Remarks and Replies

Control Is Not Movement

Peter W. Culicover
Ray Jackendoff

We present arguments against Hornstein's recent movement theory of control. Such a theory can be sustained only if a restricted subset of the data is considered. We review additional data that show that the position of the controller is determined at least in part by semantic constraints. A semantic account captures the generalizations in a manner impossible for a syntactic account.

Keywords: control, movement, thematic roles, Minimal Distance Principle, PRO

1 Hornstein's Proposal

The problem of control may be stated briefly like this: In infinitivals and gerundives that lack an overt subject, such as *to leave* in (1), how is the external θ-role of the verb established?

(1) John tried to leave.

The traditional approach in the Government-Binding Theory/Minimalist Program (GB/MP), and before it the Extended Standard Theory (EST), has been to assume that the infinitival or gerundive has a covert syntactic subject PRO that receives its θ-role by ordinary structural principles. In turn, PRO is an anaphoric element whose antecedent, located by means of the binding theory, is the ''controller'' of PRO. So, for example, the overt sentence (1) has the syntactic structure (2).

(2) $[_{IP}$ John$_i$ $[_{VP}$ tried $[_{IP}$ PRO$_i$ to $[_{VP}$ leave]]]]

Hornstein (1999), departing from this standard approach, offers a minimalist theory of syntactic control, by reducing certain cases of control to movement. (Similar proposals are developed by O'Neil (1997), and, in a much earlier theoretical framework, by Bowers (1981).) In this approach, Merge and Move build up the structure in stages as in (3).

(3) a. [$_{IP}$ John to [$_{VP}$ leave]]
        (Merge and Move in lower IP)
    b. [$_{VP}$ John try [$_{IP}$ John to [$_{VP}$ leave]]]
        (merge IP with *try;* raise *John* to [Spec, VP])
    c. [$_{IP}$ John I [$_{VP}$ John try [$_{IP}$ John to [$_{VP}$ leave]]]]
        (merge VP with I; raise *John* to [Spec, IP])

All the lower instances of *John* in (3c) are absent in PF.

    The consequence of this innovation is that the type of control illustrated here falls in with raising in its syntactic analysis. The only difference between the two is that control verbs like *try* license the target of movement as a θ-position, so that *John* acquires a second θ-role by virtue of moving to [Spec, VP] in (3c); if the verb were *seem* instead of *try,* there would be no additional θ-role. The consequences are, first, that PRO is eliminated in favor of trace, and second, that the θ-Criterion must be abandoned. Other things being equal (including coverage of the basic facts), this is a desirable result.

    Hornstein's theory eliminates certain formal syntactic devices, but it retains the syntactic character of control: an empty argument in syntactic representation is bound to the controlling antecedent. Generative approaches outside the EST/GB/MP tradition, dating back to Brame 1976 and continuing through Bresnan 1978 to Lexical-Functional Grammar (LFG) and Head-Driven Phrase Structure Grammar (HPSG), achieve a unification of control and raising similar to Hornstein's, while taking the goals of the MP one step further: they completely eliminate the representation of the binding relation in syntactic structure.[1] LFG and HPSG do without PRO or any other empty syntactic argument; the syntactic complement of *tried* is simply *to leave.* Control is instead established through linkages in other levels of grammatical organization, where the external argument of *leave* is explicit: f-structure in LFG and grammatical argument structure in HPSG. The similarity between *try* and *seem* is that they both project their subject argument *downward* into the argument structure of the complement, fulfilling the missing external argument. As in Hornstein's account, however, *try* but not *seem* assigns its subject an independent θ-role.[2]

    It is crucial to the LFG/HPSG accounts that what is projected downward is not a θ-role but an external argument (or in LFG, a grammatical function). The well-known reason is that items such as expletives and idiom chunks can appear in the relevant positions of ''raising'' predicates, one of the important reasons that Rosenbaum (1967) originally argued they are raised.

---

[1] For related approaches, see also Culicover and Wilkins 1984, 1986, Jackendoff 1990, Van Valin and LaPolla 1998.
[2] The latter approaches also unify the parallel phenomena with *persuade* versus *believe.*

(i) a. Joan persuaded Kim to leave.
    b. Joan believed Kim to have left.

In GB/MP, of course, *persuade* is a control verb but *believe* is an exceptional-Case-marking (ECM) verb; the old raising-to-object transformation has been rejected. In LFG/HPSG *Kim* is in object position in both examples; *to leave/to have left* is a simple VP complement; and both *persuade* and *believe* project their object downward into the argument structure of the complement, fulfilling the missing external argument. However, *persuade* but not *believe* assigns its object an independent θ-role. Thus, these approaches retain Rosenbaum's (1967) nice symmetry in the account of control and raising, abandoned in GB/MP.

(4) a. There tended/*tried to be trouble.
    b. It tended/*tried to rain.
    c. Tabs tended/*tried to be kept on Bill.

Despite the desirable unification achieved by Hornstein's movement theory of control, there is much well-known evidence that creates serious problems for it. In particular, there is a long tradition in the literature to the effect that the position of the controller is determined at least in part by semantic constraints; see, for instance, Jackendoff 1972, 1974, Bresnan 1982, Cattell 1984, Ruwet 1983, 1984, Chierchia 1988, Farkas 1988, and Sag and Pollard 1991, the last of which features an extensive literature review. Some of the evidence against a purely syntactic approach appears in print as early as Chomsky 1968:58–59; Chomsky (1981:78–79) observes that the theory of control "involves a number of different factors: structural configurations, intrinsic properties of verbs, other semantic and pragmatic considerations."

The contribution we wish to offer here is twofold. First, we wish to reiterate and emphasize, especially in light of Hornstein's article, that a purely syntactic account—especially (but not only) one that involves movement—will not work. Second, situations in which there is only one potential controller cannot decide among theories of control. We will argue here that in an interesting class of cases with two potential controllers, a semantic account captures the generalizations in a manner impossible for a syntactic account. This evidence is fatal to Hornstein's analysis.

2 Obligatory versus Nonobligatory Control

We begin with a terminological clarification. In the early literature on control, or Equi (e.g., Lakoff 1971, Perlmutter 1971, Jackendoff 1972), obligatory Equi consisted of cases where the subject of the infinitive must be identical (in the relevant sense) with an antecedent NP. Hence, *try* is an instance of obligatory control, while *hope* is not.

