The Syntax of Preverbal Particles and Adjunction in Irish

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Abstract It is shown that five apparently irreconcilable claims about the clausal syntax of Irish can be reconciled in a natural, base-generated LFG analysis that builds on the standard LFG theory of endocentricity and coheads/extended heads, the LFG projection architecture, and Toivonen's (2001)'s work on non-projecting categories and c-structure adjunction. The analysis also builds on McCloskey's (1996) analysis of Irish adjunction, but does not posit complementizer lowering. The principal theoretical consequences of the analysis are 1) the reconciliation of the five claims, in particular a synthesis of McCloskey's position that the Irish preverbal particles are complementizers and Sells's (1984) position that they are head-adjoined to the verb, 2) the elaboration of Toivonen's (2001) theory of c-structure adjunction, 3) correct predictions about not only adjunction to matrix and subordinate clauses, but also adjunction to appositives.

1 Introduction[1]

The goal of this paper is to reconcile the apparently irreconcilable claims about the clausal syntax of Irish listed in (1). Claims 1 and 2 have been proposed in the literature as universals and claims 3 to 5 have been proposed as specific to the syntax of Irish.

(1)
1. Adjunction to a lexically selected phrase is prohibited (universal).
   (Chomsky 1986)
2. Phrasal categories are endocentrically headed (universal).
   (Jackendoff 1977)
3. The preverbal particles *go*, *aL*, and *aN* in Irish are complementizers.[2]
   (McCloskey 1979, to appear)
4. The preverbal particles are head-adjoined to the finite verb.
   (Sells 1984)
5. The order of a subordinate clause with an adjoined adverbial phrase is *Adverbial Particle V S O* (*not* Particle Adverbial V S O).
   (McCloskey 1996)

There are three principal theoretical consequences of the proposed analysis. First, there is the reconciliation of claims 1 to 5 itself. In particular, a synthesis is achieved between Sells's position (the particles are head adjuncts) and McCloskey's position (the particles are complementizers). Second, the class of adjunction structures will be further restricted, building on recent work by Toivonen (2001). Third, there are further consequences for the theory of adjunction and c-structure. Specifically, the impossibility of adjunction to appositives is derived, while allowing the possibility of adjunction to matrix clauses.

In section 2 I lay out why the claims in (1) present various problems when taken together. I go on to show how an extension of Toivonen's (2001) theory of c-structure adjunction (section 3.1) and use of LFG's projection architecture (section 3.2) and theory of endocentricity (section 3.3) solves these problems, building on transformational work by McCloskey (1996).

[1]I would like to thank Joan Bresnan, Mary Dalrymple, and Ida Toivonen for valuable comments, criticism, and discussion. I owe special thanks to Jim McCloskey and Peter Sells for their generosity in sharing their expertise on this topic. Any errors are my own. This research was funded in part by SSHRC 752-98-0424.

[2]Although *aL* and *aN* are both phonetically realized as a schwa, McCloskey (1979) argues convincingly that they should be treated as separate but homophonous morphemes. One part of his argument is that *aL* and *aN* induce differing mutations on following words: *aL* induces lenition and *aN* induces nasalization. This difference in mutation-triggering is indicated by the *L* and *N*.

2 The Problem: Five Conflicting Claims

It seems at first that of the claims in (1) only claims 3 and 4 are necessarily conflicting. However, I will show in this section that these five claims taken together yield a mess of contradictions that can be fairly intricate at certain points.

The first claim is:

(2) **Claim 1**
Adjunction to a lexically selected phrase is prohibited. **(Universal)**

This is based on the following principle proposed by Chomsky (1986:6), which McCloskey (1996:57) calls the *Adjunction Prohibition*:

(3) Adjunction to a phrase s-selected by a lexical head is ungrammatical.

As noted, claim 1 is postulated as a universal condition on adjunction. This claim applies to lexically selected nominals as well as lexically selected clauses, but in this paper I will concentrate on the latter.

McCloskey (1996) notes that claim 1 accounts for the ungrammaticality of sentences like the following:

(4) a. *[$_{CP}$ When she moved to the city [$_{CP}$ that she could actually get a job]] was amazing.
(McCloskey 1996:57, (21a))

b. *It was amazing [$_{CP}$ when she moved to the city [$_{CP}$ that she could actually get a job]].
(McCloskey 1996:57, (22a))

c. *After [$_{IP}$ last year [$_{IP}$ she resigned]], she moved to Paris.
(McCloskey 1996:58, (26))

The CP *that she could actually get a job* is a sentential subject in (4a) and the complement of an adjective in (4b). The ungrammaticality of adjoining the adverbial *wh*-phrase *when she moved to the city* to this clause is explained by (2), since in both cases the clause is lexically selected. Similarly, in (4c) the IP *she resigned* is the lexically selected complement to *after*; (2) prohibits adjunction of the adverbial NP *last year* to this lexically selected clause.

The importance of the phrase "lexically selected" in (2) is further illustrated by the following variants of (4a) and (4b) McCloskey (1996:57 ,(21b–c) and (22b–c)):

(5) a. [$_{CP}$ That [$_{IP}$ [$_{IP}$ she could actually get a job] when she moved to the city]] was amazing.

b. [$_{CP}$ That [$_{IP}$ when she moved to the city [$_{IP}$ she could actually get a job]]] was amazing.

(6) a. It was amazing [$_{CP}$ that [$_{IP}$ [$_{IP}$ she could actually get a job] when she moved to the city]].

b. It was amazing [$_{CP}$ that [$_{IP}$ when she moved to the city [$_{IP}$ she could actually get a job]]].

There is a crucial difference between the sentences in (5) and (6) and (4a) and (4b) respectively. In the ungrammatical cases, adjunction is to CP, which is lexically selected. This adjunction is ruled out by (2). In the grammatical cases, adjunction is to the IP complement of C. Since C is not a lexical head, the IP complement of C is not lexically selected, and there is no violation of (2). These cases also contrast with (4c), in which there was ungrammatical adjunction to an IP. The difference is that the IP in (4c) is the complement of the lexical head *after* and is therefore a lexically selected clause, to which adjunction is prohibited by (2).

