The Domain of Reflexivization in English

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0. Introduction.

The distribution of reflexive and reciprocal pronouns--hereafter, R-pronouns, following Reinhart (1983a)--has been a major concern in the theoretical literature over the past some fifteen years. A basic assumption in the vast majority of cases has been that the distribution of such R-pronouns is syntactic in nature--from the clausemate condition (Postal, 1971) to the binding conditions (cf. Chomsky, 1981 and Reinhart, 1983a,b).[1] The present paper--focussing specifically on reflexive pronouns--follows this line of inquiry, operating under the assumption that the distribution of reflexive pronouns is statable strictly in terms of syntactic domains where the domain of reflexivization is defined in the context of the feature instantiation system found in Gazdar, Klein, Pullum and Sag (1985)--hereafter, GKPS.[2]

The analysis presented here follows GKPS (who do not actually provide a treatment of reflexives) in assuming reflexivization is encoded in a categorial-valued syntactic feature, a feature whose migration in trees is regulated by the Foot Feature Principle, where the upper bound of the domain of reflexivization is set by a feature cooccurrence restriction. Simply put, a reflexive feature percolates up to, but not into, the first predicative category containing a specification for the categorial-valued feature SUBJ(ect). This paper departs from GKPS and earlier work in GPSG on reflexives (cf, Gazdar and Sag (1981), Pollard and Sag (1983)) however in the analysis of reflexive agreement, which is treated here as a condition on binding in the semantics (specifically, in the translation to intensional logic) rather than as a principle of syntactic agreement.

The organization of this paper is as follows. Section 1 provides a syntactic account of the domain of reflexivization, where predicative categories form the upper bound on instantiation (percolation) of reflexive feature specifications. Section 2 discusses the range of categories which form barriers for reflexivization. Section 3 provides an account of reflexives in unbounded dependency constructions (i.e., reconstruction contexts). Section 4 discusses conditions on binding (including morphological agreement) in translation to intensional logic. A number of technical points are persued in appendices. Appendix A offers a reformulation of the Foot Feature Principle (FFP), which regulates the instantiation of the reflexive feature RE. This is because, in its present form, the FFP makes false predictions not only in the treatment of reflexives discussed here but in an account of interrogative pronouns. Appendix B treats binding in unbounded dependency constructions.
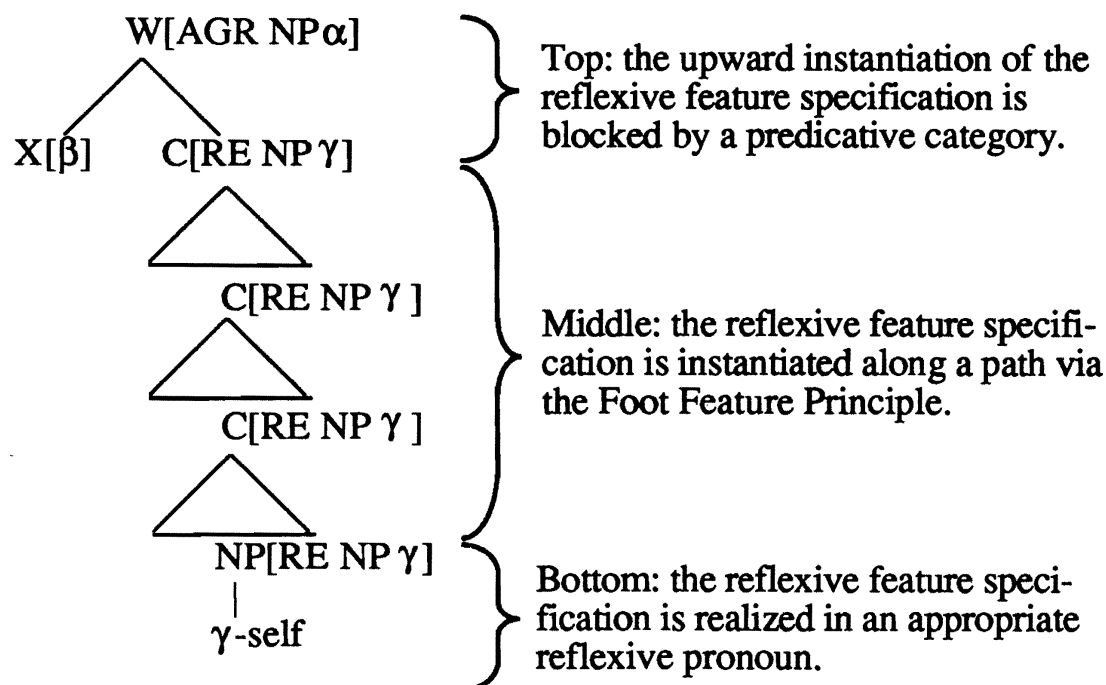
1. Domains.

Reflexivization is represented by the categorial-valued foot feature RE, whose upward migration in trees is limited by the following Feature Cooccurrence Restrictions, which are absolute restrictions on the feature composition of categories in trees.

(1) FCR 1: [VP ∨ [+PRD]] ⊃ SUBJ
(2) FCR 2: ~[SUBJ & RE]

FCR 1 says that verb phrases and elements containing the feature specification [+PRD] (predicative) must also contain a specification for SUBJ. I use SUBJ(ect) in place of AGR(eement) in GKPS to emphasize the role of this feature both here and in a semantic analysis of control (cf,

Hukari and Levine, 1987 and 1988) in encoding salient information about subjects. It is FCR 2 which sets the bound on the percolation of the reflexive feature, saying that no category may be specified both for SUBJ and RE. The reflexive feature, as a foot feature, then percolates from a reflexive pronoun up to--but not into--a category containing a SUBJ feature specification as in the following diagram.[3]

(3)

W[AGR NPα]

X[β]   C[RE NP γ]

> Top: the upward instantiation of the reflexive feature specification is blocked by a predicative category.

C[RE NP γ]

> Middle: the reflexive feature specification is instantiated along a path via the Foot Feature Principle.

C[RE NP γ]

NP[RE NP γ]

γ-self

> Bottom: the reflexive feature specification is realized in an appropriate reflexive pronoun.

The analysis owes much to Pollard and Sag (1983), though differing in several respects. First, the present analysis is cast in terms of the feature instantiation system of GKPS, as opposed to the propagation of features by metarules in earlier versions of GPSG. Second, the upper bound on the migration of the reflexive feature here is described strictly within the context of a theory of feature coocurrence restrictions (FCRs), where all statements involve syntactic feature names or values, or logical connectives. See GKPS for further discussion of Feature Cooccurrence Restrictions and Gazdar, Pullum, Klein, Carpenter, Hukari and Levine (forthcoming) for further elaboration on the formal constraint language.

Pollard and Sag, on the other hand, formulate a cooccurrence restriction which falls outside that theory of FCRs:

(4) *X[R] where Type(X) = <NP, NP> and R is an R-feature [P&S 27, p. 198],

where expressions of the type <NP, NP> are, in their terminology, generalized predicatives, and include N1 and S. As given by them, this is not simply a statement concerning the cooccurrence of syntactic features in a category. Rather, it is a constraint involving a category, a feature specification and the intensional logic (IL) type of the category. In the present analysis, the restriction will be formulated in terms of the syntactic feature SUBJ--in keeping with the definition of FCRs. Intuitively, we can think of categories containing SUBJ as predicative, since they generally will translate as predicate categories.

1.1. Semantics.

Notice that the discussion above focusses exclusively on feature migration with no mention of morphological agreement or binding between a reflexive pronoun and its antecedent. A syntactic agreement principle is certainly not antithetical to GPSG but it is by no means obvious that agree-

ment for person, number and gender in reflexive pronouns differs substantially from general pronominal agreement in English, which strikes me as being more plausibly described in the semantics. For the purpose of exposition, I follow a middle course in section 4, where agreement for inflectional features is a condition on semantic binding. A very brief outline of the approach to binding taken in Section 4 may be a useful digression at this point in showing where the analysis is going.

The categorial valued feature SUBJ can be thought of intuitively as encoding information about subjects, following Hukari and Levine (1987, 1988). The analysis of binding in section 4 follows the type-driven approach to semantic translation in GKPS and in Pollard and Sag (1985), where local (two-generation) syntactic trees are provided with intensional logic translations.

When a specification for RE appears in the daughter of a predicative category (i.e., a category containing SUBJ), this must be bound either to the subject or to a sister in the translation of the mother, either being a possibility in the following as both match the reflexive in inflectional features.

(5) Alice$_i$ told Judith$_j$ about herself$_{i,j}$.

Under the interpretation where the subject is the antecedent, the binding condition requires a match in inflectional features between the values of RE and SUBJ, so subject binding is possible in a local tree such as the following (in equivalent phrase structure rule format), where a abbreviates appropriate inflectional features.

(6) $\text{VP[SUBJ: NP}\alpha] \rightarrow \text{V} + \text{NP}\alpha + \text{PP[RE: NP}\alpha]$

The verb phrase in (x) will translate approximately as follows when the reflexive is bound to the subject (where x^* marks the relevant positions).

(7) $\lambda \mathcal{P} \mathcal{P} \{\lambda x[\text{told}'(\text{about}'(x^*))(j^*)(x^*)]$

This combines with the actual subject at the level of S to translate as

(8) $\text{told}'(\text{about}(a^*))(j^*)(a^*)$.

But since the object in (6) and the categorial value of RE in PP match in inflectional features, the reflexive can be bound instead by the object, roughly as in

(9) $\lambda \mathcal{P}[\text{told}'(\text{about}'(j^*))(j^*)(\mathcal{P})]$

This, in turn, combines with the syntactic subject to yield (xv).

(10) $\text{told}'(\text{about}'(j^*))(j^*)(a^*)$

This brief discussion glosses over much of the semantics and perhaps it should be emphasized that the reflexive binding translation schema is driven by the syntactic information available in a local tree such as (6). For example, while the constraint on identity of inflectional features can access the object in (6) for object binding, it does not have access to the syntactic subject directly, rather it has available to it the information encoded in the categorial value of SUBJ in the mother (which agrees with the syntactic subject via the feature instantiation system of GKPS, specifically the Control Agreement Principle). By the same token, the condition for subject binding will be met in italicised VP of the following.

(11) I persuaded Alice to *tell Judith$_j$ about herself$_{i,j}$*.

Following a standard phrase structure approach, the infinitive VP *to tell Judith about herself* has no syntactic subject but *Alice* controls it and the feature instantiation system of GKPS says that the categorial value of SUBJ in this VP agrees with the controller. The relevant domain for binding will be the minimal VP *tell Judith about herself*, whose value for SUBJ will be exactly as in (6) above.[4] Thus the analysis presented here makes crucial use of the feature instantiation system of GKPS in defining the domain of reflexivization, although morphological agreement between the reflexive pronoun and its antecedent is a condition on binding in IL rather being a feature instantiation principle in the syntax.

1.2. Monoclausal Structures.

In the simplest cases, the antecedent of a reflexive pronoun is the closest subject as in the following examples, where the antecedent is a subject and a clausemate (though not necessarily a clausemate in other syntactic frameworks).[5]

(12) Felix baked himself a cake.
(13) Freda wanted to bake herself a cake.
(14) Every senator likes to see photographs of himself.
(15) (= 14)
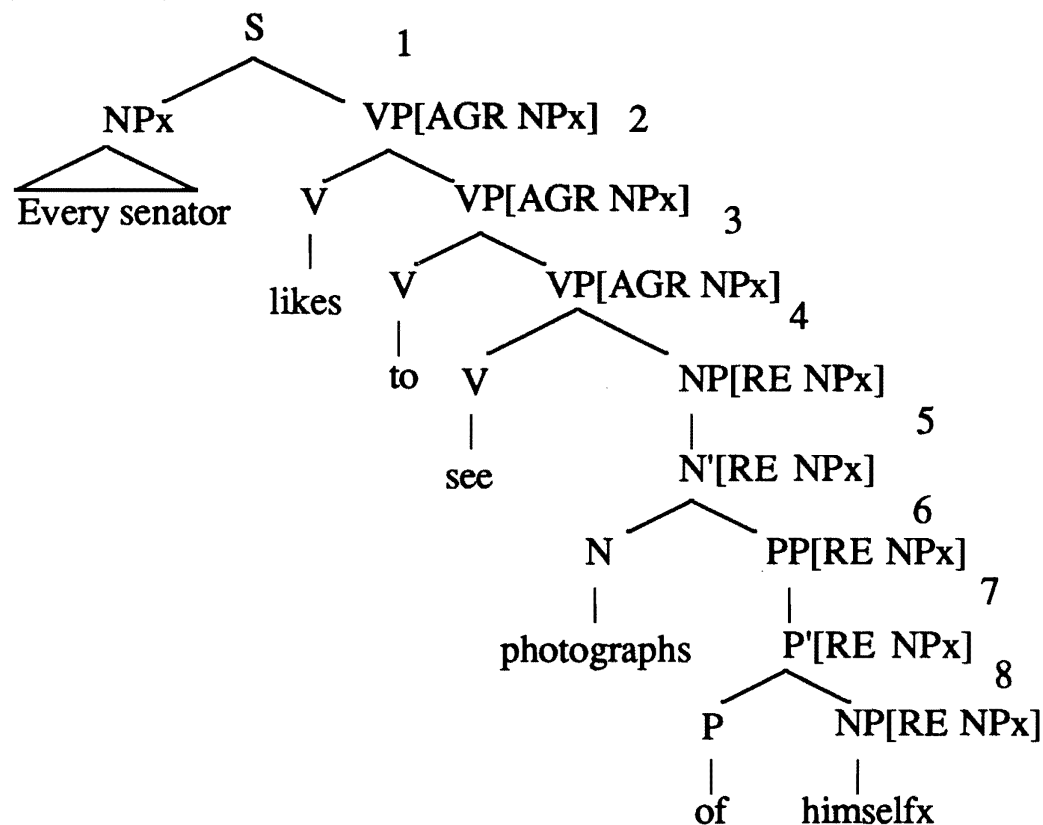
Example (12) is relatively straightforward. A reflexive feature (RE) specification is associated with the reflexive pronoun. I assume reflexive pronouns are assigned to category NP, contra Verheijen and Beukema (1987), who treat reflexive pronouns as, in effect, verbal suffixes in their GPSG analysis, where the verb and the reflexive form are immediately dominated by lexical V.[6] The FOOT feature RE is identified here with reflexives, though possibly both reflexives and reciprocals involve different values for a single feature (cf. GKPS).The reflexive specification does not percolate upward into the VP category, given the Feature Cooccurrence Restrictions in (1) and (2) above.

