

Precedence-sensitive A-movement in Locative Inversion

Zachary Feldcamp

1. Introduction

This paper is concerned with the syntactic locality properties of PP movement in English locative inversion (1a) in comparison with DP A-movement (1b) and PP \bar{A} -movement (1c).

- (1) (a) To the refugees were given various supplies. (Locative inversion)
- (b) Various supplies were given to the refugees. (Raising of VP-internal DP subject in passive)
- (c) To the refugees there were given various supplies. (PP topicalization with expletive subject)

The PP of locative inversion (LocInv) is known to exhibit certain properties characteristic of A-moved DP subjects, and others of \bar{A} -moved topics (Stowell 1981). Yet the syntactic locality profile of LocInv has not been systematically investigated with regard to the A/ \bar{A} distinction. This paper makes two empirical contributions towards this endeavor. First, I show that LocInv exhibits A-movement locality in prohibiting PP subextraction from DP, in contrast with topicalization and other forms of \bar{A} -movement. Second, I provide novel data showing that DP must be linearized to the right of AdjP secondary predicates and other VP-internal material resistant to extraposition, corroborating the long-standing hypothesis of Rochement (1978) and others that focus postposing is obligatory in LocInv. I propose that this condition is captured straightforwardly if movement always targets the leftmost potential goal. Ordinarily, DP precedes PP, so that DP raises; if DP undergoes rightward focus movement, however, PP precedes DP, so that PP raises.

2. A-movement locality in subextraction

In this and the following section we diagnose the syntactic locality of LocInv by its sensitivity to the presence of intervening DPs. This allows us to adjudicate between different analyses of LocInv, which disagree as to the A- vs. \bar{A} -status of the PP movement involved in LocInv. We consider two prominent hypotheses. According to the *PP raising hypothesis*, PP undergoes A-movement to spec,TP, which I assume to be triggered by ϕ -Agree (e.g., Doggett 2004; cf. Bresnan 1994). The *null expletive hypothesis*, in contrast, holds that PP undergoes \bar{A} -movement to spec,CP, licensing a null expletive subject *there*_Ø in spec,TP, so that (1a) and (1c) are structurally identical (e.g., Postal 2004, Bruening 2010). In this section, we use a diagnostic motivated by the Müller-Takano generalization to examine intervention by dominating DPs. The results support the PP raising hypothesis.

2.1. Assumptions about subextraction

I assume that long-distance dependencies in syntax involve the operation Agree, which relates a head or *probe* $H_{[uF]}$ for the feature [F] with an XP *goal* that bears [F] (Chomsky 2000, 2001; et seq.). H may be specified to attract its goal to the specifier position of HP; I mark this property with an asterisk on the relevant feature of the probe (e.g., $H_{[uF*]}$), adopting notation from Adger (2003). The locality profile of

* Zachary Feldcamp, Massachusetts Institute of Technology, feldcamp@mit.edu. Many thanks to David Pesetsky for his guidance on this project. For insights, judgements, and feedback on various parts of this work, I also thank Michel DeGraff, Ksenia Ershova, Christopher Legerme, Haoming Lu, Norvin Richards, Parker Robbins, Bergül Soykan, and Zhouyi Sun. I apologize for any omissions.

a given construction involving movement is then described by the conditions under which movement of $XP_{[F]}$ is blocked by an “intervening” node YP in some structural relation to $H_{[uF*]}$ and $XP_{[F]}$.¹

Let us first consider cases where the relevant structural relation is domination; that is, where $H_{[uF*]}$ c-commands YP and YP dominates (i.e., contains) $XP_{[F]}$. I assume that a relevant locality condition that holds in such cases is what Müller (2011) terms the “F-over-F principle,” formulated in (2).

- (2) *F-over-F Principle* (e.g., Müller 1996, Sauerland 1999, Fukui 2006; cf. Bresnan 1976)

The structure $[H_{[uF*]} \dots [YP[\dots F \dots] \dots XP[\dots F \dots] \dots] \dots]$, may not involve Agree between H and XP.