The prohibition against adjunction to a lexically selected clause also holds for Irish. McCloskey (1996:64–65) notes that adjunction of an adverbial to a *wh*-complement is ungrammatical:[3]

[3]I have added some phrase structural annotations to McCloskey's examples for the sake of exposition.

(7) a. * Ní bhfuair siad amach ariamh [$_{CP}$ an bhliain sin [$_{CP}$ cé a bhí ag goid a gcuid
NEG found they out ever that-year who COMP was steal PROG their
móna]].
turf
They never found out who was stealing their turf that year.
(McCloskey 1996:65, (45))

b. * Níor thuig mé [$_{CP}$ roimh an Nollaig [$_{CP}$ cé chomh gnóitheach is a bheadh
NEG-PAST understand I before Christmas how busy as COMP be.COND
siad]].
they
I didn't realize how busy they would be before Christmas.
(McCloskey 1996:65, (46))

The *wh*-complements in (7) are lexically selected by *bhfuair siad* ('found out') and *thuig* ('understand/realize'). Therefore (2) predicts the ungrammaticality of adjunction to these CPs.

The examples in (7) show that it is false to simply assume that (2) does not hold for Irish, yet (2) is seemingly contradicted by other Irish examples, where there is apparent adjunction to lexically selected clauses:

(8) a. Deiridís [$_{CP}$ an chéad Nollaig eile [$_{CP}$ go dtiocfadh sé aníos
they-used-to-say the first Christmas other COMP would-come he up]].
They used to say that next Christmas he would come up.
(From *Bhí Mo Lá Agam*, by Ger Ó Cíobháin, as cited by McCloskey (1996:59, (30)))

b. Is dóiche [$_{CP}$ faoi cheann cúpla lá [$_{CP}$ go bhféadfaí imeacht
COP.PRES probable at-the-end-of couple day COMP could.IMPERS leave.[− FIN]
It's probable that in a few days it would be possible to leave.
(From *Bhí Mo Lá Agam*, by Ger Ó Cíobháin, as cited by McCloskey (1996:59, (31)))

c. chun isteacht duit [$_{CP}$ [$_{CP}$ nuair a bhíos thall ar an tamhnach] go bhfaca mé
to tell.[-FIN] to-you when COMP I-was over on the slope COMP saw I
ceann de do chuid beithíoch]
one of your portion cattle.GEN
to tell you that when I was over on the hillside, I saw one of your cattle
(From *An Leacht Nár Tógadh*, by Séamas Ó Conghaile, as cited by McCloskey (1996:60, (33)))

If we assume that the preverbal particles mark the left edge of the CP (McCloskey 1979, Sells 1984), then these sentences have the structure indicated and seem to be straightforward violations of (2).

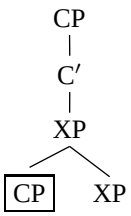
Another puzzle for (2) is appositives, which are not lexically selected, but nevertheless cannot be adjoined to:

(9) *Her prediction, when she moved to the city that her social life would improve, was false.

Given (9), it seems that (2) is not general enough. I will consider appositives again in section 3.1, but for now I wish to focus on the Irish problem raised by (8) and McCloskey's (1996) solution to it.

Based on the premise that claim 1 is universal and prior, McCloskey (1996) argues that these adverbials are in fact not adjoined as indicated in (8), but are rather adjoined *inside* a subcategorized CP, as in the following structure (where the adjoined CP is boxed):

(10)



The outermost CP is the lexically selected clause. Since the adjoined CP is adjoining to an XP inside this selected clause, there is no adjunction to a lexically selected clause and there is no violation of (2).

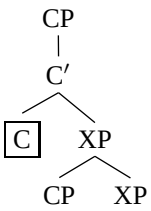
It is a normal assumption of X-bar theory that a maximal projection like the outermost CP in (10) must have a head, a C in this case. This brings us to claim 2:

(11) **Claim 2**
Phrasal categories are endocentrically headed. **(Universal)**

The presence of a CP requires the presence of a C projecting the CP. If the adverbial modifier in (8) is adjoined inside a subcategorized CP, there must be a complementizer dominated by and projecting the CP in question.

This suggests expanding (10) as follows (where the head of the CP in question is boxed):

(12)

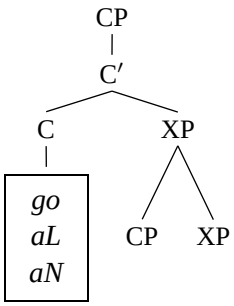


The natural next question to ask is: what is the morphological realization of C in (12)? McCloskey (1996) argues that the C in question is the preverbal particle. This brings us to claim 3:

(13) **Claim 3**
The preverbal particles *go*, *aL*, and *aN* are complementizers. **(Irish, theoretical)**

In other words, the C in (12) expands as follows:

(14)



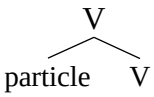
There is independent motivation for assuming that the preverbal particles are complementizers (McCloskey 1979, 1990). First, the particles in question are generally left-peripheral. Second, the particles are sensitive to extraction phenomena in the clause they introduce, famously registering (roughly) whether

an unbounded dependency that passes through their clause terminates in a gap (registered by *aL*) or a resumptive pronoun (registered by *aN*).[4] Third, the particles are sensitive to tense and negation in the clauses they introduce, indicating morphologically whether the clause is past or non-past and whether it is negated.[5] The fact that the particles are sensitive to the presence or absence of arguments and how the argument's extraction site is registered and their sensitivity to tense and negation indicates that the particles are part of the extended verbal functional domain. This coupled with their left-peripheral position argues in favour of treating them as complementizers.

However, Sells (1984) argues that the particles are not complementizers, making claim 4 instead:

(15) **Claim 4**
The preverbal particles are head-adjoined to the finite verb. **(Irish, theoretical)**

In particular, he proposes that the preverbal particles are base-generated as adjuncts to the verbal head:

(16)


As adjuncts to V, the preverbal particles are still within the verbal domain. In fact, they are part of the core verbal domain, rather than the extended functional domain of the verb that complementizers appear in. The evidence that McCloskey gives for the complementizer status of the preverbal particles (that they are left-peripheral, register extraction phenomena, and register tense and negation information) is therefore compatible with Sells's position that they are head-adjoined to the verb.

