditions, the possessor of the NP (Harry) only should be chosen as antecedent (not Ken or Joe).

The predictions of BT were confirmed for pronouns on both lead-in conditions. On 94.9% of the trials overall participants chose the relevant picture of the subject or lead-in of the sentence. These results were similar on both lead-in conditions: 93.7% on the same lead-in condition; 96.1% on the different lead-in condition. On the different lead-in condition, where there was a choice of antecedent according to BT, the lead-in was chosen 74.2% of the trials and the subject was chosen 21.9% of the trials. Thus, pronoun reference is consistent with the predictions of BT.

However, for reflexives the predictions of BT were not confirmed. On only 74.8% of the trials did participants choose the relevant picture of the possessor of the NP; on 25.2% of the trials their choice was incompatible with BT. These results were true on both the same lead-in condition (where BT was violated on 25.4% of trials) and on the different lead-in condition (BT violated 25.0%).

An ANOVA revealed a significant main effect of Binding Theory compatibility ($p < .01$), which suggests that overall participants are following BT more often than not; however, this was modulated by an interaction between BT compatibility and type of anaphor ($p < .04$), reflecting the fact that participants violated Binding Theory more often for reflexives than for pronouns. Thus, there is a clear asymmetry between reflexives and pronouns in possessed picture NPs.

Runner et al. also analyzed the total proportion of looks to the relevant pictures of the dolls mentioned in the instructions and found a parallel pattern. An ANOVA again showed a main effect of BT compatibility ($p < .01$), suggesting that participants' looks to the relevant pictures of the dolls mentioned were more often than not consistent with Binding Theory; however, they also found a marginal interaction between BT compatibility and anaphor type ($p < .08$); participants' looks were consistent with BT more on the pronoun conditions than on the reflexive ones. Once again, an asymmetry shows up between reflexives and pronouns in possessed picture NPs.

The results of this experiment give initial support to the view that while pronouns in possessed picture NPs obey BT, reflexives do not: they can be bound either within the possessed picture NP itself, or by the subject of the sentence.

One of the most surprising results of this experiment was the breakdown in complementarity found on the different lead-in condition: pronouns took the subject of the sentence on 21.9% of the trials, and reflexives took the subject on 23.8% of the trials. Two elements in complementary distribution should not exhibit such similar behavior in the same syntactic environment.

Rather than abandon BT for possessed picture NPs, Runner et al. considered another hypothesis that might explain the data from this experiment, which could be called the PROBABILISTIC BINDING THEORY hypothesis. The idea is this: pronouns in possessed picture

NPs probabilistically avoid taking a sentence-internal antecedent, and reflexives in possessed picture NPs probabilistically prefer to take a possessed picture NP-internal antecedent.

Since the claim of this hypothesis is that these conditions are (only) probabilistic, "violations" will occur on some proportion of trials. Thus, on a little less than a quarter of the trials, the subject of the sentence is chosen as the (dispreferred but probabilistically available) antecedent for both the pronoun and the reflexive.

To test this hypothesis, factors which will affect the likely binding of one of these anaphors need to be manipulated to see if under the same conditions an inverse binding preference is found with the other anaphor. Runner et al. (2003) designed an additional experiment to do this.

3.3 Possessed Picture NPs -- Discourse Manipulation

The Probabilistic BT hypothesis predicts that if one of the anaphors' binding preferences can be manipulated, the other's preferences should show sensitivity to the same manipulation, but inversely. For example, if a particular manipulation increases the likelihood that the pronoun in a possessed picture NP will take the subject of the sentence as its antecedent, then the Probabilistic BT hypothesis predicts that under that same manipulation the likelihood that the reflexive will take the subject as antecedent should decrease, since the pronouns and reflexives are in complementary distribution, though only probabilistically.

This experiment manipulated the accessibility of the subject as a potential referent for a subsequent pronoun by using two different "lead-in" instructions. One asked the participant to look at one of the dolls (e.g., *look at Joe*); another asked the participant to pick up one of the dolls (e.g., *pick up Harry*). The action sentence was the same as in the previous experiment (e.g., *Have Harry touch Ken's picture of him/himself*). The subject of the action sentence (*Harry* in the above example) always matched the doll in the *pick up* lead-in. What was varied was the order in which the two lead-in instructions appeared. For example (subject referent underlined):

- (35) a. Subject 1st Condition:
Pick up Harry. Look at Joe. Have Harry touch Ken's picture of him/himself.
- b. Subject 2nd Condition:
Look at Joe. Pick up Harry. Have Harry touch Ken's picture of him/himself.

Varying the order of mention was expected to affect the reference choice for pronouns. Participants should prefer for the pronoun to take the sentence-external NP which is less remote (due to "recency", cf., Garnham 2001, Arnold et al. 2001). This means that in the Subject 1st condition (35a), Joe (the closer sentence-external NP) should be the preferred pronoun antecedent, predicting that Harry, the subject of the action sentence, will be a less preferred antecedent. On the Subject 2nd condition (35b), Harry (the closer sentence-external NP) should be the preferred pronoun antecedent, which means that the subject of the action sentence (also Harry) will be a more preferred antecedent for the pronoun. If the Probabilistic BT hypothesis is correct, the antecedent choices on the reflexive conditions should be complementary to the antecedent choices on the pronoun conditions: on the Subject 1st condition, the reflexive should take the subject (Harry) more often than on the Subject 2nd condition. Figure 2 illustrates these predictions:

Figure 2. Predictions of Probabilistic Binding Theory

Condition	Pron preference for Subj	Refl pref for Subj
Subj 1st (more remote)	lower	higher
Subj 2nd (less remote)	higher	lower

Before turning to the results of the lead-in order manipulation, let's look at the overall results. The overall results replicated the findings of the previous experiment. On 88.9% of the pronoun trials, participants chose the relevant picture of the subject or lead-in, violating BT on about 11% of the trials. However, on only 68.9% of the reflexive trials, participants chose the relevant picture of the possessor, violating BT on about 31% of the trials. An ANOVA again reflected a main effect of BT compatibility ($p < .01$) and an interaction with type of anaphor ($p = .03$). As in the previous experiment, overall BT is being followed more often than not; however, it is being violated significantly more frequently on the reflexive conditions than on the pronoun ones. Looking at the total proportion of looks to the relevant pictures of the mentioned referents there is also a main effect of BT ($p < .01$) and a significant interaction with type of anaphor ($p < .01$); again, looks to the pictures are consistent with BT, though significantly less so on reflexive conditions than on pronoun conditions. Thus, the results from the previous experiment are replicated in a somewhat more complex discourse context. There is an asymmetry between pronoun and reflexive binding.

Now to the main point of this experiment. Recall that the Probabilistic BT hypothesis predicts that on the Subject 1st condition (35a), the pronoun should prefer the non-subject lead-in as antecedent; and on the Subject 2nd condition (35b), the pronoun should prefer the subject as antecedent. On the reflexive conditions, the subject should be chosen more often on the Subject 1st condition than on the Subject 2nd condition.