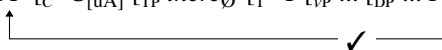
The F-over-F principle is relativized to the feature [F] of the probe H. Whereas the classical A-over-A principle of Chomsky (1968) incorrectly bars subextraction of one constituent from another of the same category, the F-over-F principle permits it (3). What the F-over-F principle rules out is movement of XP to satisfy a probe for [uF*] (e.g., $[uw h^*]$), when YP dominating XP could alternatively have done so. In (4), movement of DP_1 is illicit because the $DP_{[wh]}$ dominating it could itself have moved, as in (5) (Müller 2011: 153ff.).²

- (3) $[_{DP} \text{What songs}]_1$ have you learned $[_{DP} \text{parts of } t_1]$? (✗ A-over-A; ✓ F-over-F)
 (4) $*[_{DP[wh]} \text{What songs}]_1$ have you learned $[_{DP[wh]} \text{how many parts of } t_1]$? (✗ A-over-A; ✗ F-over-F)
 (5) $?[_{DP[wh]} \text{How many parts of } [_{DP[wh]} \text{what songs}]]_1$ have you learned t_1 ? (✓ A-over-A; ✓ F-over-F)

2.2. Predictions for subextraction in locative inversion

The first empirical contribution of this paper is to show that the F-over-F principle gives us a diagnostic for the A- versus \bar{A} status of the PP movement in LocInv, and that the results of this diagnostic support an A-movement (or PP raising) analysis. Suppose that PP is base-generated within DP, as in cases where the head noun N of DP lexically selects (l-selects) for the preposition P that heads PP. The null expletive hypothesis predicts that PP may cross the dominating DP (6), because PP is attracted by an \bar{A} -probe on C and DP may lack an \bar{A} -feature. That is, the F-over-F principle is not violated.

- (6) *F-over-F predicts DP not to intervene for \bar{A} -movement of PP*

$[_{CP} PP [_{C'} C_{[u\bar{A}]} [_{TP} there_{\emptyset} [_{T'} T [_{VP} \dots [_{DP} \dots PP_{[\bar{A}]} \dots] \dots]]]]]]$


Next, consider the predictions of the PP raising hypothesis. In general, A-movement to spec,TP occurs because T bears a probe $[u\phi^*]$, attracting a goal bearing $[\phi]$. I assume that all DPs bear some ϕ -features, so that DPs always intervene for A-movement in a relevant structural configuration (van Urk 2015). The nature of the hypothetical ϕ -feature borne by a raised PP is unclear, but let us notate it as $[\phi: LOC]$, remaining agnostic as to its true nature.³ The PP raising hypothesis predicts that PP may *not* cross a dominating DP (7), because DP is a closer goal to spec,TP, under the F-over-F principle.

¹ We are concerned here with phrasal movement. Whether head movement and phrasal movement are subject to the same locality principles is an interesting question that is beyond the scope of this paper.

² The cases motivating the A-over-A condition involved what today are considered definite NP island effects. This is irrelevant to the ungrammaticality of (4)—there is no definiteness effect in *there* sentences like (i).

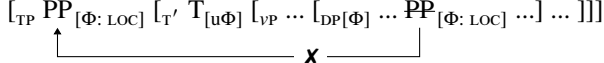
(i) Just how many students were there at the demonstration? (Keenan 2003: 188, ex.1f)

The F-over-F condition is motivated by the Müller-Takano generalization, according to which α -movement of XP out of YP followed by α -movement of YP is less acceptable than α -movement of YP followed by α -movement of XP out of YP, where α ranges over scrambling, *wh*-movement, etc. (e.g., Takano 1994, Kitahara 1994, Müller 1996).

³ LocInv bleeds person agreement with the postposed DP, as is expected if PP bears a person feature (i). This is only weak evidence for a person feature on PP, however, because person agreement generally tends to be hyper-local (Baker 2008).

