Towards a Unified Account of Adjuncts

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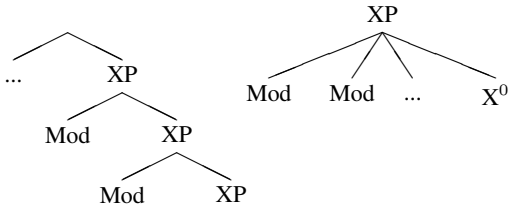
Abstract

We present an analysis of adjuncts which, while based on the traditional binary adjunction schema, accommodates the phenomena that motivate the alternative Adjunct-as-Complement approach, such as adjunct extraction and case marking. The key idea is to enable the syntactic head (modifiee) to select for its modifier (adjunct) via the new valence feature dedicated for adjuncts, while leaving its values underspecified. Thus the selectional property of the modifiee percolates as well as that of the modifier, dispensing with the need to endow adjuncts a complement-like status.

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. The difference is illustrated roughly in the following trees.



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).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, i.e. to be syntactically 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

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to the traditional configurational structure, but nevertheless captures the two main phenomena that have motivated the A-as-C analysts, extraction and case-marking of adjuncts. A proposal in a similar spirit is also made by Levine and Hukari (2006) (henceforth LH06), but we argue that our approach is more general and hence dispenses with additional machineries they have to posit. Furthermore, we do not posit ARG-ST and DEPS, the now familiar valence features indirectly related to our issues, for the purpose of adressing these problems. The crux of our proposal is to incorporate into the lexical head adjuncts it selects for as valence values.

1.1 A-as-C vs. Traditional Accounts

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

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.[1]

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

[1] 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.

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.[2] 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.

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).

Cumulative scoping: As Levine and Hukari (2006) point out, the standard A-as-C account is faced with a difficulty with what they call *cumulative scoping*, a phenomenon that can be very straightforwardly accounted for by the traditional analysis: the fact that an adjunct may collectively modify a coordination phrase of multiple phrases.

(3) sleep, take a shower and go out again in an hour

Under the traditional Head-Adjunct Schema, *sleep*, *take a shower* and *go out again* are all analysed as full VPs. These VPs then project to a single coordination phrase with the standard Coordination Schema. This coodinated VP is then modified by *in an hour* with the same Head-Adjunct Schema. Thus the desired analysis simply falls out in the traditional account.

However, in the A-as-C analysis, each of the VPs has to be analysed as having an adjunct value in the COMPS list, which is to be realised not immediately but after some projections to its *right*. Each of the adjunct values also need to be amalgamated to achieve the 'cumulative' effect, and this suggests for a use of some

[2]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.

version of SLASH mechanism, though it needs to work towards right, as in right-node raising (RNR). However, considerable doubt has been cast over such RNR analyses (Beavers and Sag, 2004).

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 a nominal, 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/modifiee and the modifier/adjunct select for each other syntactically *in distinct manners*, by granting to the modifiee a new valence feature with underspecified values. The selectional property of modifier/adjunct over its modifiee 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, the feature ADJS, separate from COMPS, is introduced into lexical heads.[3] 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 Figure 1.[4]

The feature structure on the left represents a general lexical head, whereas the one on the right exemplifies one of its subtypes, noun. The Kleene Star ('*') notation is taken to indicate zero or more occurrences of the type it attaches to. Thus the ADJS value is generally an empty list or a list of one or more occurrences of the *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. 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. Thus our proposal is not different from BMS01 or PS94 (or LH06) in that we also take a lexical head to be 'ambiguous' in its adjunct-subcategorising capacity. The difference is that we leave the values of ADJS list deliberately underspecified. Notice that it is specified only as a *phrase* for the general type, and although it is nar-

[3] Similar features have been proposed in Kasper (1994) and Levine and Hukari (2006), both of whom employ a feature specifically 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.

[4] 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.