Two pieces of evidence that Sells (1984) presents for his position is that 1) there is no material can separate the particles from the verb, and 2) in VP coordination structures the particle must occur in each conjunct:

(17) a. an fear aL cheannaionn agus aL dhíolann tithe
the man ptc buys and ptc sells houses
the man that buys and sells houses
(Sells 1984:131, (25a))

b. *an fear aL cheannaionn agus d(h)íolann tithe
the man ptc buys and sells houses
(Sells 1984:131, (25b))

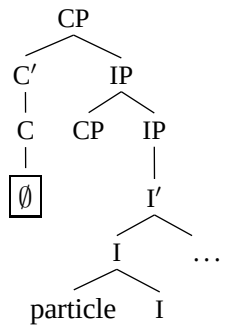
This leads to a somewhat complicated situation. Claim 4 as Sells presents it, i.e. with the structure (16), contradicts claim 3. However, it seems desirable to maintain McCloskey's (1996) structure in (10), which preserved the universal about adjunction (claim 1). If we also wish to maintain claim 2 as a matter of X-bar theory, then we have two choices.

The first choice is that there is a null complementizer heading the CP, as in (18). Note that I have updated Sells's proposal, reflecting the argument that finite verbs in Irish occupy I, not V (Chung and McCloskey 1987, McCloskey 1996).

[4]The choice between *aL* and *aN* is actually extremely complex — especially when the unbounded dependency passes through more than one clause — as discussed in McCloskey (1979) and in more detail in McCloskey (to appear).

[5]See McCloskey (1979:11) for the full morphological paradigm.

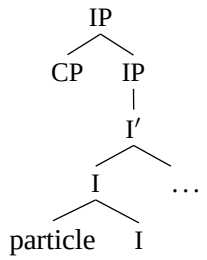
(18)



The problem with this proposal is that it proposes a null element. Not only is this undesirable from an LFG-specific ontological perspective, it even seems undesirable from a transformational perspective, since there is an overt element that is arguably a complementizer, the preverbal particle.

The second choice, again accepting the argument that finite verbs occupy I, is to make the selected clause an IP, not a CP, effectively peeling away the CP layer in (18):

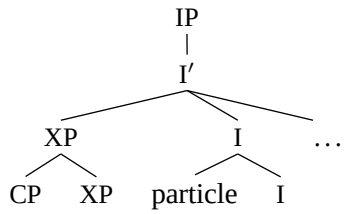
(19)



The problem is that this structure runs equally afoul of claim 1, because there is adjunction to a lexically selected IP.

A possible solution to the latter problem is to make a position for adjunction inside the IP, adopting McCloskey's (1996) strategy. Presumably this position would be a functional projection, as there are no candidate lexical projections, and we would get a stucture like the following:

(20)



However, we must ask ourselves what the functional projection XP in (20) could be. The only functional projections that are standardly part of LFG ontologies are CPs, DPs, and IPs, but none of these are appropriate. Also, to get the correct word order *Adverbial Particle V S O*, XP must be empty; otherwise it is wrongly predicted that some functional element can intervene between the adjoined adverbial (CP in this case) and the particle.[6] This solution therefore introduces an unmotivated functional projection that is independently problematic.

At this point we seem to be rather stuck. It seems that there is no way to simultaneously maintain claim 1 about universal adjunction possibilities, McCloskey's (1996) proposed structure for Irish clausal adjunction,

[6]The adverbial could also be right-adjoined to XP, but this does not solve either of these problems: XP is still unmotivated and we would wrongly predict the possibility of some functional element to the left of the adverbial.

the widely-accepted contention that finite verbs in Irish occupy I, and Sells's (1984) well-motivated claim that the preverbal particles in Irish are in fact base-generated as head adjuncts to the verb. It seems that we may have to abandon Sells's proposal and to retreat to claim 3, McCloskey claim that the preverbal particles are complementizers.

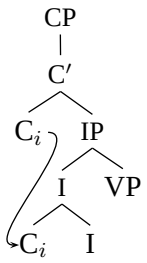
However, things are not even this easy, due to an empirical observation about Irish word order (McCloskey 1996), which constitutes claim 5:

(21) **Claim 5**
The order of a subordinate clause with an adjoined adverbial phrase is *Adverbial Particle V S O*. **(Irish, empirical)**

This is in fact true of all the Irish sentences presented above. However, if the particles are complementizers, as per claim 3, and adjunction takes place *inside* the lexically selected CP, as per McCloskey's (1996) proposal in (10), then we would expect the order *Particle Adverbial V S O*. This is *not* what is observed, which is *Adverbial Particle V S O*.

To resolve this contradiction, McCloskey (1996) proposes that the C is lowered and adjoins to the verb, which occupies I:

(22)



There are various problems with this proposal. First, from an LFG perspective, a lowering analysis, or in fact any movement-based analysis, is certainly not desirable. Second, even in a transformational theory such as the one McCloskey (1996) adopts, lowering is potentially problematic. The principal problem is that the analysis makes false predictions about possible landing sites. There can be indefinitely many CPs adjoined to the IP hosting the proper landing site for the lowered C. However, each of these CPs will presumably also contain an IP. The challenge is to prevent lowering into one of these IPs and to guarantee lowering only into the proper IP; this would require unmotivated stipulations regarding landing sites.[7] A second problem is that minimality requirements on head movement (e.g., the Head Movement Constraint and its descendants; Travis 1984) would need to be adapted to work in the lowering direction to make sure that this kind of head movement is not a violation.

