Towards a Theory of Head-Binding

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In this paper I develop a theory of binding based on relations between heads bearing the N-features of arguments. The theory consists of certain fairly straightforward assumptions about the distribution of these N-features, along with certain general syntactic constraints, such as Shortest Move and Economy of Representation. I try to show that a theory of this kind can account for the core binding facts, as well as a variety of facts from other languages which have been the topic of some debate. Phenomena treated here include the blocking effect for long-distance anaphora in Chinese and its absence for long-distance anaphora in various other languages, anti-subject-orientation of pronouns in languages like Norwegian, disjoint reference effects for anaphors in languages such as Dutch, Danish, and Japanese, and certain cases of non-complementarity between anaphors and pronouns.

Traditionally, binding theory has concerned itself with relations between various kinds of NPs[1]. In this paper I will develop a theory based on rather different assumptions. The theory will concern itself with the nature of the N-features which are taken in the Minimalist Program to enter into checking relations with nominal elements. The phenomena typically examined by binding theory[2] will fall out as a side effect of well-formedness conditions on these checking relations.

Chomsky (1995) suggests that among the things that can move are features of various kinds. In a case like 1, for example, a [+wh] feature is claimed to move into CP in order to enter into a checking relation with a feature on C^{o}:

1. What is he cooking t?

In English, however, a [+wh] feature cannot move by itself, presumably for morphological reasons. Thus, all the features associated with the wh-word *what* are "pied-piped" along with the [+wh] feature (just as in Italian, a wh-word embedded in a prepositional phrase cannot move by itself, and must pied-pipe the entire prepositional phrase along with it). The movement in 1, then, creates a number of related but distinct chains: a feature-chain headed by the feature [+wh], a category-chain headed by the N^{o} *what*, and perhaps others.

The Minimalist approach to syntax centers largely on checking relations between specifiers of heads and features on the heads. The postulation of feature-chains raises interesting questions, in the Minimalist program, about what kinds of conditions exist on well-formed checking relations; what kind of relation does a feature-chain have to bear to a specifier for feature-checking to take place?

In this section I will suggest a partial answer to this question, examining particularly the behavior of certain kinds of N-features on T^{o} and on θ-assigners. The result will be a theory of well-formedness conditions on feature checking which yields the behavior of anaphors and pronouns essentially as a side effect. I will assume the basic phrase structure for the clause given in Chomsky 1995, as in 2:

```
2.      CP
4
  C'
        4
        Co          TP
              4
                T'
                    4
                    To          vP
                          4
                          DP          v'
                          !     4
                          SUBJ  vo          VP
                                      4
                                      DP          V'
                                      !     4
                                      OBJ   Vo
```

In 2, the subject and object are assigned their θ-roles by different heads; the subject is base-generated in the specifier of a "light verb" *v*[3]. The subject then moves to Spec TP to check an N-feature on T^o; the subject is thus in the unique position of being related both to a θ-assigner and to T^o, which will figure in the account developed here of the distinctive behavior of subjects with respect to binding theory. I will crucially assume, also, that the N-features of the arguments of the sentence appear on the heads which assign θ-roles to those arguments, as well as on the head T^o.

For my purposes it will be useful to assume that these N-features come in two types. I will be assuming ϕ-features of the familiar kind having to do with person, number, and gender. In addition, we will need a second kind of features I will call "U-features"; these are unique to a given NP, unlike ϕ-features. Note that U-features are not referential indices; they have no connection to the reference of the noun. All that must be true of them is that no two nouns in a sentence have the same U-features; we may take them as representing the noun's position in the

Numeration, for example. Crucially, we will assume that a head may be base-generated "underspecified" for either or both of these kinds of features.

Now we can return to the question with which this section began; what must be true of the N-features of a head for it to be able to check off its features with an NP in its specifier? I want to claim that a feature-chain must satisfy two requirements in order to allow feature-checking to take place[4]:

3. a. Accuracy--the feature-chain must be associated with features that accurately reflect the features on the element involved in checking.

AND b. Completeness--the feature-chain must be associated with a fully specified set of features.

A feature-chain is taken to be "associated", in the relevant sense, with the features of the feature-chains on any head occupied by any member of the chain. Thus, if a ϕ-feature moves from head X to head Y, it is associated with the ϕ-features (if any) on both heads. Furthermore, we will need to take "association" to be transitive; if a ϕ-feature *a* is associated with another ϕ-feature chain *b*, and *b* is associated with yet another ϕ-feature chain *c*, then *a* is associated with *c*.

There will be many cases, of course, in which Accuracy and Completeness are both satisfied by a trivial feature-chain, as in 4:

4. $[_{XP}\ NP_{\phi(3sg),\ U(3)}\ \ X_{\phi(3sg),\ U(3)}]$

Here the NP in Spec XP has third person singular ϕ-features and the U-feature 3, and the head X^{o} has N-features which are the same as those on the NP, satisfying Accuracy, and are not underspecified, satisfying Completeness. This trivial N-feature-chain can therefore enter into a well-formed feature-checking relation and vanish, following standard Minimalist assumptions.

Accuracy and Completeness could also be satisfied in a non-trivial feature-chain, as in 5:

5.$[_{XP}\ NP_{\phi(3sg),\ U(3)}\ \ X_{\phi(3sg),\ U(3)}\ [_{YP}\ NP_{\phi(3sg),\ U(5)}\ \ \ \ \ \ Y_{\phi(\ ),U(5)}]]$

```
                  :                            1
                  z-------------------m
```

Here the ϕ-feature-chain on Y^o is non-trivial, with members on both X^o and Y^o. If the chain consisted purely of the features on Y^o, it would satisfy neither Accuracy nor Completeness, since these features are underspecified and do not accurately reflect the features of the NP in Spec YP. The head of the chain, on the other hand, is associated with a set of third person singular ϕ-features that are on the head X^o which the head of this ϕ-feature chain occupies. These features are fully specified and correspond to the ϕ-features of the NP in Spec YP. Thus, the ϕ-feature chain on Y^o obeys Accuracy and Completeness, and can enter into a well-formed spec-head relation with the NP in Spec Y and be checked off.

Accuracy and Completeness could also be satisfied separately by different members of a feature-chain, as in 6:

6.$[_{XP}\ NP_{\phi(3sg),\ U(3)}\ \ X_{\phi(3sg),\ U(3)}\ [_{YP}\ NP_{\phi(\ ),\ U(5)}\ \ Y_{\phi(\ ),\ U(5)}]]$

```
                  :                  1
                  z---------------m
```

In this case, the ϕ-feature-chain satisfies Accuracy, since its underspecified features correspond to the underspecified features on the NP in Spec YP. It also satisfies Completeness, because the head of the chain is associated with completely specified ϕ-features on X^o. Thus, the feature-chain can enter into a well-formed checking relation and be checked off.

It may be worth noting that none of the above claims have any semantic consequences to speak of. Of course, Accuracy can force two NPs to have the same ϕ-features; compare 5 with 7:

7.[$_{XP}$ NP$_{\phi(1sg), U(3)}$ X$_{\phi(1sg), U(3)}$ [$_{YP}$ NP$_{\phi(3sg), U(5)}$ Y$_{\phi( ),U(5)}$]]

```
                          :                              1
                          z-----------------m
```

The ϕ-feature chain in 7 fails to satisfy Accuracy, since no member of the chain is associated with ϕ-features that correspond to those of the NP in Spec YP; it does satisfy Completeness, since the head of the chain is associated with the fully specified ϕ-features on X^o, but these ϕ-features are not the same as those on the NP in Spec YP, so Accuracy is not satisfied. Thus, there is a sense in which the two NPs in 7 must have the same ϕ-features if a ϕ-feature chain of the type shown is to be constructed. This is taken here to be due to well-formedness conditions on feature-checking.

The theory will make two claims about anaphors. First, all anaphors are taken to have underspecified N-features, so that Accuracy will require feature-chains checked by them to be associated with underspecified N-features, as in 6. Second, the configuration in 8 is taken to be interpretable just in case the N-features α are those of an anaphor:

```
8.          XP
        5
        NP          X'
            q
            X
                1

        [N-features α]
```

The interpretive component will contain instructions assigning an interpretation to configurations like 8 involving some semantic relation between the NP in Spec XP and the anaphor that supplied the N-features; for reflexives, for example, this semantic relation will involve some type of referential dependence. Assuming, following Chomsky 1995, that feature-checking takes place only in order to get rid of uninterpretable features, features in this configuration need not be checked off, since they can be assigned an interpretation; thus, they will remain unchecked.

These relatively straightforward assumptions will get us the core binding facts. The requirements of Accuracy and Completeness, along with the assumption that anaphors always have underspecified N-features, will force anaphors to be bound. Because feature-movement is subject to Shortest Move, binding will observe certain locality conditions. The Economy condition requiring features to be underspecified whenever possible will give the effect of Condition B, preferring that anaphors be used whenever they can be. The basic facts of binding theory thus fall out from well-formedness conditions on feature-checking, as desired in a Minimalist framework. In fact, a variety of new facts can now be captured, as we will see.

1. The Basic Theory

Let us run through some basic examples showing how the approach outlined above gets the core binding facts. Consider 9:

9. a. Stacy$_i$ told Susan$_j$ about herself$_{i/j}$

b. Stacy T$_{\textbf{stacy}}$ $v_{\textbf{stacy}}$ told$_{\textbf{susan}}$ Susan about$_{\textbf{herself}}$ herself

9.b represents the structure of 9.a which is relevant for the binding theory. The θ-assigner *about* bears the N-features of the NP *herself*. Similarly, the θ-assigning light verb *v* and T^o both bear the N-features of the subject NP *Stacy*, and the verb *told* bears the N-features of*Susan*. Because the features on the θ-assigner *about* are in a checking relation with an anaphor, the N-feature-chain cannot be trivial; the chain must satisfy both Accuracy and Completeness by being associated both with an underspecified set of N-features and with a fully specified set of N-features. Thus, we base-generate *about* with underspecified N-features, satisfying Accuracy, and then move these features to another head with fully specified features, creating a feature-chain that satisfies Completeness.

For example, the derivation of a sentence like 9.b might proceed as follows (head-movement and XP-movement is not shown; categories are shown in their positions at Spell-Out):

10. a. TP

4

DP T'

! 4

Stacy T^{o}**N(Stacy)** *v*P

i

v'

4

v^{o}**N(Stacy)** VP

1 4

told DP V'

! wu

Susan V^{o}**N(Susan)** PP

i

P'

4

P^{o}**N( )** DP

1 !

about herself

b. TP
4
DP T'
! 4
Stacy $T^{o}_{\mathbf{N(Stacy)}}$ *v*P
i
v'
4
$v^{o}_{\mathbf{N(Stacy)}}$ VP
1 4
told DP V'
! ep
Susan $V^{o}_{\mathbf{N(Susan)}}$ PP
N( ) i
: P'
1 4
z---$P^{o}_{\mathbf{N(\ )}}$ DP
1 !
about herself

c. TP
4
DP T'
! 4
Stacy T^{o} *v*P
i
v'
4
v^{o} VP
1 4
told DP V'
! wu
Susan $V^{o}_{\mathbf{N(\ )}}$ PP
i
P'
4
$P^{o}_{\mathbf{N(\ )}}$ DP
1 !
about herself

In a., all the θ-assigners and T^{o} heads in the sentence are base-generated with N-features accurately reflecting the N-features of the nominals that enter into checking relations with them. In particular, the preposition *about* is base-generated with underspecified N-features, corresponding to the underspecified N-features of the anaphor *herself*. All the N-feature-chains in a., then, satisfy Accuracy. In b., the N-features on *about* move to the verb *told* in order to become associated with a fully specified set of N-features, thus satisfying Completeness. Now N-feature-checking can take place; all uninterpretable N-features vanish as a result of feature-checking. The results of this are shown in c. Only the anaphoric N-features that moved to the verb remain, since these features can receive an interpretation; the interpretive component interprets this structure as involving referential dependence between *herself* and *Susan*.

Given that feature-movement is subject to Shortest Move, we might wonder why sentences like 9 are ambiguous; that is, why the anaphoric features on *about* are not forced to move to *told*, thus obligatorily creating the semantic effect of referential dependence on *Susan*. In what follows I will crucially be assuming that T^{o} and θ-assigners are distinct types of heads[5] in a sense which is relevant for Shortest Move, and therefore do not interfere with one another for purposes of calculating shortest moves. We will see as the paper progresses that T^{o} and θ-assigners have quite different binding-theoretic properties, so this claim is not entirely ad hoc. Thus, anaphoric features will always have the option, I assume, of moving either to the closest θ-assigner or to the closest T^{o}. In 9.b, this creates the ambiguity that we see; the anaphoric features can move either to *told*$_{\textbf{susan}}$, creating the semantic effect of referential dependence between *Susan* and *herself*, or to $T_{\textbf{stacy}}$, creating the semantic effect of referential dependence between *Stacy* and *herself*.