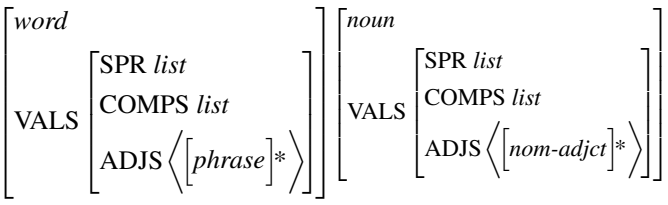

Figure 1: Feature structures of a lexical head with ADJS

rowed down to the *nom(inal)-adj(un)ct* subtype for noun, it is still underspecified —provided that a *nom-adjct* is defined as a PP, nominal or adjective— reflecting the aforementioned fact that an adjunct may be of a variety of categories. One important advantage of this underspecified representation is that it allows the list to be discharged *only when* an element is unified with an adjunct, dispensing with the need to compute multiple subcategorisation frames beforehand at the lexical level. Therefore we avoid the instantiation problem mentioned in 1.1, as well as some of the problems relating to extraction and cumulative scoping as we shall illustrate in the next section.

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 modified Head-Adjunct Schema in Figure 2. The figure on the left represents the Schema in a general form, whereas the one on the right exemplifies a subcase with a nominal. Notice first that, as in the traditional Schema, it is recursive and binary-configurational, where the adjunct's selectional capacity over its modifiee is expressed with MOD, and the mother inherits the semantic content from its adjunct daughter (semantic head). Crucially, however, the first element of the ADJS list of the syntactic head is simultaneously unified with the sister adjunct (2), enforcing the head's selection of its modifier, *nom-adjct*, i.e. PP, nominal or adjective, as shown on the figure on the right. Further notice that this underspecified ADJS value is 'fed' with specific SYNSEM information from the adjunct, when unification takes place (2 becomes instantiated to an adjective in the figure).

Nothing is particularly remarkable in this projection illustrated in the figure, as this is mostly identical to the standard analysis, except the ADJS feature, which is underlined and where I adopt the $\langle top\_element\_of\_list | tail\_list \rangle$ notation for readability.[5] Observe the fact that the top element of the Kleene list is unified with the adjunct sister, and the tail list, which is again the Kleene list, is passed up to the mother. One other technical detail to note is the fact that in a Head-Adjunct projection, the ADJS list is not made empty (or at least not exactly —it includes an empty list as a disjunct). In this nominal example, this 'emptying' operation is done in the maximal NP projection, and hence a small modification is required for

[5]The same notation will be used for the subsequent figures.

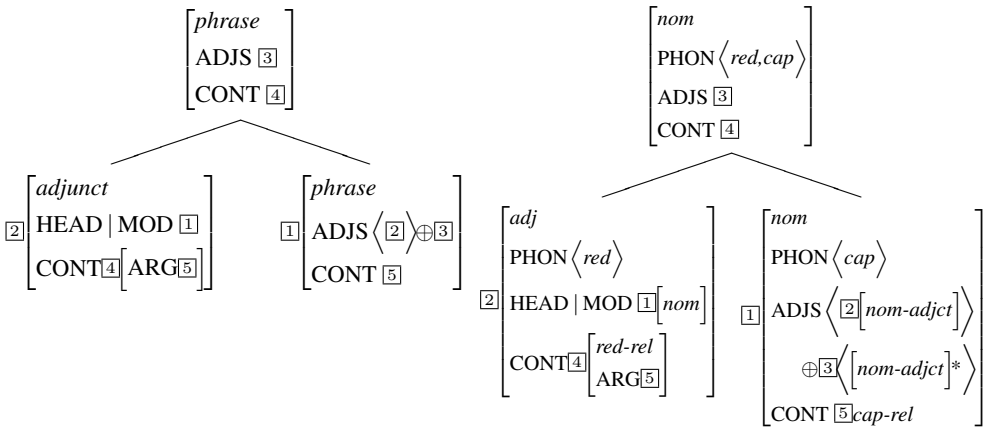

Figure 2: Revised Head-Adjunct Schema and a nominal instantiation

the Head-Specifier Schema, although we omit this detail in the interest of space.[6]

3 Examples

We will now see how our proposal works out with two types of examples. The first is cumulative scoping we saw earlier in 1.1, a particular sub-species in particular where the adjunct is extracted. In the following section, our handling of adjunct case-marking will be demonstrated with Korean examples.