Intuitively, we can say that the reflexive pronoun must find its antecedent within the domain (cf, section 1.1 above).

But the syntactic link between the antecedent and the reflexive need not be local, as in (13) and (14) where nonlocal linkage is established through the feature-instantiation principles of GKPS even though these principles are well-formedness conditions on local trees. SUBJ passes down the tree (via the CAP) from the main VP to *see photographs of himself* while the reflexive specification passes up from the reflexive pronoun via the Foot Feature Principle, as in (15).[7] The Foot Feature Principle (FFP) in Gazdar, Klein, Pullum and Sag (1985) says roughly that if a mother contains an instantiated Foot feature specification (one not mentioned in the licensing ID rule) then so must at least one daughter (and vice versa). Thus the reflexive specification in NP in local tree 8 must pass upward or, looking at it from the other direction, the reflexive specification in the mother NP in local tree 5 must pass downward.

The antecedent of a reflexive pronoun may be something other than a subject, as in (5) above and in the following examples.

(16) Felix told the girls about themselves/himself.
(17) Felix talked to the girls about themselves/himself.
(18) Henry wrapped the pythons around themselves/himself.
(19) Henry leaned the ladders against themselves/himself.
(20) The professor showed his colleagues pictures of himself/themselves.

This changes nothing as far as the basic analysis of feature instantiation is concerned. Again, the reflexive feature percolates from a reflexive pronoun up to, but not into, a predicative category.[8]

(21) (= 18)
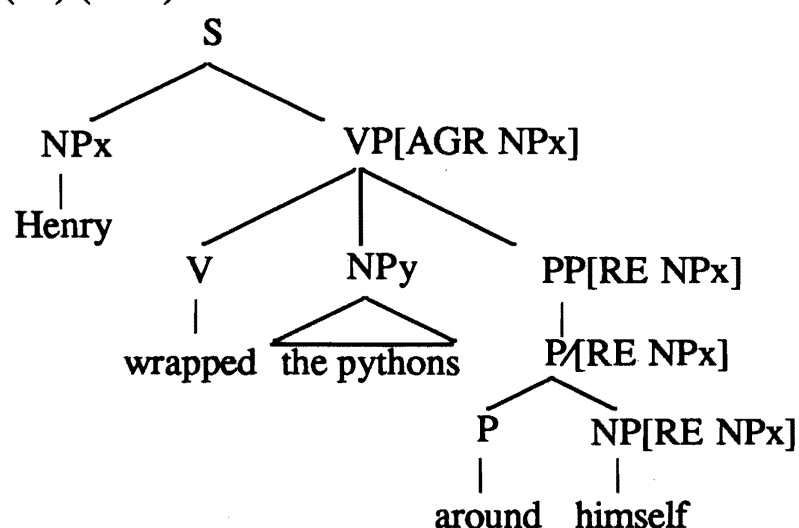
1.3. Biclausal Structures.

While early transformationalist work on the distribution of reflexives in English assumed the reflexive and its antecedent are within the same minimal clause (cf. Lees and Klima, 1963), it seems generally conceded that certain constituents of subordinate clauses may take on superordinate antecedents. It has long been known, for example, that picture noun phrases may contain reflexives whose antecedents are in a superordinate clause (cf. Ross, 1970), as in (23). I will assume all of the following are grammatical and that they contain bonafide reflexive pronouns (as opposed, say, to emphatics).[9]

(22) Fred would have preferred for himself to have done better.

(23) The professor thought that pictures of himself were on sale at the Louvre.
(24) Felix knew how many pictures of himself Alice showed the press.
(25) The senator knew which stories about himself his campaign manager had managed to suppress.

One might well question some of these--(22) being much better than (26), for example, though perhaps some principle of parsimony is involved.[10]

(26) Fred would have preferred to have done better.

Note too that a nonreflexive form is possible in place of the reflexive in (23).[11]

(27) The professor$_1$thought that pictures of him$_1$ were on sale at the Louvre.

And there doubtlessly is variation among speakers as to whether him or himself is preferred in the following examples.

(28) Felix claims that photographs of him/himself have been released by a recording studio.
(29) Fred claims that rumors about him/himself have exacerbated the problem.
(30) Alice frequently points out that stories about her/herself are generally false.
(31) Phibbs tells me that descriptions of him/himself can be found in several ancient documents.

But I assume here that the reflexives are grammatical, where RE percolates through S. In (23) the instantiation path of RE passes down from local tree 2 into the subordinate clause subject in local tree 4, as in (32) below. The Foot Feature Principle (FFP), as noted above, says that if a mother contains an instantiated foot feature specification (i.e., one not mentioned in the ID rule) then so must at least one daughter, thus driving RE down into the subordinate clause subject in this case.

(32) (= 23)
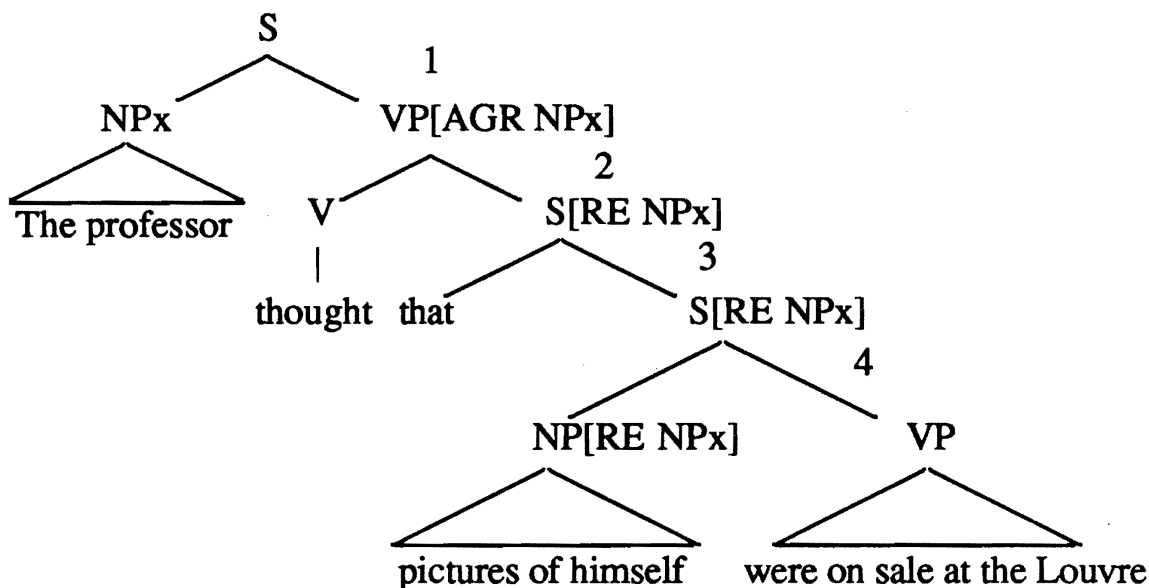
Following Brame (1977), I assume a reflexive pronoun must not be nominative, though this does not prevent it from being the subject of an infinitive clause or a nonhead constituent of a nominative subject.
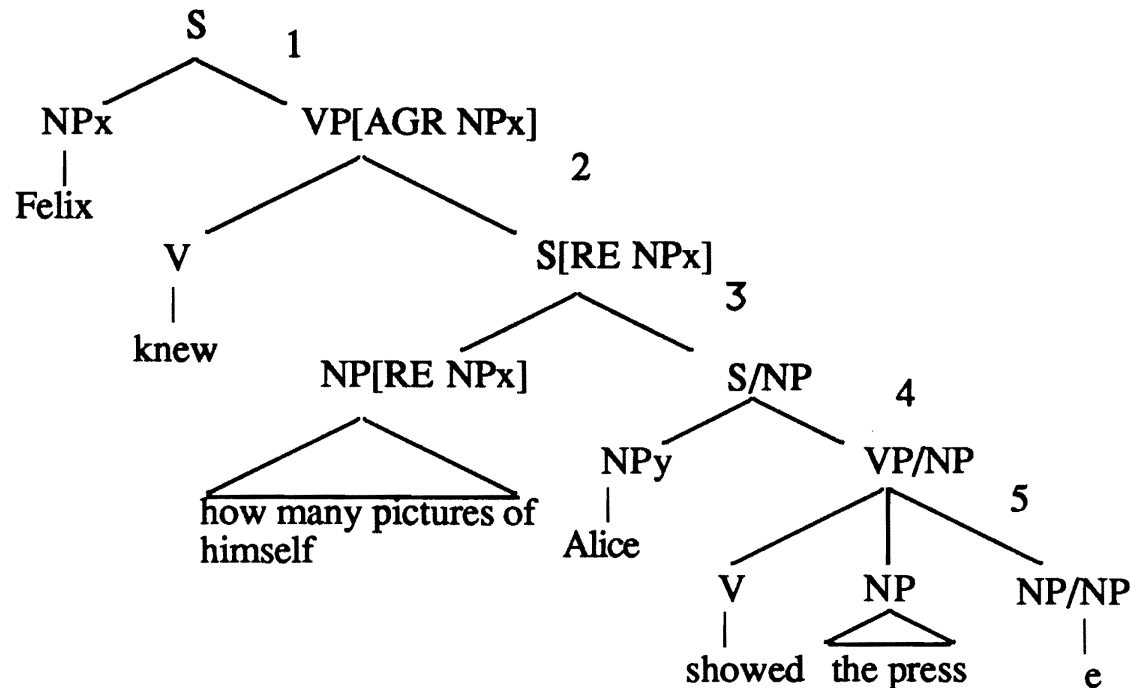
Picture NP reflexives within a clause-initial interrogative constituent as in (32) are analogous.[12] Note that the context for reflexive antecedence is superficial in these examples. Sentences corresponding to (24) and (25) without wh-movement are ungrammatical.

(34) Felix knew that Alice showed the press pictures of him/*himself.
(35) The senator knew that his campaign manager had managed to suppress stories about him/
*himself.

This contruction will be compared in Section 3 to cases which operate quite differently (i.e. reconstruction).

(33) (= 24)

```
                    S
                   / \ 1
                 NPx   VP[AGR NPx]
                  |   /      \ 2
                Felix V      S[RE NPx]
                      |      /      \ 3
                    knew   NP[RE NPx]   S/NP
                           /\           / \ 4
                          /  \        NPy   VP/NP
                how many pictures of    |   /  |  \ 5
                himself              Alice V   NP  NP/NP
                                          |   /\    |
                                       showed the press  e
```
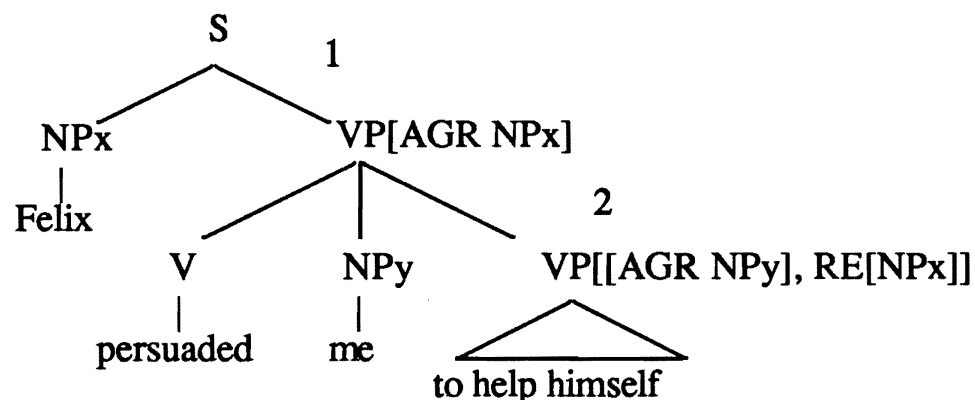
In summary, the domain of reflexivization can be characterized in GPSG by the free instantiation of a foot feature RE(flexive), where FCR 2 prevents any category from containing specifications for both reflexives and SUBJ. Thus the upper bound on percolation of a reflexive feature specification is the first category containing a specification for SUBJ.

2. Predicative Categories.

This section considers which categories constitute barriers to the instantiation of RE, the reflexive feature. It seems clear that RE should not appear in the feature composition of VP as this would give rise to examples such as

(36)*Felix persuaded me to help himself.
(37) (= 36)

```
                S
               / \ 1
             NPx   VP[AGR NPx]
              |   /   |   \ 2
            Felix V  NPy  VP[[AGR NPy], RE[NPx]]
                  |   |        /\
              persuaded me    /  \
                          to help himself
```

If RE appears in the feature composition of infinitive VP, the reflexive feature will percolate up from the reflexive pronoun to the main VP in local tree 2 of (37) below, yielding the incorrect prediction that the domain of reflexivization is, in effect, the entire sentence. Similarly, while RE can pass down into subordinate subjects as in (38), (39) is quite impossible.

(38) The professor thought that pictures of himself were on sale at the Louvre.
(39)*The professor thought that you would give himself the choice classes.

Let us assume that predicative adjective phrases also contain a SUBJ specification and hence form domains for reflexivization. This seems to be the correct generalization, as in the following examples.

(40) They make me ashamed of myself.
(41) They believe her totally unconcerned about herself/*themselves.
(42) a.   b.
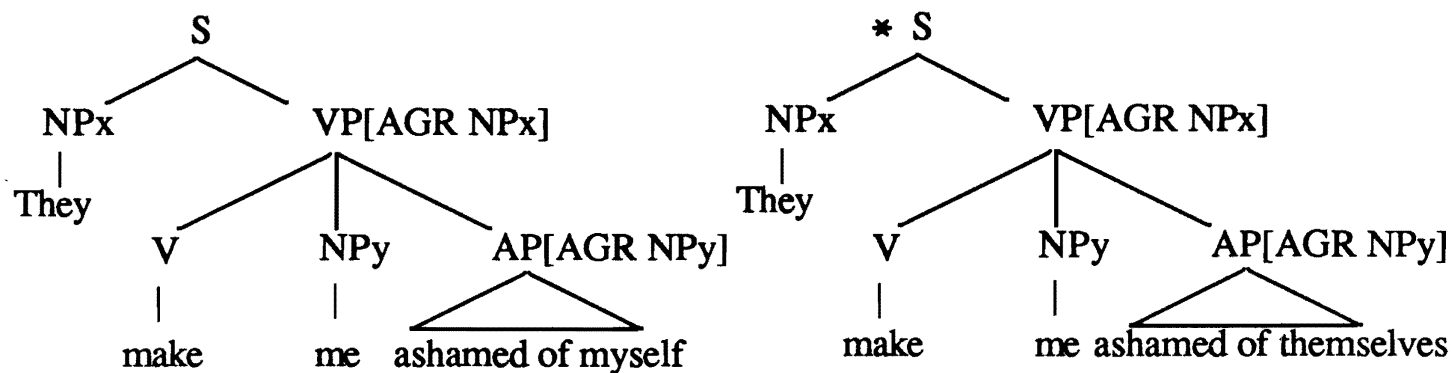
If predicate A^1 did not form the domain of reflexivization--the upper bound on feature migration, then presumably the upper VP would do so and the matrix subject would be a potential antecedent as in the ungrammatical (42b).

