

THE LOWER OPERATOR WITH PARASITIC GAPS AND THE COMPUTATIONAL SPECIFICATION OF SUBJECTS

Handout based on J. Emonds, “The Lower Operator Position with Parasitic Gaps” in *Features and Interfaces in Romance. Essays in honor of Heles Contreras*, J. Herschensohn, E. Mallén, and K. Zagana, eds., John Benjamins, Amsterdam, 2001, 85-106. Material here is reproduced with the kind permission of the publisher.

1. *General background and limitations of study*

I presuppose some familiarity with parasitic gaps ‘PG’ (Chomsky, 1982; Engdahl, 1983; or Culicover, 2001), and limit discussion to English PG. Chomsky (1982, #56) credits Taraldsen (1981) with the generalization (1).

(1) *No C-command Condition. A trace of the operator binding a PG cannot C-command the PG.*

- (2) a. **Who** did he give [a picture of *t*] [to *e*]?
 b. I prefer hosts **who** [letters to *e*] don’t [make *t* sarcastic].
 c. **Who** did the professor strike [friends of *t*] as [unfair to *e*]?
 d. **Which candidate** did Bill [dismiss *t*] [without interviewing *e*]?
 e. **Which one** did she [criticize *t*] [right after introducing *e*]?
 f. ?Here is the author **who** John [sent a manuscript to *t*] [in order to impress *e*].
 g. ?**Which guest** did Bill [invite *t*] [before recalling that Sue hated *e*]?

Two limitations: I will treat only **PG that are impossible as traces** (3), e.g., in adverbial adjuncts as in (2d-g). [\[1\]](#)

- (3) *Which candidate did Bill [dismiss the issues] [without interviewing *t*]?
 *Which student did she [criticize the supervisor] [right after introducing *t*]?

*Here is the author John [got a haircut] [in order to impress t].

*Which guest did Bill [go out] after recalling that Sue [hated t]?

I also treat only what Postal (1994) calls “true P-gaps”, i.e. licensed by some leftward movement, and not those he shows are “pseudo-P-gaps” licensed by rightward movement.

Basic generalization. Chomsky (1982, 45) proposes that a **necessary No C-command Condition** between an A-bar bound trace t and a co-referential parasitic gap e is due to the very definition of an LF variable:

(4) (Only) A locally A-bar bound empty XP in a theta position is a well-formed LF variable.

I interpret (4) as follows: an empty XP in a theta (argument or A-) position is a well-formed LF variable only if it has a closest binder, which determines its range, in an A-bar (non-argument) position. [\[2\]](#)

This interpretation of (4) accounts for Strong Crossover as in (5), without using Principle C (Chomsky, 1981):

(5) a. Example: ***Which candidate_i** did Hillary think that **he_i** had tricked Bill into hiring **t_i**?

b. Generalization: An empty XP variable in a theta position cannot have a local binder in an A-position.

According to (4), the traces and the PGs in (2) are both LF variables bound by the same WH antecedents. If an intervening trace additionally C-commands a potential variable as in (6), the antecedent of the trace fails to *locally* bind it and thus violates (4).

(6) *Who did he describe t to (a friend of) e ?

?Which secretary did Bill promise t that he would hire e ?

*Who did Bill persuade t that Sue had betrayed e ?

*Which student did she promise t to introduce e to a professor?

*Which city did John prefer t to the residents of e ?

*Who did the professor strike t as unfair to e ?

Chomsky's (4) thus entails the No C-command Condition (1). **This is the main charm of Chomsky (1982).** There is no need for the later ad hoc and poorly understood "chain composition" of Chomsky (1986).

Contreras (1984) and Chomsky (1986) use Binding Theory Principles to question the No C-command Condition (1) between a trace t and a PG e . That is, they "undo" the nice result of Chomsky (1982) and essentially leave the whole topic of parasitic gaps as yet another unsolved problem. This can be avoided, however.

