Probing phrases, pronouns, and binding[1]

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Abstract
One claim in this paper is that all labels with unvalued features are probes, in other words, phrases, too are probes. The second claim is that the difference between pronouns and reflexives is an effect of the syntactic derivation; personal pronouns are formed with all φ-features valued and need only case, which it gets in a clausal structure. The reflexive is formed in a structure that does not have values for its φ-features, since it lacks an N^0. Therefore, in addition to case it needs an antecedent that can value its φ-features. The valuation of φ-features is a probe–goal relation.

1 Introduction

The distribution of nominal expressions has given rise to a lot of debate in the literature (Chomsky, 1981; Reinhart and Reuland, 1993; Reuland, 2001; Zwart, 2002, etc). Traditionally, their distribution has been regulated by the binding principles. For various reasons the binding principles are not available in a minimalist syntactic theory. However, in a more recent suggestion, Reuland (2001) claims that the complementary distribution of pronouns and reflexives is an effect of the operation Agree (after movement into checking positions, Chomsky (1995)). Also, the notion of bound variable interpretation plays a crucial role. Consider the examples in (1). Coindexing does not have any theoretical status.

(1) a. Mary$_i$ saw herself$_i$. ... and so did John.
b. Mary$_i$ said that John saw her$_i$. ... and Lisa said so, too.
c. * Mary$_i$ saw her$_i$. ... and so did John.

For some reason a 'locally' bound variable must be (spelled out as) a reflexive (1a), whereas a 'non-locally' bound variable is (spelled out as) a pronoun (1b). In (1a), a bound variable reading is required, but not in (1b). Reuland suggests that only a reflexive allows the bound variable reading in (1a) because it enters into an Agree relation with its antecedent. A pronoun cannot enter such a relation and consequently does not allow a bound variable reading. I assume, in line with Reuland (2001) that the bound variable reading that is possible in (1b) is a different kind of relation, especially since only the one in (1a) has a morphological effect.

[1]I'm grateful to Eva and Satu for comments. This paper is based on a presentation held in Barcelona at GLOW-2006, in April.

Two problems with Reuland's analysis are: It requires (overt or covert) movement of the reflexive for feature checking, and it predicts that 1^{st} and 2^{nd} person pronouns can be used as reflexives.

The suggestion in this paper is: There is indeed an Agree relation between reflexive and antecedent, but not between subject and pronoun. This Agree relation is a probe–goal relation, just like other Agree relations. Moreover, in line with Zwart (2002) (but contra Reuland (2001)) the morphophonological form of a pronoun/reflexive is an effect of the syntactic derivation. There are only root pronouns in the lexicon and they are unmarked for reflexivity. The syntactic difference between reflexives and pronouns is what category forming head the root merges to.

We can split the binding problem into two parts:

- the formation of a syntactic relation: probes
- the difference between reflexives and pronouns

The outline of the paper is the following: in section 2, we will briefly look at probes. In section 3, we will look at the structure of pronouns and reflexives. In section 4, we will look at how the agree relation between an antecedent and a reflexive is established. Finally, section 5 summarizes and concludes the paper.

2 Probes

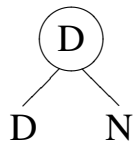
Syntactic relations are formed via Agree between a *probe* and a *goal* (Chomsky, 2001, 2004a,b).

(2) Feature checking, then, resolves to pairs of heads $<$ H, H$'$ $>$ [. . .]. For optimal computation, one member of the pair must be available with no search. It must, therefore, be the head H of the construction α under consideration, α=$\{$H, XP$\}$. Call H a *probe* P, which seeks a *goal* G within XP;. . . (Chomsky, 2004a, 113)(emphasis in original)

In short, a probe is the label of the structure and it searches its c-command domain. According to Chomsky (2001, 2004b) the label is a probe because it is available without search.

But since the label (or projection) of D and N in (3) and (4) is available for external merge without search, it should be a probe when it is merged to vP.

