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On Control and Control Theory

In section 1 of this article we present the facts of control and propose a theory for them. If we are correct, control is an essentially configurational phenomenon and control theory an essentially configurational theory; in particular, control theory is constructed on essentially the same notions on which binding theory is constructed in Chomsky (1981). Our approach to control as a configurational phenomenon and to control theory and binding theory as one theory is new, as far as we know, in the context of both Chomsky's (1981) theory of grammar and alternative theories. In the last part of the section we present other analyses of control, in particular the fragment of a theory in Chomsky (1980) and the theories in Williams (1980) and Bresnan (1982), and we compare them to our theory. If we are correct, the comparison altogether weighs in favor of our theory.

In section 2 we propose a modification of Chomsky's (1981) theory of binding and discuss the consequences of our modified theory of binding, as well as of our theory of control, for binding phenomena. Most notably, our theory, contrary to Chomsky's, predicts that pronominals and anaphors in the subject position of nominals or in the object position of subjectless nominals are not in complementary distribution; and it implies, contrary to Chomsky's theory, that the distribution of PROs does not depend entirely on the theory of binding, but must depend partially on Case properties.

In section 3 we suggest a revision of Chomsky's (1981; 1982) theory of empty categories. Our idea, derived from proposals in Bouchard (1982) and Sportiche (1982), is that PROs, like NP-traces, are pure anaphors. Our conclusions are admittedly tentative.

Finally, in the appendix, we present a modification of Chomsky's theory suggested in Chomsky (1981), and we examine it in the light of our theory.

Before proceeding to the body of the article, we now sum up the notions and principles in the literature crucially referred to there.

I would like to acknowledge the MIT Department of Linguistics and Philosophy for financial support during the writing of this article. My professional debts should be clear from the paper itself; my intellectual and moral debts are probably too complicated to discuss in a footnote.

In the time elapsed between the first and the published versions of this article a few works on control and related subjects have been completed. In some cases, as in the case of Bouchard (1982) and Sportiche (1982), the topics dealt with are much the same as in this article and the comparison transparent if not explicitly discussed; in other cases, as in the case of Guéron (1982), the topics dealt with are too much outside the original scope of this article to be discussed at all. In all cases I regret I have not been able to give these and other recent works better attention.

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First, following Reinhart (1976) and Aoun and Sportiche (1981), we define *c-domain* as in (1), *c-command* as in (2), and *government* as in (3):

(1) γ is the c-domain of α iff
γ is the minimal maximal category dominating α.
(2) α c-commands β iff
the minimal maximal category dominating α dominates β.
(3) α governs β iff
a. α is a lexical category, and
b. α and β c-command each other.

Following Chomsky (1981), we define *binding* as in (4), state the *i-within-i condition* as in (5), and define accessibility as in (6):

(4) α binds β iff
a. α and β are coindexed, and
b. α c-commands β.
(5) *[$_{\delta}$ . . . α . . .], where δ and α are coindexed.
(6) α is accessible to β iff
a. α c-commands β, and
b. coindexing of α and β does not violate the i-within-i condition.

Further, following Chomsky (1981), we define *governing category* as in (7) (where by *subject* we mean the technical notion of subject, SUBJECT in Chomsky (1981)), until we modify the definition in section 2; and we state the *binding conditions* as in (8), following Chomsky (1982) in eliminating condition C:

(7) γ is a governing category for α iff
a. γ is the minimal category containing α, a governor for α, and a subject accessible to α;
b. γ is the root sentence, if not (a) and α is governed.
(8) A. An anaphor is bound in its governing category.
B. A pronominal is free in its governing category.

Finally, following Chomsky (1982), we assume the *inventory of empty category types* in (9), define the [+*pronominal*] *type* as in (10), and let Chomsky's (1981) *PRO theorem*, as in (11), determine the [+anaphoric, +pronominal] type, until we revise the theory in section 3:

(9)
NP-trace:	[+anaphoric, −pronominal]
PRO:	[+anaphoric, +pronominal]
pro:	[−anaphoric, +pronominal]
variable:	[−anaphoric, −pronominal]

(10) An empty category is [+pronominal] iff it is free or bound by an element independent in θ-marking.
(11) A pronominal anaphor is ungoverned.

1. Control

Consider first a PI
with an object or
the object in (12).
(15):

(12) John a
(13) John a
(14) John p
(15) John p

The PRO cannot
outside *S*, as sho

(16) *John a
(17) *John p
(18) *Mary
(19) *Mary

Thus, with respe
(20) appears to h

(20) A PR(

An obvious
predicts that bot
control is possib
Correspondingly
in the passives c
of (13) and (14),

(21) Bill w
(22) *Bill w
(23) *Bill v
(24) Bill v

However, with
syntactic groun
and subject co
reasons—say, (
A less obvi
that only subje
PROs in object

(25) John

1. Control

Consider first a PRO in an object sentence of a sentence *S*. The PRO must be coreferential with an object or with the subject of *S*, as in (12)–(15), where PRO is coreferential with the object in (12), the subject in (13), the subject in (14), and the object, if anything, in (15):

(12) John asked Bill [PRO to shave himself]
(13) John asked Bill [PRO to be allowed to shave himself]
(14) John promised Bill [PRO to shave himself]
(15) John promised Bill [PRO to be allowed to shave himself]

The PRO cannot have arbitrary reference, as shown in (16)–(17), and cannot corefer outside *S*, as shown in (18)–(19):

(16) *John asked Bill [PRO to behave oneself]
(17) *John promised Bill [PRO to behave oneself]
(18) *Mary said that John asked Bill [PRO to behave herself]
(19) *Mary said that John promised Bill [PRO to behave herself]

Thus, with respect to a PRO in an object sentence of a sentence *S* the generalization (20) appears to hold:

(20) A PRO in an object sentence of a sentence *S* is bound in *S*.

An obvious problem with (20) as a sufficient descriptive condition is that, while (20) predicts that both subject and object control are possible in all of (12)–(15), only object control is possible in (12) and (15), and only subject control is possible in (13) and (14). Correspondingly, the problem is that coreference between the PRO and *Bill* is possible in the passives of (12) and (15), i.e. (21) and (24), whereas it is impossible in the passives of (13) and (14), i.e. (22) and (23):

(21) Bill was asked [PRO to shave himself]
(22) *Bill was asked [PRO to be allowed to shave himself]
(23) *Bill was promised [PRO to shave himself]
(24) Bill was promised [PRO to be allowed to shave himself]

However, with respect to this problem, it appears quite possible to assume that on syntactic grounds all of (12)–(15) and (21)–(24) are indeed well formed with both object and subject control; and that either subject or object control is excluded for other reasons—say, on semantic grounds.

A less obvious problem for (20) as a necessary condition is that, although it predicts that only subject or object control is possible for a PRO in an object sentence, some PROs in object sentences do have arbitrary reference, as in (25):

(25) John said [PRO to behave oneself]

However, with respect to this problem, it appears quite possible to assume that in (25) *say* has a phonologically null indirect object and that the PRO is bound by it.

Consider on the other hand a PRO in a subject sentence of a sentence *S*. The PRO can have arbitrary reference, as in (26); or it can corefer into *S*, as in (27), into a phrase superordinate to *S*, as in (28), or into a phrase subordinate to *S*, as in (29):

(26) [PRO to behave oneself in public] would help Bill
(27) [PRO to behave himself in public] would help Bill
(28) Mary knows that [PRO to behave herself in public] would help Bill
(29) [PRO to behave himself in public] would help Bill's development

Thus, for a PRO in a subject sentence the generalization (30) appears to hold:

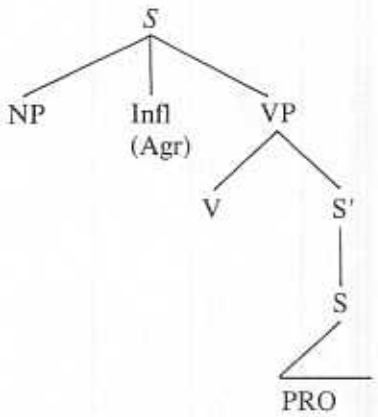
(30) A PRO in a subject sentence (co)refers freely.

