

The resuscitation of CED*

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1. Abstract

Huang's (1982) Condition on Extraction Domains (CED) has been challenged in recent years both theoretically, from the move away from government, and empirically, from evidence that overt subextraction from specifiers/adjuncts is not uniformly banned. In a recent summary paper, Stepanov (2007) suggests that the challenges facing the CED are so great that it should be abandoned. This paper defends a Minimalist reinterpretation of the central observation of the CED based on Uriagereka's (1999) Multiple Spell-Out. The implication is that given a certain theory of linearization, the strong islandhood of certain kinds of specifiers and adjuncts is attributable to the requirements of the PF-interface, more specifically the need for total linear order of terminals. Differences between derived vs. externally-merged specifiers and head-initial vs. head-final phrases are argued to fall out from Uriagereka's approach if a copy theory of labeling is adopted. Initial research suggests that the behavior of adjuncts, though more complex, potentially result from the same linearization process, with the added complications that: (i) there is no selection involved in the merger of adjuncts; and (ii) for this reason late merger is also possible (cf. Lebeaux 1991). It is also proposed that this general approach to the CED allows a conceptually-motivated unification of Chomsky's notion of phase and Uriagereka's Multiple Spell-Out: a phase is any phrase with an externally merged specifier.

2. Introduction

Huang (1982) proposes the Condition on Extraction Domain (CED) to explain why the possibility of subextraction from a given category appears to interact with its syntactic position:

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(1) Condition on Extraction Domain (Huang 1982:505)

A phrase A may be extracted out of a domain B only if B is properly governed.

Thus, in English, complements of V are properly governed, whereas specifiers are not, hence subextraction from NP is possible in (2a), but not (2b):

- (2) a. Which star did you see several [_{NP} pictures [_{PP} of t]]?
b. *Which star did several [_{NP} pictures [_{PP} of t]] disgust you?

Adjuncts pattern with specifiers in failing to be properly governed and so are also predicted to behave like strong islands. In some cases, this prediction appears to hold (though minimal pairs are not easy to create for independent reasons):

- (3) a. ?Who do you wonder if you should invite?
b. *?Who will you get into trouble if you invite?

In Section 3 I consider Uriagereka's (1999) account of these facts, based on the availability of Multiple Spell-Out (MSO). Section 4 raises some empirical challenges for MSO, notably classes of adjuncts and specifiers which allow subextraction in English and other languages. In Section 5, I propose a reinterpretation of the labeling mechanism which allows constrained instances of non-opaque specifiers. In Section 6, I show that this amended version of the theory accounts for the problematic data without losing the empirical coverage of Uriagereka's approach and also provides a testable definition of phasehood. Section 7 addresses a potential problem with the proposal: overgeneration. Finally, Section 8 concludes.

3. A Minimalist Account of CED: Uriagereka (1999)

Uriagereka (1999) proposes a reformulation of Kayne's (1994) Linear Correspondence Axiom (LCA) which serves to derive the CED. He observes that the LCA contains a hidden stipulation to enable the linearization of branching specifiers. As such, the LCA can be broken down into a 'basic step' and an 'induction step':

- (4) A reworded version of Kayne's (1994) LCA
(a) Basic step: If α asymmetrically c-commands β , then α precedes β .
(b) Induction step: If α precedes β and α dominates γ then γ precedes β

The 'induction step' (4b) ensures that all of the terminals dominated by the maximal projection of a specifier precede all the heads asymmetrically c-commanded by that maximal projection. Uriagereka's proposal is to permit Spell-Out (SO) to occur as many times as necessary in the course of the derivation, so that structures can be linearized using only (4a). (4a) and the availability of Multiple SO (MSO) ensure that branching phrases are spelled out prior to insertion in a specifier or adjunct position. In Uriagereka's terms, SO serves to 'atomize' a phrase, making it into a complex word and hence a strong island (because of lexical integrity):

- (5) *Who did [_{a_picture_of_t}] cause the problem? (specifier is atomized)

Crucially complements *can* be linearized with respect to c-commanding heads without atomization, and as such are correctly predicted not to be strong islands:

- (6) **Who** have you seen **a picture of**? (complement is not atomized)

Nunes & Uriagereka (2000) extend the analysis to account for the apparent strong islandhood of ‘derived specifiers’. I use the term ‘derived specifier’ to denote phrases which enter the derivation as complements and are then internally merged as specifiers. According to Nunes & Uriagereka (2000), derived specifiers are atomized prior to internal merge as specifiers, and as such they also disallow subextraction¹:

- (7) ***Who** was [a_picture_of_t] taken [~~a_picture_of_t~~] ?