(3)



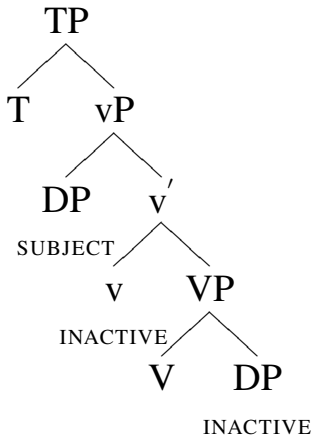
(4) D $\{$D, N$\}$

Therefore I will assume that all externally merged heads/labels are probes (cf. Epstein et al., 1998, 26–36). In the rest of the paper I will refer to the label of D as DP, to avoid confusion.

Note that only the label, that is DP, is a probe, the objects embedded in DP are not available without search and do not enter a relation with the things DP probes.

Now, what are the consequences of letting phrases probe? If we maintain Chomsky's activation condition (Chomsky, 2001, 2004a) that probes and goals are only active if they have unvalued features, there are no unwanted side effects. When the subject in (5) is merged, the label, DP, probes its domain. But since little v and the object have already valued and checked each other's features, there are no unvalued features left, and no active goals in the domain of DP. So the subject DP does not agree with anything when it probes. When T is merged, the subject gets its unvalued case feature valued and the φ-features of T are valued. The conclusion is that there are no unwanted consequences of letting all labels probe. All syntactic objects, heads and phrases/labels with unvalued features are probes when they are externally merged.

(5)



To sum up this section, the assumption is that all externally merged syntactic objects with unvalued features are probes. There appears to be no unwanted consequences.

Now, let us turn to the structure of the pronominal DP.

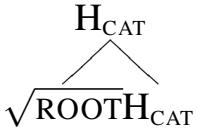
3 Pronouns

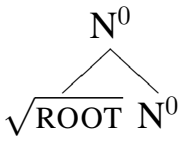
The suggestion in this section is that pronouns and reflexives are formed from the same root (Zwart, 2002). The differences we see between personal pronouns and reflexives depend on what category forming head the pronominal root merges to.

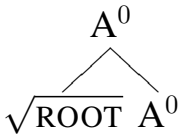
3.1 Word formation

On the assumption that word formation is syntactic (Distributed Morphology) (Halle and Marantz, 1993; Marantz, 1997; Josefsson, 1998; Julien, 2002; Embick and Noyer, 2001, among many others), the formation of compounds proceeds as outlined in (6).

(6) *Word formation* (Josefsson, 1998)

a. 

b. 

c. 

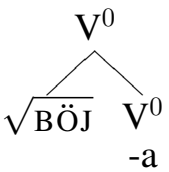
Josefsson (1998) claims that a word is formed as in (6a). A category neutral root is merged to a category forming head. In (6b) a noun is formed and in (6c) an adjective. The root lacks syntactic features, these are on the category forming head.

Now let us look at compounds. Since we don't find inflection inside compounds, as in (7) (Williams, 1981), Josefsson (1998) claims that the first element in a compound is a bare root without a category forming head.

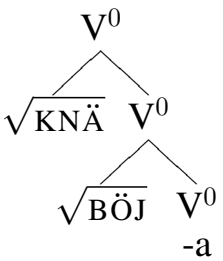
(7) a. cannonballs
b. * cannonsball
c. * cannonsballs

Josefsson's suggestion is that a compound, such as Swedish *knäböja* 'kneebend', 'kneel', is formed as in (8) .

(8) *Swedish Compounds* (Josefsson, 1998)

a. 

bend + verbal infl

b. 

kneebend 'kneel'

First, the root *böj* 'bend' is merged to a category forming head V which is instantiated with the morpheme *-a*, as in (8a). Then the root *knä* 'knee', is merged to the structure, as in (8b). Since the root *knä* never gets any inflection it is spelled out as a root.