Let us then define a *domain-governing category* for an element as in (31), on the basis of the definition of governing category in (7); and, on the model of binding condition (8A), let us state the binding condition for an anaphor without a governing category, hence a pronominal anaphor, as in (32):

(31) γ is a domain-governing category for α iff
  a. γ is a governing category for the c-domain of α, and
  b. γ contains a subject accessible to α.
(32) An anaphor without a governing category is bound in its domain-governing category.

The examples with PROs in object sentences, as in (12)–(19) and (21)–(25), involve configuration (33):

(33)

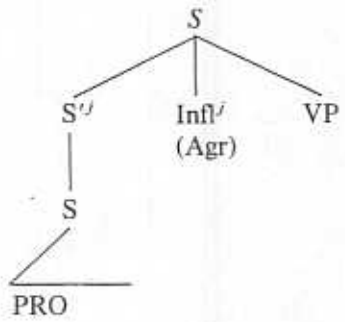


In (33) the c-domain of PRO is S', since S' is the minimal maximal category dominating PRO. Further, the governing category for the c-domain of PRO is *S*; for *S* is the minimal category containing S', a governor for S' (V), and a subject accessible to S' (NP or Agr).

Finally, *S*, the governing category for the c-domain of PRO, contains a subject accessible to PRO (NP or Agr again); for NP and Agr c-command PRO and coindexing of NP or Agr with PRO does not violate the i-within-i condition. Hence, by (31), *S* is the domain-governing category of PRO; and by (32), PRO is correctly predicted to be bound in *S*.

On the other hand, the examples with PROs in subject sentences, as in (26)–(29), involve configuration (34), where we assume that S′ and Agr are cosuperscripted:

(34)



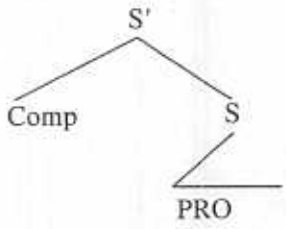
In (34), as in (33), the c-domain of PRO is S′ and the governing category for the c-domain of PRO, S′, is *S*, where the governor and accessible subject for S′ is Agr. But in (34), *S*, the governing category for the c-domain of PRO, does not contain a subject accessible to PRO; for S′ and Agr c-command PRO, but cosuperscripting of S′ or Agr and PRO would violate the i-within-i condition. Hence, by (31) PRO does not have a domain-governing category; (32) then does not apply, and PRO is correctly predicted to (co)refer freely.

Consider next the case of a PRO in a sentence with a Comp. The PRO (co)refers freely no matter what the position of the sentence is. In (35)–(37), where a PRO is in an object sentence with a Comp, the PRO can corefer into the sentence *S* of which the control sentence is an object, as in (35), or have arbitrary reference, as in (36)–(37):

(35) John asked [how [PRO to behave himself]]
(36) John asked [how [PRO to behave oneself]]
(37) John was asked [how [PRO to behave oneself]]

Examples (35)–(37) involve configuration (38):

(38)



If in the presence of a Comp, S is the maximal projection of Infl and S′ is the maximal

projection of Infl and Comp together, then in (38) the c-domain of PRO is S. But S, the c-domain of PRO, does not have a governing category, since it does not have a governor; and since S, the c-domain of PRO, does not have a governing category, PRO does not have a domain-governing category. (32) then does not apply, and PRO is correctly predicted to (co)refer freely.

Notice that under the present approach, if the higher *t* in sentences like (39)–(40) is in Comp, a configuration like (38) results and the PRO is predicted to (co)refer freely; if on the other hand the higher *t* is adjoined to S/S', a configuration like (33) results and the PRO is predicted to be bound in the matrix sentence:

(39) What did John ask Bill [*t* [PRO to do *t*]]
(40) What was Bill asked [*t* [PRO to do *t*]]

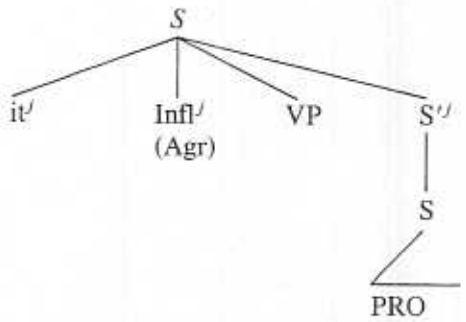
Since in both (39) and (40) PRO must be coreferential with *Bill*, we are led to the conclusion that the higher *t* in (39)–(40) is not in Comp, but adjoined somewhere.

Consider next the case of a PRO in an extraposed sentence in a sentence *S*. The PRO (co)refers freely. In (41)–(44), for example, the PRO can corefer into *S*, as in (41), into a phrase subordinate to *S*, as in (42), or into a phrase superordinate to *S*, as in (43), or it can have arbitrary reference, as in (44):

(41) It would help Bill [PRO to behave himself in public]
(42) It would help Bill's development [PRO to behave himself in public]
(43) Mary knows that it would help Bill [PRO to behave herself in public]
(44) It would help Bill [PRO to behave oneself in public]

Examples (41)–(44) involve configuration (45), where we assume that *it*, Agr, and S' are cosuperscripted:

(45)



In (45), as in (33) and (34), the c-domain of PRO is S'; and as in (33) and (34) the governing category for the c-domain of PRO, S', is *S*. But as in (34) *S*, the governing category of the c-domain of PRO, does not contain a subject accessible to PRO; for *it* and Agr c-command PRO, but cosuperscripting of *it* or Agr with S' would violate the i-within-i condition. Hence, in (45) PRO does not have a domain-governing category; (32) then does not apply, and PRO is correctly predicted to (co)refer freely.

Notice that under the present approach a PRO in a sentence moved into subject position is predicted to behave exactly like a PRO in a sentence generated in subject position. The prediction cannot be tested, however, since independently of control the case of a moved infinitival sentence can never arise, as shown in (46)–(47):

(46) *[For Bill to win] was hoped (by John)
(47) *[PRO to win] was hoped (by John)

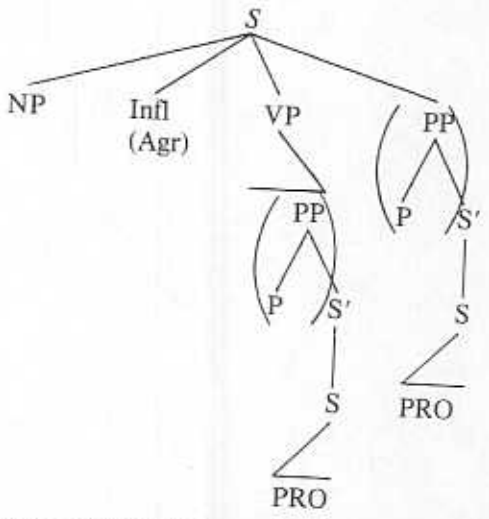
More interestingly, under the present approach a PRO in a passivized sentence in situ is predicted to behave exactly like a PRO in an extraposed sentence if the control sentence is coindexed with the (expletive) subject; and is predicted to behave exactly like a PRO in an object sentence if the control sentence is not coindexed with the (expletive) subject. Concretely, if the control sentence in (48)–(50) is coindexed with the subject, essentially configuration (45) results and the PRO is predicted to (co)refer freely; if on the other hand the control sentence is not coindexed with the subject, essentially configuration (33) results and the PRO is predicted to be bound in the matrix sentence *S*:

(48) It was decided by John [PRO to behave himself]
(49) *Mary knew that it had been decided by John [PRO to behave herself]
(50) *It was decided by John [PRO to behave oneself]

Since in (48)–(50) PRO can corefer into *S*, as in (48), cannot corefer outside *S*, as in (49), and cannot have arbitrary reference, as in (50), we are led to the conclusion that in (48)–(50) the control sentence and the subject are not coindexed.