The implication is that all branching phrases must be atomized prior to external *or* internal merge in a specifier position. This has the ultimate effect that branching specifiers are ruled out altogether. Assuming, following Kayne (1994), that there is no specifier/adjunct distinction, it follows that adjuncts will also be atomized prior to external merge and hence be strong islands.

4. Empirical Problems with the Very Strict LCA

Uriagereka’s approach to the CED represents a genuine ‘minimalist’ reduction of the theory, which makes robust falsifiable predictions. However, unlike Huang’s (1982) approach, which allows for parameterization of ‘proper governors’, Uriagereka’s proposal derives directly from the LCA: a proposed universal linearization axiom. As such, the apparent prediction is that there will be no cross-linguistic variation: *all* specifiers and adjuncts in *all* languages will be atomized strong islands and specifiers/adjuncts will always occur on the left. Unfortunately, these predictions appear to be falsified by a number of phenomena. In the following sections, I briefly discuss these challenges before proposing a solution in section 5.

4.1 Subextraction from (certain kinds of) specifiers

There appear to be three different kinds of specifiers which allow subextraction: (i) derived specifiers (ii) harmonically head-final specifiers and (iii) recursively head-final phrases more generally (which are also complex specifiers in an antisymmetric model of phrase structure).

4.1.1 The special behavior of derived specifiers

As is noted by Ross (1967), Kuno (1973) and Chomsky (2008), subextraction from derived specifiers is acceptable for many speakers of English:²

- (8) a. Of which celebrity have several/*those pictures appeared recently?
b. About which topic do several/*those books seem to have been borrowed?
c. About which topic have several/*those stories been told lately.

¹ It is necessary for these phrases to be atomized prior to internal merge because of the ‘chain uniformity constraint’. Atomization of the phrase in its derived (specifier) position would create a non-uniform chain.

² The fact that it is subextraction from the nominal which is at stake is shown by the specificity effect. If the PP were not the complement of N then this interaction would be unexplained.

This is a problem for the claim that internal merge of a specifier must be preceded by atomization (cf. Nunes & Uriagereka 2000).³ Rather, it appears that derived specifiers differ from externally merged specifiers in some crucial respect.

4.1.2 The non-universality of subject islands

Many languages allow subextraction from externally/internally merged head-final specifiers (cf. Kural 1997 on Turkish, Lasnik & Saito 1992 on Japanese, Mahajan 1992 on Hindi and Stepanov 2007 for an overview):

- (9) [Op_i [Ahmet-in t_i kırma-sı]-nın beni
 Ahmet-GEN break.INF-3SG-GEN I-ACC
 üz-dü-ğü] bardak
 sadden-PAST-3SG glass [Turkish, Kural (1997:502)]
 'The glass that [Ahmet's breaking t] saddened me'
- (10) [Op_i [Mary-ga t_i yonda no]-ga akirakana yorimo
 Mary-NOM read C-NOM is.obvious than
 John-wa takusan-no hon-o yonda.
 John-TOP many-GEN book-ACC read
 'John read more books than [that Mary read t] is obvious.'
 [Japanese, Stepanov (2007:89)]

Lasnik & Saito (1992: chapter 2) explore two potential explanations of the Japanese facts. The first involves parameterising the directionality of government, building on Kayne (1983). The second explanation, which they eventually adopt, is that subjects remain inside vP in Japanese, hence are properly governed by INFL. A similar idea is also advanced by Kural (1997: 502) in relation to Turkish. These parametric explanations cannot be carried over to MSO, however, as government plays no role in Uriagereka's account and even if the subject occupies its base-generated vP-internal position in Japanese/Turkish, the fact that it occupies a specifier position rather than a complement position means that atomization will be forced nonetheless. As such, these facts remain problematic for MSO in Uriagereka's terms.

4.1.3 Object extraction in head-final languages.

A related problem for Uriagereka's approach concerns head-final languages more generally. If one assumes the LCA to be a universal principle, then it follows that head-final phrases must be derived via movement (cf. Kayne 1994). In effect, this means that head-finality involves the creation of increasingly large branching specifiers:

- (11) [TP [_{VP} Subj [_{VP} [O] V] v] T]

³ A further complication comes from the fact observed by Sauerland & Elbourne (SE) (2002: 304) that subextraction from derived specifiers is also possible in the following cases:

(i) *That's the book Op_j that [a chapter of t_j]_i seems t'_i to have been assigned to John *ti*.
 (ii) ?That's the book Op_j that [a chapter of t_j]_i seems t'_i to have been assigned to every student *ti*.
 SE propose that in these examples subject movement from comp to spec position is delayed until PF so that variable binding can take place. I leave examples like this to one side here.