3.1 Cumulative scoping and extraction

Our main example for this section is one in which both cumulative scoping and extraction are observed, as in the following example:

(4) In an hour, he says he will sleep, take a shower and go out again.

The reason for choosing such an example is that it exemplifies the difficulties for PS94 and BMS01 respectively: the main weakness of the former lies with adjunct extraction, while that of the latter with cumulative scoping. The focus therefore is to show how our amalgamated approach straightforwardly avoids both problems. We will also compare our approach with LH06, who set out to solve the same set of problems.

Firstly, as a preliminary, Figure 4 shows our analysis of the VP coordination, *sleep, take a shower and go out again*. This is mostly a standard VP coordination,

[6] An analogous treatment can however be more problematic for verbal projections, as a sentence can further be modified. This issue is briefly discussed in Sato (2008), but needs to be further explored.

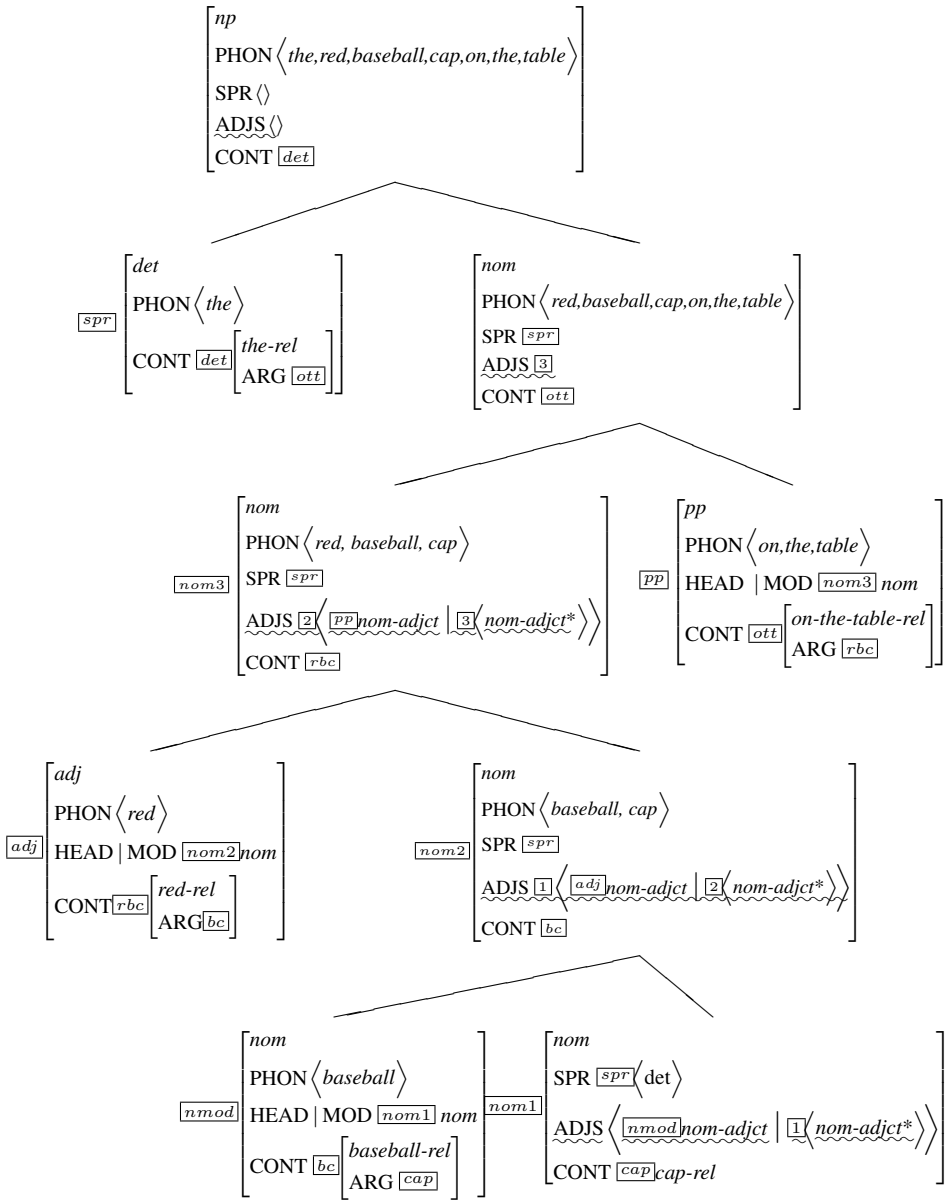

Figure 3: The projections of *the red baseball cap on the table*

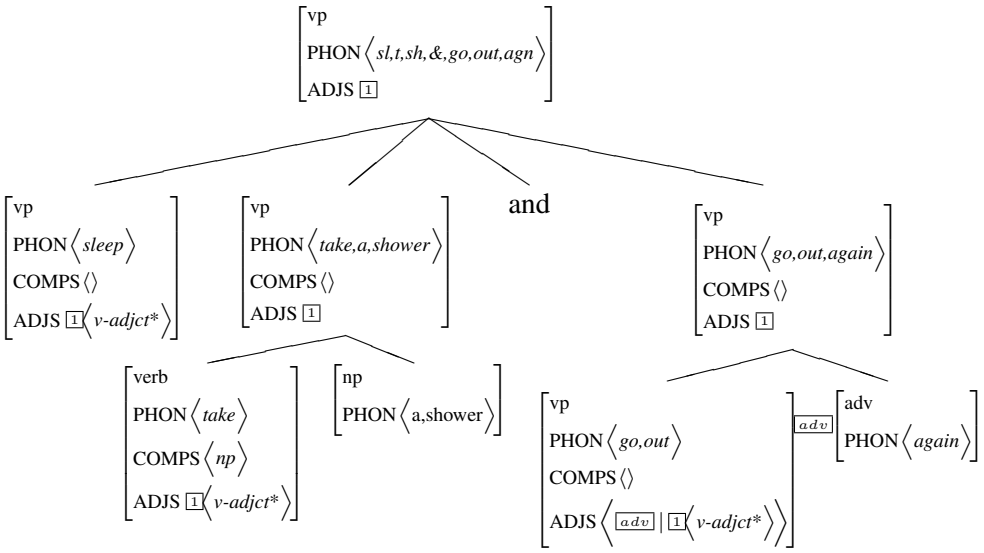

Figure 4: VP coordination example with ADJS

with COMPS list discharged in each coordinate, except that in anticipation of potential adjunctions, the ADJS values, namely the Kleene iteration of verbal adjuncts, are passed up towards the maximal projection. Notice that the slashing operation, as would be required in BMS01 or PS94 at the preterminal projection stage, is yet to be applied.

