

The restricted interaction of parasitic gaps and subjects is explained by anti-locality*

Colin P. B. Davis ◊ University of Konstanz ◊ colin.davis@uni-konstanz.de

Abstract: The intricacies of parasitic gaps have long enriched research on the syntax of movement. However, the interaction between parasitic gaps and subjects is a point of contention. I integrate a variety of facts which I argue reveal that parasitic gaps and subjects interact productively, except when interrupted by *anti-locality*—a ban on certain movements that are illegally short. I argue that such anti-locality predicts when parasitic gaps in subject position are allowed, when subject movement licenses parasitic gaps, and has implications for the distribution of subject A-bar movement in general.

1 Introduction

The goal of this paper is to examine the interaction between parasitic gaps (PGs) and subjects. This is a multifaceted topic which previous literature has mostly discussed in a scattered fashion. This paper thus aims to clarify our understanding of this issue by collecting a variety of observations about PGs in English, which I argue turn out to have a principled distribution.¹ Specifically, I argue here that PGs and subjects interact productively and straightforwardly, except when a particular constraint on the length of movement interferes.

The nature and limitations of A-bar movement from subject position are central to this paper. This topic is itself an active area of debate, which it will be useful to overview before considering PGs. In standard English, among other languages, we can see clearly that a *wh*-phrase in that originates in a non-subject position must move to the clause edge, with concomitant T to C movement in main clauses:

- (1) *Movement required in non-subject wh-questions*
- a. **What**₁ will₂ you *t*₂ eat *t*₁? (Wh-movement and T to C movement)
 - b. * You will eat **what**? (No movement—possible only as an echo question)

Since the *wh*-movement in a non-subject *wh*-question results in a word order change, the presence of that movement is obvious. However, this is not so when the *wh*-phrase is a subject, as (2) below shows. In a main clause question, if a subject *wh*-phrase does move, we would expect that movement to be accompanied by T to C movement (triggering *do*-support if T is not overtly filled). However, after these movements occur, the subject *wh*-phrase and T would have the same order as they had before movement (2a). If T to C movement did not occur here, the relative order of these elements would still be no different (2b). Thus the surface word order in a subject *wh*-question is also consistent with a derivation in which neither T nor the subject moves at all (2c).

*Acknowledgments redacted.

¹While much of the data I discuss in this paper is cited from previous literature, work on PGs over the decades has often reported judgments without much explicit substantiation. This fact, in combination with the generally marked status of PGs, presents a challenge for the analysis of them. For this reason, the PG patterns examined here have also been checked with judgments from 9 English native speakers—mostly Americans, though including two British speakers and one Australian. While some of these individuals are linguists who offered their judgments after seeing this work in presented format (3 people), the rest are university students presented with the data, without indication about the contrasts being sought. While a few individuals were excluded due to not permitting PGs in general, the 9 speakers mentioned largely agree with the contrasts reported in previous literature, though I note below when judgments diverge.

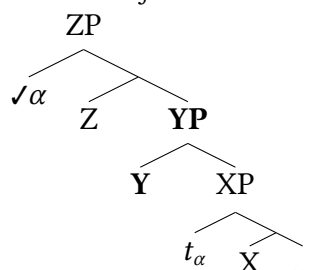
(2) *Potential analyses of subject wh-questions*

- a. [_{CP} **Who**₁ will₂ [_{TP} t₁ t₂ eat the cake]]? (*Wh-movement and T to C movement*)
- b. [_{CP} **Who**₁ [_{TP} t₁ will eat the cake]]? (*Wh-movement without T to C movement*)
- c. [_{CP} [_{TP} **Who** will eat the cake]]? (*No movement*)

For reasons like this, subject A-bar movement is often difficult to diagnose. Since *wh*-movement is obviously required from non-subject positions (1), it is often assumed that *wh*-movement also occurs from subject positions. However, some work argues that there is typically no clause-internal subject A-bar movement (George 1980; Chung and McCloskey 1983; Agbayani 2000; Brillman and Hirsch 2016; Carstens et al. 2017; Gallego 2017; Erlewine 2017, 2020). Using data about PGs, in this paper I argue that clause-internal subject A-bar movement is indeed usually impossible. In particular, I argue that correct predictions about the interaction of subjects and PGs, which align with this proposal about subject A-bar movement, emerge from a hypothesis termed *anti-locality* (Bošković 1997; Ishii 1999; Grohmann 2003; Abels 2012; Erlewine 2016, 2017, 2020, and references therein).

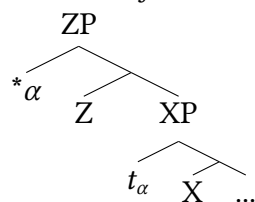
Anti-locality states that movements that are too short fail, though several different versions of this constraint have been proposed. I will focus on a version of anti-locality stating that movement from one specifier to another must cross over at least one intervening phrase (Bošković 2005; Brillman and Hirsch 2016; Erlewine 2016, 2017, 2020, a.o.). More specifically, this constraint requires movement of a given phrase α from the specifier of some phrase XP to the specifier of another phrase ZP to cross over another phrase that dominates XP. This intervener is labeled YP in the following schema:

(3) *A schema for movement that is long enough*



In contrast, if this intervening YP were absent, anti-locality would prevent this movement:

(4) *A schema for movement that is too short*



Several of the works just cited argue that such anti-locality prevents clause-internal subject A-bar movement in many contexts, for the following reason: Given the ban on “improper movement” subjects must A-move to spec-TP for case/EPP reasons before A-bar moving to spec-CP, but movement from spec-TP to spec-CP is too short, since no XP intervenes between TP and CP (5a). Thus the only option is for a subject *wh*-phrase to remain in situ (5b).

(5) *Prediction of anti-locality: Movement from spec-TP to spec-CP cannot occur*

- a. * [_{CP} **Who** [_{TP} t will eat the cake]]?
↑

- b. ✓ [_{CP} [_{TP} **Who** will eat the cake]]?

I argue that PG facts support this analysis of subject A-bar movement. PGs are, descriptively speaking, “extra” gaps that can occur in constituents crossed-over by an independently well-formed A-bar movement path. PGs are very productive in object positions, as we see in (6) below. Here we have PGs in the object position of adjunct clauses:

(6) *Object PGs in clausal adjuncts*

(Nissenbaum 2000, p. 30)

- a. [What movies]₁ did Mary [claim she liked *t*₁ [in order to get you to see **PG**₁]]?
 b. John’s the guy \emptyset ₁ that they said they’ll [hire *t*₁ [if I criticize **PG**₁ publicly]].

Importantly in contrast, it is unacceptable to place a PG in the subject position of an adjunct clause (Kayne 1983; Munn 1992):

(7) *Unacceptable PGs in subject position*

- a. Who₁ did you slap *t*₁ [because **they**/***PG**₁ ate your lunch?]
 b. That’s the guy who₁ I fired *t*₁ [after **he**/***PG**₁ insulted me.]
 c. What₁ will you eat *t*₁ [if **it**/***PG**₁ is confirmed to be healthy]?

I will argue that anti-locality predicts this contrast, and facilitates analyses of a variety of other facts about subject movement and PGs, as we’ll see.