The end of CED

The apparent prediction is that these derived specifiers will require atomization prior to internal merge and hence will be strong islands. As such, it should be impossible to extract the object or any other phrase from a head-final structure, contrary to fact:

- (12) saare phal ravi-ne socaa ki siitaa-ne [TP [VP t khaaye] the]
all fruits Ravi-ERG thought that Sita-ERG eat.PERF.PL were
'All the fruit, Ravi thought that Sita had eaten.' [Hindi, Mahajan (2003:233)]

In fact it appears that most, if not all, OV languages allow objects to be scrambled to a leftwards position. Unless a non-movement account of head-finality can be reconciled with the LCA, the fact that object extraction is possible in head-final languages also constitutes a problem for MSO.

4.2 Right Adjunction

A further problem arises for Uriagereka's proposal from the fact that adjuncts often can and even must follow the VP they modify in English and other VO languages.

- (13) I eat cake a lot.

If adjuncts like *a lot* were obligatorily atomized and merged as specifiers then they should precede the phrase they modify, because of (4a).⁴ Arguably even more problematic is the fact that the presence of a post-VP adverb, does not block subextraction from VP or even from the complement of V:

- (14) a. What do you [VP eat t] a lot ?
b. Who do you [VP talk [PP to t]] a lot ?
c. Who do you [VP need [DP a meeting with t]] tomorrow?⁵

This raises a serious problem for Uriagereka's analysis, as Johnson (2002) also points out. Consider the following illustration:

- (15) a.
b.
c.

⁴ The situation with adjunction to nominals is similar, as is well-known from Emonds' Surface Recursion Restriction', Williams' 'Head-Final Filter' and Haider's 'Edge effect' (cf. Escrivano 2004 for discussion). I consider only adjunction to VP here because of the independent restrictions on subextraction from DP/NP.

⁵ It has been claimed that in clauses like (14c) the PP is not a complement of the noun but rather of the verb, hence the fact that subextraction is possible (cf. Bach & Horn 1976 for an early proposal along these lines). Constituency tests, though, suggest that the PP forms a constituent with N:

- (i) What do you need? – a meeting with Mr. T.
- (ii) *What do you need with Mr. T? – a meeting
- (iii) A meeting with Mr. T is what I need.
- (iv) *A meeting is what I need with Mr T.

Moreover, if subextraction is a diagnostic for complementhood (as it *must* be under Uriagereka's approach) then it follows that *with who* is a complement of N in (14c). Note that this means that many complements to N will actually fail the one-replacement test (cf. Chomsky 2008 for discussion).

The structure in (15a) correctly predicts VP not to be a strong island but gives the wrong word order. (15b), a Larsonian approach, gets the correct word order but predicts the object PP/NP to be a strong island, contrary to fact. Finally, moving the VP round the adjunct, as in (15c) is also problematic. Again it gets the correct word order but wrongly predicts the VP to be a strong island.

4.3 Subextraction from (certain kinds of) adjuncts

A final empirical challenge to the CED comes from the fact that a subclass of post-verbal adjuncts remains open to subextraction, at least in English (cf. Kayne 1983, Jones 1991, Manzini 1992, Levine & Sag 2003, Haider 2004, Truswell 2007, 2009):⁶

- (16) a. What temperature should I wash my jeans [at]?
b. Which room does Karen teach her class [in]?
c. What did you do that [for]?
d. How long have you been waiting [for]?
e. *Which way does climate change affect the weather [in]?
f. *Which extent is Google Earth useful [to]?
- (17) a. Which play did you fall asleep watching/*before watching/?after watching?
b. Which man did you return home without talking to/in order to talk to/*because you had talked to?

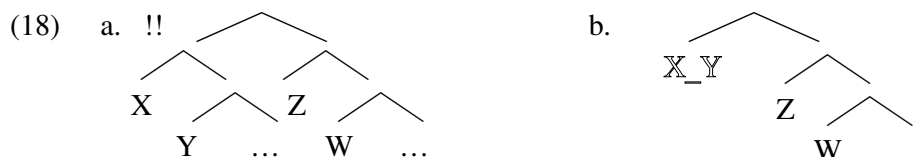
There are a number of factors affecting the grammaticality of this subextraction. In the case of PP adjuncts to VP, subextraction appears to be dependent on the function of PP: measure/locative/rationale/temporal PPs often allow subextraction (16a-d), but manner/extent PPs (which can be replaced by *how/how much*) seem to disallow subextraction (16e-f). Where the adjunct is clausal, tense appears to play a crucial role, as Manzini (1992:29) notes. Truswell (2007, 2009) proposes that there is also a semantic constraint on subextraction ‘the single event condition’, which requires that the adjunct “occupy an event position in the argument structure of the main clause verb”. In relation to MSO the fact that subextraction from adjuncts is possible at all remains problematic even if this subextraction is constrained by other semantic/syntactic factors.