An independent--though theory-internal--argument that adjectival categories contain SUBJ specifications involves extraposition: GKPS's analysis relates (43) and (44) but it cannot be extended to adjectives as in (45) and (46) unless the latter contain SUBJ.

(43) That Sandy dislikes chard bothers Kim.
(44) It bothers Kim that Sandy dislikes chard.
(45) That Sandy dislikes chard is apparent to us.
(46) It is apparent to us that Sandy dislikes chard.

The former are related by a metarule which, if stated as follows, will account for both sets of constructions

(47) EXTRAPOSITION METARULE.

X[SUBJ S] → W

⇓

X[SUBJ NP[it]] → W, S

where the feature SUBJ corresponds to AGR in GKPS.[13] It seems obvious that GKPS intended the extraposition metarule to apply in the case of adjectives. In fact, they give the ID rule in (48), mutatis mutandis, from which (49) can be derived by the revised metarule above.

(48) A^1[SUBJ S] → H[25], PP[to]

(49) A¹[SUBJ NP[it]] → H[25], PP[to], S

An independent matter, of course, is whether SUBJ (or AGR) manifests itself in morphological agreement on the part of the lexical head. While predicate adjectives do not agree with subjects in English, they do, for example, in Icelandic (cf, Andrews, 1982).
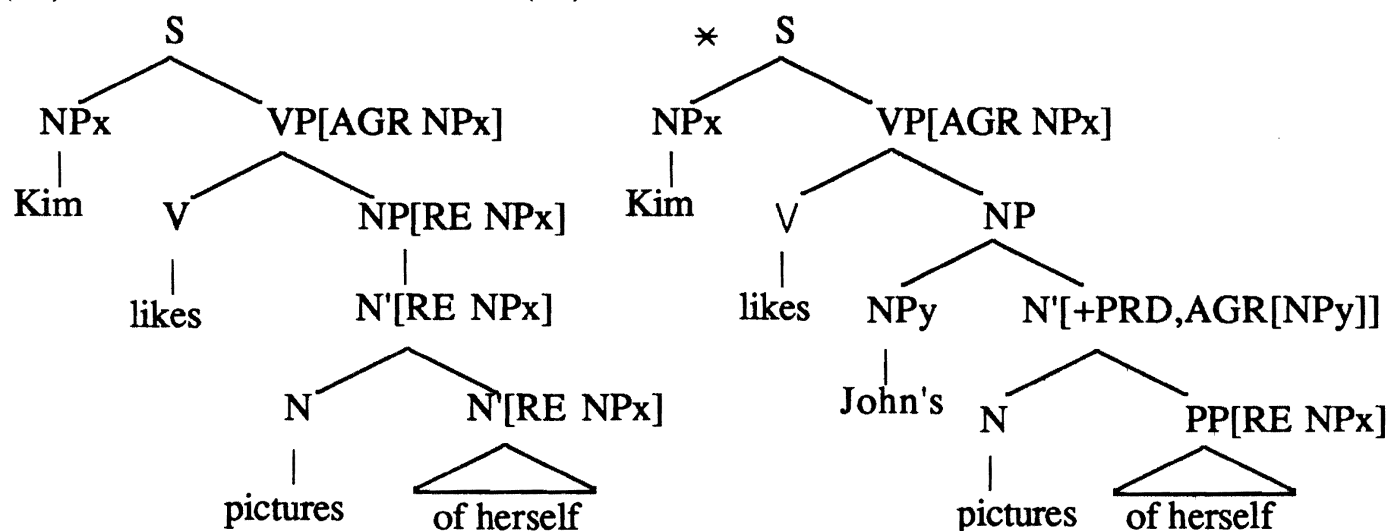
Perhaps noun phrases form a more controversial case as far as the presence of SUBJ goes.[14] But possessed and unpossessed NPs behave differently with respect to reflexives, an amply documented point in the literature (cf. Kuno, 1987).

(50) Kim likes pictures of herself.
(51)*Kim likes John's pictures of herself.
(52)   (53)

```
              S                          *        S
           /     \                             /     \
        NPx    VP[AGR NPx]              NPx      VP[AGR NPx]
         |      /      \                 |        /     \
        Kim   V       NP[RE NPx]        Kim     V        NP
              |          |                       |      /    \
            likes     N'[RE NPx]               likes  NPy   N'[+PRD,AGR[NPy]]
                       /    \                          |      /     \
                      N    N'[RE NPx]               John's   N      PP[RE NPx]
                      |       /\                             |       /\
                  pictures  of herself                   pictures  of herself
```

The antecedent of the reflexive may appear outside an NP as in (50) but not when the NP is possessed, as in (51). If possessed N1 is [+PRD], as in the following ID,

(54) NP → NP[+POSS], H¹[+PRD]

then FCR 1 (cf, 1) causes N¹ to contain a SUBJ specification. This of course means that the domain for reflexivization will be N¹ in possessed NPs.[15]

Note that this of course corresponds quite closely to Chomsky (1981), where binding condition A says that an anaphor must be bound in its governing category and a governing category may be defined as the first category dominating the anaphor's governor and an accessible subject, where possessive NP counts as a subject. However it might be objected that the feature SUBJ is rather different here, as it corresponds to AGR in GKPS, which is employed in subject-verb agreement and it may seem unlikely that head nouns agree with possessive NPs. However this simply means that a language may show agreement, not that it must. Finnish, for example, shows such agreement.

(55) (meidän) kirja-mme *our book*
       our-GEN. book-(NOM)-1P.PL.POSS.

Some complement locative PPs also seem to be predicative, as in the following examples.
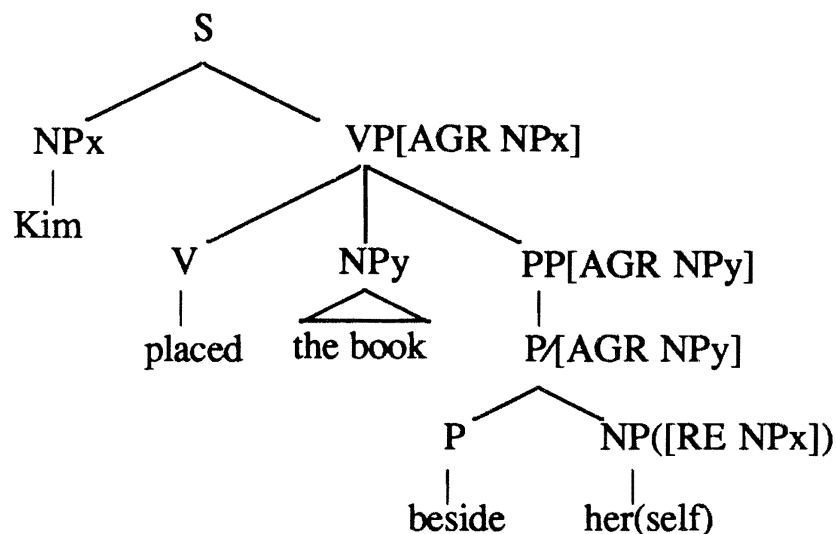
(56) Kim placed the book beside her/?herself.
(57) Fred keeps his valuables near him/?himself.

(58) Professor Zed always has many students around him/*himself.

Apparently the verbs subcategorize for predicative PPs (subject to speaker variation). If, for example, the PP category dominating *beside her* in (56) contains a SUBJ specification by virtue of being [+PRD], then the domain for reflexivization will be the PP (or P[1]), which presumably is controlled by *the book,* as in the following tree.

(59)

```
                    S
           ┌────────┴────────┐
          NPx            VP[AGR NPx]
           │          ┌──────┴──────┐
          Kim      ┌──┴──┐          │
                   V    NPy      PP[AGR NPy]
                   │   ╱──╲         │
                placed the book  P[AGR NPy]
                                 ┌──┴──┐
                                 P    NP([RE NPx])
                                 │      │
                              beside  her(self)
```

While reflexive antecedence has not been dealt with yet, clearly we could think of this as involving some relationship between the SUBJ specification in P[1] (ultimately controlled by *the book*) and the reflexive feature. In other words, the subject is quite outside the reflexive domain, so *herself* is not appropriate and *itself* is (though nonsensical). But the prepositional phrase is nonpredicative for speakers who accept *herself* in this context, in which case the reflexive feature specification percolates up into PP where VP forms the reflexive domain.[16]

Notice that even when a nonreflexive pronoun is used for subject antecedence, a reflexive pronoun is obligatory if the object is the antecedent. It is difficult to demonstrate this, since most relevant examples are pragmatically bizarre. But if one stretches one's imagination a little, I believe the following judgments hold.

(60) Henry tried to hide the python behind him/himself.
(61) Henry tried to hide the python behind itself/*it.
(62) Henry wrapped the python around him/himself.
(63) Henry wrapped the python around itself/*it.

This follows from the analysis as the object of the verb (*the python*) will be the controller of predicative PP and hence is accessible to the reflexive via the SUBJ specification in P[1]. This is an important point, since (61) and (63) clearly illustrate that reflexives are possible in this construction- -even for speakers who reject reflexives when the subject is the antecedent--so the PPs in question are not simply barriers to reflexivization. These facts fall out if the licensing immediate dominance rule is either (64) or (65), depending on dialect.

(64) VP → H, NP, PP([+PRD])

(65) VP → H, NP, PP[+PRD]

The first allows for reflexives referring to the subject when optional [+PRD] is not present and the second excludes this case.

In Summary, the instantiation of reflexive feature specifications is blocked by predicative categories, categories containing a specification for the feature SUBJ, which could be thought of as a species of subject. The percolation of reflexive (RE) feature specifications is blocked by Feature Cooccurrence Restriction 2, which says no category may contain specifications for both RE and SUBJ. In other words, predicative categories are barriers to percolation and hence form the domains for reflexivization.These categories include VP, predicate AP, possessed N^1 and certain cases of predicate PP.

3. Reflexives In Unbounded Dependency Constructions.

In section 1.2, we saw cases where a reflexive pronoun in a clause-initial wh-phrase has its antecedent in a higher clause (cf, 24). Let us now consider a fuller range of possibilities.
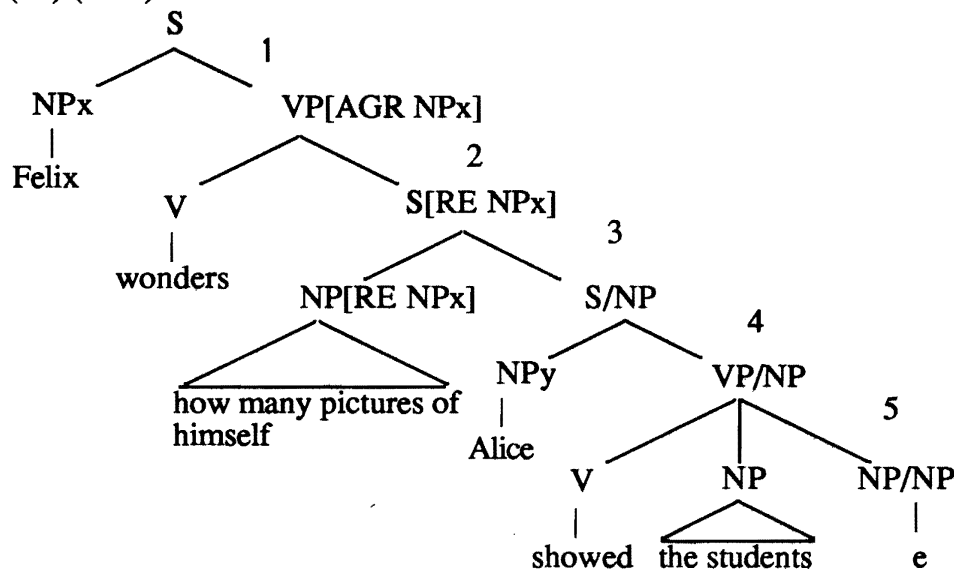
(66) *Felix* wonders how many pictures of *himself* Alice showed the students e.
(67) Felix wonders how many pictures of *herself Alice* showed the students e.
(68) Felix wonders how many pictures of *themselves* Alice showed *the students* e.