1.1 Contents of the paper

Next, section 2 provides background on anti-locality and its avoidance by summarizing its relation to the *that*-trace effect, which will be relevant at several points in this paper. Section 3 overviews the basic properties of PGs, and explains why they are relevant to the investigation of anti-locality. Section 4 provides the core analysis, including examination of PG licensing by subject and object movement, as well as PGs in subject and object positions, which lead us to numerous correct predictions of the anti-locality theory. Section 5 addresses a puzzle that emerges from that analysis, involving predictions about anti-locality circumvention in adjunct clauses, which I argue indicates that the structure of such clauses is relatively impoverished. Section 6 contains the concluding remarks.

2 Background on anti-locality

While the PG evidence will suggest that clause-bounded A-bar movement of subjects usually doesn’t occur, it is clear that cross-clausal subject A-bar movement does, since this causes a clear word order change:

- (8) *Subject wh-movement from an embedded clause*
Who₁ did you say [*t*₁ is silly]?

However, when the subject of an embedded clause moves away, that clause cannot have an (overt) complementizer. This is known as the *that*-trace effect (Perlmutter 1968; Pesetsky 2017), named due to the fact that the relevant illicit configuration involves a trace to the right of the complementizer.

- (9) *The that-trace effect*
- Who**₁ did you say [(***that**) *t*₁ is silly]?
 - That's the person **who**₁ I think [(***that**) *t*₁ is silly]

In contrast, cross-clausal movement of a non-subject is compatible with the presence of a complementizer:

- (10) *Complementizer allowed with non-subject movement*
- What**₁ did you say [_{CP} (**that**) you want *t*₁]?
 - Where**₁ do you think [_{CP} (**that**) we should go *t*₁]?

Therefore it is clear that the *that*-trace effect, whatever its cause, is specifically relevant for subject movement. Furthermore, Bresnan (1977) observed that there is a way around the *that*-trace effect—adding an adverb after the complementizer:

- (11) *Additional adverb repairs the that-trace effect*
- Who**₁ did you say [_{CP} (**that**) unfortunately *t*₁ is not very smart at all]?
 - That's the person **who**₁ I heard [_{CP} (**that**) just yesterday *t*₁ bought a duck]


Previous work arguing for the version of anti-locality adopted in this paper proposes that this adverb amelioration effect is due to the presence of additional structure, which allows circumvention of anti-locality. Recall that this version of anti-locality requires movement from specifier to specifier to cross over an intervening phrase:

- (12) *Anti-locality*
- A movement that is too short*
-
- (12a) *A movement that is too short*
- (12b) *Movement made possible by crossing more structure*
-
- (12b) *Movement made possible by crossing more structure*

This anti-locality hypothesis predicts the *that*-trace effect, and its amelioration by inclusion of an adjunct, when combined with *phase theory* (Chomsky 2000, 2001; Citko 2014, a.o.). The essence of phase theory is that syntactic structures are built in a “chunk-by-chunk” manner, due to the way that the syntactic derivation is related to the other components of the grammar (specifically phonology and semantics). Such chunks are termed “phases”, widely regarded to include CP, vP, and often DP.² One of the characteristic properties attributed to phases is that, when a phrase moves from a phase, it must reach the phase edge before moving further. If CP

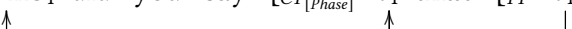
²In this section I describe an application of anti-locality in the CP region. For a similar use of anti-locality to explain restrictions on extraction from DP, see Bošković (2005, 2016).

is a phase, it is thus necessary for movement to reach spec-CP before exiting CP. There is a great deal of independent evidence for such intermediate movement from CP (see for instance McCloskey 2000, 2001).

- (13) *Movement to CP edge feeds further movement*
 ✓ What did you say [_{CP[Phase]} *t* that [_{TP} you ate *t*]]?


Importantly, when we attempt to extract the subject of an embedded CP, anti-locality and phase theory conflict. However, there is a way around that conflict, as we'll see next.


If movement of a *wh*-subject through spec-CP is required, but anti-locality prevents movement from spec-TP to spec-CP, then we expect the derivation to fail:

- (14) *Embedded subject extraction causes a phase/anti-locality conflict*
 * **Who**₁ did you say [_{CP[Phase]} *t*₁ **that** [_{TP} *t*₁ ate the beans]]?


This prediction fits the description of the *that*-trace effect. If embedded clauses without *that* are bare TPs (Doherty 1997; Brillman and Hirsch 2016), then for such clauses both the phase problem and the anti-locality problem are irrelevant.³ In this case, we correctly predict that the embedded subject can be extracted:

- (15) *Subject extraction from CP-less clause succeeds*
Who₁ did you say [_{TP} *t*₁ ate the beans]?

If the conflict in (14) above which yields the *that*-trace effect indeed stems from anti-locality, then we predict that the *that*-trace effect should be avoided by adding structure between TP and CP. As we saw above, the inclusion of an adverb in this position does indeed ameliorate the *that*-trace effect. Specifically, the anti-locality hypothesis correctly predicts this fact if we assume that the adverb below C entails the merger of additional structure between TP and CP (Brillman and Hirsch 2016; Erlewine 2017, 2020), as (16) shows.

- (16) *Adverb repairs that-trace effect by introducing more structure*
Who₁ did you say [_{CP[Phase]} *t*₁ **that** [_{XP} unfortunately [_{TP} *t*₁ ate the beans]]]?


I have labeled the additional intervening phrase that hosts the adjunct as XP. The anti-locality analyses in Erlewine (2016, 2020) simply label this phrase Adv(erb)P, following Cinque (1999) in proposing that adverbs are hosted by dedicated phrases in the functional spine of the clause. We might also consider this XP to be a phrase in an articulated clausal periphery (Rizzi 1997). Since the precise label of this phrase does not affect the analysis I offer in this paper, I will continue to simply label it as XP. In any case, the phrase in question must be absent when no adjunct is present, since otherwise there would be no anti-locality violation in examples like (14) above. See Erlewine (2020) for further discussion of this point, and additional cross-linguistic evidence for the anti-locality effect described here.

We now have an anti-locality explanation the *that*-trace effect and its avoidance. These hypotheses will be relevant at several points throughout this paper. In the next section, I describe the relevance of PGs to the investigation of anti-locality.

³Erlewine (2017) offers an alternative version of this account in which CP is not necessarily absent, but must be silent in order to prevent a linearization problem, building on Fox and Pesetsky (2005).

3 Why parasitic gaps are relevant

PGs and gaps formed by typical phrasal movement differ in at least one important way. As is well-known, there are certain constituents which movement cannot exit, known as *islands*. In other words, an island cannot separate a moved phrase and its corresponding gap (or *trace*):

- (17) *Some islands*
- a. *Adjunct island*
* [Whose birthday]₁ did you cry [because I forgot *t*₁]?
 - b. *Subject island*
* Who₁ do [pictures of *t*₁] scare you?
 - c. *Complex NP island*
* [How many hotdogs]₁ did you hear a rumor [that I managed to eat *t*₁]?

For this paper, adjunct islands are especially relevant. Specifically I will focus on sentential/clausal adjuncts like those in (18) below, since these adjuncts are structurally rich enough to allow the manipulations needed for this paper's analysis. While some adjuncts are stronger islands than others, many of them clearly block or degrade movement.

- (18) *Clausal adjunct islands*
- a. *?? Tell me [**which paper**]₁ you ate fried chicken for lunch [after giving them comments on *t*₁].
 - b. *?? [**What assignment**]₂ did you go home [because you need to finish *t*₂ tonight]?
 - c. *?? I think I know [**what kind of pet**]₃ you'd move out of town [if your roommate bought *t*₂].