Runner et al.'s results did not seem to support the Probabilistic BT hypothesis. In particular, lead-in order affected pronoun responses to a greater degree than reflexive responses (see Figure 3). An analysis of target choice resulted in a type of anaphor by lead-in order interaction ($p < .01$). However, planned comparisons showed that the lead-in manipulation affected the proportion of subject choices for the pronouns, but not for the reflexives. An analysis of the proportion of looks to the relevant picture of the subject also casts doubt on the Probabilistic BT hypothesis: there was a main effect of type of anaphor ($p = .02$), and of lead-in order ($p < .01$), and an interaction between the two ($p = .01$). Again, planned comparisons confirmed that the lead-in manipulation affected the proportion of looks to the relevant picture of the subject for pronouns but not for reflexives.

Figure 3. Percentage of trials subject chosen as target

Condition	Pron subj target	Refl subj target
Subj 1st	44%	35%
Subj 2nd	68%	27%

To summarize, this follow-up experiment replicated the findings of the first experiment looking at possessed picture NPs: reflexives within possessed picture NPs can take the subject of the sentence as antecedent, violating BT, whereas pronouns follow BT by avoiding the possessor of the NP. However, a hypothesis that might have offered an explanation for the apparently probabilistic complementarity of reflexives and pronouns found in possessed picture NPs failed to be confirmed by this experiment. Thus, other explanations of these facts need to be considered.

4. BT-exempt Reflexives in Picture NPs with Possessors?

Recall that most approaches to binding assume that reflexives in picture NPs with possessors must be bound to the possessor of the NP (cf., the discussion of (10b), above). This is true of the "basic" (Chomsky 1981) Binding Theory, as well as the approaches pursued by Pollard & Sag (1992, 1994) and Reinhart & Reuland (1993). As we have seen, however, none of these approaches accounts for the observed data: that the reflexive in a possessed picture NP may take the subject of the sentence as antecedent.

Having set aside a probabilistic BT for reflexives and pronouns in possessed picture NPs, two other possible hypotheses seem plausible to consider. The STRUCTURAL view is that reflexives in possessed picture NPs are structurally constrained anaphors whose domain is the whole sentence (S), not just the possessed NP. The BT-EXEMPT REFLEXIVE view is that reflexives in possessed picture NPs are BT-exempt, just like picture NP reflexives as analyzed by P&S and R&R. Both hypotheses deny the complementarity of pronouns and reflexives in possessed picture NPs, accounting for the data observed.²

On the structural view, pronouns and reflexives in possessed picture NPs are both structurally constrained: the domain in which the pronoun must be free is the possessed NP itself; and the domain in which the reflexive must be bound is S. On the BT-exempt reflexive view, pronouns in possessed picture NPs are structurally constrained, as on the structural view (they must be free in the possessed NP); and reflexives in both picture NPs and possessed picture NPs are exempt from BT (to be constrained by discourse/pragmatic factors, as mentioned above and discussed in more detail by Kuno 1987).

The predictions of these approaches differ. On the structural view these reflexives should behave like other structural reflexives in all relevant respects. On the BT-exempt view these reflexives should behave like other BT-exempt reflexives. One possible difference between structural reflexives and BT-exempt reflexives is discussed by Reinhart & Reuland (1993) and Grodzinsky & Reinhart (1993), and will be the subject of the next few sections: like pronouns, BT-exempt reflexives can be interpreted as either bound variables or "coreferential" anaphora; however, structural reflexives can be interpreted only as bound variables.

4.1 Bound Variable vs. Coreferential Anaphora

Reinhart & Reuland (1993) (see also Grodzinsky & Reinhart 1993), among others, have suggested that pronouns and BT-exempt reflexives (which they call logophors) can be interpreted as both bound variable and coreferential anaphora, whereas true structural reflexives can be interpreted only as bound variables.³ If this is true, then we have a testing ground for our reflexives in possessed picture NPs. If they are structural reflexives then only a bound variable interpretation should be available to them; if they are BT-exempt reflexives then both bound variable and coreferential interpretations should be available.

² Both P&S and R&R claim that there is a set of contexts in which a reflexive is not constrained by BT. I will use "BT-exempt reflexive" to talk about these reflexives; this is an attempt to be neutral between P&S's "BT-exempt anaphor" and R&R's "logophor" terminology.

³ Reinhart & Reuland's claim here is not uncontroversial. See for example Sells et al.'s (1990) arguments against it. In particular Sells et al. examine particular examples in which apparent "true" reflexives can receive a coreferential interpretation. Though it is beyond the scope of this article, I would like to pursue the possibility that in these cases what we have is what would normally be structural reflexives behaving as logophors, or BT-exempt anaphors, as suggested by Reinhart & Reuland (1993: 674-5).

Two constructions are often used to illustrate the distinction between bound variable and coreferential interpretations: the "only" and ellipsis constructions. Consider the following examples (based on R&R, p. 674, Grodzinsky & Reinhart, p. 74):

- (36) a. Only Alfred thinks he is a great cook.
 b. Only Lucie praised herself.
- (37) a. Alfred thinks he is a great cook, and Felix does [e], too.
 b. Lucie praised herself, and Lili did [e], too.

The (a) examples, which contain pronouns, are ambiguous in a way that the (b) examples, which contain structural reflexives, are not.

Besides the irrelevant reading in which the pronoun picks up its reference from something prior in the discourse context, (36a) can be paraphrased as, "Alfred is the only x , such that x thinks x is a great cook." Or, it can be paraphrased as, "Alfred is the only x , such that x thinks that Alfred is a great cook." The former reading, called the bound variable reading, could be used in a situation where Alfred is in a cooking class and he's the only student with any self-confidence. He believes he is a great cook, but none of his classmates believe that they are great cooks. The second reading, called the coreferential reading, could be used in a situation where Alfred is cooking for a dinner party but none of his guests think much of the dinner he has prepared; he believes he is a great cook, but nobody else believes he (Alfred) is much of a cook.

The reflexive example in (36b), however, does not seem to allow the same ambiguity. The best paraphrase for this sentence is, "Lucie is the only x , such that x praised x ." It does not paraphrase well as, "Lucie is the only x , such that x praised Lucie." The first reading, the bound variable reading, could be used in a situation where everyone had to discuss their role in some project; nobody but Lucie was particularly pleased with the work they had done; Lucie, though, was proud of her work and thus praised herself in her speech. Nobody else did anything like that. The second reading, the coreferential one, does not seem to be available. It would require a situation where the background question was something like, "who praised Lucie?," and the answer was meant to reflect the fact that nobody (other than Lucie herself) praised her. In other words, nobody but Lucie was happy about Lucie's work.

A similar contrast results for the examples in (37). The pronoun example in (37a) is ambiguous. One paraphrase, the bound variable interpretation, can be something like, "Alfred _{x} thinks that x is a great cook, and Felix _{y} thinks that y is a great cook, too." The second paraphrase, the coreferential interpretation, could be something like, "Alfred _{x} thinks that x is a great cook, and Felix _{y} thinks that x is a great cook, too." The first is consistent with a situation in which Alfred thinks that Alfred is a great cook, and Felix thinks that Felix is a great cook. The second is consistent with a situation in which both Alfred and Felix think that Alfred is a great cook.