5. The role of labeling

MSO appears to eliminate the reliance of the LCA on labeling. As such it can be considered in relation to the broader debate on the potential elimination of labels (cf. Collins 2002). The reason for this is as follows. As long as phrase structure uniformly branches in a single direction, with no complex specifiers, the induction step of the LCA can be dispensed with and structures can be linearized based only on the precedence pairs defined by terminal nodes, as in (17b). Crucially, the same is not true of a label-free syntax with branching specifiers (17a) (where !! means unlinearizable via the base step of the LCA in (4a)):

⁶ The discussion here focuses on English, but similar effects appear to hold in Italian (cf. Cinque 1990) as well as Mandarin (cf. Huang 1982: 480).

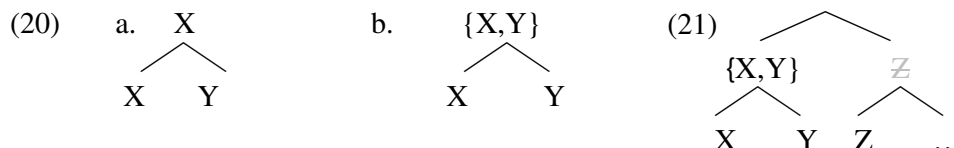
The end of CED



In this kind of approach, the labels of maximal projections, even if present in (17b), would play no role in linearization.

Unfortunately, given the fact that (17b) is empirically too restrictive (as we saw in Section 4) it appears that the LCA's reliance on labels cannot be eliminated. Faced with this situation we can either (a) reject Uriagereka's analysis altogether or (b) posit some notion of labeling/projection which allows for constrained instances of branching specifiers, whilst ruling out externally-merged right-branching specifiers of the English kind. The standard notion of labeling, whether stated in X-bar or Bare Phrase Structure (BPS) terms, will not help. This is because traditional labeling mechanisms entail the induction step of the LCA (4b). The effect of (18) is that labels actually represent sets of terminals/sub-trees, as in (19):

(19) Bare Phrase Structure (Chomsky's 1995: 398-99) - "[E]ach node is understood to stand for the sub-tree of which it is the root."



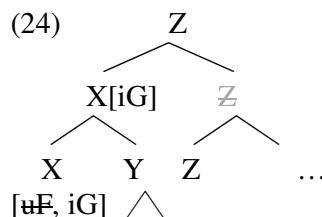
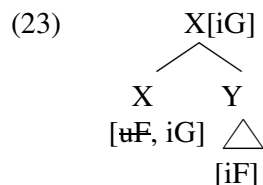
It follows that if X_{MAX} is allowed to define precedence pairs via asymmetric c-command, it will affect the linear position of every terminal it dominates (i.e. the set $\{X,Y\}$). Under BPS then (or X-bar theory), we lose Uriagereka's account of the CED if we allow maximal projections to specify precedence pairs because (20) can necessarily be linearized via induction, without atomization of the branching specifier.

An alternative is to assume that labels are really copies of the terminals they replicate. The idea would be that, upon merge, all the unvalued and interpretable features of the selecting head project. This means that labels will be subsets of the features of the projecting head. Assume a simple projection algorithm such as the following (abstracting away from adjunction here):

(22) If X selects and merges with Y then copy the interpretable/unvalued features of X to dominate $\{X, Y\}$.

In this case, the precedence pairs defined by X_{MAX} in (19a) where it is inserted as a specifier will affect *only* the linear position of X_{MIN} and not that of Y. This will enable an explanatory extension of MSO to account for the problems outlined in Section 4, as will be demonstrated in the following section.