(5) a. John tried (*for Harry) to read *War and Peace.*
    b. John hoped (for Harry) to read *War and Peace.*

Hornstein uses a different notion of obligatory control. Hornstein's example of obligatory subject control is *expect.* He asserts that "it is possible to paraphrase [obligatory control cases] by replacing PRO with reflexives" (p. 74), as shown in the alternation (6a–b).[3] However, as Bresnan (1972) shows, *expect* is an unusual verb in that it can appear either in a subject control or an ECM (formerly called object raising) construction. The latter is illustrated in (6c–d). (*Claim* displays parallel behavior.)

(6) a. John expects [PRO to win].
    b. John expects himself to win.
    c. John expects Fred to win.
    d. John expects there to be trouble.

---

[3] Hornstein says that he is following Williams (1980). But Williams, following the traditional use, says (p. 209) that "[l]exical NP cannot appear in the position of PRO."

With a pure subject control verb such as *try,* the parallels of (6b–d) are impossible, as seen in (7). Hence, Hornstein's characterization of this particular property of obligatory control is in error.[4]

> (7) a.   John tried [PRO to win].
> b.   *John tried himself to win.
> c.   *John tried Fred to win.
> d.   *John tried there to be trouble.

Hornstein contrasts obligatory control with what he calls nonobligatory control, exemplified in (8) (Hornstein's (6a)).

> (8) It was believed that PRO shaving was important.

Here there is no evident position to which the subject of *shaving* can have moved; moreover, it is within the subject of a tensed clause, and so cannot be extracted in any event. Hornstein proposes that in such cases the subject of the infinitive is small pro, ''the null pronominal found in various Romance and East Asian languages'' (p. 91). Thus, it can be interpreted variously as a generic, as in (9a) (where the appropriate reflexive is *oneself*), or as a discourse pronoun, as in (9b); split antecedents are even possible, as in (9c) (Hornstein's (6e)).[5]

> (9) a. It was believed that shaving oneself was important.
> b. It was believed by Mary$_i$ that shaving herself$_i$/himself$_j$ was important to Fred$_j$.
> c. John$_i$ told Mary$_j$ that washing themselves$_{i+j}$/each other$_{i+j}$ would be fun.

This is a different sort of case from Rosenbaum's (1967) nonobligatory control, exemplified by *hope* above. In order to keep the phenomena straight, we will say that *hope* has *R-nonobligatory control* and the subject of *important* has *H-nonobligatory control.*

Thus, Hornstein bifurcates his solution to control. In obligatory control the missing subject is a full NP that moves up to the controller position; in H-nonobligatory control the missing subject is the anaphoric element pro, which is either connected to a controller by binding or interpreted generically.

Consider a bit further the distinction between obligatory control and R-nonobligatory control. A distinction similar to that between *try* and *hope* appears with infinitival complements of transitive verbs.

> (10) a. Arlene persuaded Sue (*for Archie) to leave.
> b. Arlene begged Sue (for Archie) to leave.

---

[4] This oversight leads to a further problem (though one irrelevant to Hornstein's argument). He proposes (p. 77) that *dress* and *wash* license PRO in object position, yielding *John dressed/washed* [*PRO*], paraphrasing *John dressed/washed himself.* As Hornstein observes, this treatment leads to difficulties in the Case marking of PRO. Alternative treatments of *dress* and *wash* consider the intransitive forms as an unusual but not anomalous argument structure alternation, in which no direct object is present in syntactic structure. See Jackendoff 1990:65–68 for one such treatment.

[5] As a reviewer has suggested, identifying the subject of (8) as pro may be a bit hasty. Doing so leaves open a number of tricky questions. The most obvious is how English restricts the licensing of pro to subjects of untensed clauses: the pro of pro-drop languages is of course licensed in the subject of tensed clauses as well.

In another well-known case, infinitival relatives differ in whether they allow a *for NP* subject, depending on whether or not they have an overt *wh*-phrase (which in turn must be embedded in a PP).

(11) a. the best place at which (*for you) to buy hummus
     b. the best place (for you) to buy hummus (at)

In other words, certain constructions (such as P-*wh* infinitival relatives) and the complements of certain verbs (such as *try* and *persuade*) are open only to *to VP* infinitivals. Following Baker (1995), we will use the pretheoretical term *Infinitival Phrase* (InfP) for the *to VP*s that occur in these restricted contexts. So far as we know, all contexts that permit *for NP to VP* infinitivals also permit *to VP* infinitivals.[6] We will refer to *for NP to VP* and the *to VP*s that occur in these contexts as *Infinitival Clauses* (InfC). Similarly, certain contexts for gerundive complements permit only *ing-VP;* others permit either *ing-VP* or *NP('s) ing-VP*. We will refer to these contexts as *GerP* and *GerC,* respectively.[7]

It is hard to imagine anything intrinsic in the semantics of (11a) versus (11b) that could condition the syntactic difference between InfP and InfC. (12) presents some pairs that are semantically as parallel as we can make them, yet one member of the pair licenses InfC and the other only InfP. Note that (12e–f) is a pair with subordinating conjunctions rather than verbs.

(12) a. John works/strives/tries to give his kids a better life.
     b. John works/strives/?tries very hard for his kids to have a better life.
     c. Sally begged/beseeched Bill to leave.
     d. Sally begged/*beseeched Bill for his kids to leave.
     e. Vera left the party in order/so as to keep Fred from getting embarrassed.
     f. Vera left the party in order/*so as for Fred not to get embarrassed.

Whether the difference is principled or totally idiosyncratic, it can be nothing but a syntactic fact.[8] One extremely simple way to accomplish this is to allow syntactic selection for InfP and InfC, the former licensing only *to VP* and the latter either *to VP* or *for NP to VP*. Such syntactic selection—in fact the solution adopted in LFG/HPSG—permits us to stipulate lexically that *try*

---

[6] One possible counterexample to this generalization is *allow*.

(i) a. (??)I allowed for several of the children to enter without tickets.
     b.   *I allowed to enter without tickets.

[7] As a reviewer has pointed out, this proposal leaves open the question of what syntactic position in an InfP can come to be occupied by the *wh*-operator. There are various possibilities, including *wh*-movement to [Spec, VP]. We personally favor a solution in which invisible *wh*-operators are not present in (narrow) syntax and appear only in conceptual structure and/or argument structure. One must however still account for the position of the visible *wh*-phrase in (11a). Given this construction's resistance over the years to being assimilated to a standard analysis of relative clauses, we are willing to accept a solution in which it is simply a partially idiosyncratic variety of *wh*-construction, along lines we have discussed in Culicover 1999 and Culicover and Jackendoff 1999. Perhaps others will not be so willing; we leave it as a question for future research.