Like the reflexive example in (36b), (37b) does not seem to be ambiguous. This sentence can be paraphrased as, "Lucie _{x} praised x and Lili _{y} praised y , too," the bound variable interpretation. It does not seem to have an interpretation paraphrased as, "Lucie _{x} praised x and Lili _{y} praised x , too," the coreferential interpretation. The first reading could be available in a situation in which both Lucie is happy about work that she (Lucie) has done, and Lili is happy about work that she (Lili) has done. Each woman is praising herself; Lili is not praising Lucie. The second reading would require the possibility that both Lucie and Lili are pleased with Lucie's work and are praising her. This second situation does not seem to be consistent with this sentence.

What is of interest to us is the fact that sentences like the following seem to be ambiguous in a way similar to the pronoun examples:

- (38) a. Only Lucie liked the picture of herself.
 b. Lucie liked the picture of herself, and Lili did [e], too.

(38a) can have an interpretation like, "Lucie is the only x , such that x liked the picture of x ," or an interpretation like, "Lucie is the only x , such that x liked the picture of Lucie." The former, bound variable, reading is compatible with a situation in which Lucie is in a photography class and their assignment was to do a self-portrait. However, the other students are not very good photographers and they know it, so they were not happy with the results of their assignment; Lucie was and liked the picture quite well. The second, coreferential, interpretation is compatible with a situation where there is a picture of Lucie wearing her favorite outfit, which most people think is rather unflattering; for this reason Lucie is the only person who actually liked the picture.

A similar ambiguity holds for (38b). It can have an interpretation like, "Lucie _{x} liked the picture of x , and Lili _{y} liked the picture of y ," or one like, "Lucie _{x} liked the picture of x , and Lili _{y} liked the picture of x , too." The former, the bound variable, interpretation, is consistent with a context in which Lucie and Lili each liked her own self-portrait; the latter, co-referential, interpretation, is consistent with a context in which both Lucie and Lili like the picture of Lucie.

(38) contains a picture NP reflexive, which by hypothesis is a BT-exempt reflexive. The readings available for (38)--both the bound variable and coreferential readings--differ from those available for the true structural reflexive illustrated in (36b) and (37b), which allow only the bound variable interpretation. Thus, the *only* and ellipsis constructions seem to be plausible testing grounds for the distinction between true structural reflexives and BT-exempt reflexives. In what follows we will test our possessed picture NP reflexives to determine the range of interpretations available to them.

4.2 Only

4.2.1 Only on Subject

If the reflexive in a possessed picture NP is a structural reflexive then only a bound variable interpretation should be possible for it in the *only* construction. If it is a BT-exempt reflexive, then both the bound variable and coreferential interpretations should be possible. Consider the following example:

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

Setting aside the prominent but irrelevant reading in which we're talking about Leibowitz's self-portrait, the bound variable interpretation can be paraphrased as, "Madonna is the only x who liked Leibowitz's picture of x ." And the coreferential one can be paraphrased as, "Madonna is the only x who liked Leibowitz's picture of Madonna."

Both the structural view and the BT-exempt reflexive view predict that the BV interpretation should be available. This reading is consistent with a context in which there is a show of Leibowitz's photos of various famous women, all of whom came to the show. However, nobody but Madonna was pleased with Leibowitz's work. Madonna is the only woman who actually liked her photo by Leibowitz. Everyone else hated the work Leibowitz had done for them.

Though judgments can be a bit tricky, given the variability pointed out above, it seems as though this reading is available.

Only the BT-exempt reflexive view predicts that the coreferential interpretation should be available. If this reading is indeed possible, we will have found our first piece of evidence that the reflexives in possessed picture NPs are BT-exempt reflexives, like those in possessor-less picture NPs. The coreferential interpretation can be brought out by considering a context in which there is an exhibition of photos of Madonna; Madonna is 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 would put it in her Manhattan apartment. In this context it seems that the coreferential interpretation of (39) becomes clear. This is the first strong hint that we are dealing with BT-exempt reflexives and not structural reflexives in this construction. However, given the delicateness of the judgments, let us consider another type of sentence, one with the *only* on the possessor itself.

4.2.2 Only on Possessor

One potential problem, pointed out above, is that speakers' judgments on the availability of the subject as antecedent for a reflexive in a picture NP containing a possessor are rather variable. However, the structural and BT-exempt reflexive views also make predictions with respect to a much more widely accepted antecedent, the possessor itself. Consider (40):

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

Most speakers would accept this sentence since it observes the "standard" binding judgment familiar from the literature. The question is what range of interpretations the reflexive *herself* has in this construction.

The bound variable interpretation can be paraphrased as, "Jimmy really wanted to see only Madonna_x's picture of x." In other words, Madonna is the only x, such that Jimmy wants to see x's picture of x. This reading, predicted by both the structural view and the BT-exempt reflexive view, is consistent with a context in which there is an exhibition of self-portraits by various women. Jimmy is a huge Madonna fan and came to the exhibition for one reason only: to see Madonna's self-portrait. In this context, the BV interpretation of (40) becomes quite salient.

The coreferential interpretation of (40), which only the BT-exempt reflexive view predicts to be available, can be highlighted in the following context. Now we have an exhibition of photos of Madonna by various women, including Madonna herself. Jimmy again is obsessed with Madonna and came to the exhibition for one reason: to see how great a photographer she is. So even though there were many photos of Madonna to look at all Jimmy wanted to see was the one by Madonna. In such a situation, it seems that (40) can very easily get the coreferential interpretation.

The availability of the coreferential interpretation for (40) is strong evidence in favor of treating reflexives in possessed picture NPs as BT-exempt reflexives and not as structural reflexives. They appear to have both the bound variable and coreferential interpretations available to them, just like other BT-exempt reflexives.

4.3 Ellipsis

4.3.1 VP-ellipsis

Consider the following example:

- (41) So Madonna bought Leibowitz's picture of herself before anyone else had the chance to [e]. [e]=[buy Leibowitz's picture of herself]

There are two bound variable interpretations of this sentence, depending on whether *herself* is bound by the possessor or the subject of the sentence. If it is bound by the possessor it can be paraphrased as, "Madonna bought Leibowitz_x's picture of x before anyone else had the chance to [buy x's picture of x]." If the BV is bound by the subject of the sentence there is another possible interpretation, paraphrased as, "Madonna_x bought Leibowitz's picture of x before [anyone else]_y could buy Leibowitz's picture of y." In each BV interpretation the *herself* within the elided VP is bound by an antecedent within its local clause.

The coreferential interpretation is one in which the reflexive within the elided phrase takes as its antecedent something in the previous discourse. In (41) that could be *anyone else*, Leibowitz or Madonna. Since the BV interpretation also allows the reflexive to be bound by *anyone else* or by Leibowitz, the only reading that is particular to the coreferential interpretation is one in which Madonna is the antecedent for the reflexive within the elided VP. That particular coreferential interpretation can be brought out in the following context: Consider 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. In this context it seems clear that (41) (repeated here) can have the coreferential interpretation.