A sentence like 11.a, on the other hand, is only two ways ambiguous, for reasons which are now fairly clear:

11. a. Helen_i hopes Stacy_j told Susan_k about $\text{herself}_{*i/j/k}$

b. Helen $T_{\textbf{helen}}$ $v_{\textbf{helen}}$ $\text{hopes}_{\textbf{CP}}$

Stacy $T_{\textbf{stacy}}$ $\text{Pr}_{\textbf{stacy}}$ $\text{told}_{\textbf{susan}}$ Susan $\text{about}_{\textbf{herself}}$ herself

In 11.b, the features on $\textit{about}_{\textbf{\textit{herself}}}$ need to move to a head with fully specified features, as before, and, as before, have the option of moving either to the closest θ-assigner ($\textit{told}_{\textbf{\textit{susan}}}$) or to the closest T^o ($T_{\textbf{stacy}}$). They are thus blocked by Shortest Move from moving either to $v_{\textbf{helen}}$ or to $T_{\textbf{helen}}$; this has the semantic result that referential dependence between *Helen* and *herself* is impossible.

12.a-b show the effects of Structural Economy:

12. a. Helen_i hopes Stacy_j told Susan_k about $\text{her}_{i/*j/*k}$

b. Helen $T_{\textbf{helen}}$ $\text{Pr}_{\textbf{helen}}$ $\text{hopes}_{\textbf{CP}}$

Stacy $T_{\textbf{stacy}}$ $v_{\textbf{stacy}}$ $\text{told}_{\textbf{susan}}$ Susan $\text{about}_{\textbf{her}}$ her

In 12 we have chosen to assign a fully specified set of N-features to the θ-assigner *about*. Structural Economy thus militates against interpretations of 12 in which *her* corefers with *Stacy* or *Susan*, since these readings could have been gotten by base-generating *about* with a more impoverished set of features, as we have just seen. No such restrictions exist on coreference of *her* with *Helen*, since base-generation of *about* with anaphoric features would not yield this reading.

1.1 Why <u>Head</u>-Binding?

We have just seen the bare bones of a fairly simple system that seems to get the core facts regarding the distribution of anaphors and pronouns. This system operates under the assumption that the entities whose behavior is regulated by the binding theory are N-features on θ-assigners and on T^o. Before we go any further in the process of elaborating such a system, it might be worth noting some phenomena that seem to suggest that binding theory ought to be formulated along these lines, rather than in more traditional terms of relations between NPs of various kinds.

1.1.1 Indicatives and Subjunctives

To begin with, reference to heads of various kinds seems to be necessary in any case when we attempt to define binding domains. 13-14 give one famous example of this. In the sentences in 13, the lower clause is in the subjunctive mood, while in the sentences in 14 it is in the indicative mood. For some reason this has an effect on the possible binding relations; long-distance binding is possible in 13 but not in 14.

13\. a. (Icelandic, from Thráinsson 1991 (55))

Jón$_i$ sagDi aD ég hefDi svikiD sig$_i$

John$_i$ said that I had-SUBJ betrayed self

b. (Italian, adapted from Napoli 1979 (18))

La signora$_i$ dice che io giaccia presso di sè$_i$

the woman says that I lie-SUBJ near of self

14\. a. (Icelandic, from Thráinsson 1991 (55))

*Jón$_i$ veit aD πú hefur svikiD sig$_i$

John knows that you have-IND betrayed self

b. (Italian, from Napoli 1979 (19))

*La signora$_i$ dice che io giaccio presso di sè$_i$

the woman says that I lie-IND near of self

On standard binding theories, this is rather mysterious; there is no reason for the mood of a clause to have anything to do with binding possibilities. In this theory, on the other hand, the distinction between 13 and 14 has to do with the fact that different T^{o} elements are involved in the two cases; since binding relations are between heads, choosing different heads has an effect on the binding relations.

1.1.2 Greek and Armenian anaphora and agreement

A second argument in favor of a head-binding account involves data from the interaction of anaphora and agreement in colloquial Modern Greek, noticed by Schneider-Zioga (1992), and in Armenian, pointed out by Sigler (1995). In both of these languages, verbs may optionally take a default third person singular form under certain conditions:

15. a. Thavmazi o Yiorghos ke o Arjiris tin Rani
    admire-**3sg** the George and the Arjiris the Rani-acc
    'George and Arjiris admire Rani'
    b. se an -i -n vra yergu a c*ig n«sd-adz er
    table -gen-dt on two girl sit -ppt be-**3sg**-past
    ‘At the table were seated two girls’

Subjects may not bind anaphors when default agreement is used:

16. a. *Thavmazi o Yiorghos ke o Arjiris ton eafto tus

admire-3sg the George and the Arjiris the self theirs

'George and Arjiris admire themselves'

b. *tasaran -i -n mec* yergu a c*ig n«sd-adz er

classroom-gen-dt in two girl sit -ppt be-**3sg**-past

iraru se an-er-u -n vra

each-other table-pl-gen-dt on

‘In the classroom were two girls seated at each other’s desks’

This suggests, again, that the properties of functional heads can play a crucial role in determining possible binding relations.

1.1.3 Japanese scrambling

The third argument in favor of this kind of binding theory has to do with the effects of movement on binding relations. The distinction between the sentences in 17 and 18 was pointed out most recently by Aikawa (1993):

17. a. Masao$_i$-ga Hanako-ni [Taroo-ga zibun$_i$-o hihansita to] itta

Masao NOM Hanako DAT Taroo NOM self ACC criticized that said

'Masao$_i$ said to Hanako that Taroo criticized himself$_i$'

b. Masao$_i$-ga Hanako-ni [Taroo-ga zibun$_i$-no ronbun-o hihansita

Masao NOM Hanako DAT Taroo NOM self GEN paper ACC criticized

to] itta

that said

'Masao$_i$ said to Hanako that Taroo criticized himself$_i$'s paper'

18. a. *Masao$_i$-ga Hanako-ni [Tanaka-sensee -ga zibun$_i$-o

Masao NOM Hanako DAT Tanaka teacher NOM self ACC

go-hihan-ninatta to] itta

HON-criticized that said

'Masao$_i$ said to Hanako that Professor Tanaka criticized himself$_i$'

b.*Masao$_i$-ga Hanako-ni [Tanaka-sensee-ga zibun$_i$-no ronbun-o

Masao NOM Hanako DAT Tanaka teacher NOM self GEN paper ACC

go-hihan-ninatta to] itta

HON-criticized that said

'Masao$_i$ said to Hanako that Professor Tanaka criticized self$_i$'s paper'

Zibun is a long-distance anaphor; as we see in 17, it can be bound by a subject of a higher clause. 18 shows that this property of *zibun* vanishes when it is in a clause whose verb bears subject honorification morphology and the verb of the higher clause does not bear such morphology; in 18, *zibun* can no longer be bound by the higher subject.

Long-distance scrambling of the direct object of the lower clause distinguishes between 18.a and 18.b:

19. a. *Masao$_i$-ga [zibun$_i$-o] Hanako-ni [Tanaka-sensee -ga t_i

Masao NOM self ACC Hanako DAT Tanaka teacher NOM

go-hihan-ninatta to] itta

HON-criticized that said

'Himself$_i$, Masao$_i$ said to Hanako that Professor Tanaka criticized t_i'

b. Masao$_i$-ga [zibun$_i$-no ronbun-o]$_j$ Hanako-ni [Tanaka-sensee-ga t_j

Masao NOM self GEN paper ACC Hanako DAT Tanaka teacher NOM

go-hihan-ninatta to] itta

HON-criticized that said

'[Self$_i$'s paper]$_j$, Masao$_i$ said to Hanako that Professor Tanaka criticized t_j'

19.a is no better than 18.a, while 19.b is better than 18.b. This contrast between 19.a and 19.b is unexpected under other binding theories; an anaphor which is embedded in a NP is bindable, while an anaphor by itself is not. In a binding theory stated in terms of relations between features on θ-assigners and T^o heads, on the other hand, this pattern of facts is what we expect. Long-distance movement of an anaphor, as in 19.a, is irrelevant to the binding theory, because no θ-assigning heads or T heads have moved. In 19.b, on the other hand, the movement is relevant to the binding theory, because the θ-assigner for the possessor of the NP *ronbun* 'paper', which bears the N-features of the anaphor *zibun*, is now in a position where it can be bound by the higher subject.

1.1.4 English PPs

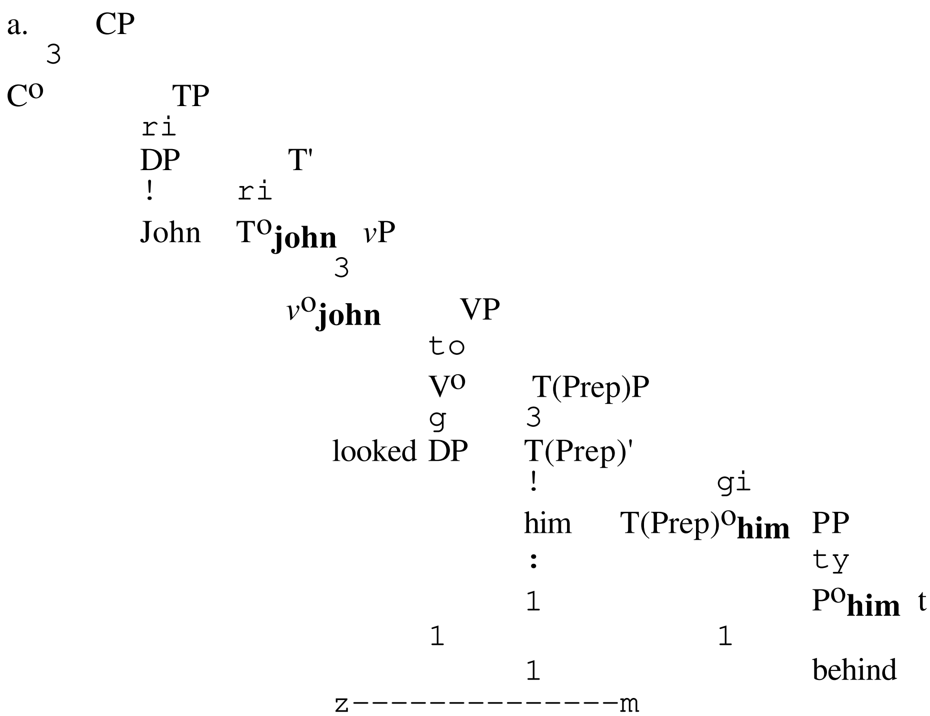
A pattern of facts similar to the one found in the Japanese case can be seen in 20:

20. a. $John_i$ looked behind him_i

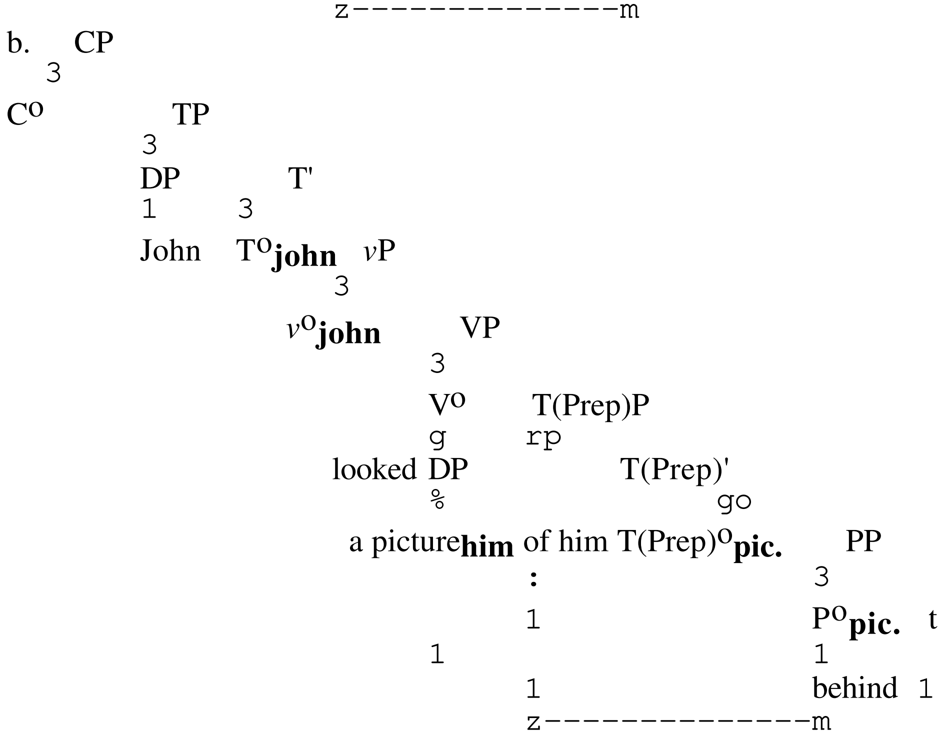
    b. ??$John_i$ looked behind a picture of him_i

This contrast is similar to the one in 19; the more deeply embedded pronoun behaves as if it is being bound, while the less deeply embedded pronoun acts free. We can assimilate this pattern to the one in 19 if we assume, following Marácz (1984) and Harbert (1989), that some prepositional phrases have a clauselike inner structure, and that the object of the preposition, like the subject of the clause, moves to the specifier of some analog of TP. Just as in the Japanese case in 19, then, in 20 the object of the preposition is moved to a position from which it can potentially be bound by *John*. Such movement actually leads to a Condition B violation in 20.b, since a θ-assigner is being moved, while in 20.a the movement has no effect on binding theory, since no heads of the relevant kinds are moved. At LF, the structures of 20.a and 20.b are as in 21.a and 21.b (irrelevant specifiers and traces are repressed):

21. a.