Principles of disjoint reference are better characterized **in terms of C^{\max} -command**. Thus, Principle C should be formulated so that **a referring expression can't be C^{\max} -commanded by an antecedent**:

- (i) *Mary [_{VP} [_V criticized him_i] after introducing John_i to us].
*John [_{VP} [_V read them_i] without buying those books_i].

Nor, according to Principle B, can an antecedent C^{\max} -command a pronoun in its Governing Category (roughly, the same IP) in similar configurations:

- (ii) *Bill recalled that [_{IP} Mary [_{VP} [_V criticized John_i] right in front of him_i]].
*Bill was happy that [_{IP} Mary [_{VP} [_V had found John_i a room] for him_i]].
?Helen [_{VP} [_V married John_i] because of a picture of him_i].

Both these Binding Conditions should be redefined using C^{\max} -command, where the lowest C^{\max} containing the referring expression in (i) and the pronouns in (ii) are VPs. Thus, although their antecedents fail to C-command *John* and *him*, **their antecedents nonetheless (improperly) C^{\max} -command them**, accounting for the ungrammaticality of (i)-(ii).

I conclude that Principle C need not be considered as applying to A-bar bound traces or to parasitic gaps.

2. *Subjacency effects on parasitic gaps*

PGs exhibit subjacency effects induced by islands. (Kayne, 1983; Contreras, 1984; Stowell, 1985)

(7) *Which guest did Bill criticize t while recalling [_{DP} the fact that Sue supported e]?
 *Which one did Bill encourage t without saying [_{CP} where he would publicly support e]?
 *What student did she criticize t right after [_{DP} introducing e to a professor] was suggested?

Thus, *at least some* PGs must be additionally bound at s-structure by a lower operator O_i in the clause containing the PG. In these cases, e is a trace of O_i at s-structure.

(8) Which one did Bill dismiss t without [O_i interviewing e]?
 Which one did she criticize t right after [O_i introducing e]?
 ?Which guest did Bill criticize t while recalling [O_i that Sue had supported e]?
 ?

There are now two questions that must be posed about this lower operator with PGs. First:

(9) *What can be the location of the lower operators O_i ?*

Second, if the definition of a variable (4) is to continue to describe the relation in LF between the higher operators and PGs e , then the **s-structure lower operators O_i must be deleted in LF**.

(10) *How do the lower operators O_i come to be deleted in LF?*

If these O_i are *not* deleted in LF, then PGs are in reality not parasitic and Chomsky's

crucial definition of variables (4) lacks generality and hence interest.

3. *The location of the parasitic operator O_i*

It is often quickly concluded that parasitic gaps occur freely in various adverbial clauses. This is far from so, and limitations on where they can occur provide important clues as to the location of the parasitic operator O_i .

I then attribute the lack of PGs in constructions to the lack of this O_i .

3.1. *Simple participial PG clauses are fine while simple finite PG clauses are not.*

Contrary to commentary about all PG clauses being marginal, finiteness provides the real contrast in English. [\[3\]](#)

(11) I liked the painting that the expert scrutinized *t* before *describing e to the owner*.

Which books did he make a list of *t* while *putting e away*?

Which students did she criticize *t* after *introducing e to the professor*?

(12) *I liked the painting that the expert scrutinized *t* before *Mary described e to the owner*.

*Which books should I make a list of *t* while *we are putting e away*?

*Which students did she criticize *t* after *the boss had introduced e to the professor*?

(13) *Which books did so many people take out *t* that *Sue had to rebind e*?

*I didn't meet the people John invited *t* in order that *I might speak to e about a job*.

*How many tools did you bring *t* in case *the carpenters need e*?

3.2. *No O_i in infinitives with overt subjects.*

(14) Who do we have to take *t* to a jazz club in order (*for you) to impress *e*?

The computer they bought *t* in order (*for their kids) to take *e* on their trip was faulty.

Cf. Bordelais (1985) for Spanish paradigms making the same point, contra a point in Culicover (2001).

3.3. *PGs are not good in adverbial participles lacking conjunctions.*

(15) *I disliked the one that she scrutinized *t* describing *e* to the owner.

*What dishes should I dry *t* putting *e* away?