- (42) So Madonna bought Leibowitz's picture of herself before anyone else had the chance to [e]. [e]=[buy Leibowitz's picture of herself]

The availability of this reading, of course, depends on the availability of the possessed NP-external subject antecedent. Given that this reading can be difficult for some speakers, it is crucial for the argument that we try to show that the coreferential interpretation is available even when the reflexive takes the possessor as antecedent. We turn to this next.

4.3.2 NP-ellipsis

An argument parallel to the VP-ellipsis one just presented can be constructed based on NP-ellipsis. Here we can test the predictions of the two hypotheses without depending on violating basic BT; if it goes through we will have evidence that even for speakers who are not as permissive we find BT-exempt reflexives rather than structural reflexives within possessed picture NPs.

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

Setting aside the readings in which the reflexive in the elided phrase takes the subject of the sentence, Jimmy, as its antecedent (see the discussion of this reading in the previous section), there are two other possible readings. The BV interpretation is one in which the reflexive in the elided phrase takes the possessor of the second clause as its antecedent. This interpretation of (43) is rather unlikely since *the museum*, short of anthropomorphization, should not be able to bind a [+human] reflexive like *himself*.

The coreferential interpretation is one in which the reflexive within the elided phrase takes either possessor (or either subject, which we set aside now) as its antecedent. Thus, the one reading that distinguishes the coreferential interpretation from the BV interpretation is one in which the reflexive within the elided phrase takes the possessor of the antecedent clause as its antecedent. This reading can be facilitated by the following context: The Kennedy mansion is having an estate sale. For sale are the personal portraits, photos and prints of the members of the Kennedy family. Since these items actually belonged to the Kennedys the prices are very high. A museum down the street, due to budget cuts, is going out of business and has to sell all of their photos, including their extensive collection of Kennedy prints. My friend Jimmy has always like a particular portrait of JFK and was pleased to find the one that JFK had actually owned at the Kennedy estate sale. He didn't know that the same portrait was available at the museum sale or he would've bought that one since he is on a tight budget. In this context (43), repeated here as (44), seems to have a coreferential interpretation:

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

This reading seems quite prominent, especially in this context. This suggests that indeed, even when the possessor is taken as antecedent, a reflexive within a possessed picture NP can have a coreferential interpretation.

Summarizing, then, we have found strong evidence that a reflexive in possessed picture NP can receive a coreferential interpretation. This was true under four different conditions: (1) constructions with *only* on the subject NP, (2) those with *only* on the possessor, (3) VP-ellipsis, and (4) NP-ellipsis. And interestingly even in (2) and (4), which do not require interpretations which violate "basic" BT, the coreferential interpretation is clearly available as well. This strongly supports the claim that these reflexives are BT-exempt reflexives, rather than structural reflexives.

4.4 Experimental Evidence for BT-exempt Reflexives in Possessed Picture NPs

Runner (2003) presents preliminary experimental evidence in favor of treating the reflexives in possessed picture NPs as BT-exempt reflexives, rather than structural reflexives. That study extends the research of Runner et al. (2003), described above in Section 3. Recognizing that a test for structural vs. BT-exempt reflexive involves bound variable vs. coreferential interpretations of reflexives within elided phrases, Runner, Sussman & Tanenhaus designed an eye-tracking experiment to test this. In what follows, I will briefly outline the experimental set-up and then discuss their results (see also Runner, Sussman & Tanenhaus, 2006)

Recall from the previous subsection that one way to test the structural vs. BT-exempt reflexive hypotheses is to investigate possessed picture NPs with NP-ellipsis. This study tests this. Participants were again seated in front of a display containing three male dolls and photographs of each of the dolls arranged in a column behind each doll (see photo of display in Figure 1, above). Sample instructions included sequences of such as (45a) followed by (b):

- (45) a. Pick up Joe. Have Joe touch Ken's picture of him/himself.
 b. Now have Joe touch Harry's <picture of him/himself>.

The material in angled brackets occurred on half of the trials, spoken with a deaccented intonation; NP ellipsis took place on the other half. Also, half of the trials tested pronouns and the other half tested reflexives.

Focusing on the reflexive trials, if participants choose a bound variable interpretation the target choice should be the appropriate picture of either the possessor (Harry's picture of Harry), or the subject (Harry's picture of Joe). If they choose a coreferential interpretation, then in addition to those possibilities, an additional target choice should be available: the possessor from the antecedent clause (Harry's picture of Ken). Of particular interest, then, is whether participants choose Harry's picture of Ken in (b).

Overall, on reflexive ellipsis conditions participants chose the appropriate picture of the possessor (Harry's picture of Harry) on 68% of trials and the subject (Harry's picture of Joe) on 22% of trials; and indeed the crucial target choice, where participants chose the antecedent clause's possessor (Harry's picture of Ken), occurred on 5% of trials. This number is small, but when compared with the percentage of trials in which that same picture was chosen on the reflexive no-ellipsis condition, the difference is significant ($p < .01$). Thus, we do find that the coreferential interpretation becomes available with NP ellipsis.

Readings consistent with the BV interpretation occurred on 90% of trials (in which Harry or Joe is antecedent); and readings consistent with the coreferential interpretation occurred on 95% of the trials (in which Harry, Joe or Ken from the previous clause is antecedent). This means that on 5% of trials readings consistent with only the coreferential interpretation occurred (in which Ken is antecedent). This difference, too, is significant ($p < .05$).

Looking at it another way, treating the BT-exempt reflexive and structural reflexive hypotheses as two levels of the same reflexive type factor reveals a main effect of reflexive type ($p < .01$), indicating that overall the BT-exempt reflexive hypothesis accounted for more of the target choices than the structural reflexive hypothesis did. There was also a marginal interaction between clause type (antecedent clause or ellipsis clause) and reflexive type ($p < .06$), which occurred because the difference between the reflexive types was apparent only in the ellipsis clauses. Planned comparisons confirmed that in clauses with ellipsis reflexive type was significant ($p < .01$), which is due to the BT-exempt reflexive hypothesis accounting for 95% of the target choices, and the structural reflexive hypothesis accounting for only 90% of them.

Thus, this study found that on a small but reliable proportion of trials the interpretation consistent only with the BT-exempt reflexive analysis was available. In addition the BT-exempt reflexive analysis does a better job of characterizing the data collected.

This section outlined some preliminary experimental evidence in favor of the claim that reflexives in possessed picture NPs are BT-exempt reflexives, and not structural reflexives. Having settled on the BT-exempt reflexive account of possessed picture NP reflexives, the next

section will focus on how to reconcile these results with Binding Theory, most versions of which rule out such a possibility.⁴

5. Analysis

The preceding sections have tried to establish that reflexives in picture NPs with possessors behave like BT-exempt reflexives. Let us return to the two approaches to binding we outlined above to determine the best way to treat this new empirical generalization theoretically.

Recall that the HPSG approach to binding takes the argument structure (Arg-St) list associated with a predicate as the basis for binding. And any reflexive which does not have a more prominent co-argument is claimed to be exempt from the BT:

- (46) HPSG Binding Conditions
 - A. A locally o-commanded reflexive must be locally o-bound.
 - B. A pronoun must not be locally o-bound.
- (47) Obliqueness: Y is less oblique than Z if Y precedes Z in an argument structure list.
 Local o-command: Y locally o-commands Z if Y is less oblique than Z.
 Locally o-bound: locally o-commanded by a coindexed XP.

