CONTROL THEORY AND THE IDENTIFICATION OF PRO

A. TOWARDS A TYPOLOGY OF CONTROL CONSTRUCTIONS. THE EMPIRICAL PHENOMENA

1. The domain of Control Theory. Obligatory and non-obligatory control

Control is the relation between *an antecedent* and the missing PRO subject, i.e., it is the relation between PRO and its controller.

Control theory deals with problems of the following type: a) What elements/positions can control? b) What is the exact nature of the relation between PRO and its controller? Is it an obligatory or an optional relation? Is it a one-to-one relation? c) How is a controller picked up in a given structure? This section surveys the variety of empirical phenomena that fall under CT, establishing a typology of control. In the second part a minimalist account of the control data reviewed in the first part will be presented.

A first relevant empirical distinction is that between *obligatory control* and *optional control.* The term *obligatory control* designates *configurations* that lead to ungrammaticality if a suitable controller is not overtly present. In (1a) the Indirect Object (= IO) is the required controller, in its absence the sentence is ungrammatical, in (1c) and the needed controller is the direct object (= DO); its absence leads to ungrammaticality, in (1e) and (1g) the expected controller is the main clause subject.

(1) a. I ordered *to them* [PRO to leave].
b. *I ordered [PRO to leave].
c. They forced *them* [PRO to leave].
d. *They forced [PRO to leave]
e. *I* promised him [PRO not to perjure myself].
f. *I promised him [PRO not to perjure himself.
g. *I* tried [PRO to give up smoking]

Verbs like *order*, *force*, *promise*, *try* have often been described as *verbs of obligatory control,* (Bach (1979), Bresnan (1982), Farkas (1988) among many). Verbs of obligatory control always require PRO-TO complements and are incompatible with FOR-TO complements. The examples show that the controller of PRO is, like the infinitive clause containing PRO, an *argument* of the main clause predicate. Exactly which argument is the controller depends on the lexical properties of the verb. Thus, *order* is a verb of obligatory IO control, *force* is a verb of obligatory DO control, *promise* and *try* are verbs of obligatory subject control.

From the more general perspective of control theory, *obligatory control* (= OC) is the LF configuration in which the controller and the infinitive complement containing PRO are *co-arguments* of the same predicate. In example (1a), for instance, the controller and the infinitive complement are co-arguments of the verb *order*, in example (1g), the controller is the subject and the complement clause the direct object of the verb *try*, a.s.o.

Obligatory control contrasts with situations of *non-obligatory control* (= NOC) i.e., cases where the infinitive need not be controlled by a clause-mate DP. Here are a few examples. In (2a) the controller is either *Mary* or *John*, as shown by the agreement with the reflexive in (2b). Notice that the second controller DP, *Mary*, is in a clause higher than the main clause. This is said to be a

situation of *long-distance control*, since the infinitive clause and the controller are not clause-mates.

(2) a. *Mary* knew that it damaged *John* [PRO to do it].
b. *Mary* knew that it damaged *John* [PRO to perjure himself/ herself].

Consider now sentences like (3), which are also examples of non-obligatory control: this time there is *no controller*, and yet the sentences are grammatical. The interpretation of PRO in such examples is that of an arbitrary indefinite generic pronoun, roughly equivalent with *one*. That the interpretation of PRO is *one* is shown by agreement phenomena; notice the presence of the reflexive *oneself* and of the possessive *one's* in examples (3):

(3) a. [PRO_{arb} to vote for oneself] would be a mistake.
b. [PRO_{arb} to love one's neighbour] is a Christian duty.
c. [PRO_{pro} to see] is [PRO_{arb} to believe].

Conclusions

1. Two types of control configurations have been identified: obligatory control and non-obligatory control

2. Obligatory control (= OC) obtains when the controller and the infinitive are clause-mates, being co-arguments of the same predicate (at LF).

3. Non-obligatory control (= NOC) obtains when the controller and the infinitive are not clause mates. Two distinct situations fall under NOC, either there is no controller, in which case there is arbitrary control, or the controller is in a clause different from the main clause, a situations referred to as long distance control.

1.1. *Empirical differences between OC and NOC*. The following empirical properties differentiate OC from NOC, jointly defining the categories of OC and NOC.

a. *Long-Distance Control* is impossible with OC, possible with NOC.
b. *Arbitrary control* is impossible with OC, possible with NOC.
c. *Strict reading of PRO* is impossible with OC, possible with NOC.

Let us briefly review the relevance of these properties:

a. *Long-Distance Control* (= LD) The term LD control refers to cases where the controller of PRO is not an argument of the clause immediately containing the infinitive. Notice that an LD-controller need not even be higher in the structure than PRO, as shown by example (4a), i.e., PRO need not be c-commanded by the controller. Typically, LD-control shows up in constructions where a closer antecedent for PRO can be skipped in favour of a remote one, as in (4b, c).

(4) a. [PRO_1 storming out of the room that way after losing the game] convinced everyone that $John_1$ is very immature.
b. $John_1$ said that *Mary* thought that [PRO_1 not shaving himself] would bother *Sue*.
c. $Mary_1$ knew that it damaged *John* [PRO_1 to perjure herself].

b. *Arbitrary control.* With " arbitrary control", no argument of the main clause, either overt or covert, is understood as the PRO controller. Arbitrary control is impossible in configurations of OC. Thus, in configurations of OC, if there is a DP that could be a controller, it is impossible to understand PRO as having arbitrary generic reference (= *one*). Notice that the problem is syntactic, not semantic: the meaning intended in the unacceptable (5b), for instance, could be rendered in a

finite complement like (5b'). In the infinitive construction, however, only a reading equivalent to (5b') is available, that is a reading where PRO is controlled, not arbitrary.

(5) a. *John tried [PRO_{arb} to be quiet].
b. *John remembers [PRO_{arb} not to smoke around the babies].
b' John remembers that one should not smoke around babies.
b" John remembers that he should not smoke around babies.

Arbitrary readings are perfectly possible in NOC configurations like (6), where the infinitive is a subject or a predicative, not an object, as in (5):

(6) a. It is dangerous for babies [PRO_{arb} to smoke around them]. [Kawasaki 1993]
a' It is dangerous for babies that one should smoke around them.
b. [PRO_{arb} to behave oneself in public] would help John. [Manzini 1983]
c. [PRO_{arb} making a large profit] requires [PRO_{arb} exploiting the tenants].

c. *Strict reading of PRO* is impossible with OC, possible with NOC. This difference is evident in co-ordinate sentences with gapped (= elided) material. Such sentences are sometimes ambiguous as to the interpretation of the gap. Generally, the constituents left behind after elision tend to be paired with overt constituents in a way that maximises the semantic parallelism between the two co-ordinate clauses. Sentence (7) is an example of ambiguity created by ellipsis. The ambiguity is represented in (7b) and (7c) and is brought out by the two contexts which select one of the possible interpretations each. In context (7b), *Tom* is paired with the object of *persuade*, while in (7c), *Tom* is paired with the subject of *persuade*.

(7) a. Bob persuaded me to pick up the sandwiches and Tom the liquor.
b.------and Bob persuaded Tom_i [PRO_i to pick up the liquor.
c.-----and Tom persuaded me_j [PRO_j to pick up the liquor]

Context b. Bob doesn't have anything to do now except wait until the party begins, since he persuaded...
Context c. I won't have a minute's rest before the party begins, since Bob persuaded me...

What matters for the typology of control is that ellipsis may lead to ambiguity only in certain types of control sentences, namely when NOC is involved. Here is an example of a licit ambiguity.

(8) a. John thinks that [PRO feeding himself] will be difficult, and Bill does, too.
a_1 $John_1$ thinks that [PRO_1 feeding himself will be difficult, and $Bill_2$ thinks that [PRO_2 feeding himself will be difficult], too. (sloppy identity)
a_2 $John_1$ thinks that [*PRO_1 feeding himself will be difficult*] and $Bill_2$ thinks that [*PRO_1 feeding himself will be difficult*], too. (strict identity)

On the one hand, the second conjunct may attribute to *Bill* the thought that it would be difficult for him, Bill, to feed himself, as in ($8a_1$). In this case, the antecedent of PRO in the second conjunct is *Bill*, a more local controller, different from the controller of PRO in the first conjunct. Alternatively, (8a) could be ascribing to Bill the thought that John's feeding himself will be difficult. In this case the antecedent of PRO is the more remote DP *John* in the first conjunct, as indicated by the indexation in ($8a_2$). Only in this second case is the gapped material strictly identical in the two conjuncts. This reading, based on a more remote controller, is known as the

strict (*identity) reading*, and it is allowed only in configurations of NOC. The infinitive clause and the controller in (8a) are not clause mates, therefore this is not an OC configuration.

In interpretation ($8a_1$), the index of the PRO contained in the gap is actually different from that of PRO in the first conjunct, which means that the two strings are not strictly identical. Reading ($8a_1$) is known as the *sloppy identity reading*.

A similar example is (9b), with the readings in b_1 (strict reading) and b_2 (sloppy identity). Again, on the strict reading, typical of NOC, (9b) could imply that for no x, x different from Bill, x expects that Bill's reading Mary the play will make a strong impression on her.

(9) b. Only Bill expects that it will make a strong impression on Mary [PRO to read the play].
b_1. Only $Bill_1$ expects that it will make a strong impression on Mary [PRO_1 to read the play.]
b_2.Only Bill expects that it will make a strong impression on $Mary_2$ [PRO_2 to read the play].

Examples (8a), (9b) above exhibit NOC and both allow a *strict identity reading* with a remote controller and a *sloppy identity reading* where the actual controller is the closer potential controller, or else an arbitrary reading obtains. PRO behaves like a pronoun, in the sense of Condition B, since it does not have a unique controller, and there may even be no controller. In contrast, the following data, due to Bouchard (1984) prove that in OC contexts, PRO behaves like an anaphor, picking up a unique most local controller. Notice that (10) exhibits OC since the infinitive clause and PRO are clause-mates.