[8] For Rosenbaum (1967) the syntactic feature in question was ''Obligatorily undergoes subject deletion.'' In Lakoff 1971 this was a ''syntactic exception feature'' of the sort that proliferated in the precursors to Generative Semantics; in Perlmutter 1971 it was a ''Deep Structure constraint.''

licenses an InfP complement and *hope* an InfC complement; similarly for *persuade* versus *beg.* In any event, whatever the mechanism, we find it likely that the choice between obligatory and R-nonobligatory control is a lexically determined syntactic distinction.

3 Treatment of the Minimal Distance Principle

Rosenbaum (1967) observes that typically, if a verb with an infinitival complement alternates between intransitive and transitive forms, obligatory control shifts from subject to object.

(13) a. John$_i$ got to shave himself$_i$/*oneself.
     b. John$_i$ got Fred$_j$ to shave himself$_{j/*i}$/*oneself.

Moreover, most verbs like *persuade* that occur with a direct object and a controlled infinitival require the direct object to be the controller.

(14) John$_i$ persuaded Fred$_j$ to shave himself$_{j/*i}$/*oneself.

Rosenbaum also observes that nonfinite adjuncts are controlled by the subject, as in (15a). Some of these (e.g., *after-* and *while*-adjuncts) are cases of obligatory control (15b); some (e.g., *without-* and *in order*-adjuncts) are instances of R-nonobligatory control (15c).

(15) a. i. John flattered Mary without compromising himself/*herself.
        ii. John flattered Mary in order to vindicate himself/*herself.
     b. i. John flattered Mary after (*Fred('s)) injuring himself/*herself.
        ii. John flattered Mary while (*Fred('s)) insulting himself/*herself.
     c. i. John flattered Mary without Fred('s) overhearing.
        ii. John flattered Mary in order for Fred to be vindicated.

Rosenbaum proposes therefore that the position of the controller be determined by a ''Minimal Distance Principle'' (MDP): the NP closest in the tree to the infinitival is the controller. When there is no direct object, a complement infinitival is closest to the subject; when there is a direct object, a complement infinitival is closer to it than to the subject. This accounts directly for the alternation in (13). Furthermore, an adjunct, which in Rosenbaum's formulation is attached to S, is only two nodes in the tree away from the subject; it is three or four nodes away from the object. Hence, the MDP accounts for the facts in (13)–(15).

The one exception to the MDP noted by Rosenbaum is the verb *promise,* which exhibits the following pattern (for some speakers; others find (16b) simply ungrammatical):

(16) a. John promised to shave himself/*oneself.
     b. John$_i$ promised Fred$_j$ to shave himself$_{j/*i}$.

Rosenbaum offers no principled solution.[9]

---

[9] However, back in 1967 almost any exception of this sort could be formulated as an exception feature on a transformation, in a manner detailed by Lakoff (1971). Such a solution is no longer considered appropriate, and with good reason.

Hornstein proposes to reduce the MDP to a special case of the Minimal Link Condition on movement. He calls it a ''markedness condition'' and says (p. 83), ''If the MDP is treated as a markedness condition, then verbs like *persuade* become the unmarked case and verbs like *promise* are highly [*sic*] marked.'' He proceeds to show how object control with *persuade* is derived; but he never shows precisely why *promise* eludes the MDP. Hence, his solution is as inexplicit as Rosenbaum's. Many attempts to explain *promise* are attested in the literature (we believe the earliest is Jackendoff 1969); Hornstein makes no references to these attempts.

The problem of *promise* is an important one, in our view. In contrast to Hornstein's claim that the exceptional behavior of *promise* with respect to the MDP is simply a ''marked'' phenomenon of little consequence, we take it to illustrate a fundamental property of obligatory control of complements: the controller is determined by the thematic properties of the verb selecting the complement. Crucially, thematic determination can only be seen clearly in cases where there is more than one possible antecedent; otherwise, the two approaches make the same predictions. We return to this issue below.

Hornstein assumes a c-command account of bound pronominals. This forces him to locate adjunct infinitivals within VP, in order to license the italicized pronominal in (17) (his (38)).

(17) John read every book$_i$ without reviewing *it*$_i$.

Consequently, the ''nearest'' NP in (15a) is *Mary* rather than *John*. Hornstein discusses at length (pp. 88–89) how the MDP might evade this incorrect result, working out a derivation in which *John* comes to be controller of the adjunct. However, he never demonstrates *why* the NP *Mary* can*not* come to be controller of the adjunct in (15a), a telling omission.

4 VP-Ellipsis including Controlled VPs

Among Hornstein's examples is a case (his (4d)) that does not bear on traditional treatments of control but raises issues for his own treatment.

(18) John expects to win and Bill does too.

How is the second conjunct derived? Under Hornstein's hypothesis, *John* in the first clause receives the external θ-role of *win* by originating within the specifier of *win*. But of course *Bill* too is interpreted as having the external θ-role of *win*. The only way it can get this role under Hornstein's hypothesis is for *expects to win* to be present in syntactic structure as a result of Merge and Move, then to be deleted in PF, as suggested for instance in Chomsky 1993. In particular, the logic of this approach precludes *Bill* from acquiring this θ-role by virtue of ''reconstruction'' in LF, in the manner proposed by Fiengo and May (1994).

But this solution will not work in general. Consider (19).

(19) a. John tried to win and Bill did the very same thing.
     b. . . . and Bill did the opposite.
     c. . . . and Bill did likewise/similarly.
     d. Sally tried to seduce Stuart, and Liz did the same thing with Dan.

As pointed out in Culicover and Jackendoff 1995, following arguments in Akmajian 1973, it is impossible to find a syntactically plausible phrase to represent what is deleted in PF—or reconstructed in LF.

(20) a. . . . ?and Bill did the very same thing as try to win.
     b. . . . ?and Bill did the opposite of try(ing) to win.
     c. . . . *and Bill did likewise/similarly as/of/to try(ing) to win.
     d. . . . *and Liz did the same thing as try to seduce (Stuart) with Dan. (acceptable only under wrong meaning)

In that article we argue that the antecedents of these sorts of VP anaphora cannot be determined at any level of syntax, but must be determined at the level of conceptual structure as defined in Jackendoff 1983, 1990, 1997. In particular, (20d) relies on the discrimination of focus and presupposition, which, following arguments in Chomsky 1972, cannot be represented at any syntactic level without violating virtually all known syntactic constraints on movement.