2.1 Summary

This is indeed a tangle web of conflicting assumptions, but in outline the problem is simple. To maintain claim 1 (no adjunction to a selected clause), McCloskey (1996) argues that what looks like adjunction to a CP is adjunction *under* a CP. Claims 1 and 2 (endocentricity) naturally lead to claim 3 (the Irish preverbal particles are complementizers), which is sufficient to satisfy endocentric headedness of a CP. Claim 4 (the preverbal particles are affixes) explains certain Irish data well, but is seemingly incompatible with claims

[7] It may be that a phase-based analysis within the assumptions of the Minimalist Program (Chomsky 1995, 2001) provides a motivated solution to this problem (McCloskey, p.c.). CPs in this framework are phases that are closed upon completion and all but their left-peripheral position is closed to the operation MOVE. Under these assumptions, one might be able to derive the fact that one cannot adjoin to intervening, adjoined CPs since these would be complete and impenetrable to movement. However, it should be noted that lowering operations in general are eschewed in Minimalism.

1–3, unless problematic assumptions are made. Retreating to claim 3 and maintaining the structure proposed by McCloskey to maintain claim 1 is not possible, since there is a clash between this proposed structure and claim 5 (the observation about Irish word order). McCloskey's (1996) solution to this clash is problematic from an LFG perspective, and perhaps even from a theory-internal transformational perspective.

3 The Solution

I will show that these contradictions can be resolved in a natural, base-generated LFG analysis that builds on the standard LFG projection architecture (Kaplan 1995) and theory of coheads/extended heads (Bresnan 2001, among others) and Toivonen's (2001) work on non-projecting categories and c-structure adjunction.

3.1 A Theory of Adjunction

Toivonen (2001) extends and modifies the theory of X-bar structure for LFG presented in Bresnan (2001). She proposes that there is a fundamental distinction between *projecting* and *non-projecting* categories and that X′ and XP level categories can only dominate projecting categories. I will write non-projecting preterminal categories as $\hat{\text{X}}$, using the circumflex accent (ˆ) to indicate iconically that these categories have a "roof" and cannot project any further.[8] Projecting preterminal categories will be written as X^0. Note that X′ is also a projecting category, but it is not a projecting *preterminal*, as it does not dominate a terminal node.

Toivonen (2001:59) also assumes that the class of admissible adjunction structures is restricted by the following generalization:

(23) **Adjunction Identity**
Same [X-bar level] adjoins to same.

In the context of Toivonen's (2001) system, the force of this generalization is that the only permissible adjunction structures involve adjunction of a maximal projection to a maximal projection or adjunction of a non-projecting preterminal to a projecting preterminal:

(24) $\text{XP} \rightarrow \text{XP}, \text{YP}^*$

(25) $\text{X}^0 \rightarrow \text{X}^0, \hat{\text{X}}^*$

This differs from Bresnan's (2001:102–103, 121) theory which allows X′ adjunction and disallows X^0 adjunction (i.e., head adjunction). Note that Toivonen (2001) allows for the possibility of multiple flat adjunction (hence the Kleene star annotation on the adjoining element).

The annotation for the adjunction target is unsurprisingly ↑=↓ (Bresnan 2001:102–103; Toivonen 2001:58–66); since the essential purpose of adjunction is to divide one c-structural category into two segments, it makes sense that the two segments should map to the same f-structure. The versions of (24) and (25) with the adjunction target annotated are as follows:

(26) $\text{XP} \rightarrow \underset{\uparrow=\downarrow}{\text{XP}}, \text{YP}^*$

(27) $\text{X}^0 \rightarrow \underset{\uparrow=\downarrow}{\text{X}^0}, \hat{\text{X}}^*$

[8] This notation departs from (Toivonen 2001), where non-projecting categories are written as X, and projecting categories as X^0. Although this is true to the letter of X-bar theory, it is potentially confusing, as X^0 is often abbreviated as X.

I leave aside the annotation of YP (see Bresnan 2001:102–103), as it is not really relevant to the discussion at hand. The annotation of the adjoined element in all the examples in this paper will be $\downarrow \in (\uparrow \text{ ADJ})$, which is in any case a permissible annotation for YP in Bresnan's (2001) theory of structure-function mappings.

We can capture the universal prohibition against adjunction to a selected phrase (claim 1) as a further refinement of the adjunction structure (26). An initial attempt to do this is shown in (28). The adjunction site XP is annotated with a negative inside-out constraining equation, $\neg(\text{GF} \uparrow)$, which states that the f-structure of the XP must not serve as a grammatical function.

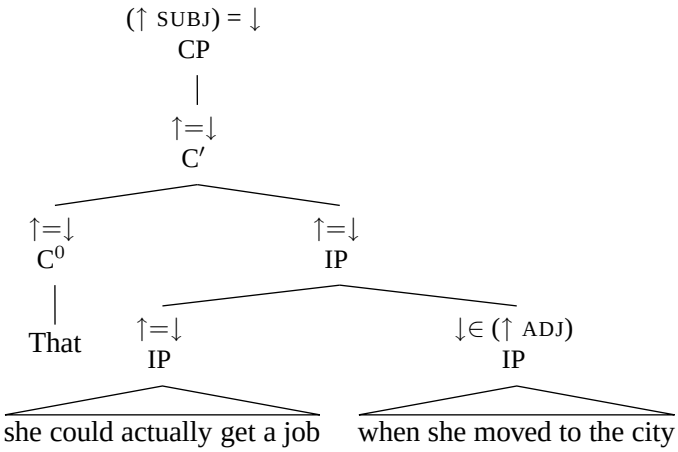
(28) $\text{XP} \longrightarrow \underset{\neg(\text{GF} \uparrow)}{\text{XP}}, \text{YP}^*$

This will not work for functional coheads, though. In particular, it will not work for C^0 and I^0.

The problem is illustrated by example (5a), repeated here along with a partial specification of its annotated constituent-structure:

(5a) [$_{\text{CP}}$ That [$_{\text{IP}}$ [$_{\text{IP}}$ she could actually get a job] when she moved to the city]] was amazing.

(29)



The adjunction site is the IP on the lower left. Although this IP is not *annotated* with a GF, since it is a cohead of C^0 it will receive the grammatical function SUBJ. This is evident if we follow the $\uparrow=\downarrow$ head paths starting at this IP. Since the IP does have a GF, (28) will erroneously rule that (5a) is ungrammatical. The same problem occurs with the left adjunction variant (5b) and the examples in (6).