3.2 Pronouns are roots

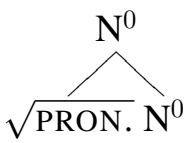
If we take a closer look at how compounds and pronouns relate to each other we see that pronouns occur in compounds and the conclusion we can draw from this is that pronouns are roots.
Consider word formation:

(9) *English* (Déchaine and Wiltschko, 2002; Rullmann, 2004)
   a. the *me*-decade (the 70s), the *me*-generation, *we*-generation
   b. *you*-section, *you*-factor
   c. *he*-goat, *she*-devil, *it*-girl

(10) *Swedish*
   a. *jag*-känsla, *jag*-centrerad, *jag*-föreställning, *vi*-känsla,
      I-feeling, I-centered, I-image, we-feeling
      'me-feeling, me-centered, self-image, we-feeling'
   b. *du*a, *du*-skål, *du*-reform, *ni*a, *ni*-reform
      you(verb) you-toast, you-reform, you-pl(verb)
      'to-say-you(sg.) drop-the-titles, you-reform, to-say-you(pl.), you-reform'

As we see in (9) (English) and (10) (Swedish) pronouns occur as the first element in compounds. According to the analysis of compounds outlined above, this means that they have to be roots.[2]

A further indication that pronouns are roots is that the root pronouns can merge with an N^0, forming a noun, as in (11), which we see examples of in (12).

(11)


(12) a. Is it a *he* or a *she*?
   b. A whole new *me*
   c. There will never be another *you*

[2]For the semantics of the root pronouns see discussion in Heinat (2006).

d. The *me*s and *you*s in this world.

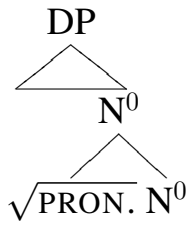
e. Är det en *hon* eller en *han*?
is it a she or a he

f. Det egna *jag*et blir lidande.
the own I-the becomes suffering
'The self suffers.'

g. I den här boken vänder hon sig till ett annat *du* än i
in this here book-the turns she refl. to an other you than in
sin förra diktsamling. (Teleman et al., 1999)
refl.poss. last collection of poems
'In this book she turns to another you than in her last collection of poems.'

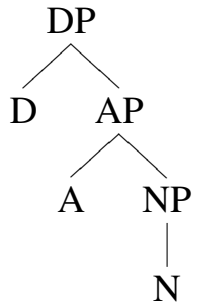
I propose the following structure for pronouns:

(13) *Referential DP*



Under the assumption that a DP has the structure as suggested by Abney (1987) shown in (14), adjectives precede the NP.

(14) *The DP* (Abney, 1987, 213)



Further support for an analysis where pronouns are N heads is the fact that they that can be (moderately) modified by preceding adjectives:

(15) *Swedish*

a. lilla jag/mej
little I/me

b. lyckliga du/dej/han/hon/dem
happy you/you/he/she/them

c. dumma hon/han
stupid her/him

(16) *Huddleston and Pullum (2002, 430)*

a. poor old me

b. lucky you

Since pronouns occur in complementary distribution with determiners, the standard analysis is that they raise to D^0. Now, let us turn to the reflexives and see how they fit the analysis of pronouns.

3.3 Reflexives

If reflexives are formed from the same roots as personal pronouns we don't expect to see them in word formation:

(17) a. * himself-defense

b. * herself-contempt

c. * sej-försvar
refl.-defense

d. * sej-förakt
refl.-contempt

(18) a. self-defense

b. self-contempt

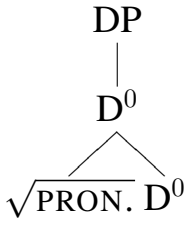
c. själv-försvar
self-defense

d. själv-förakt
self-contempt

As is clear from (17) and (18) it is impossible to use reflexives in word formation. Note that this is not due to the complex/simplex distinction that is sometimes made (Reinhart and Reuland, 1993).

