Towards a Unified Account of Adjuncts

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1 Introduction

After Hukari and Levine's (1995) seminal paper on adjunct extraction and Przepiorkowski's (1999) discussion on case-marking, a flat construal that treats adjuncts as sisters of complements has established itself as what becomes known as the Adjuncts-as-Complements (henceforth A-as-C) paradigm in HPSG (see Bouma et al. 2001, henceforth BMS01, for a systematic formulation). This type of analysis contrasts markedly with the traditional iterative adjunction analysis, which constitutes a binary configurational tree.

Equally important to the flat/configurational contrast is the A-as-C theory's claim that (at least some) lexical heads *select* for (at least some) adjunct(s).[1]This claim is indeed supported by some evidence (as we shall see shortly). However, even the A-as-C advocates do not believe their analysis to be universally applicable to all the head-adjunct phrases. BMS01 say they 'have no reason to question the traditional wisdom in the case of preverbal adverbs' (p.38). Also, very little argument for extending the same treatment to adnominals is offered from the A-as-C quarters, presumably because of the dearth of supporting evidence. Thus, in the current state of the theory, two systems co-exist in parallel, forcing an adjunct to receive one analysis or the other, or perhaps both (to be ambiguous). However, it is unclear whether there is evidence for such a sharp boundary or systematic ambiguity.

This paper is an attempt towards reconciling the two approaches and find a unifying middle ground. We shall present an analysis that essentially reverts back to the traditional configurational structure, but nevertheless captures the two main phenomena that have motivated the A-as-C analysts, by incorporating adjuncts into the lexical head as valence values *as well*.

1.1 A-as-C vs. Traditional Accounts

Two principal reasons that motivate the A-as-C analysis are the following:

[1]The A-as-C analysts additionally invoke the feature DEPS as a locus to which generalisations that involve multiple adjuncts or both adjuncts and arguments apply. See the last section.

Extraction: At least some adjuncts seem to behave exactly the same way as arguments in that they participate in unbounded dependency constructions (Hukari and Levine, 1995; Levine and Hukari, 2006). For this reason the lexical account of Pollard and Sag (1994) has been seen as 'less than fully satisfying' (BMS01). Incorporating adjuncts into the COMPS list provides the locus for gapping, which then allows for the application of HPSG's standard SLASH mechanism.

Case-assignment: In some languages there is evidence that adjuncts seem to be assigned case by lexical heads. A relatively simple case in point comes from Korean:

(1) a. hansikan-ul/(*i) chaek-ul/(*i) ilkta
one hour-ACC/*NOM book-ACC/*NOM read
('read a book for an hour')

b. hansikan-i(/*ul) chaek-i/(*ul) philyohata
one hour-NOM/*ACC book-NOM/*ACC one hour-NOM/*ACC need
('need a book for an hour')

Here the adverbial *hansikan* ('for an hour') receives accusative case in (a) and nominative in (b). This difference is difficult to explain in the traditional account, but is straightforwardly accounted for if adjuncts are in the domain (such as COMPS) on which the lexical head exerts its case-assignment capacity, as the two lexical heads, verbs *ilkta* ('read') and *philyohata* ('need') respectively subcategorise for accusative and nominative NPs for their external argument.[2]

On the other hand, the traditional analysis should not be lightly dismissed, as it has its merits:

Compositional semantics: It is broadly accepted that a modifier/adjunct is semantically a functor, which takes its modifiee (syntactic head) as its argument, whereas these statuses are reversed for head/arguments. While this semantic difference is easy to accommodate if, as in the traditional analysis, the head-adjunct and head-complement/specifier phrases constitute separate projections, it requires more complication if, as in the A-as-C account, adjuncts and arguments are placed in the same valence feature.

Scope and word order: Adjuncts can be sensitive to scope ambiguity, but their scope behaviour seems more 'linear' than quantified arguments.[3] That is, the most plausible scope reading with multiple adjuncts tends to be the one faithful to the surface word order, as below:

(2) a. Peter trains two hours daily.

b. ? Peter trains daily two hours.

c. * Peter trains daily every week two hours.

[2]This is an oversimplification of the case system of Korean, which also exhibits more problematic phenomena. See the last section for possible directions within the present approach.

[3]Quantified arguments may arguably allow for all the permuted scope patterns (Ebert, 2005). Also, scope ambiguity is not restricted to quantified adjuncts, as in *new favourite films* and *favourite new films*, which is another difference from arguments.

In a theory that treats adjuncts as mutual sisters, an additional mechanism needs to be posited to rule out the unacceptable readings, while the traditional analysis can straightforwardly capture the most plausible reading (while it may miss some possible readings —we will come back to this point in the last section).

Computational: A flat structure is prone to an increased parsing complexity, in contrast with the binary branching structure assumed in the traditional analysis (Müller, 1996). For a sequence of multiple (say k) categorially indistinguishable adjuncts whose order is free (which is a distinct possibility), the search space will be as large as $k!$ for the former and only $2k$ for the latter. The traditional analysis is also free from the left-corner uninstantiation problem that haunts the A-as-C analysis in a head-driven parsing (van Noord and Bouma, 1994).