A tempting move is to adjust rule (28) so that it refers specifically to CPs, since the problematic case of adjunction in both English and Irish involved CP adjunction:

(4a) *[$_{\text{CP}}$ When she moved to the city [$_{\text{CP}}$ that she could actually get a job]] was amazing.

(7a) * Ní bhfuair siad amach ariamh [$_{\text{CP}}$ an bhliain sin [$_{\text{CP}}$ cé a bhí ag goid a gcuid móna]].
NEG found they out ever that-year who COMP was steal PROG their turf
They never found out who was stealing their turf that year.

The CP-specific version of (28) would look like this:

(30) $\text{CP} \longrightarrow \underset{\neg(\text{GF} \uparrow)}{\text{CP}}, \text{YP}^*$

This rule allows adjunction to a CP only if it does not have a grammatical function.

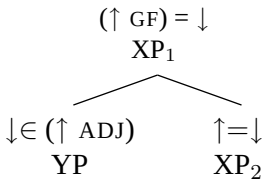
This will indeed rule out (4a) and (7a) but allow (5) and (6). The problem is that there is in fact IP-adjunction that needs to be barred too, as we saw in (4c):

(4c) *After [$_{IP}$ last year [$_{IP}$ she resigned]], she moved to Paris.

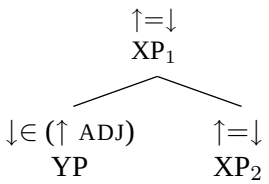
The CP-specific rule (30) will erroneously admit this sentence, since the adjunction site is an IP. We need to capture the distinction between adjoining to an IP that happens to bear a grammatical function because it is a cohead to C^0 and one that bears a grammatical function in its own right. Otherwise we cannot distinguish between grammatical IP-adjunction cases like those in (5) and (6) and the ungrammatical cases like (4c).

What we need is an adjunction rule that distinguishes between structures like (31), which should be disallowed, and (32), which should be allowed. Notice that I am not using the indices *1* and *2* to indicate identity, but just as convenient labels to make subsequent reference to the parts of the XP easier.

(31)



(32)



The crucial difference between the two structures is that XP_1 is annotated with a GF in (31) and with the $\uparrow=\downarrow$ head path in (32). However, there is no way within LFG's formal theory to refer to occurrences of annotations on c-structure nodes.

Yet we can take advantage of the $\uparrow=\downarrow$ head path in the licit structure (32). A consequence of the two occurrences of the $\uparrow=\downarrow$ path in (32) is that the f-structure of XP_1's mother will be identical to the f-structure of XP_2. In other words, the f-structure of the adjunction target XP_2 is identical to the f-structure of its grandmother. This is not true in (31), where the f-structure of XP_1's mother is the f-structure of the predicate for which XP_1's f-structure is a GF.

Therefore, what is needed is a way of referring to a node *x*'s grandmother's f-structure so that the usual kind of f-structure equality can be stated between the grandmother's f-structure and *x*'s f-structure. To accomplish this, we use the standard function M (Kaplan 1995:10), which maps from a node to its mother:

(33) $M: N \rightarrow N$

For example, the $\uparrow$ metavariable for the f-structure of a node's mother is defined as follows, where '$*$' indicates the current node (Dalrymple 2001):

(34) $\uparrow \equiv \phi(M(*))$

Since M is function from nodes to nodes, we can apply it recursively. Thus, we can define a metavariable $\uparrow^2$ for the f-structure of a node's grandmother as follows:

(35) $\uparrow^2 \equiv \phi(M(M(*)))$

Using the metavariable $\uparrow^2$, we can capture the necessary distinction if we further annotate the adjunction rule (26) as follows:

(36) $XP \longrightarrow \underset{\uparrow=\downarrow}{XP}, \; YP^* \quad \{\neg(GF\ \uparrow) \mid \uparrow^2 = \downarrow\}$

We will see shortly that independent parts of LFG theory will do the rest of the work.

Let us first take a brief digression to consider a matter of descriptive power, particularly locality. A possible objection to the grandmother metavariable is that it is nonlocal in nature, despite the general desirability of keeping syntactic relations strictly local. There are two responses to this. The first is that the metavariable is in fact local, in the sense of not being global: it requires reference to a c-structure node that is a bounded distance away from the node that is decorated by the metavariable. Second, and more interestingly, it is precisely in the case of adjunction that we would expect the grandmother relation to be relevant. The reason is that adjunction splits one category into two parts. The resulting two c-structure categories are then in some sense really the same category and should have the same mother. Suppose there is an XP, call it $\mathrm{XP}_{d(aughter)}$, that has the annotation $\uparrow{=}\downarrow$. Let us call this XP's mother $\mathrm{YP}_{m(other)}$. When XP_d is split by adjunction, into an upper part (XP_{d1}) and a lower part (XP_{d2}), then both parts should identify their f-structural information with that of YP_m, since the unsplit category XP_d identifies its f-structure with that of YP_m, via the $\uparrow{=}\downarrow$ annotation. The fact that XP_{d2} has the same f-structure as YP_m is indirectly captured by annotating XP_{d2} and XP_{d1} with $\uparrow{=}\downarrow$; it is directly captured by annotating XP_{d2} with $\uparrow^2 = \downarrow$. Since the two parts of the adjunction should map to the same f-structure, XP_{d2} is also annotated $\uparrow{=}\downarrow$.[9]

We can now return to a consideration of (36) and how it captures the correct pattern of data. Consider first structure (31), which represents the kind of adjunction that should be blocked. Since the upper XP (XP_1) bears the annotation ($\uparrow$ GF) = $\downarrow$ its f-structure must be the argument of some predicate that selects for GF in order to satisfy Coherence (Kaplan and Bresnan 1982, Bresnan 2001), which requires that every GF be designated by a PRED. The f-structures of XP_1 and the adjunction target XP_2 are identified as being the same by the $\uparrow{=}\downarrow$ equation on the adjunction target XP_2. A schematic specification of the resulting f-structure is:

(37)
$$\textit{xp}_1\textit{'s mother}\begin{bmatrix}\text{PRED} & \text{`...GF...'}\\ \text{GF} & \textit{xp}_1, \textit{xp}_2\begin{bmatrix}\text{PRED} & \text{`...'}\end{bmatrix}\end{bmatrix}$$