(10) a. John tried [PRO to leave early], and Bill did too.
a' John tried [PRO to leave early], and $Bill_j$ tried [PRO_j to leave], too.
b. Only Bill expects [PRO to win]

In (10a, a'), PRO in the reconstructed VP of the second conjunct must be controlled by *Bil*l, therefore, by *the most local* antecedent. Thus, in contexts of obligatory control *only the sloppy identity* reading is possible. Example (10b) implies that for no x, x different from Bill, x expects him / herself to win. An arbitrary reading is excluded.

To sum up, there appear to be clear empirical differences between obligatory control configurations and non-obligatory control configurations. The two types of control configurations differ in terms of the (non) clause-mate relation between the infinitive clause and the controller.

2. Varieties of Obligatory Control: exhaustive / partial control

While the distinction between obligatory control and optional control has been known since the seventies, recently, a new quite significant empirical problem has been discovered (cf. Landau (1999)). It has been proved that *the relation between PRO and the controller is not always one of identity*, that is, PRO and the controller do not always have the same referent, even if sameness of reference and of referential index is by far the more common situation.

Consider examples (11) and (12) below which exhibit two varieties of obligatory control: in examples (11) PRO is referentially identical to the controller. When a verb imposes this sort of tight relation (identity) between PRO and the controller, we will speak of *Exhaustive Control* (= EC). In contrast, in (9), the controller is merely *referentially included in the set denoted to by PRO*, there is a subset-superset relation between the controller and PRO. Verbs that allow this possibility, the vast majority of verbs in English, will be said to manifest *Partial Control* (PC).

Exhaustive control(EC)

(11) a. The chair$_1$ managed [PRO$_1$ to gather the committee at 6].
b. *The chair$_1$ managed [PRO$_{1+}$ to gather at 6].
c. Mary knew that John$_1$ began [PRO$_1$ to work (*together) on the project].

Partial Control (PC)

(12) a. The chair$_1$ preferred [PRO$_1$ to gather the committee at 6].
a. The chair$_1$ preferred [PRO$_1$+ to gather at 6].
b. * The chair$_1$ preferred [PRO$_1$+ to gather without him$_1$]
c. Mary$_1$ thought that John$_2$ didn't know [where PRO$_{1+2}$ to go together].

Manage and *begin* are EC verbs, while *prefer* and *know* are PC verbs. Consider the minimal pair in (11a, b). The transitive *gather* requires a collective direct object, but imposes no condition on its subject, which may be, and is, singular. The intransitive *gather* is a collective verb, requiring a plural subject. Since m*anage* is an EC verb, requiring identity between PRO and the controller, and the controller of PRO is singular, (11b) is ruled out.

In contrast, the PC verb *prefer is grammatical in both* (12a) and (12b). The relevant remark is that although the subject of *prefer* is singular, it may control a PRO subject which stands for a collective referent, subject of the intransitive *gather*. Moreover, (12b) is an example of PC, and at the same time of OC, as can be seen from (12c). In sentence (12b), Condition B would require complete disjointness between PRO and the pronoun *him*; in fact, however, given its controller, PRO, a clause mate of *him*, includes the reference of *him*, in violation of Condition B of BT. The result is that the pronoun *him* cannot be bound from the main clause. The contrast between (11c) and (12c) illustrates the same difference between EC and PC: The adverb *together* forms (semantic) predicates which require a plural subject. Although controlled by a singular DP in both (11c) and (12c), PRO is compatible with the a semantically collective predicate only in (12c) due to the partial control effect.

Conclusions:

a) There are two varieties of OC: Exhaustive Control and Partial Control.
b) Exhaustive Control (EC) PRO must be identical to the controller.
c) Partial Control (PC) PRO must include the controller, but not the other way round.

2.1. ***The empirical domain of PC***. Before giving an account of EC and PC, one should demarcate the empirical domain of PC, as opposed to EC, since not all verbs allow both options.

A limited number of verbs allow *only EC*. Semantically, EC-verbs are implicative (*manage, fail*, etc.), aspectual (*begin, continue*) or modal (*be going to, have to*). Verbs that allow PC also allow EC, since if it is possible with these verbs that the controller is merely included in PRO (PC), naturally it is also possible for the controller to be referentially identical with PRO. Semantically, PC-verbs are, desiderative (*desire, wish*), verbs that take interrogative complements (*wonder*), factive (*regret, resent*), and propositional verbs (*claim*). Here is a reminder of these predecats classes with examples of each type:

(13) a. **Aspectual:**
begin, start, continue, finish, stop, resume.
b. **Modal:**
need, is able, is going to
c. **Implicative:**

manage, fail, bother, remembered, see fit, condescend, avoid, forgot, fail, refrain, decline, neglect, force, compel.

d. **Desiderative (including exercitive verbs):**

want, prefer, yearn, arrange, hope, afraid, refuse, agree, plan, aspire, decide, mean intend, resolve, strive, demand, promise, choose, offer, eager, ready.

e. **Factives:**

glad, sad, regret, like, dislike, hate, loath, surprised, shocked, sorry

f. **Interrogatives:**

wonder, ask, find out, interrogate, inquire, contemplate, deliberate, guess, grass, understand, know, unclear.

g. **Propositional**:

claim.

Distributionally, the distinctive property of PC constructions, setting them apart from EC, is the possibility of the former, and the impossibility of the latter, to control the PRO subject of a *collective* predicate. Two types of collective predicates will be considered in order to illustrate PC and EC with the verb-classes mentioned above:

(14) a) inherently collective or reciprocal predicates (*gather, convene, assemble, scatter, disperse, meet*);
b) contextually collective predicates, formed with the collective adverb *together*.

Here are sentences containing *inherently collective* predicates (*meet, convene*), whose subject is PRO in the infinitive clause. With verbs of EC-control, the controller of PRO cannot be singular, because PRO and the antecedent are identical, PRO will also be semantically singular and it cannot be the subject of a collective predicate. Hence (15a), (16a), (17a) are ungrammatical. In sharp contrast, with PC-verbs, the controller of PRO may be singular, while PRO is interpreted as semantically plural, because of the subset-superset relation that holds between the antecedent and PRO.

(15) a. *John told Mary that he *managed* [PRO] to meet at 6.
b. John told Mary that he$_1$ *preferred* [PRO$_{1+}$ to meet at 6 today].
c. John told Mary that he$_1$ didn't *know* [whether PRO$_{1+}$ to meet at 6 or at 8].

(16) a.* The chair *continued* [PRO to convene during the strike].
b. The chair$_1$ *decided* [PRO$_{1+}$ to convene during the strike.
c. The chair$_1$ has not *decided* yet [whether PRO$_{1+}$ to convene during the strike].

(17) a.* Mary said that John *began* to debate this question recently.
b. Mary said that John$_1$ wished [PRO$_{1+}$ to debate this question very soon].
c. Mary said that John$_1$ finally realized [when [PRO$_{1+}$ to debate this question]].

Examples (15a), (16a), (17a) illustrate EC-verbs (implicative, aspectual), while examples (15b, c), (16b, c), (17b, c) in each triplet illustrate PC-verbs (desiderative and interrogative), respectively. In each case, the complement clause includes an inherently collective predicate (*convene, debate, separate*) or a reciprocal predicate (*meet*).

Similar effects obtain with *contextually collective* predicates, derived with the adverb *together* (*dance together, win together, fight together* in (18)-(20) below). Notice also the type of configuration proposed: in the examples below, there is a local controller of PRO, *John* or *he,* (co-indexed with *John*), as well as another DP, *Mary* mentioned in a higher clause, so as to supply a salient member in the group reference of PRO, other than *John* himself. PRO refers at least to John and Mary, so the controller (*John* or *he*) refers to a subset of the set designated by

PRO. Just as before, implicative and aspectual verbs (examples (18a-20a) below) fail to control the PRO subject of a contextually collective predicate. PC-verbs of control (examples (18-20 b, c)) are not subject to this restriction.

(18) a. *Mary asked John if he *dared* [PRO to dance together at the party].
b. Mary asked John if he planned [PRO to dance together at the party].
c. John said that Mary wasn't certain whether to dance together at the party.
(19) a. *Mary learned that John *condescended* [PRO to fight together].
b. Mary learned that John was ready [PRO to fight together].
c. Mary learned that John didn't know [whom PRO to fight together].
(20) a. * John told Mary that he *was able* [PRO to win the game together].
b. John told Mary that he *was eager* [PRO to win the game together].
c. John told Mary that he *found out* [PRO how to win the game together].

This set of data establishes a clear contrast between (implicative) EC-verbs, and (desiderative and interrogative) PC verbs. As shown by the example below, propositional and factive verbs (21) are also PC verbs:

(21) a. Mary said that John *regretted* [PRO working together on the presentation].
b. The chair *hated* [PRO gathering without a concrete agenda].

The discussion so far has set off EC constructions from PC ones. Before proposing an explanation of this contrast and ascertaining its theoretical import, one important qualification is in order: PC induces *semantic* plurality on PRO, not *syntactic* plurality. The contrast between semantic and syntactic plurality is visible in many places that have nothing to do with Control Theory. Thus the subject of collective predicates must be *semantically plural*, but may *be syntactically singular or plural*, as shown in the examples below. Semantic plurality is an inherent property of nouns or verbs, while syntactic plurality is the result of a combination between two morphemes: Noun + s. Syntactic plurality entails semantic plurality, *but not the other way round*:

(22) The committee/ *The student/ The students gathered.
The crowd / *The demonstrator /The demonstrators scattered.

Certain expressions may require syntactic plurality in order to be licensed. Such is the case of plural reflexive anaphors and reciprocal anaphors in American English; similarly floating quantifiers (*each, all, both*), or plural predicative nouns require subjects which are syntactically plural.