We conclude therefore that a movement approach to control runs afoul of the proper solution to VP-ellipsis.

5 Infinitival Indirect Questions

One of Hornstein's examples (his (42a)) includes an infinitival indirect question, which in fact presents a challenge to his treatment. On the one hand, infinitival indirect questions do exhibit obligatory control in the sense of section 2 (21a). On the other hand, in an appropriate configuration they allow the missing subject to be interpreted as *one* (21b).

(21) a. John knows who (*for Bill) to see.
     b. John told Sam how to hold oneself erect at a royal ball.

In fact, the verb *tell* with an infinitival complement behaves like a standard obligatory object control verb (22a). With an infinitival indirect question, its control behavior is close but not identical (22b).

(22) a. John told Sue (*for Harry) to wash herself/*oneself/*himself/*themselves/*each other.
     b. John told Sue when (*for Harry) to wash herself/oneself/*himself/*themselves/ ??each other.

So we are faced with the following problem. Since the subject of an infinitival indirect question is obligatorily absent, we must assume on Hornstein's theory either that it has moved or that it is an obligatory pro. The former solution would require it to move out of a *wh*-island, not a happy consequence (and one that Hornstein rejects (p. 92)). The latter solution would create configurations that license only pro but not an overt NP. This in turn creates many of the problems with pro that Hornstein is trying to avoid with PRO.

6 Control by Nominals instead of Verbs

Among the arguments in Chomsky 1970 for *not* deriving action nominals from sentences was a difference in behavior between the nominals of subject control verbs such as *attempt* and those of raising-to-subject verbs such as *appear*.

(23) a.   John attempted to leave. (control)
    b.   John's attempt to leave
    c.   John appeared to leave. (raising to subject)
    d.   *John's appearance to leave

If control is a special case of movement, there is nothing about movement per se that distinguishes the two cases.[10]

In fact, there is an important class of control situations in nominals in which movement is impossible. Cases like these were noticed by Postal (1969).

(24) a. an American attempt to invade Vietnam
    b. the Anglo-French agreement to respect each other's territorial claims

In these cases the controller is a morphologically derived adjective, so it cannot have moved up from a subject position in the subordinate clause. Moreover, the form *Anglo-French* is a counterpart of the conjoined NP *England and France,* offering no possibility of close syntactic parallelism between the controller and the controlled position.

In addition, there exist cases of control in nominals that are obligatory in the sense of section 2, but that contain no overt controller (25a). Such examples can be constructed with specifiers that are arguably incompatible with a landing site for an empty subject that has moved up from the infinitival (25b). These cases display unusual properties, in some respects resembling and in some respects differing from R-nonobligatory control: compare (25c–d) with (9a–c).

(25) a. [A furtive attempt to leave] would be a good idea now.
    b. [Those attempts to leave] were too conspicuous.
    c. [An attempt to shoot oneself] would be out of order.
    d. Last night there was [an attempt to shoot me/*oneself/*himself/*myself].

Since Hornstein does not address control in nominals, it is impossible to speculate how he would account for these configurations.[11] They raise no particular problem for theories of control

---

[10] On the other hand, there do exist examples that appear to be parallels of raising in nominals.

 (i) John's likelihood/probability of winning

(ii) John is likely/*probable to win.

[11] In particular, the MP's treatment of functional categories might well be manipulated so as to allow a position for pro but not for an overt NP among the functional categories of the specifier of DP/NP, such that one could find a landing site for movement of pro in *such an attempt to leave.* In the absence of explicit proposals, we are in no position to judge such a strategy.

based on argument structure or conceptual structure. In these theories an implicit argument is precisely a semantic/functional argument that has no NP corresponding to it in phrase structure. Control by an implicit argument of the sort in (25a–c) is therefore control marked only in argument structure or conceptual structure, where the controller is explicit.

7 Control into Nominals

The argument given above is that there need be no overtly expressed controller in syntactic structure that provides a target position for movement. It is also possible to construct examples where the controlled argument itself is necessarily implicit, because it is the argument of a nominal. Consider the following:

(26) a. John promised Mary some sort of messy kiss.
     b. John's dishonest promise to Mary of that famous kiss
     c. John asked Mary for a kiss.
     d. John's unpleasant solicitation from Mary of a kiss

In (26a) the noun *kiss* is controlled by *John,* not *Mary,* in that the Agent of kissing is John. Since there is no syntactic subject of *kiss,* we must appeal to argument structure or conceptual structure in order to find an explicit constituent available to be controlled.

One might attempt to evade this problem by proposing that the noun *kiss* actually does have a covert syntactic subject in (26). But this move would lead in dangerous directions. If *kiss* has a covert syntactic *subject,* the same reasoning should lead us to believe that there is a covert syntactic *object* as well, bound to *Mary.* But such a covert object of course does not appear in the infinitival counterpart of (27)—the Recipient of the kiss cannot control an empty object of the noun *kiss.*

(27) *John promised Mary$_i$ to kiss e$_i$.

Similar observations can be made with any noun that denotes an action involving two or more entities.[12] Again, such examples pose no particular problem to theories of control based on argument structure or conceptual structure.

8 Control in Adjunct Clauses

One point in control theory where some syntactic constraint seems unavoidable is in the control of adjuncts. As seen in (12e–f), some subordinating conjunctions that introduce adjuncts (e.g.,

---

[12] On the other hand, control *into* nominals has somewhat different properties from control into infinitivals. For instance:

(i) a. John$_i$ resisted attempting to shoot himself$_i$/*him$_i$.
    b. John$_i$ resisted attempts to shoot him$_i$/*himself.

In (ia) *John* controls *attempting* by the usual means; in turn, control by *attempting* makes *John* the external argument of *shoot,* whence it binds *himself.* By contrast, in (ib) the attempter is someone other than *John,* so that a pronominal is the appropriate object of *shoot.* We leave it as a puzzle why this should be so.

in order) select for InfC, and some (e.g., *so as*) for InfP. Similarly, as seen in (15), some (e.g., *without*) select for gerundives with or without overt subjects, and others (e.g., *after*) select for subjectless gerundives. In every case, if the adjunct lacks an overt subject, the surface subject of the main clause, whatever its thematic role, is always the controller. A generic interpretation is never possible; a split antecedent is never possible.