The f-structure corresponding to XP_2 has a GF; therefore $\neg$(GF $\uparrow$) is false and $\uparrow^2 = \downarrow$ must hold. This means that the f-structure of XP_1's mother, i.e. the outermost f-structure in (37), will be equated with the f-structure for XP_2:

(38)
$$\textit{xp}_1\textit{'s mother}\begin{bmatrix}\text{PRED} & \text{`...GF...'}\\ \text{GF} & \textit{xp}_1, \textit{xp}_2\begin{bmatrix}\text{PRED} & \text{`...'}\end{bmatrix}\end{bmatrix}\!\!\Big\}$$

This results in a functional uniqueness violation for the semantic feature PRED; thus, structures like (31) are blocked. The adjunction rule (36) prevents adjunction to lexically selected phrases, no matter their category, maintaining the claim 1.

Consider next the structure (32), which represents the valid kind of adjunction further articulated in (29). XP_1 in (32) is identifying its f-structure with that of its mother and XP_2 is identifying its f-structure with that of its own mother, which is XP_1. Therefore XP_2's f-structure is independently asserted to be the same as its grandmother's f-structure and $\uparrow^2 = \downarrow$ does no further work or harm. Although the left disjunct $\neg$(GF $\uparrow$) is false of XP_2 in (29) (i.e., the IP that is the adjunction target has a GF as discussed above), the right disjunct is true and the structure is licensed. The adjunction rule (36) does not prevent adjunction to an XP contained in a lexically selected phrase.

A case that we have not considered so far is adjunction to matrix CPs, which should be allowed:

(39) When she moved to the city, where did she live?

[9]The $\uparrow^2 = \downarrow$ annotation can also be added to the righthand X^0 in the head-adjunction rule (27). An X^0 head will always have the $\uparrow{=}\downarrow$ annotation; therefore the mother of X^0 with no adjunction and the grandmother of the lower X^0 in an adjunction structure will always be the same. The reader can check this against the head adjunction structures shown in (44) and (47).

The adjunction rule (36) does not block matrix adjunction: since the root clause is not a selected phrase, the negative constraining equation $\neg(\text{GF} \uparrow)$ is satisfied.

Thus, the universal barring adjunction to a lexically selected phrase, claim 1, is maintained in (36) by extending further the theory of adjunction presented by (Bresnan 2001) and modified by (Toivonen 2001). In fact, (36) is slightly more general than claim 1. As noted in section 2, the universal has nothing to say about the badness of adjunction to an appositive as in (9), since appositives are not lexically selected.

(9) *Her prediction, when she moved to the city that her social life would improve, was false.

However, the appositive does have a GF in LFG: ADJUNCT. This feature is set-valued (see Dalrymple 2001:153–158 and references therein); the appositive in (9) occurs in an f-structure that can be schematically represented as:

(40) $\left[\text{ADJUNCT} \quad \left\{\left[\text{“that her social life would improve”}\right]\right\}\right]$

Thus, it seems that the crucial concept for claim 1 should not be whether the adjunction site is lexically selected, but rather whether it bears a grammatical function, even a non-selected function like ADJUNCT.

The set-valued nature of ADJUNCT necessitates a slight notational modification to (36), such that it does not matter if the inside-out path that is checking for a grammatical function passes through a set or not:

(41) $\text{XP} \longrightarrow \underset{\substack{\uparrow=\downarrow \\ \{\ \neg(\text{GF}\ (\in)\uparrow)\ \mid\ \uparrow^2=\downarrow\}}}{\text{XP}}\ ,\ \text{YP}^*$

Notice that the optionality of the path through the set ($\in$) means that the left disjunct is equivalent to the negated disjunction $\neg[(\text{GF} \uparrow) \vee (\text{GF} \in \uparrow)]$. This in turn is equivalent to the conjunction $\neg(\text{GF} \uparrow) \wedge \neg(\text{GF} \in \uparrow)$ (by DeMorgan's Law). Therefore, in order for the left disjunct in (41) to be satisified, the f-structure corresponding to the adjunction site cannot be either the value of a GF or a member of a set that is the value of a GF.

The equation $\neg(\text{GF}\ (\in) \uparrow)$ is not satisfied in the f-structure for (9), since the appositive is a member of an ADJUNCT set, as shown in (40); $\uparrow^2 = \downarrow$ cannot be satisfied either, for essentially the same reasons as discussed for (31) (i.e., the f-structure reentrancy introduced results in a functional uniqueness violation). The LFG theory of adjunction presented here not only preserves claim 1, it goes further by correctly blocking adjunction to appositives.

3.2 Irish Complementizers as Head-adjoined Verbal Particles

In the previous section I built on Toivonen's (2001) theory of adjunction, which is in turned based on Bresnan (2001). In this section I will show how Toivonen's (2001) distinction between projecting and non-projecting heads can be used to synthesize McCloskey's claim that the Irish preverbal particles *go*, *aL*, *aN* and their morphological alternants are complementizers and Sells's claim that they are head adjuncts.

The synthesis is achieved by treating the particles as *non-projecting* complementizers. This is demonstrated in the following lexical entry for one of the realizations of the complementizer *go*, which has the non-projecting category $\hat{\text{C}}$, rather than the projecting category C^0:[10]

(42) *goN* $\hat{\text{C}}$ $(\uparrow \text{TENSE}) \neq \text{past}$
$(\uparrow \text{MOOD}) = \text{affirmative}$

[10]The affirmative, non-past *go* induces the nasalization mutation, hence it is written *goN* (McCloskey 1979:11).