Finally, consider the case of a PRO in a modifier sentence. This case involves configuration (51), where we assume that the modifier control sentence is attached to either *S* or VP:

(51)



In (51) the c-domain of PRO is again S′; and the governing category for the c-domain

of PRO, S′, is again *S*, where the governor for S′ is P (possibly an abstract P) and its accessible subject is NP or Agr. Since *S* again contains a subject accessible to PRO, by (31) *S* is the domain-governing category of PRO; by (32), then, PRO is predicted to be bound in *S*. Concretely, in the case in which the modifier control sentence is attached to VP, the prediction is that PRO is coreferential with either an object or the subject of *S;* this can be the case, for instance, with the purpose sentence (52):

(52) John hired Mary [PRO to fire Bill]

In the case in which the modifier control sentence is attached to *S*, on the other hand, since only the subject c-commands (hence, can bind) the PRO in *S*, the prediction is that the PRO is coreferential with the subject of *S;* this must be the case, for instance, with the purpose sentence (53):

(53) John fired Mary [PRO to hire Bill]

The case in which PRO has arbitrary reference, as in (54) and possibly (55), can be assumed to be the result of control by a phonologically null agent:

(54) Mary was fired [PRO to hire Bill]
(55) Mary was hired [PRO to fire Bill]

Let us now consider the theory of control in Chomsky (1980), as summarized in (56)–(58):

(56) . . . V . . . [$_{S'}$ Comp [$_{S}$ . . . PRO . . .
where V subcategorizes S′
(57) In (56) NP is a controller for V if
  a. NP is properly related to V (subject, direct object, certain complements)
  b. if V = [+SC] (i.e. [+Subject Control]), NP is the subject of V.
(58) In (56)
  a. if Comp ≠ null and V has no controller, PRO (co)refers freely;
  b. if Comp = null or V has a controller, PRO is coreferential with the nearest controller.

The theory is designed to take into account examples like (12), (14), (21), (23), (35), and (37):

(12) John asked Bill to shave himself.
(14) John promised Bill to shave himself.
(21) Bill was asked to shave himself.
(23) *Bill was promised to shave himself.
(35) John asked how to behave himself.
(37) John was asked how to behave oneself.

In (12) Comp = null and V has two controllers, the object and the subject; by (58b) PRO is coreferential with the nearest controller, the object. In (14) Comp = null and V has one controller, the subject, V being a [+SC] verb; by (58b) PRO is coreferential

with the only controller, the subject. In (21) Comp = null and V has a controller, the subject, V being [+SC]; by (58b) PRO is coreferential with the subject. In (23) Comp = null and V, being [+SC], has no controller, the subject of V disappearing under passive; by (58b) PRO must be bound by a controller, but it cannot be and ungrammaticality results. In (35) Comp ≠ null and V has a controller, the subject, V being [+SC]; by (58b) PRO is coreferential with the subject. In (37) Comp ≠ null and V, being [+SC], has no controller under passive; by (58a) PRO (co)refers freely.

A first problem with (58) is the existence, next to examples like (12) and (14), of examples like (13) and (15), with their passives (22) and (24); (24) is in fact pointed out in Chomsky (1980):

(13) John asked Bill to be allowed to shave himself.
(15) John promised Bill to be allowed to shave himself.
(22) *Bill was asked to be allowed to shave himself.
(24) Bill was promised to be allowed to shave himself.

In (13) PRO is coreferential with the most distant controller, not with the nearest one; in (15) the subject is not a controller and the object, if anything, is. This suggests that the principle of the nearest controller and the feature [+SC] have to be given up, possibly (as in the present theory) in favor of semantic considerations. A second problem with (58) is the existence, next to examples like (37), of examples like (36), where V has a controller but arbitrary reference is possible; an example analogous to (36) is in fact pointed out in Chomsky (1980) outside the discussion of control:

(36) John asked how to behave oneself.

This suggests that the distinction between the case in which Comp ≠ null and V has no controller and the case in which Comp = null or V has a controller has to be given up, as in the present theory, in favor of a distinction between the case in which Comp ≠ null and the case in which Comp = null.

Thus, good arguments can be made in favor of the present theory against that of Chomsky (1980).

Consider next the theory of Williams (1980). Here, a sentence with PRO in subject position, $[_S$ PRO VP], can be a (complex) predicate. $[_S$ PRO VP] can then be coindexed with an NP under some predication rule or can be assigned a free (*arb*) index, and the free index can further undergo some rewriting rule. The PRO finally takes on the index of the control sentence. The predication rules include (59); the rules rewriting a freely indexed $[_S$ PRO VP] are the "more or less" obligatory rule (60) and the optional rule (61):

(59) If X is in VP and X is specified by V to be a predicate, coindex X with NP, NP the theme of V or NP specified by V.
(60) Rewrite *arb* as the index of NP, if NP and *arb* command each other.
(61) Rewrite *arb* as the index of NP, if NP commands *arb*.

A first essential difference between Williams's theory and the theory proposed here is that the latter predicts that all PROs in object sentences pattern differently from all PROs in subject sentences; Williams's theory, on the contrary, predicts that PROs in those object sentences that do not undergo predication and PROs in subject sentences, which never undergo predication, pattern alike.

Thus, the present theory correctly predicts that arbitrary reference is possible in an example like (26) with PRO in a subject sentence and impossible in an example like (62) with PRO in an object sentence; depending upon whether (60) is actually obligatory or optional, Williams's theory incorrectly predicts that arbitrary reference is equally impossible or equally possible in both (26) and (62), which according to Williams's theory are both examples of nonpredication control:

(26) To behave oneself in public would help Bill.
(62) *John wanted to shave oneself.

In the same way, the present theory correctly predicts that coreference outside the sentence *S* in which the control sentence occurs is possible in (28) and impossible in (63); depending upon whether (60) is actually obligatory or optional, Williams's theory incorrectly predicts that coreference outside *S* is equally impossible or equally possible in both (28) and (63):

(28) Mary knows that to behave herself in public would help Bill.
(63) *Mary knew that John wanted to behave herself.

That PROs in object sentences like (62)–(63) behave differently from PROs in subject sentences therefore makes a good case for the present theory against Williams's.

A second essential difference between the two theories is that Williams's predicts that the PROs in object sentences that undergo the predication rule (59) behave differently from the PROs in object sentences that do not; the present theory, on the contrary, predicts that all PROs in object sentences behave alike.

In particular, under the assumption that the substitution of a lexical NP for a PRO is incompatible with a sentence being a predicate, Williams's theory predicts that lexical NPs can alternate with PROs in cases of nonpredication control, but not in cases of predication control. Further, under a strict c-command condition on predication, Williams's theory predicts that the antecedent must strictly c-command the PRO in cases of predication control, but not in cases of nonpredication control. Furthermore, Williams's theory predicts that the antecedent must be unique in cases of predication control, by the predication rule (59), but not in cases of nonpredication control. Finally Williams's theory predicts that, by rule (59), there must be an antecedent in cases of predication control, but not in cases of nonpredication control.

Thus, Williams's theory predicts a sentence like (64) to be well formed as a case of nonpredication control involving lack of an antecedent for the PRO:

(64) It was decided to shave oneself.