The analysis of a picture NP containing a possessor like, *Joe's picture of himself*, was that both *Joe* and *himself* are on the Arg-St list of the head noun *picture*. Since *himself* does indeed have a more prominent (locally o-commanding) co-argument, it is not exempt from BT, but instead must be bound to *Joe*. We have already seen that this is an incorrect prediction and that this reflexive should actually be exempt.

A similar problem arises with Reinhart & Reuland's reflexivity approach:

- (48) Reflexivity Binding Conditions
 - A. A reflexive-marked (syntactic) predicate is reflexive
 - B. A reflexive (semantic) predicate is reflexive-marked
- (49) A predicate is reflexive iff two of its arguments are coindexed.
 A predicate (formed of P) is reflexive-marked iff either P is lexically reflexive or one of P's arguments is a SELF anaphor.

Because *Joe* and *himself* are both considered to arguments of *picture*, the picture NP is a reflexive-marked predicate. However, *Joe* and *himself* are not coindexed, which means the predicate is not reflexive. This violates Condition A.

So, to extend the P&S or the R&R approaches, we need to find a different way of characterizing either the Binding Conditions themselves, or the Arg-St of the picture NP, or both.

⁴ Contra Runner (2003) and Runner et al. (2006), I am no longer convinced that finding coreferential interpretations for reflexives in the type of discourse structure examined in this experiment shows they are not structural/argument reflexives. Kehler (2000) and Frazier & Clifton (2006) show convincingly that less "parallel" contexts can lead to more coreferential interpretations for structural/argument reflexives. The discourse structure examined in the experiment would be characterized by Kehler as "contiguous/narration", as opposed to parallel. Indeed, Goldwater & Runner (2007) have found that coreferential interpretations can regularly be elicited for true argument (clearly direct object) reflexives in the contiguous/narration/non-parallel type of context. Goldwater & Runner (in prep) test the roles of discourse structure vs. parallelism *per se* on the interpretation of PNP and object reflexives.

5.1 Simplest Extension

5.1.1 HPSG

Perhaps the simplest way to extend the HPSG Binding Theory would be to redefine under what conditions a reflexive may be exempt from BT. The current view is that this obtains just in case the reflexive has no locally o-commanding (=more prominent) co-argument. Thus, if a reflexive is on an Arg-St list and there is any locally o-commanding co-argument, that reflexive is constrained by BT. This approach does not differentiate among different types of locally o-commanding co-arguments. Perhaps a locally o-commanding "possessor" is not the right type of argument to trigger BT. Typically, the type of argument that triggers BT is the subject of the sentence. Could we redefine Condition A to constrain a reflexive only if it is locally o-commanded by an argument which is a sentence "subject" but not a NP possessor?

(50) A. A reflexive locally o-commanded by a "subject" must be locally o-bound.

Indeed, there are a number of languages which seem to require such a stipulation. Manning & Sag's (1998) analysis of Russian, West Greenlandic and Sanskrit reflexives proposes something similar; perhaps a restriction like this is relevant for English BT. Manning & Sag's approach was to define "subject" as the first entity on an Arg-St list. This does not straightforwardly extend to the present case since presumably if the possessor is indeed an argument of the head noun, it will be the first entity on that noun's Arg-St list, making it a subject, by definition. We would need another way to define subject, to include only sentence subjects, but not NP possessors. A possibility would be to invoke valency features such as SUBJ and SPEC to distinguish sentence subjects (SUBJ) from possessors (SPEC) (cf., Pollard & Sag 1994, among others). The elements on the Arg-St list also have values for valency features, which determine their superficial grammatical expression. Thus, one might distinguish a picture NP like (51a) from a full sentence such as (51b) as in (52a) and (52b), respectively (relevant heads underlined):

- (51) a. John's picture of himself
 b. John talked to himself.
- (52) a. [Spec <NP_[1]>, Comps <PP_[2]>, Arg-St <[1],[2]>]
 b. [Subj <NP_[1]>, Comps <PP_[2]>, Arg-St <[1],[2]>]

An appropriately revised Condition A (along the lines of (50)) would then allow the reflexive in (51a) to be BT-exempt, while constraining the reflexive in (51b) to take *John* as its antecedent.

Aside from how to characterize Condition A technically, the first and most obvious challenge for such an approach comes from examples that have led researchers to claim that in fact English reflexives need not be bound by a "subject" in the first place. English reflexives seem to be able to be bound by non-subject locally o-commanding arguments:

(53) Mary told Bill about himself.

Examples like (53) suggest that the English reflexive can be bound by a non-subject antecedent. However, before we accept this conclusion we must consider an alternative hypothesis: could this reflexive actually be a BT-exempt reflexive? If (50) is correct, then the reflexive in (53) would be an exempt reflexive. How would we know if this is correct? We could ask if it behaves like a structural or exempt reflexive.

If the arguments presented above in Section 4 are on the right track, then it might be possible to answer this question by looking at ellipsis (54) and the *only* construction (55):

- (54) a. Mary told Bill about himself and then his doctor.
 b. Mary told Bill about himself and then <told> his doctor <about himself>.
 (55) Mary told only Bill about himself; she didn't tell anybody else about Bill.

If (54a) is an elided version of something like (54b) then it appears that the reflexive in the *about himself* PP can receive a coreferential interpretation, suggesting it is a BT-exempt, not structural, reflexive. The same argument can be made based on (55). This sentence seems to be able to receive a coreferential interpretation in a context like the following. Perhaps Bill has amnesia and Mary happens to know that he is actually an escaped convict. She tells him about this, but she doesn't tell anybody else about this.

These examples provide some initial plausibility to the suggestion that even English ("true") reflexives are "subject-oriented".

5.1.2 Reflexivity

A similar analysis could be provided assuming the reflexivity theory. Let's take a closer look at the theory. Reinhart & Reuland (1993: 678) define slightly different predicate types for Conditions A and B.

- (56) Syntactic predicate
- The syntactic predicate formed of (a head) P is P, all its syntactic arguments, and an external argument of P (subject).
 - The syntactic arguments of P are the projections assigned theta-roles or Case by P.
- (57) Semantic predicate
- The semantic predicate formed of P is P and all its arguments at the relevant semantic level.
- (58) A. A reflexive-marked (syntactic) predicate is reflexive
 B. A reflexive (semantic) predicate is reflexive-marked

Note that the definition of syntactic predicate involves reference to an external argument of the predicate. If the possessor of the picture noun is not an external argument in the relevant sense, then the NP *John's picture of himself* will not form a syntactic predicate and the reflexive will not reflexive-mark the predicate; the reflexive will be exempt from BT. Condition A will be satisfied vacuously.

However, for this extension to work it would still need to be assumed that the NP *John's picture of him* forms a semantic predicate. This is so that Condition B correctly rules out the possibility of the possessor and the pronoun being coindexed. If independent evidence for treating a picture NP as a semantic predicate but not a syntactic predicate can be found, this may be a promising approach.