Significantly, PGs are not constrained by islands in the same way. If there is a well-formed A-bar movement in a given structure, it is often possible for an island in that same structure to contain an additional gap, which co-refers with the moved phrase just as the "main" gap does. The additional unexpected gap is thus parasitic on the formation of a typical gap elsewhere in the structure. For this reason it is called a PG.⁴ PGs are very productive in clausal adjuncts, as (19) below shows. This example contains object PGs licensed by *wh*-moved objects:

- (19) *PGs in clausal adjuncts*
- a. Who₁ did you forget about *t*₁ [after talking to **PG**₁]?
 - b. Who₁ did you tell *t*₁ about our idea [in order to impress **PG**₁]?
 - c. Tell me [which paper]₁ I should read *t*₁ [before giving you comments on **PG**₁]
 - d. This is a dish [\emptyset ₂ that I know a lot about *t*₂ [because I make **PG**₂ every week]].

Much previous literature has argued that this island-insensitivity reveals that PGs do not involve movement from an island, but rather A-bar movement of a null operator within the island (Contreras 1984; Stowell 1985; Chomsky 1986; Browning 1987; Nissenbaum 2000, a.o.).⁵

⁴PGs do not occur only in islands, but using an island makes it clear that a given gap is indeed parasitic.

⁵The null operator approach to PGs is in contrast to "shared antecedent" theories, for which PGs involve genuine extraction of a variety resembling the Across-The-Board (ATB) movement from coordinate structures. As Nissenbaum (2000) and Nissenbaum and Schwarz (2011) discuss, asymmetries in reconstruction for principle A, principle C, and variable binding all show that PGs involve a separate operator, and are thus not reducible to ATB extraction configurations. Additionally, as Culicover and Postal (2001) discuss, there is a consensus in the literature that at least in English PGs are nominals, though ATB movement is not category-specific in this way,

Under this hypothesis, what we call a PG is just the trace of a silent operator's movement:

- (20) *Operator movement within containing island forms PG*
 Who₁ did you forget about t₁ [[OP after talking to t_{OP}(=PG₁)]]?
-

If PGs are indeed formed by such island-internal movement of a separate operator, we predict that a PG will fail if we place another island inside of the first, in such a way that it would block the operator's movement. In other words, while we have seen that an island can separate a PG from the moved phrase that it matches, we expect that a PG will be unable to be separated from the matching phrase by more than one island. Many previous works have shown that this is indeed the case (Kayne 1983; Longobardi 1984; Chomsky 1986; Cinque 1990; Postal 1994), as the following example shows by combining an adjunct and relative clause:

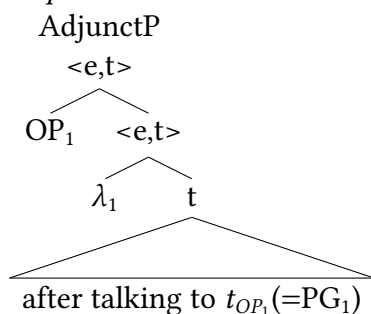
- (21) *PG-forming operator cannot move from a second island inside the first*
 * Who₁ did you insult t₁ [OP after meeting a guy [who likes t_{OP}(=PG)]]?
-

I will thus assume that PGs require movement of a null operator within the containing island. Importantly, if there is indeed a moving operator in PG constructions, we expect the possible landing sites for that operator to be constrained by anti-locality. I will argue that a variety of facts about PGs and subjects reveal that this prediction is correct. However, before beginning the analysis, I will say a little more about the motivation for this operator movement.

3.1 The operator must move for semantic reasons

Nissenbaum (2000) argues that the semantics of PG-formation depends on the the PG-licensing phrase undergoing successive-cyclic movement, along with island-internal operator movement, in the following way. When the PG-forming operator moves to the edge of the island, it triggers the semantic rule of Predicate Abstraction (Heim and Kratzer 1998). If the island is a sentential adjunct, its original type t is thus raised to <e,t> (assuming semantic vacuity of the operator), as shown in (22) below:

- (22) *Operator movement and Predicate Abstraction in an adjunct*



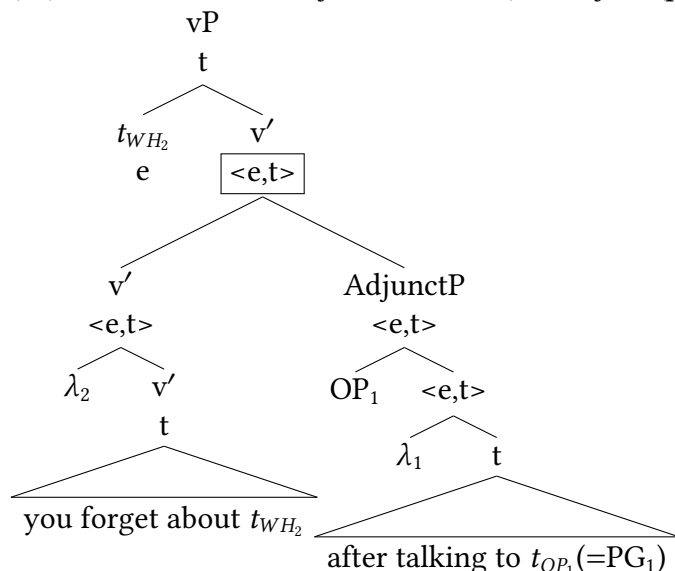
The moved phrase that licenses the PG successive-cyclically moves through vP, as diagrammed in (23) below, since vP is a phase. This triggers Predicate Abstraction in vP, creating an <e,t> position below the trace of that successive-cyclic movement. The type <e,t> adjunct built in (22) above can adjoin to the <e,t> node in vP and be interpreted by Predicate Modification, which semantically unites sister nodes of type <e,t> (Heim and Kratzer 1998). This conjoins

further supporting the distinctness of PGs and ATB gaps.

Importantly, the insights of this paper are not dependent on the operator theory of PGs. An ATB-style theory of PGs will also be constrained by anti-locality in the desired way, as footnote 12 below discusses.

their denotations, creating another $\langle e,t \rangle$ node in vP , as in (23) below. This third $\langle e,t \rangle$ node, boxed here, is saturated by the intermediate trace left by successive-cyclic movement from vP . Consequently, the moved phrase (here the object) which left that intermediate trace binds its original trace, and the operator's trace in the adjunct, which is the PG.⁶

(23) *The derivation of a PG in an adjunct of vP (partial structure for (20) above)*



The point here is that movement of the operator to the edge of the island has a semantic effect, which allows the operator's trace to be made co-referent with the moved phrase that we refer to as the PG-licenser. Thus if this operator movement does not occur, co-reference between the PG and its licenser cannot be established.⁷

I argue that anti-locality sometimes blocks this necessary operator movement, and thus prevents the formation of PGs in some circumstances, as the remainder of this paper discusses.

4 Analyzing the interaction between PGs and subjects

In this section, I discuss PG-licensing by movement of subjects and objects, which sets the stage for investigating the possibility of PGs in subject and object positions. I argue that both PG-licensing by subjects, and PGs in subject positions, are constrained by anti-locality.

Culicover and Postal (2001) note that there is a tendency in the literature to conclude that subjects and PGs do not interact, or at least do so in a restricted way. Though the discussion of this topic is scattered, important observations about it were made in one of the first articles on PGs—Engdahl (1983). As Engdahl pointed out, assuming that *wh*-subjects do undergo some clause-internal A-bar movement, it does not appear that such movement can license PGs:

⁶Nissenbaum makes the simplifying assumption that vPs and vP modifiers (like clausal adjuncts) are type t prior to movement within them triggering Predicate Abstraction.