Crucially, the strong islandhood of externally-merged head-initial specifiers still follows as per Uriagereka's analysis. The external merge of (22), a head-initial phrase will require atomization so that Y can be linearized with respect to Z in (23):⁷



A complication arises from the fact that the intermediate copy of Z asymmetrically c-commands into the branching specifier, a problem shared by Kayne's LCA and avoided by the stipulation that segments do not c-command.⁸ As the segment/category distinction becomes problematic from our perspective, an alternative solution is necessary. Given that contradictory linearization commands are elsewhere regulated via copy deletion (cf. Nunes 2004), I propose that this can apply to labels too, where they create a linearization paradox. Given the independent PF preference to delete lower copies rather than higher ones, it follows that in such contexts it will always be the intermediate (X-bar) level Z which is deleted rather than the maximal copy of the branching specifier X (cf. Sheehan 2009b for further justification of this proposal). In short, externally merged head-initial specifiers will be obligatorily atomized prior to external merge, and hence will be strong islands, even under the copy theory of labels.⁹

6. A PF-analysis of cross-linguistic patterns

In this section I outline how the copy theory of labeling resolves the problems raised in section 4 in an explanatory manner.

6.4 Head-initial derived specifiers

The crucial difference between externally-merged and derived head-initial specifiers is that with the latter, a lower copy of the offending complement occupies a complement position in the clause, where it can be ordered with respect to all other heads. As such, derived specifiers can evade atomization via scattered deletion (cf. Bošković 2001 on the last resort status of scattered deletion).¹⁰

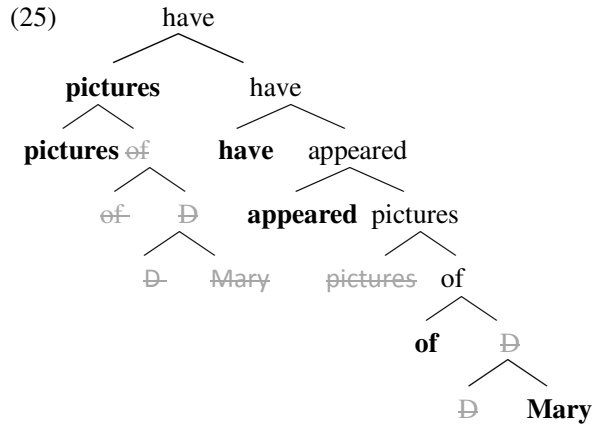
⁷ Throughout this discussion I abstract away from the independent problem of how the bottom pair of heads in a BPS tree or copy-label tree are linearized. There are a number of possibilities, and the problem might well be resolved differently in different contexts: the presence of null structure; morphological re-analysis; movement etc.

⁸ This is briefly discussed by Chomsky (2001), who proposes simply stipulating that X-bar levels do not count for the LCA.

⁹ David Pesetsky raises a potential problem for this claim. What is it that triggers atomization at the point of merger? Why is it that subsequent narrow syntactic movements cannot serve to resolve the linearization problem? I return to this crucial problem in section 6.7, relating it to Chomsky's notion of phase.

¹⁰ The assumption that *pictures* is the projecting head here is not an innocent assumption given Abney's (1987) DP hypothesis. Note, however, that this need only be the case for nominals which permit subextraction (i.e. non-specific indefinites). A full discussion of what this implies for the structure of these nominals would take us too far afield (cf. Sheehan 2009a for discussion).

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Crucially, this possibility is not available with externally merged specifiers, even if they surface in a derived position, as with the latter *all copies of the offending complement occupy a position on a left branch*. This means that complement extraposition (as a last resort to avoid atomization) can only apply to complements contained in an externally merged complement, externally-merged specifiers will always require atomization.

The prediction is that complement extraposition via scattered deletion should be preferred over atomization. An obvious complication arises from the fact that (25) is available as an apparently optional alternative to (24):

(26) Pictures of Mary have appeared (recently).

Sheehan (2009a) argues that the possibility of (25) is linked to the well-known but poorly understood observation that nominals are often strong islands even in complement position (cf. Davies & Dubinsky 2003). The behavior of nominals with respect to subextraction has long resisted explanation and many approaches to strong islandhood have essentially stipulated that N/D is a barrier in some sense (cf. Chomsky 1986, Manzini 1992). Pending a better understanding of this effect, I also stipulate that the presence of D triggers atomization of DPs. It follows that complement DPs will also be strong islands if moved to a specifier position. Let us assume that the apparent optionality of complement extraposition stems from the fact that some non-specific nominals need not be selected by D in English. The crucial prediction, which appears to hold, is that complement extraposition will correlate with the possibility of subextraction:

- (27) a. *The/many pictures have been published of the fire.
 b. Of which incident have *the/many pictures been published?