CP
C°
TP
DP
T'
John
T°john
vP
v°john
VP
V°
T(Prep)P
looked
DP
T(Prep)'
him
T(Prep)°him
PP
P°him
t
behind

b.


CP
C°
TP
DP
T'
John
T°john
vP
v°john
VP
V°
T(Prep)P
looked
DP
T(Prep)'
a picture him of him
T(Prep)°pic.
PP
P°pic.
t
behind

21.a-b clearly show the relevant distinction between 20.a-b; in 21.b, the N-features of *him* are not c-commanded by the feature-bearing head T (Prep)^{o}, so the fact that they are more inclined to behave like a bound pronoun (that is, to force a reading of non-coreference with the subject) is no surprise. In a theory in which binding relations are between nominals, on the other hand, I can see no way to capture the asymmetry in 20.

1.2 Conclusion

This concludes the preliminary sketch of the theory. In what follows I will develop this binding theory in more depth. Section 2 will investigate the behavior of anaphors in different languages, deriving the various cross-linguistic differences from differences in the inventory of anaphors and in the availability of different types of T^{o}. In section 3 we will turn our attention to creating a theory of the distribution of pronouns based on a straightforward notion of Structural Economy; this approach will then be expanded to deal with problems involving noncomplementary distribution between pronouns and anaphors and cases of anti-subject-orientation of both pronouns and anaphors.

2. Anaphors

In section 1 we saw a preliminary sketch of how this theory deals with reflexives. This sketch cannot be the whole story, of course; if it were, anaphors would exhibit the same behavior in all languages, which they clearly do not. Let us take a look at some of the cross-linguistic differences postulated in this theory.

2.1 T^{o}

Consider the distinction between Japanese and English illustrated in 22-23 (23.a from Gunji 1983 (131), 23.b from Masanori Nakamura, p.c.[6]):

22. a. *Naomi$_i$ thinks that sheself$_i$/herself$_i$ is beautiful

b. Naomi$_i$ thinks that she$_i$ is beautiful

23. a. Naomi-wa [zibun-ga utukusii] -to omotteiru

Naomi TOP self NOM beautiful that think

'Naomi$_i$ thinks that she$_i$ is beautiful'

b. *Naomi-wa [kanozyo-ga utukusii] -to omotteiru

Naomi TOP she NOM beautiful that think

'Naomi$_i$ thinks that she$_i$ is beautiful'

Here I will adapt a claim made by Borer 1989, Progovac 1992, 1993, and Aikawa 1993, who claim that languages may differ in whether they have "anaphoric Agr" in their agreement paradigms or not. On this account, then, the ill-formedness of NIC violations like 22.a is at least partly attributable to a simple failure of spec-head agreement; to have an anaphor in subject position, a language must have an appropriate agreement morpheme in its inventory that can agree with it, and English, unlike Japanese, lacks such a morpheme. I am following Chomsky (1995) here in assuming that agreement is actually a spell-out of N-features on heads of various kinds; in particular, agreement with the subject is taken here to reflect N-features on T^o. The account based on the availability of an anaphoric morpheme that enters into a spec-head relation with the subject can be transferred to this way of thinking fairly straightforwardly; some languages can have T^o morphemes with anaphoric N-features, while others cannot. In a language in which T^o cannot be anaphoric, T^o cannot enter into a feature-checking relation with an anaphor in its specifier, since the features of T^o and the anaphor cannot be identical; thus, well-formedness conditions on feature-checking produce the NIC effect.

More specifically, we should say that some T^{o} morphemes but not others can be anaphoric, since the NIC effect may appear in some tenses but not others in a given language. Compare 24 with 22-23:

24. a. $Naomi_i$ wants $herself_i$ to win

b. *$Naomi_i$ wants her_i to win

English infinitival clauses act like Japanese tensed clauses with respect to the NIC; in this theory, this indicates that English infinitival T may be anaphoric.

2.2 Types of Anaphors

The second major type of cross-linguistic difference which is relevant for anaphora has to do with the types of anaphors which are available in the lexicon of a given language. A cursory glance at the literature on anaphora shows that many languages have several different types of reflexives. Here we will make use of the more detailed theory of N-feature types first described in the Introduction. I will be assuming a distinction between the ϕ-features (person, number, gender) and another class of features I call U-features, which differ from ϕ-features in that they are unique to the particular nominal bearing them; several nominals may have the same ϕ-features, but no two nominals have the same U-features[7]. This distinction yields three logically possible types of anaphors: anaphors with defective ϕ-features, those with defective U-features, and those with defective features of both kinds[8]. I propose that all three types are attested. 25 gives some examples of the different kinds of expressions which are relevant for the binding theory (where +

indicates that the element in question possesses fully specified features of that kind, while - indicates defective features):

25.	ϕ-features	U-features
Chinese *ziji*	-	+
Chinese *ta-ziji*	+	-
Japanese *zibun*	-	+
Japanese *kare-zisin*	+	-
Japanese *zibun-zisin*	-	-
English *himself*	+	-
English *him*	+	+
John	+	+

2.3 Applying the theory

Suppose we claim that T^{O} is the only possible supplier for defective ϕ-features[9]. Anaphors with defective ϕ-features are therefore subject-oriented, since only T^{O} can satisfy the defective features on heads coindexed with such anaphors, and the features on T^{O} are always those of the subject.

Now consider 26-28 (Chinese, from Huang and Tang 1991 (263-4)):

26. Zhangsan$_i$ renwei Lisi$_j$ hai-le ziji$_{i/j}$

Zhangsan think Lisi hurt-ASP self

'Zhangsan$_i$ thought that Lisi$_j$ hurt himself$_{i/j}$'

27. Zhangsan$_i$ renwei wo$_j$ hai-le ziji$_{*i/j}$

Zhangsan think I hurt-ASP self

'Zhangsan$_i$ thought that I$_j$ hurt myself$_{*i/j}$'

28. Zhangsan$_i$ renwei Lisi$_j$ hai-le ta-ziji$_{*i/j}$

Zhangsan think Lisi hurt-ASP him-self

'Zhangsan$_i$ thought that Lisi$_j$ hurt himself$_{*i/j}$'

Note that Chinese is like Japanese and unlike English in allowing apparent violations of the NIC (Chinese, from Huang 1982 (331)):

29. Zhangsan shuo [ziji hui lai]

Zhangsan say self will come

'Zhangsan$_i$ says that he$_i$ will come'

By hypothesis, this is an indication that Chinese tensed T^o can be inherently anaphoric.

Up until now, we have used anaphoric heads in all and only those cases where anaphors were related to heads; a θ-assigner was anaphoric just in case it was assigning a θ-role to an anaphor, and T^o was anaphoric just in case the subject was an anaphor, as in 29. There is at least one clear syntactic distinction, however, between T^o and θ-assigners. θ-assigners enter into the relevant structural relation with the nominals whose features they bear at the beginning of the derivation, while Spec TP is empty at the beginning of the derivation; a nominal must move to Spec TP at some point in the derivation to check the features of T^o. In a language like

Chinese, then, where T^o may have anaphoric features, there is no reason not to base-generate T^o with anaphoric features even in cases where the subject is not an anaphor. The only requirement imposed by the syntax should be that the N-feature-chain on T^o satisfy Accuracy and Completeness at the point in the derivation at which the features on T^o are checked. Thus, we should be able to base-generate T^o with anaphoric features even if the subject is not an anaphor, just in case some higher T^o can supply the anaphoric T^o with the features it lacks in time for feature-checking to take place (that is, feature-movement will have to take place before movement of the subject to Spec TP).

Here I am taking advantage of a property of the system of feature-movement outlined above, namely the distinction drawn between the syntax and the semantics of binding. The syntax of feature-movement, as we saw, has no inherent semantic effects, and the N-features it manipulates have nothing essential to do with the reference of nominals. In the cases we have seen so far, feature-movement has always been associated with referential dependence, because the only features that needed to move were those contributed by anaphors. But according to the theory developed here, this is not a necessary property of feature-movement, which may have semantic consequences of quite different kinds, depending on whether the features in question are those of an anaphor. The interpretive component, in other words, will distinguish between syntactically identical representations, assigning coreferent readings just in case moved features belong to an anaphor.

Now we are in a position to account for the data in 26-28. 26 may be base-generated with the structure in 30 (heads and features which do not participate in binding are omitted for clarity's sake, and the feature specification of *ziji* is included):

30. Zhangsan Tϕ**(3 sg), U(zhangsan)** renwei

Lisi Tϕ**( ), U(lisi)** hai-le ϕ**( ), U(ziji)** ziji (*ziji* = -ϕ, +U)

30 shows the topmost T^o base-generated with the ϕ-features and U-features of *Zhangsan*, while the T^o of the embedded clause is base-generated with blank ϕ-features and the U-features of *Lisi*. The θ-assigner *hai-le* 'hurt-ASP' picks up a blank set of ϕ-features from the direct object *ziji* 'self', along with a fully specified set of U-features.

In 30, the nearest ϕ-features to *hai-le* ϕ( ) are those on the topmost T^o; the ϕ-features of*hai-le* ϕ( ) may therefore move there, satisfying Completeness and creating the semantic effect of referential dependence between *ziji* and *Zhangsan*. The ϕ-features of the embedded T^o may then also satisfy Completeness by moving the topmost T^o; since *Zhangsan* and *Lisi* have the same ϕ-features, the feature-chain thus created satisfies Accuracy as well as Completeness. By LF, all N-feature chains have entered into well-formed checking relations with nominals and been checked off, except for the ϕ-features of *ziji*, which, being interpretable, can remain on the T^o whose specifier is *Zhangsan*; *Zhangsan* and *ziji* are thus interpreted as coreferent.

Now consider 31, a possible structure for 27:

31. Zhangsan Tϕ**(3 sg), U(zhangsan)** renwei

wo Tϕ**( ), U(wo)** hai-le ϕ**( ), U(ziji)** ziji (*ziji* = -ϕ, +U)

27 exhibits the well-known blocking effect of Chinese; if two potential antecedents for *ziji* have different ϕ-features, only the closer binder can actually act as an

antecedent. 31 shows why. The T^o of the embedded clause can be base-generated anaphoric for ϕ-features, just as in 30, and the ϕ-features of *ziji* can satisfy Completeness by moving to the higher T^o, just as it did in 30. However, the embedded T^o also has anaphoric ϕ-features, and must also satisfy Completeness by moving to the higher T^o; this means that the embedded T^o will have to be associated with the 3rd person singular ϕ-features which are on the higher T^o, and these features conflict with those of the embedded subject *wo* 'I'. *wo* and the embedded T^o therefore cannot enter into a feature-checking relation, since their features are different, and the structure will violate Accuracy and crash. Long-distance anaphora in 36 is thus correctly predicted to be impossible.