Though I have no overwhelming evidence against this approach or the HPSG version treating Condition A as sensitive to the valence feature SUBJ, I will pursue a different analysis to our reflexive problem, which is detailed in the following sections.

5.2 Argument Structure for Picture NPs?

The simple approach outlined above builds on a commonly held assumption about picture NPs: that they have an argument structure containing both the possessor and the PP. For the approach to work at all we recognize that a noun like *picture* has two arguments. However, since the possessor is not a "subject" or external argument BT does not constrain the reflexive: it is BT-exempt.

5.2.1 Reflexives in Concrete Nominals

A recent article by Davies & Dubinsky (2003) challenges this basic assumption. Based on extraction patterns, Davies & Dubinsky (D&D) argue that there are essentially three different classes of nominal. The differences among the three classes are arguably due to their different types of argument structures.

- (59) Complex nominals: *examination* (process reading)
- have argument participants
 - extraction okay with no definiteness effect
- Result nominals: *examination* (result reading)/*book* (informational reading)
- have non-argument participants
 - extraction okay but with definiteness effect.
- Concrete nominals: *book* (physical object reading)
- have no participants
 - extraction not possible.

Here are some examples to illustrate the extraction and definiteness effects distinctions. Complex NPs allow extraction, even over a definite determiner (60); result NPs allow extraction but not out of definite NPs (61); but concrete NPs do not allow extraction at all (62):

- (60) Complex NP
Who did Ashley participate in/watch/protest the coronation of?
- (61) Result NP
Who did they write a/*the book about?
- (62) Concrete NP
*Who did they destroy/stack books about?

D&D argue that the kinds of "participants" semantically entailed by each of these nominal types affects the extraction and definiteness facts. If a nominal has participants (what they call either argument or non-argument participants) the nominal will allow extraction. If a nominal allows for no participants (in their terminology) then extraction is disallowed. So a crucial distinction between nominals that allow extraction and those that do not comes down to whether the nominal is associated with what they call participants.

An important observation is that all of the nominals we have been looking at in this paper would be characterized as concrete nominals, those without any participants/arguments at all. This observation paves the way to an alternative analysis of our exempt reflexives. I will first briefly outline how the reflexivity approach might be able to exploit this observation. Then I will turn to a longer discussion of an HPSG approach, elaborating on the Binding Theory in several fundamental ways.

5.2.3 Reflexivity

The claim that concrete nominals like our picture NPs have no argument structure has consequences for the reflexivity theory. Recall that Condition A refers to syntactic predicates:

(63) A. A reflexive-marked (syntactic) predicate is reflexive

If we extend D&D's claim that concrete nominals have no participants to the claim that they have no syntactic arguments then a noun like *picture* will not form a syntactic predicate and any reflexive associated with it will be BT-exempt, as desired.

From the technical standpoint, though, this may not be as easy to implement as it seems. Recall the definition of syntactic predicate:

(64) Syntactic predicate

- The syntactic predicate formed of (a head) P is P, all its syntactic arguments, and an external argument of P (subject).
- The syntactic arguments of P are the projections assigned theta-roles or Case by P.

One could argue that the generalization D&D point out has to do with theta-role assignment: concrete nominals do not assign theta roles in the way that other nominals do. However, it does appear that the Case-marking of the phrases associated with the head *picture* is exactly the same as it would be in a usual case of a predicate noun and its true arguments: the possessor is genitive Case-marked and the "object" is Case-marked by the usual "inherent" Case-marker *of*. To make this analysis work, we would have to guarantee that the genitive and inherent Case-marking found in this construction are not actually assigned by P, otherwise they would count as syntactic arguments and Condition A would have to apply.

In addition, as in the simple extension to the reflexivity approach outlined above in Section 5.1.2, we must assume that the picture NP does form a semantic predicate. This is because Condition B is stated in terms of semantic predicate:

(65) B. A reflexive (semantic) predicate is reflexive-marked

We need the picture NP to form a semantic predicate due to the fact that a pronoun is disjoint from the possessor of the NP. Recall the definition of semantic predicate:

(66) Semantic predicate

- The semantic predicate formed of P is P and all its arguments at the relevant semantic level.

This definition refers to the "arguments" of P. For the D&D approach to work here, we need to allow the possessor and the PP associated with the head noun to be arguments for this definition but not arguments for the other one.

Again, if independent evidence can be provided for treating a picture NP as a semantic predicate, but not a syntactic one, then the reflexivity approach, combined with the proposed extension of the D&D analysis of noun types, will account for the data presented in this paper. I present this solution with some reservation, however, because from a conceptual point of view it seems counterintuitive that these NPs are semantic but not syntactic predicates.

5.2.4 HPSG

5.2.4.1 Reflexives

I would like to take D&D's claim that concrete nominals have no participants to mean that they have an empty Arg-St list. This immediately makes a prediction with respect to the HPSG Binding Theory. If a reflexive is associated with a concrete nominal, it will by definition not be locally o-commanded since it will not be associated with an Arg-St. If the reflexive is not locally o-commanded then it is automatically exempted from BT. That is, this extension of D&D's claim that concrete nominals have an empty Arg-St list (which is based on extraction possibilities) immediately predicts our observation, motivated throughout this paper, that picture NP reflexives are BT-exempt reflexives, not structural ones.

The reason that the reflexive in a possessed picture NP is BT-exempt is that the head it is associated with, being a concrete noun, has nothing on its Arg-St list. If this extension of D&D's approach is right, then we should find different binding patterns in other types of NPs, those with non-empty Arg-St lists.

In a recent paper, Anne Sturgeon (Sturgeon 2002) discusses just such a contrast between concrete nominals like picture NPs and complex nominals with respect to their binding possibilities in both English and Czech. She notes the following contrasts in English (her judgments):

- (67) a. \checkmark /?Jill found Matt's article about herself.
 b. \checkmark /?Martina looked for Michael's book about herself.
 c. \checkmark /?Marissa hates Brandon's picture of herself.
 (68) a. *Jill found Matt's fear of herself surprising.
 b. *Joanna was irritated by Mark's pride in herself.

As we have pointed out, examples like those in (67) are acceptable at least some of the time. And though we have not tested examples like (68) there does seem to be a clear contrast between those and the examples in (67). The nominals in (68) would be characterized by D&D as complex nominals, with full argument/participant structures. Compare the (simplified) Arg-St lists for (67a) and (68a), respectively:

- (69) a. [Arg-St <>]
 b. [Arg-St <NP_[1], PP_[2]>]

Since the Arg-St list for *article* (69a) is empty, a reflexive that co-occurs with such a head will be BT-exempt, as desired. A reflexive associated with *fear* will appear on its Arg-St list (69b), will have a locally o-commanding co-argument, and will be required to be locally o-bound. This will account for the degradation in (68).

The main point of Sturgeon's paper, though, is that similar contrasts are apparently quite clear in Czech.

- (70) Božena_i zahodila Karlovy_j básně o sebe_{i/j}
 Božena threw-away Karel.adj poems about self
Božena_i threw away Karel_j's poems about herself_i/himself_j.