(28) a. Helen examined Bernie in order/so as to vindicate herself/*himself/*oneself/*themselves.
　　 b. Bernie was examined by Helen in order/so as to vindicate ?himself/*herself/*oneself/*themselves.
　　 c. Helen examined Bernie in order/*so as for us to vindicate *herself/*himself/*oneself/ourselves.

(29) a. Helen liked/pleased Bernie without/after compromising herself/*himself/*oneself/*themselves.
　　 b. Bernie was liked/pleased by Helen without compromising himself/*herself/*oneself/*themselves.
　　 c. Helen liked Susan without/*after Bernie's compromising himself/*herself.[13]

However, two pieces of evidence show that some nonsyntactic influence is necessary even in these cases. First, these adjuncts can be controlled by implicit arguments, where there is no evident syntactic position for a covert controller.

(30) a. [Such a brutal interrogation of the suspect without considering the legal repercussions] could lead to disaster.
　　 b. [That sort of flattery of your professors, just in order to curry favor,] is frowned upon at this institution.

The subject of *consider* is necessarily understood as the individual who is interrogating the suspect. Yet, because of the form of the determiner, there is no apparent place to cram an Agent NP into the specifier of *interrogation.* Similarly, the subject of *curry favor* is necessarily understood as the flatterer, yet there is apparently no NP position available in the specifier of *flattery* where an appropriate controller could be located.

　As discussed in section 6, there are two possible solutions. One can find a position for a null subject in the NP, in violation of the (quite complex) surface constraints on English determiners (see footnote 11). Or one can admit the possibility of an implicit controller, present only at a level such as argument structure or conceptual structure.

　A deeper semantic influence concerns control with *in order to* clauses. Since *in order to* denotes a purpose, it must be controlled by an individual capable of having a purpose. When the

---

[13] Another use of *without* lacks this restriction: like depictive predicates such as *drunk,* it can apply to either the subject or the object.

(i) a. Helen examined Bernie drunk. (either one is drunk)
　　 b. Helen examined Bernie without her/his glasses on.

subject of the matrix is not such an individual, two options are available for the controller. First, if the matrix is a passive, the explicit or implicit Agent of the passive controls the subject of the *in order to* clause, as in (31a). Second, in the absence of any explicit or implicit Agent in the matrix clause, the *in order to* clause can be controlled by an implicit ''stage manager'' or ''playwright'' who has control over the course of action, as in (31b–c).

(31) a. The ship was sunk (by the owners) in order to collect the insurance. (the owners collect the insurance)

b. The ship sinks in order to further the plot. (the playwright furthers the plot by making the ship sink)

c. This story will appear on the back page in order not to embarrass the president. (the editors keep the president from being embarrassed by putting the story on the back page; *or* the editors keep the story from embarrassing the president by putting it on the back page; *or* the president's representative (or the president) orders the editors to keep the story from embarrassing the president by putting it on the back page)

This presents two problems for the movement analysis. First, there is no way for a movement analysis to be sensitive to the presence of an Agent role in the main clause. Second, when the controller is *not* the subject of the main clause, it can be covert; hence, there is no plausible syntactic position for the subject of the infinitive to move to—particularly in cases like (31b–c).

9 The *promise* and *order* Classes

The touchstone of the analysis of control in Jackendoff 1972, 1974, was the treatment of *promise,* which was Rosenbaum's (1967) leading exception to the MDP (see (16)). The literature has recognized only *promise* and perhaps *vow* as verbs in English that display this particular exceptional behavior. However, the class is considerably enlarged when we consider nominals.

(32) a. John's promise/vow/offer/guarantee/obligation/pledge/oath/commitment to Susan to take care of himself/*herself

b. John's agreement/contract with Susan to take care of himself/*herself

For the most part these nominals select obligatory control.

(33) *John's promise/vow/offer/guarantee/obligation/pledge/oath/commitment (to Susan) for the job to be listed in the weekend classifieds

Judgments may vary among speakers, however.[14]

---

[14] A sentential *that*-complement is perfectly acceptable with these verbs, with the appropriate meaning.

(i) John's vow to Susan that the job would be listed in the weekend classifieds

This shows that the obligatory control with infinitival complements is not semantically motivated. We take it as another piece of evidence that these predicates syntactically select InfP complements, that is, subjectless VPs, as argued in section 2.

The verbal counterparts of most of the nominals in (32) license either an InfP or an (indirect) object plus some other complement, as seen in (34a–d). But for some reason, apart from *promise* and *vow,* they exclude the combination of (indirect) object plus InfP, as seen in (34e).

(34) a.   John offered/guaranteed/pledged to leave.
     b.   John offered a cookie to Susan./John offered Susan a cookie.
     c.   John guaranteed Susan that Fred would come.
     d.   John pledged to Susan that Fred would come.
     e.   *John offered/guaranteed/pledged (to) Susan to leave.

However, three previously unremarked cases of subject control predicates emerge from this set.

(35) a.   John agreed with Susan to take care of himself/*herself.
     b.   John contracted with Susan to take care of himself/*herself.
     c.   John is obligated to Susan to take care of himself/*herself.

In the acceptable cases in (32) and (35), *Susan* is embedded in a PP, which might be taken as a syntactic reason why it is not the controller. But the following nominals have identical syntax except that the object of the PP is the controller.

(36) John's order/instructions/encouragement/reminder/invitation to Susan to take care of herself/*himself

To try to preserve a syntactic approach for the difference between (32)/(35) and (36), one would have to find an underlying syntactic difference between them. For example, one might stipulate that some instances of some prepositions are underlying (and hence block their objects from being controllers), while others are inserted after the control relation is computed (perhaps as a form of ''Case realization''). The artificiality of such a stipulation is patent; perhaps others will be cleverer than we are at developing a mechanism of suitable generality. A particular difficulty that such an analysis would have to overcome is that the same preposition yields different judgments; compare (36) (e.g., *John's order to Susan to take care of herself/*himself*) with (32) (e.g., *John's commitment to Susan to take care of *herself/himself*).