Now consider 32, a structure for 28:

32. Zhangsan T$_{\phi}$**(3 sg), U(zhangsan)** renwei

Lisi T$_{\phi}$**(3 sg), U( )** hai-le ϕ**(3 sg), U( )** ta-ziji (*ta-ziji* = +ϕ, -U)

In 32, as in 31, long-distance binding of the reflexive is impossible. The embedded reflexive in this case is *ta-ziji*, an anaphor which, by hypothesis, projects blank U-features. For the anaphor to be long-distance bound, therefore, the embedded T^o must be base-generated anaphoric for U-features. This means that the U-features on the intermediate T^o will have to move to the higher T^o to satisfy Completeness. This leads to an ill-formed structure, since *Lisi* and *Zhangsan* have different U-features; the embedded T^o will thus have different features from *Lisi*, leading to a violation of Accuracy and a failure of feature-checking. In effect, *ziji* and *ta-ziji* exhibit the same "blocking effect"; the difference between them is that *ta-ziji* is sensitive to U-features rather than ϕ-features. Since U-features are unique to the nominal bearing them, no two potential antecedents will ever have the same U-features; the blocking effect for *ta-ziji* is therefore more frequently triggered.

We have seen how a sufficiently rich theory of features, coupled with the assumption that some languages but not others have a variety of T^o which is base-generated with anaphoric features, can successfully predict the behavior of reflexives in Chinese. Chinese only has two types of reflexives; a reflexive with blank ϕ–features (*ziji*) and one with blank U-features (*ta-ziji*). We have seen that reflexives with blank ϕ–features are subject-oriented, since only T^o can supply ϕ–features, and reflexives with blank U-features are apparently local. We would expect, then, that a reflexive with underspecified features of both kinds would be both local and subject-oriented. Japanese, which has all three kinds of possible reflexives, confirms this (Japanese, adapted from Katada 1991 (289)):

33. a. John$_i$-ga [Bill$_j$-ga Mike$_k$ -ni zibun$_{i/j/*k}$-no koto -o hanasita to] itta

John NOM Bill NOM Mike DAT self GEN matter ACC told that said

'John$_i$ said that Bill$_j$ told Mike$_k$ about himself$_{i/j/*k}$' (*zibun* = -ϕ, +U)

b. John$_i$-ga [Bill$_j$-ga Mike$_k$ -ni kare-zisin$_{*i/j/k}$-no koto -o hanasita to] itta

John NOM Bill NOM Mike DAT him self GEN matter ACC told that said

'John$_i$ said that Bill$_j$ told Mike$_k$ about himself$_{*i/j/k}$' (*kare-zisin* = +ϕ, -U)

c. John$_i$-ga [Bill$_j$-ga Mike$_k$-ni zibun-zisin$_{*i/j/*k}$-no koto -o hanasita to] itta

John NOM Bill NOM Mike DAT self self GEN matter ACC told that said

'John$_i$ said that Bill$_j$ told Mike$_k$ about himself$_{*i/j/*k}$' (*zibun-zisin* = -ϕ,-U)

33.a and b show that the behavior of Japanese *zibun* and *kare-zisin* is parallel to that of Chinese *ziji* and *ta-ziji* respectively. Japanese *zibun-zisin* behaves just as we predicted an anaphor with blank features of both kinds would behave; we can conclude that Japanese has all three of the possible kinds of anaphors predicted by this theory.

There is a class of languages that appears to exhibit long-distance binding of a kind that differs from what we have seen so far (Icelandic, from Thráinsson 1991 (51, 55-6))[10]:

34. a. Jón$_i$ bad Jens, um aD raka sig$_i$

John$_i$ asked Jens to shave self$_i$

b. Jón$_i$ sagDi [aD ég hefDi svikiD sig$_i$]

John$_i$ said that I had-SUBJ betrayed self$_i$

c. *Jón$_i$ veit [aD ˜ú hefur svikiD sig$_i$]

John$_i$ knows that you have-IND betrayed self$_i$

Where do these reflexives fit into the typology I have sketched? They appear to be long-distance, subject-oriented reflexives, which puts them in a class with Chinese *ziji*; that is, they are anaphors which project null ϕ–features. Yet they differ from *ziji* in at least two ways. First, they exhibit no "blocking effect":

35. a. (Icelandic, from Thráinsson 1991 (55))

Jón$_i$ sagDi aD ég hefDi svikiD sig$_i$

John$_i$ said that I had-SUBJ betrayed self$_i$

b. (Chinese, from Huang and Tang 1991 (264))

*Zhangsan$_i$ renwei wo hai-le ziji$_i$

Zhangsan think I hurt-ASP self

Second, these reflexives must be bound by third person antecedents, whereas *ziji* can have an antecedent of any person or number:

36. (Icelandic, adapted from Thráinsson 1975 (578))

a. *Ég$_i$ hata sig$_i$

I hate self

b. Jón$_i$ hatar sig$_i$

John hates self

37. (Chinese)

a. Wo$_i$ hai-le ziji$_i$

I hurt-ASP self

b. Zhangsan$_i$ hai-le ziji$_i$

Zhangsan hurt-ASP self

Suppose we try to take advantage of this constellation of facts in the following way. Recall the explanation proposed here for the ill-formedness of 35.b: *ziji* has blank ϕ–features, so that in order for it to be long-distance bound the closer T^o must be base-generated with null ϕ–features as well. As a result, the closer T^o is itself anaphoric, and must be associated with the features of the higher T^o in order to satisfy Accuracy; since the higher T^o has 3rd person singular ϕ–features, the lower T^o will fail to enter into a well-formed spec-head relation with its subject *wo* 'I'.

Note, however, that whereas *ziji*'s antecedent can have any ϕ–features, the antecedent of Icelandic *sig* must be 3rd person singular. This suggests that while *ziji* may have completely blank ϕ–features, *sig*'s ϕ–features must be at least partially specified. Suppose this is the case; that is, *sig* has only partially deficient ϕ–features, possessing 3rd person singular features but lacking some other ϕ–features; call these missing features [±X]. If this feature is something all potential antecedents have in common[11], we now have an explanation for the lack of blocking effects in Icelandic. 36.a-b have the structures shown in 38.a-b' (heads and features which do not participate in binding are omitted for clarity's sake):

38. a. Jón$_i$ sagDi aD ég hefDi svikiD sig$_i$

a'. Jón T_{ϕ}**(3sg, +X)** sagDi aD ég T_{ϕ}**(1sg)** hefDi svikiD$_{\phi}$**(3sg)** sig

(sig = partial ϕ, +U)

b. *Zhangsan$_i$ renwei wo hai-le ziji$_i$

b'. Zhangsan T_{ϕ}**(3sg, +X)** renwei wo $T_{\phi( )}$ hai-le$_{\phi( )}$ ziji

(*ziji* = -ϕ, +U)

In 38.b', *ziji* projects completely null ϕ–features, and the nearest T^o must therefore be base-generated with completely null ϕ–features as well for *ziji* to be long-distance bound; this leads to a violation of well-formedness conditions on feature-checking, as we have seen. In 38.a', on the other hand, *sig* already has some ϕ–features, lacking only the feature [±X]. The intervening T^o can therefore be base-generated with person and number features, as long as its [±X] feature is blank. The lack of a blocking effect follows.

In deriving the difference between Chinese and Icelandic from a lexical difference in the anaphors in question, we leave open the possibility that there might be a language that had both kinds of anaphors. That is, there might be a language with two long-distance subject-oriented anaphors, one of which exhibited a blocking effect and could be bound by antecedents of any person and number, while the other had no blocking effect and could only have antecedents of a certain specified person and number. In fact, Korean appears to be such a language[12]. Korean *casin* seems to be an anaphor of the first kind, like Chinese *ziji*, while

Korean *caki* acts like Icelandic *sig*. *Casin*, but not *caki*, exhibits blocking effects (Korean, adapted from Cole, Hermon, and Sung 1990 (18-19)):

39. a. *Chelswu$_i$-nun [nay-ka casin$_i$-ul sarangha-n -ta] -ko sayngkakha-n-ta

Chelswu TOP I NOM self ACC love Prs Dec Comp think Prs Dec

'Chelswu$_i$ thinks I like self$_i$' (*casin* =-ϕ, +U)

b. Chelswu$_i$-nun [nay-ka caki$_i$-ul sarangha -n -ta]-ko sayngkakha -n -ta

Chelswu TOP I NOM self ACC love Prs Dec Comp think Prs Dec

'Chelswu$_i$ thinks I like self$_i$' (*caki* = partial ϕ, +U)

Also, *casin* may have antecedents of any person, while *caki* may only have a 3rd person antecedent (Korean, adapted from Cole, Hermon and Sung 1990 (20)):

40. a. Na$_i$ (Ne$_i$)-nun casin$_i$-ul sarangha-n-ta

I (you) TOP self ACC love Prs Dec

'I$_i$ (you$_i$) like self$_i$' (*casin*=-ϕ, +U)

b. *Na$_i$ (Ne$_i$)-nun [Inho-ka caki$_i$-lul miweha-n -ta]-ko mit -nun-ta

I (you) TOP Inho NOM self ACC hate Prs Dec Comp believe Prs Dec

'I$_i$ (you$_i$) believe Inho hates self$_i$' (*caki* = partial ϕ,+U)

The fact that Korean has one long-distance subject-oriented anaphor which acts like Icelandic *sig* and another which acts like Chinese *ziji* would seem to militate in favor of analyzing the differences in behavior between the Icelandic and the Chinese anaphors as lexical differences in the anaphors in question, rather than attempting to derive these differences from more general features of the languages involved.

2.5 Summary of section 2

Let me sum up this section by sketching again the bare bones of the binding theory whose essentials I have just outlined. NPs share N-features with θ-assigning heads and with T^o. Anaphors are NPs with defective features of some kind (either defective ϕ–features, or defective U-features, or both). In order for a feature-chain to enter into a well-formed checking relation with a nominal, it must satisfy the requirements of Accuracy and Completeness; that is, the feature-chain must be associated both with a set of features that accurately reflect the features on the nominal entering into a checking relation, and with a fully specified set of features. In the case of checking relations with anaphors, these two requirements conflict, and a feature must therefore move to another head, so that the feature-chain can be associated with two different sets of features; this gives the effect of Condition A, requiring anaphors to be bound. There are also cases, as we have seen, in which T^o heads entering into checking relations with non-anaphors bear defective features, and these features must therefore also be "bound" in the sense developed here; that is, they must move to a head with fully specified features. Feature-movement is constrained by Shortest Move, which gives us the relevant notion of binding domain. Cross-linguistic variation in the behavior of anaphoric elements can be partly attributed to the behavior of T^o; some languages have morphemes in their T^o paradigms which are anaphoric. Furthermore, T^o is the only kind of head which can supply ϕ–features; this accounts for the existence of subject-oriented reflexives. Table 41 is an expanded version of Table 25:

41.	ϕ–features	U-features
Chinese *ziji*	-	+
Chinese *ta-ziji*	+	-
Japanese *zibun*[13]	-	+
Japanese *kare-zisin*	+	-
Japanese *zibun-zisin*	-	-
English *himself*	+	-
English *him*	+	+
John	+	+
Icelandic *sig* [14]	partial	+
Korean *caki*	partial	+
Korean *casin*	-	+
Korean *caki-casin*	partial	-
Korean *ku-casin*	+	-

3. Pronouns and Structural Economy

We have seen that a rather large part of the phenomena which have traditionally fallen within the scope of binding theory can be made to follow from an interaction of independent linguistic principles; Shortest Move and some natural conditions on feature-checking allow us to dispense with any conditions which are solely concerned with anaphora. Given certain assumptions about linguistic structures, then, we apparently no longer need a Condition A at all. This would seem to be a welcome result. Let us see whether we can similarly dispense with Condition B by reducing it to Structural Economy[15].

3.1 Structural Economy

On this account, then, anaphoric features must be understood as being "cheaper" than fully specified features, and therefore to be preferred whenever possible[16]:

42. a. *John$_i$ hurt him$_i$

b. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ hurt$_{\textbf{him}}$ him

On this account, 42.a is ill-formed because in 42.b, the θ-assigning head *hurt*$_{\textbf{\textit{him}}}$ bears fully specified N-features, while base-generating *hurt* with underspecified N-features would yield a sentence whose meaning is identical[17] to that of 42.b. The structure therefore violates Structural Economy, on the reasonable assumption that underspecified, anaphoric features are more economical than fully specified, non-anaphoric features.