- (71) Marie_i nenávidí Petrův_j strach o sebe_{i/*j}
 Marie hates Peter.adj fear about self
*Marie_i hates Peter_j's fear of himself_j/*herself_i.*

In (70), with a concrete nominal *poem* the NP-internal reflexive can take the subject of the sentence as its antecedent. This is parallel to the types of examples we have been examining throughout this article, and would have an Arg-St like the one in (69a). In (71), however, with a complex nominal *fear* the NP-internal reflexive must take the NP-internal possessor as its antecedent; its Arg-St would be like the one in (69b). This is interesting independent support for trying to correlate Arg-St type with reflexive-binding possibilities.⁵

Another prediction of the D&D classification of nominals comes from the claim that nominals like *picture* are actually ambiguous between a "physical object reading", the concrete use we have seen, and an "informational reading", what they call a result nominal. Recall the difference in extraction:

- (72) Physical object reading (concrete nominal)
 *Who did they destroy/stack books about?
 (73) Informational reading (result nominal)
 Who did they write a/*the book about?

The prediction is that the binding should be different between the two readings. As we have seen reflexives in concrete nominals are BT-exempt because the Arg-St list associated with such a nominal is empty. However, a result nominal, which has arguments/participants, should have a non-empty Arg-St list, so if a reflexive occurs with a possessor the reflexive should not be BT-exempt and should be obligatorily bound by the possessor. The judgments are delicate, but there seems to be a reliable contrast:

- (74) a. √/?Joe_i destroyed Harry's book about himself_i.
 b. ?/*Joe_i wrote Harry's book about himself_i.

The intended interpretation for (74b), which would be something like, "Joe wrote the book about himself that Harry owns," does not seem easily available. Such a contrast is predicted by D&D's classification of NPs combined with the analysis of BT-exempt reflexives being developed: (74a) and (74b) would have Arg-St lists like (69a) and (69b), respectively.

Two questions are left open so far: (1) exactly how are the possessor and PP associated with the head noun if they are not arguments of it listed on its Arg-St? and (2) how is this approach going to account for the fact that pronouns do seem to behave correctly with respect to Binding Theory? We turn to these questions in the next section.

⁵ Sturgeon's (2002) analysis also exploits the difference between the kinds of arguments the two noun types take. In particular, she claims that in examples like (63) the possessor phrase is a specifier of DP, but not a part of the internal NP itself; in (64), though, the possessor phrase is both the specifier of DP and the specifier of NP (having moved from the latter to the former). She develops a version of Hestvik's (1992) Binding Theory, exploiting the structural difference in terms of "complete functional complex". In many ways the intuition of Sturgeon's account and the one developed here is similar: the binding differences depend (roughly) on argument-taking differences between the two types of nominal. I do not pursue the Hestvik account in the text because I want to emphasize the parallelisms between the English and Czech reflexives behavior; Sturgeon does not treat either the English or Czech reflexives in concrete nominals as BT-exempt, a conclusion I disagree with, at least for the English examples.

5.2.4.2 Pronouns and Other Dependents in Concrete Nominals

My extension of D&D's analysis of concrete nominals also makes predictions with respect to pronoun binding. Condition B requires that pronouns be o-free; we have seen that indeed pronouns are not bound by the possessor of the picture NP. This suggests that for the purposes of Condition B the possessor and the pronoun are on an Arg-St list associated with the head noun *picture*. So, extending the D&D approach to reflexives in concrete NPs means offering a new explanation for the pronoun facts.

What we need then is a way to talk about how the possessor and the PP associated with a concrete nominal are related, since Condition B is sensitive to this relation. At the same time we do not want to claim that their relation is one of co-arguments on an Arg-St list, since that would entail that a reflexive in such a PP would be a structural reflexive and not a BT-exempt one.

In a recent paper, Bouma, Malouf & Sag (2001) proposed that associated with a head are two structures relevant to what sorts of phrases the head combines with. They maintain the standard assumption that an Arg-St list is lexically specified by a particular head. This list will contain all of the semantic arguments of the head (as well as certain syntactic ones, such as "raised objects", etc.). In addition to this list, however, is a general "dependents" (Deps) list. This new list is made up of all of the elements from the Arg-St list plus all other dependents, such as adjuncts and other types of phrases that are more loosely dependent on the head, but may not be semantically/syntactically selected by it. The primary motivation for having a Deps list comes from Bouma et al.'s desire to be able to characterize wh-extraction phenomena: extraction can affect both arguments and adjuncts of a head. They still want to maintain a syntactic distinction between arguments and non-argument dependents, which is why an Arg-St list is also needed. Thus, they propose a constraint such as the following (Bouma et al. 2001, p. 11):

(75) verb => [Arg-St [1], Deps [1] (+) list ('adverbial')]

They suggest this constraint for verbs, but to assimilate the analysis to nominals this constraint would have to be more general. What the constraint says is that Deps list is made up of the Arg-St list ([1]) plus an "underspecified list of adverbial synslems" (p. 11). The proposal would be that the possessor and PP phrases dependent on the head noun are associated via the Deps list, rather than the Arg-St list.

Exploiting this new list of dependents of a head, we could try to put together an analysis treating the possessor and PP associated with a picture noun as dependents of that noun, though not arguments of it. Thus, the picture noun will have a Deps list containing the non-argument possessor phrase and PP. If this is the right answer, then Condition B of the Binding Theory seems to be sensitive to "co-dependents", as opposed to "co-arguments".

This suggests that it is actually the Deps list, not the Arg-St list, that Binding Theory is stated over. Compare the (simplified) lexical representation of the NP *John's picture of him*:

(76) [Deps <NP_[1], PP_[2]>, Arg-St <>]

There are at least two ways to implement the intuition that Condition B is sensitive to Deps rather than Arg-St. One would be to assume that Condition A is stated over the Arg-St list and condition B is stated over the Deps list. A second would be to assume that all of Binding Theory refers to the Deps list (both Condition A and Condition B).

Let's look at each proposal in more detail. The first would require defining relations among members of the Deps list for Condition B:

- (77) D-Obliqueness: Y is less d-oblique than Z if Y precedes Z on a dependents list.
 Local d-command: Y locally d-commands Z if Y is less d-oblique than Z.
 Locally d-bound: locally d-commanded by a coindexed XP.

We would retain regular obliqueness, as defined above (in (47)) for Condition A. Then the Binding Conditions would be revised as follows:

- (78) Binding Conditions (first revision)
 A. A locally o-commanded reflexive must be locally o-bound.
 B. A pronoun must not be locally d-bound.

Both conditions would refer to types of binding but on different lists.

The second approach, which claims that all of Binding Theory takes place on the Deps list, would also require the definitions in (77). The only difference for the binding conditions would be in Condition A:

- (79) Binding Conditions (second revision)
 A. A locally o-commanded reflexive must be locally d-bound.
 B. A pronoun must not be locally d-bound.

Reference to local o-command would still be required for Condition A because it is the Arg-St list that determines whether a reflexive is exempt or not. However, the binding conditions themselves simply refer to relations on a single Deps list.