(23) a. I saw the committee gathering/disappearing.
b. I approve of the population acting together against the new regulations.
(24) a. *The government cleared themselves / each other of any responsibility. (AE)
b. *The class each submitted a different paper.
c. * I consider the delegation (to be) idiots. (AE)

Considering only those dialects of English where the distinction between semantic and syntactic plurality is robust, there is good evidence that the plurality of PRO in PC contexts is semantic, not syntactic, since elements which require syntactic plurality (listed above) are not licensed when the controller is syntactically singular. In PC cases, PRO always inherits the syntactic number of the controller, but semantically it may have plural interpretation including the controller in its reference. Examine the examples below containing the verb *prefer*, a PC verb of subject control. The controller (he_1) in (25) is merely included in the reference of PRO_{1+}. The referent of PRO_{1+} is semantically plural and this *is* enough to license a reciprocal predicate like *meet* in (25a), but it *is not* enough to license the

reciprocal anaphor *each other* in (25b), because *each other* requires syntactic plurality, *they* in (24c). The contrast between semantic and syntactic plurality is obvious in (26) as well. The adverb *together* requires merely semantic plurality, while *become members of* requires syntactic plurality.

(25) a. $John_1$ told Mary that he_1 preferred [PRO_{1+} to meet at 6 today.
b. *John1 told Mary that he1 preferred [PRO_{1+} to meet each other at 6 today.
c. John told Mary that $they_{1+}$ agreed [PRO_{1+} to meet each other at six today].

(26) a. John told Mary that he_1 didn't know which club[PRO_{1+} to join together].
b. *John told Mary that he_1 didn't know which club [PRO_{1+} to become members of.

Given these data, one may conclude that in a PC construction with a controller in the singular, the embedded predicate can be lexically collective or contain *together*, but cannot be inflected for plural, or contain a non-singular anaphors (i.e., a plural reflexive pronoun or a reciprocal anaphor). One may state the following generalisation on partial control.

(27) **The PC Generalization**
Syntactic number, person and gender on PRO in (tensed) infinitival complements are inherited from the controller, but semantic number is not. PRO in PC contexts is essentially a group name, being semantically plural, but syntactically singular.

Statement (27) is a genuine generalisation about partial control. It only applies when the controller is in the singular; there is nothing intrinsic to the semantics of PC complements that makes them incompatible with a plural PRO, licensed by a plural controller, as shown by the examples below:

(28) a. *John and Mary* preferred [PRO to meet *each other* at 6 today].
b. *John and Mary* regretted [PRO having talked about *themselves*].
c. *We* hoped [PRO to become *members* of that club].

Landau (1999) proposes that the distinction EC/PC verbs, which regards control properties correlates with a semantic property differentiating the two verb classes and already noted above. EC complements are untensed, PC complements are tensed.

(29) PC complements are tensed; EC complements are untensed.

2.2. ***The properties of Partial Control.*** PC shows the three properties in a-c below, which were found to characterize OC in contrast with NOC

(30) Properties of PC:
a. *Arbitrary control* is impossible.
b. *Long-Distance Control* is impossible.
c. *Strict reading of PRO* is impossible.

Let us give evidence supporting properties a-c.

a. *Arbitrary control is impossible*. Consider sentence (31), containing the desiderative verb *want*. In (31a), this verb is compatible with PC, as shown by the possibility for its singular subject *John* to control the semantically plural subject PRO of the collective predicate *go there together*. Yet, *want* disallows an arbitrary interpretation of PRO (of the type *John wanted that everybody should be quiet*), as shown by the ungrammaticality of (31b). The interrogative verb

guess in (32) shows the same behaviour, that is, *John* must be included in the reference of PRO. In sum, PC contexts disallow arbitrary control.

(31) a. * John$_1$ wanted [PRO$_{arb}$ to be quiet]
b. John$_1$ wanted [PRO$_{1+}$ to go there together]
(32) a. *John guessed [where PRO$_{arb}$ not to smoke].
b'. John$_1$ guessed [PRO$_{1+}$ to go together].

b. *Long-distance control* is equally impossible with PC verbs. *Hope* is a desiderative verb, which allows PC, but does not allow LD control, as shown in (33). Sentence (33a) illustrates PC. The singular controller *Mary* is sufficient to license PRO with collective interpretation. However, *hope* disallows LD control: example (33b), which involves coreference between a remote controller, *Mary* and PRO, skipping a more local controller, *John*, i.e., LD control is ungrammatical.

(33) a. John$_1$ told Mary that he$_1$ hoped [PRO$_{1+}$ to meet at 2 tomorrow.
b. *$Mary_1$ knew that *John* hoped [PRO$_1$ to perjure herself].

c. *Strict reading of PRO* (under ellipsis) is impossible. Only sloppy readings are available. In (34a), the only interpretation is that Bill prefers that he himself should leave early. Thre is no reading meaning that Bill prefers for John to leave early. Thus the PRO in the gap is coreferential with *Bill*, and is not identical with the PRO in the first conjunct, which is coreferential with *John*. Sentence (34a) is an example of sloppy reading. Each PRO is controlled by its local matrix subject, as shown in (34a'). The same is true about (34c,c''). Re-constructions where the second PRO is controlled by the more distant antecedent in the first conjunct are not possible.

(34) a. John$_1$ preferred [PRO$_{1+}$ to leave early] and Bill did too.
a'. John$_1$ preferred [PRO$_{1+}$ to leave early] and Bill$_2$ preferred [PRO$_{2+}$ to leave early] too.
b. Only Bill1 wondered [whom PRO$_{1+}$ to invite]
c. John$_1$ remembered when [PRO$_{1+}$ to meet] and Bill did, too.
c' John$_1$ remembered when [PRO$_{1+}$ to meet] and Bill$_2$ remembered when [PRO$_{12}$ to leave] too.

The facts presented in (30a-c) confirm the hypothesis that PC is a variety of OC, since it shares the basic properties of OC: lack of arbitrary control, locality of the control, no strict readings under ellipsis.

Conclusions on Partial Control

1. PC and EC are varieties of OC. There is a clear empirical difference between EC and PC.
2. PC allows the controller to be a proper subpart of PRO, i.e., to be referentially included in PRO.
3. In PC cases, PRO inherits the syntactic number of the antecedent, but may be semantically plural.
4. EC, which requires identity of PRO and the controller, is the strongest form of control.

3. Split control

PC should not be mixed up with the different phenomenon of *split control*. The characteristic property of PC is that a *semantically singular DP* may control a collective PRO. Only one controller is overt, and the effect is semantic plurality, not syntactic plurality. This leads to the impossibility of licensing in PC contexts the class of expressions which require syntactically plural subjects, such as plural anaphors (*themselves, each other),* floating quantifiers *(all, both, each),* plural predicatives, etc.

(35) a. John told Mary that he_1 didn't know which club[PRO_{1+} to join together].
b. *John told Mary that he_1 didn't know which club [PRO_{1+} to become members of.

Another important feature is that PC is obligatory control, therefore, the unique singular controller and PRO are clause mates.

Split control is a variety of NOC. There are *two overt controllers* in different syntactic positions, as in (36), (37), and they need not be in the same clause as the infinitive complement. The effect of split control is not only semantic, but also syntactic plurality. Consequently, split controllers may license syntactic anaphors. Consider examples like (37) below. The controller is represented by two distinct DPs (*Mary, John*) in two distinct syntactic positions. Moreover, neither controller is a clause mate of PRO so these are examples of NOC. Syntactically plural anaphors are licensed in this case.

(36) John agreed with Bill [PRO kiss Mary].
(37) a. *Mary* thought that *John* said that [PRO helping *each other*] is crucial.
b. *Mary* realised that *John* too considered the possibility of [PRO applying *both* to the same job].
c. *Mary* made it clear *to John* that [PRO to become *members* of the new club] is no simple matter.

With split control, two (higher) arguments jointly control a plural PRO. Split control is thus a variety of non-obligatory control, differing from partial control.

4. More on arbitrary control

The term arbitrary control has sometimes been used more loosely, to designate any situation where PRO does not have an obligatory controller. Arbitrary control simply designated situations where PRO behaved as a BT pronoun: PRO was said "to refer and co-refer freely", (cf. Manzini (1983). It could have arbitrary generic indefinite reference, where no controller was available, or it could pick up an antecedent in the discourse.

Landau (1999) proposes a more rigorous use of the tern "arbitrary control", claiming that truly arbitrary control should never be related to any grammatical antecedent. Arbitrary readings are always indefinite generic readings, where PRO is the equivalent of ONE. Thus, in the examples below, the subject DP is a pronoun in the infinitive clause, so that PRO must have arbitrary interpretation.

(38) a. $John_i$ thought that it was wrong [PRO_{arb} to introduce him_i to the dean].
b. Sue_i said that [PRO_{arb} to buy her $_i$ nothing in Rome] would be unacceptable.

In this context it is worth discussing the interpretation of PRO in interrogative complements since it has often been believed that in such complements PRO behaves like a BT pronoun, that is, it refers and co-refers freely, picking up some controller or having generic indefinite reference.

The counter-argument to this proposal is that an indefinite generic reading is excluded in object clauses, even in contexts where the CP projection is filled by an interrogative word, "protecting PRO" from the influence of a main clause controller. Thus, in (39) PRO cannot be understood generically, but must be bound by the main clause subject.

(39) a *John guessed [where PRO_{arb} not to smoke].
b. John guessed [where PRO_{1+} to go together].

The claim that PRO in object interrogative complements is an instance of OC is the only that explains the Principle B effects in (40) below. When (at least) partial coreference between PRO and the matrix subject is excluded by the context, the sentence becomes ungrammatical. Thus in (40) below, the matrix DP is co-indexed with a pronoun in the infinitive clause and is not intended as a controller of PRO, so that the only interpretation for PRO is the arbitrary reading. But this is not possible in examples like (40) where the infinitive clause and a potential controller are clause mates. Thus interrogative complements exhibit obligatory control whenever the infinitive is in object position.