(i) In this picture is/*am me, and in that one is/*are you (Longenbaugh 2019: 65, ex.6a)

- (7) *F-over-F predicts DP to intervene for A-movement of PP*

$$[_{TP} PP_{[\Phi: LOC]} [_{T'} T_{[u\Phi]} [_{VP} \dots [_{DP[\Phi]} \dots PP_{[\Phi: LOC]} \dots] \dots]]]$$


The two sets of predictions are tested by considering the interaction of extraction site (VP-internal versus NP-internal) and movement type (LocInv versus Topicalization). In an informal survey of native speakers, the results of the F-over-F diagnostic are shown in Table 1.

	Topicalization	LocInv
PP l-selected by verb	✓	✓
PP l-selected by noun	✓	✗

Table 1: Results of the F-over-F diagnostic.

Consider the root $\sqrt{\text{RESPOND}}$, which l-selects for a PP headed by *to* in both a nominal and a verbal frame. When a *toP* is l-selected in a VP headed by the verb *respond*, the *toP* may undergo either topicalization (8a) or LocInv (8b).⁴

- (8) (a) [To the call for papers]₁ there had [_{VP} *responded* *t*₁] too many linguists. (PPTop+*there*)
 (b) [To the call for papers]₁ had [_{VP} *responded* *t*₁] too many linguists. (LocInv)

The crucial cases, however, involve a *noun* l-selecting for PP, as in (9), where DP dominating PP is an argument of the adjectival predicate *available*. Here, we find a strong contrast: PP may subextract via topicalization (9a) but *not* via LocInv (9b). Note that subextraction is sensitive to islands dominating DP (9c), indicating that PP indeed moves from a position local to the selecting N.

- (9) (a) [To that objection]₁, there is [a satisfying *response* *t*₁] available. (PPTop+*there*)
 (b) *[To that objection]₁ is [a satisfying *response* *t*₁] available. (LocInv)
 (c) *[To that objection]₁, there are linguists upset [because there is [no satisfying *resp.* *t*₁] avail.]

It is not necessary to choose an adjectival predicate in cases where PP is l-selected by a noun. The same contrast may be observed when a verbal predicate is chosen, for instance *make* in (10-11).

- (10) *Deduct + from; LocInv vs. PP topicalization; VP extraction site*
 (a) From the red teams's score, there have been deducted too many points. (PPTop+*there*)
 (b) From the red teams's score have been deducted too many points. (LocInv)
 (11) *Deduct + from; LocInv vs. PP topicalization; NP extraction site*
 (a) From the red teams's score, there have been too many deductions made. (PPTop+*there*)
 (b) *From the red teams's score have been too many deductions made. (LocInv)

The asymmetry between LocInv and \bar{A} -movement extends to cases involving PP relativization and PP *wh*-movement (12-13). The contrasts are slightly less strong, however, due to the independent markedness of LocInv involving relativization or *wh*-movement of PP (and the definiteness effect in (13a) and (13c)).

- (12) *Deduct + from; LocInv vs. PP relativization; VP vs. NP extraction site*
 (a) The red team's score, from which there have been deducted too many points, ... (PPRel+*there*)
 (b) ?The red team's score, from which have been deducted too many points, ... (PPRel+LocInv)
 (c) The red team's score, from which there have been too many deductions made, ... (PPRel+*th.*)
 (d) *The red team's score, from which have been too many deductions made, ... (PPRel+LocInv)

⁴ For some speakers, *there*-sentences and LocInv are degraded with unergative verbs. What is relevant here is that there is little, if any, contrast between the acceptability of PP topicalization in *there*-sentences and LocInv, in cases where PP is l-selected by a verb.