Note that so far all examples of subextraction from derived specifiers have involved pied-piping of the prepositional head of the complement. This is not always the case, however, many speakers also accept stranding of the preposition. However, where stranding occurs, P always surfaces in the extraposed position, and never adjacent to the head N of the derived subject:

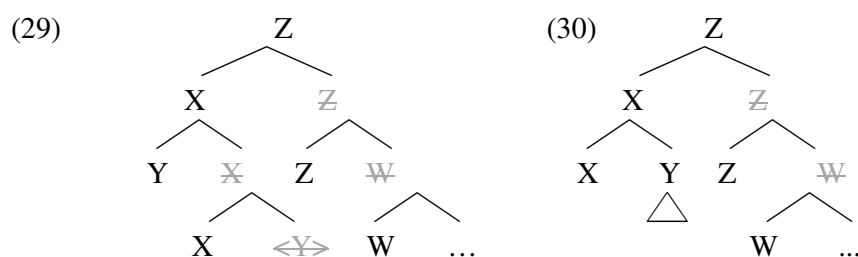
- (28) a. Extraction is possible from extraposed clauses.
 b. Extraction from extraposed clauses is possible.
 c. From which types of clauses is extraction possible?

- d. ?Which types of clauses is extraction possible from?
 e. *Which types of clauses is extraction from possible?

There is thus good evidence of a link between extraposition and subextraction from derived specifiers.¹¹ As such, a scattered deletion account of complement extraposition accounts for the key properties of the latter and serves to explain why derived specifiers are not strong islands (cf. Sheehan 2009a for further discussion).

6.5 Head-final specifiers

The copy theory of labeling also provides a potential explanation for why harmonically head-final specifiers pattern differently from head-initial/disharmonic specifiers with respect to strong islandhood. The reason for this is that harmonically head-final specifiers do not require atomization. Consider the following example:



In the spirit of Kayne (1994), I assume that head-final phrases convert their complements to (additional) specifiers via comp-to-spec movement under c-selection. This means that a head-final phrase like X is essentially a phrase with a specifier but no complement at PF. Although no asymmetric c-command holds between Y&Z, or Y&W (once copy deletion has taken place), Y can be ordered w.r.t. Z and W parasitically based on the precedence pairs defined by X: $Y > X$ & $X > Z > W$. This is crucially different from the situation in (29), where no order is defined between Y and Z, W even parasitically: $X > Y$ & $X > Z > W$. The implication is that whereas atomization will be required in (29), the same is not true in (28). It follows that harmonically head-final specifiers will not necessarily be strong islands. This serves to explain both the lack of subject island effects in head-final languages such as Turkish and Japanese, and also the fact that head-final clauses permit object extraction. In a sense, this approach provides an explanatory account of the connection between the CED and directionality noted by Kayne (1983).

6.6 Subextraction from adjuncts

The behavior of adjuncts with relation to subextraction is more complex. Post-verbal adjuncts are not always strong islands nor do they trigger strong islandhood of the main clause. In this section I propose a tentative account of these facts, limiting the discussion to *in order* clauses (IOCs) for reasons of space. Consider the following examples:

- (31) a. Which exam did you give John some tuition [(in order) to help him pass t]?

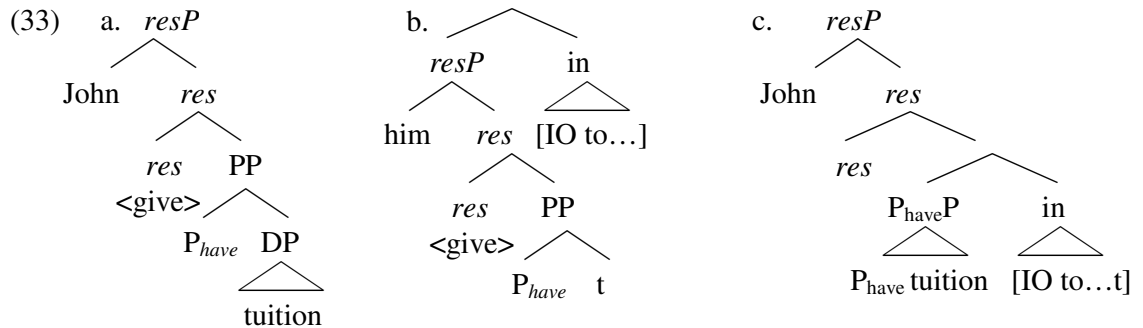
¹¹ Note that relative clause extraposition behaves differently from PP extraposition in several crucial respects (cf. Fox and Nissenbaum 1999), suggesting that a uniform analysis of the two phenomena is neither possible nor desirable.

- b. What did you give John *t* [(in order) to help him pass the exam]?
- c. What did you show John a picture of *t* [(in order) to cheer him up]?