(40) a.*$John_1$ wondered [who PRO_{arb} to intorduce him_1 to].
b. *We_1 contemplated [how PRO_{arb} to promote us_1].
c. *Sue_1 asked [what PRO_{arb} to buy her_1 in Rome].

Notice that no semantic anomaly is involved in (40). Once the complements are made finite and PRO is replaced by the indefinite pronoun *one*, corresponding to the arbitrary reading of PRO, the pronominal coreference in (41) is fine:

(41) a. $John_1$ wondered who one should introduce him_1 to.
b. We_1 contemplated [how one should promote us_1.
c. Sue_1 asked [what one should buy her_1 in Rome].

In conclusion, PRO in object interrogative clauses must *always include a matrix controller*. The intuition that control is more flexible in interrogative complements than in some declarative infinitive complements is probably the effect of PC control as opposed to EC.

5. Implicit control

The term implicit control, designates situations where the controller is a non-overt argument of the main clause. The controller is local, but it is not syntactically expressed. Consider examples (42). At first sight, they might be taken to represent genuine cases of arbitrary control in object interrogative infinitival clauses:

(42) a. $John_1$ said [where PRO to leave him_1 a message].
b. It is unclear [what PRO to do with him].
c. Mary asked [what PRO to do with him].

However, an alternative analysis is available: Such examples may be viewed as cases of local control by implicit arguments, as apparent in the paraphrases below.

(43) a. $John_1$ said to-x [where PROx+ to leave him_1 a message].
b. It is unclear to-x [what PRO x+ to do with him]
c. Mary was asked by-x [what PROx+ to do with him].

Such instances represent a distinct control configuration: *implicit control*: the controller is not syntactically expressed. Implicit control is a species of non-obligatory control.

Several typical configurations of implicit control have been discussed in the literature. One of them is control by an implicit Benefactive argument, often with adjectival predicates. (cf. Kimball (1971)). The parallelism between the implicit and the overt Benefactive below should be obvious. Notice also that the overt controller in examples like (44) is not a clause-mate of the infinitive. This shows that implicit control is a species of NOC.

(44) a) Jones said that it was necessary to promote himself.
a) Jones said that it was necessary for Jones [PRO to promote himself].

Furthermore a closer benefactive prevents control by a more remote one (Koster (1984)):

(45) a. $Mary_1$ said it was difficult [PRO_1 to take another topic]
b. Mary said that it was difficult for $John_1$ [PRO_1 to take another topic]

Implicit Goal arguments are also possible with a couple of verbs of communication: *say, shout, signal, order*.

(46) a. John said (to Mary [PRO to listen to him].
b. Louise gestured / said/ signalled (to Tom) [PRO to follow her].
c. Mary knew it had been recommended (to her) [PRO to behave herself in public]].
d. Mary knew it had been prohibited (to her) [PRO to behave herself in public]].
e. Bill knew she had said [PRO to behave himself].

Finally, a frequent form of implicit control is control by an implicit Agent. This is often the case the case with impersonal passives:

(47) a. It was decided [PRO to leave]
b. It was concluded (by the committee) [PRO to cancel the next meeting]

Implicit Agents control may also control into adjunct clauses (manner, time clauses, possibly rationale clauses (for a discussion of rationale clauses see, Roberts (1987), Clark (1990) and Landau (1999):

(48) a. The game was played wearing no shoes.
b. The president was elected without considering his competence.
c. The boat was sunk [PRO to collect the insurance].

6. Control Shift

The phenomenon of control shift was associated with the discussion of verbs of obligatory control, which were supposed to have a fixed argument designated as obligatory controller, either the Agent or the Goal. Whereas in "normal" circumstances the controller of PRO is fixed either as the Agent or the Goal, in "special circumstances", usually related to the passivization of the infinitive clause, control shifts to the other argument. Here are a few characteristic examples. *Promise,* a verb of subject control, appears with an IO controller in (49b), *persuade,* a verb of DO control, appears with a subject controller in (49d):

(49) a. Grandpa$_1$ promised the children [PRO$_1$ to take them to the zoo].
b. Grandpa promised the children$_2$ [PRO$_2$ to be allowed to leave early].
c. Susie persuaded the teacher [PRO to leave earlier].
d. Susie persuaded the teacher [PRO to be allowed to leave earlier].

Different verbs tolerate control shift to different degrees. This phenomenon is probably related to the fact that there are many verbs which allow more than one controller: *ask*, *shout, signal*, *agree*, etc.:

(50) a. The parked police car signalled (to) the oncoming motorist$_2$ [PRO$_2$ to turn left].
b. The speeding car$_1$ signalled (to) the startled pedestrian [PRO$_1$ to turn left].
c. The pupil$_1$ asked the teacher [PRO$_1$ to leave early].
d. The guard asked the prisoner$_2$ [PRO$_2$ to leave the room].

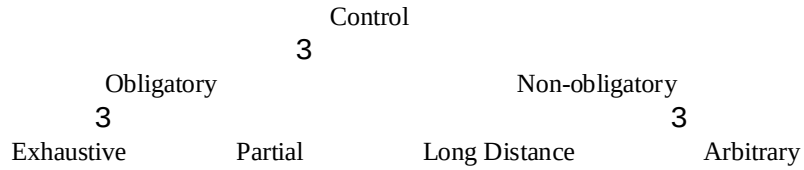
The possibility of control shift thus depends on the semantics of the matrix verb, the semantics of the embedded event, pragmatic information (knowledge of authority relations, as in (50c, d), dialect factors. Control shift clearly represents a semantic aspect of control.

Conclusions on the typology of control phenomena.

1.The discussion so far has allowed us to distinguish between the following types of control:

a) Obligatory control (OC): The controller and the infinitive are clause-mates.
b) Exhaustive Control (EC) PRO must be identical to the controller.
c) Partial Control (PC) PRO must include the controller.
d) Split Control: Two (matrix) arguments jointly control a plural PRO.
e) Non-Obligatory Control (NOC): The infinitive need not have a clause-mate controller.
f) Long-Distance Control: The controller and the infinitive clause are not clause-mates.
g) Arbitrary Control: PRO has no argumental controller.
h) Implicit Control: The controller is not syntactically expressed.

2.The relations between these situations are shown below.



In the following sections an account will be given of the difference between OC/ NOC and EC/PC, relating the interpretation of PRO to other syntactic properties of the configurations where PRO appears.

B. AN ANALYSIS OF CONTROL

1. Previous accounts

GB accounts of control presented the interpretation of PRO as an extension of BT. Obligatory control was assimilated to *anaphoric* binding (Condition A). The unique, obligatory relation between PRO and its controller was described on the model of the relation between a syntactic anaphor and its antecedent. Anaphoric PRO was supposed to be bound in a local domain (the domain governing category of Manzini (1983), Chomsky (1986)). In contexts of optional control, PRO was described as a *BT pronoun*, which could pick up an antecedent and was assigned arbitrary interpretation otherwise.

In the MP, there are several accounts of PRO, formalising its relation to the controller in terms of Move or in terms of Agree.

a) Thus, Martin (1996) continues to interpret PRO as an anaphor. Following Chomsky's suggestion that clitic anaphors raise to I^0 to check their features, Martin specifically interprets PRO as the counterpart of the Romance anaphoric clitic SE. In his system OC involves clitic climbing of PRO to the controller, resulting in "chain fusion". As a result PRO acquires reference.

a) In insightful work, Hornstien (1999) analyses control as a case of *DP movement*. Hornstein proposes a modification in the GB theory of chains. While previously a chain was allowed to contain one Case position and one θ- position, Hornstein assumes that the same DP initially projected in the lower infinitival clause raises to the next θ- position of the main clause and finally to the case position of the main clause. A sentence like (1a) below rests on a chain of the type (DP_{Agent}, t_{Agent}), which contains two θ-positions.

(1) a. He_{agent} tried [t_{agent} to arrive in time].
b. He $_{agent}$ seemed [t_{agent} to arrive in time].

The difference between subject-to- subject raising chains in (1b) and control chains is merely that, in the latter, the chain contains tow θ-positions, while in the raising chains, the chain contains only one θ-role.

c) A related well-known minimalist analysis is proposed by Manzini & Roussau (1998). The theoretical innovation is to regard θ-roles as features on the verb. These features are checked by DPs in appropriate positions. The same DP, the controller, projected only in the main clause will check both the role feature of the lower verb and the role feature of the main verb in examples like (1a).

1.2. ***On the semantic interpretation of control clauses***. Significant arguments against the movement analyses mentioned above come from the phenomenon of PC, where the control chain clearly cannot contain identical copies of one and the same DP, and more than checking two θ-features is involved.

As known, environments that force PC are those that involve collective predicates, i.e., predicates incompatible with a semantically singular subject (see examples (2)). The possibility of examples (3) means that PRO is semantically plural, even though its antecedent is semantically singular.

(2) a. *John met at 6.
b. *The chair gathered during the strike.
c. * Mary applied together for the grant.
(3) a. John wanted [PRO to meet at 6].
b. The chair was afraid [PRO to gather during the strike].
c. Mary wondered whether [PRO to apply together for the grant].

Most control verbs are PC verbs, and only a small minority are EC verbs. PC is thus not an exotic peculiarity but an option widely available, even if not widely instantiated. The

phenomenon of PC provides robust evidence that PRO should be projected as an argument DP, and, moreover, that the PRO-DP is semantically a *term*, since neither its referential index nor its semantic type match that of the controller.