However, as a case of nonpredication control, a sentence like (65), involving alternation of the PRO with a lexical NP, is also predicted to be well formed, which it is not:

(65) *John decided for Bill to shave himself.

Hence, if it is maintained that *decide* is a verb of nonpredication control, (65) must be explained on grounds other than the theory of control—say, subcategorization properties—under Williams's theory as under the present theory. If, on the contrary, it is maintained that *decide* is a verb of predication control, (64) must be independent of the theory of control under both.

In the same way, Williams's theory predicts that sentences like (66) and (67), involving control of the PRO by a non–strictly c-commanding NP and alternation of the PRO with a lexical NP, respectively, will be well formed as cases of nonpredication control:

(66) John signaled to Mary to behave herself.
(67) John signaled to Mary for Bill to behave himself.

However, as cases of nonpredication control, both (66) and (68), involving nonuniqueness of antecedents, are predicted to be well formed, which (68) is not:

(68) *John signaled to Mary to shave himself.

Hence, if it is maintained that *signal* is a verb of nonpredication control, (68) must be explained on grounds other than the theory of control—say, semantic grounds—under Williams's theory as under the present theory. If, on the contrary, it is maintained that *signal* is a verb of predication control, (66) and (67) must be independent of the theory of control under both theories.

Thus, the case for Williams's theory is substantially undermined by lexical idiosyncrasies.

Finally, consider Bresnan's (1982) theory. Here, object infinitival sentences can either be expressions with an open subject or closed expressions with possibly a subject PRO; open expressions are closed under functional control, PROs corefer under anaphoric control. An Obviation Principle states that a subject pronoun is disjoint in reference, and a subject PRO is coreferential, with the subject of the minimal clause nucleus that contains the pronoun's or PRO's clause, respectively; otherwise, thematic conditions can determine what a PRO is coreferential with, overriding the Obviation Principle.

As opposed to the present theory, Bresnan's predicts that the nonlexical subjects of object infinitival expressions that undergo functional control behave differently from the nonlexical subjects of object infinitival expressions that undergo anaphoric control. In particular, Bresnan's theory predicts that in the cases of anaphoric control there can be counterparts with lexical subjects, whereas in the cases of functional control there can be no such counterparts. Furthermore, Bresnan's theory predicts that in the cases of functional control there must be an antecedent and in the cases of anaphoric control there need not be one. It also predicts that in the former cases the antecedent must be

unique and in the latter it need not be. Finally, for theory-internal reasons, it predicts that in the cases of functional control the antecedent must be a direct object, an indirect object, or a subject and that in the cases of anaphoric control it need not be.

Obviously, Bresnan's functional and anaphoric control are terminologically different but conceptually identical to Williams's (1980) obligatory and nonobligatory control, respectively. If so, examples like (64)–(65), etc., undermine the case for Bresnan's theory as much as they do the case for Williams's.

2. Binding

Let us now consider the relation of our theory of control to Chomsky's (1981) theory of binding.

The binding conditions in (8) and the control condition in (32), the latter constructed on the model of the former, together form an extended binding theory, as in (69):

(69) A. An anaphor is bound in its governing category.
A′. An anaphor without a governing category is bound in its domain-governing category.
B. A pronominal is free in its governing category.

In turn the binding condition (8A)/(69A) and the control condition (32)/(69A′) rather obviously collapse into one condition, as in (70):

(70) A. An anaphor is bound in its governing category and its domain-governing category.
B. A pronominal is free in its governing category.

On the other hand, the definition of governing category in (7) and the definition of domain-governing category in (31), the latter constructed on the basis of the former, do not exactly parallel each other. For, given an element α, the definition of governing category for α in (7) requires us to stop at the minimal category that contains a subject accessible to α; the definition of domain-governing category for α in (31) requires us to stop at the governing category for the c-domain of α and to check whether it contains a subject accessible to α or not. Furthermore, under the definition of governing category for α in (7), if α is governed, the root sentence is the governing category for α by a default clause; under the definition of domain-governing category in (31), there is no default clause. Assuming the definition of domain-governing category in (31) as given, then, we can modify the definition of governing category in (7) as in (71):

(71) γ is a governing category for α iff
a. γ is the minimal category with a subject containing α and a governor for α, and
b. γ contains a subject accessible to α.

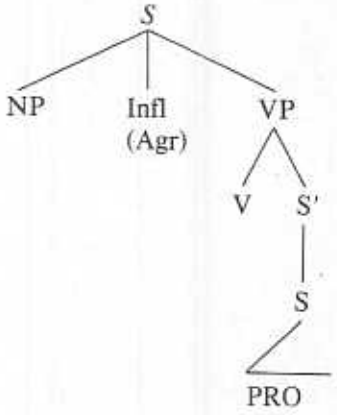
In turn, given the definition of governing category in (71) we can modify the definition

of domain-governing category in (31) as in (72):

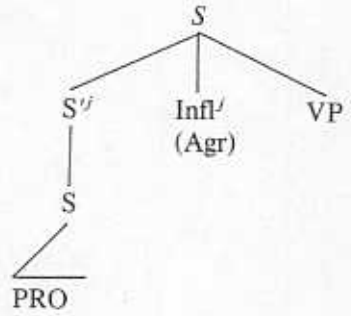
(72) γ is a domain-governing category for α iff
  a. γ is the minimal category with a subject containing the c-domain of α and a governor for the c-domain of α, and
  b. γ contains a subject accessible to α.

The definitions of domain-governing category in (31) and (72) can easily be seen to be equivalent. Consider again configurations (33) and (34), for instance:

(33)



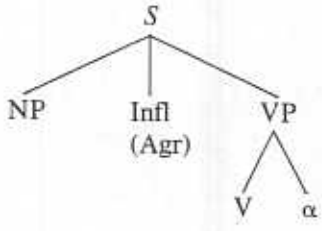
(34)



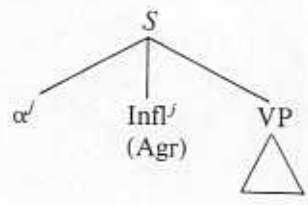
In (33) and (34), the c-domain of PRO is as usual S'. Under definition (72), in (33) *S* is the domain-governing category of PRO, because *S* is the minimal category with a subject, NP or Agr, containing the c-domain of PRO and a governor, V, for the c-domain of PRO; and *S* contains a subject accessible to PRO, NP or Agr. In (34), on the other hand, under definition (72), PRO does not have a domain-governing category, because *S* is the minimal category with a subject, S' or Agr, containing the c-domain of PRO and a governor, Agr, for the c-domain of PRO; but *S* does not contain a subject accessible to PRO, since Agr c-commands PRO but coindexing of PRO and Agr would violate the i-within-i condition. By (69A'), in (33) PRO is bound in *S;* in (34), on the other hand, PRO (co)refers freely, since (69A') does not apply.

Furthermore, it can be easily seen that, though the definition of governing category in Chomsky (1981) and the definition of governing category in (71) are not equivalent, in most cases the same results follow under both definitions. Consider for instance the cases of the subject and object position α of a sentence, as in (73) and (74), respectively:

(73)



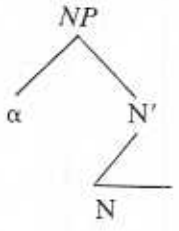
(74)



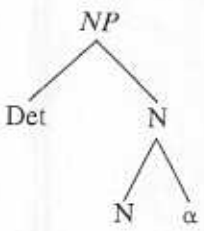
In (73) and (74), *S* is the governing category of α under definition (71), as under Chomsky's (1981) definition. In Chomsky's terms, *S* is the minimal category containing α and a governor for α, V in (73) and Agr in (74), and a subject accessible to α, NP or Agr in (73) and Agr in (74). In terms of the present theory, on the other hand, *S* is the minimal category with a subject, the subject being NP or Agr in (73) and α or Agr in (74), containing α and a governor for α, V in (73) and Agr in (74); and *S* contains a subject accessible to α, NP or Agr in (73) and Agr in (74). If α is an anaphor, by (8A)/(69A) α is bound in *S;* if α is a pronominal, by (8B)/(69B) α is free in *S*.