*Which students do we need to praise *t* introducing *e* to you?

3.4. *PGs are excluded in absolute constructions.*

(16) *The papers I can't locate *t* with the staff putting *e* away so soon are important.

*Which supplies don't you trust *t* with Bill getting *e* so cheap?

The four puzzles suggest that exactly the sequence: overt P + non-finite V plays a curious role in allowing PGs with parasitic operators O_i . **This previously unrecognized factor** is the basis of the present analysis.

4. *The lower operator O_i is not in SPEC(CP). Rather, it is in SPEC(IP) or SPEC(DP).*

The adverbial constructions introduced by overt P + non-finite V, even though it favors

PGs, otherwise exhibit no COMP phenomena of the type which motivates SPEC(CP).

4.1. The constructions P + non-finite V show no evidence of a long distance escape hatch for A-bar movement; see examples (3). This restriction on movement motivates Huang's (1982) Condition on Extraction Domains.

4.2. These adjunct constructions show no evidence of null operators other than the PG lower operator itself:

(17) *Bill had to find a wall_i O_i before leaning the boards against *t_i*.

*We must justify more receipts_i O_i in order to list *t_i* for the tax investigation.

4.3. The constructions P + non-finite V can contain no overt WH phrases:

(18) *Bill hired the candidate in order who(ever) to please in his home state.

*She might criticize us after whatever tasks doing for low pay.

We need to find some other landing site, presumably also a SPEC, to house the lower operator for PGs.

(14) Who do we have to take *t* to a jazz club in order (*for you) to impress *e*?

The computer they bought *t* in order (*for their kids) to take *e* on their trip was faulty.

Certain subordinating P do not impose obligatory control on their DP-gerund (V + *ing*) complements (19):

(19) She scrutinized the paintings without the owner('s) knowing about it.
Instead of John putting away the dishes, let's leave now.

But *with parasitic gaps, these same gerunds tolerate no overt subject (20)*:

(20) Which paintings could she scrutinize without (*the owner) bringing to the gallery?

These are the dishes you should leave out instead of (*John) putting away.

(14) and (19)-(20) suggest a first, descriptive version of my hypothesis for the lower operator in parasitic gaps:

(21) *Lower Operator Hypothesis (tentative): A non-case-marked SPEC(IP) can house a lower or parasitic operator for PGs.*

The LOH (21) immediately explains why PGs are ill-formed in finite clauses (12)-(13) or infinitives with overt subjects (14). Similarly, Absolute constructions must contain an overt lexical subject and so exclude PGs (16).

The Lower Operator Hypothesis can explain (15) if extended from infinitive clauses to V + *ing* clauses, i.e., to all non-finite clauses, along the following lines.

English introduced and headed by V + *ing* are generally of two types:

(22) a. DP gerunds are generated freely in all structural DP positions. They translate as Spanish infinitives or finite clauses, but never as ‘gerundios’ introduced by V + *ndo*. **English gerunds pass all DP tests** (Rosenbaum, 1967; Emonds, 1976).

b. Non-DP participles are generated freely in structural AP positions. They always translate as Spanish ‘gerundios’. **English participles fail all DP tests** in both languages (Emonds, 1985, Ch. 2). [\[4\]](#)

We can't easily tell which of these two types includes the PG-favoring adverbial sequence in (15), i.e., “overt P + V + *ing*”, because Huang's CED independently stops us from using movement to test these for DP status:

(23) *It's { the dinner party/ introducing me } that you should reveal our secret after.

*It was { a fair interview/ reviewing his book } that Bill dismissed her without.

Moreover, obligatory control actually says nothing about whether a sequence V + *ing* is a DP (22a) or not (22b), since gerunds can also exhibit such control.

(24) She avoided (*the owner's) selling the painting.

Sue tried (*my) lecturing the new students.

But what decides that **the sequences P + V + *ing* in (15) are deep DPs** is that they otherwise fit with (22a). They translate as **Spanish infinitives** introduced by P, and never as ‘gerundios’.