Therefore, given the data, PRO is at least sometimes a *term*, rather than a variable. This empirical discovery is surprising in light of the many semantic studies arguing that PRO is a λ-bound variable. A long semantic tradition (going back at least to Menzel (1975)) regards VPs, and thus subjectless infinitives and/or PRO-TO clauses as expressing properties, and as being semantic predicates. The property expressed by PRO-TO is ultimately attributed to the controller as the subject of predication. PRO would be a mere variable, bound by the lambda operator which forms the property. A sentence like (4) was analysed by saying that the property of 'trying to get the job' was attributed to the subject *John*.

(4) a. John tried [PRO to get that job].
b. John (λx. x tried x to get that job).

However, PC sentences provide examples which are not amenable to this treatment. In PC situations, PRO is not semantically equivalent to the controller, so the property expressed by the infinitive must be attributed to the referent of PRO, different from the referent of the controller. If PRO is a referential term, then the PRO-TO clause expresses a proposition rather than a property. What happens is that in a chain of type [DP_1...PRO_1+ …], the controller and PRO have distinct denotations: they do not share the referential index and their semantic type is also different: the controller may be an individual level variable/term, while PRO may stand for a group variable/term, adequate to be the subject of a collective predicate. Examples like (3) above cannot be analysed on the model of (4). The argument is quite simple. In the semantic tradition, controlled complement infinitivals are treated as properties rather than propositions, with PRO construed as a lambda variable. Suppose we applied this analysis to example (5a). This will yield the compound property in (5c):

(5) a. John wanted [PRO to meet at 6].
b. meet at 6(x)
c. λx. x want x to meet at 6

However, quite clearly, (5c) is semantically ill formed. The same individual variable x, cannot stand for both the subject of *want* (individual level) and the subject of *meet* (group level). PRO in the subordinate clause must be viewed as a referential expression, rather than as a variable. The infinitive clause expresses a *proposition* rather than a property.

The analysis of Manzini & Roussou (1998), or Hornstein (1999) which completely dispense with PRO are incapable of expressing any control relation other than identity (i.e., EC) and rely on the formation of complex predicates attributed to the controller, on the model of (4).

Furthermore, the unification of raising and control chains, which seemed to be an advantage for analyses like Hornstein's is empirically undesirable since PC effects never occur in raising constructions, undermining Hornstein's reduction of OC to raising:

(6) a. * John is likely to meet tomorrow.
b. * The chair appeared to be gathering once a week.
c. The chair claimed to be gathering once a week.

The contrast between (6a, b) and (6c) cannot be related to the semantic type of the infinitive, which is propositional throughout. Rather, it is the control versus raising distinction which is crucial here.

The existence of PC is in itself an argument for projecting PRO, as well as for the propositional analysis at least some control constructions.

Conclusions

a. Complement control cannot always be reduced to predication or variable binding.
b. PRO exists, and it is not always a variable, but it may be a term.
c. PRO-TO constructions at least sometimes have propositional interpretation, for instance in PC contexts.

2. An AGREE theory of Control

2.1. The theory in a nutshell. We prefer to analyse control in terms of Agree, following Chomsky (1998) and Landau (1999). Landau's analysis relies on the classic insight that OC PRO is (like) a syntactically licensed anaphor. PRO is endowed with anaphoric φ-features, which must be "externally" checked by the controller. PRO agrees with its controller DP in φ-features and can thus pick up a referential index from the controller.

The features of the controller are "transmitted" to PRO, not by means of chain formation, but through a number of derivationally possible Agree relations. The controller DP transmits its features to the functional head (F^0) that checks its Case. This functional head F^0 subsequently also agrees with PRO, directly, or through the intercession of the anaphoric Agr features of the infinitive inflection. As already discussed, in control constructions the infinitive I^0 has Tense with anaphoric Agr(eement) features, which must be licensed by external checking. An interesting idea in Landau's analysis is precisely that the relation between PRO and the controller may be mediated by the *anaphoric Agr of the infinitive complement*. Remember that PRO is Case licensed in situ by the infinitive inflection and does not move out of the SpecVP position. The proposal is that the features of the infinitive inflection, indirectly checked by the antecedent may be passed on to PRO, since PRO in Spec VP agrees with the infinitive inflection (case-checking), as already explained.

2.2. ***Towards a formal account.*** An adequate analysis of OC must offer an account of EC and PC, starting from the empirical differences between them: a) PC complements are tensed, EC complements are not tensed; b) in EC complements PRO inherits all the features of the controller, *including semantic number*; c) in PC complements PRO *does not inherit the semantic number of the controller*, and this allows the partial control effect.

Therefore, an adequate account needs to syntactically articulate these three major distinctions: exhaustive / partial control, tensed / untensed infinitives and syntactic / semantic number. The explanation should guarantee that some special property of semantic number renders it 'invisible' to the mechanism of partial control, so as to allow for the mismatch between the controller and PRO on PC cases. This option should be made available only in the presence of contentful tense.

Landau (1999) hypothesizes that the relevant feature of semantic number is that it is not a φ feature, i.e., not a formal syntactic feature.

Briefly, the difference between EC and PC is that in the case of EC, PRO directly agrees with the controller DP, or, as can be seen in (16), with the functional head F^0 that Case licenses and agrees with the controller DP. As a result, PRO inherits *all* the features of the controller, semantic number included. PRO is then identical to the controller. (the EC effect). Since the complement is untensed, the infinitive inflection remains in situ, and plays no part in the

mechanism of control. It does not go up to C^0, since C^0 is empty. The EC configuration looks like in (7) below, and the active Agree relations are as indicated

(7) a. [...F..DP...[$_{CP}$[$_{IP}$ T-Agr [$_{VP}$ PRO...]]]] Exhaustive Control
T-Agr agrees with PRO (Agree1)
F agrees with DP (Agree2)
F agrees with PRO (Agree3)

In PC control cases, the relation between PRO and the controller is mediated by the infinitive inflection. As before, the infinitive inflection agrees with PRO regarding its φ features and checks its null Case. (Agree1) Also, as before, the controller agrees with the functional Case head F^0, passing to it all its features (including semantic number). This is the Agree2 relation.

PC complements are tensed and tensed CPs have an unchecked uninterpretable feature in C^0. This feature requires checking by the lower tense feature in I^0, by the mechanism of T-to C. Therefore, the [+Tense] infinitive inflection raises to C^0 to check tense. It is in this left edge position that the infinitive inflection is visible for the matrix clause elements and will be attracted to the functional head F^0 that has licensed the controller.

But it is only the φ-features of the controller that can be checked through this mechanism. Even if semantic number were passed to the infinitive inflection, it would have no way of reaching PRO in Spec VP, which has already been passed in the derivation. Consequently PRO acquires semantic number contextually, by semantic-pragmatic mechanisms, so its semantic number may be plural, even with a singular antecedent; (the PC effect). The configuration of PC looks like in (8) where the Agree relations have also been indicated.

(8) [...F…DP...[$_{CP}$ T-Agr [$_{IP}$ t $_{T\text{-}Agr}$ [$_{VP}$ PRO...]]]] Partial Control
t $_{T\text{-}Agr}$ agrees with PRO (Agree1)
F agrees with DP (Agree2)
F agrees with T-Agr (Agree 3)

2.3. More technically the analysis relies on the following concepts and ideas.

(9) **Agree** - Agree is a relation between two lexical items, triggered by uninterpretable features. Agree (α, β) is established between a *probe* α and a *goal* β in the domain (= sister) of α in virtue of some uninterpetable feature of α and some feature of β that make β visible or active, and that match the features of α.
Interpretable features of heads persist until the end of the phase (cycle) and may enter more than one checking relation.

(10) **Move** The operation Move consists of Agree (α, β), generalized pied which piping determines the size of the phrase P(β) to be moved and Merge (P(β), αP)), where P(β) is normally merged as the specifier of α.

(11) **Phase** The phase is the smallest containing *v*P or CP. Chomsky (1998) allows checked uninterpretable features to remain undeleted, and accessible until the end of the phase. This formulation is designed to reconcile the tension between the need to make those features accessible to spell-out after checking, and at the same time guarantee that they are invisible to later cycles as well as at LF.

(12) **(Modified) Phase Impenetrability Condition**
In a structure [...X…[$_{YP}$...Z...], where YP is the only phase boundary between X and Z, Z is visible to X:
i) only at the head or edge of YP, if Z is uninterpretable.
ii) anywhere in the YP phase, if Z is interpretable.

(13) **Characterisation of PRO**

PRO has φ features which it freely picks up when it enters the derivation, but which are *anaphoric* because they need to be checked against the features of the controller, by co-indexing (that is by external identification). The features of PRO are *interpretable.*

It will be hypothesized that semantic number of PRO is either provided by agreement with the controller or by the semantic pragmatic context. The first option is utilised in EC, the second option is utilised in PC. In sum, PRO enters the derivation with valued anaphoric φ-features but no semantic number. It can acquire semantic number by agreement with a lexical noun, or by context.

(14) **Functional heads** enter the derivation with unvalued φ-features. These features are uninterpretable for functional heads. Functional heads can acquire semantic number only by agreement.

(15) **T-to C.** In tensed clauses, C contains an uninterpretable T feature. The *u*T feature is checked by T to C, i.e. the raising of T to C. As amply discussed in the analysis of *that* complements, the existence of T to C in English is supported by Inversion in questions and *If* clauses, where a tensed auxiliary occupies the C head. Given the principles of Greed and Last Resort, T-to-C does not take place in untensed clauses. Since PC complements but not EC complements are tensed, T to C applies in PC complements, but not in EC complements.

Since there is no independent AgrP projection in English PRO-TO clauses, φ-features are located on T-Agr, so Agr reaches C as a free rider. *The basic insight in the present analysis of control is that the relation between PRO and the controller is mediated by the anaphoric Agr of the infinitive complement, just in case there is T to C, i.e., in PC complements.*

2.4. ***Exhaustive Control.*** We want to describe Obligatory Control in these terms, retaining the intuition that OC-PRO establishes an anaphoric relation with the controller, and expressing this relation in terms of Agree.