A possible argument in favor of the latter version, which treats all of BT as referring to co-dependents rather than co-arguments, comes from Condition C, which we have so far ignored. In the original Pollard & Sag (1992, 1994) Binding Theory, there is a third condition which non-pronominals are constrained by:

- (80) C. A non-pronoun must not be o-bound.

A lingering problem for Condition C, if o-binding is determined in Arg-St, is that referential expressions embedded within adjunct phrases seem to be disjoint from more syntactically prominent pronouns:

- (81) a. John_i was dismayed. He_i had given Bill a present just before he hit him_i/*John_i.
 b. Mary_i is tired. She_i had to prepare dinner for Betsy when she_i/*Mary_i got home.

The first sentence in each pair is meant to introduce a discourse referent, making it plausible for the second sentence to begin with a pronoun. The second name was introduced to make it otherwise ambiguous in the adjunct clause had a pronoun been used. This was meant to increase the likelihood that a referential expression could be used to disambiguate. However, these sentences seem degraded, possibly due to something like a Condition C violation.

The important thing to note is that the adverbial clauses in (81) would not be present on the Arg-St list of the heads *give* and *prepare*. Thus, the standard Condition C, stated in terms of o-command, which is defined over the Arg-St list, would not rule them out.

Now, if all of the binding conditions are stated over the Deps list, then this implies Condition C would be as well. Since these adverbial clauses would be present on the Deps list of the heads *give* and *prepare* in (81) we would have a straightforward explanation for what is wrong with them.⁶ This would leave us with the following Binding Theory:

- (82) Binding Conditions (final revision)
- A. A locally o-commanded reflexive must be locally d-bound.
 - B. A pronoun must not be locally d-bound.
 - C. A non-pronoun must not be d-bound.

I will settle on this version of Binding Theory, though it is certainly possible that other considerations may lead us to prefer one of the others outlined in this section.

6. Conclusions and Examples

This article argued that pronouns and reflexives in possessed picture NPs are not in complementary distribution and that the reflexive in that construction is a BT-exempt reflexive. The evidence for the claim that the complementarity between pronouns and reflexives breaks down here came from a series of on-line eye-tracking studies discussed in Runner et al. (2003). The argument that the reflexives in this construction are BT-exempt is based on the fact that they can receive a coreferential interpretation as well as a bound variable interpretation, a possibility not allowed for structurally bound reflexives, according to Reinhart & Reuland (1993) and Grodzinsky & Reuland (1993).

To account for why in this construction reflexives are BT-exempt, I extended the observations of Davies & Dubinsky (2003), who classified noun types in terms of participant/argument-taking properties; their classification was determined independently, based on extraction possibilities. The concrete picture NPs that have been the focus of this article arguably turn out to lack any elements on their argument structure (Arg-St) list. This point paved the way to an account of the behavior of the reflexives in the picture NP construction.

The analysis developed builds on the HPSG Binding Theory of Pollard & Sag (1992, 1994). On that approach the binding conditions are stated with respect to an Arg-St list organized in order of increasing obliqueness. The essential intuition is that a reflexive that lacks a less oblique co-argument is "exempt" from the binding conditions. Since the picture nouns we have been studying are claimed to lack any arguments on their Arg-St lists altogether, that immediately accounts for why a reflexive associated with such a noun is exempt from BT.

However, this claim does not account for two important issues: how the possessor and the PP are associated with the head noun, and why the pronoun in a picture NP must be disjoint from the possessor. Bouma et al.'s analysis of different sorts of dependents of a head forms the foundation of the remainder of the account. Adopting both an Arg-St list and a dependents (Deps) list, we can state the relevant intuition: a BT-exempt reflexive is one which does not appear on an Arg-St list containing a less oblique co-argument; and the condition of the Binding Theory constraining pronouns must be stated over the Deps list. The proposal I pursue is that all of Binding Theory is stated over the Deps list. Here is the revised Binding Theory:

⁶ Bouma et al (2001) claim that Condition C should remain a constraint over argument structures, or following more recent work on the problem, they suppose that there is no syntactic Condition C. Neither approach would say anything about the examples in (69).

- (83) Binding Conditions
 A. A locally o-commanded reflexive must be locally d-bound.
 B. A pronoun must not be locally d-bound.
 C. A non-pronoun must not be d-bound.
- (84) D-Obliqueness: Y is less d-oblique than Z if Y precedes Z on a dependents list.
 Local d-command: Y locally d-commands Z if Y is less d-oblique than Z.
 Locally d-bound: locally d-commanded by a coindexed XP.

And here are some sample (simplified) lexical entries and the coindexation allowed by this Binding Theory, including their valence features (the relevant heads are underlined):

- (85) a. Harry_i saw Joe_j's picture of him_{i/*j}/himself_{i/j}.
 b. [Spec <NP_[1]>, Comps <NP_[2]>, Deps <[1],[2]>, Arg-St <>]
- (86) a. Harry_i found Joe_j's fear of him_{i/*j}/himself_{j/*i} surprising.
 b. [Spec <NP_[1]>, Comps <NP_[2]>, Deps <[1],[2]>, Arg-St <[1],[2]>]
- (87) a. Joe_i talked to him_{j/*i}/himself_{i/*j}
 b. [Subj <NP_[1]>, Comps <NP_[2]>, Deps <[1],[2]>, Arg-St <[1],[2]>]

In (85) is the concrete picture NP. It has two NPs in its Deps list but no elements in its Arg-St list. If [2] is a reflexive, it will be BT-exempt because it will not be o-commanded (it has no less oblique co-argument on an Arg-St list--it is not even on an Arg-St list); it will thus be sensitive to pragmatic conditions, which may allow it to take either the possessor or the subject of the sentence as its antecedent. If [2] is a pronoun, it will have to be disjoint from [1] since it is locally d-commanded by it. In (86) is a case of a complex NP. It has two NPs in its Deps list and the same two are on its Arg-St list. If [2] is a reflexive, it will be locally o-commanded (having a less oblique co-argument on its Arg-St list) and will then have to be coindexed with [1]. If [2] is a pronoun, as in (85) it will have to be disjoint from [1]. In (87) is a verbal predicate. As in (86) it has two NPs in its Deps list and the same two in its Arg-St list. This will force a reflexive as [2] to be coindexed with [1], and a pronoun as [2] to be disjoint from [1]. One of the differences between the nominal predicates in (85) and (86) and the verbal one in (87) is in the valence features. The possessors in the nominal predicates are Specs and the subject in the verbal predicate is a Subj.

Throughout this paper I have been comparing the Pollard & Sag's HPSG approach with Reinhart & Reuland's reflexivity approach. Overall, they are both superior to the "basic" Binding Theory approach, which does not allow for BT-exempt reflexives at all. And more importantly both approaches can characterize the BT-exempt reflexives in possessed picture NPs that have been my focus. I have some reservations about the reflexivity approach to these data only because it relies on a distinction between syntactic predicate and semantic predicate that seems counterintuitive. It is my hope, at least, that the data presented here and the type of analysis offered can pave the way to an overall better understanding of both the structural and non-structural constraints on anaphoric elements like pronouns and reflexives, not just within the narrow domain of picture NPs.

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