(25) *Lower Operator Hypothesis: A non-case-marked SPEC(IP) or SPEC(DP) can house a lower or parasitic (A-bar) operator for PGs.*

By requiring a non-case-marked SPEC, the LOH (25) accounts for why IPs with a lower operator O_i are infinitival and why DPs with O_i are gerundive.

5. *Explaining why parasitic gaps must be DPs*

Emonds (1985) and Lasnik & Stowell (1991): PGs are limited to DPs and cannot be PPs or APs.

(26) a. *This is a neighborhood in which you should look around *t* before residing [_{PP} *e*].

This is a neighborhood which you should look over t before residing in [_{DP} e].

- b. *For whom did he ever work t without praying [_{PP} e]?
Who would he ever work with t without praying for [_{DP} e]?
- c. *How sick did John say he felt before actually getting [_{AP} e]?
- d. *How clever does she look while acting [_{AP} e] in company?

Lasnik & Stowell's proposal is that PGs are limited to DPs because empty operators O_i only bind names and names are DPs; but this stipulation is incorrect for many O_i beyond PGs:

(27) In the hall would be a good place O_i to put it [_{PP} e_i].

Less abrasive would be an appropriate way O_i to act [_{AP} e_i].

Summary of data patterns. The LOH (25) thus successfully explains (i) the DP status of PGs, (ii) paradigms for (3.1)-(3.4), (iii) the paradigms supporting (4.1)-(4.3), (iv) subjacency effects on PGs, and (v) the No C-Command Condition (1). No competing account of PGs makes so many predictions. They follow with no extra stipulations beyond the Lower Operator Hypothesis itself and whatever answers the remaining question (10).

(10) *How do the lower operators O_i come to be deleted in LF?*

The LOH is so strongly supported that theory should accommodate it and not vice-versa.

The LOH and (10) thus reduce to the two intriguing problems (28)-(29), still to be derived:

(28) In the structure [_{IP/DP} (DP') - I/D - XP], the SPEC position DP' may have binding properties of an A-bar (non-argument) position, provided it is deleted in LF. Cf. also Deprez (1994).

(29) In this same structure, if DP' is an A-bar position and $X = V$, the subject of V cannot be in SPEC position but must be elsewhere (higher).

The solution to (28) is a nearly **trivial extension of the system of LF deletions in Lasnik and Saito (1984)**.

The solution to (29) is based on **applying the structural definition of subject in Emonds (1985) to trees at LF, and not earlier in a derivation**.

6. *The sequence of T-model operations on a Cyclic Domain*

(28) becomes less puzzling by conceptualizing Chomsky & Lasnik's (1977) T-model as applying not to deep structures but rather to a series of derivational "phases," such as the cyclic domains IP and DP.

(30) First, heads of YP are selected in terms of subcategorized complements of Y (**Merge**).

(31) Second, phrases can **Move to SPEC(YP)** positions, including SPEC(IP) and SPEC(DP).

This second step becomes A-movement (to a subject position) if and only if case is directly assigned to the SPEC position. I assume case assignment is always optional, resulting in Case Filter violations in argument chains if not applied. If case is not assigned, movement to SPEC is A-bar movement.

Thus, when a DP moves to a subject position SPEC(DP) by the structure-preservation of Emonds (1976), SPEC can be an A-bar position if no case assigner assigns case. Similarly on an IP domain: if no case assigner assigns case, SPEC(IP) can be an A-bar position. *That is, these SPEC positions can house A-bar binders.*

However, these A-bar SPEC positions are *not* automatically interpretable operators, due to (32)-(33).

(32) Specific interpretive rules for LF must license any configurations that are not licensed by Merge.

(33) **English operators can be licensed for LF only in SPEC(CP).**

Consequently such A-bar DPs (i.e., the lower operators with parasitic gaps) must eventually delete. This happens as the bottom up sequencing of operations on cyclic domains continues:

(34) Third, Spell Out derives Phonological Form on the YP domain.

(35) Fourth, **Logical Form on the YP domain is derived after Spell Out**, by (33) and by deleting uninterpretable empty elements under appropriate identity of indexing.