- (13) *Deduct + from; LocInv vs. PP wh-movement; VP vs. NP extraction site*
- (a) ?From which team's score have there been deducted the most points? (PP_{wh}+there)
 - (b) ?From which team's score have been deducted the most points? (PP_{wh}+LocInv)
 - (c) ?From which team's score have there been the most deductions made? (PP_{wh}+there)
 - (d) *From which team's score have been the most deductions made? (PP_{wh}+LocInv)

In summary, the PP raising analysis of LocInv correctly predicts a dominating DP to intervene for movement of PP, whereas the the null expletive analysis incorrectly predicts LocInv via subextraction to be grammatical, as for \bar{A} -extraction of PP in *there*-constructions.

In the literature may be found other proposals about the PP movement in LocInv beyond those considered above. It has been suggested in recent years that PP undergoes a kind of composite A-/ \bar{A} -movement (Chou 2020, Bošković 2024), which captures topic-like properties of LocInv that are not treated here. The data presented above restrict what kind of composite movement this may be: T could potentially bear a disjunctive probe [$\phi \vee \bar{A}$] but not a conjunctive one [$\phi \wedge \bar{A}$]. A disjunctive probe is specified to attract the closest constituent bearing either disjunct, barring subextraction of $XP_{[\bar{A}]}$ out of $DP_{[\phi]}$, for instance, mimicking A-movement locality. A conjunctive probe, on the other hand, attracts the closest constituent bearing *both* relevant features, and is therefore expected to be able to bypass a dominating DP that lacks an $[\bar{A}]$ -feature. For the purposes of this paper, I assume that T bears a simple [ϕ] probe, though the disjunctive probe hypothesis is promising and should be considered in future work.

3. Subversion of A-movement locality via DP postposing

3.1. HNPS ameliorates apparent F-over-F violations

In the previous section we saw that LocInv exhibits A-movement locality with respect to the F-over-F principle, where the grammaticality of subextraction via \bar{A} -movement contrasts with the ungrammaticality of subextraction in LocInv. Surprisingly, however, F-over-F violations in LocInv involving subextraction are partially ameliorated when DP is focused in a postverbal position, as independently occurs in heavy NP shift (HNPS). Despite the somewhat marginal status of such constructions, they contrast strongly with their counterparts in which postposing does not occur, as is evident in (14)-(16).

- (14) To this problem has recently been ⟨*a possible solution⟩ discovered ⟨?a possible solution⟩.
- (15) From the red team's score have been ⟨*too many deductions⟩ made ⟨?too many deductions⟩.
- (16) To that cause may still be ⟨*widespread devotion⟩ found ⟨?widespread devotion⟩.

3.2. The Stowell-Rezac contrast

The ameliorating effect that HNPS has for violations of A-movement locality described above for domination may also be observed in cases involving what appears to be c-command locality. Stowell (1981) and Rezac (2006) discuss a contrast in which a pre-predicate DP in a copular construction intervenes for movement of PP out of VP in LocInv (17b) but does not intervene in PP topicalization (17c), and does not intervene in LocInv when DP follows the predicate (17d). The bracketing is that of Stowell, who follows Rochement (1978) in analyzing cases like (17d) as involving HNPS.

- (17) (a) There was [_{VP} [*an alcoholic*] [_{V'} sitting [_{in the room}]_I]]. (Stowell 1981: 275, ex.47a)
- (b) *[_{In the room}]_I was [_{VP} [*an alcoholic*] [_{V'} sitting *t*_I]]. (ibid. p. 275, ex.50)
- (c) [_{In the room}]_I there was [_{VP} [*an alcoholic*] [_{V'} sitting *t*_I]].
- (d) [_{In the room}]_I was [_{VP} *t*_I [_{V'} [_{V'} sitting *t*_I] [*an alcoholic*]]] (ibid. p. 276, ex.51).

3.3. Evidence for postposing in locative inversion

To explain why A-movement locality conditions are obviated when DP is in a post-predicate position, I first show that LocInv *always* involves HNPS. That LocInv involves focus on DP has been argued for

by Rochemont (1986), Bresnan (1994), and Birner & Ward (1998), among others. Notice, for instance, that in a *wh*-question, the would-be DP subject of LocInv felicitously corresponds to the *wh*-phrase (18), but does not felicitously correspond to backgrounded material (19).