Example (66) contrasts markedly with (67) and (68). It seems as though the antecedents of the reflexives are determined at the gap site in the latter two, as opposed to (66), which is like (24). Compare the following examples without extraction.[17]
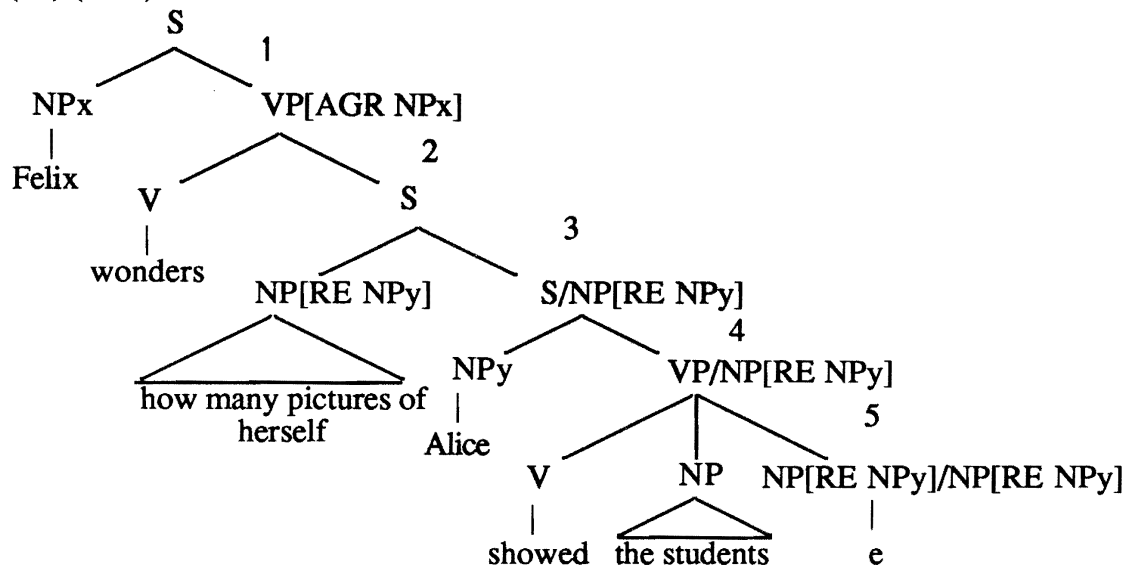
(69)**Felix* knows Alice showed the students several pictures of *himself.*
(70) Felix knows *Alice* showed the students several pictures of *herself.*
(71) Felix knows Alice showed *the students* several pictures of *themselves.*

On first blush, it seems that (66) involves superficial antecedence while (67) and (68) involve some sort of reconstruction or lowering of the wh-phrase down to the gap site. But the latter can be modelled by the feature composition of categories along the unbounded dependency path. In (72), corresponding to the case of 'superficial' antecedence in (66), the reflexive specification is not encoded in the categorial value of the UDC feature SLASH, while it is in (73), representing the reconstruction case in (67).
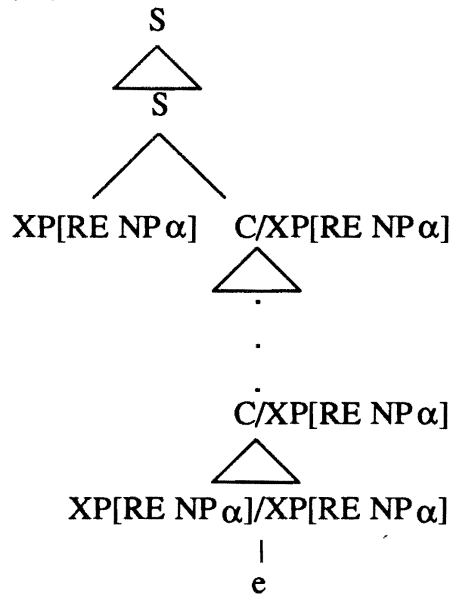
(72) (= 66)

82

(73) (= 67)

```
                          S
                         / \ 1
                      NPx   VP[AGR NPx]
                       |    / \ 2
                     Felix V   S
                           |  / \ 3
                        wonders NP[RE NPy]  S/NP[RE NPy]
                              /‾‾‾\ NPy      / \ 4
                   how many pictures of |  VP/NP[RE NPy]
                          herself     Alice  / | \ 5
                                            V  NP  NP[RE NPy]/NP[RE NPy]
                                            |  /‾‾\        |
                                         showed the students  e
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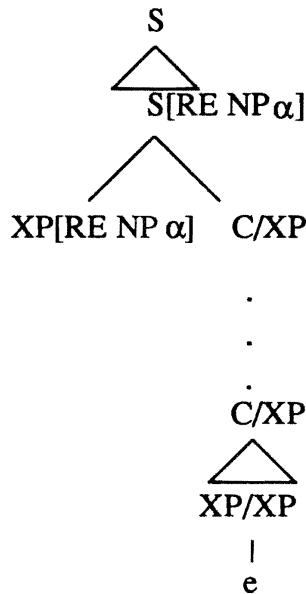
In (723), the reconstruction case, clearly [RE NP$_i$] in the wh-phrase should link with *Alice* at the bottom of the UDC path, which follows if RE is present in the gapped category, NP[RE NP$_i$]/ NP[RE NP$_i$], as in local tree 5. Assuming that terminal SLASHed categories are of the form α/α, the reflexive feature specification must be present in the value of SLASH as well in this terminal empty category and it is passed up the tree in the value of SLASH by the instantiation principles. In short, the empty category counts as a reflexive constituent and this information is transmitted up the tree in the value of SLASH.

What is not clear is why the reflexive specification is present in the value of SLASH in (73) but not in (72). Seemingly we need the following two configurations.[18]

(74) a.   b.