7. Deriving LF: deleting and pruning empty categories

When (35) processes a domain YP whose SPEC contains an empty (parasitic) operator O_i , nothing happens to prepare O_i for LF. However, on the *next largest* domain XP, which always exists for parasitic operators, this now “lower” operator O_i can delete if it is co-indexed with (i.e., locally bound by) some ZP_i in XP. [\[5\]](#)

This deletion on the higher XP domain conforms to the system of deleting “intermediate traces” in COMP in Lasnik & Saito (1984). There is no reason not to consider it rather as applying to a chain of operators.

There may be reasons for allowing LF deletion to apply only to operators, i.e. to non-

argument positions. The intermediate argument trace t_i' must remain in LF to properly bind the anaphor in (36).

(36) John_i is likely t_i' to seem to himself t_i to be incompetent.

A lower operator binding PGs fulfills the same range of conditions as do “intermediate operators” in successive cyclic chains of WH-movement:

- (37)
- a. They are empty categories in the highest SPEC position of a cyclic domain @.
 - b. They are locally bound by an operator not in a theta position, in the smallest cyclic domain above @.
 - c. They are not in a case-marked position.
 - d. They are in a position where they typically alternate (and cannot co-occur) with a phonologically realized phrase.
 - e. They are freely generated only when they bind arguments, not when they bind adjuncts.

These parasitic operators are forced to delete. Then, adjuncts bound by these operators in PG s-structures are ill-formed when that operator disappears in LF.

(38) *Which room did the artist move out of t before painting her portraits in e ?

?This is the car that Joan wants to sell t instead of driving to work in e .

?Who are they preparing to see now t in order to visit museums with e next week?

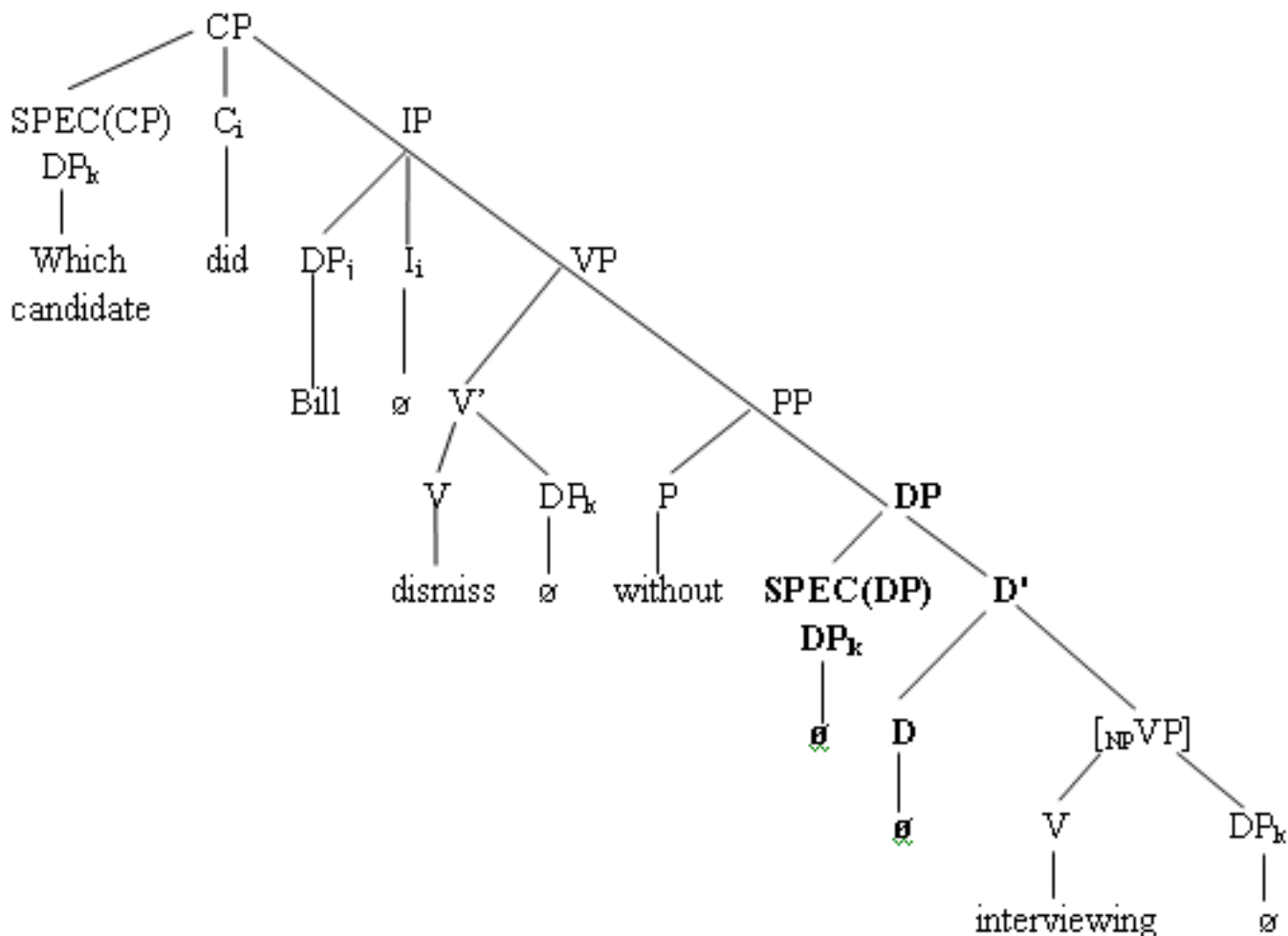
(39) ?Which room did the artist move out of before putting her portraits in?
This is the road that Joan avoids instead of driving along.
Who are they telephoning now in order to visit next week?