- (18) Q: What will be awarded to the player with the most points?
 A: To the player with the most points will be awarded a grand prize of \$1,000.
- (19) Q: Who will the grand prize of \$1,000 be awarded to?
 A: #To the player with the most points will be awarded the grand prize of \$1,000.

The main empirical contribution here, however, is to provide evidence that the DP of LocInv is not only focused, but is in fact in a position to the right of its base-generated position, for which Pesetsky (1994) and Doggett (2004) have argued based on word-order in verb-particle constructions. Pesetsky (1994) shows that a DP internal argument must occur to the right of verb particles (20) and that there is a somewhat weaker preference for DP to occur after recipients (21). However, various authors have pointed out that DP may precede VP adverbs (22), suggesting that DP may remain in situ in LocInv (e.g., Culicover & Levine 2001, Bruno 2016).

- (20) To the stockholders were sent ⟨*several brochures⟩ out ⟨sev. brochures⟩. (Pesetsky 1994: ex.19)
- (21) In this room were assigned ⟨??several important cases⟩ to him ⟨sev. imp. cases⟩ (ibid. ex.20)
- (22) Into the room walked Robin carefully. (Culicover & Levine 2001: 292 ex.18b)

But there is no reason to expect run-of-the-mill PPs and AdvPs to diagnose the position of DP, given that both categories are relatively free in their right-adjoined positions, presumably due to the poorly understood operation of “extraposition.” In order to diagnose the position of DP, one must instead consider its position relative to categories that are more or less fixed in their positions. It is unclear if particles are one such category, given the debate on the nature of particle shift. Instead, we consider here (i) AdjP secondary predicates of small clauses, (ii) and subcategorized material of various categories.

Small clause constructions involve an information-structurally neutral word-order of DP-XP, where XP is the predicate of the small clause, indicating an underlying structure in which DP asymmetrically c-commands XP from a left specifier (e.g., Hoekstra 2004). In (23a) we see that the verb *render* selects for a DP-AdjP small clause. If PP raises to spec,TP in such a construction, however, we see that the word-order must be AdjP-DP (23b), which is explained if DP must be postposed in LocInv. Obligatory postposing after AdjP predicates may be similarly observed for unaccusative verbs selecting for small clauses (24) and for copular constructions (25).

- (23) (a) In this chamber, we will render ⟨various toxins⟩ inert ⟨various toxins⟩.
 (b) In this chamber will be rendered ⟨*various toxins⟩ inert ⟨various toxins⟩.
- (24) On the plane has just become ⟨*one first-class seat⟩ available ⟨one first-class seat⟩.
- (25) In the US were once ⟨*large dance halls⟩ common ⟨large dance halls⟩, like this one.

Next, note that it is relatively unacceptable for extraposition to apply to material that is closely subcategorized for by V, such as when it forms part of a collocation or idiom with V (26-27) (Ernst 2004: 291).

- (26) (a) The governor signed that letter —₁ last night [in his office]₁.
 (b) ??The governor signed that bill —₁ last night [into law]₁.
- (27) (a) John took them (e.g., *his pills*) —₁ this morning reluctantly₁.
 (b) ??The audience took them (e.g., *the talks*) —₁ this morning seriously₁.

In LocInv, we find a preference for DP to occur after subcategorized PPs (28) and AdvPs (29). This is explained if DP obligatorily moves to the right periphery of VP, because then linearizing DP to the left of the subcategorized XP would require illicit extraposition of XP.

- (28) In the governor's office has just been signed ⟨??a highly controversial bill⟩ *into law* ⟨a highly controversial bill⟩.
- (29) At the conference were only taken ⟨??those presentations⟩ seriously ⟨those presentations⟩ that had copious amounts of data.

To summarize, HNPS of the DP co-argument of PP not only allows PP raising to obviate ordinary A-movement locality conditions, but in fact appears to be obligatory in the derivation of LocInv.