If the IOC's have the same status in all examples then (30) is highly problematic for MSO as neither the main clause nor the adjunct appears to be atomized/opaque. Moreover, (30c) indicates that a Larsonian analysis is also problematic in our terms for the reasons outlined in section 4.2. Interestingly, though, there is some evidence that the IOC's in (30) occupy different structural positions:

- (32)
- a. [How much tuition did she give him₁ *t*] [to help John₁ pass the exam]?
 - b. *[How much tuition did she give every student₁ *t*] [to help him₁ pass the exam]?
 - c. *[Which exam did she give him₁ some tuition [to help John₁ pass *t*]?
 - d. Which exam did she give every student some tuition [to help him pass *t*]?

(31a-b) show that where extraction has taken place from the main clause, the IOC is adjoined higher than the indirect object of the matrix clause (above *resP* assuming Ramchand's 2008:103 structure for double object constructions, as in (32b)). (31c-d), on the other hand, show that where a *wh*-phrase has been extracted from an adjunct IOC, the latter must be adjoined lower than the indirect object (to *P_{have}P* in Ramchand's terms, as in (32c)):



The crucial question is how the height of adjunction is connected to (i) the linear placement of the adjunct and (ii) the extraction facts.

First, consider the transparent low-adjoined IOC in (32c). In order for the IOC to follow *P_{have}P*, it must be the case that *P_{have}P* is atomized rather than the IOC. Assume that this option is available with adjuncts unlike specifiers as the former are not thematically selected by the projecting head. This correctly accounts for the fact that subextraction is possible from the IOC in such cases. The prediction is that subextraction from *P_{have}P* should be banned in such cases. This prediction can be tested, and appears to hold, in dialects which allow promotion of the direct object in passives of double object constructions.¹² Promotion of the direct object is possible in (33a), but is banned where subextraction has taken place from the IOC (33b). (33c) shows that passivization of the indirect object is possible in such cases, as predicted if the indirect object is outside the atomized phrase (*P_{have}P*):¹³

¹² Many Northern British dialects allow this construction.

¹³ Thanks to Marcel Den Dikken for suggesting this test to me.

- (34) a. Some tutoring was given John [in order to help him pass the exam]
 b. *Which exam was some tutoring given John [in order to help him pass t]?
 c. Which exam was John given some tutoring [in order to help him pass t]

As such, it would appear that where an IOC is adjoined to $P_{\text{have}}P$, it is the main clause phrase rather than the adjunct which is atomized. We return to a possible explanation for this pattern after we have considered the pattern with high-adjoined IOCs.

Where the IOC does not contain a gap, it appears that it must be adjoined higher, to $\text{res}P$. In such cases the IOC still follows the phrase it modifies, contrary to expectations, if it is atomized. A potential analysis of this fact comes from the availability of late adjunction (cf. Lebeaux 1991). Given that adjuncts can be merged late, after the main clause has been atomized via cyclic transfer (cf. a version of Chomsky's 2001 phases), it would be economical for PF to capitalize on this periodic atomization and combine it with late adjunction to avoid multiple applications of SO. In such cases, the adjunct will not be atomized prior to merge but it will nonetheless be a strong island, because it is merged to late to participate in the derivation (cf. Stepanov 2007). Crucially, it seems that the head-initiality of the adjunct is key in such cases as it is this property which makes late adjunction the least costly strategy. A harmonically head-final adjunct can be merged early and linearized with respect to the main clause without atomization (as was the case with head-final specifiers). Evidence for this comes from the fact that head-final adjuncts are much freer in their placement possibilities than their head-initial counterparts (cf. Ernst 2003):

- (35) Alice-ga {endai-de} situmon-ni {endai-de} sizukani
 Alice-nom podium-at question-dat podium-at quietly
 {endai-de} kotae-te-iru {*endai-de}
 podium-at answer-gerund-been podium-at [Japanese]

Moreover, it seems to be the case that harmonically head-final adjuncts are not strong islands even in a derived position. Haider (2004:782) shows that this prediction holds for German adjuncts and according to Yoshido, Japanese, Malayalam and Korean also permit scrambling from various kinds of adjuncts (cf. Yoshido 2006). Both of these properties follow if head-final adjuncts can be merged early at no extra cost and linearized without atomization.

The question remains why late merge of adjuncts targets $\text{res}P$ whereas early merge targets $P_{\text{have}}P$. In the following section I provide evidence that $\text{res}P$ but not $P_{\text{have}}P$ is a phase (in the Chomskyan sense). Given that late merger of adjuncts is in principle possible, early merger, where it happens, will be forced to target a position other than that targeted by late merge. The explanation of (i) why early merge of head-initial adjuncts is possible at all and (ii) why it triggers atomization of the phrase it modifies remain mysterious and the best hope of an explanation would appear to be semantic (cf. Truswell 2007, 2009). I leave these matters to future research.