```
        S                              S
       /\                             /\
        S                            S[RE NPα]
       / \                          / \
 XP[RE NPα]  C/XP[RE NPα]    XP[RE NPα]  C/XP
              /\                           .
              .                            .
              .                            .
        C/XP[RE NPα]                     C/XP
          /\                             /\
 XP[RE NPα]/XP[RE NPα]                 XP/XP
          |                              |
          e                              e
```

Configuration (a) pertains to cases where the reflexive behaves as though its antecedent is determined at the bottom of the unbounded dependency construction--as in (67) and (68)--while

configuration (b) describes the seemingly superficial cases, as in (66), where the reflexive's antecedent is determined at the site of the UDC filler (or above).

Two facts may be salient here. First, the reflexive specification percolates up through S in configuration (b) and presumably it does not in (a). Second, the filler and the value of SLASH agree for the reflexive specification at the top of the unbounded dependency construction in (a), but presumably this is not the case in (b). If this characterization is correct, then the analysis in the context of the feature instantiation system in GKPS must involve the following rules.[19]

(75) $S \rightarrow X^2[RE\ NP],\ H/X^2$
(76) $S \rightarrow X^2,\ H/X^2$

This yields the option between inheritance and instantiation of the reflexive feature. The top of the unbounded dependency construction in (a) involves ID rule (76) whereas the top in (b) is a projection of (75), as discussed below. These of course can be conflated into (77).

(77) $S \rightarrow X^2([RE\ NP]),\ H/X^2$

RE is inherited in (67), corresponding to configuration (a), this is why it does not percolate up into S, since the Foot Feature Principle looks only at instantiated Foot features (those not mentioned in the licensing ID rule) and the licensing ID rule is (75). On the other hand, inherited Foot features (those mentioned in the licensing ID rule) are visible to the Control Agreement Principle, which forces agreement between the filler and the UDC feature SLASH, so RE appears in the value of SLASH and is passed down to the gap site.

RE is instantiated in (66), corresponding configuration (b), and this is why it percolates up to S, since it is visible to the Foot Feature Principle, where the licensing ID rule(76) does not mention RE. But the value of SLASH does not contain a specification for RE in configuration (b) and this is because the Control Agreement Principle as formulated in GKPS (page 89) says, in effect, that the filler and the value of SLASH agree in head features and **inherited** foot features.[20]

Two caveats may be in order. First, the domain of reflexivization may be clause-bounded for some speakers, who reject reflexives in examples such as

(78) Felix claims that himself/him, Alice refuses to deal with.

though this is difficult to reconcile with (22) under the assumption that (22) is fully grammatical. Second, it is highly likely that the domain of reflexivization in *picture* NPs extends beyond the normal cases. I have assumed here that principles regulating the domain of reflexivization in core cases extend to *picture* NPs when these appear in the appropriate syntactic contexts. But even if this is a reasonable assumption, it seems clear that additional principles come into play in

(79) Felix claims that it is likely that pictures of him(self) have been released by a recording studio.
(80) Felix insists that there are photographs of him(self) in the Louvre.

I suspect such cases may belong in the domain of pragmatic reference, much as presumably does control of infinitive VP when there is no configurational controller, though the following revision of FCR 2 will accommodate them.

(81) FCR 2: ~[[AGR NP[+NORM]] & RE]

This says, in effect, that reflexive specifications cannot occur in categories which encode referential NP subjects, as opposed to expletive ones. [+NORM] is an abbreviation for NFORM[NORM],

where expletive it NPs are NFORM[it], *there* is NFORM[there] and other NPs contain NFORM [NORM] (GKPS, pp 115-121). RE then passes up through categories containing specifications for expletive subjects. But examples such as following--where reflexives not in *picture* NPs are ill-formed in analogous contexts--lead me to believe that (79) and (80) may nevertheless fall outside the basic generalizations one might make concerning the domain of reflexivization.

(82) Felix claims that it is quite impossible for him(*self) to win the prize.
(83)*Felix claims that it appears to him(*self) that the butler killed the duchess.

Picture NP subjects of experiencer verbs also appear to fall outside the core cases (cf, Postal (1974), Grinder (1970), Jacobson and Neubauer (1976), and Pesetsky (1987)):

(84) Pictures of him(self) annoy Felix.

But this may not be a normal binding context, as the following example suggests, and, if so, examples such as (84) are problems for any current approach.

(85)*Pictures of him(self) annoy no senator.

4. Binding.

The syntactic treatment of reflexives above makes no mention of inflectional agreement between a reflexive pronoun and its antecedent. Since this approach addresses only the problem of defining the domain of reflexivization (expressed as feature-percolation) antecedence does not even come into play. While it is possible to provide a syntactic account of reflexive agreement a more plausible approach is to treat reflexive agreement simply as an instance of pronominal agreement which seems to be a semantic matter in English (e.g., natural gender). Here, I will incorporate inflectional agreement into the conditions on reflexive binding, though a more general treatment may treat the relevant features as semantic and set consistency constraints in the semantic model.

Reflexive binding is set here in the context of a type-driven translation to intensional logic along the lines of Klein and Sag (1985) and GKPS, as opposed to the rule-to-rule approach found in Gazdar and Sag (1981) or Pollard and Sag (1983). We should arrive at translations roughly along the following lines

(86) a. Felix liked a picture of himself.
b. liked' (a'(picture'(f*)))(f*)
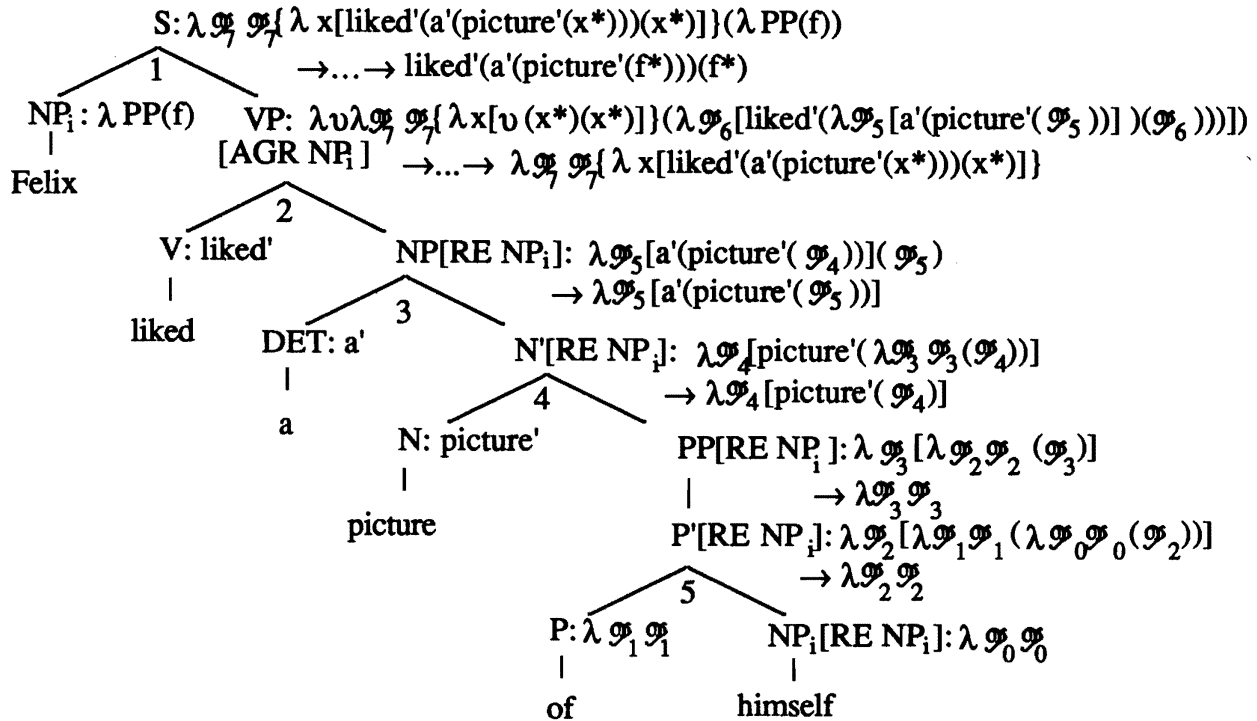(87) a. Kim showed Felix a picture of himself.
b. showed (a'(picture'(f*)))(f*)(k*)
c. showed (a'(picture'(k*)))(f*)(k*)

where f* (i.e., $\lambda PP(f)$) and (k*) translate *Felix* and *Kim* respectively.[21]

A reflexive pronoun translates as the identity function on NP types: $\lambda \mathscr{P} \mathscr{P}$ (cf. Pollard and Sag, 1983). The Foot feature RE is translated, working up the tree, by successive introductions of an NP-type variable bound by a lambda abstraction operator as in the following translation of (86).
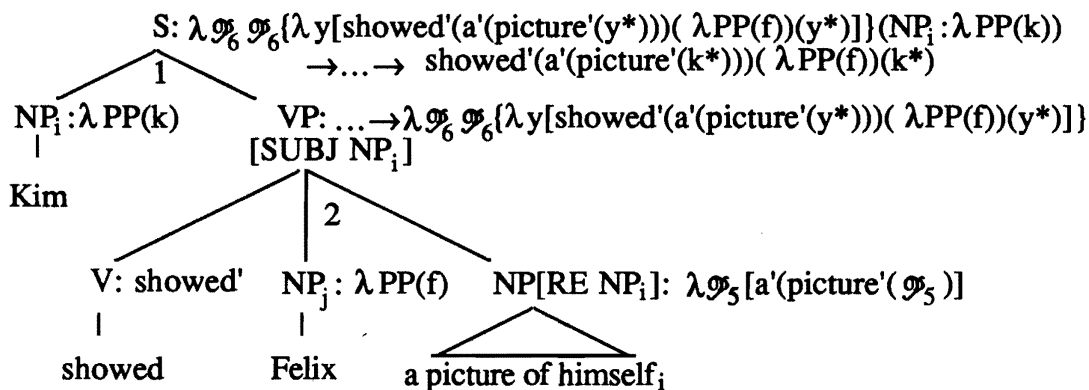
(88) (= 86)

$$S: \lambda \mathcal{P}_7 \, \mathcal{P}_7 \{ \lambda x[\text{liked}'(a'(\text{picture}'(x*)))(x*)] \}(\lambda PP(f))$$
$$\rightarrow \ldots \rightarrow \text{liked}'(a'(\text{picture}'(f*)))(f*)$$

$NP_i: \lambda PP(f)$ 1 $VP: \lambda \upsilon \lambda \mathcal{P}_7 \, \mathcal{P}_7 \{ \lambda x[\upsilon (x*)(x*)] \}(\lambda \mathcal{P}_6 [\text{liked}'(\lambda \mathcal{P}_5 [a'(\text{picture}'(\mathcal{P}_5))])(\mathcal{P}_6)))])$

Felix $[\text{AGR } NP_i]$ $\rightarrow \ldots \rightarrow \lambda \mathcal{P}_7 \, \mathcal{P}_7 \{ \lambda x[\text{liked}'(a'(\text{picture}'(x*)))(x*)] \}$

V: liked'   2 $NP[\text{RE } NP_i]: \lambda \mathcal{P}_5 [a'(\text{picture}'(\mathcal{P}_4))](\mathcal{P}_5)$
$\rightarrow \lambda \mathcal{P}_5 [a'(\text{picture}'(\mathcal{P}_5))]$

liked   DET: a'   3 $N'[\text{RE } NP_i]: \lambda \mathcal{P}_4 [\text{picture}'(\lambda \mathcal{P}_3 \, \mathcal{P}_3 (\mathcal{P}_4))]$
$\rightarrow \lambda \mathcal{P}_4 [\text{picture}'(\mathcal{P}_4)]$

a   N: picture'   4 $PP[\text{RE } NP_i]: \lambda \mathcal{P}_3 [\lambda \mathcal{P}_2 \, \mathcal{P}_2 (\mathcal{P}_3)]$
$\rightarrow \lambda \mathcal{P}_3 \, \mathcal{P}_3$

picture $P'[\text{RE } NP_i]: \lambda \mathcal{P}_2 [\lambda \mathcal{P}_1 \, \mathcal{P}_1 (\lambda \mathcal{P}_0 \, \mathcal{P}_0 (\mathcal{P}_2))]$
$\rightarrow \lambda \mathcal{P}_2 \, \mathcal{P}_2$

$P: \lambda \mathcal{P}_1 \, \mathcal{P}_1$ 5 $NP_i[\text{RE } NP_i]: \lambda \mathcal{P}_0 \, \mathcal{P}_0$

of   himself

The reader familiar with the translation of unbounded dependency constructions in GKPS will find the translation of RE in the middle of the path analogous. At the top of the reflexive path, in local tree (2), an extensionality predicate (RE_{SUBJ} below) is introduced in the translation of the VP, causing the subject and and reflexive to be bound in the expression
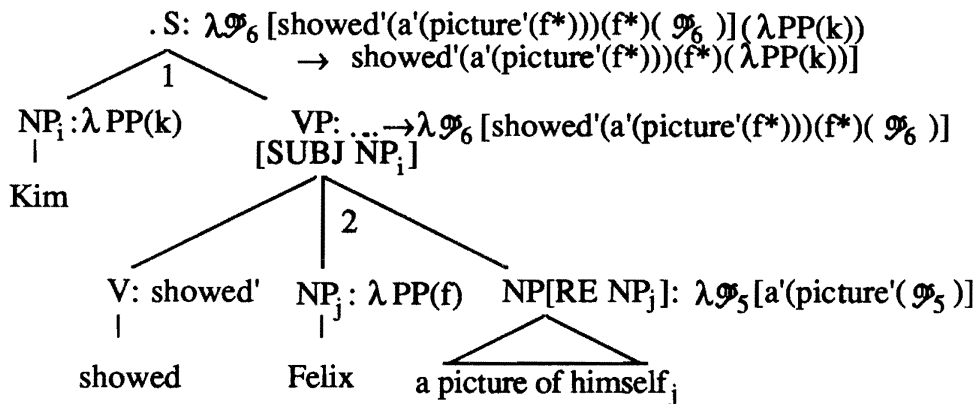
(89) $\lambda \mathcal{P} \mathcal{P} \{ \lambda x[\text{liked}'(a'(\text{picture}'(x*)))(x*)] \}$

where the first token of the variable x fills the position corresponding to *himself* and the second, the subject argument position. I return to a formal statement of the binding schemata below.

In (87) either subject or nonsubject antecedence is possible, as in the following trees.

(90) (= 87c) **Subject Binding.**

$$S: \lambda \mathcal{P}_6 \, \mathcal{P}_6 \{ \lambda y[\text{showed}'(a'(\text{picture}'(y*)))(\lambda PP(f))(y*)] \}(NP_i: \lambda PP(k))$$
$$\rightarrow \ldots \rightarrow \text{showed}'(a'(\text{picture}'(k*)))(\lambda PP(f))(k*)$$

$NP_i: \lambda PP(k)$ 1 $VP: \ldots \rightarrow \lambda \mathcal{P}_6 \, \mathcal{P}_6 \{ \lambda y[\text{showed}'(a'(\text{picture}'(y*)))(\lambda PP(f))(y*)] \}$

Kim $[\text{SUBJ } NP_i]$ 2

V: showed' $NP_j: \lambda PP(f)$ $NP[\text{RE } NP_i]: \lambda \mathcal{P}_5 [a'(\text{picture}'(\mathcal{P}_5))]$

showed   Felix   a picture of himself$_i$

(91) (= 87b) **Nonsubject Binding.**

. S: $\lambda\mathcal{P}_6$ [showed'(a'(picture'(f*)))(f*)($\mathcal{P}_6$)](λPP(k))
   $\rightarrow$ showed'(a'(picture'(f*)))(f*)(λPP(k))]

$NP_i : \lambda PP(k)$ ... 1 ...   VP: ...$\rightarrow\lambda\mathcal{P}_6$ [showed'(a'(picture'(f*)))(f*)($\mathcal{P}_6$)]
   [SUBJ NP_i]

Kim

V: showed' $NP_j : \lambda PP(f)$ ... 2 ...   NP[RE NP_j]: $\lambda\mathcal{P}_5$ [a'(picture'($\mathcal{P}_5$)]

showed   Felix   a picture of himself$_j$

The object and the argument inside the indirect object are bound in the nonsubject binding case, where a extensionality predicate (RE_{Obj} below) combines the translations of the daughters in local tree (2) in such a way that these two positions are bound as in

(92) $\lambda\mathcal{P}$[showed'(a'(picture(f*)))(f*)($\mathcal{P}$)]

which combines with the subject as in local tree (1). Nonsubject binding will be discussed at some length below.

The binding schema, applicable to local trees (2) in the three examples above, may be stated as follows, where this is intended to fit into the general translation schema in GKPS (cf, GKPS, pages ...). C_0 refers to the mother in the local tree (i.e., VP here).

(93) REFLEXIVE BINDING SCHEMA. When any daughter C_i contains a specification for <RE, NP>,
   RE $\notin$ DOM(C_0) and SUBJ $\in$ DOM(C_0) then
   i. C_i translates as $C_i'(\mathcal{P})$ and, if there is a daughter C_j and the head daughter is of type
      <...<C_i',...<C_j', VP>>...>, then either (ii) or (iii); otherwise (ii).
   ii. a. C_i(RE)|INFL = C_0(SUBJ)|INFL, and
      b. the semantic combination of the daughters (roughly, functional application),ϕ, is bound
         by $\lambda\mathcal{P}$ (i.e., $\lambda\mathcal{P}[\phi]$) and
      c. RE_{SUBJ} predicates on the result of (i) and (iib) (i.e., on $\lambda\mathcal{P}[\phi]$).
   iii. a. C_i(RE)|INFL = C_j|INFL, and
      b. the semantic combination of the daughters (functional realization), ϕ, is bound by $\lambda\mathcal{P}$
         (i.e., $\lambda\mathcal{P}[\phi]$)--except $C_j'$is replaced by $\mathcal{P}$ in ϕ--and
      c. RE_{OBJ} predicates on the result of (i) and (iiib) and on C_j' (i.e., on $\lambda\mathcal{P}[\phi]$ and C_j'),
   where INFL = {XSP, THRP, SING, GEN}.

The predicates RE_{SUBJ} and RE_{OBJ} are extensionality predicates binding, respectively, subject and nonsubject antecedents as follows.

(94) $RE_{SUBJ} = \lambda\, \upsilon^\alpha\lambda\mathcal{P}\mathcal{P}\{\lambda x[\upsilon^\alpha(x*)(x*)]\}$, where υ^α corresponds to the type of the functional
   realization of the daughters with the lambda abstract operator (i.e., TYPE(υ^α) =
   TYPE($\lambda\mathcal{P}[\phi]$), which is TYPE(<NP, VP>), noted as υ).[22]

(95) $\text{RE}_{\text{OBJ}} = \lambda \upsilon^\alpha \lambda \mathscr{P}_1 \lambda \mathscr{P}_2 \mathscr{P}_1 \{\lambda x[\upsilon^\alpha(x^*)(x^*)(\mathscr{P}_2)]\}$, where υ^α corresponds to the type of the functional realization of the daughters with the lambda abstract operator $(\text{TYPE}(\upsilon^\alpha) = \text{TYPE}(\lambda \mathscr{P}[\phi])$, which is TYPE(<NP, VP>), noted as υ).

While the binding translation schema looks complex, basically it breaks down into two cases, subject binding and nonsubject binding, each introducing an extensionality predicate which binds the appropriate arguments, as outlined above and discussed now in more detail.

For subject binding, consider the following.

(96)   VP[SUBJ: NP$_i$]

         V   NP[RE: NP$_i$]

The basic conditions obtain for binding: the mother contains a specification for SUBJ and a daughter contains one for RE while the mother does not. Further, this falls under the "otherwise" case in clause (i) of the schema, since there are no sisters which might be potential antecedents (i.e., C_j). *Liked a picture of himself* translates initially as in (a)-(b) below, following clauses (i) and (iia), with RE_{SUBJ} predicating on the result, as in (c), following clause (iib).

(97) a. $\lambda \mathscr{P}_4[\text{liked}'(\lambda \mathscr{P}_3[\text{a}'(\text{picture}'(\mathscr{P}_3))](\mathscr{P}_4))]$
         | |
       by (iib)   by (i)
   b. $\rightarrow \lambda \mathscr{P}_4[\text{liked}'(\text{a}'(\text{picture}'(\mathscr{P}_4)))]$ (lambda conversion)
   c. $\text{RE}_{\text{SUBJ}}(\lambda \mathscr{P}_4[\text{liked}'(\text{a}'(\text{picture}'(\mathscr{P}_4)))])$

In actual fact, the translation of the local tree is (a-c) collectively with no implication of sequential processes, yielding the following with the actual introduction of the extensionality predicate (where, once again, variables of type <NP, VP> are noted as υ).

(98) $\lambda \upsilon \lambda \mathscr{P} \mathscr{P} \{\lambda x[\upsilon(x^*)(x^*)]\}(\lambda \mathscr{P}_4[\text{liked}'(\text{a}'(\text{picture}'(\mathscr{P}_4)))])$
   $\rightarrow \lambda \mathscr{P} \mathscr{P} \{\lambda x[\text{liked}'(\lambda \mathscr{P}_3[\text{a}'(\text{picture}'(\mathscr{P}_3))](x^*))(x^*)]\}$
   $\rightarrow \lambda \mathscr{P} \mathscr{P} \{\lambda x[\text{liked}'(\text{a}'(\text{picture}'(x^*)))(x^*)]\}$

Clearly when the translation of the VP combines with the translation of the subject *Felix*, $\lambda\text{PP(f)}$, we achieve the desired result.[23]

(99) *Felix liked a picture of himself*
   $\Rightarrow \lambda \mathscr{P} \mathscr{P} \{\lambda x[\text{liked}'(\text{a}'(\text{picture}'(x^*)))(x^*)]\}(\lambda\text{PP(f)})$
   $\rightarrow \lambda\text{PP(f)}(\lambda x[\text{liked}'(\text{a}'(\text{picture}'(x^*)))(x^*)])$
   $\rightarrow \text{liked}'(\text{a}'(\text{picture}'(f^*)))(f^*)$

Turning to nonsubject cases, the conditions under which a nonsubject functions as an antecedent of a reflexive pronoun are not altogether clear, though I assume here that the antecedent is higher in the grammatical hierarchy than the constituent containing the reflexive feature specification, where Dowty's modelling of grammatical relations is assumed (Dowty, 1982a,b). For example, the italicised constituents in the following examples will be higher than the NPs or PPs which follow them.

(100) Kim gave *the students* pictures of themselves.

(101) Kim talked *to the students* about themselves.

Give as a ditransitive verb in (100) will be assigned the intensional logic type <NP, <NP, <NP, S>>>. That is, it is a function from NP-types (*pictures of themselves*) to a function from NP-types (*the students*) to a function from NP-types (*Kim*) to S-types. In Dowty's modelling of the grammatical hierarchy, the left-to-right order in <NP, <NP, <NP, S>>> is from the leftmost and most oblique argument (the 2-object *pictures of themselves*) to the rightmost and least oblique argument, the subject. Let us further assume, following GKPS, that PPs such as *to the students* translate as NP-types. *Talk* in the context of (101) is of type <NP, <NP, <NP, S>>>, where the first NP corresponds to the translation of the *about* PP.[24] So the condition in (i) that the head is of type <...<C_i',...<C_j', VP>>...> says that the nonsubject antecedent C_j must be higher in the grammatical hierarchy than the daughter C_i containing the reflexive specification.

When the antecedent of the reflexive is within the VP the translation of RE is somewhat more complex than in subject-binding, since an extensionality predicate must bind into two arguments within the VP translation. The VP in (79b) must translate as something along the following lines.

(102) *showed Felix a picture of himself*

$\Rightarrow \lambda\mathcal{P}_1\lambda\mathcal{P}_2\mathcal{P}_1\{\lambda x[\text{showed}'(a'(\text{picture}'(x*)))(x*)(\mathcal{P}_2)]\}(\text{lPP}(f))$

$\rightarrow \lambda\mathcal{P}_2\text{lPP}(f)(\text{lx}[\text{showed}'(a'(\text{picture}'(x*)))(x*)(\mathcal{P}_2)])$

$\rightarrow \lambda\mathcal{P}_2[\text{showed}'(a'(\text{picture}'(f*)))(f*)(\mathcal{P}_2)]$

Note that the translation of the object is outside at the initial stage (i.e. $\lambda\text{PP}(f)$). In effect, the antecedent NP must be pulled out of the "initial" translation which is to function as the argument of an extensionality predicate, to be replaced by a placeholder.

The verb phrase *showed Felix a picture of himself* translates "initially" as follows, where $\mathcal{P}_4$ replaces the translation of *Felix* following clauses (i) and (ii).

(103) a. $\lambda\mathcal{P}_4[\text{showed}'(\lambda\mathcal{P}_3[a'(\text{picture}'(\mathcal{P}_3))](\mathcal{P}_4))(\mathcal{P}_4)]$

　　　| 　　　　　　　　　　　| 　　　|

　　　by (iiib) 　　　　　by (i) by (iiib)

b. $\rightarrow \lambda\mathcal{P}_4[\text{showed}'(a'(\text{picture}'(\mathcal{P}_4)))(\mathcal{P}_4)]$ [lambda-conversion]

And this combines with RE_{OBJ} and the translation of *Felix* as in (95).

(104) $\text{RE}_{\text{OBJ}}(\lambda\mathcal{P}_4[\text{showed}'(a'(\text{picture}'(\mathcal{P}_4)))(\mathcal{P}_4)])(\lambda\text{PP}(f))$

　　　| 　　　　　　　　　　　　　　　　　|

　　　by (iiic) 　　　　　　　　　　　by (iiic)

$\rightarrow \lambda\upsilon\lambda\mathcal{P}_1\lambda\mathcal{P}_2\mathcal{P}_1\{\lambda x[\upsilon(x*)(\mathcal{P}_2)]\} (\lambda\mathcal{P}_4[\text{showed}'(a'(\text{picture}'(\mathcal{P}_4)))(\mathcal{P}_4)])(\lambda\text{PP}(f))$

$\rightarrow \lambda\mathcal{P}_2\lambda\text{PP}(f)(\lambda x[\lambda\mathcal{P}_4[\text{showed}'(a'(\text{picture}'(\mathcal{P}_4)))(\mathcal{P}_4)](x*)(\mathcal{P}_2)])$

$\rightarrow \lambda\mathcal{P}_2\lambda\text{PP}(f)(\lambda x[\text{showed}'(a'(\text{picture}'(x*)))(x*)(\mathcal{P}_2)])$

$\rightarrow \lambda\mathcal{P}_2[\text{showed}'(a'(\text{picture}'(f*)))(f*)(\mathcal{P}_2)]$

The awkwardness of this translation is of course due to the fact that a constituent of the VP is to have scope over the translation of the VP itself. This is eliminated if we assume binary branching within the verb-complement structure, as do Pollard and Sag (1983) and many researchers working in Montague Grammar (cf, Dowty, 1982a,b), though this entails a very different approach to subcategorization from that found in GKPS and goes beyond the scope of the present study.[25]
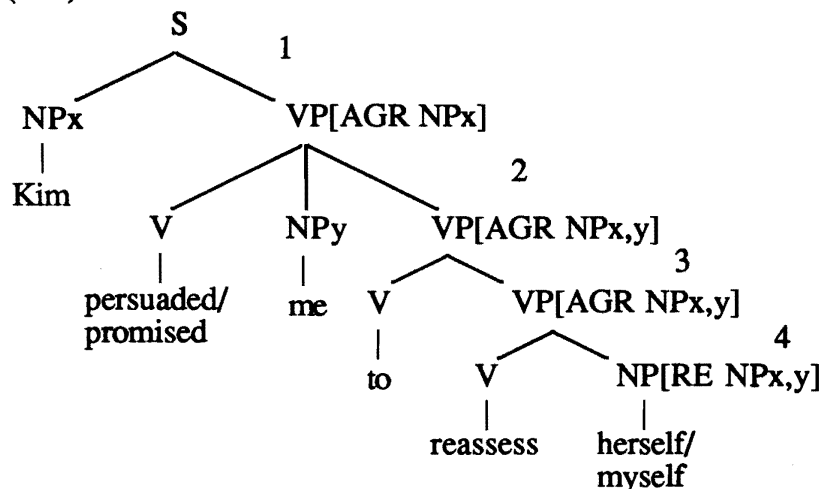
Incorporating reflexive agreement into the semantics or, specifically, into the binding conditions may appear to depart from the original objective of this study: to provide a description of reflexivization which articulates with the syntactic feature instantiation system in GKPS. But this is illusory since the conditions on binding depend crucially on syntactic feature instantiation. Consider the following sentences.

(105) Kim persuaded me to reassess myself/*himself.
(106) Kim promised me to reassess himself/*myself.

The object of *persuade* is the controller of the infinitive in (105) and, via the Control Agreement Principle, it is the ultimate controller of *reassess myself*. This means that the inflectional information associated with *me* will appear in the value of SUBJ in the lower VP, where the binding conditions require, in effect, that the reflexive pronoun be compatible in inflectional features as in the following when the value of RE is NPy.

(107)