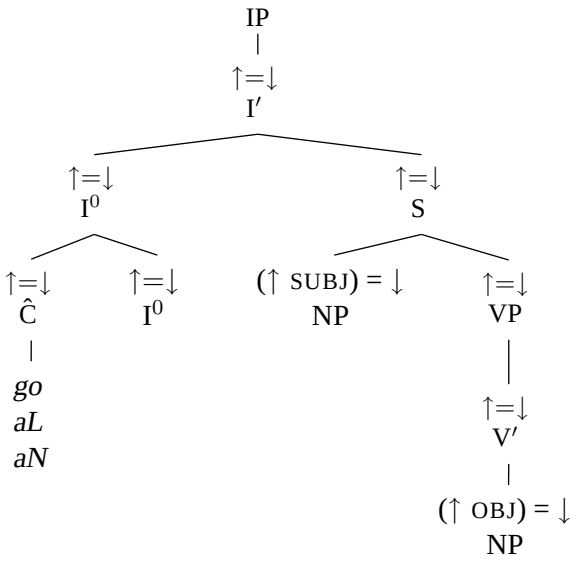
The particles are head-adjoined to finite verbs base-generated in I by the c-structure rule (43), an instantiation of Toivonen's (2001) head-adjunction rule (see (27) above).

(43)
$$\begin{array}{lcll} \mathrm{I}^0 & \longrightarrow & \hat{\mathrm{C}} & \mathrm{I}^0 \\ & & \uparrow{=}\downarrow & \uparrow{=}\downarrow \end{array}$$

This maintains Chung and McCloskey's (1987) claim that Irish finite verbs occupy I, but with no movement from V to I. The assignment of the category I to finite verbs is normal practice in LFG (cf. King's (1995) analysis of Russian finite verbs and the analysis of Welsh in Bresnan 2001:127–131).

The resulting IP structure for Irish will be:[11]

(44)



If we adjoin an adverbial to the left of this IP, we get the correct word order, *Adverbial Particle V S O*, as per claim 5. This is akin to McCloskey's (1996) solution of lowering the complementizer to adjoin to I^0, but everything is base-generated and there is no lowering.

A problem remains, though: how is adjunction to this IP possible if it is a lexically selected clause (i.e., a COMP)? I will adopt McCloskey's (1996) solution of shielding the IP inside a CP. The next question is where this CP comes from, as the Irish complementizer is a non-projecting head and does not project a CP. The problem of projecting a CP is solved by further annotating the head-adjunction rule that adjoins $\hat{\mathrm{C}}$ to I^0:

(45)
$$\begin{array}{lcll} \mathrm{I}^0 & \longrightarrow & \hat{\mathrm{C}} & \mathrm{I}^0 \\ & & \uparrow{=}\downarrow & \uparrow{=}\downarrow \\ & & \mathrm{CP} \in \mathrm{CAT}(\uparrow) & \end{array}$$

The rule uses the CAT operator defined in (10) (Kaplan and Maxwell 1996:93–94; Dalrymple 2001:171):

(46) $\mathrm{CAT(f)} = \{c \,|\, \exists n(n \in \phi^{-1}(f) \wedge \lambda(n) = c)\}$

CAT(f), where f is an f-structure node, returns the set of category labels of c-structure nodes that map to f, using the labeling function λ (Kaplan 1995). Thus, rule (45) states that there is a CP in the set of category labels of c-structure nodes that map to the particle-verb complex's f-structure. A CP is projected, but by the adjunction rule that forms the particle-verb complex, not by the complementizer itself, which cannot project.

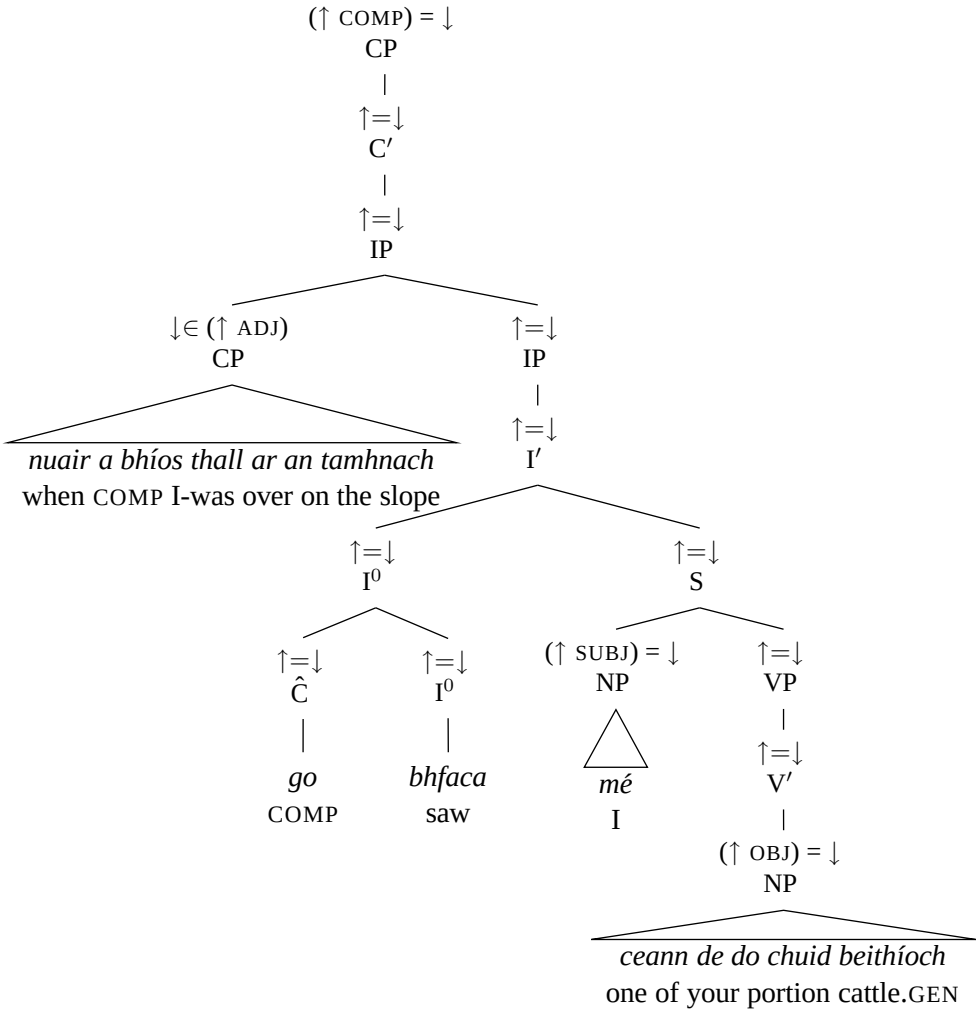
Let us see how all of this comes together in the analysis of example (8c), repeated below, which demonstrated the possibility of adjunction to the left of the particle, yielding the word order *Adverbial Particle V S O*:

[11] The small clause analysis of S dominating NP and VP is also motivated by Chung and McCloskey (1987).