The essential idea is that the relation between the controller and PRO is mediated by the functional head F^0 which case-licenses PRO. This F^0 head has uninterpretable φ-features, which function as an attractor (as a probe). The F^0 head will function as a probe for both the controller and PRO, thus connecting them. In the case of subject control, the F^0 probe is T, because T is the functional head that checks the case of the subject and agrees with the subject. In the case of object control, the probe is some AgrO head or some other head which is assumed to case-check the object, and which thus agrees with the object (see next chapter). For Dative and oblique controllers, Landau assumes that they too are licensed as specifiers of suitable functional heads; (e.g. the AgrIO head proposed by Koizumi (1995), the Asp heads of Borer (1998) or any other analogue).

All we need is that every matrix argument DP should be associated with some functional head that agrees with the DP in φ-features, and checks its case.

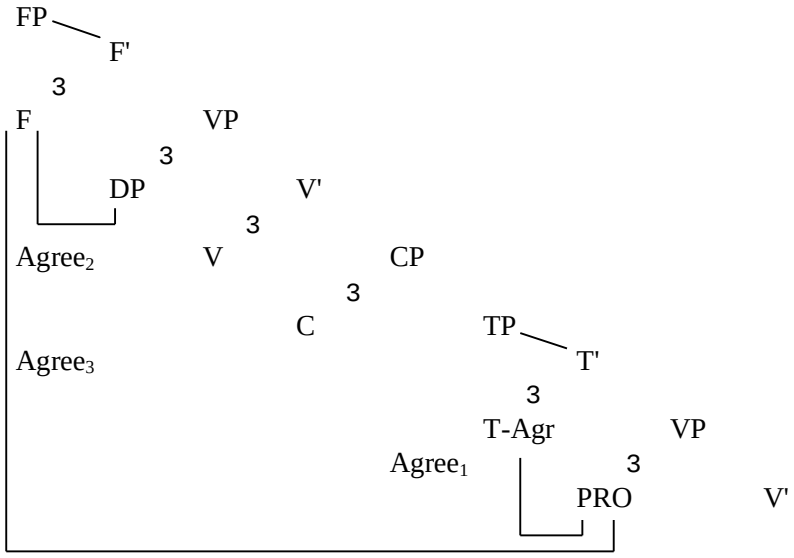
The F^0 head which acquire the φ-features of the controller is thus the *probe* (attractor) in the control relation. As to the *goal* of Agree in OC, this is either PRO, for EC, or the infinitival Agr, for PC, both made "active" precisely because of their anaphoric nature.

The traditional intuition that PRO in OC is anaphoric is reconstructed by taking this property to constitute its visibility as a goal for Agree. This property may be extended to infinitival Agr, which is endowed with anaphoric φ-features as well.

An illustration of EC.

A configuration of EC is represented in (16), where F stands for either T, AgrO, or some oblique functional head. The relation between PRO and its controller is achieved by a number of Agree described below:

(16) Exhaustive Control



Agree1 (T-Agr, PRO) matches the φ-features of the infinitival Agr and PRO; PRO stays in situ checking null case. Crucially this operation cannot involve semantic number, since neither PRO nor Agr has this feature at this stage. Given that EC complements are untensed, T-Agr remains in situ, since the infinitive has no tense feature to check by raising to C. Moreover, since the φ features of T-Agr are uninterpretable, and since they are not at the head or the edge of the infinitival phase, T-Agr is invisible for the elements in the higher clause and cannot be activated as goal.

Agree2 (F, DP) matches the features of the controller DP against F, the case-licensing head. The head F inherits the φ-features, as well as the semantic number of the controller DP. We will assume that even though the uninterpretable features of F have been checked by the controller, they do not erase until the end of the main clause phase. This opens the possibility of using the functional head in a further Agree relation, Agree 3.

Agree3 (F, PRO) matches *all* the φ-features of F and PRO and crucially, also assigns PRO semantic number. As a result, PRO agrees with the controller in semantic number in cases of EC. As already stressed, PRO can be activated by F because of its anaphoric nature. Moreover, even if it is in the lower sentence, PRO is visible for Agree because it has *interpretable features*, unlike T-Agr. According to the modified PIC in (12) above, an element in a higher phase may interact with an element in a lower phase, provided that the latter has interpretable features. The functional head F mediates co-indexing between the controller and PRO, by virtue of establishing Agree relations with both.

In EC control, the interpretative component effectively interprets PRO as a variable bound by the controller, although, strictly speaking, neither a chain, nor a binding-theoretic relation is established between the two.

Remark. One problem may be that of the (il)legitimate nature of Agree 3, the relation between PRO and the functional head F which in turns agrees with the controller. Since PRO remains in situ, it is not a left edge element and it is in a different cycle (phase) from the head F in the main clause. Actually the highest element in this configuration is I^0. The Agree relation ought to be barred by the PIC. There are at least two solutions to this problem.

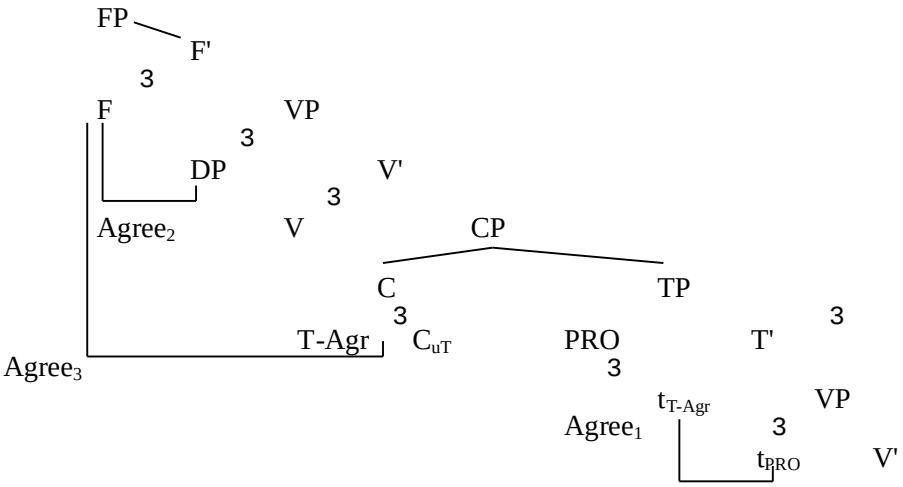
a) One solution, sketched above, is to refer to the difference between the uninterpretable features of the infinitive inflection in contrast with the interpretable features of PRO. As stipulated in Landau's modified PIC an element external to a phase may interact with an element in the lower phase, provided that the latter has interpretable features. Obviously, in this case Agree3 is licit.

b) A different, perhaps better, solution is also available. We will maintain Chomsky's formulation of the PIC, claiming that an element in a higher phase can interact only with the head or the specifier of the projection which is on a lower phase, i.e. only clause i) of the modified PIC in (12) above. We propose to exploit the untensed nature of the infinitive clause in Exhaustive control constructions. In such case the C° head is radically empty, and we might as well not generate it. The infintive clause is merely an IP projection (similar proposals have often been made from Bouchard (1984) to Boskovič (1997)). In this case the infinitive clause is part of the same phase as the main clause, and this allows Agree3, with no problems, again giving priority to the interpretable features of PRO as a goal.

To conclude, in EC control, PRO agrees with the antecedent by Agreeing with the Functional head which agrees with the antecedent. All the features of the antecedent, including its semantic number are transmitted to PRO (the EC effect).

2.5. ***Partial Control.*** Consider now the representation of partial control. This time there is an uninterpretable T feature in C^0, which will have to be checked by T to C. This means that the infinitive inflection with its anaphoric Agr features will be at the edge of the infinitival phase, and capable of entering Agree relations on the next cycle, according to the PIC in (12). The connection between PRO and its antecedent is set up through the following licit Agree relations:

(17) Partial Control.



$Agree_1$ (T-Agr, PRO) matches the φ features of Agr and PRO, both of which still lack semantic number. The infinitive is tensed, so three is an uninterpretable T-feature (*u*T) in C. T-to C applies, to check this feature, carrying Agr along with it. Being at the head of the CP phase, T-Agr escapes the Phase Impenetrability Condition (cf. Chomsky 1998), which makes elements below the head of a phase invisible to operations from outside.

Next, $Agree_2$ (F, DP) applies as before, matching the features of the controller DP and F, which now inherits semantic number from it.

Agree3 targets T-Agr in C° as a goal, since T-Agr is the head of the lower CP and may interact with constituents on the next phase, according to the PIC. A relation between F and PRO is correctly blocked by the PIC in (12). The operation $Agree_3$ (F, T-Agr) matches the φ-features of F and T-Agr in C. By transitivity of agreement, PRO gets to match the controller in all φ-features. However, *semantic number which is not a* φ-feature, *cannot be transmitted to PRO*. The reason is simple: PRO can inherit from T-Agr all and only the features that were implicated in Agree1. Those features did not include semantic number. In a derivational system, a late operation cannot

overwrite an early one. PRO ends up inheriting all φ-features from the controller, except semantic number, which is assigned contextually. This is the partial control effect.

3. The distribution of OC and NOC

In this section we attempt to characterize the contexts where OC and NOC obtain. Informally, as already known, OC obtains when the infinitive and the controller are clause mates. NOC represented the e*lsewhere* case.

More formally, OC obtains when the infinitive is in its base position (VP- internal), while NOC obtains when the infinitive clause is displaced from the position where it was projected (i.e., it is VP external). The following OC generalisation describes obligatory control

(18) *The OC Generalisation*
In a configuration [... $DP_{1...}$Pred...[$_{CP/IP}$ PRO_1...]...] where DP controls PRO:
If, at LF, CP/IP occupies a complement / specifier position in the VP shell of Pred, then DP or its trace also occupies a complement/ specifier position in the VP shell, i.e. the controller is a co-argument of the infinitive clause.