```
            S
          ╱   ╲        1
      NPx       VP[AGR NPx]
       |        ╱    |    ╲        2
      Kim      V    NPy    VP[AGR NPx,y]
               |     |     ╱    ╲          3
         persuaded/  me   V      VP[AGR NPx,y]
         promised         |      ╱    ╲         4
                          to    V      NP[RE NPx,y]
                                |         |
                            reassess   herself/
                                       myself
```

In order for binding to go through, the values of RE and SUBJ must agree in inflectional features in local tree 4. Similarly, *promise* is a subject-control verb, so *Kim* is the ultimate controller of the VP *reassess himself* and the value of RE is then NPx. Clearly the effects of the syntactic Control Agreement Principle are essential to the analysis.

5. Conclusions.

The domain of reflexivization is described above in the context of the feature instantiation principles in Gazdar, Klein, Pullum and Sag (1985) where reflexivization is represented by a categorial valued Foot feature RE whose percolation defines the domain. The generalization presented here is that RE percolates up to but not into a predicative category—a category containing a specification for SUBJ—and the upward migration of RE is blocked by feature cooccurrence restrictions.

While I see no reason why the actual inflectional agreement between a reflexive pronoun and its antecedent could not be stated in the syntax, I believe that such agreement is essentially semantic and comparable to agreement between other pronouns and their antecedents. I have steered a middle course here by making inflectional agreement a condition on binding. This approach meets the initial objective of providing an analysis of reflexivization which articulates with the syntactic feature instantiation principles found in Gazdar, Klein, Pullum and Sag (1985), though straying somewhat from their dictum that the grammar does not admit semantic filtering.

Appendix A. The Foot Feature Principle.

The Foot Feature Principle as formulated in GKPS will not permit the analysis outlined above, where Feature Cooccurrence Restrictions 1 and 2 block the upward migration of reflexive feature specifications. I propose a reformulation of the FFP here and provide independent evidence for this move.

The FFP is absolute in its current formulation, which says roughly that the mother and daughters must agree in foot features. The formal statement of the FFP is discussed below but the following suffices for the present discussion.

(108) Foot Feature Principle (Informally Stated).
The instantiated foot feature specifications of the mother must form the unification of the instantiated foot feature specifications of the daughters.

Instantiated features are those which are not mentioned in the licensing immediate dominance rule (versus inherited ones, which are mentioned in the ID rule). Local tree 2 below violates the FFP if the reflexive feature specification is freely instantiated in a projection from the ID rule in (109).

(109) VP → H[#], NP, NP
(110)

```
                S
              /    \   1
          NPx      VP[AGR NPx]
           |        /  |  \    2
         Fred      V  NPx   NP
                   |  [RE NPx] △
                 baked   |    a cake
                       himself
```
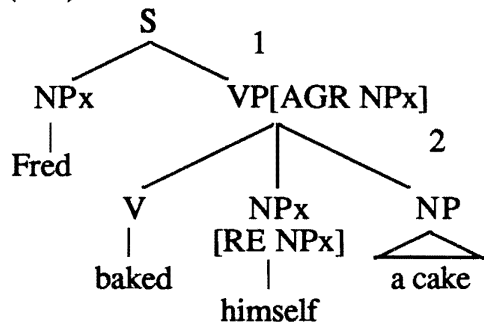
Recall that Feature Cooccurrence Restrictions 1 and 2 block the upward migration of the reflexive specification into VP. So while the FFP insists that an instantiated reflexive feature specification in a daughter be instantiated in the mother as well, the FCRs say this is impossible. In short, FCRs and the FFP as currently formulated conspire to guarantee that no VP (or other predicative category) may dominate a category containing a reflexive specification, clearly an undesirable outcome.

One might counter that a possible remedy is to assume reflexives are introduced by metarules as in earlier analyses of reflexives in Generalized Phrase Structure Grammar (cf. Gazdar and Sag (1981) or Pollard and Sag (1983)). Metarules operate on (lexically headed) ID rules, inducing new ID rules. So, for example, if the licensing ID rule for local tree 2 in (10) were one derived from (54)--as in (55)--the tree would not constitute a violation of the Foot Feature Principle, since the inherited reflexive specification in the daughter would be ignored by the FFP.

(111) VP → H[#], NP[RE X²], NP

There are a number of reasons for believing that this is not the right approach in the context of the version of Generalized Phrase Structure Grammar found in GKPS, however.

For the sake of argument, suppose we posit the following reflexivization metarule.

(112) <u>Reflexivization Metarule</u>.

$X \rightarrow W, X^2$

$\Downarrow$

X[SUBJ NPα] → W, X2[RE NPα], where α ∈ {<f, v> I f ∈ {SING, THRP, XSP, GEN}}.

That is, for any (lexically headed) ID rule which introduces a BAR-2 category, there is a corresponding ID rule in which the BAR-2 category contains a reflexive feature specification. Note that the metarule introduces SUBJ on the mother, so we can assume that the metarule is restricted to categories which may contain SUBJ specifications. This guarantees that the upper bound on percolation of RE will be a category containing SUBJ. Further, the rule is set up to cause agreement between the value of SUBJ and RE. This is of course an oversimplification of agreement between reflexive pronouns and their antecedents (cf, nonsubject antecedents).

But agreement cannot be stated in a metarule if we assume the analysis of person and number found in Sag, Gazdar, Wasow and Weisler (1985) where third person is {<THRP, +> , <XSP, +> }, second person is {<XSP, +>} and first person is unmarked. Similarly, plural is unmarked and singular is {<SING, +> }. The problem for stating agreement in a metarule is this: the absence of a specification is significant. Suppose we induce the following ID rule from (112).

(113) VP[SUBJ NP[+XSP]] → H[#], NP[RE NP[+XSP]], NP

Clearly our intent is that the values of SUBJ and RE should be second person plural, however nothing prevents either the value of SUBJ or that of RE from being more fully specified in an instantiated tree, since categories in trees need not be identical to those in ID rules; they extend the categories in the rules. So, for example, the value of SUBJ might be as it is in the ID rule but that of RE could be {<XSP, +>, <THRP, +>,<SING, +>}--since this is a valid extension of the ID rule--yielding ungrammatical examples such as the following.

(114)*You should fix himself a sandwich.

This of course does not preclude the use of a metarule, though it seems clear that metarules are not the place for stating agreement if we accept unary-valued inflectional features.[26]

Second, if a metarule were involved, it is not at all clear how two or more reflexive constituents could be introduced into the same domain, yet all of the following are grammatical.

(115) Kim sent himself pictures of himself.
(116) Sandy talks to herself about herself.
(117) Leslie persuaded herself that pictures of herself were on sale at the Louvre.

Metarules in GKPS are constrained in such a way that only one constituent could receive a reflexive specification. This is because only a single category on the right side of an ID rule can be mentioned in the input statement of a metarule.[27]
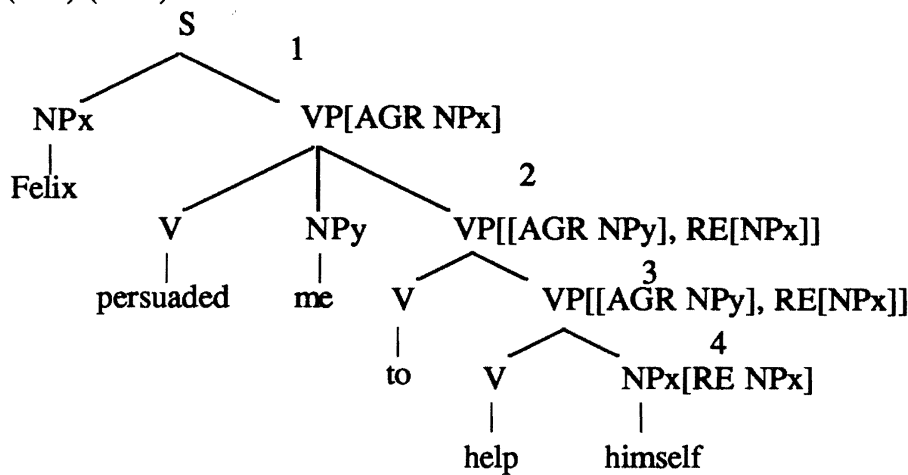
Lastly, a metarule will not in itself eliminate our original problem of preventing the percolation of the reflexive feature through predicative categories as in the following example.

(118)*Felix persuaded me to help himself.

Supposing reflexives are introduced by a metarule, there is no obvious reason why the licensing ID rule for local tree 2 in (64) below might not be the following (ignoring inflectional features in the values of SUBJ and RE).

(119) VP[SUBJ NP] → H[#], NP, VP[INF, RE[NP]]

(120) (= 62)