2 Proposal

The peculiarity of the behaviour of adjuncts boils down to their 'dual' nature displayed not just in the semantics/syntax double role (semantic functor / syntactic argument), but also in syntax alone (case selecter/selectee). However, the syntactic selectional effects of a syntactic head (modifiee) on its adjunct (modifier) and of a modifier on its modifiee are not symmetrical. First, a head does *not* require the *presence* of an adjunct, whereas the latter does the presence of the former. Second, a head does not select for an adjunct of a single categorial type (e.g. an adverbial could be a PP or an NP, as well as an advP) but rather for a particular feature inside it (such as case, as in Korean).

The spirit of the proposal is to make the syntactic head and the modifier/adjunct select for *each other syntactically in distinct manners*. The selectional property of modifier/adjunct is, as in the traditional analysis, encoded in the MOD feature. Additionally, in order to allow a modifiee head to select its modifier as well, a *valence* feature ADJS, separate from COMPS, is introduced into lexical heads.[4] It is then an interaction of these two features that enforces the selectional effects while ensuring that the head-complement and head-adjunct phrases form separate projections. The modified feature structure for a lexical head looks like the following:[5]

$$\begin{bmatrix} \textit{lex-head} \\ \text{SPR } \textit{nelist} \\ \text{COMPS } \textit{nelist} \\ \text{ADJS} \left\langle \left[\textit{phrase} \right]^{*} \right\rangle \end{bmatrix}$$

[4] Similar features have been proposed in Kasper (1994) and Levine and Hukari (2006), who employ a lexically coded feature for adjuncts. Kasper is however led to a flat analysis with his flattening Head-Adjunct Schema, due to his emphasis on a fine-grained semantics in terms of scope. The difference to Levine and Hukari's proposal is to be noted later.

[5] We are adopting the simplifying assumption that equates SPR feature with the SUBJ feature for verbs. The hidden agenda is, however, paving way to a uniform account both for adverbials and adnominals.

The Kleene Star ('*') notation is taken to indicate zero or more occurrences of the type it attaches to. ADJS value is therefore unified with an empty list or a list of one or more occurrences of *phrase* type. The Kleene iteration expresses the fact that a head can be attached with any number of adjuncts, as well as be devoid of any adjunct,[6] while the type of an adjunct is deliberately underspecified (specified only as a *phrase*), reflecting the aforementioned fact that an adjunct may be of a variety of categories. Since ADJS is treated as a valence feature, its value percolates up, via the Valence Principle, up to a point where it is 'discharged', with the following modified Head-Adjunct Schema.

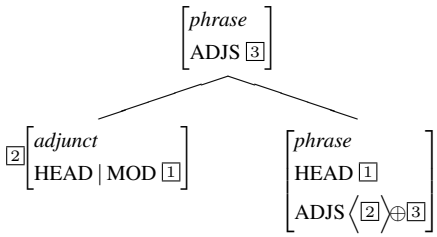


Figure 1: Revised Head-Adjunct Schema

Notice first that the Schema is recursive and binary-configurational, where the adjunct's selectional capacity is expressed with MOD, as usual, though it is unified with HEAD of the modifiee head (1) rather than its SYNSEM, to allow for the possibility of various levels of projections (sentential or bar-level phrases) to be combined and hence for some flexibility for word order.[7] Crucially, however, the first element of the ADJS list is simultaneously unified with the adjunct (2), expressing the selectional property of the syntactic head. Notice also that through this unification the ADJ value, which was 'underspecified' at the prior stages, is now 'fed' with specific SYNSEM information from the adjunct.[8]