Suppose we take the following principle, then, as a preliminary attempt at dealing with the distribution of pronouns in this framework:

43. Anaphoric Structural Economy Principle (version 1 of 2):

Features must be base-generated anaphoric whenever a given reading allows it.

On the face of it, there are a number of cases which appear to violate this principle. One of the more obvious ones is listed below:

44. a. John$_i$ thinks he$_i$ is a wombat

b. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ thinks$_{\textbf{CP}}$ [CP he T$_{\textbf{he}}$ $v_{\textbf{he}}$ is$_{\textbf{wombat}}$ a wombat]

In 44.b, $T_{\boldsymbol{he}}$ apparently violates Structural Economy, since it is in a position to be bound by $T_{\boldsymbol{john}}$ and still fails to be anaphoric. Note that the problem is only with $T_{\boldsymbol{he}}$, not with $v_{\boldsymbol{he}}$; the nearest T to $v_{\boldsymbol{he}}$ is $T_{\boldsymbol{he}}$, and the nearest θ-assigner is *thinks*$_{\boldsymbol{CP}}$. $v_{\boldsymbol{he}}$ and $T_{\boldsymbol{he}}$ are both associated with a single NP-chain, and on the assumption that binding theory deals with relations between chains (cf. Chomsky 1986), rather than relations within a chain, the first of these is not a problem for Structural Economy. Neither is the second, of course, since the features are distinct. $T_{\boldsymbol{he}}$ thus appears to be the only problematic head in this sentence. We might try to get around this, then, by postulating some kind of exemption for T; Structural Economy, for some reason, would only apply to θ-assigners.

This would be somewhat ad hoc, and moreover it appears to be an unwise move for empirical reasons:

45. a. John$_i$ believes himself$_i$/*him$_i$ to be an extremely handsome marsupial

b. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ believes$_{\textbf{CP}}$ him T$_{\textbf{him}}$ $v_{\textbf{him}}$ to be$_{\textbf{marsupial}}$ an extremely handsome marsupial

c. (Norwegian, from Hestvik 1992 (557)):

John$_i$ liker hans$_{*i/j}$ bil

John likes his car

d. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ likes$_{\textbf{car}}$ his T$_{\textbf{his}}$ $v_{\textbf{his}}$ car[18]

e. (Japanese, Masanori Nakamura, p.c.):

Naomi$_i$-wa [kanozyo-ga$_{*i/j}$ utukusii] -to omotteiru

Naomi TOP she NOM beautiful that thinks

'Naomi thinks that she is beautiful'

f. Naomi T$_{\textbf{naomi}}$ $v_{\textbf{naomi}}$ thinks$_{\textbf{CP}}$ she T$_{\textbf{she}}$ $v_{\textbf{she}}$ is beautiful

These are all cases in which we want to say that the matrix T is in a position to bind the lower T, and that Structural Economy demands that an anaphor be used if referential dependence is intended. The lower *v*s are all apparently safe; in each case, there is an T and a θ-assigner intervening between the lower *v* and the heads coindexed with the higher subject. For example, in 45.b, the closest T to $v_{\textit{\textbf{him}}}$ is $T_{\textit{\textbf{him}}}$, and the closest θ-assigner is *believes*$_{\textit{\textbf{CP}}}$; thus, neither $T_{\textit{\textbf{john}}}$ nor $v_{\textit{\textbf{john}}}$ is in a position to bind $T_{\textit{\textbf{him}}}$. We cannot say that the lower clauses in these cases lack T entirely, since that would predict ill-formedness in the following cases:

46. a. John$_i$ believes the teacher to be fond of him$_i$

b. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ believes$_{\textbf{CP}}$ the teacher T$_{\textbf{teacher}}$ $v_{\textbf{teacher}}$ to be fond$_{\textbf{him}}$ of him

c. (Norwegian, from Hestvik 1992, 557):

John$_i$ likte Marits bilde av ham$_i$

John liked Mary's picture of him

d. John T$_{\textbf{john}}$ $v_{\textbf{john}}$ liked$_{\textbf{picture}}$ Mary's T$_{\textbf{Mary}}$ $v_{\textbf{Mary}}$ picture$_{\textbf{him}}$ of him

e. (Japanese):

Naomi$_i$-wa [Taroo-ga kanozyo$_i$-o hihansita]-to omotteiru

Naomi TOP Taro NOM her ACC criticized that thinks

'Naomi thinks that Taro criticized her'

f. Naomi T$_{\textbf{naomi}}$ $v_{\textbf{naomi}}$ thinks$_{\textbf{CP}}$ Taro T$_{\textbf{taro}}$ $v_{\textbf{taro}}$ criticized$_{\textbf{her}}$

Here the lower T is responsible for shielding the head bearing the features of the pronoun from binding by the higher T, so we clearly cannot assume that T is absent in the sentences in 45; we must assume that it is present, and that it is subject to an Structural Economy condition which requires it to be anaphoric when the T of the matrix clause bears features that can bind it.

Thus, we cannot exempt T from Structural Economy. How, then, are we to deal with sentences like 44 (repeated here as 47), which apparently violate Structural Economy?

47. a. John$_i$ thinks he$_i$ is a wombat

b. John $T_{\textbf{john}}$ $v_{\textbf{john}}$ thinks$_{\textbf{CP}}$ [CP he $T_{\textbf{he}}$ $v_{\textbf{he}}$ is$_{\textbf{wombat}}$ a wombat]

In fact, we already have a way of dealing with these sentences. Recall that the difference between English tensed T^{O} and Japanese tensed T^{O} was that Japanese has an anaphoric T^{O} element in its T^{O} paradigm, while English lacks such an element. This was supposed to account for the distinction in 48:

48. a. *Naomi$_i$ thinks that sheself$_i$/herself$_i$ is beautiful

b. Naomi-wa [zibun-ga utukusii] -to omotteiru

Naomi TOP self NOM beautiful that thinks

'Naomi$_i$ thinks that she$_i$ is beautiful'

48.a is bad because it violates conditions on the well-formedness of feature-checking relations (the feature-chain associated with the lower T^{O} cannot satisfy Accuracy, since English T^{O} can never be anaphoric), while 48.b is good because Japanese has a T^{O} morpheme which can have anaphoric features. But now the cause of the well-formedness of 47 is clear. English tensed T^{O} acts as though it is exempt from Structural Economy, not because Structural Economy does not apply in general to T^{O}, but because English tensed T^{O} cannot possibly be anaphoric. Even if it is structurally in a position to be bound by another head, it cannot be base-generated with defective N-features, and thus fails to violate Structural Economy. We can thus retain our maximally general statement of Structural Economy; all heads must be anaphoric if they possibly can be.

3.2 Noncomplementarity

Cases of noncomplementarity between pronouns and anaphors seem problematic for this kind of outlook. If the basic idea is that anaphors are used whenever possible, it is unclear why there should ever be a free choice between an anaphor and a pronoun as equally grammatical ways of expressing a proposition. Space constraints prevent me from considering all such cases, unfortunately. Suppose we look at one case, which arises in structures of long-distance anaphora:

49. (Icelandic, from Thráinsson 1991, 55):

a. Jón$_i$ sagDi aD ég hefDi svikiD sig$_i$

John said that I had betrayed self

b. Jón$_i$ sagDi aD ég hefDi svikiD hann$_i$

John said that I had betrayed him

50. (Chinese):

a. Zhangsan$_i$ renwei Mali ai ziji$_i$

Zhangsan think Mary love self

b. Zhangsan$_i$ renwei Mali ai ta$_i$

Zhangsan think Mary love him

Such non-complementarity is typical in long-distance anaphora; see Koster and Reuland (1991) for an overview. Let us review the derivation of sentences like 50.a. The sentence is base-generated as in 51.a. Binding of the verb *ai* 'love' by the T^{O} coindexed with *Zhangsan* then takes place across the T^{O} coindexed with

Mali, as shown in 51.b, and finally the intermediate T^O is bound by the higher T^O, as in 51.c. (I list only relevant ϕ–features here, since U-features are unimportant in the binding of *ziji*, a ϕ-feature anaphor):

```
51.   a.  Zhangsan        Tφ(3sg) renwei Mali Tφ( ) aiφ( ) ziji


      b.  Zhangsan        Tφ(3sg) renwei Mali Tφ( ) aiφ( ) ziji
                            :                         1
                            z------------m

      c.  Zhangsan        Tφ(3sg) renwei Mali Tφ( ) aiφ( ) ziji
                            1:           1       1
                            1z------m            1
                            z------------m

                                                  (ziji=-φ, +U)
```

By hypothesis, long-distance binding of *ziji* is possible because the T^O in its clause can be base-generated anaphoric, thus failing to erect a minimality barrier against movement of the features of *ziji* to the higher T. By the end of the derivation, of course, this is no longer the case; the intervening T is now fully specified, and if the features of *ziji* had not yet moved they would have to move to the T^O of their clause, not to the higher T^O. The set of possible binders thus changes in the course of the derivation. Furthermore, the binder which is available at the beginning of the derivation but not at the end (namely, the matrix T^O) is the binder which can corefer with a pronoun in sentences like 50.b.

Structural Economy, in other words, appears to be concerned with possible binding relations at the end of the derivation, not at the beginning. Suppose we say that Structural Economy applies at LF, marking as ill-formed structures containing features which were base-generated (that is, features which did not move in the course of the derivation) and which could have been fully specified by moving to higher heads.

Now we assume the following principle, a subcase of Structural Economy:

52. Anaphoric Structural Economy Principle (version 2 of 2):

At LF, no fully-specified feature must be capable of being associated by movement with the features with which it is associated.

This is the principle we need to deal with the well-formedness of 50.b. The derivation is as in 53:

53. a. Zhangsan Tϕ**(3sg) U(Zhangsan)** renwei Mali
Tϕ( ) **U(Mali)** aiϕ**(3sg) U(Zhangsan)** ta

b. Zhangsan Tϕ**(3sg) U(Zhangsan)** renwei Mali
: Tϕ( ) **U(Mali)** aiϕ**(3sg) U(Zhangsan)** ta
z---m

53.b is the stage of the derivation with which Structural Economy will concern itself. It will check the features on the higher T^o and on *ai* 'love', and the U-features on the lower T^o, since these are the features that were base-generated as they are. The features on the higher T^o trivially satisfy Structural Economy, since there is no c-commanding head to which the features could move. The U-features of the lower T^o also satisfy Structural Economy, since there are no c-commanding heads with those U-features. In the case of *ai* 'love', the nearest c-commanding T^o to which the N-features of *ai* could move is the clausemate T^o, and its features are distinct from those of *ai*, so the structure is well-formed. The fact that the verb could, in fact, have been bound long-distance by the higher T^o at an earlier point in the derivation is irrelevant for purposes of Structural Economy, which is unconcerned with S-structure relations.

This approach to noncomplementarity in long-distance anaphora makes the interesting prediction that we ought to be able to construct well-formed sentences in which a subordinate clause contains both a long-distance bound anaphor and a pronoun that corefers with a c-commanding NP outside its clause. Such sentences are indeed well-formed in Icelandic (Rögnvaldsson 1986 (91)):

54. Jón taldi aD María hefDi sagt aD ég hefDi skilaD henni
Jon believed that Maria had-SUBJ said that I had-SUBJ returned her
bókunum sínum
books self's
'John$_i$ believed that Mary$_j$ had said that I had returned self's$_i$ books to her$_j$'

In 54, the pronoun *henni* 'her' and the anaphor *sínum* 'self's' both refer to c-commanding subjects; in fact, the binder for the anaphor is structurally more distant than the binder for the pronoun. As Rögnvaldsson (1986) and Maling (1984) both point out, this is a problem for theories which try to get the noncomplementarity facts by claiming in one way or another that subjunctive clauses are optional binding domains in Icelandic. If the subjunctive clauses in 54 are binding domains, the anaphor should violate Condition A, while if they are not, the pronoun should violate Condition B. In the theory developed here, on the other hand, no such problem arises. At the beginning of the derivation, both subjunctive T^os are base-generated with anaphoric features, permitting binding of the anaphor. By the end of the derivation both T^os have had their features fully specified, so Structural

Economy, which only looks at LF relations, marks the sentence as well-formed; by LF, the pronoun is in a position such that it could not possibly be bound.

This type of approach, in which T^o can begin the derivation transparent to binding and later become opaque by virtue of being bound itself, will also be useful in dealing with sentences like those in 55:

55. a. (Icelandic, Höskuldur Thráinsson, p.c.)