```
                    S
                   / \          1
                 /     \
               NPx      VP[AGR NPx]
                |      /  \         2
              Felix  /     \
                   /   |     \
                  V   NPy    VP[[AGR NPy], RE[NPx]]
                  |    |    /   \        3
             persuaded me  V    VP[[AGR NPy], RE[NPx]]
                          |    /  \        4
                         to   V    NPx[RE NPx]
                              |       |
                            help   himself
```

The point here is that we need a restriction to the effect that predicative categories cannot contain reflexive specifications, regardless of whether or not a metarule is employed. Note that no revision of the metarule would rule out examples such as the following.

(121)*Kim would have preferred for us to have helped himself.

If we assume that reflexive specifications can pass between clauses, then nothing prevents (121) unless FCR 2 is operative.

Given these problems with the introduction of reflexive specifications by a metarule at the tops of reflexive paths, another approach seems preferable if one exists within the context of the theory. As it turns out, Feature Cooccurence Restrictions 1 and 2 suffice to block the upward migration of RE through predicative categories if we revise the Foot Feature Principle slightly so that it forgives the impossible. The problem is currently as follows: FCRs 1 and 2 make it impossible for a predicative category to contain a reflexive specification but the FFP insists that if any daughter contains a reflexive specification, then the mother must as well--even if the mother is a predicative category. In short, the FCRs and the FFP are at odds with one another. This can be eliminated by reformulating the FFP along the lines of the Head Feature Convention in GKPS, employing the notion free **feature specification** (cf. GKPS, p. 95). Informally, the revised FFP should say something like the following.

(122) FOOT FEATURE PRINCIPLE, REVISED (Informally Stated).
    The inherited foot feature specifications in the mother must form the unification of the inherited foot feature specifications in the daughters insofar as this is possible.

The FFP as presented in GKPS is as follows (p. 82).

(123) FOOT FEATURE PRINCIPLE (FFP)
    Let Φ_r be the set of projections from r, where $r = C_0 \to C_1,...,C_n$.
    Then $\phi \in \Phi_r$ meets the FFP on r if and only if
    $$\phi(C_0)|FOOT\text{-}C_0 = \bigsqcup_{1 \le i \le n} \phi(C_i)|FOOT\text{-}C_i$$

$\phi(C)$IFOOT~C denotes the feature-value pairs in $\phi(C)$--the projection in the tree of category C in the ID rule--where the feature is a FOOT feature and it is not mentioned in C in the ID rule (i.e., the instantiatiated specifications). More precisely, this is as in (68) or, more succinctly, (69).

(124) $\{<f, v> \in \phi(C) \mid f \in FOOT\}-\{<f, v> \mid f \in DOM(C)\}$
(125) $\{<f, v> \in \phi(C) \mid f \in FOOT \& f \notin DOM(C)\}$

The equation in (123) then says that the instantiated foot feature specifications in $\phi(C_0)$--the mother in the tree--must equal the unification of the instantiated foot feature specifications in the daughters, $\phi(C_i)$.

The FFP is revised as follows, where $\psi(C, \Phi_r)$ denotes the **free feature specifications** in all possible projections of category C in an ID rule r. This is the set of feature-value pairs occurring in all possible projections of C. Here this is restricted to foot features and the notion 'possible projection' at this point means all projections of the licensing ID rule, where the ID rule and any Feature Cooccurrence Restrictions are satisfied.

(126) FOOT FEATURE PRINCIPLE (Relativized)[28]
    Let Φ_r be the set of projections from r, where $r = C_0 \rightarrow C_1,...,C_n$.
    Then $\phi \in \Phi_r$ meets the FFP on r if and only if
    $\phi(C_0)$IFOOT~$C_0 = (\sqcup \phi(C_i)$IFOOT~$C_i) \cap \psi(C_0, \Phi_r)$IFOOT
    $1 \leq i \leq n$

This says that the inherited foot feature specifications of the mother must be equal to the unification of the inherited foot feature specifications of the daughters intersecting with the free feature specifications of the mother. If a given foot feature specification is, in principle, not possible in the mother then it will not appear in $\psi(C_0, \Phi_r)$IFOOT. But if it does not, then it will not appear in the intersection, so such cases are forgiven by the revised FFP. In other words, a daughter of a predicative category may contain a reflexive specification and this will not percolate up into the mother due to FCRs 1 and 2.

There may be independent evidence for the relativized version of the FFP. Consider examples such as the following.

(127) I wonder who gave which books to whom.
(128) Which books do you think Felix gave to whom?

These sentences are ruled out, given GKPS's formulation of the FFP and the following Feature Cooccurrence Restrictions in GKPS.

(129) FCR 21: ~([SLASH] & [WH])
(130) FCR 22: VP $\supset$ ~[WH]

SLASH is the unbounded dependency feature and WH is a categorial valued feature involved in interrogative and relative pronouns. FCR 21 models the WH-Island constraint, blocking extraction from wh-clauses as in the following.[29]
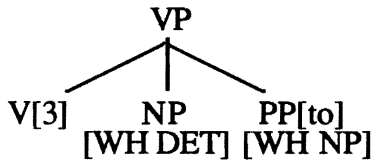
(131)*What do you wonder [S[WH]/NPwho ate e]?

As the WH feature specification is governed by the Foot Feature Principle, it percolates up to S, where the presence of SLASH then violate FCR 21. I believe (130) is intended to prevent VPs from counting as wh-phrases, blocking examples such as the following.
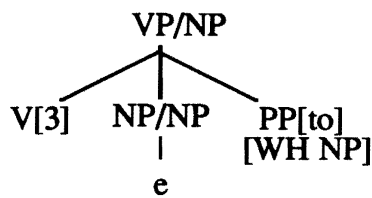
(132)*I wonder to see whom Felix wants e.

The problem in (127) and (128) is that the FFP rules out the following verb phrases.

(133) (cf, 127)

```
              VP
        ___/  |  \___
     V[3]    NP      PP[to]
          [WH DET]  [WH NP]
```

(134) (cf, 128)