There are essentially two cases in which the theory in (70)–(72) and Chomsky's theory give different results. The first is the case of the subject position α of a nominal, shown in (75); the second is the case of the object position α of a nominal with no subject, shown in (76), when the nominal is itself in subject position:

(75)



(76)



Consider first pronominals and anaphors in the position of α in (75), with *NP* in object position, as in (77)–(78), and *NP* in subject position, as in (79)–(80) and (81)–(82):

(77) [$_S$ The boys saw [$_{NP}$ their pictures]]
(78) [$_S$ The boys saw [$_{NP}$ each other's pictures]]
(79) The boys thought that [$_S$[$_{NP}$ their pictures] were on sale]
(80) The boys thought that [$_S$[$_{NP}$ each other's pictures] were on sale]
(81) [$_S$[$_{NP}$ Their pictures] would please the boys]
(82) [$_S$[$_{NP}$ Each other's pictures] would please the boys]

According to Chomsky's definition, the governing category for the genitive is *S* in (77)–(78), the matrix sentence in (79)–(80), and *S* again in (81)–(82); where *pictures* is the governor, in (77)–(80) *the boys* or its Agr is the accessible subject, and in (81)–(82), there being a governor and no accessible subject, the default clause applies. According to definition (71), on the contrary, α in (75) does not have a governing category: *NP* is the minimal category with a subject, α itself, containing α and a governor for α; but *NP* does not contain a subject accessible to α, since obviously α is not accessible to itself. On the other hand, the genitive in (77)–(78) has a domain-governing category, namely *S: S* is the minimal category with a subject, *the boys* or its Agr, containing the c-domain of the genitive, *NP*, and a governor, V, for the c-domain of the genitive; and *S* contains a subject accessible to the genitive, *the boys* or its Agr. The genitive in (79)–(82), however, does not have a domain-governing category either: the minimal category with a subject containing the c-domain of the genitive and a governor for the c-domain of the

genitive is *S*; but *S* does not contain a subject accessible to the genitive, since coindexing of the genitive and the Agr in *S* would violate the i-within-i condition.

Thus, according to Chomsky's theory, under binding condition (B) the pronominal in (77) is free in *S*, the pronominal in (79) is free in the matrix sentence, and the pronominal in (81) is free in *S*. The prediction that the pronominal is free in *S* is trivially fulfilled in (81), since nothing in *S* c-commands the pronominal. But the prediction that the pronominal is free in *S* in (77), hence disjoint in reference from *the boys*, is obviously false; and so is the prediction that the pronominal is free in the matrix sentence in (79), hence again disjoint in reference from *the boys*. According to the present theory, on the contrary, since the pronominal in (77), (79), and (81) does not have a governing category, binding condition (B) does not apply; hence, the pronominal is correctly predicted to (co)refer freely. Thus, in this case (79) and (81) clearly favor our theory over that of Chomsky (1981).

Further, according to Chomsky's theory, under binding condition (A) the anaphor in (78) is bound in *S*, the anaphor in (80) is bound in the matrix sentence, and the anaphor in (82) is bound in *S*. According to the present theory, the anaphor in (78) is again bound in *S* under binding condition (A'); the anaphors in (80) and (82) are not subject to any conditions. Hence, both the present theory and Chomsky's theory correctly predict that the anaphor in (78) is bound by *the boys*. But Chomsky's theory predicts that the anaphor in (80) is bound by *the boys* and that the anaphor in (82), not being bound, is excluded. The present theory predicts that the anaphors in (80) and (82)—assuming that they must corefer—corefer freely, and hence are coreferential with *the boys* in both (80) and (82). In this case the choice between the two theories depends upon whether (80) and (82) are equally well formed, as predicted here, or whether only (80) is well formed, as predicted in Chomsky (1981). Our judgments are that (80) and (82) are equally, if not perfectly, well formed; if so, our theory is favored over that of Chomsky (1981).

Consider then the case of pronominals and anaphors in the position of α in (76), as in (83)–(88), *NP* being in object position in (83)–(84) and in subject position in (85)–(86) and (87)–(88):

(83) [$_S$ The boys saw [$_{NP}$ pictures of them]]
(84) [$_S$ The boys saw [$_{NP}$ pictures of themselves]]
(85) The boys thought that [$_S$[$_{NP}$ pictures of them] were on sale]
(86) The boys thought that [$_S$[$_{NP}$ pictures of themselves] were on sale]
(87) [$_S$[$_{NP}$ Pictures of them] would please the boys]
(88) [$_S$[$_{NP}$ Pictures of themselves] would please the boys]

According to Chomsky's definition, the governing category for the pronominal and anaphor is *S* in (83)–(84), exactly as in (77)–(78); the matrix sentence in (85)–(86), exactly as in (79)–(80); and *S* in (87)–(88), exactly as in (81)–(82). According to definition (71), on the contrary, only the pronominal and anaphor in (83)–(84) have a governing category. Indeed, *S* in (83)–(84) is the minimal category with a subject, *the boys* or its Agr, containing the pronominal and anaphor, respectively, and their governor, *pictures* or *of*; and *S*

contains a subject accessible to them, *the boys* or its Agr; hence, *S* is the governing category for the pronominal and anaphor. On the contrary, *S* in (85)–(88) still is the minimal category with a subject containing the pronominals and anaphors and their governor; but *S* does not contain a subject accessible to them, since coindexing of the pronominals and anaphors with the Agr in *S* violates the i-within-i condition; hence, the pronominals and anaphors do not have a governing category. Furthermore, the pronominals and anaphors in (85)–(88) do not have a domain-governing category either: the minimal category with a subject, containing the c-domain of the anaphors and pronominals, *NP*, and a governor, Agr, for the c-domain of the anaphors and pronominals is *S;* but *S* does not contain a subject accessible to them, since coindexing of the pronominals and anaphors and Agr would violate the i-within-i condition.

Thus, according to both Chomsky's theory and the present theory, under binding condition (B) the pronominal in (83) is free in *S*, hence disjoint in reference from *the boys*. On the other hand, according to Chomsky's theory, under binding condition (B) the pronominal in (85) is free in the matrix sentence, hence again disjoint in reference from *the boys*, and the pronominal in (87) is free in *S;* according to the present theory, the pronominal in (85) and the pronominal in (87) (co)refer freely.

However, given the sentences *The boys saw pictures of them, The boys thought that pictures of them were on sale,* and *Pictures of them would please the boys* and the interpretation under which the embedded nominal has no definite reference subject, their structure can be not only as in (83), (85), or (87), where *NP* has no subject, but also as in (89)–(91), where *NP* has an arbitrary PRO subject:

(89) The boys saw [$_{NP}$ PRO$_{arb}$ pictures of them]
(90) The boys thought that [$_{NP}$ PRO$_{arb}$ pictures of them] were on sale
(91) [$_{NP}$ PRO$_{arb}$ pictures of them] would please the boys

Obviously, according to both Chomsky's theory and the present theory, in (89)–(91) *NP* is the governing category for the pronominal, *pictures* or *of* being the governor and PRO the accessible subject; hence, according to both theories, under binding condition (B) the pronominal in (89)–(91) is free in *NP*. Thus, given the sentence *The boys saw pictures of them* and the interpretation on which the nominal has no definite reference subject, combining the structures in (83) and (89) both theories correctly predict that *them* is free in the nominal, hence not disjoint in reference from *the boys*. On the other hand, given the sentences *The boys thought that pictures of them were on sale* and *Pictures of them would please the boys* and the interpretation under which the nominal has no definite reference subject, combining the structures in (85), (87), and (90)–(91), the present theory correctly predicts that *them* (co)refers freely, and Chomsky's theory equivalently predicts that *them* is free in the nominal, hence not disjoint in reference from *the boys* in (85). Thus, in this case the differences between the two theories fail to translate into any empirical difference.