Jón$_i$ heldur aD Haraldur$_k$ se aD skrifa bókina sína$_k$ í herberginu sinu$_j$

Jon thinks that Harald is writing book self's in room self's

'Jon$_j$ thinks that Harald$_k$ is writing his$_k$ book in his$_j$ room'

b. (German, Uli Sauerland, p.c.)

Hans$_j$ ließ Maria$_k$ ein Bild von sich$_k$ an einen Freund von sich$_j$ schicken

Hans let Maria a picture of self to a friend of self send

'Hans$_j$ let Maria$_k$ send a picture of herself$_k$ to his friend$_j$'

c. (Danish, Sten Vikner, p.c.)

?Peter$_j$ bad Michael$_k$ snakke med sin$_j$ kone om sine$_k$ problemer

Peter asked Michael talk with self's wife about self's problems

'Peter$_j$ asked Michael$_k$ to talk with self$_j$'s wife about self's$_k$ problems'

d. (Norwegian, Arild Hestvik, p.c.)

?John$_j$ lot Chomsky$_k$ skrive anbefalingen sin$_j$ på sitt$_k$ kontor

John let Chomsky write recommendation self's in self's office

'John$_j$ let Chomsky$_k$ write his$_j$ recommendation in his$_k$ office'

These sentences all involve two long-distance anaphors in the lower clause of a biclausal sentence. Interestingly, the anaphors need not corefer; one anaphor can be bound by the lower subject while the other is bound by the higher. We can see here that transparency for binding cannot simply be equated with inability to bind; in each case, the lower T^O is apparently transparent for binding, since one of the anaphors is bound by the higher T^O, yet the lower T^O is also capable of binding an anaphor itself. This is a serious problem for any theory which attempts to derive binding domains from some notion of Shortest Move. Clearly, the simplest notion of Shortest Move we could use would involve moving the features to the first available head that could supply them, but we seem to have a case here in which a head can supply features and features can still move past it. Note that the noncomplementarity facts discussed above militate against stipulating that the T^Os in question are of relevantly different "types", as we did for T^O and θ-assigners; Economy will treat the lower T^O as opaque for binding, while a θ-assigner is never opaque to binding by a higher T[19].

On the story developed here, the data in 55 are not difficult to explain. The derivation of the sentences in question will be something like that in 56:

```
56. a. ...     T1(x) ... T2( ) ... θ1( ) ... θ2( )

    b. ...     T1(x) ... T2( ) ... θ1( ) ... θ2( )
               :               1
               z---------m

    c. ...     T1(x) ... T2( ) ... θ1( ) ... θ2( )
               ::          1   1
               1z---m          1
               z---------m

    d. ...     T1(x) ... T2( ) ... θ1( ) ... θ2( )
               ::    1:        1          1
               1z-mz--+--m
               z---------m
```

As the representation begins, the only relevant head with fully specified features is the matrix T^O; the embedded T^O and the θ-assigners associated with the two anaphors both have underspecified features. In the first step, the features of the first θ-assigner move to the matrix T^O, thus creating the semantic effect of referential dependence between that anaphor and the higher subject. In the second step, the features of the lower T^O move to the features of the higher T^O, thus effectively giving the lower T^O fully specified features. Movement past the lower T^O would now be impossible; this T^O is now capable of binding, since it is associated with a fully specified set of features and feature-movement need move no farther to be associated with fully specified features, since association is transitive. Finally, we move the features of the second θ-assigner to the lower T^O. As a result, the two anaphors fail to corefer, since they are associated with different T^O heads.

We have seen that T^O seems to have a kind of dual nature with respect to long-distance anaphora, with the same T^O head behaving both opaque and transparent to binding. If we want to maintain the simplest, Shortest Move-based account of these facts, the most straightforward way of doing so would seem to involve having T^O change its status in the course of the derivation, so that it is transparent to binding initially and opaque at the end of the derivation. In a theory in which binding involves supply of features, the most natural way of accomplishing this is to allow T^O to be bound even when it is not in a checking relation with an anaphor.

I should mention that there do appear to be some languages in which readings of the kind exhibited in 56 are strongly disfavored. Howard and Howard (1976) note, for example, that multiple instances of *zibun* in Japanese must typically corefer. Thus, 57.a can have the readings in 60.b-c, but not those in 60.d-e:

57. a. Taroo-wa [Hanako-ga zibun-no heya-de zibun-no sigoto-o site-ita
Taro TOP Hanako NOM self GEN room in self GEN work ACC do ing
to] itta
that said

b. $Taro_i$ said that $Hanako_j$ was doing his_i work in his_i room

c. $Taro_i$ said that $Hanako_j$ was doing her_j work in her_j room

d. *$Taro_i$ said that $Hanako_j$ was doing his_i work in her_j room

e. *$Taro_i$ said that $Hanako_j$ was doing her_j work in his_i room

Similar facts are discussed for Korean by Fiengo and Kim (1980)[20] (Yoo-Kyung Baek, p.c.):

58. a. Chelswu-ka [Sunhi-ka caki pang-ese caki il -ul
Chelswu NOM Sunhi NOM self room in self work ACC
ha -ko -iss-ta -ko] sayngkakha-n -ta
do-Prog-Be -Dec-Comp think -Prs-Dec

b. $Chelswu_i$ said that $Sunhi_j$ was doing his_i work in his_i room

c. $Chelswu_i$ said that $Sunhi_j$ was doing her_j work in her_j room

d. *$Chelswu_i$ said that $Sunhi_j$ was doing his_i work in her_j room

e. *$Chelswu_i$ said that $Sunhi_j$ was doing her_j work in his_i room

Finally, a similar restriction is found in Chinese (Hooi-Ling Soh, p.c.):

59. a. Xiao Ming xiang Da Hua zai ziji de fangjian zuo ziji de gongke

Xiao Ming think Da Hua at self 's room do self's homework

b. Xiao Ming$_i$ said that Da Hua$_j$ was doing his$_i$ homework in his$_i$ room

c. Xiao Ming$_i$ said that Da Hua$_j$ was doing his$_j$ homework in his$_j$ room

d. *Xiao Ming$_i$ said that Da Hua$_j$ was doing his$_i$ homework in his$_j$ room

e. *Xiao Ming$_i$ said that Da Hua$_j$ was doing his$_j$ homework in his$_i$ room

This would seem to be a problem for the theory outlined above, which deals straightforwardly with languages like Icelandic, German, and so forth which permit the readings in 57-59.d-e, but not with languages like Japanese, Chinese, and Korean, which disallow these readings[21]. I will have to leave the question of what distinguishes these languages an open one for now[22].

We have seen, then, that while noncomplementarity between pronouns and anaphors is a problem for a competition-based theory like the one developed here, it need not be a fatal one. In particular, in a derivational theory of syntax, we can capture noncomplementarity by allowing the competition to make reference to only a single stage of the derivation; because the competition is not really "aware" of all the possible binders for a particular position, it allows a pronoun in that position even in cases where an anaphor could be used. The particular version of this tactic that was developed here involves claiming that Structural Economy is sensitive only to facts about LF, while feature-movement of anaphoric features can take place at any point in the derivation. Thus, in cases where a given position can be bound by a certain head at an early point in the derivation, but not at a later point, we find noncomplementarity. The particular case of this which we have seen involves structures in which minimality barriers which are absent at the beginning of the structure are erected in the course of the derivation. We would also expect to find noncomplementarity when a head with which a pronoun or anaphor is coindexed is moved to a position where it can no longer be bound. Space requirements prevent me from fully investigating all of the cases of noncomplementarity between pronouns and anaphors, but it seems clear to me that the problem can be solved along the lines developed here.

3.3 Anti-subject-orientation

3.3.1 Anti-subject-oriented pronouns

A number of languages have been described as having anti-subject-oriented pronouns:

60. (Russian, from Avrutin 1993 (13)):

?*Ivan$_i$ slomal ego$_i$ velosiped

Ivan broke his bike

61. (Norwegian, from Hestvik 1992 (557, 578)):

a. John$_i$ fortalte Ola$_j$ om hans$_{*i/j}$ kone

John told Ola about his wife

b. John$_i$ kikket bak ham$_{*i/j}$

John looked behind him

We already have the means available to us for dealing with these cross-linguistic differences. Recall the explanation for the difference between Japanese and English in 22-23 (repeated here as 62-63, 63.a from Gunji 1983 (131), 63.b from Masanori Nakamura, p.c.):

62. a. *Naomi$_i$ thinks that sheself$_i$/herself$_i$ is beautiful

b. Naomi$_i$ thinks that she$_i$ is beautiful

63. a. Naomi-wa [zibun-ga utukusii] -to omotteiru

Naomi TOP self NOM beautiful that think

'Naomi$_i$ thinks that she$_i$ is beautiful'

b. *Naomi-wa [kanozyo-ga utukusii] -to omotteiru

Naomi TOP she NOM beautiful that think

'Naomi$_i$ thinks that she$_i$ is beautiful'

The account given of the contrast between 62 and 63 was that English T^o differs from Japanese T^o in that the latter has an anaphoric element in its paradigm which the former lacks. Thus, 63.a is a violation of well-formedness requirements on feature-checking, and 63.b violates Structural Economy.

A parallel account is available for the difference between Norwegian and English. The Norwegian prepositional and nominal T^o paradigms contain an anaphoric T^o morpheme, which the corresponding English paradigms lack. Just as in the Japanese case, substitution of anaphors for pronouns in 64-65 yields well-formed sentences:

64. (Russian, from Avrutin 1993 (13)):

Ivan slomal svoj velosiped

Ivan broke self's bike

65. (Norwegian, from Hestvik 1992 (578)):

a. John$_i$ kikket bak seg$_i$

John looked behind self

b. John$_i$ fortalte Oma$_j$ om sin$_{i/*j}$ kone

John told Oma about self's wife

At this point someone might reasonably object that the explanation given here for the anti-subject-orientation phenomenon fails to properly unify the phenomena. According to what I have just said, Norwegian simply happens to have anaphoric prepositional and nominal T^o; there is no reason not to expect to find a language in which the equivalent of 65.a is well-formed but the equivalent of 65.b is ill-formed, or vice versa. In this regard my account differs from that of Hestvik (1992), for example, in which the facts in 65 are derived from a single fact about Norwegian pronouns (namely, a requirement that they raise at LF).

There are in fact languages in which the phenomena in 65 are dissociated:

66. (Vata, from Koopman 1983)

a. O$_i$ yE mO$_{*i/j}$ fu tlE ye

he saw him near snake PART

'He saw a snake near him'

b. O$_i$ yE Oyi$_{i/*j}$ fu tlE ye

he saw himself near snake PART

'He saw a snake near himself'

c. O$_i$ wa O$_{i/j}$ nO

he love his mother

'He loves his mother'

d. *O wa OyI$_i$ nO

he love himself's mother

'He loves himself's mother'

67. (Hungarian; a.-b. from Kiss 1987 (186), c. from Miklos Bona, p.c.):

a. János$_i$ letette a könyvet önmaga$_{i/*j}$ mellé

John down-put the book himself-nom beside-3sg

'John$_i$ put the book beside him'

b. János$_i$ letette a könyvet ö$_{*i/j}$/pro$_{*i/j}$ mellé

John down-put the book he-nom beside-3sg

'John put the book beside him'

c. János$_i$ megette a kutyaját$_{i/j}$

John ate the dog-3sg

'John ate his dog'

In 66-67 we see that Vata and Hungarian behave like Norwegian with regard to prepositions, but like English with regard to nominals. It may be, then, that the Norwegian facts follow from a single underlying fact about the language, but it is no longer as obviously desirable to have a theory which concludes that they do.

3.3.2 Anti-subject-oriented anaphors

A number of languages have been reported to have anaphors which cannot be bound by their clausemate subject:

68. (Dutch, from Reinhart and Reuland 1993 (665))

    *Max_i haat $zich_i$

    Max hates self (*zich*=partial ϕ, +U)

69. (Norwegian, from Hellan 1988 (104, 130))

    a. *Jon_i foraktet seg_i

       Jon despised self (*seg*=partial ϕ, +U)

    b. *Jon_i respekterer ham $selv_i$

       Jon respects him self (*ham selv*=+ϕ, -U)

70. (Danish, from Vikner 1985 (10, 16))

    a. *at $Peter_i$ fortalte Michael om sig_i

       that Peter told Michael about self (*sig*=partial ϕ, +U)

    b. *at $Susan_i$ fortalte Anne om hende $selv_i$

       that Susan told Anne about herself (*hende selv*=+ϕ, -U)

71. (Japanese, from Aikawa (1993, 42))

    *Daremo -ga zibun-o hagemasita

    everyone NOM self ACC encouraged

    'Everyone encouraged himself' (*zibun*=-ϕ, +U)

72. (Korean, from Yoo-Kyung Baek (p.c.))