```
            VP/NP
       __/   |   \__
    V[3]   NP/NP    PP[to]
             |     [WH NP]
             e
```

These are projections of the following immediate dominance rules (where the second is derived from the first by Slash Termination Metarule 1).[30]

(135) VP → V[3], NP, PP[to]
(136) VP → V[3], NP[+NULL], PP[to]

The FFP insists that VP contain the WH specifications in both cases, but the relevant FCRs say this is impossible, therefore the grammar wrongly predicts that no VP will ever contain a wh-constituent. These problems are eliminated in the new version of the Foot Feature Principle given above.

In summary, the relativized version of the Foot Feature Principle above permits the restriction on the upward migration of reflexive feature specifications by FCR 2. This reformulation has independent motivation in the instantiation of the interrogative feature WH, correctly permitting VP to dominate wh-constituents in (127) and (128). It should be noted that this relativization of the FFP does not constitute a change in the theory, since the notion **free feature specification** is employed in the formulation of the Head Feature Convention in GKPS.

Appendix B: Binding in Unbounded Dependency Constructions.

This appendix considers the binding of reflexives in unbounded dependency constructions, demonstrating that such constructions provide no unsurmountable problems for the analysis of reflexives above.

B.1. The semantics of reflexives in topics.

This section briefly outlines the translation of topicalized constructions when the topic contains a reflexive pronoun, as in
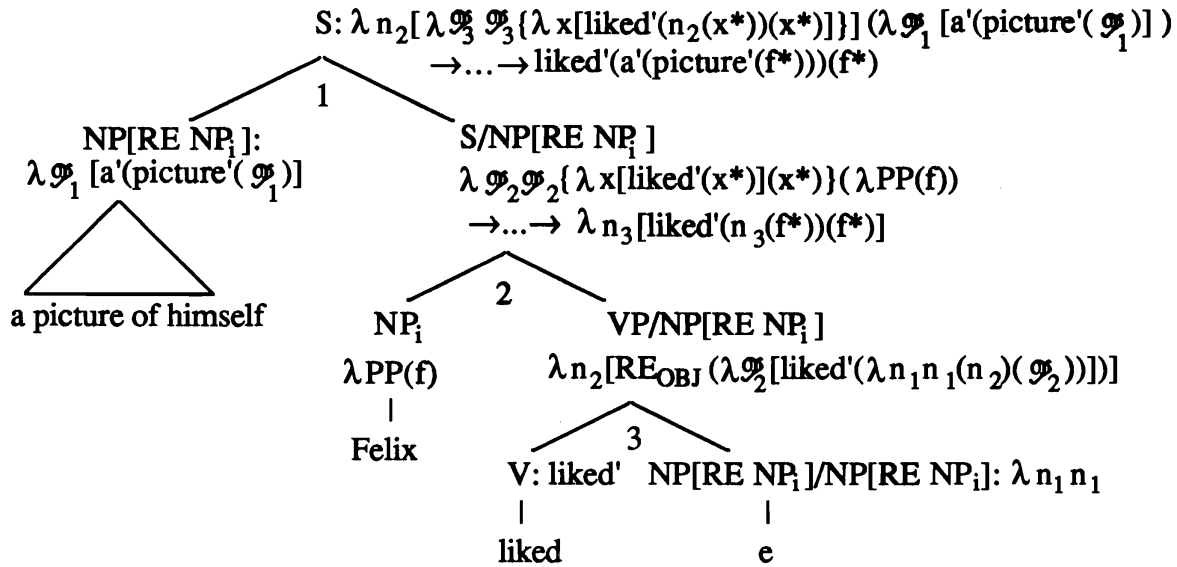
(137) A picture of himself, Felix liked.

I assume that topics are not necessarily extensional, following Pollard and Sag (1983) and contra GKPS. The topic will be interpreted down into the gap site, where it is in the domain for binding to the subject.

Note that a specification for RE appears within the value for SLASH in such constructions, as in the following tree.

(138) (= 137)

S: $\lambda n_2[\lambda \mathcal{P}_3 \mathcal{P}_3\{\lambda x[liked'(n_2(x^*))(x^*)]\}] (\lambda \mathcal{P}_1 [a'(picture'(\mathcal{P}_1)])$
$\to ... \to liked'(a'(picture'(f^*)))(f^*)$

         1

NP[RE NP$_i$]:
$\lambda \mathcal{P}_1 [a'(picture'(\mathcal{P}_1)]$

a picture of himself

S/NP[RE NP$_i$]
$\lambda \mathcal{P}_2 \mathcal{P}_2\{\lambda x[liked'(x^*)](x^*)\}(\lambda PP(f))$
$\to ... \to \lambda n_3[liked'(n_3(f^*))(f^*)]$

        2

NP$_i$
$\lambda PP(f)$
|
Felix

VP/NP[RE NP$_i$]
$\lambda n_2[RE_{OBJ}(\lambda \mathcal{P}_2[liked'(\lambda n_1 n_1(n_2)(\mathcal{P}_2))])]$

        3

V: liked'   NP[RE NP$_i$]/NP[RE NP$_i$]: $\lambda n_1 n_1$
| |
liked   e

At the bottom of the UDC path, NP[+NULL]/NP translates as the identity function on NP types--$\lambda \mathcal{P} \mathcal{P}$--and, in general, $\alpha[+NULL]/\alpha$ translates as $\lambda \upsilon^\alpha[\upsilon^\alpha]$, where υ^α is TYPE(α). Since NP[RE NP] is $\lambda \mathcal{P} \mathcal{P}$, which is of type <NP, NP>, the empty category NP[+NULL, [RE NP]]/NP[RE NP] should be a function from <NP, NP> types to <NP, NP> types--the identity function on <NP, NP> types. Hereafter, a variable of type <NP, NP> will be given as simply n here, so this null category is $\lambda n n$.

    Reflexive binding--the introduction of RE_{SUBJ}--occurs in the translation of *saw e* in local tree 3.

(139) *liked e* $\Rightarrow$

   i) $\lambda n_2[RE_{SUBJ}(\lambda \mathcal{P}_2[liked'(\lambda n_1 n_1(n_2)(\mathcal{P}_2))])] \to$

   ii) $\lambda n_2[\lambda \upsilon[\lambda \mathcal{P}_3 \mathcal{P}_3\{\lambda x[\upsilon(x^*)(x^*)]\}](\lambda \mathcal{P}_2[liked'(\lambda n_1 n_1(n_2)(\mathcal{P}_2))])] \to$

   iii) $\lambda n_2[\lambda \mathcal{P}_3 \mathcal{P}_3\{\lambda x[\lambda \mathcal{P}_2[liked'(n_2(\mathcal{P}_2))](x^*)(x^*)]\}] \to$

   v) $\lambda n_2[\lambda \mathcal{P}_3 \mathcal{P}_3\{\lambda x[liked'(n_2(x^*))(x^*)]\}]$

The addition of $\mathcal{P}_2$, the lambda abstraction operator binding it and RE_{SUBJ} in (i) follows the translation discussed in Section 4. The introduction of n_2 and the lambda abstraction operator binding it follows the translation of SLASH in GKPS (pp 229-236). Both SLASH and RE translating in the middle part of their paths by successive introductions of (a) the appropriate variable associated with the daughter constituent containing the Foot feature in question and (b) a lambda abstract operator binding this variable. So n_2 in $(\lambda n_1 n_1(n_2))$ is the former and λn_2 outside the translation of the whole phrase is the latter.[31]

    In local tree 1, the noun phrase *a picture of himself* is of type <NP, NP>, and so is n_3, bound by lambda in the translation of *Felix liked e*, which therefore predicates on *a picture of himself* as in

(140) $\lambda n_3[liked'(n_3(f^*))(f^*)](\lambda \mathcal{P}_1[a'(picture'(\mathcal{P}_1))])$
    $\to liked'(\lambda \mathcal{P}_1[a'(picture'(\mathcal{P}_1))](f^*))(f^*)$
    $\to liked'(a'(picture'(f^*)))(f^*)$

This is of course the desired result, that is, (137) and (99) are equivalent.

(99) *Felix liked a picture of himself*
$\Rightarrow \lambda \mathscr{P}\mathscr{P}\{\lambda x[\text{liked}'(\text{a}'(\text{picture}'(x^*)))(x^*)]\}(\lambda PP(f))$
$\rightarrow \lambda PP(f)(\lambda x[\text{liked}'(\text{a}'(\text{picture}'(x^*)))(x^*)])$
$\rightarrow \text{liked}'(\text{a}'(\text{picture}'(f^*)))(f^*)$

B.2. Reflexives in Constituent Questions.

Reflexive pronouns in wh-phrases present obvious problems if we assume the wh-phrase is extensional and is therefore not interpreted into the scope of the antecedent.

(141) Which pictures of himself would no teenage boy show to his girlfriend.

However Engdahl (1986) argues convincingly that wh-questions are not necessarily extensional. For example, the wh-phrase in the following example (Engdahl's (40), p. 167) has both de dicto and de re interpretations.

(142) Which book did John believe every author would read from?

As she notes, this '...has a reading on which it is appropriate to answer *his latest book* or *his best selling book.*' This reading does not imply John knows anything about the books in question (i.e., they seem to be part of the world of belief).

I will assume here that wh-phrases as UDC fillers are not necessarily extensional. However it is difficult to reconcile this with a treatment of questions along the general lines of Karttunen (1977) if we simply interpret the wh-phrase in, as in the treatment of topics in the previous section. For example, Karttunen translates (143) (his (34b), p. 20) as in (144).[32]

(143) Which girl sleeps?
(144) $\lambda p \exists x[\text{girl}'(x) \wedge {}^{\vee}p \wedge p = {}^{\wedge}\text{sleep}'(x)]$

This denotes a set of true propositions, those for which it is true that the individual sleeps and is a girl. So when a speaker asks such a question, he is requesting information about that set of propositions. Note that the individual, x, in subject position--*$^{\wedge}sleep'(x)$*--is bound outside by an existential quantifier outside the intensional context, but the description *girl'* is also treated as extensional (and would also be in object extraction).

Engdahl notes (following a treatment in Engdahl, 1980), the quantification part of Karttunen's analysis can be preserved while still interpreting the translation of N^1 into the gap context. While she rejects this approach, her reasons are not compelling and I adopt it here, recast into the present analysis. (145) will translate as in (146).

(145) which pictures of himself did Felix like?
(146) $\lambda p \exists F[{}^{\vee}p \wedge p = {}^{\wedge}\text{liked}'(\lambda P \forall x[F(\text{pictures}'(f^*)) \rightarrow P(x)])(f^*)]$

This involves binding a quantifier F corresponding to *which*, rather than the whole NP-translation. Roughly, F picks out the pictures such that p is true. The translation is as follows, where the the variable F is a determiner type (<N1, NP>) and corresponds to a WH feature specification so the translation is regulated by (i) and (iii) of GKPS's schema, involving Tr_0 and Tr_2. *Which* translates much like *all*, but it is a function from determiner types to determiner types.

(147) *all* $\Rightarrow \lambda P \lambda Q \forall x[P(x) \rightarrow Q(x)]$
(148) *which* $\Rightarrow \lambda F \lambda P \lambda Q \forall x[F(P(x)) \rightarrow Q(x)]$
(149) *pictures of himself* $\Rightarrow \lambda \mathscr{P}[\text{pictures}'(\mathscr{P})]$

(150) *which pictures of himself*

$\Rightarrow\lambda F_1\lambda\mathcal{P}_1[\lambda F\lambda P\lambda Q\forall x[F(P(x)) \rightarrow Q(x)](F_1) (\lambda\mathcal{P}[pictures'(\mathcal{P})](\mathcal{P}_1))\rightarrow\cdots$

$\rightarrow\lambda F_1\lambda\mathcal{P}_1[\lambda Q\forall x[F_1(pictures'(\mathcal{P}_1)(x))\rightarrow Q(x)]$

(151) *Felix liked e* $\rightarrow \lambda n[liked'(n(f^*))(f^*)]$ (cf. 116)

Note that the gap in (151) involves RE (cf, 140 and n is of type <NP, NP>). (151) and (152) will combine if the translation in the former is provided with an argument of type F, which it will be because WH will percolate up to the mother and clauses (i) and (iii) of GKPS's schema apply.

(152) *which pictures of himself Felix liked*

$\Rightarrow \lambda F_2[\lambda n[liked'(n(f^*))(f^*)](\lambda F_1\lambda\mathcal{P}_1[\lambda Q\forall x[F_1(pictures'(\mathcal{P}_1)(x)) \rightarrow Q(x)](F_2)) \rightarrow\cdots$

$\rightarrow \lambda F_2[liked'(\lambda Q\forall x[F_2(pictures'(f^*)(x)) \rightarrow Q(x)])(x^*)]$

This is not quite the translation in (146), repeated here.

(146) $\lambda p\exists F[\check{}p \wedge p = {}^\wedge liked'(\lambda P\forall x[F(pictures'(f^*)) \rightarrow P(x)])(f^*)]$

However, this translation results when (152) combines with the following predicate (save alphabetic variance of P and Q).[33]

(153) $Q_{WHICH} = \lambda\upsilon^{<F, S>}[\lambda p\exists F[\check{}p \wedge p = {}^\wedge\upsilon^{<F, S>}]]$

(154)

$\lambda\upsilon^{<F, S>}[\lambda p\exists F[\check{}p \wedge p = {}^\wedge\upsilon^{<F, S>}(F)]](\lambda F_2[liked'(\lambda Q\forall x[F_2(pictures'(f^*)(x)) \rightarrow Q(x)])(x^*)])$

$\rightarrow \cdots\rightarrow\lambda p\exists F[\check{}p \wedge p = {}^\wedge liked'(\lambda Q\forall x[F(pictures'(f^*)) \rightarrow Q(x)])(f^*)]$

In summary, reflexives in unbounded dependency constructions where the reflexive pronoun in the UDC filler finds its antecedent at the gap site seem to provide no particular problems under the assumption that UDC fillers are not necessarily extensional.

Notes

[1]Notable exceptions are Bach and Partee (1980), whose analysis is cast in terms of the translation from syntactic representations to intensional logic following a functional principle (cf. Keenan, 1974), and perhaps Pollard and Sag (1983) whose analysis --though similar in many respects to the one presented here--invokes an intensional logic type it setting the domain of reflexivization. This mixing of levels is outside the range of possibilities for feature cooccurrence restrictions as envisioned here and presented in GKPS (cf, section 1 below).

[2]While the analysis concentrates on reflexive pronouns, I would hope it is extensible to reciprocals for the most part, though some evidence suggests that the distributions of reflexives and reciprocals differ (cf, Lebeaux, 1983).

[3]Under the formulation of the FFP found in GKPS this is not true. Rather, if a daughter of VP contains RE, the local tree is inadmissible because the FCR prevents the mother from also containing it. See Appendix A for a discussion of this and a reformulation of the FFP.

[4]The analysis of infinitives in GKPS is assumed here, where *to* is treated as a verb (cf, Pullum, 1982) which selects a base-form (BSE) VP complement. The Control Agreement Principle of GKPS passes the value of SUBJ (or AGR in their system) down to the VP complement.

[5]See Carroll (1986) for an analysis of morphological reflexives used as referring pronouns. Her analysis (somewhat surprisingly) predicts examples such as the following are well-formed, though presumably subject to speaker variation.

i) Felix dislikes myself/themselves.

I focus here on what I take to be cases of bound anaphora.

[6]The facts are not clear, but I believe I would be willing to say that a reflexive is better than a simple pronoun in the following examples, yet presumably a reflexive should be impossible under their analysis.

 i) They could see Kim and themselves/*them in the mirror.

 ii) Alice sent Harry and ?herself/*her illegal souvenirs from Brazil.

[7]The Control Agreement Principle says roughly that when a category contains AGR, the value of AGR agrees with a controller sister (e.g., a subject) or, if there is no controller, it takes on the value of AGR in the mother. In local tree 2, for example, the infinitive VP has no local controller sister, hence its value for AGR must agree with AGR in the mother.

[8]I return to such examples in Section 2, noting that a nonreflexive pronoun is possible (or perhaps obligatory for some speakers) when the subject is the antecedent.

 i) Henry wrapped the pythons around him.

[9]If one were to decide such examples are outside the core cases perhaps they should not be termed 'emphatics', at least not in the sense of Verheijen (1987), who equates the term with **intensifiers** (e.g., *John himself mowed the lawn*). They might instead fall within the class of referring definite pronouns discussed in Carroll (1986).

[10]The so-called Avoid Pronoun Principle in Chomsky (1981, p. 65) might be thought of as a discourse constraint, in which case (22) could be construed to be grammatical but inappropriate in light of the possibility of (26).

[11]A treatment of bound nonreflexive, definite pronouns is beyond the scope of this paper. It seems clear that reflexives and definite pronouns are not always in complementary distribution, though I give no account here of the cases where a nonreflexive cannot be interpreted as coreferential with another NP. See, for example, Reinhart (1983a), who considers this to be a pragmatic constraint.

[12]Analogous examples are cited by Jacobson and Neubauer (1976). See also Bouchard (1985) and Huang (1983).

[13]The version in GKPS (page 118) is essentially the same except that it gives X^2 rather than X on the left sides of the arrows. Since the first projection above V^0 is V^2 in GKPS's system, the metarule applies to VP rules. But A^1 is the first level above A^0 and hence their version of the metarule can never apply to adjectives, since metarules apply only on lexically headed ID rules (and A^2 will never have a lexical head daughter.)

[14]R. Levine (personal communication) notes that predicative NP may necessarily carry AGR in missing object constructions so that the link between the filler (subject) and the gap is completed.

 i) Kim is a nuisance to deal with.

 ii) Felix is a pain to talk to.

See Hukari and Levine (1987c) for further discussion of connectivity in missing object constructions.

[15]This ID rule is of course analogous to Pollard and Sag's treatment and follows, as they note, Keenan and Faltz (1978) in taking possessed N^1 as being predicative.

[16]This may be an oversimplification. As noted by Kuno (1987), speakers often find a semantic contrast between examples such as the following.

 i) John pulled the blanket over himself.

 ii) John pulled the blanket over him.

Kuno's explanation is that the object of *over* is the target in the former and not in the latter. Though I find his explication of the notion 'target' somewhat unclear, I do perceive a difference: I would be more inclined to use (i) if the person pulled the blanket completely over himself, covering his head.

[17]A third case, so-called 'pitstop' reflexives (cf, Weisler, 1983), is problematic.

 i) How many pictures of *himself* does *Felix* think Alice claims the girls liked?

 ii) How many pictures of *herself* does Felix think *Alice* claims the girls liked?

iii) How many pictures of *themselves* does Felix think Alice claims *the girls* liked?

If (ii) is fully grammatical, then apparently a reflexive pronoun may be bound along the UDC path. Given configurations such as the following, where the mother is the VP whose subject is *Alice*,

iv) VP[AGR NP$_i$]/NP[RE NP$_i$]

V

S/NP

it is certainly possible to state binding, where a subject along the UDC path binds the reflexive if this is the correct generalization. However this configuration seemingly violates the Foot Feature Principle, under the assumption that the reflexive specification in the value of SLASH does not travel all the way down to the gap site. This not to say that such cases are beyond the power of the theory. In the worse case, a special exemption to the FFP could be formulated, though a more principled approach would be preferable.

[18]This, in fact, is a problem for the analysis in Pollard in Sag (1983). It seems clear that they assume their analysis accounts for configuration (a), where the reflexive feature is encoded in SLASH and passes down to the gap site (though they do not explicitly state this). But nothing in their proposal licenses the lack of a reflexive specification in the mother. In fact, it appears they have an account for (b), but not (a).

[19]This optional introduction of features in a licensing ID rule appears to be an essential mechanism for handling certain sorts of optionality in feature percolation in GKPS's system. See, for example, the immediate dominance rule for introducing conjunction markers in Warner (1988).

[20]More precisely, clause (i) of the CAP says that the value of SLASH agrees with the head features and inherited foot features of the filler. That is, RE need not be inherited in the value of SLASH; if it is inherited in the filler this is sufficient to make RE visible to the CAP. If SLASH were to contain a specification for RE in (66)--i.e., case (b)--this would be inadmissible at the top of the unbounded dependency construction because the CAP would force the filler to contain not only its instantiated RE specification but an additional inherited one, matching the value of SLASH, which is impossible.

[21]For simplicity, the intensionality will not be noted.

[22]I follow GKPS's IL types in the presentation here, where TYP(N^1) is $<e, t>$, rather than $<s, <e, t>>$ and TYP(NP) is $<s, <<e, t>, t>>$, not $<<s, <e, t>>, t>$ (or $<s, <<s, <e, t>>, t>>$). If we assume instead that TYP(NP) is $<s, <<s, <e, t>>, t>>$, then RE$_{SUBJ}$ is: $\lambda \upsilon^{\alpha} \lambda \mathscr{P} \mathscr{P} \{^{\wedge} \lambda x [\upsilon^{\alpha}(x^*)(x^*)]\}$.

[23]The notation $\lambda PP(x)$ and x^* are used equivalently here, both taken to be NP types. Strictly speaking the former should be $^{\wedge}\lambda PP\{x\}$, of type $<s, <<s, <e, t>>, t>>$.

[24]*About*-PPs are a problem given that the following is ungrammatical.

i)*Kim talked about the students to themselves.

Note that we understand this in such a way that the about-PP describes an implicit theme (i.e., the discussion was about so-and-so). Possibly the about-PP can be viewed as some species of predicative category. If so, the restriction of nonsubject binding to elements which translate as NP-types will account for the ungrammaticality of (i).

[25]See for example the head-driven approach in Pollard (1984).SUBCAT(egorization) is a list (stack) valued feature. Well-formedness conditions can be cast in terms of matching categories in binary trees with those in the SUBCAT stack (i.e., those in the tree extend those in the stack). In this approach, the complements of a head need not be sisters. In fact, the subject is in the stack.

[26]See, though, Warner (1988) for difficulties with unary valued inflectional features in light of the Head Feature Convention.

[27]This of course is not a compelling argument against the use of a metarule, given that one could imagine relaxing this constraint, though such a move is questionable in light of other problems with the use of a metarule noted here.

[28]This version of the FFP may not be adequate if we wish to rule out examples such as (i) as opposed to (ii) in the syntax.

i)*The person Fred wants to see whom is Alice.

ii) The person whom Fred wants to see is Alice.

It seems that features such as RE and interrogative WH may be bounded, restricted by FCRs, whereas certain other foot features, such as relative WH and probably SLASH cannot be bounded in this way. Calling interrogative WH Q and relative WH R, let us say that Q and RE are BOUNDED while R and SLASH are unbounded. The FFP might then be stated as follows, where, in effect, the original version of the FFP pertains to UNBOUNDED foot features.

iii) <u>Foot Feature Principle (Second Revision)</u>

Let Φ_r be the set of projections from r, where $r = C_0 \rightarrow C_1,...,C_n$.

Then $\phi \in \Phi_r$ meets the FFP on r if and only if

i) $\phi(C_0)|\text{UNBOUNDED} \sim C_0 = (\bigsqcup_{1 \le i \le n} \phi(C_i)|\text{UNBOUNDED} \sim C_i)$, and

ii) $\phi(C_0)|\text{BOUNDED} \sim C_0 = (\bigsqcup_{1 \le i \le n} \phi(C_i)|\text{BOUNDED} \sim C_i) \cap \psi(C_i, \Phi_r)|\text{BOUNDED}$.

[29]The reformulated FFP correctly rules out (131) and (132). Wh-extraction of VP in main clauses is not eliminated but this can be handled by more direct means such as blocking VP from being a possible value for SLASH.

[30]STM 1 in GKPS simply introduces [+NULL] on a BAR-2 daughter and a Feature Cooccurrence Restriction forces instantiation of SLASH. Hukari and Levine (1987b, in press) give a different treatment, where SLASH is inherited in the mother and the daughter is replaced by the special terminal symbol e.

[31]Note that $\lambda \mathscr{P}_2$ in (i) is inside the scope of the reflexive predicate while λn_2, binding the UDC variable, is outside. For those familiar with the translation schema in GKPS (pp 230-231), this shows that the placement of $\lambda \mathscr{P}_2$ here should not be conflated with the translation of Foot features in the mother.

[32]His IL expression is cast in a more classical montagovian approach, where subjects predicate on VP translations, as opposed to the approach taken here.

[33]Note that GKPS assume that the translation of an interrogative feature into a predicate (cf, QWHICH) does not occur unless the clause is imbedded. This is because it becomes "potent" at the point when the feature specification occurs in a daughter and not in the mother (cf. clause (iv) of their schema). I leave the matter open.

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