In fact, the most plausible basis for the difference in controller between (36) and (32) is thematic structure. This becomes clearer when we observe that control in the nominals in (32) is not associated with the specifier (or ''subject'') position. Rather, it follows the thematic role Source—the giver of the promise—wherever that may be located in the syntax.[15]

---

[15] Examples similar to (37b–c) are cited in Jackendoff 1972:217 as ''a long-standing puzzle connected with the control problem''; RJ believes they were cited in a syntax course at MIT by Chomsky, Morris Halle, or Edward Klima in 1965–1966. Chomsky (1968:48, 49) provides these examples:

(i) a.   John gave me the impression of working on that problem.
     b.   John gave me the suggestion of working on that problem.
     c.   John made an offer to Bill (received advice from Bill, received an invitation from Bill) to stay.

(37d) is a type pointed out by Sag and Pollard (1991).

(37) a. the promise to Susan from John to take care of himself/*herself

    b. John gave Susan some sort of promise to take care of himself/*herself.

    c. Susan got from John some sort of promise to take care of himself/*herself.

    d. A: John made Susan a promise.

       B: What was it?

       A: I think it was to take care of himself/*herself.

The examples in (37) elude Hornstein's solution to control in terms of movement. There is no way that *John* can move upward from the specifier of *take care,* to land in its surface position. In (37a) it would have to land in the object of a preposition; in (37b–c) it would have to land in the completely occupied specifier of *promise* (see footnote 11), only to move on to different positions in the main clause; and in (37d) it would have to jump into a previous sentence in the discourse.

If, alternatively, control is identified with the semantic role of Source, the giver of the promise, the facts emerge elegantly. However, the price is that the controller cannot be identified in terms of syntactic position.

To try to preserve the structural approach, one might argue that the nominals are subject to a different mechanism that is only superficially related to control of the complement of a verb. But this would miss the generalization that control with the verbs *promise* and *order* is precisely parallel to that with the homophonous nominals; moreover, it would leave *promise, vow, agree, contract,* and *be obligated* as isolated exceptions.

An important difference between the nominal and verbal forms is that the latter have fewer syntactic options, so that it is harder to tease out the proper generalizations. In particular, the verbs *vow, agree,* and *contract* cannot undergo passive, so we cannot observe their behavior with an implicit Source argument. *Promise,* which does undergo passive, also behaves somewhat anomalously: control does not follow the Source over to the *by*-phrase as it does in the nominal.

(38) a. *Susan was promised by John to take care of himself/herself.

    b. the promise to Susan by John to take care of himself/*herself

However, in the very special case (39a), below, pointed out by Hust and Brame (1976), the surface subject of the passive, the Recipient of the promise, can serve as controller.

Hust and Brame (and many subsequent writers including Chomsky (1981)) take this case as a fatal counterexample to the thematically based theory of control in Jackendoff 1972; but further examination is revealing. This configuration is exquisitely narrow: it is fully acceptable only when the complement is a passive verb of permission, as the contrast between (39a) and (39b) indicates. (39c) shows that, in the nominal, the same complement shifts control to the Recipient of the promise. (39d), pointed out by Bresnan (1982), shows a different passive, closer in form to (39c). (39e–f), from Sag and Pollard 1991, are in our judgment less acceptable than (39a,c–d), but certainly better than (39b). We find the previously uncited (39g) better than (39e–f).

(39) a. Susan was promised (by John) to be allowed to take care of herself/*himself.

b. *Susan was promised $\left\{\begin{array}{l}\text{to permit John to leave}\\ \text{to get permission to leave}\\ \text{to leave the room}\\ \text{to be hit on the head}\end{array}\right\}$.

   c.   the promise to Susan to be allowed to take care of herself

   d.   It was promised to Susan to be allowed to take care of herself.

   e.   ?Grandma promised the children to be able to stay up for the late show.

   f.   ?Montana was promised (by the doctor) to be healthy by game time on Sunday.

   g.   Susan was promised to be helped/encouraged/enabled to take care of herself.

Thus, if anything, this exceptional case depends *more* heavily on semantics than does control in the nominal headed by *promise*. In particular, to the extent that (39e–g) are acceptable, it is because the situation described by the complement is more plausible for the Recipient of the promise than for the promiser (the Source). A simple movement of the controlled NP into subject position is far too crude to incorporate the semantic subtlety here. Sag and Pollard propose a solution to these examples based on coercion, a semantic operation whose effects are beyond the scope of the present article.

Returning to the *order* class of verbs, the contrast between (38) and (39) suggests that control with *order* might be identified with the Recipient. And indeed this is the case, contrasting perfectly with the *promise* nominals.

(40) a. the order/instructions/encouragement/reminder/invitation to Susan from John to take care of herself/*himself

     b. Susan's order/instructions/*encouragement/*reminder/invitation from John to take care of herself/*himself

     c. John gave Susan some kind of order/instructions/encouragement/reminder/invitation to take care of herself/*himself.

     d. Susan got from John some kind of order/instructions/encouragement/reminder/invitation to take care of herself/*himself.

     e. A: Susan got an order from John./John gave Susan an order.

          B: What was it?

          A: I think it was to take care of herself/*himself.

These examples of course present the same challenge as (37a–d) to Hornstein's movement theory of control. Furthermore, the two paradigms together show that no principle based on syntactic structure can account for controller position, as the paradigms are syntactically identical. All that varies is the lexical semantics of the nominal.

And of course, if the verbs *order, instruct,* and so on, carry the same lexical specification of controller as the nominals do, controller position with these verbs will invariably be the (underlying) object, in this case apparently verifying the MDP—but in fact arising through different means.

10 The *say* and *ask* Classes

A class of verbs pointed out by Perlmutter (1971) has the paradigm shown in (41). As (41a) demonstrates, these verbs all license InfC rather than just InfP.

(41) a. John said/shouted/yelled/screamed/signaled (to Sally) for Harriet to leave.
b. John said/shouted/yelled/screamed/signaled to Sally$_i$ to take care of *her$_i$/herself$_i$/ *himself.
c. John$_i$ said/shouted/yelled/screamed/signaled to take care of him$_i$/*himself$_i$/*oneself/ yourself.

When the *to*-phrase expressing addressee cooccurs with a *to VP* complement (41b), the interpretation might be construed either as an ordinary case of the MDP, or it might be a case in which control is lexically assigned to the addressee. The telling case is when the addressee is implicit, as in (41c): here control is still assigned to the addressee. As has already so often been the case, we are faced with a choice: we can license a null addressee in the syntax (and deal with the absence of *to*—not a trivial problem, if our syntactic analysis is to be serious); or we can assign the controller at some nonsyntactic level where the addressee is explicit.