I attribute the operator deletion to a step which is not part of a derivation but of the definition of projection. (revising a proposal by S.-Y. Kuroda).

(40) *Pruning: YP disappears when its head has no marked features and its SPEC is deleted.*

Thus in LF, a clause with a typical PG looks like (41); the bold nodes delete and prune in LF and are thus absent in the final interface representation. I simplify the representation of gerunds as VPs in an NP position.

(41)



The No C-command condition (1) again holds in full generality: **the two empty non-bold DP_k in (41) are not in a C-command relation, and both are locally bound by the same LF operator which candidate.**

There remains a question, however. **Where is the subject of the lower V in (41) in LF?**

8. *Extending the analysis to long distance movement*

Lifting the limitation to PGs, we can observe the same processes in arguments as are at work in adjuncts: **The possessive position in English DP gerunds can act like a deletable intermediate operator.**

(42) *Lower Operator Hypothesis (extended): A non-case-marked SPEC(DP) with V + ing can house a lower or parasitic (A-bar) operator.*

When SPEC(DP) is a subject (with its own theta role), i.e., disjoint in reference from any higher subject, it must survive at LF. This makes long distance movement through SPEC(DP) impossible.

- (43) *Which prisoners_i did they criticize PRO_j executing t_i for petty crimes?
 *What_i did John enjoy Mary's showing off t_i at the party?
 *The jobs_i we talked about Bill's having lost t_i never paid well.

Now the SPEC of this gerund can serve as a deletable intermediate trace, exactly as in PG constructions:

- (44) Which prisoners_i did they avoid executing t_i for petty crimes?
 What_i did John enjoy showing off t_i at the party?
 He asked which letters_i I was worried about having lost t_i .

Long distance movement blocked by unlike subjects in (43) is perfect when the subjects are the same in (44).

9. *A generalized definition of Subject*

(29) In the structure $[_{IP/DP} (DP') - D - XP]$, if DP' is an A-bar position and $X = V$, the subject of V cannot be in SPEC position but must be elsewhere.

(45) *Extended Projection Principle. Every interpreted V that heads a phrase must have a subject in LF.*

This statement of the EPP of Chomsky (1981) is more general and explanatory than “the strong D-feature on Tense” in the minimalist program (see Emonds 2001, Chs. 1, 6, 10).