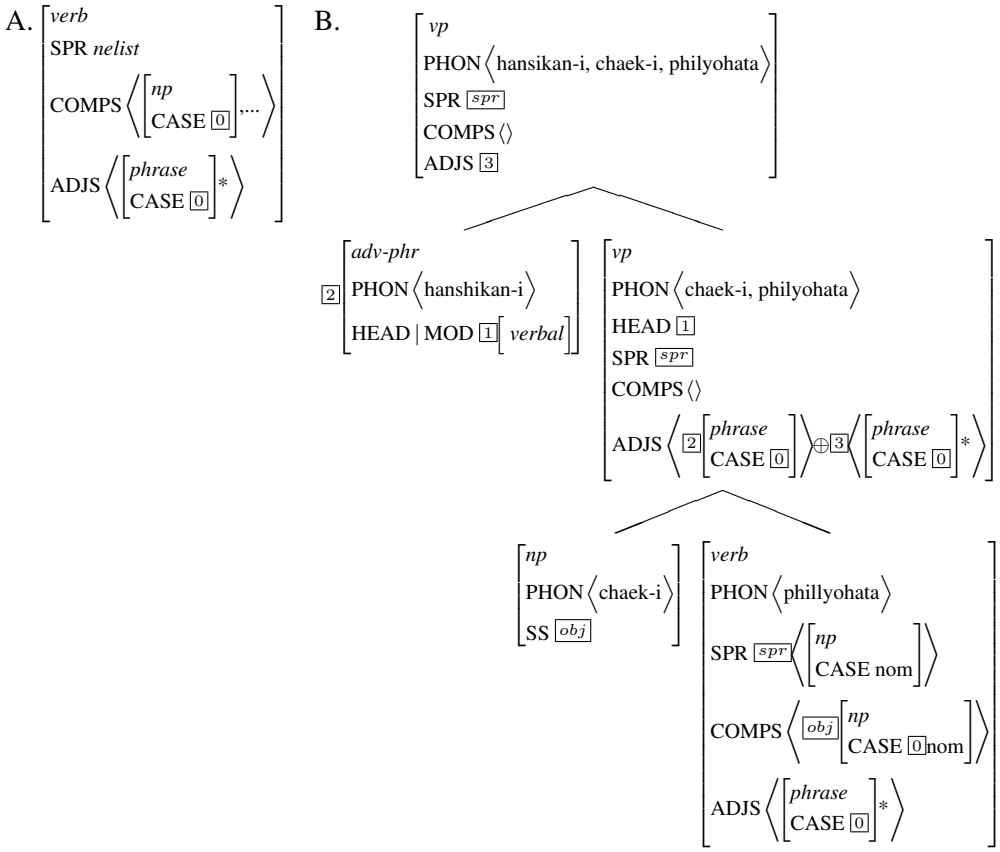
The 'rest' of the ADJS value then percolates up via the Schema's discharge mechanism. Recall, however, unlike COMPS or SPR, the ADJS value starts out as a list of zero or more elements. This value in fact remains constant on the phrasal levels. Through the Schema one adjunct is instantiated, and the lower phrase's ADJS value is specified to a list of *one* or more elements. As a result of the discharge, therefore, the percolated list (3) of the higher phrase is again a list of zero or more phrases, which allows for a further Head-Adjunct projection in the same manner.

[6]Formally, it is intended to be a shorthand for a disjunctive feature structure: an ADJS value is an empty list, a list of one phrase or a list of two phrases, and so on. This is not very different from the Argument Structure Extension proposed in BMA01, where the DEPS value of a lexical head is a list of 'arguments' (members of ARG-ST list) plus zero or more adjuncts successively appended.

[7]This treatment also avoids cyclic unification, which is computationally difficult to manage.

[8]Levine and Hukari (2006) provide a similar account with a binary projection with a adjunct list feature separate from COMPS, but do not admit it as a valence feature. The main reason for this complication comes from the behavioural difference in extraction between arguments and adjuncts. Although the present account does not address this problem, it would be relatively straightforward to account for this difference, given ADJS is a separate list from COMPS.

Now our Korean example can be accounted for as an indirect structure sharing between a COMPS element of the verb and the adjunct. The left feature structure below (A) is that of a Korean verb with the ADJS list. Notice that the top element of the COMPS list is unified with elements in the ADJS list, which captures the fact that adverbials receive the same case as the first external argument, whatever it may be.



(B) represents projections with the case-marked adjunct *hansikan-i* ('for an hour') of *philyohata* ('need'), which selects for nominative case. After the Head-Complement projection, COMPS will be discharged, while ADJS percolate up, just like the familiar staggered discharge mechanism. The top element of the ADJS list is then discharged in the upper Head-Adjunct projection, though leaving the upper node again with a list of zero or any number of adjuncts.

It should be easy to see that the same machinery as proposed in BMS01 can be employed for adjunct extraction. As (potential) adjuncts are registered lexically in the ADJS list, an element in this list could perfectly well be 'gapped', which would then participate in the standard SLASH percolation.

3 Remaining issues

Lastly we raise two of the most important outstanding issues that are the main sources of controversy. The first concerns scope ambiguity. Essentially we are proposing an analysis where multiple adjuncts constitute a configurational structure faithful to the word order, but it is well-documented that there may be discrepancy between word order and scope. In German, for example, the equivalent for (2b), '*Peter trainiert jede Woche zwei Stunden*', is perfectly acceptable, suggesting inverse scope is available. In a related argument, the A-as-C advocates claim the configurational analysis is *over*specified, predicting spurious ambiguity between, say, *red fast car* and *fast red car*. However, these arguments cut both ways. A flat analyst will have the opposite difficulty: that of excluding the wrong readings and differentiating distinct readings, as opposed to our problem of including the right ones and equating the same ones. As suggested by Kasper (1994) and discussed in more detail by Sato (2008), we believe that ultimately the linearisation technique initiated by Reape (1993) should be employed to overcome these difficulties, given the complex interrelationship between word order and scope.

The other issue concerns the problems of 'syntactic' —as opposed to 'lexical'— case-marking behaviour that involves relations that hold amongst arguments and adjuncts, such as case stacking and case alteration in Finnish and Korean (Maling, 1993; Wechsler and Lee, 1996). These are difficult phenomena for any lexicalist system to handle, but some of them are accounted for by relating the valence features to the more global ARG-ST and DEPS features in HPSG (Przepiórkowski, 1999). Such an extension is perfectly amenable to the analysis presented here, just as in the A-as-C analysis.

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