Further, according to both Chomsky's theory and the present theory, the anaphor in (84) is bound in *S* under binding condition (A); hence, both correctly predict that *themselves* in (84) is coreferential with *the boys*. More interestingly, according to Chom-

sky's theory, under binding condition (A) the anaphor in (86) is bound in the matrix sentence and the anaphor in (88) is bound in *S;* hence, Chomsky's theory predicts that the anaphor in (86) is coreferential with *the boys* and the anaphor in (88), not being bound, is excluded. According to the present theory, on the contrary, both the anaphor in (86) and the anaphor in (88)—assuming that they must corefer—are coreferential with *the boys*. In this case, the choice between the two theories depends upon whether (86) and (88) are equally well formed, as predicted here, or whether only (86) is, as predicted in Chomsky (1981). Our judgments are that (86) and (88) are equally, if not perfectly, well formed; if so, our theory is again favored over that of Chomsky (1981).

Obviously, given the sentences *The boys saw pictures of themselves, The boys thought that pictures of themselves were on sale,* and *Pictures of themselves would please the boys* and the interpretation under which the nominal has no definite reference subject, their structure can be not only as in (84), (86), or (88), where *NP* has no subject, but also as in (92)–(94), where *NP* has an arbitrary PRO subject. Indeed, according to both Chomsky's theory and the present theory, *NP* is the governing category for the anaphor in (92)–(94) exactly as it is for the pronominal in (89)–(91); hence, under binding condition (A) the anaphor is predicted to be bound in *NP* and consequently by PRO. However, *themselves* cannot be bound by an element with arbitrary reference. Hence, the structures in (92)–(94) are altogether irrelevant:

(92) *The boys saw [$_{NP}$ PRO$_{arb}$ pictures of themselves]

(93) *The boys thought that [$_{NP}$ PRO$_{arb}$ pictures of themselves] were on sale

(94) *[$_{NP}$ PRO$_{arb}$ pictures of themselves] would please the boys

Finally, we must consider the case in which α in (75)–(76) is a pronominal anaphor. Under both Chomsky's theory and our theory, pronominal anaphors must lack a governing category; for if they have a governing category, being anaphors they must be bound in it under (8A)/(69A) and being pronominals they must be free in it under (8B)/(69B), which they cannot simultaneously be. Further, under Chomsky's definition of governing category, an element lacks a governing category if and only if it lacks a governor. For, given an element α, if α has a governor, either there is a subject accessible to α, and this defines a governing category for α by (7a), or the root sentence is a governing category for α by (7b). Vice versa, if α has a governing category, by (7a) or (7b) it has a governor. On the contrary, under our definition of governing category, if a given element α lacks a governor, it necessarily lacks a governing category; but if α lacks a governing category, it does not necessarily lack a governor. For if there is a governor for α, α can still lack a governing category because the minimal category with a subject that contains α and its governor does not contain a subject accessible to α. Hence, under Chomsky's theory, it follows that pronominal anaphors must lack a governor or be ungoverned, as in (11); under our theory, that pronominal anaphors must lack a governor or be ungoverned, as in (11), does not follow. Thus, according to Chomsky's theory, α in (75)–(76) cannot be a pronominal anaphor, because α is governed; according to our theory, α can be a pronominal anaphor, if *NP* in (76) is in subject position, because α, though governed, does not have a governing category.

Consider first a pronominal anaphor in the object position α of a subjectless nominal, as in (76). According to Chomsky's theory, α cannot be a pronominal anaphor; according to our theory, α can be a pronominal anaphor if *NP* is in subject position. Consequently, Chomsky's theory correctly predicts (95) to be ill formed; our theory incorrectly predicts it to be well formed with the meaning 'Pictures of themselves please the boys' or 'Pictures of PRO_{arb} please the boys'.

(95) *[Pictures (of) PRO] please the boys

Under our theory, then, if (95) is to be excluded, we must have recourse to some additional stipulation. Suppose we stipulate that anaphoric empty categories must lack Case. If so, and if *of* insertion/object Case assignment in (95) is obligatory, then (95) is excluded because PRO has Case.

Consider next a pronominal anaphor in the subject position of a nominal, as in (75). α can be a pronominal anaphor under our theory, but not under Chomsky's. On the other hand, both theories are forced to conclude that nominals have subject PROs, because of examples like (83) and, under Chomsky's theory, (85). Obviously, the conclusion that PROs cannot appear in the position of α in (75) and the conclusion that nominals have subject PROs are not contradictory, if some other position can be found for them. Indeed, if—whatever their actual position—PROs cannot appear in the position of α in (75), (96)–(100) are correctly predicted to follow, where genitives and determiners are in complementary distribution but PROs and determiners are not:

(96) John saw [the book]
(97) John saw [Bill's book]
(98) *John saw [PRO book]
(99) *John saw [the Bill's book]
(100) John saw [the PRO book]

Furthermore, α in (75) has a domain-governing category if *NP* is in object position; hence, if *NP* is in object position, a PRO in the position of α in (75) is predicted to corefer in the sentence *S* of which *NP* is object. But PROs in the subject position of nominals always corefer freely. Hence, the correct results are again derived if indeed, whatever their actual position, PROs cannot appear in the position of α in (75). Again, then, our theory must have recourse to the stipulation that anaphoric empty categories must lack Case. If so, and if genitive Case assignment in the position of α in (75) is obligatory, we predict that PRO cannot be generated in the position of α in (75), thus eventually predicting the paradigm in (96)–(100), as well as the free (co)reference of the PRO under the theory of control.

3. Empty Categories

Let us now consider the relation of our theory of control and binding to the theory of empty categories in Chomsky (1981; 1982).

We notice first that our theory of control, as stated in (32)/(69A'), refers not to

pronominal anaphors but to anaphors without a governing category; and that this theory is indeed a corollary of a part of the theory of binding referring to anaphors in general, as in (70A). Further, we notice that, given the definition of governing category in (71), the distribution of pronominal anaphors follows in part from the binding theory theorem that pronominal anaphors lack a governing category, but in part also from some stipulation that anaphors, not necessarily pronominal anaphors, lack Case.

These observations suggest the possibility, first, that as in Bouchard (1982) and Sportiche (1982) there is no [+anaphoric, +pronominal] category type, or, in other words, that the inventory of empty category types reduces from (9) to (101); second, that the [+anaphoric] category type is defined by lack of Case, as in (102), and that—compensating for the introduction of (102)—the definition of the [+pronominal] category type, originally given in (10), is eliminated:

(101) NP-trace, PRO: [+anaphoric] or redundantly [+anaphoric, −pronominal]
pro: [+pronominal] or redundantly [+pronominal, −anaphoric]
variable: [−anaphoric, −pronominal]

(102) An empty category α is [+anaphoric] iff it lacks Case.

Obviously, all propositions about pronominal anaphors, such as the PRO theorem in (11), become meaningless.