The OC generalisation (18) leads to the classification of controller clauses in three types of positions: complement, intraposition (preverbal, spec T), extraposition.

a) An infinitival in a complement position of a predicate X satisfies (18) w.r.t. XP, hence it must be locally controlled within the minimal sentence containing XP. Object clauses in situ give rise to OC configurations, a result which is likely to be correct.

b) By contrast an infinitival in SpecT, (in preverbal "intraposition"), or higher, or extraposed is not contained in the maximal projection of its governing predicate; therefore it will be an example of NOC, allowing either arbitrary or LD control.

The position relevant for control is the LF or phase final one.

3.1. ***Subject clauses and control. The data.***

While object clauses always give rise to obligatory control, subject clauses present a varied picture, since they always move out of the SpecVP position. As known, under minimalist assumptions, traces of movement are full copies of the element moved, and the following principle regarding Chain interpretation is valid:

(19) **Chain Interpretation**
Any link in a chain may be the LF-visible link.

This means that a displaced constituent may in principle be interpreted in the derived higher position, or it may "reconstruct" to its lower position. *Reconstruction* is a situation where the higher copy is pronounced and the base copy is interpreted. Reconstruction usually affects A'-movement.

Subject clauses are in principle open to interpretation either in SpecVP, or in their derived position: the SpecT position (preverbal subject clauses) or the extraposed position. Both are out of the VP, so both represent configurations of NOC. There is however, a difference between the two positions.

SpecT position is an A-(rgument) position, and A-positions do not reconstruct. Constituents in A-positions are normally interpreted in situ. Subject clauses in SpecT will then be interpreted in their higher SpecT position.

Extraposition, on the other hand, is an A'-movement. A'-movement reconstructs. Therefore Extraposition yields two copies, base and extraposed, either of which may feed LF.

The base position of the infinitive clause is VP internal, interpretation in the base position gives rise to OC; the extraposed position is out of the VP, so interpretation of the subject clause in the extraposed position is an instance of NOC.

Given these differences between intraposition and extraposition, we expect and get differences in the possible control patterns.

Let us examine the behaviour of intraposed and extraposed subject clauses now. Clauses in Spec TP and extraposed clauses are external to the VP shells and engender optional control configurations. As known NOC is characterized by the possibility of LD control and arbitrary control.

1) That Su clauses allow arbitrary readings of PRO is easy to illustrate for both extraposed and intraposed clauses.

(20) [PRO $_{arb}$ to love one's neighbours] is a Christian duty.
It is a Christian duty [PRO$_{arb}$ to love one's neighbours].
(21) [PRO$_{arb}$ to err] is human, [PRO $_{arb}$ to forgive], divine.
It is human [PRO to err].

2) LD control, i.e., control of PRO by a DP/DPs which are not in the matrix clause was first noticed by Grinder (1970) in examples like (22), where the understood subject of the infinitive is coreferential with an DP which bears no unique relation with it, and can be indefinitely remote:

(22) a. Eric insisted that it would be ridiculous [PRO to call for help].
b. [That [PRO covering themselves with mud] disturbed Spiro] amused Dick.

Research on LD in infinitive subject clauses showed that LD control is sensitive to two factors:

a) First, LD is sensitive to the intraposed / extraposed position of the clause. Specifically, LD control is more constrained for extraposed clauses.

(23) a. Mary knew that [PRO to perjure himself / herself] would disturb John.
b. Mary knew that it disturbed John [PRO to perjure himself / * herself].

This contrast between intraposition and extraposition was already noticed by Grinder (1970).

(24) a. John said that making a fool of herself in public disturbed Sue.
b. John said that making a fool of himself in public disturbed Sue.
c. John said that it disturbed Sue to make a fool of herself in public.
d. *John$_1$ said that it disturbed *Sue* [PRO$_1$ to make a fool of himself in public].

Grinder's precise formulation of the constraint was that in Extraposition no DP could intervene between the intended controller and PRO. (The Intervention Constraint). Thus in (24), a closer controller, *Sue*, blocks control by the intended remote controller, *John*. Grinder's position went unchallenged until Manzini (1983), who produced the following example of LD control across an intervener in an extraposed subject clause.

(25) Mary knows that it would help Bill [PRO to behave herself in public].

b) This brings us to the second factor influencing LD control: the semantic nature of the matrix predicate. Specifically, only psychological predicates disallow LD control in "extraposed"

subject clauses. Thus LD control is ungrammatical with the psychological verb *disturb* in (26a), but fine with the public verb *damage* in (27a).

(26) a. Mary knew that it disturbed John [PRO to perjure himself / * herself].
b. Mary knew that it damaged John [PRO to perjure himself / herself].
(27) a. Mary knew that [PRO to perjure himself / herself] would disturb John.
b. Mary knew that [PRO to perjure himself / herself] would damage John.

In each sentence of (26), (27), there are two potential controllers for PRO - *John* or *Mary* - the first of which is contained in the clause immediately dominating the infinitive, the second of which is higher up. Long distance control is impossible only with psychological predicates, though not with public verbs.

However the contrast between psychological and non-psychological predicates is neutralised when the infinitive is in subject position (SpecT).

(28) a. Mary knew that it was painful to John [PRO to perjure himself / * herself.]
b. Mary knew that it was harmful to John [PRO to perjure himself / herself.]
c. Mary knew that [PRO to perjure himself/herself] would be painful to John.
d. Mary knew that [PRO to perjure himself/herself] would be harmful to John.
(29) a. Mary thought that it pleased John [PRO to speak his/ *her mind].
b. Mary thought that it helped John [PRO to speak his/ her mind].
c. Mary thought that [PRO to speak his / her mind] would please John.
d. Mary thought that [PRO to speak his / her mind] would help John.

In short, LD-control is susceptible to intervention only in extraposition, and only when the intervener bears an Experiencer role.

3.3. ***Subject clauses and control. The analysis.*** At first sight the contrast between the extraposed and the intraposed position is surprising since in both cases the clause appears to be out of the VP shell (in SpecT or VP adjoined), in a configuration of NOC. In fact, it can be shown that the exception to the generalisation that an extraposed clause exhibits NOC is only apparent. It can be shown that extraposed subject clauses of psychological predicates are locally controlled because they are *not* in fact *extraposed*, but find themselves inside the VP in a position of local control (= OC).

To understand the contrast between psychological and public predicates, we must consider certain principles concerning the projection of arguments. Also one should exploit the insight that psych verbs are unaccusative (Hoeckstra (1984), (Belletti & Rizzi, (1988)), i.e., the two arguments (the Experiencer (a DP) and the CAUSER (a proposition) are both internal arguments. Let us adopt, without further argument, the following principles of argument projections, deduced form the Thematic Hierarchy (cf. Grimshaw (1990), among many):

(30) Argument projection
a. EXPERIENCER is generated above CAUSER.
b. CAUSER is generated above GOAL / PATIENT / THEME

Consider first the structure of "extraposed" subject clauses with psychological predicates. In the representation below, the index 1 indicates local control, the index 2 indicates non-local control.

Representation (31a) corresponds to clauses like (29) above. In (31a) the infinitive clause is *in situ*, below the Experiencer direct object, according to (30a). Since the clause and the DO are inside the VP, the Direct Object is an obligatory controller. The clause is projected in final position and satisfies the requirement that clauses should be sentence final without undergoing

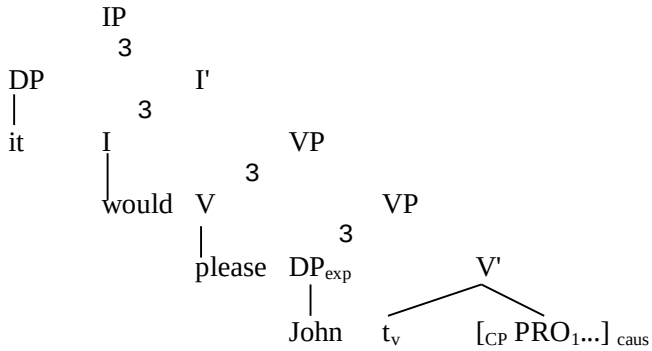
extraposition. The configuration in (31a) is one where the controller and the infinitive are clause-mates, therefore, this is a configuration of obligatory control. This explains the intervention effect with "extraposed" clauses of psychological predicates.

Sentence (32), represented in (32b) and involving non-local control is ungrammatical. The ungrammaticality of (32), with non-local control, follows from economy considerations: since the infinitive clause already is clause final, extraposition serves no purpose, a derivation involving extraposition as in (32b) would "have no effect at the output" and is consequently impossible.

Conclusion:

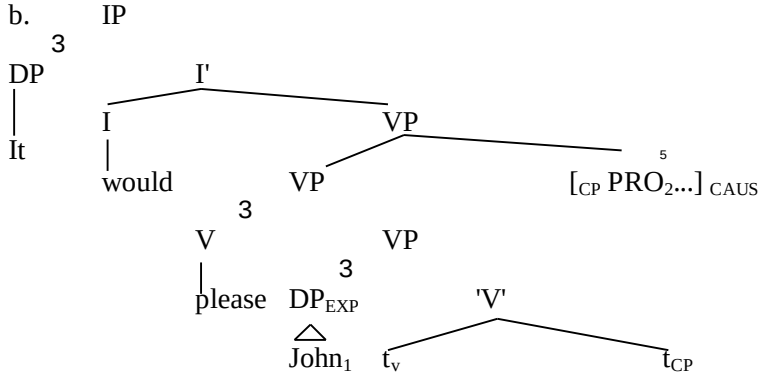
With psychological predicates, the infinitive clause is in fact in situ, inside the VP, the expletive *it* does not signal Extraposition. The configuration is one of obligatory control. The DO is the obligatory local controller.

(31) it would please John$_1$ [PRO$_1$...]