* John$_i$-un ku-casin$_i$-ul miwehanta

John TOP he-self ACC hates

'John hates himself' (*ku-casin*=+ϕ, -U)

Reinhart and Reuland (1993) develop a theory of the fact in 68 which could certainly be generalized to the data in 69.a, 70.a, and 72. Their claim is essentially that anaphors like *zich* cannot be bound within the clause except in the presence of an anaphor which can have a clausemate antecedent (in the case of Dutch, this is *zichzelf*). The account is meant to deal with the following data (Dutch, from Reinhart and Reuland 1993 (661, 665, 668)):

73. a. Jan haat zichzelf

Jan hates himself

b. *Max haat zich

Max hates self

c. *Henk$_i$ wees mij aan zich$_i$ toe

Henk assigned me to self

d. Henk$_i$ wees zichzelf$_i$ aan zich$_i$ toe

Henk assigned himself to self

While this account deals admirably with the Dutch facts, it does have a few flaws which might prompt us to try to develop another story. For one thing, this approach is unsuitable for anaphors like those in 69.b and 70.b, which can (in fact, must) be bound within the clause, as long as the binder is not a subject:

74. (Norwegian, from Hellan 1988 (130, 105):

a. *Jon$_i$ respekterer ham selv$_i$

Jon respects him self (*ham selv*=+ϕ, -U)

b. Vi fortalte Jon$_i$ om ham selv$_i$

we told Jon about him self

75. (Danish, from Vikner 1985 (16)

at Susan$_i$ fortalte Anne$_j$ om hende selv$_{*i/j}$

that Susan told Anne about her self (*hende selv*=+ϕ, -U)

We apparently cannot claim, then, that the ill-formedness of 69.b and 70.b, and is due to the fact that the anaphors involved cannot be bound within the clause; in fact, they cannot be bound by the clausemate subject. When dealing with a subject-oriented anaphor such as *zich*, of course, the claim that it cannot be bound within its clause and the claim that it cannot be bound by the clausemate subject make the same predictions. We have a choice, then, of claiming that the anti-subject-orientation of Dutch *zich* and of Norwegian *ham selv* are completely different phenomena, or of trying to unify them in a single account. Clearly the latter course is preferable, all other things being equal.

3.3.2.1 Economy extended

From the standpoint of the theory developed here, the facts in 68-72 are surprising; all the sentences above ought to be well-formed. In fact, this theory is set up in such a way that any anaphor ought to be able to be bound by the clausemate subject. In other words, the theory so far leads us to believe that in some languages, sentences involving an anaphor bound by a clausemate subject ought to have several possible translations. It seems, however, that some factor is making the choice among anaphors less arbitrary than this. Let us see if we can isolate this factor.

Dutch has two anaphors[23]: *zich*, a partial ϕ-feature anaphor, and *zichzelf*, an U-feature anaphor. Only the latter can be bound by a clausemate subject (from Reinhart and Reuland 1993 (690)):

76. a. Willem$_i$ bewondert zichzelf$_i$

Willem admires himself (*zichzelf*=+ϕ, -U)

b. *Willem$_i$ bewondert zich$_i$

Willem admires self (*zich*=partial ϕ, +U)

Thus, whatever factor is forcing a choice between anaphors prefers U-feature anaphors over partial ϕ-feature anaphors:

77. [+ϕ, -U] >> [partial ϕ, +U]

Norwegian is a language with three anaphors: *seg*, a partial ϕ-feature anaphor, *ham selv*, a U-feature anaphor, and *seg selv*, a language which is partially deficient in ϕ–features and fully deficient in U-features. Only the last of these may be bound by a clausemate subject (Norwegian, from Hellan 1988 (104, 130)):

78. a. *Jon$_i$ foraktet seg$_i$

Jon despised self (*seg*=partial ϕ, +U)

b. *Jon$_i$ respekterer ham selv$_i$

Jon respects him self (*ham selv*=+ϕ, -U)

c. John$_i$ foraktet seg selv$_i$

John despised himself (*seg selv*=partial ϕ, -U)

Thus, Norwegian appears to offer evidence that the factor choosing between anaphors prefers [partial ϕ, -U] anaphors over both [partial ϕ, +U] anaphors and [+ϕ, -U] anaphors:

79. [partial ϕ, -U] >> [partial ϕ, +U], [+ϕ, -U]

Collapsing 77 with 79 gets us 80:

80. [partial ϕ, -U] >> [+ϕ, -U] >> [partial ϕ, +U]

The scale in 80 looks eerily familiar. The "best" anaphor, the one to be preferred above all others if it is available, is precisely the most underspecified one, while the "worst" anaphor is the one which is only partially anaphoric for one type of features. So far we have only used Structural Economy to distinguish between anaphors and non-anaphors, forcing us to use anaphors when they are available. These facts suggest that Structural Economy actually forces a choice of the most anaphoric element available. Because the clausemate subject is the one binder which is available in principle as a binder to all kinds of anaphors, it is in the case of binding by the clausemate subject that the effects of Structural Economy are seen.

3.3.2.2 Variable binding

There is a contrast between Japanese and Norwegian with regard to these effects which offers some support for the account developed here.

81. (Japanese, a-b. from Aikawa 1993 (41-42), c. from Aikawa (p.c.))

a. *Dareka$_i$ -ga zibun$_i$-o tunetta

someone NOM self ACC pinched

'Someone pinched himself' (*zibun*=-ϕ, +U)

b.?John$_i$ -ga zibun$_i$ -o tunetta

John NOM self ACC pinched

'John pinched himself' (*zibun*=-ϕ, +U)

c. John$_i$-ga kare-zisin$_i$-o tunetta

John NOM him self ACC pinched

'John pinched himself' (*kare-zisin*=+ϕ, -U)

82. (Norwegian, from Hellan 1988 (104, 130)):

a. *Jon$_i$ foraktet seg$_i$

Jon despised self (*seg*=partial ϕ, +U)

b. *Jon$_i$ respekterer ham selv$_i$

Jon respects him self (*ham selv*=+ϕ, -U)

There are two main differences between Japanese and Norwegian that we will examine. On the one hand, the ill-formedness of 81.b is rather weak and apparently varies from speaker to speaker; what is generally agreed, apparently, is that sentences involving *zibun* locally bound by a quantifier are very bad, but binding by a non-quantifier is apparently not as bad and for some speakers is perfectly well-formed. In Norwegian, on the other hand, no such variability is reported. Also, Japanese differs from Norwegian in that its U-feature anaphor, *kare-zisin*, can apparently be locally bound by the subject with no ill effects, while the Norwegian U-feature anaphor, *ham selv*, is anti-subject-oriented. So far, we would expect both languages to behave like Norwegian; both languages have anaphors with defective ϕ- and U-features (*zibun-zisin* in Japanese, *seg selv* in Norwegian) which should be preferred over the less economical U-feature anaphors when both choices are available.

On the story developed here, this can be related to another semantic difference between Japanese and Norwegian anaphors, namely their status with respect to variable binding. Aikawa (1995) notes that the Japanese anaphors *kare-zisin* and *zibun-zisin* yield quite different interpretations in a sentence like 83 (Aikawa 1995, 7-8):

83. a. John-dake-ga kare-zisin-o hihansita

John only NOM him -self ACC criticized

'Only John criticized himself (that is, no one else criticized John)'

b. John-dake-ga zibun-zisin-o hihansita

John only NOM self self ACC criticized

'Only John criticized himself (that is, no one else performed self–criticism)'

83.a and 83.b have different truth values; in a situation in which John, Bill, and Mary all criticized John, for example, 83.a is false and 83.b is true (since no one but John performed self-criticism, but several people other than John performed criticism of John: namely, Bill and Mary). Furthermore, the sentences are not ambiguous; neither can have the other's meaning. Aikawa (1995), following much work on the semantics of *only*, interprets this difference as a difference in the properties of the reflexives *kare-zisin* and *zibun-zisin*; the former cannot be interpreted as a bound variable, but must induce a reading of coreference, while the latter must be interpreted as a bound variable, and cannot allow a coreference reading.

Aikawa (1993) notes that *zibun* can be bound by quantificational elements, suggesting that it can have a bound-variable reading (Aikawa 1993, 45):

84. Daremo -ga [John -ga zibun-o semeta to] itta

everyone NOM John NOM self ACC blamed that said

'Everyone$_i$ said that John blamed self$_i$'

Furthermore, *zibun* interacts with *dake* 'only' to yield ambiguities that suggest that *zibun* can be interpreted as related to its antecedent either by coreference or by variable binding (Aikawa, p.c.):

85. John-dake-ga [Mary-ga zibun-o hihansita to] itta

John only NOM Mary NOM self ACC criticized that said

'Only John$_i$ said that Mary criticized self$_i$...

a....no one else said that Mary criticized John'

OR b....no one else$_i$ said that Mary criticized self$_i$'

Thus, in Japanese, *zibun-zisin* [-ϕ, -U] apparently cannot corefer with its antecedent and must be a bound variable, while *kare-zisin* [+ϕ, -U] cannot be a bound variable and must corefer, and *zibun* [-ϕ, +U] can either be a bound variable or corefer with its antecedent. Let us move on to consider the situation in Norwegian.

In Norwegian, the equivalents of *kare-zisin* and *zibun-zisin* are not so distinct. The anaphor *ham selv* (+ϕ, -U), unlike *kare-zisin*, may trigger either a bound-variable or a coreference reading (Asbjørn Bonvik, p.c.):

86. Vi fortalte bare Jon_i om ham $selv_i$

we told only Jon about him self

'We only told Jon about himself...

a....we didn't tell anyone else about Jon'

OR b...we didn't tell anyone else about himself'

Similarly, depending on context, *seg selv* (partial ϕ, -U) may be interpreted either as a bound variable or as coreferring with its antecedent (Arild Hestvik, p.c.)[24]:

87. Bare Jon respekterer seg selv

only Jon respects self self

'Only Jon respects himself...

a....no one else respects Jon'

OR b....no one else respects himself'

Here, again, Norwegian differs from Japanese; the closest Japanese equivalent to *seg selv*, *zibun-zisin*, can only be a bound variable, as we have seen.

Finally, Hellan (1988, 1991) notes that Norwegian *seg*, like Japanese *zibun*, can give either a bound-variable or a coreference reading (Hellan 1991, 44):

88. John hadde hørt meg snakke nedsettende om seg,

John had heard me talk depreciatorily about self

og det hadde de som stod rundt også

and it had those who stood around also

'$John_i$ had heard me talk depreciatorily about $self_i$, and so had those who were standing around'

According to Hellan, sentences like 88 can have either a strict or a sloppy reading (that is, the people who were standing around could have heard me talking either about John or about themselves).

Thus, we have a robust semantic distinction between the behavior of the anaphors of the two languages, which can be put to use in our theory. Recall that the notion of structural economy developed above makes crucial reference to the meaning of the sentence; the most economical way of expressing a particular meaning must be chosen. If the relevant notion of meaning is sensitive to the contrast between the bound-variable and coreference readings of anaphors, then the anti-subject-orientation contrasts described above fall out straightforwardly.

A speaker of Japanese who wishes to express a sentence involving local referential dependence on a subject (say, referential dependence of the clausemate object on the subject) has the following options, in principle, depending on whether she wishes to communicate a bound-variable or a coreference reading:

89. bound-variable	coreference
zibun-zisin (-ϕ, -U)	kare-zisin (+ϕ, -U)
zibun (-ϕ, +U)	zibun (-ϕ, +U)

A speaker of Norwegian in the same situation has the following options:

90. bound-variable	coreference
seg selv (partial ϕ, -U)	seg selv (partial ϕ, -U)
ham selv (+ϕ, -U)	ham selv (+ϕ, -U)
seg (partial ϕ, +U)	seg (partial ϕ, +U)

Let us take the Norwegian case first, as it is the simplest. Here the contrast between the bound-variable and the coreference reading is irrelevant; all Norwegian anaphors can have either reading, so the set of possibilities is the same in each case. The most underspecified Norwegian anaphor is *seg selv*, which is at least partially underspecified for both kinds of features. Thus, this anaphor must be used whenever possible (that is, whenever binding is by a clausemate subject), and both of Norwegian's other anaphors are thus correctly predicted to always exhibit "anti-subject-orientation", in the sense of being unable to be bound by a clausemate subject.