I suggest that reflexives have the following structure:

(19) *Reflexive DP*



The prediction of the structure in (19) is that reflexives cannot be modified in any way since they lack all projections below D. This is also, to my knowledge, true. It is impossible to modify reflexives. In the next subsection we take a closer look at why reflexives, in contrast to pronouns, need an antecedent in the clause.

3.4 Why does the reflexive DP need an antecedent?

In line with Pesetsky and Torrego (2004) I assume that there is a distinction between feature valuation and feature interpretability. Their claim is that there are in fact four kinds of features:

(20) *Features that are the input to the syntactic derivation*

1. uninterpretable valued
2. uninterpretable unvalued
3. interpretable unvalued
4. interpretable valued

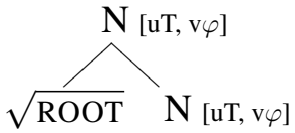
The difference from a Chomskyan system is that interpretability is separated from feature values. However, in line with Chomsky (2001, 2004a) the assumption is that all features must have a value – otherwise the feature cannot be deleted if it is uninterpretable, or it cannot be interpreted if it is interpretable. In (21) I give the feature set up of the DP (Julien, 2005). The N-head has uninterpretable and valued φ-features, and an uninterpretable unvalued T. Basically T is a case feature, but it differs from Chomsky's case feature in that it behaves just like any other feature and it has a valued counterpart. The features on D are interpretable but unvalued φ-features, and an uninterpretable unvalued T-feature.

(21) *The feature set up in DP* (cf. Julien, 2005; Pesetsky and Torrego, 2005)

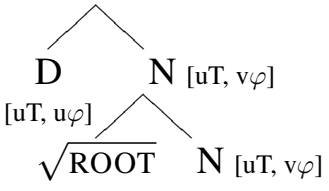
a. N = uninterpretable valued φ-features
b. N = uninterpretable unvalued T-feature
c. D = interpretable unvalued φ-features
d. D = uninterpretable unvalued T-feature

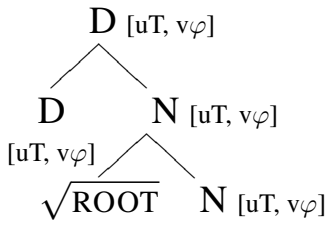
So a DP is built like in (22). A root and N merge, (22a). Then D merges to the structure, (22b). Since D, an externally merged head , is a probe, the φ-features of D get their values from N via Agree, as in (22c).

(22) a.

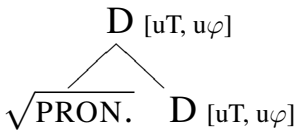


b.



c.


All features in the DP get a value except T (case) which gets its value from a head in the extended projection of V. This is also the way a pronoun is formed. The reflexive on the other hand has the structure we see in (23). Since there is no N-head in this structure the reflexive DP will have unvalued φ-features. Only DPs with an N^0 have valued φ-features, therefore the reflexive DP must get into an Agree relation with a DP with valued φ-features.

(23)


The different morphological forms we see are inserted after syntax. The two structures have lexical elements with different morphophonological forms inserted.

3.5 Cross-linguistic observations

The difference between languages regarding reflexive objects seems to boil down to what kind of roots can be merged to D, as in (23). In (24) we see that languages make use of different roots.

(24) *Sources for reflexivity* (from Schladt 1999, 103)
- a. Body part names
- b. Sources denoting *person*, *self*, *owner* etc.
- c. Emphatic pronouns
- d. Object personal pronouns

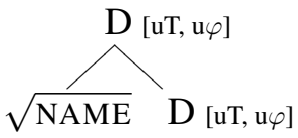
Also, some languages, like San Lucas Quiaviní Zapotec (SLQZ) , allow names to function as a reflexive (a bound variable) (from Lee, 2003):

(25) B-gwi'ih Gye'eihlly lohoh Gye'eihlly zë'cy cahgza' Li'eb
PERF-look Mike at Mike likewise Felipe
'Mike looked at himself, and Felipe did too.' (i.e. Felipe looked at himself/*Mike)

In (25) the name *Mike* functions as a bound variable and allows a reflexive interpretation. So instead of saying that in SLQZ names are anaphors sometimes

and R-expressions sometimes, we can assume that in SLQZ a name root can be merged to either an N-head, or a D-head as in (26).