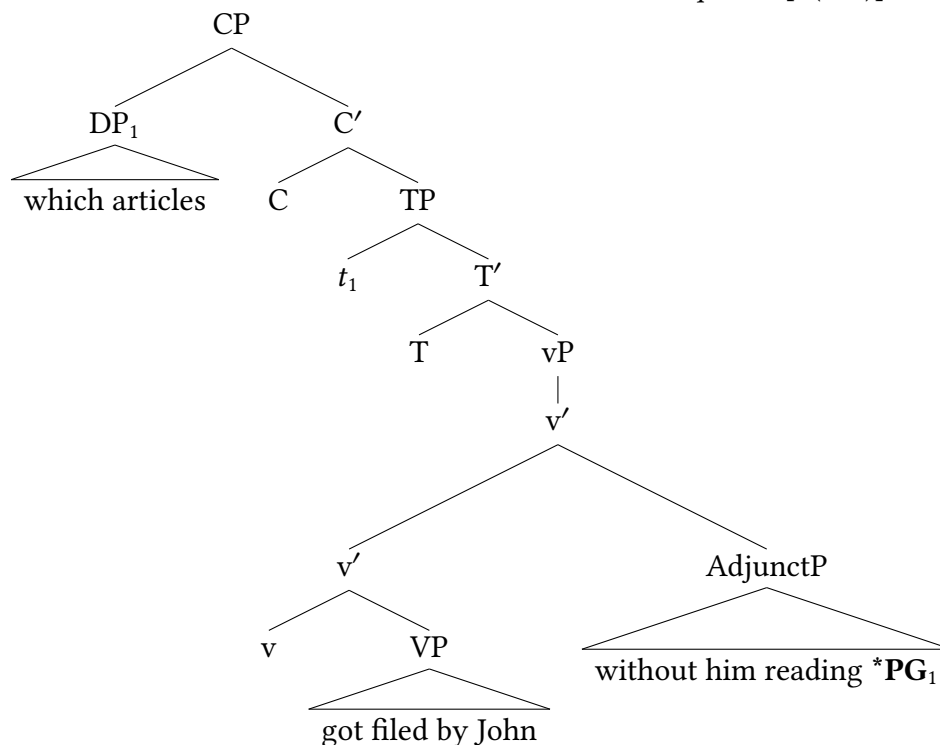
⁷If a PG's interpretation is established when the syntactic structure is evaluated at Logical Form, we might wonder how the syntactic derivation "knows" to perform operator movement in advance, for the sake of the semantics that will be determined later on. However, it is not necessary to conceive of the relationship between syntax and Logical Form in this way. We can assume that the syntactic derivation either chooses to move the operator, or not (depending on whether the needed movement-triggering features were present in the original numeration). If operator movement occurs, Logical Form will be able to bind its trace, yielding a PG. If operator movement does not occur, the interpretation of the gap in the adjunct would simply fail.

- (24) *If clause bounded subject A-bar movement exists, it doesn't license PGs*
- [Which articles]₁ t₁ got filed by John [without him reading them/*PG₁]?
(Engdahl 1983, ex. 53)
 - * That's the person [_{CP} who₁ t₁ fired me [because I insulted PG₁]]
 - * Tell me [_{CP} what₁ t₁ scared you [when you found PG₁ under the bed]]

If anti-locality bans such movement, then we correctly make the prediction that PGs here should fail. However, Engdahl identifies another reason why PG licensing should not succeed in this situation, which we must avoid in order to better test for PG licensing by subjects.

Engdahl proposes that a PG-containing constituent cannot be c-commanded by the trace of the licensor's movement—a generalization known in the literature as the *anti-c-command condition*. More specifically, as Kayne (1983) and Longobardi (1984) also observed, the PG-containing constituent must be structurally crossed over by the movement of the licensing phrase (and not contain more than one island, as discussed above). These requirements are not met in the examples in (24) above. Here the gap of the subject's movement in spec-TP c-commands the PG-containing adjuncts, assuming that these adjuncts merge to VP. Thus this adjunct is not crossed by movement of the PG-licenser, since this would only be the case if the adjunct were structurally between the moved phrase and its trace. Later work by Nissenbaum (2000) argues that such adjuncts in fact merge to the vP, as I assume in this paper, though this difference is not analytically significant. Nissenbaum argues that this constraint on PGs has a semantic explanation: if the PG-containing island is not merged structurally between the licensing phrase and its trace, then the PG-container cannot possibly be merged local to a landing site of the licensor's successive-cyclic movement. As described in the previous section, this is essential for the PG's interpretation to be established. Thus examples like (24) above are expected to be unacceptable, as diagrammed below:

- (25) *Licensor's movement doesn't cross island → PG unacceptable [= (24a)]*



Since this configuration is ruled out for an independent reason, in order to find PGs licensed by subjects we must consider different structures that do not have this problem.

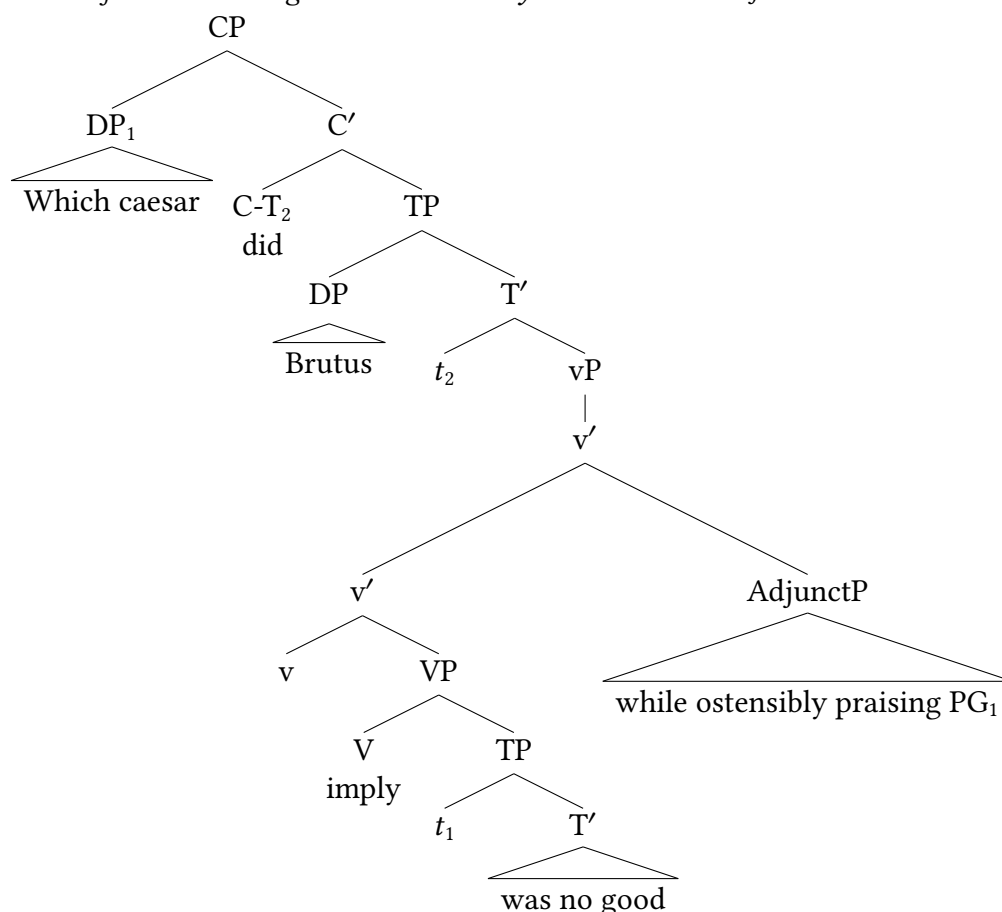
4.1 PG-licensing by cross-clausal subject movement