  We take it that *yourself* in (41c) refers to a discourse addressee. Sag and Pollard (1991:93) provide further cases like this, for instance (42) (their (89)).

(42) a. Mary realized that John had signaled to position herself near the door.
b. Mary was on the alert. John had signaled to position herself behind the door.

Moreover, if the sentence is explicitly marked as generic, a generic addressee becomes possible.

(43) John always signals to position oneself/yourself near the door.

Thus, control is determined by a thematic role of the matrix verb; apparent variability of control in the absence of an overt controller is determined by independent principles for interpreting the implicit argument.

  A closely related class of verbs, exemplified by *ask,* contrasts with the *say* class in that, when the addressee is absent, control shifts to the actor of the main clause. (44a–c) parallel (41a–c); (45)–(48) add further members of the class with slightly different syntactic properties but identical control properties.

(44) a. John asked/begged (Sally) for Harriet to leave.
b. John asked/begged Sally to take care of herself/*himself.
c. John$_i$ asked/begged to take care of himself$_i$/*him$_i$/*oneself/*yourself.

(45) a.   John requested (?Sally) for Harriet to leave.
b.   John requested Sally to take care of herself/*himself.
c. *John requested to take care of himself.

(46) a. John pleaded (with Sally) for Harriet to leave.
b. John pleaded with Sally to take care of herself/*himself.
c. John$_i$ pleaded to take care of himself$_i$/*him$_i$/*oneself/*yourself.

(47) a. John prayed (to Athena) for Harriet to leave.
    b. John prayed to Athena to take care of herself/*himself.
    c. John prayed to (be able to) take care of himself.

(48) a.   John beseeched *(Sally) (for Harriet) to leave.
    b.   John beseeched Sally to take care of herself/*himself.
    c. *John beseeched to leave.

Suppose one were to adopt a solution to the *say* verbs in which a null addressee in syntax controlled the infinitive structurally. Then, by parallelism, the *ask* verbs in the (c) examples of (45)–(47) should also have a null addressee in syntax, and it too should control the infinitive. The contrast between (41c) and the (c) examples of (45)–(47) shows that this is the wrong solution; hence, this is another case of control that is independent of syntactic configuration.

The *ask* class contrasts with the *say* class in another respect. In the *ask* class it is possible, using the right VP complement, to shift control from an overt addressee to the actor; the same complements are simply ungrammatical with the *say* class.

(49) a.   i. John asked/begged/requested/beseeched Sally to be allowed to take care of himself/*herself.
      ii. John pleaded with Sally to be allowed to take care of himself/*herself.
     iii. John prayed to Athena to be allowed to take care of himself/*herself.
    b. *John said/shouted/yelled/screamed/signaled to Sally to be allowed to leave.

The complements that permit this shift of control are the same ones that allow control to shift in the *promise* class.

(50) a. John asked Sally to be allowed/permitted/able/encouraged/helped/enabled to leave.
    b. He begged me to be able to stop taking German. (example recorded by RJ in conversation)

The same contrast appears in the corresponding nominals.

(51) a.   John's request/plea/prayer to Sally to take care of herself/*himself
    b.   John's request/plea/prayer to Sally to be allowed to take care of himself/*herself
    c.   John's shout/signal to Sally to take care of herself/*himself
    d. *John's shout/signal to Sally to be allowed to leave

As with the *promise* class, the possibility of control with implicit arguments in the nominals provides evidence that the shift of controller is thematic, that is, to Source, not to subject.

(52) a. a request/plea/prayer to Sally from John to be allowed to take care of himself/*herself
    b. John is very proud. A request/plea/prayer to Sally to be allowed to take care of himself/*herself would be unthinkable.

The behavior of the *ask* class with these complements thus parallels the behavior of the *promise* class; the *say* class parallels the *order* class. Sag and Pollard's (1991) proposal for the controller shift with *promise* generalizes to this class as well.

11 Conclusion

The upshot of our discussion is that the cases of control that Hornstein (1999) analyzes as move-
ment are an arbitrary subset of the full pattern. A more thorough examination reveals that in
many cases the thematic structure of the matrix predicate has a quite precise effect on the choice
of controller. We have not offered an account of precisely *why* the various classes of predicates
determine control the way they do. But the fact that predicates with parallel thematic control are
semantically similar (e.g., *promise/vow/contract* vs. *order/instruct/encourage*) suggests that a full
explanation lies in a more complete theory of lexical semantics than is available at present.

There are two syntactic factors involved in control. The first is that the choice between
obligatory control and R-nonobligatory control is a matter of syntactic selection: some predicates
and subordinating conjunctions syntactically select InfP or GerP, resulting in obligatory control,
and some syntactically select InfC or GerC, resulting in R-nonobligatory control. The second
syntactic factor is that control does appear to be syntactically based in the case of the control of
adjuncts by a surface subject (section 8). But even in this situation there is semantic mitigation.
In every other case we have examined, the syntactic structure associated with control shows
considerable overlap between classes as well as considerable variety within classes. We therefore
find the choice quite clear between a syntactically based solution and a solution in which semantics
plays a considerable role.

Most of the evidence presented here has been in the literature for years, though perhaps not
organized quite so systematically. We hope that this article will highlight some of the relevant
generalizations that are central to the study of control, and that it can lead to further progress in
teasing the problems apart.

References

Akmajian, Adrian. 1973. The role of focus in the interpretation of anaphoric expressions. In *A festschrift
       for Morris Halle,* ed. Stephen R. Anderson and Paul Kiparsky, 215–226. New York: Holt, Rinehart
       and Winston.
Baker, C. L. 1995. *English syntax.* 2nd ed. Cambridge, Mass.: MIT Press.
Bowers, John S. 1981. *The theory of grammatical relations.* Ithaca, N.Y.: Cornell University Press.
Brame, Michael K. 1976. *Base generated syntax.* Seattle, Wash.: Noit Amrofer.
Bresnan, Joan W. 1972. The theory of complementation in English syntax. Doctoral dissertation, MIT,
       Cambridge, Mass.
Bresnan, Joan W. 1978. A realistic transformational grammar. In *Linguistic theory and psychological reality,*
       ed. Morris Halle, Joan W. Bresnan, and George Miller, 1–59. Cambridge, Mass.: MIT Press.
Bresnan, Joan W. 1982. Control and complementation. In *The mental representation of grammatical rela-
       tions,* ed. Joan W. Bresnan, 282–390. Cambridge, Mass.: MIT Press.
Cattell, Ray. 1984. *Composite predicates in English.* New York: Academic Press.
Chierchia, Gennaro. 1988. Structured meanings, thematic roles, and control. In *Properties, types, and mean-
       ing.* Vol. 2, *Semantic issues,* ed. Gennaro Chierchia, Barbara Partee, and Raymond Turner, 131–166.
       Dordrecht: Kluwer.
Chomsky, Noam. 1968. *Language and mind.* New York: Harcourt, Brace and World.
Chomsky, Noam. 1970. Remarks on nominalization. In *Readings in English transformational grammar,* ed.