(26)

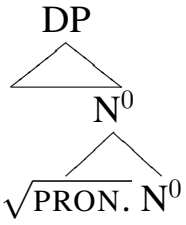


(see Barner and Bale (2002) for arguments that names are roots.)

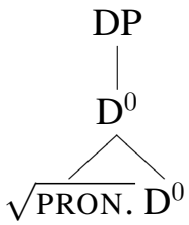
To sum up this section before we move on to the technical details of feature valuation, the main point is that the difference between pronouns and reflexives is not lexical, its syntactic. They originate from the same root, but this root is merged to different heads.

In (13) the root pronoun is merged to an N-head and we get the morphophonological form of a personal pronoun. In (19), on the other hand, the root pronoun is merged to a D-head and we get the morphophonological form of a reflexive, and the consequence is that the reflexive DP must get into an Agree relation with another DP to get values for its φ-features.

(13) *Referential DP*
(valued φ-features)



(19) *Reflexive DP*
(unvalued φ-features)



4 Binding

This section deals with how the reflexive gets its φ-features valued. Assuming that all labels/heads, with all their features, valued and unvalued, are probes, it is possible to form a relation between a c-commanding DP and a reflexive DP, and all φ-features will get a value and can be interpreted. We start with some technicalities.

4.1 Feature sharing

I assume that features that agree enter feature 'chains' (Frampton and Gutmann, 2000; Pesetsky and Torrego, 2004, 2005), as in (27). An alternative analysis would be along the lines of 'Multiple Agree' (Hiraiwa, 2001).

(27) *Value Sharing Agree*
The feature F_α of a probe α and the feature F_β of a goal β share the same value if they match and Agree (Agreement can be vacuous). All active/unvalued features F that share a value with β in the c-command domain of α share the value of F_α and F_β. (Heinat, 2006)

The cases where we get feature chains are listed in (28). So if a feature on a probe has a value +v and the goal has the same feature unvalued, the features match and Agree. The important case is when no feature has a value, the third case in (28). Then we get a feature chain , but no valuation.

(28)

FEATURE ON PROBE	FEATURE ON GOAL	AGREE
[+v]F	[–v]F	+
[–v]F	[+v]F	+
[–v]F	[–v]F	+
[+v]F	[+v]F	–

In line with Chomsky (2001, 2004a) other assumptions are that a probe and a goal need at least one unvalued feature to be active, the activation condition, and that v and C are phase heads (ibid).

In (29) we see the notation for feature valuation. The features with the same number are in a chain.

(29) Notation for value sharing
φ[2v] ... φ[2v] ... φ[5u]

In (29) the φs with value [2] share value, the φ-feature with value [5] does not share the value of the other φ-features. The number is just an indication of a shared value and has no significance in the actual valuation of φ-features. The *v* stands for a valued feature and *u* stands for an unvalued feature. Interpretability is irrelevant to the feature valuation.

4.2 Forming a relation

Now, consider (30). In (30a) we want there to be a relation between the subject DP, *Mary*, and the reflexive *herself*. But, at the same time, we don't want this relation to form in (30b) and (30c).

(30) a. ✓ Mary$_i$ likes herself$_i$
b. * Herself$_i$ likes Mary$_i$.
c. * Mary$_i$ likes her$_i$.

We will go through the derivations of the sentences in (30) and after that we will consider some problems that arise. First we will look at (30a), renumbered as (31). Before little v and the reflexive are in a relation they have different features and all of them but the T-feature on v, are unvalued. Remember that the reflexive lacks φ-feature-values since it consists of a root pronoun and a D^0, but crucially it does not contain an N^0. This is shown in (31a).