(8c) chun isteacht duit [$_{CP}$[$_{CP}$ nuair a bhíos thall ar an tamhnach] go bhfaca mé ceann de
to tell.[-FIN] to-you when COMP I-was over on the slope COMP saw I one of
do chuid beithíoch]
your portion cattle.GEN
to tell you that when I was over on the hillside, I saw one of your cattle

The structure yielded for the CP complement of *isteacht* ('tell') in this example, according to the particle-verb adjunction rule (45), the phrasal adjunction rule (41), and lexical selection, is shown in (47):

(47)



The adjunction rule (45) that creates the particle-verb complex requires that a CP be in the set of categories corresponding to the f-structure node of the complementizer Ĉ. This CP is assigned the GF COMP by the lexical item that selects it as a complement. The requirements of the XP adjunction rule (41) are such that adjunction to this CP is impossible, but adjunction to the IP is possible, for the reasons discussed in section 3.1 above.

The analysis has so far achieved a base-generated synthesis of McCloskey position that the Irish preverbal particles are complementizers (claim 3) and Sells position that the Irish particles are head-adjoined to the finite verb (claim 4). This has been done using Toivonen's (2001) theory of X-bar structure and adjunction such that the universal prohibiting adjunction to a selected phrase (claim 1) is maintained and such that the correct and surprising word order *Adverbial Particle V S O* (claim 5) is attained.

3.3 Endocentricity

The last remaining consideration is claim 2, the universal requirement that phrases be endocentrically headed. We saw in section 2 that this was a problem for claim 4, that the complementizers are head adjuncts, if we wish to maintain McCloskey's (1996) solution to the problem of adjunction to selected clauses in Irish. The problem is illustrated in (47): the CP that shields the IP adjunction does not dominate a C^0 in its maximal projection, seemingly violating endocentricity. In fact, c-structure (47) contains an apparent further violation of endocentricity, since the VP does not dominate a V^0.

However, the independently-motivated LFG theory of endocentricity and heads (Bresnan 2001:ch. 7) allows structures such as (47). The statement of endocentricity in this theory is as follows (Bresnan 2001:134):

(48) **Endocentricity:** Every lexical category has an extended head.

Bresnan (2001:132) defines *extended head* as in (49), based on previous work by Zaenen and Kaplan (1995) and Bresnan (2000):

(49) **Definition of Extended Head**: Given a c-structure containing nodes $\mathcal{N}$, $\mathcal{C}$, and c- to f-structure correspondence mapping ϕ, $\mathcal{N}$ is an **extended head** of $\mathcal{C}$ if $\mathcal{N}$ is the minimal node in $\phi^{-1}(\phi(\mathcal{C}))$ that c-commands $\mathcal{C}$ without dominating $\mathcal{C}$.

The force of this definition is to define the notion of head partly in terms of f-structure and partly in terms of c-structure, since these are the two syntactic projections (or levels) in LFG. Although, the definition is somewhat complicated, its basic import is that a c-structural head X^0 of an XP is defined as its extended head if such an X^0 is present;[12] otherwise the immediately c-commanding c-structure node that is on the same $\uparrow{=}\downarrow$ head path as the XP serves as its extended head.

We can now see that the VP in (47) satisfies (48), because its extended head is the upper I^0, which hosts the particle-verb complex. But what about the CP? Since CP is not a lexical category, it does not need even an extended head, according to (48). The capacity for CPs to lack heads is motivated by Bresnan (2001:133, (15a–c)), based on examples such as the following:

(50) a. I wonder [$_{\mathrm{CP}}$ [$_{\mathrm{C}}$ if] [$_{\mathrm{IP}}$ I am tall enough]].
b. I wonder [$_{\mathrm{CP}}$ [$_{\mathrm{AP}}$ how tall] [$_{\mathrm{IP}}$ I am]].
c. *I wonder [$_{\mathrm{CP}}$ [$_{\mathrm{AP}}$ how tall] [$_{\mathrm{C}}$ if] [$_{\mathrm{IP}}$ I am]].

Bresnan (2001) argues that the correct generalization is that either the interrogative complementizer of CP (*if*) or the specifier of CP (*how tall*) is present, but not both. In the former case the CP is headless. Bresnan (2001:133) notes that there is evidence that the *wh*-phrase cannot be an alternative realization of the head of CP, since the *wh*-phrase licenses ellipsis of the IP (*She's tall. I wonder how tall.*), but the complementizer does not, even when heavily stressed (** They say she'll do it, but I wonder IF.*). Thus, CPs in general can lack heads, hence the formulation of endocentricity in (48). There is nothing exceptional about the CP in (47).

4 Conclusion

I have shown in this paper that the apparently irreconcilable claims 1–5 can be reconciled in a natural, base-generated LFG analysis that builds on the standard LFG theory of endocentricity and coheads/extended heads (Bresnan 2001, among others), the LFG projection architecture (Kaplan 1995), and Toivonen's (2001)

[12] Note that Bresnan (2001:142, fn. 11) defines c-command such that "[a node] c-commands itself and all of the nodes dominated by its mother (including that mother)".

work on non-projecting categories and c-structure adjunction. The analysis built on McCloskey's (1996) analysis of Irish adjunction, but does not posit complementizer lowering. The principal theoretical consequences of the analysis are 1) the reconciliation of claims 1–5, in particular the synthesis of McCloskey's position that the Irish preverbal particles are complementizers and Sells position that they are head-adjoined to the verb; 2) the extension of Toivonen's (2001) theory of c-structure adjunction; 3) the correct prediction that adjunction to appositives is impossible, while also disallowing adjunction to lexically selected clauses and allowing adjunction to matrix clauses.

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