Next let us move on to the Japanese case, which is more interesting. We have seen that Japanese differs from Norwegian in that *kare-zisin*, unlike its Norwegian equivalent *ham selv*, exhibits no anti-subject-orientation. In 90, we can see why. *Ham selv* is anti-subject-oriented because it must compete with the more underspecified anaphor *seg selv*, as we have seen. *Kare-zisin*, on the other hand, has semantic properties which are quite distinct from those of *zibun-zisin*; *kare-zisin* must corefer and cannot be a bound variable, while *zibun-zisin* must be a bound variable and cannot be linked to its antecedent by coreference. Thus, the two anaphors are never in competition, and the lack of anti-subject-orientation follows.

The peculiar behavior of *zibun* follows in a similar way. We can see in 108 that *zibun* competes with *zibun-zisin* when it acts as a bound variable, and with *kare-zisin* when it corefers with its antecedent. In the former competition, it will lose; in the latter, it will tie. Thus, we expect *zibun* to be well-formed when it corefers with a clausemate subject, but to be ill-formed when it acts as a variable bound by a clausemate subject. As we noted before, this is the case; *zibun* exhibits at worst a very weak anti-subject-orientation[25] when its antecedent is not a quantifier, but when its antecedent is a quantifier (that is, when its antecedent can only be related to it by variable binding), it becomes ill-formed (81.a-b, repeated as 91):

91. a. *Dareka$_i$ -ga zibun$_i$-o tunetta

someone NOM self ACC pinched

'Someone pinched himself' (*zibun*=-ϕ, +U)

b. ?John$_i$ -ga zibun$_i$ -o tunetta

John NOM self ACC pinched

'John pinched himself' (*zibun*=-ϕ, +U)

Recall that *zibun* can perfectly well be bound long-distance by a quantifier (85, repeated as 92):

92. Daremo -ga [John -ga zibun-o semeta to] itta

everyone NOM John NOM self ACC blamed that said

'Everyone$_i$ said that John blamed self$_i$'

This, of course, is what we expect; in 92, *zibun* is not in competition with *zibun-zisin*, which can only be locally bound.

Thus, the contrasts between Japanese and Norwegian with regard to anti-subject-orientation provide striking evidence for an account of this phenomenon in terms of competition between anaphors; anti-subject-orientation is found only when two different anaphors could potentially be used for the same job. The account of anti-subject-orientation in anaphors developed here is incomplete, of course; for example, I have no account to offer of the facts of 73.c-d[26]. Still, the simplicity of the account sketched here, as well as its applicability to a wide variety of languages, would appear to make it rather attractive as a base for further research into these questions.

4. Conclusion

If the story I am telling here is right, there is probably no need for a syntactic theory of binding. All we need are some general principles regulating feature-checking and some statements about the lexicons of various languages (in particular, statements about the feature specifications of various T morphemes and anaphors). It appears, then, that even without any principles which are specifically concerned with binding theory, we can expand the coverage of the theory to problems that were previously beyond its grasp.

Let me close, then, by summarizing again the general framework I have tried to develop here. I have assumed, following much recent work, that nominals share N-features with θ-assigning heads and with T^{o}. Anaphors are elements whose N-features are deficient in some way, and well-formedness conditions on feature-checking therefore require features on heads associated with anaphors to move to c-commanding heads with fully specified features by LF. Which heads are possible landing sites for feature-movement is determined by Shortest Move.

In addition, there is a requirement of Structural Economy which checks at LF to make sure that features which were not supplied by anaphora could not possibly have been. This requirement is blind to S-structure relations, so various operations can "save" structures which violate Structural Economy in early stages of the derivation. This leads to cases of noncomplementarity between pronouns and anaphors. Generally, if the set of possible binders for a given head changes in the course of a derivation, we expect to find noncomplementarity. Structural economy, then, will give us the effects of Condition B, as well as deriving cases of so-called "anti-subject-oriented" anaphors.

Cross-linguistic differences in the behavior of anaphora are partly or completely attributable to differences in the lexicon; more specifically, in the kinds of T^O morphemes and anaphors available in the lexicon. If a particular T^O paradigm lacks an anaphoric T^O morpheme, long-distance anaphora will be impossible across T^O of that kind, an NIC effect will obtain (because of well-formedness conditions on feature-checking), and a pronoun coindexed with that kind of T^O will be able to corefer with the nearest c-commanding nominal controlling agreement, in apparent violation of Structural Economy. Examples of paradigms which contain anaphoric T^O morphemes include English infinitival T^O, Japanese tensed T^O, Icelandic subjunctive and infinitival T^O, Norwegian nominal and prepositional T^O, and Hungarian and Vata prepositional T^O. Examples of paradigms lacking anaphoric T^O morphemes include English tensed T^O, nominal T^O, and prepositional T^O, Icelandic indicative T^O, and Hungarian and Vata nominal T^O.

The possible kinds of anaphors are defined in terms of the familiar ϕ–features, along with U-features, a type of N-feature which is unique to the nominal bearing it. Anaphors which are deficient only for ϕ–features are subject-oriented, since only T^O can supply ϕ–features, and can be long-distance bound if the nearest T^O can be anaphoric. Anaphors which are deficient only for U-features are not subject-oriented and are local. Anaphors which are deficient for both kinds of features are both subject-oriented and local.

(Acknowledgements to be added.)

[1] This tradition is not without its exceptions, of course: see Reinhart and Reuland 1993, in particular, for a different viewpoint.

[2] That is, the facts regarding the distribution of pronouns and anaphors. I will be unable to discuss Condition C here.

[3] Theories assuming that subjects and objects are base-generated in different maximal projections include Bowers (1993), Koizumi (1993, 1995), Bobaljik (1995), and Chomsky (1995).

[4] These requirements are probably too simple; in fact, we will see later that Accuracy must apparently be satisfied at the point in the derivation at which a nominal enters into a spec-head relation with the feature-chain. If we were to assume a version of Watanabe's (1994) Three-Layered Case Theory suggested by Chomsky (class lectures, 1994), in which N-features must be checked twice, we could claim that these two requirements hold of the two different instances of feature-checking.

[5] We might think of the relevant distinction as one between lexical and functional heads (on the assumption that the light verb *v* is lexical).

[6] The acceptability of sentences like 23.b varies from speaker to speaker; for Katada (1991), for example, they are apparently well-formed. This is one of several problematic cases of noncomplementarity between pronouns and anaphors, which I will discuss in section 3.2. I will not discuss sentences like i., which are apparently well-formed for all speakers:

i. Naomi-wa [e utukusii]-to omotteiru

Naomi TOP beautiful that think

The approach outlined here would lead us to conclude that the empty category in sentences like i. can be anaphoric, at least for speakers who reject 23.b. See Aoun and Li 1990, Vainikka 1989 for arguments for a similar conclusion in Chinese and Finnish, respectively.

[7] This is based on the distinction introduced in Huang and Tang 1991 between ϕ-features (person, number, gender) and R-features (aspects of reference other than ϕ-features), the only difference being that the N-features assumed here are purely syntactic; they are not intended to represent the reference of the nominal.

[8] We might wonder why anaphors which only lack ϕ-features need to corefer with their antecedents, rather than simply agreeing with them in ϕ-features. Recall that we are assuming that any structure in which the N-features of an anaphor move to a head whose specifier is a possible antecedent for the anaphor is given a reading involving coreference by the interpretive component. Ensuring that coreference is enforced is not the duty of the syntax. We will shortly see another case in which the syntax and semantics of binding diverge; feature-movement does not always force coreference.

[9] This may be related to the fact that T^o is the one functional head that bears N-features (the others all being lexical(arguably, in the case of v^o)); for arguments associating ϕ-features with functional projections of various kinds, see Ritter 1993, 1995 and references cited there.

[10] In Icelandic, as in a number of other languages, long-distance binding is restricted to binding into clauses of certain tenses or moods: in this case, subjunctive and infinitival clauses, but not indicative clauses, allow long-distance binding. In terms of the theory developed here, Icelandic infinitival and subjunctive T^o, but not indicative T^o, has an anaphoric morpheme in the paradigm. Given that infinitival and subjunctive clauses are generally subordinate clauses, while main clauses are typically indicative, the relative frequency with which the Icelandic pattern shows up (as

compared, for example, to the reverse pattern, which as far as I know has never been attested) may be explainable in terms of functional load; forms of T^o which are typically in subordinate clauses are more likely to be in a position to be bound, and an anaphoric morpheme is thus more useful.

[11] For example, the feature [+N], or [+D].

[12] The facts of Korean anaphora are apparently subject to considerable dialectical variation. Judgments compatible with the facts reported here can be found, however, in Yoon 1989, Cole, Hermon and Sung 1990, and Li and Takahashi 1993.

[13] See Aikawa 1993 for discussion of a blocking effect in Japanese long-distance binding, which suggests that *zibun*, like *ziji* in Chinese, is a full ϕ-feature anaphor. Aikawa argues convincingly, however, that the Japanese blocking effect is distinct from the Chinese one in interesting ways. I will have to leave this problem for future research.

[14] According to Anderson (1986), there are at least some dialects of Icelandic in which *sig* is ambiguous between a partial ϕ-feature anaphor and an R-feature anaphor. In these dialects, *sig* can be bound short-distance by non-subjects (Icelandic, from Anderson 1986 (66)):

i. Ég sendi $Haraldi_i$ föt á sig_i

I sent Harold-DAT clothes for self

[15] See Burzio (1989, 1991, to appear), in particular, for accounts pursuing this line.

[16] I revert here to the less detailed notation for features on heads which was used at the beginning of the paper, simply for ease of processing. The notation is intended as a mnemonic, not as an exact representation of the features on the head.

[17] The question of when two sentences have identical meanings in the relevant sense is not a simple one. See Grodzinsky and Reinhart 1993, Heim 1992 for discussion.

[18] Here I assume that there are nominal equivalents of *v* and T^{o}; the exact identity of these heads is unimportant here.

[19] As Harbert (1995) points out for Gothic and Anderson (1986) and Maling (1984) for Icelandic, infinitive clauses in those languages do not exhibit the complementarity discussed above with respect to long-distance binding; only anaphors are possible in those contexts. This might be a case in which postulating relevantly different types of T^{o} would be warranted, although justifying this move will take much more work.

[20] Fiengo and Kim (1980) present a very interesting set of facts, which I cannot do justice to here, partly because my informants disagree with several of their crucial judgments. I will have to leave this problem to further research.

[21] It is probably worth noting that for some speakers, at least, the phenomenon described in 57-59 can be overruled by semantic factors (Korean, Yoo-Kyung Baek, p.c.):

i. John_i-un $[\text{Bill}_j$-i $[\text{caki}_j$-ka caki_i-pota te ttokttokha-ta- ko]
John TOP Bill NOM self NOM self than more smart Dec Comp
saynggkakha-n -ta -ko] malha-ess -ta
think Prs Dec Comp say Past Dec
'John_i thinks Bill_j said self_j is smarter than self_i'

i. can have the reading shown, where the two instances of *caki* fail to corefer, presumably because the reading where they corefer would be semantically anomalous (since people cannot be smarter than themselves).

[22] See Richards 1995 for some further discussion of this problem.

[23] I ignore here the anaphor *hemzelf*, the behavior of which is completely mysterious to me. See Koster 1985 for an account.

[24] There is apparently some debate about this, and various tests for bound variable-hood give different results; for example, many Norwegian speakers can only get the sloppy reading for sentences like i. (Arild Hestvik, p.c., Hellan 1988, 1991):

i. Jon respekterer seg selv, og det gjøre Bjørn også

Jon respects self self and it does Bjorn also

'Jon respects himself, and so does Bjørn'

For these speakers, *seg selv* appears to only be able to operate as a bound variable here. On the other hand, there are speakers who can get a strict reading (in which Bjørn respects Jon) for sentences like i., and there are speakers who only get the sloppy reading in i but agree with the judgment in 87 (Arild Hestvik, p.c.). There is obviously a great deal of work to be done in sorting these matters out, but the general outline of the facts above seems clear; Japanese and Norwegian anaphors differ in crucial ways with regard to their status as bound variables which can be used to explain the difference between them with respect to anti-subject-orientation.

[25] To the extent that coreferring *zibun* exhibits an anti-subject-orientation, I would have to attribute the effect to a preference for a bound-variable reading over a coreference reading whenever possible.

[26] See Richards (to appear) for an attempt at dealing with these facts.

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