(31) ✓ Mary$_i$ likes herself$_i$

a. $\underset{[T[2v],\ \varphi[2u]]}{v}\ [_{VP}\ \underset{[T[5u],\ \varphi[5u]\ ]}{V}\ \underset{}{\text{REFL.}}\ ]$

b. $\underset{[T[2v],\ \varphi[5u]]}{v}\ [_{VP}\ \underset{[T[2v],\ \varphi[5u]]}{V}\ \underset{}{\text{REFL.}}\ ]$

c. $\underset{[T[7u],\ \varphi[7v]]}{DP}\ [_{vP}\ \underset{[T[2v],\ \varphi[5u]]}{v}\ \underset{[T[2v],\ \varphi[5u]]}{\text{REFL.}}\ ]$

d. $\underset{[T[2v],\ \varphi[7v]]}{DP}\ [_{vP}\ \underset{[T[2v],\ \varphi[7v]]}{v}\ \underset{[T[2v],\ \varphi[7v]]}{\text{REFL.}}\ ]$

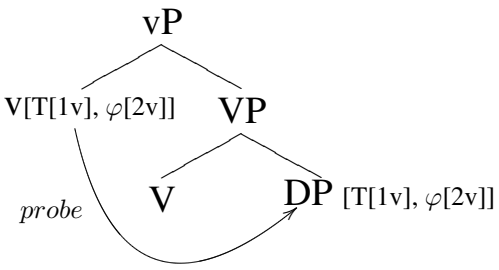
In (31b) little v and the reflexive are in an Agree relation. The T-feature of the reflexive has been valued and has the same number and value as that of little v, in this case 2. The φ-features, on the other hand, have formed a chain but they don't have values yet since neither the reflexive not little v has valued φ-features.

In (31c) the subject is merged to the structure. Since the subject has an unvalued T-feature, it is a probe. In (31d) the subject DP has entered a relation with little v, and in the extension with the reflexive, since the reflexive and little v share their values. Also, all features in (31d) are now valued. The fact that the subject DP gets its T-feature valued by little v is a problem that we will return to further down.

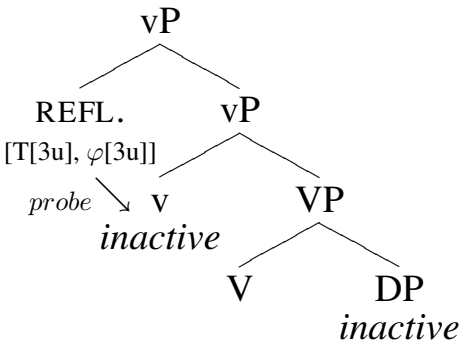
Now, consider (32). In this sentence we don't want a relation to form between subject and object arguments. As is clear from (32a), the relation between little v and the object *Mary* leaves no unvalued features behind. The consequence is that there is no active goal available when the reflexive is merged in subject position . Since T doesn't have any valued φ-features either the derivation will crash.

(32) * Herself$_i$ likes Mary$_i$.

a.



b.



The derivation of (30c) proceeds as in (33). Basically, the derivation is the same as in (32). Since the root pronoun is merged to an N^0 and therefore has valued φ-features, the will not be any active goals available when the subject DP *Mary* is merged in (33c). The derivation doesn't crash, but it does not allow a bound variable interpretation of the pronoun *her*.

(33) * Mary$_i$ likes her$_i$

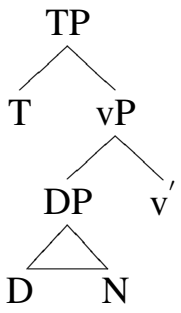
a. $\underset{[T[4v],\ \varphi[4u]]}{v}\ [_{VP}\ \underset{[T[8u],\ \varphi[8v]\ ]}{V}\ \underset{}{pron.}\ ]$

b. $\underset{[T[4v],\ \varphi[8v]]}{v}\ [_{VP}\ \underset{[T[4v],\ \varphi[8v]]}{V}\ \underset{}{pron}\ ]$

c. $\underset{[T[6u],\ \varphi[6v]]}{DP}\ [_{vP}\ \underset{[inactive]}{v}\ \underset{[inactive]}{pron}$

As we saw above the only problem is the valuation of the T-feature on the subject DP by little v in (31). This is what we will deal with below. The problem arises only when there is a reflexive object. So, for example in (34), the subject DP has valued T from little v. We don't want this feature value to 'trickle down' into the rest of the DP. The main reason is that it would make the subject DP inactive since all its features would be valued and when T is merged there are no active goals, leaving the φ-features of T unvalued and the derivation crashes.