If PG-containing adjuncts merge in the vP, we can create a structure where subject A-bar movement definitely crosses the PG-containing constituent by using a bi-clausal structure. In particular, we must merge the PG-containing adjunct in the vP of the matrix clause, and then A-bar move the subject of the embedded clause to the spec-CP of the main clause. Such subject movement thus crosses the adjunct, and should be able to license a PG in that adjunct. Engdahl reports an example that verifies this prediction, and the speakers I have consulted agree that this configuration is acceptable:

- (26) *Cross-clausal subject extraction licenses a PG in the main clause's adjunct*
- [Which caesar]₁ did Brutus [imply [_{TP} *t*₁ was no good] [while ostensibly praising PG₁]]?
(Engdahl, ex. 60)
 - Remind me who₁ you [found out [_{TP} *t*₁ likes cats] [after talking to PG₁ about animals]]
 - This is the guy who₁ I [said [_{TP} *t*₁ is stupid] [because I wanted to insult PG₁]]

This configuration is illustrated in tree format below:

- (27) *Successful PG licensing in main clause by cross-clausal subject extraction*



We thus find that subjects can license PGs, once we ensure that the structure is appropriate.

So far in this paper, nearly all PG examples have involved PGs in object positions. We've seen that, when the structure is right, object PGs can be licensed either by object movement (19) or subject movement (26). Next let's examine PGs in subject positions. We will see that

these are possible, but restricted in a way which is attributable to anti-locality.

4.2 A case where anti-locality prevents subject PGs

Though PG-licensing by subject movement is possible in principle, we've seen that it is more restricted since it requires a bi-clausal structure. Therefore in order to achieve licensing of a subject PG, the simplest strategy is to first attempt licensing by A-bar movement of a non-subject. It turns out that non-subject A-bar movement cannot license a PG in the subject position of a mono-clausal adjunct, as (28) shows. This fact is observed by Kayne (1983) and Munn (1992), and speakers I have consulted agree that such examples are unacceptable:

- (28) *Non-subject movement fails to license PG in subject of mono-clausal adjunct*
- Who₁ did you slap t_1 [because **they**/*PG₁ ate your lunch?]
 - What₁ will you eat t_1 [if **it**/*PG₁ is discovered to be healthy?]
 - That's the guy who₁ I fired t_1 [after **he**/*PG₁ insulted me]

While I will argue that anti-locality predicts this fact, first I will consider a potential confound.

In some languages, it has been observed that there is a requirement for a PG, and the moving phrase that licenses it, to match in case and/or semantic role. See for instance Kiss (1985) on Hungarian, and Franks (1992, 1993) on Russian and other Slavic languages. If this is also true for English, then the configuration in (28) above would be no good due to the mismatch between subject and non-subject, which certainly differ in semantic roles as well as case (though morphological case, at least, is impoverished in English). However, Engdahl shows that for English there are acceptable examples like (26a) above, repeated in (29) below, where subject movement licenses a non-subject PG. All the examples in (26) above make the same point. Thus it does not seem that English in fact forces a PG and its licenser to match, as Engdahl explicitly argues.⁸

- (29) *A PG succeeding despite subject / non-subject mismatch*
[Which caesar]₁ did Brutus imply [t_1 was no good] while ostensibly praising PG₁?

To be sure that a matching requirement is not the problem in examples that attempt subject PG licensing like (28) above, we can modify these examples to attempt licensing of these subject PGs by movement of subjects. This should improve these examples, if there really is a matching requirement. To give this configuration the best chance of succeeding, we should use cross-clausal subject movement, which we've seen in (26) above can license non-subject PGs. Even when we control for these factors, a PG in the subject position of an adjunct fails:

- (30) *Subject movement cannot license subject PG*
- Who₁ did you say [t_1 is a jerk] [because **they**/*PG₁ ate your lunch?]
 - That's the guy who₁ I will suspect [t_1 hates dogs] [if **he**/*PG₁ turns out to have a cat].
 - Remind me what₁ you told us [t_1 now disgusts you] [since **it**/*PG₁ gave you a stomachache]

⁸Franks (1992, 1993) and Asarina (2011) show that in Slavic, multi-gap constructions like PGs, ATB movement, and right node raising require both gaps and the "filler" to match in case. Importantly, these languages have rich morphological case, and mismatches in case in such constructions are ameliorated when the case of the "filler" is syncretic or ambiguous, such that it could correspond to the cases of both gaps. This suggests that such matching effects are a concern of Phonological Form, and therefore irrelevant in English, which lacks case (except in pronouns, which are not relevant for the configurations under examination).

Since it is clear that a matching violation is not responsible for this unacceptability, we have good reason to instead look for a structural problem. I argue that anti-locality is the constraining structural factor, as I show next.

Recall that as described in the previous section, PGs are formed by movement of an operator from the PG position, to the edge of the island:

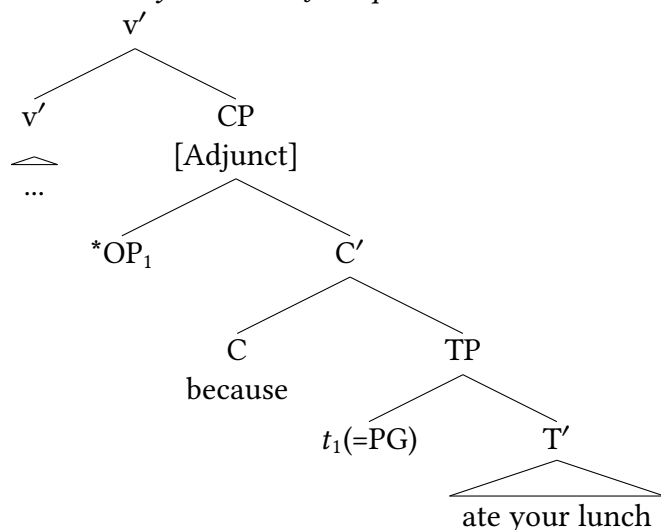
- (31) *Operator movement within containing island*
 Who₁ did you forget about t₁ [[OP after talking to t_{OP}(=PG₁)]]?

In the case of a PG in the subject position of a mono-clausal adjunct, it would be necessary for the operator to move from spec-TP to the edge of the island. I hypothesize that such clausal adjuncts are CPs, which are headed by words like *because*, *after*, *if* and so on. To form a subject PG in such adjunct CPs, it would be necessary for an operator to move from spec-TP to spec-CP. However, such movement is banned by anti-locality:⁹

- (32) *Operator movement from subject position within island is impossible*
 * Who₁ did you [_{vP} say [t₁ is a jerk] [_{CP} OP because [_{TP} t_{OP}(=PG₁) ate your lunch]]]?

Thus anti-locality accurately predicts the unacceptability of PGs in the subject position of mono-clausal adjuncts.

- (33) *Anti-locality blocks subject operator movement in mono-clausal adjunct*



However, subject PGs are not totally ruled out, as we will see next.