4. Analysis: Syntactic locality as Attract Leftmost

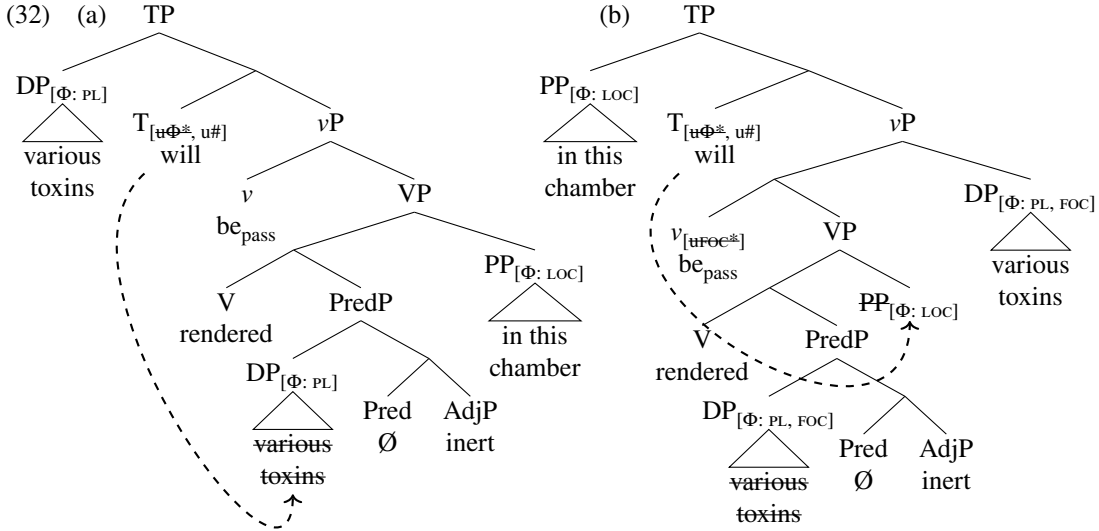
To explain the obligatoriness of HNPS in LocInv, I suggest that syntactic locality is based on precedence (i.e., linear order), rather than c-command or path-length: the “closest” potential goal to a probe is that which does not follow any other; in the case of two such potential goals, the larger is closer (30).

(30) *Attract Leftmost*

The goal of a probe $P_{[uF]}$ is the maximal leftmost phasemate of P that bears [F].

Intuitively, Attract Leftmost requires that a probe search a tree top-to-bottom, exhaustively searching left branches before right branches.⁵ In the typical case involving one potential goal c-commanding and preceding another (e.g., from a left specifier), Attract Leftmost makes the same predictions as a formulation of “closest” based on asymmetric c-command or path-length. Differences arise when (i) neither potential goal c-commands the other, or when (ii) one potential goal c-commands but *follows* another. Consider the derivation of (23b), reprinted below as (31), with reference to the trees in (32).

- (31) In this chamber will be rendered ⟨*various toxins⟩ inert ⟨various toxins⟩.



In (31/32), DP is the subject of the small clause (i.e., PredP) complement of *render* and PP is a locative adjunct to VP, so that PP underlyingly c-commands DP. In a theory of locality formulated in terms of asymmetric c-command or path length, a PP raising analysis of LocInv incorrectly predicts PP to be able to raise in (32a).⁶ What matters under Attract Leftmost, however, is precedence. In the English verb

⁵ For recent approaches to Agree that are explicitly algorithmic, see Hewett (2023), Branen & Erlewine (2022), and Ke (2023). The present approach most closely resembles a pre-order tree-traversal algorithm.