(34)



There are two approaches to this problem: first, in a multiple Agree analysis, we would have to assume that DP is not an intervener for T and that T gets its φ-features valued by N, and N gets its T feature valued by T. In the feature sharing approach, the solution is to assume that each time a head/label probes it enters a new feature chain. D probes the DP that it heads. This is one chain D is part of. When D probes v and the reflexive, this is a new feature chain it is part of. So in (35) we see the feature set up of the subject DP. DP, the label, is part of two feature chains, one DP internal which gets its T-feature valued by T, and one DP external which gets its T-feature valued by little v. Now, we might expect that this leads to some kind of semantic clash or mismatch since there is a possibility for the two values to be different. But since T is uninterpretable on DP and the only purpose of the value is to make T on DP possible to delete, such a clash will not occur.

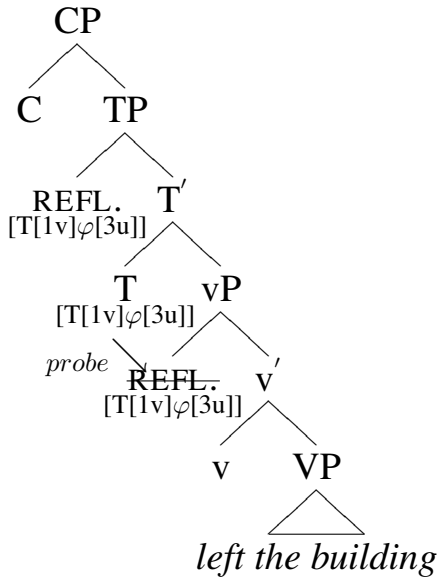
(35)

DP		[D NP]	
φ	$[3v]$	φ	$[3v]$
T	$[1v]_a, [9v]_b$	T	$[1v]_a$

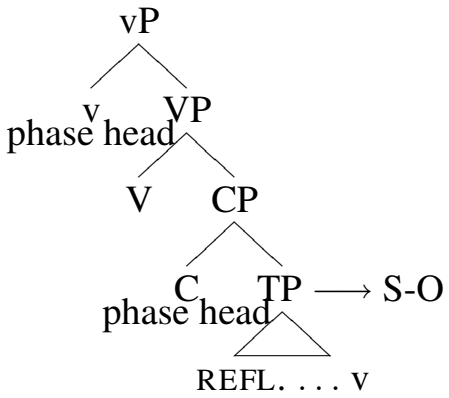
Finally let us look at some other clause types where we find reflexives and where we don't find them, and see how the proposed analysis can account for them. In general, the *Phase Impenetrability Condition* (PIC) (Chomsky, 2001) that states that at a phase head only the next lower phase head and its specifiers are available for syntactic computation, prevents reflexives in subject positions in finite clauses. However, in non-finite clauses the CP phase is missing and it should be possible to form a relation between the subject in the matrix clause and a reflexive in an ECM clause. This is also what we find; consider (36) and (37). In (36a) the reflexive has raised to the subject position in the embedded clause. But since the subject in the matrix clause is not merged until the reflexive has been spelled-out, as in (36b), the reflexive will never get its φ-features valued and the derivation crashes.

(36) * Elvis claimed that himself left the building.

a.