4.3 PGs are permitted in embedded subject position

The above analysis predicts that subject PGs should succeed when the PG is the subject of an embedded TP in a bi-clausal adjunct. This is because operator movement from the lower TP to the higher CP edge in such a structure would not violate anti-locality. Engdahl (1983), Browning (1987), and Munn (1992) report examples that fit this description. These works report such examples as at least somewhat marked, and speakers I have consulted agree that this is so. However, they maintain that there is a clear contrast between these examples,

⁹It would not matter if words like *after* and so on are in fact instances of P in these structures, since movement from spec-TP to the specifier of an immediately dominating PP would still be banned by anti-locality.

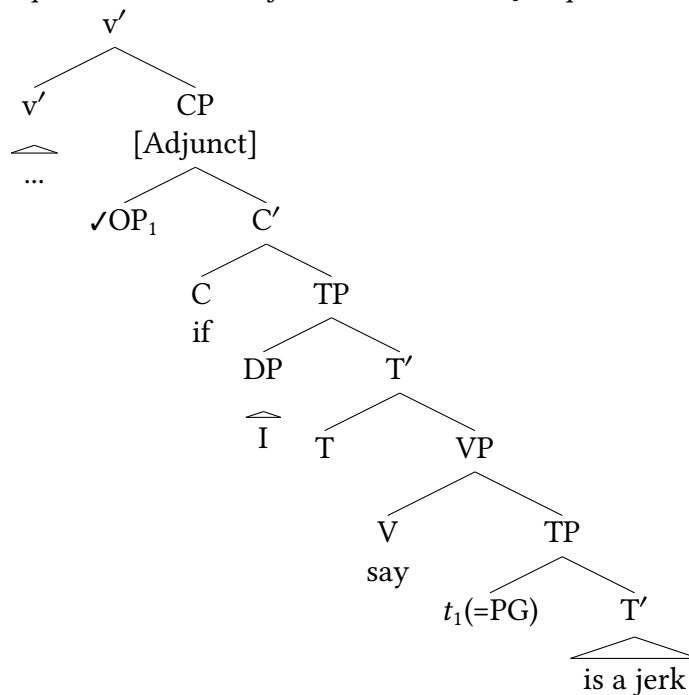
and the totally unacceptable subject PG examples like those in (28) and (30) above which use mono-clausal adjuncts.

(34) *PGs in embedded subject position*

- a. ? This is the student \emptyset_1 everyone thinks t_1 is clever [because John said [_{TP} PG₁ was clever]]
(Engdahl, ex. 59)
- b. ?? the person \emptyset_1 that you consulted t_1 [because you thought [_{TP} PG₁ understood the problem]]
(Browning 1987)
- c. ? Who₁ did you avoid t_1 [after Mary said [_{TP} PG₁ is a jerk]]?
- d. ? Let me tell you [which students]₁ I punished t_1 [after finding out [_{TP} PG₁ have been stealing my cookies]].

That such examples should be relatively acceptable is precisely what we expect, since the required operator movement in this scenario does not violate anti-locality. This is diagrammed in (35) below, where we see that movement of the operator from the embedded TP to the specifier of the CP in the clause above crosses over at least the higher VP and TP:

(35) *Operator movement from embedded subject position respects anti-locality*



The PGs in the configuration just discussed are the subjects of embedded TPs. In section 2, we saw that subject extraction from embedded TPs is permitted, but not from embedded CPs, or at the very least, CPs headed by the overt complementizer *that*. All things being equal, we expect this *that*-trace effect to also apply to movement of PG operators: movement of such an operator from an embedded CP should have an anti-locality issue, just as movement of an overt phrase does. Munn (1992) reports an example that verifies this prediction, and speakers I have consulted generally agree that this is so.¹⁰

¹⁰Though one speaker reports that such examples are unacceptable with or without the complementizer. More puzzlingly, another states that they generally lack the *that*-trace effect, but detect it in examples like (36).

- (36) *That-trace effect for embedded subject PG*
 (Adapted from Munn 1992, ex. 49a)
 Who₁ did John support *t*₁ [after Mary said (*that) PG₁ would win]?

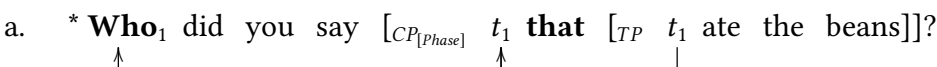
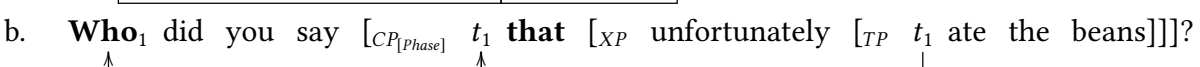
This fact demonstrates yet another way in which operator movement respects anti-locality.¹¹

We have now seen that both subjects and objects are capable of PG-licensing in principle, though licensing by subject movement requires a more specific structure. Furthermore, we have also seen that both subject and object PGs are possible, though subject PGs require a biclausal structure in order to avoid anti-locality.¹² In the next section, I show another correct prediction of the anti-locality hypothesis, regarding the licensing of PGs by subjects.

4.4 PG-licensing by subjects through adjunct amelioration

In (24) above, we saw that clause-internal subject A-bar movement from spec-TP to spec-CP, if it even occurs, cannot license PGs. As I discussed, this is expected given the observation that a PG-containing constituent must be structurally crossed by movement of its licenser, assuming that PG-containing adjuncts are merged below TP (in VP/vP). The facts about PGs in subject positions discussed above are consistent with theories in which movement from spec-TP to spec-CP is impossible in any case, due to anti-locality. If this is so, then in examples like (24) we even more so do not expect PG-licensing by the subject to succeed, since these subjects are frozen in place by anti-locality.

If clause-internal subject A-bar movement from spec-TP to spec-CP (whether for an operator or an overt phrase) is banned by anti-locality, then we expect the inclusion of additional structure between TP and CP to facilitate such movement. As we discussed in section 2, patterns of this sort have been observed for the *that*-trace effect, which is ameliorated by the addition of a high adjunct in this position:

- (37) *The that-trace effect and its repair*
- a. * **Who**₁ did you say [_{CP[Phase]} *t*₁ **that** [_{TP} *t*₁ ate the beans]]?

- b. **Who**₁ did you say [_{CP[Phase]} *t*₁ **that** [_{XP} unfortunately [_{TP} *t*₁ ate the beans]]]?


It is thus worth asking whether clause-bounded subject movement can also be permitted by use of an adjunct in this way. Importantly, if such a configuration actually has subject movement in it, we should be able to detect that movement by placing a PG in the adjunct. This is because, as discussed above, a PG is only possible when the constituent that contains it is structurally crossed over by the licensing phrase. An example that verifies this prediction is reported by Haegeman (1984), and the speakers I have consulted agree that this is productive:

¹¹Furthermore, we expect use of an adjunct below the embedded complementizer to repair a *that*-trace effect caused by a PG operator. I have not had the chance to systematically investigate this prediction, though in my own judgment, the expected amelioration occurs:

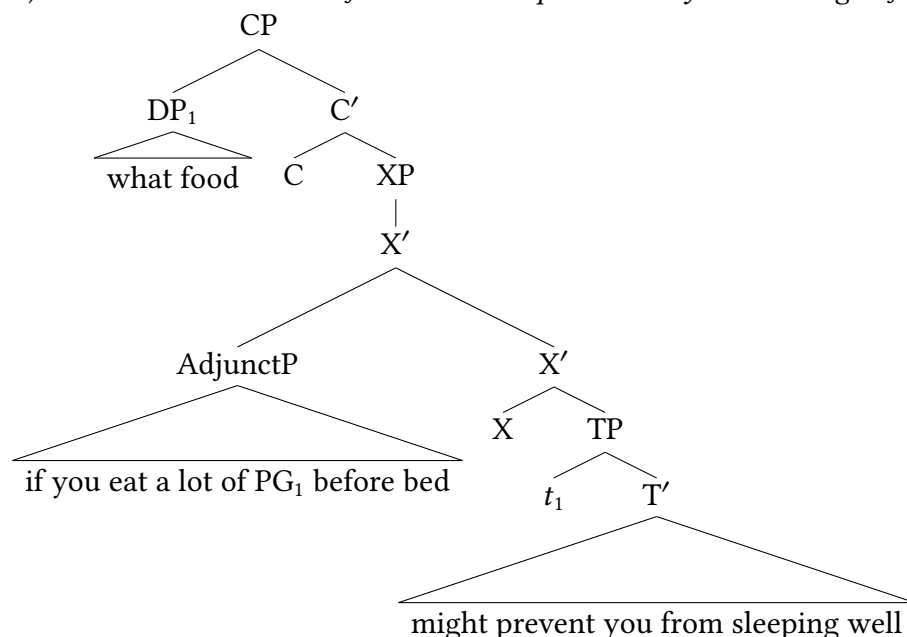
- (i) Who₁ did John support *t*₁ [after Mary said **that probably** PG₁ would win]?

¹²The analysis presented here is also compatible with an ATB extraction analysis of PGs. Under such an analysis, the normal gap and PG are both formed by genuine movement paths, which unite at a higher point in the structure, resulting in one moved phrase visible on the surface which corresponds to two gaps. Assuming that CP is a phase, the movement path within the adjunct clause would need to reach spec-CP before moving on out of the adjunct. However, if that movement is initiated from spec-TP, anti-locality will prevent such a derivation from succeeding.

- (38) *Intervening adjunct facilitating clause-internal subject movement and PG licensing*
- a note which₁ [unless we send back PG₁] t₁ will ruin our relationship (Haegeman, ex. 9)
 - Let me tell you who₁, [despite nobody liking PG₁ at all], t₁ is probably gonna get promoted.
 - [What food]₁, [if you eat a lot of PG₁ before bed], t₁ might prevent you from sleeping well?

This is precisely what the anti-locality theory predicts, as the following tree illustrates:

- (39) *Clause-bounded subject movement permitted by intervening adjunct*



While anti-locality normally bans subject movement from spec-TP to spec-CP, the additional structure in the above configuration makes this movement possible. Since this movement does structurally cross the intervening adjunct, the moved phrase can license a PG in that adjunct, as we expect. This fact thus shows us yet another way that anti-locality correctly predicts the interaction between subjects and PGs.

The considerations just discussed make a prediction about adjunct amelioration and subject PGs, which I will show turns out to be incorrect. I argue that this fact provides evidence that the structural periphery of PG-hosting adjunct clauses is relatively impoverished.

5 No anti-locality circumvention in adjunct clauses

I have argued that anti-locality prevents the formation of PGs in the subject position of monoclausal adjuncts, since the needed operator movement would be too short:

- (40) *Failed operator movement from subject position within island*
 * Who₁ did you [_{vP} say [t₁ is a jerk] [_{CP} OP because [_{TP} t_{OP}(=PG₁) ate your lunch]]]?
 ↑

We predict that the addition of an adjunct between TP and CP in the PG-containing adjunct should facilitate operator movement, and make such a subject PG acceptable. However, the speakers that I have consulted agree that adjunct amelioration does not seem to succeed here:

- (41) *No PG in subject position, even with intervening adjunct*
- * Who₁ did you slap t₁ [because **unfortunately** PG₁ ate your lunch]?
 - * What₁ will you eat t₁ [if **eventually** PG₁ is confirmed to be healthy]?
 - * That's the guy who₁ I fired t₁ [after **surprisingly** PG₁ insulted me]

These examples would be unacceptable, regardless of whether anti-locality is violated or not, if the relevant adjuncts cannot actually be attached in this position in such clauses. However, these adjuncts seem to be acceptable in of themselves. We can see this by taking the above PG examples and replacing the PGs with pronouns:

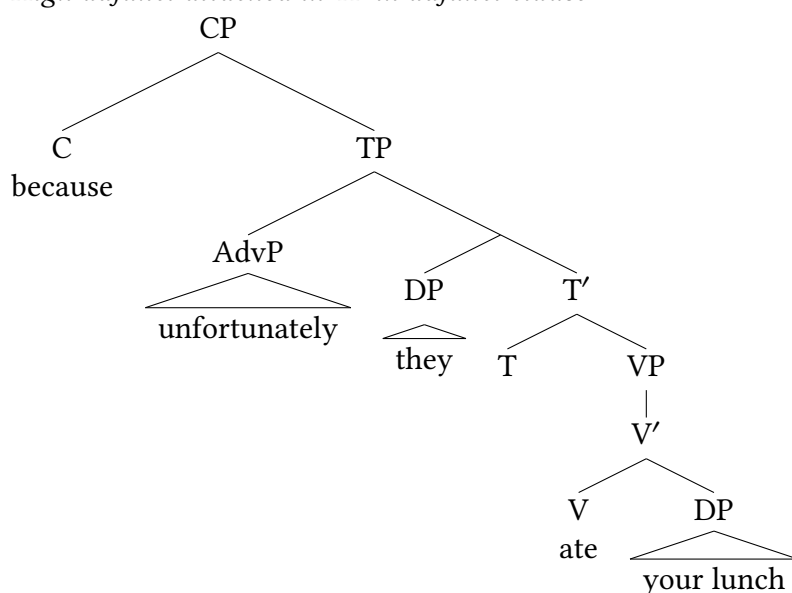
- (42) *High adverbs allowed in clausal adjuncts*
- Who₁ did you slap t₁ [because **unfortunately** they₁ ate your lunch]?
 - What₁ will you eat t₁ [if **eventually** it₁ is confirmed to be healthy]?
 - That's the guy who₁ I fired t₁ [after **surprisingly** he₁ insulted me.]

I suggest that this fact emerges from a difference in the structures possible in the left periphery of CPs headed by *that*, versus the adjunct CPs that can host PGs. As mentioned above, several relevant works argue that adverbs ameliorate the *that*-trace effect due to introducing additional structure between TP and CP, as (43) below shows again. In this structure, the presence of the XP containing the adverb is what is vital:

- (43) *Adverb resolves that-trace effect by introducing more structure*
Who₁ did you say [_{CP} t₁ **that** [_{XP} unfortunately [_{TP} t₁ ate all the beans]]]?