(32) a. Mary thought that it pleased John [PRO to speak *her mind].

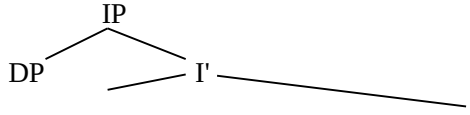
b.

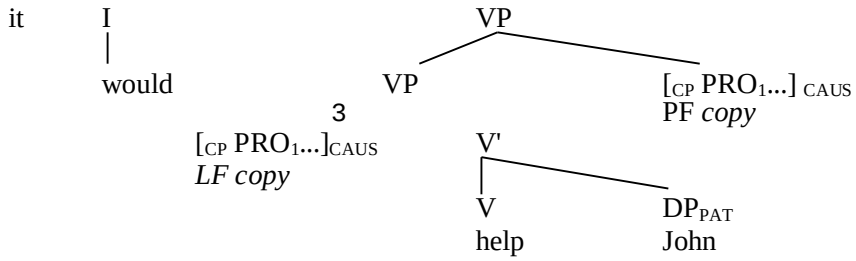


Next, consider extraposition with non-psychological predicates:

According to the projection principle in (30b), the infinitive CP is generated in Spec V, above the Direct Object, in a position which is not peripheral to the VP. Extraposition is forced by the need that clauses should be sentence final at PF, creating a chain in which each link may be interpreted at LF.

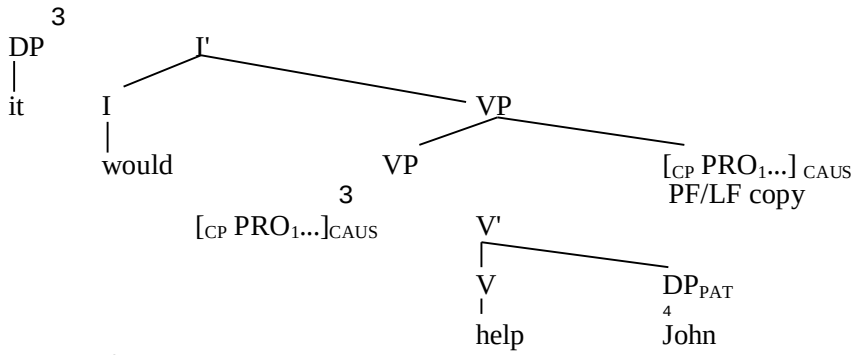
(33) a. It would help John$_1$ [PRO$_1$.....]





OC: Infinitive interpreted in situ

(33) b.



NOC: Infinitive interpreted extraposed

Extraposition reconstructs, so the base position is accessible at LF. If the base position is interpreted as in (33a), the CP is VP-internal at LF, and the Direct Object is an obligatory controller. Hence the local control interpretation in (28b), (29b) above.

If the extraposed position is interpreted in its peripheral position, as in (33b), the CP is VP external at LF, generating a configuration of NOC; hence the possibility of a non local controller in examples like (28b), (29b). The ambiguity of examples like (28b), (29b) is nicely explained by taking into account the different positions where the clause can be at LF.

Finally, consider the case of intraposition with both types of predicates: With either predicate the infinitive CP moves to SpecT, to satisfy the EPP of finite T. This is an instance of A-movement, and we may assume that unless special circumstances demand otherwise, it is the higher link of the chain that gets interpreted. Again the infinitive escapes the domain of OC, this time regardless of the semantic class of the matrix predicate. Control is always optional, no situation of obligatory control emerges.

(34) a. $[_{IP}[_{S}PRO_{1/2}$ to work late$]$ $_{PF/LF}$would $[_{VP}John_1$ $[_{V'}$ please $[_{S}$*PRO$_{1/*2}$ to work late*$]]]$

b. $[_{IP}[_{S}PRO_{1/2}$ to work late$]$ $_{PF/LF}$would $[_{VP}[_{S}$*PRO$_{1/*2}$ to work late*$][_{V'}$help John$_1]]]$

The analysis predicts the grammaticality of examples like (28c, d) and (29c, d).

3.4. ***A consequence of the analysis***. The interaction of our assumptions about OC and extraposition yields the following consequence: Whenever the infinitive is syntactically in situ, control is local; and whenever control is non-local (arbitrary or long-distance), the infinitive is extraposed to a position adjoined to VP. Assuming that adjuncts are islands to extraction, we expect a correlation between non-local control and failure of extraction. We expect extraction to be impossible in cases of LD control. This prediction appears to be borne out:

(35) a. It would kill the workers$_1$ [PRO$_1$ to build this dam]

b. What$_2$ would it kill the workers1 [PRO$_1$ to build t$_2$]?
c It would kill the forest [PRO$_{arb}$ to build this dam].
d. *What$_2$ would it kill the forest [PRO$_{arb}$ to build t$_2$]?

Kill is a non-psychological predicate. It allows either an OC configuration where the clause is interpreted in SpecVP, a possibility illustrated in (35a), or a NOC reading, when the clause is interpreted in VP adjunction position, a possibility illustrated by example (35c). However, when extraction takes place from the infinitive clause, NOC is no longer available, as shown by the contrast between (35b) and (35d). This is because extraction requires the LF copy of the infinitive to be the base one, whereas, NOC requires it to be the extraposed one; those conflicting demands cannot be simultaneously satisfied.

A similar paradigm obtains below for the (non-psychological) verb *damage.*

(36) a. Hillary thinks it damaged Bill$_1$ [PRO$_1$ to talk about himself on the Dave Letterman show.]
b. That's the talk show$_2$ that Hillary thinks it damaged Bill$_1$ [PRO$_1$ to talk about himself on t$_2$]
c. Hillary$_1$ thinks it damaged Bill [PRO$_1$ to talk about herself on the Dave Letterman show]
d. *That's the talk show$_2$ that Hillary thinks it damaged Bill [PRO$_1$ to talk about herself on t$_2$].

Conclusions on the distribution of OC/NOC

The following generalisation characterizes the distribution of OC and NOC:
1. Infinitive is VP complement/ VP-specifier --> OC
2. Infinitive is IP-subject/ adjunct --> NOC

4. Anaphors and Logophors. PRO in NOC contexts

The discussion above has shown that PRO in OC environments is interpreted by mechanisms of syntactic anaphora. In GB, in NOC environments PRO was considered to be the silent analogue of a pronoun. Landau's analysis, adopted here, starts from a different empirical property. In NOC cases, PRO may be contained in islands. The point to stress is that if in NOC PRO may appear in an island, PRO will be generally licensed by *non-syntactic means*, since syntactic mechanisms like Move or Agree are sensitive to islands.

The problem is what licenses PRO in islands, in other words how is PRO interpreted in an island environment, i.e., when it can enter no syntactic relation with elements outside the island?

Following Reinhart & Reuland (1993), we will accept that an anaphoric element which fails to be syntactically licensed is interpreted as a *logophor*.

Logophors are *semantic anaphors*, contrasting with reflexives, which are syntactic anaphors, subject to Condition A of BT, and always distributed in argumental position. Logophors are licensed by discourse factors, such as focus, perspective and centre of consciousness or of communication. Although the elements that license logophors are diverse, the class itself is well-defined, logophors representing the complement of reflexives, i.e., of syntactic anaphors. Suppose this division applies to all anaphoric elements. Then we expect anaphoric Agr and PRO to be logophoric precisely in those environments where they are not syntactically

licensed – namely, where they cannot enter a syntactic relation with an antecedent. *These environments should display LD control*, subject to logophoricity constraints.

Consider the following examples. The first is grammatical and allows LD control of PRO. The second is not acceptable, the difference is the result of a discourse element:

(37) a. John said to Mary that it would be easy to prepare herself for the exam.
b. *John said about Mary that it would be easy to prepare herself for the exam.
c. John sued Mary for divorce because it was no longer possible to support her/*him.

A logophor can only refer to antecedents that are sources/targets of mental/communicative reports. Thus (37a) is grammatical because in (37a) *Mary* is the addressee in the communicative report, a condition which is not met in (37b). Notice the failure of LD-control in (37c), even though Mary has an argumental function in (37c); the DP *Mary* fails to qualify as a centre of consciousness.

This view contrasts with an alternative view, by which PRO in LD-control is pronominal (cf. Bouchard (1984), Hornstein (1999). Since logophors are subject to more stringent antecedent conditions than pronouns, the two views make different predictions. Environments in which the remote antecedent is not a logophoric centre allow a pronoun but disallow PRO in the subject position of the infinitive. In other words pronouns and logophors have different distribution. Here is an example.

(38) a. John said about Mary that it would be easy [for her to prepare herself for the exam].
b. *John said about Mary that it would be easy [PRO to prepare herself for the exam].
c. John sued Mary for divorce because it was no longer possible for her to support him.
d. * John sued Mary for divorce because it was no longer possible [PRO to support him].
e. John's friends think that it is important [for him to feed himself].
f. *John's friends think that it is illegal [PRO to feed himself.]
g. Mary discussed with friends of John the possibility of [him leaving her].
h. Mary discussed with friends of John the possibility of [PRO divorcing her.]

The distribution of PRO is different from that of a pronoun. Landau's analysis reveals the unitary nature of PRO, which is always an anaphoric element, syntactically identified in cases of OC, semantically identified in case of NOC.PRO has the properties of a logophor. These semantic properties emerge in island environments, where the infinitival Agr fails to enter an Agree relation with an element outside the island and cannot be syntactically identified. This view replaces the older, dual view on PRO, PRO as an anaphor in OC contexts and PRO as a pronoun in NOC.

Conclusions

1. PRO in NOC is a logophor, i.e. a semantic anaphor, rather than a silent pronoun.
2. The referential properties of PRO are constrained by logophoricity.
3. PRO is always an anaphoric element, syntactically identified in cases of OC, semantically identified in case of NOC.