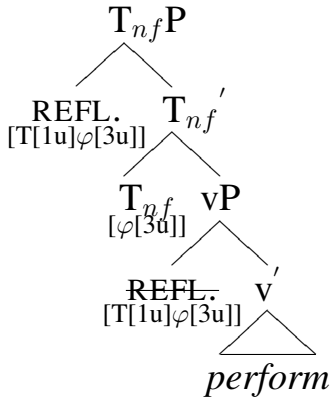
b.



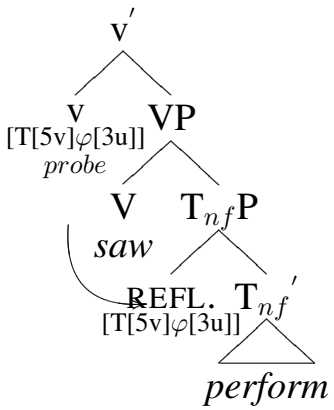
In a non-finite embedded clause, as in (37), the reflexive raises to the subject position in spec-TP of the embedded clause, (37a). In (37b), little v in the matrix clause is merged, it probes and Agrees with the reflexive, just as in the transitive clause we looked at in (31). Then the subject is merged and the φ-features of the reflexive get valued, as in (37).

(37) The King saw himself perform (on video)

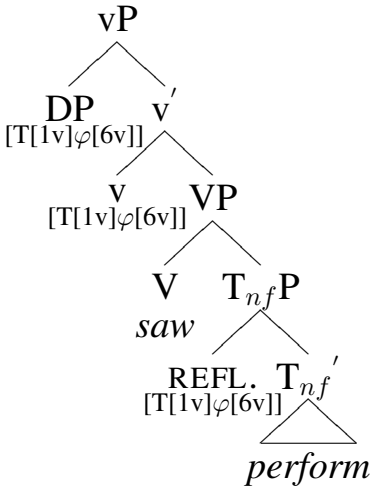
a.



b.



c.



One prediction of this analysis is that the first c-commanding DP with valued φ-features must bind the reflexive. This is also what we see in (38). If we assume that vP is a phase that is not spelled out until C is merged, which isn't a very controversial claim to make, the analysis presented here can account for 'chains' of reflexives in non-finite clauses as in (38e).

(38) a. ✓ Bart saw Lisa$_i$ hurt herself$_i$.

b. * Lisa$_i$ saw Bart hurt herself$_i$.

c. * Bart saw herself$_i$ hurt herself$_i$.

d. ✓ Lisa$_i$ saw herself$_i$ hurt Bart.

e. ✓ Lisa$_i$ saw herself$_i$ hurt herself$_i$.

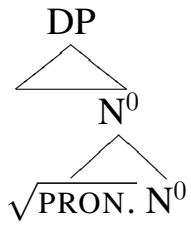
It is clear from (38a) that the subject, *Lisa*, in the ECM clause can bind the reflexive in the object position in the same clause. From (38b) it is clear that the subject position in the matrix clause is not a position that can bind the embedded ECM reflexive. As shown in (38c) it is obvious that the ECM reflexive cannot be bound by another reflexive.

5 Summary and Conclusion

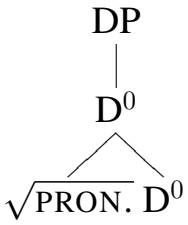
The first proposal was that all labels with unvalued features are probes, in other words, phrases, too are probes.

Second, the difference between pronouns and reflexives is an effect of the syntactic derivation; personal pronouns are formed as in (13). This structure has all φ-features valued and needs only case, which it gets in a clausal structure. The reflexive is formed as in (19). This structure does not have values for its φ-features, since it lacks an N^0. Therefore, in addition to case it needs an antecedent that can value its φ-features. The valuation of φ-features is a probe–goal relation.

(13) *Referential DP*



(19) *Reflexive DP*



The conclusion is that the distribution of reflexives and pronouns can be explained without making reference to binding principles. Instead their distribution is a consequence of the way probing and Agree work. The fact that pronouns and reflexives have different forms is a consequence of post-syntactic lexical insertion.

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