    Roderick Jacobs and Peter Rosenbaum, 184–221. Waltham, Mass.: Ginn. [Also in Chomsky 1972, 11–61.]

Chomsky, Noam. 1972. *Studies on semantics in generative grammar.* The Hague: Mouton.

Chomsky, Noam. 1981. *Lectures on government and binding.* Dordrecht: Foris.

Chomsky, Noam. 1993. A minimalist program for linguistic theory. In *The view from Building 20,* ed. Kenneth Hale and Samuel Jay Keyser, 1–52. Cambridge, Mass.: MIT Press.

Culicover, Peter W. 1999. *Syntactic nuts: Hard cases, syntactic theory, and language acquisition.* Oxford: Oxford University Press.

Culicover, Peter W., and Ray Jackendoff. 1995. *Something else* for the binding theory. *Linguistic Inquiry* 26:195–217.

Culicover, Peter W., and Ray Jackendoff. 1999. The view from the periphery: The English comparative correlative. *Linguistic Inquiry* 30:543–571.

Culicover, Peter W., and Wendy Wilkins. 1984. *Locality and linguistic theory.* New York: Academic Press.

Culicover, Peter W., and Wendy Wilkins. 1986. Control, PRO, and the Projection Principle. *Language* 62: 120–153.

Farkas, Donka. 1988. On obligatory control. *Linguistics and Philosophy* 11:27–58.

Fiengo, Robert, and Robert May. 1994. *Indices and identity.* Cambridge, Mass.: MIT Press.

Hornstein, Norbert. 1999. Movement and control. *Linguistic Inquiry* 30:69–96.

Hust, Joel, and Michael Brame. 1976. Jackendoff on Interpretive Semantics (review of Jackendoff 1972). *Linguistic Analysis* 2:243–277.

Jackendoff, Ray. 1969. Some rules of semantic interpretation for English. Doctoral dissertation, MIT, Cambridge, Mass.

Jackendoff, Ray. 1972. *Semantic interpretation in generative grammar.* Cambridge, Mass.: MIT Press.

Jackendoff, Ray. 1974. A deep structure projection rule. *Linguistic Inquiry* 5:481–506.

Jackendoff, Ray. 1983. *Semantics and cognition,* Cambridge, Mass.: MIT Press.

Jackendoff, Ray. 1990. *Semantic structures.* Cambridge, Mass.: MIT Press.

Jackendoff, Ray. 1997. *The architecture of the language faculty.* Cambridge, Mass.: MIT Press.

Lakoff, George. 1971. *Irregularity in syntax.* New York: Holt, Rinehart and Winston.

O'Neil, John. 1997. Means of control: Deriving the properties of PRO in the Minimalist Program. Doctoral dissertation, Harvard University, Cambridge, Mass.

Perlmutter, David M. 1971. *Deep and surface structure constraints in syntax.* New York: Holt, Rinehart and Winston.

Postal, Paul M. 1969. Anaphoric islands. In *Papers from the Fifth Regional Meeting of the Chicago Linguistic Society,* 205–235. Chicago Linguistic Society, University of Chicago, Chicago, Ill.

Rosenbaum, Peter S. 1967. *The grammar of English predicate complement constructions.* Cambridge, Mass.: MIT Press.

Ruwet, Nicolas. 1983. Montée et contrôle: Une question à revoir? In *Analyses grammaticales du français: Études publiées à l'occasion du 50e anniversaire de Carl Vikner. Revue romane,* no. spécial 24: 17–34. [English translation in Nicolas Ruwet, *Syntax and human experience.* Chicago: University of Chicago Press.]

Ruwet, Nicolas. 1984. De la distribution des compléments à temps fini et des compléments à l'infinitif en français. *Cahiers de grammaire* (Toulouse-le Mirail) 7:74–138. [English translation in Nicolas Ruwet, *Syntax and human experience.* Chicago: University of Chicago Press.]

Sag, Ivan, and Carl Pollard. 1991. An integrated theory of complement control. *Language* 67:63–113.

Van Valin, Robert D., Jr., and Randy J. LaPolla. 1998. *Syntax: Structure, meaning, and function.* Cambridge: Cambridge University Press.

Williams, Edwin. 1980. Predication. *Linguistic Inquiry* 11:203–238.

(Culicover)
Department of Linguistics
*   and Center for Cognitive Science*
The Ohio State University
222 Oxley Hall
1712 Neil Avenue
Columbus, Ohio 43210-1205

culicover.1@osu.edu

(Jackendoff)
Program in Linguistics and Cognitive Science
Brandeis University
Waltham, Massachusetts 02454

jackendoff@brandeis.edu

Arabic Hypocoristics and the Status of the Consonantal Root

Stuart Davis
Bushra Adnan Zawaydeh

There is currently a controversy regarding the lexical (morphemic) status of the consonantal root in the Semitic languages. Bat-El (1994) and Ratcliffe (1997) have argued against the lexical status of the consonantal root in Hebrew and Arabic, respectively. However, Prunet, Béland, and Idrissi (2000) present Arabic aphasic evidence supporting the lexical (morphemic) status of the consonantal root for Arabic. In this article we offer supporting evidence from Arabic hypocoristics for the morphemic status of the consonantal root. We argue that hypocoristic formation is an output-to-output word formation process that nonetheless references the consonantal root. We then discuss implications.

Keywords: Arabic, hypocoristic, root, Semitic, word-based morphology

1 Introduction

Prunet, Béland, and Idrissi (2000) present evidence from the metathesis errors of an Arabic/French bilingual aphasic (ZT) for the existence of the consonantal root as a lexical (morphemic) unit in Arabic. ZT's aphasic speech in Arabic is characterized by metathesis of root consonants (but not