⁶ This follows from either of the following definitions of “closest” and the assumption that the “closest” potential goal moves. Briefly, *C-command Attract Closest* is formulated as follows: G is closest when “there is no distinct category K such that K c-commands G and K bears a feature matching F” (Fitzpatrick 2002: 446, ex.7). Alternatively, Müller (1998) proposes that the closest category is that which has the shortest path to its potential landing site, where the length of a path from α to β is the number of nodes γ such that γ dominates α or β and is reflexively dominated by the minimal XP that dominates both α and β (Müller 1998: 130, ex.51).

phrase, DP is always base-generated to the left of PP, regardless of c-command. Then Attract Leftmost requires DP to be the goal of the [uΦ*] probe on T in (32a), yielding an ordinary passive sentence.

We expect things to be different if DP is re-ordered to the right of PP. In (32b), an optional [uFOC*] probe on *v* triggers rightward focus movement of DP to spec,νP (i.e., HNPS), so that PP precedes DP.⁷ Attract Leftmost then requires that PP raise. Thus, LocInv involves A-movement of PP that is sensitive to the precedence relation between PP and DP. To capture the fact that DP controls agreement morphology on T, I assume that, in addition to bearing a general [uφ] probe, T bears a [u#] probe that cannot be checked by PP. Once PP has moved to spec,TP, T probes a second time, finding DP and copying its features.⁸

A more striking illustration of the centrality of precedence to syntactic locality (and of the irrelevance of c-command or path-length) comes from cases where PP is base-generated in a higher clause than DP. In a raising-to-object construction (e.g., 33a), the embedded DP subject may be pronounced immediately to the right of the matrix verb; alternatively, DP may be pronounced in a right-peripheral position following matrix adverbials like locative PPs, indicating that DP has undergone HNPS to a right-adjoined position of the matrix νP (Postal 1974). When such a PP raises in LocInv, we find that the immediate postverbal position of DP is no longer available—nor is an embedded VP-internal position—DP *must* undergo HNPS to the matrix νP (33b), as diagnosed by the possibility of linearizing DP to the right of matrix adverbials, such as benefactive *for* PPs.⁹

- (33) (a) We show ⟨a novel method⟩ to be ⟨*a novel method⟩ feasible—*in this report*—⟨a novel method⟩ of reducing energy consumption.
 (b) In this report is shown ⟨*a novel method⟩ to be ⟨*a novel method⟩ feasible—(for the benefit of policy-makers)—⟨a novel method⟩ of reducing energy consumption.

Finally, consider how HNPS may ameliorate F-over-F violations, as in (34). I suggest a remnant movement derivation consisting of two rightward movements of different kinds. First, PP undergoes rightward movement via extraposition as in (35). Second, DP undergoes HNPS to the right of PP, as in (36). This results in PP preceding DP, so that PP is closer to T under Attract Leftmost.

- (34) [*To this problem*]₁ has been ⟨*[a possible solution *t*₁⟩ discovered recently—⟨?[a poss. sol. *t*₁⟩.
 (35) There has been discovered [a possible solution *t*₁] recently—[*to this problem*]₁.
 (36) ?There has been discovered *t*₂ recently—[*to this problem*]₁—[a possible solution *t*₁]₂.

5. Conclusion

In this paper I have provided a novel argument for the A-movement status of PP raising in locative inversion, based on a contrast with topicalization in the grammaticality of subextraction from DP. We saw that grammatical instances of locative inversion require that DP undergo heavy NP shift, in which case DP ceases to be an intervener for PP raising. I argued that this precedence-sensitivity is best captured by the principle Attract Leftmost. Future work should investigate the predictions of Attract Leftmost in other movement constructions and the role of precedence elsewhere in grammar.

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⁷ I assume that [uFOC*] on *v* is idiosyncratically specified to be checked in a right specifier of *v* (Doggett 2005: 55ff.).

⁸ Doggett (2004) describes agreement in LocInv in terms of the notion of phi-completeness, from Chomsky (2001).

⁹ To see that PP is indeed base-generated in the matrix clause, notice that when PP is clearly in the embedded clause, as in (i), it has a different, odd interpretation, where the report specifies the location of the feasibility, not the showing.

(i) #We show that, in this report, a novel method of reducing energy consumption is feasible.

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