Generative studies have been laboring for decades under a misconception, namely that structural subjects, e.g. those that satisfy the EPP, must somehow be specified as such early in or even at the beginning of derivations.

For a variety of constructions (passives and Romance causatives with post-posed agent phrases, Romance restructuring constructions, auxiliaries), superior accounts emerge if we identify subjects of Vs *only in the final LF interface representations* such as (41), i.e., in which the bold nodes are absent.

DP subjects are not sisters of predicates but are rather the lowest DPs that c-command them, as determined by the following definition: [\[6\]](#)

(46) *Generalized definition of Subject. DP_j is the subject of X^0 in LF if and only if DP_j is the lowest DP c-commanding X^1 such that DP_j and X^1 are in all the same DP and IP.*

Eventually, (46) will sound simple: “the subject DP of X^0 is the closest DP to X^1 .” Why?

Because all syntactic relations will require “c-command,” and only nodes in the same “phases” or “cyclic domains” will be relatable.

Given the pruning of the bold nodes in the LF of (41), this general definition of subject successfully relates the verb *interviewing* in the adverbial clause with the higher subject DP_j *Bill*.

Since every head V interpreted in LF must have its own subject position in LF (by the EPP), the structure (41) can survive only through **deletion of the DP in the lower SPEC position**.

For if the DP in the lower SPEC remained, it would be the subject of the lower V, by (46). But since parasitic operators are forced to delete (37), it could not have index k, in which case movement of the object to subject position would not take place and the lowest empty DP_k would be unlicensed.

The generalized definition of Subject (46) is thus compatible with deletion of a parasitic operator and the consequent Pruning (40) of the DP (or IP) over a non-finite adverbial clause containing a PG.

But the definition of Subject (46) must apply “late” in a derivation after steps (32)-(35) and (40), in order **to successfully locate the “missing subject” in non-finite PG clauses**, and thus complete the present analysis.

In conclusion, not only is there no need to properly identify subjects “early” in a derivation. Defining subjects in prior to LF in fact obscures and interferes with effective accounts of the many paradigms in this study, some well known and some newly presented.

In fact, “early subjects” make a successful account of parasitic gaps essentially impossible.

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[1]

Lack of C-command by a trace is not always sufficient to permit a potential parasitic gap. The following two structurally similar examples contrast with respect to permitting a PG.

- (i) *Which student did the professor speak with *t* about (friends of) *e*?
- (ii) Which neighborhood did the councilman talk about with the residents of?

[2]

It might be thought that the bold A-bar binder **which** for the variable *e* in example (i) from Stowell (1985, 315) is not local, because of the intervening *who*.

- (i) This is the type of book **which** [laymen [*who* try to read *e*]] usually can't understand *t*.

However, the relative *who* may simply not be raised out of IP here into the CP projection. When CP clearly contains a potential closer A-bar binder, a PG is impossible:

- (ii) *This is the type of book **which** [laymen [who we consult about *e*]] usually can't understand *t*.

[3]

Chomsky's (1982) example, *This is the kind of food you must cook before you eat*, sounds better than the more typical structures below, because a) its two overt subjects are identical unstressed pronouns, and b) intransitive *eat* can pragmatically be construed as referring to the food being cooked (*John cooked the fish and then we ate*).

- *These are the tools that I broke before Mary could sell cheap.
- *Which articles did she file if the boss put on her desk?
- *Here's the editor who we sent your manuscript to just after Mary contacted.

*This is the kind of food this restaurant overcooks when we order.

[4] Emonds (1985) argues further that participles without introductory P as in (22b) are not IPs either.

[5] There are limitations on permissible positions for ZP, but generally any ZP which is a WH-phrase in SPEC(CP) seems to be a candidate for properly binding a lower O_i .

[6] Emonds (2000, Ch. 1) argues that subjects of various DP-internal predicates are not always full DPs but sometimes only intermediate N-projections. Hence (46) should be modified (generalized) using “N-projections” including DPs.