I propose that this XP can be merged in complement *that*-CPs, but not sentential adjunct CPs. However, if this intervening XP cannot be merged in adjunct clauses, we must ask why the high adverbs in examples like (42) are possible. I argue that the high adjuncts in such examples are merged in the TP edge, rather than being hosted by an additional projection. This is illustrated in (44) below, which diagrams the adjunct clause of (42a) above:

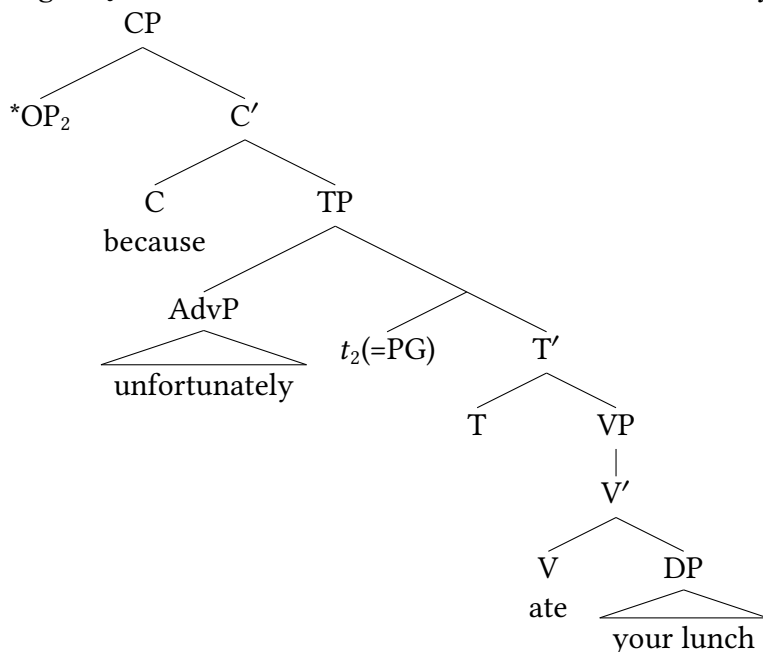
- (44) *High adjunct attached in TP in adjunct clause*



Placing an adjunct above the specifier of TP in this way does not sit well with a conservative view of the X-bar theory. However, this tension dissolves if we abandon X-bar levels as a primitive of syntactic structures (as in a *bare phrase structure* theory; Chomsky 1995) and

thus treat specifiers and adjuncts as fundamentally structurally parallel (as in, for instance, Bošković 2016). Importantly, if the only way to include a high adjunct in the sorts of sentential adjuncts that host PGs is as illustrated in the above tree, then we do not predict that anti-locality avoidance is possible here. This is because in this situation the adjunct is not hosted by an additional XP that dominates TP, but is instead contained by TP. Since there is thus no phrase below CP that dominates TP, anti-locality will still ban operator movement from spec-TP to spec-CP. The tree in (45) below illustrates this by diagramming the adjunct from (41a) above:

(45) *High adjunct attached in TP doesn't circumvent anti-locality*



In summary, my proposal is that in *that*-CPs (and main clauses, as discussed in section 4.4 above) an additional XP can be merged between TP and CP to host high adjuncts. This allows anti-locality avoidance. The same cannot occur in adjunct clauses like those which host PGs. At best, in such structures high adjuncts can be merged in TP, though this does not allow anti-locality circumvention. This analysis entails that the left periphery of the relevant adjunct clauses is relatively structurally impoverished. Assuming that *that*-CPs are essentially matrix-like, this result aligns with the known tendency for embedded clauses to allow less syntactic phenomena than main clauses. Ross (1973) termed this the *Penthouse Principle*. See also Hooper and Thompson (1973) for discussion of a variety of syntactic phenomena that distinguish matrix (“root”) and embedded clauses.

6 Conclusion

I have argued that the interaction between PGs and subjects in English is productive, except when anti-locality interferes. Anti-locality accurately bans subject PGs in mono-clausal adjuncts, but permits embedded subject PGs.¹³ Furthermore, while anti-locality predicts an

¹³Munn (1992) proposes that this contrast is due to the Empty Category Principle, which (among other effects) prevents a trace in spec-TP from being appropriately “governed” by an antecedent moved phrase in spec-CP, because C is a barrier for the government relation. See Chomsky (1986) for further discussion. The Empty Category Principle thus correctly rules out clause-internal movement of either an overt phrase, or a PG-forming

absence of clause-internal subject A-bar movement in the basic case¹⁴ (which many works have independently proposed), anti-locality also correctly predicts that such movement can be facilitated by inclusion of a high adjunct—a fact which PGs allow us to verify. Finally, we saw that such amelioration by adjunction fails in PG-hosting adjunct clauses, which I argued indicates that such clauses do not allow the merger of the needed additional structure.

6.1 A note on another analysis of subject A-bar movement

There is a third analysis of subject *wh*-phrases that I have not discussed above: that such phrases move directly from their θ -position, presumably spec-vP, to spec-CP. See Messick (2020) for a recent overview of arguments for this hypothesis.

- (46) *Subject A-bar movement directly to spec-CP*
 $[_{CP} \text{ Who } [_{TP} \text{ will } [_{vP} t \text{ eat the cake }]]]?$
-

Such a theory is not obviously compatible with the findings of this paper. However, there are arguments that *wh*-subjects do indeed reach spec-CP in at least some contexts. For instance, if A-bar movement in relative clauses occurs to trigger Predicate Abstraction, which makes the relative CP the right type to combine with NP (Heim and Kratzer 1998), then for semantic reasons the *wh*-subject of a relative clause should be forced to move. While in this paper I have argued for a theory that typically rules out movement of subjects to the spec-CP of the same clause, it is possible that different A-bar constructions have other properties, and that such movement can be forced under certain conditions. Indeed, we have seen in this paper that subject movement to CP does succeed in situations where anti-locality can be avoided, and it is possible that there are yet more ways this can be achieved. Furthermore, Erlewine (2016) argues that anti-locality is not an absolute principle, but rather a violable constraint.

operator, from spec-TP to spec-CP. However, it is not clear that the Empty Category Principle can account for contexts where the addition of an adjunct facilitates movement from spec-TP to spec-CP, though we have seen multiple such cases in this paper. Specifically, even if there is another XP between these two phrases, the result of such movement is that C intervenes between the trace in spec-TP and the moved phrase in spec-CP, which should cause a failure of government. The anti-locality theory defended in this paper, however, does not have to deal with this complication.

¹⁴The arguments of this paper make a more general prediction: that PGs should be impossible in any situation where the corresponding operator would have to move in an anti-locality violating way. I am aware of one other potential case like this, involving PGs in DPs. It is generally possible for DPs to contain PGs. Below we see some instances of PGs in subjects:

- (i) a. Who₁ would [every student of PG₁] love to throw a pie at *t*₁?
 b. Tell me who₁ [a statue of PG₁] would surprise *t*₁

Nissenbaum (2000) argues that the syntax and semantics of such configurations is fundamentally the same as for PG-containing adjuncts. Presumably, in such examples there is operator movement from the PG position to the DP edge. The examples in (i) above involve PGs in PP complements of NP, and operator movement from this position to the DP edge certainly respects anti-locality. However, consider what we predict for a configuration with a PG inside of a DP that is contained by a PP. It is common to assume that DP is a phase (Bošković 2005, 2016, a.o.). If so, a PG-forming operator would need to move through spec-DP on its way to the edge of PP in order to derive a PG in a DP in a PP. However, notice that movement from spec-DP to spec-PP would violate anti-locality, since PP directly dominates DP. Consequently, we predict a PG inside of a DP that is in a PP to be unacceptable. I have not had the opportunity to test this prediction, though my own judgments fit it:

- (ii) a. * This is the guy who₁ it seems [to every student of PG₁] that I told a very mean joke about *t*₁
 b. * Remind me who₁ you told an awful rumor about *t*₁ [to every friend of PG₁]

If this is correct, then we indeed expect anti-locality to sometimes be superseded by other factors. A united analysis of all *wh*-subject phenomena is a goal that is beyond the scope of the current paper, and one that has remained elusive for some time. This paper, hopefully, has shed light on a particular subset of relevant phenomena.

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