Suppose first that an empty category occurs in the object position of a transitive verb, as in (103), or of a transitive noun, as in (104):

(103) *John hit *e*
(104) *John's picture *e*

Chomsky's (1982) theory of empty categories correctly predicts that (103)–(104) are ill formed. First, putting aside pro and variable in the obvious way, *e* cannot be a PRO because it is governed. Further, *e* cannot be a trace; for, if *e* is a trace and *e* is not bound by *John*, binding condition (A) is violated; if *e* is a trace and *e* is bound by *John*, *John* and the trace form a chain, and the chain is assigned both the subject and the object θ-role in violation of the θ-Criterion. Under our theory, if *John* does not bind *e*, then *e* cannot be an anaphor or condition (A) of the binding theory is violated. But if *John* binds *e*, what prevents *e* from being an anaphor and (103)–(104) from being well formed with the reading 'John hit himself' and 'John's picture of himself'? Our answer is that *e* cannot be an anaphor by definition (102), where we assume that in (103)–(104) object Case assignment and *of* insertion/object Case assignment are obligatory.

Suppose next that an empty category occurs in the subject position of a tensed sentence, as in (105), of an infinitival sentence, as in (106), and of a nominal, as in (107)–(108):

(105) **e* won
(106) *e* to win

(107) *e* picture
(108) a *e* picture

Chomsky's theory correctly predicts that (105) and (107) are ill formed and (106) and (108) well formed. In (105) and (107) *e* is governed, hence it cannot be a PRO; and since in (105) it cannot be bound in its governing category, etc., it cannot be a trace. In (106) and (108), *e* again cannot be a trace; but *e* can be PRO, being ungoverned. Under our theory, in (105) and (107), where we assume that nominative Case assignment and genitive Case assignment are obligatory, *e* cannot be an anaphor by definition (102). In (106) and (108), where we assume that there is no nominative or genitive Case assignment, *e* is an anaphor. Since *e* in (106) and (108) does not have a governing category, it is not subject to binding condition (A); if *e* in (106) has a domain-governing category, it is subject to binding condition (A'); otherwise, *e* (co)refers freely.

Suppose next that an empty category occurs in the object position of a passive verb, as in (109) and (110):

(109) John was hit *e*
(110) *There was hit *e*

Chomsky's theory correctly predicts that (109) is well formed with the interpretation '*e* killed John' and that (110) is ill formed. In (109)–(110) *e* cannot be a PRO because it is governed. On the other hand, in (109) *e* can be a trace bound by *John* and enter a chain with *John*. But in (110) *e* cannot be a trace; for, if it is bound by *there* and enters a chain with *there*, the chain is assigned the object θ-role, but the chain does not contain any argument in violation of the θ-Criterion. Under our theory, in (109)–(110) *e* is an anaphor by definition (102), since we assume that there is no object Case assignment. In (109) *John* can bind *e* and *John* and *e* can form a chain, satisfying binding condition (A) as well as the θ-Criterion. In (110), on the other hand, *there* must bind *e*, again by binding condition (A); but then (110) is ill formed because there is one θ-role but no argument to receive it, in violation of the θ-Criterion.

Suppose finally that an empty category occurs in the object position of a passive nominal, as in (111)–(112):

(111) Rome's destruction *e*
(112) *the destruction *e*

Chomsky's theory predicts that (111), much like (109), is well formed with the interpretation 'the *e* destruction of Rome', and that (112) is ill formed: in (112) *e* cannot be a trace and cannot be a PRO because it is governed. Our theory predicts that (111) is well formed, much as (109) is, if *destruction* indeed does not assign Case. But then, why couldn't (112) be well formed, for instance with the reading 'the destruction of PRO_{arb}', if the nominal is in subject position? Evidently, if we are to exclude (112), we must assume that there is no such thing as a passive nominal.

Notice that under our theory of binding as combined with Chomsky's (1981; 1982)

theory of empty categories, (95) is excluded only if *of* insertion and Case assignment by *of* are obligatory, and (98) is excluded only if genitive Case assignment is obligatory. Under our theory of empty categories, (103) is excluded only if object Case assignment by the verb is obligatory; (104) is excluded again only if *of* insertion and Case assignment by *of* are obligatory; (105) is excluded only if nominative Case assignment by the Infl is obligatory; (107) is excluded only if genitive Case assignment is obligatory. As for (95) and (98), we tacitly assumed that *of* insertion and Case assignment by *of* are indeed obligatory and that genitive Case assignment is obligatory as well. When we consider (103), (104), (105), and (107), however, and we assume not only that *of* insertion/Case assignment by *of* and genitive Case assignment are obligatory, but also that object Case assignment by a verb and nominative Case assignment by Infl are obligatory, some comments are in order.

We obviously want to maintain with Chomsky (1981) that there is a principle, the Case filter, stating that every lexical nominal must be assigned Case. Our idea, however, is that there is an additional principle stating that every Case up for assignment must be assigned. If so, obviously in (103) the object Case of the verb must be assigned and is assigned to the empty category. As for (104), we propose that [+N] elements and in particular nouns assign Case exactly like [−N] elements, in particular verbs; and that whatever the concrete realization of verbal object Case, *of* insertion is the realization of object Case by a noun. If so, the noun in (104) has an object Case to assign exactly like the verb in (103); and exactly like the object Case of the verb in (103), the object Case of the noun in (104) must be assigned and assigned to the empty category. Finally, the nominative Case of the Infl must be assigned in (105). As for (107), the genitive Case is unlike any other Case in that it does not imply a relation between a Case assigner and a Case-assigned element, but rather is a property of an element in a certain position; we can then assume that in (107) genitive Case is obligatorily assigned in the sense that it is generated obligatorily with an NP in Det position.

Needless to say, if a principle is added to the Case filter stating that every Case up for assignment must be assigned, a theory of Case more complicated than the one in Chomsky (1981) results; however, the addition of such a principle brings the theory of Case closer to another theory of grammar, θ-theory, including in particular the θ-Criterion. Similarly, if nouns and [+N] elements in general assign Case exactly as verbs and [−N] elements in general do, our theory of Case is more abstract than Chomsky's (1981) theory; but in this way again the theory of Case is brought closer to θ-theory, where an abstract object or subject θ-role can correspond to different concrete θ-roles: theme, goal, source, etc. Finally, the present assumptions about the obligatoriness and abstractness of Case assignment are not motivated here independently of our theory of empty categories; however, if Manzini (1983; forthcoming) is correct, they are in fact independently motivated in the theory of reanalysis, in particular in the theory of causatives in such languages as Italian and French.

One last set of remarks is in order. Under our theory of binding, (80), (82), (86),

and (88) are predicted to be well formed if the anaphor is coreferential with another nominal and ill formed if it is not, only if anaphors must corefer at all. In section 2 we tacitly assumed that an anaphor must corefer. This assumption, however, is consistent with Chomsky's theory of empty categories, but not with our theory; for under Chomsky's (1981; 1982) theory of empty categories, PROs, including arbitrary PROs, are pronominal anaphors; under our theory, PROs, including arbitrary PROs, are pure anaphors. Let us assume that an anaphoric empty category is a free variable. A free variable can be referentially dependent upon another element, in which case the bound reading arises as with NP-traces; or alternatively, a free variable can be not referentially dependent upon anything, in which case the arbitrary reading arises as with arbitrary PROs. We can assume, on the other hand, that an anaphor such as *himself* is a free variable, but is associated in the lexicon with specific features such as number, person, etc.; and that anaphors associated with a specific set of features must be referentially dependent upon some element. Again, no independent justification is given here either for the assumption that a free variable can give rise to both a bound and an arbitrary interpretation, or for the assumption that the distinction between anaphors that can be referentially independent and anaphors that must be referentially dependent is a distinction between pure free variables and free variables with specific features. However, if Manzini (1982; forthcoming) is correct, at least the first assumption is independently justified with respect to the lexical items that give rise to impersonal/middle and reflexive/middle-reflexive constructions in languages such as Italian.