6.7 Phases and atomization

A potential problem with the proposal in Section 6.6. is that in the absence of an independent diagnostic for phasehood, the explanation risks circularity. It seems however that the copy theory of labelling potentially provides the key for a much-needed diagnostic of phasehood. Consider the problem mentioned in footnote 9. This

amounts to the fact that we apparently have to stipulate that externally merged specifiers are atomized prior to external merge. Atomization is not actually forced by the PF-interface, given that subextraction of the complement of a branching specifier will resolve the PF-problem:

- (36) *Of which celebrity have several pictures caused an outcry?¹⁴

In a sentence like (35), the PP complement of pictures has raised out of NP. Assuming that pictures is the projecting head in such nominals, it follows that removal of its complement at PF removes the linearization problem discussed in section 5. The fact that this kind of PF-rescue is not possible suggests that the PF-interface cannot wait this long for transfer of the externally merged nominal. The question is why this should be the case. One interesting solution to this problem is to propose that PF-transfer is triggered every time a specifier is externally merged. Externally merged specifiers differ crucially from internally merged specifiers because of the inherent linearization challenge they pose. Note that from an LF point of view they also introduce complexity. As long as only heads or non-branching specifiers are merged the derivation need only add a single c-command relation stepwise. When a branching specifier is merged, though, multiple c-command relations are added. It is plausible that for this reason, transfer occurs in such cases, so that LF and PF can take stock. Interestingly, this appears to provide a much needed link between Uriagereka's notion of MSO and Chomsky's phase theory. If a PF-phase is defined every time a branching specifier is externally merged, then we predict that vP is a phase only where it contains an external argument (accounting for the well-known differences between passive and unaccusative vPs vs. transitive/unergative vPs). Moreover, if recent proposals by Rackowski & Richards (2005) and Den Dikken (2009) are correct and CP is not actually a phase, then we actually have an explanation for phasehood more generally. CP is not generally a phase as it is not generally the target for externally merged specifiers. I leave a full exploration of this idea to future research. In relation to Section 6.6, though, note that it correctly characterises *resP* but not $P_{\text{have}}P$ as a phase, and so predicts that only the former can be targeted by late merged adjuncts.

7. Overgeneration

An apparent problem with this whole approach is that it appears to predict that any head-initial XP which moves will necessarily strand its complement. Firstly, it is important to emphasize that this prediction relates only to externally-merged complements. Externally merged specifiers will necessarily require atomization, for the reasons given in section 5. More problematic are non-nominal categories which appear to move without giving rise to complement stranding in English: PP, VP, CP. In many cases, these very same phrases do *not* appear to be strong islands in complement position so assuming them to be inherently atomic (as is the case with DPs) is problematic:

- (37) a. [That pigs eat apples] is believed by most people.
 b. *That is believed (by most people) pigs eat apples.
 c. What do most people believe [that pigs eat t]?

¹⁴ I assume that preposition pied-piping necessarily involves atomization of the PP, meaning that it does not give rise to stranding.

There are at least two potential solutions to this problem: either (i) (36a) does not involve movement, but rather base-generation of the complex CP in a specifier (Topic) position; or (ii) the moved CP in (34a) is a covert DP for independent reasons. I will not pursue this matter here for reasons of space, but it is interesting to note that both (i) and (ii) have actually been proposed as analyses of (34a) for independent reasons (cf. Alrenga 2005 for an overview of the debate). Future research will therefore focus on fronted CPs, VPs and PPs which fail to display complement extraposition. Note however, that the Final-over-Final Constraint (FOFC), which states that a head-initial phrase cannot be immediately dominated by a head-final phrase is evidence that complement extraposition does apply more generally to derived head-initial specifiers (cf. Sheehan 2009a for an account of FOFC in these terms).

8. Conclusions

It has been argued that the empirical challenges facing Uriagereka's account of the CED can be explained if a copy theory of labeling is adopted. This kind of approach attributes the strong islandhood of certain specifiers and adjuncts to the properties of the PF-interface. This provides a principled account of the behavior of head-final phrases, derived specifiers and right-adjoined adjuncts. In all cases, strong islandhood is linked to atomization which can, but need not be, triggered by a simplified version of the LCA. Placement facts with adjuncts are made more complex by the availability of late adjunction and the fact that in cases of early adjunction, it is the modified phrase which is atomized rather than the branching adjunct. It has further been shown that this approach provides a conceptually grounded testable definition of phases as phrases with externally merged specifiers.

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