Appendix

Chomsky (1981) attempts to simplify the notion of governing category, by eliminating the notion of governor from definition (7) and correspondingly renaming governing category to binding category, as in (113), the binding conditions being then obviously modified to (114):

(113) γ is a binding category for α iff
  a. γ is the minimal category containing α and a subject accessible to α, and
  b. γ is the root sentence, if not (a) and α is governed.

(114) A. An anaphor is bound in its binding category.
  B. A pronominal is free in its binding category.

The definition of governing category for α in (7) and the definition of binding category for α in (113) are equivalent for all the cases in which α is governed; since it can be easily checked that any category that contains an element α and a subject accessible to α also contains the governor for α, if α indeed has a governor. However, the two definitions are not equivalent in most of the cases in which α is ungoverned, as in the simple cases (12) or (28):

(12) John asked Bill to shave himself.
(28) Mary knows that to behave herself in public would help Bill.

According to the definition of governing category in (7), neither the PRO in (12) nor the PRO in (28) has a governing category. According to the definition of binding category in (113), the matrix sentence is a governing category for the PRO in both (12) and (28); for the matrix sentence is the minimal category containing the PRO and a subject accessible to the PRO, i.e. *John* and *Mary* or their Agrs, respectively. But if in (12) or (28) the matrix sentence is the governing category for the PRO, the PRO must be bound in it by (114A) and free in it by (114B), which it cannot be. Hence, (12) and (28) are incorrectly predicted to be ill formed. Thus, because of control examples like (12) and (28), the definition of governing category in (7) cannot be simplified to the definition of binding category in (113).

Suppose, on the other hand, that our notions of governing category and domain-governing category are simplified by eliminating from the definitions in (71) and (72) the notion of governor, correspondingly renaming governing category and domain-governing category as binding category and domain-binding category, as in (115)–(116), and obviously modifying the binding conditions to (114A,B) and the control condition to (114A'):

(114) A'. An anaphor without a binding category is bound in its domain-binding category.

(115) γ is a binding category for α iff
  a. γ is the minimal category with a subject containing α, and
  b. γ contains a subject accessible to α.

(116) γ is a domain-binding category for α iff
  a. γ is the minimal category with a subject containing the c-domain of α, and
  b. γ contains a subject accessible to α.

Our definition of governing category for α in (71) and our definition of binding category for α in (115) are equivalent in all of the cases in which α is not governed; for it is easily checked that the cases in which α is not governed essentially reduce to the case of α in the subject position of a sentence lacking Agr, which means the case of the PRO in (12), (28), etc. Under the definition of governing category in (71), since the PRO does not have a governor, there is no category with a subject containing the PRO and a governor for the PRO; hence, the PRO does not have a governing category. Under the definition of binding category in (115), the minimal category with a subject containing the PRO is the control sentence, but the control sentence does not contain a subject accessible to the PRO; hence, again, the PRO does not have a governing category.

Furthermore, our definition of governing category for α in (71) and our definition of binding category for α in (115) are equivalent in most of the cases in which α is governed; for it is easily checked that, in most of the cases in which α is governed, as in the simple cases in (73)–(76), the minimal category with a subject that contains α also contains the governor for α. There is one case, however, in which the definition of governing category in (71) and the definition of binding category in (115) are not equiv-

alent; this is the case of the subject position of Exceptional Case Marking or small clauses, as in (117)–(118):

(117) The boys believed [them (to be) smart]
(118) The boys believed [themselves (to be) smart]

According to the definition of governing category in (71), the governing category for the pronominal and anaphor in (117) and (118) is the matrix sentence; for the matrix sentence is the minimal category with a subject containing the pronominal and anaphor and their governor, *believed*, and the matrix sentence contains a subject accessible to them. According to the definition of binding category in (115), on the other hand, the pronominal and anaphor in (117) and (118) do not have a binding category; for the minimal category with a subject containing the pronominal and anaphor is the embedded clause, but the embedded clause does not contain a subject accessible to them. Finally, according to the definition of domain-binding category in (116), the matrix sentence is the domain-binding category for the pronominal and anaphor in (117) and (118); for the matrix sentence is the minimal category with a subject containing the c-domain of the pronominal or anaphor, i.e. the matrix VP, and the matrix sentence contains a subject accessible to them. Hence, the anaphor in (118) is correctly predicted to be bound in the matrix sentence by (69A) or equivalently by (114A). The pronominal in (117), on the other hand, is correctly predicted to be free in the matrix sentence by (69B), but, lacking a binding category, is incorrectly predicted not to be subject to (114B) and to (co)refer freely. Thus, the definition of governing category in (71) cannot be simplified to the definition of binding category in (115) because of Exceptional Case Marking or small clause examples like (117).

The different ways in which the notion of governing category fails to simplify to the notion of binding category in our theory and in Chomsky's theory illustrate well the not insignificant conceptual differences between the two theories that underlie their almost identical empirical predictions.

Finally, the definitions of domain-governing category in (72) and domain-binding category in (116) are again equivalent in most of the cases; for it is easily checked that in most of the cases, as in the simple cases (33)–(34), the minimal category with a subject containing the c-domain of α also contains a governor for the c-domain of α. There are two cases in which the definitions of domain-governing category in (72) and domain-binding category in (116) are not equivalent.

The first case involves a PRO in a sentence with a Comp when the sentence is in object position, as in (37):

(37) John was asked how to behave oneself.

According to the definition of domain-governing category in (72), and assuming that S is the c-domain of PRO in (37), there is no category with a subject containing the c-domain of PRO and a governor for the c-domain of PRO, since S does not have a governor; hence, PRO does not have a domain-governing category. According to the

definition of domain-binding category in (116), the minimal category in (37) with a subject containing the c-domain of PRO, S again, is the matrix sentence, and the matrix sentence contains a subject accessible to PRO; the matrix sentence is therefore the domain-binding category for PRO. Hence, under (69A′) it correctly follows that PRO in (37) (co)refers freely, since (69A′) does not apply; by (114A′) it incorrectly follows that PRO in (37) is bound in the matrix sentence.

The second case involves a PRO in a subject sentence of an Exceptional Case Marking sentence or a small clause, as in (119):

(119) The boys believed [[PRO to behave in public] (to be) smart]

According to the definition of domain-governing category in (72), the matrix sentence is the domain-governing category for PRO in (119); for, assuming as usual that the control sentence is the c-domain of PRO, the matrix sentence is the minimal category with a subject containing the c-domain of PRO and a governor for the c-domain of PRO, *believed*, and the matrix sentence contains a subject accessible to PRO. According to the definition of domain-binding category in (116), there is no domain-binding category for PRO in (119); for, assuming as usual that the control sentence is the c-domain of PRO, the embedded clause is the minimal category with a subject, the control sentence itself, containing the c-domain of PRO, but the embedded clause does not contain a subject accessible to PRO. Hence, by (69A′) it follows that PRO in (119) is bound in the matrix sentence, which is clearly incorrect; under (114A′), since (114A′) does not apply, it correctly follows that PRO in (119) (co)refers freely.

Thus, examples like (37) suggest that the notion of domain-governing category cannot be modified to the notion of domain-binding category; but examples like (119) suggest that the notion of domain-governing category must be modified to the notion of domain-binding category. The contradiction can be resolved if either definition is revised so as to introduce the notion of governor as an optional notion, as in the definition of domain-governing category in (120):

(120) γ is a domain-governing category for α iff
  a. γ is the minimal category with a subject containing the c-domain of α (and a governor for the c-domain of α), and
  b. γ contains a subject accessible to α.

Whether the notion of governor for the c-domain of α is retained or not in (120) is irrelevant in most cases; if it is not retained, the correct predictions are derived for examples like (119); if it is retained, the correct predictions are derived for examples like (37).

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