Now consider the analysis of the full sentence, (4), shown in Figure 5. At the Head-Adjunct projection (lowest in this figure), the top element of the ADJS list is slashed. Thus the gap is first created at this coordinated phrase, avoiding the need for the SLASH mechanism to be triggered at the lexical level, and hence the difficulty facing BMS01 concerning cumulative scoping described in 1.1.[7] As can be seen from the figure, the SLASH mechanism is of the standard variety: it carries the extracted valent towards the top node, where it is released and unified with the filler, *In an hour*.

In PS94, on the other hand, a lexical rule —the Adjunct Extraction Lexical Rule (AELR)— is invoked to add to a lexical head the SLASH value corresponding to an adjunct, which then threads upwards as a gap. Thus the SLASH operation must start, as in BMS01, at the lexical level, but as it is treated as a 'genuine' adjunct that is subject to the Head-Adjunct Schema, the coordination problem does not arise while leaving the issues surrounding the valence-like behaviour of adjuncts —extraction and case-marking— unaddressed. Concerning extraction, as LH06 emphasise, it is lack of generality that is problematic: the fact that AELR only

[7] In fact, our analysis allows an adjunction, even with a gap, to be triggered at *any* level towards the maximal projection, making the 'distributive' reading available, i.e. each of the events taking an hour. We believe such a reading should not be precluded, given the plausibility of this type of reading for e.g. *Many times he took a nap, drank water and took a shower on that hot day*.

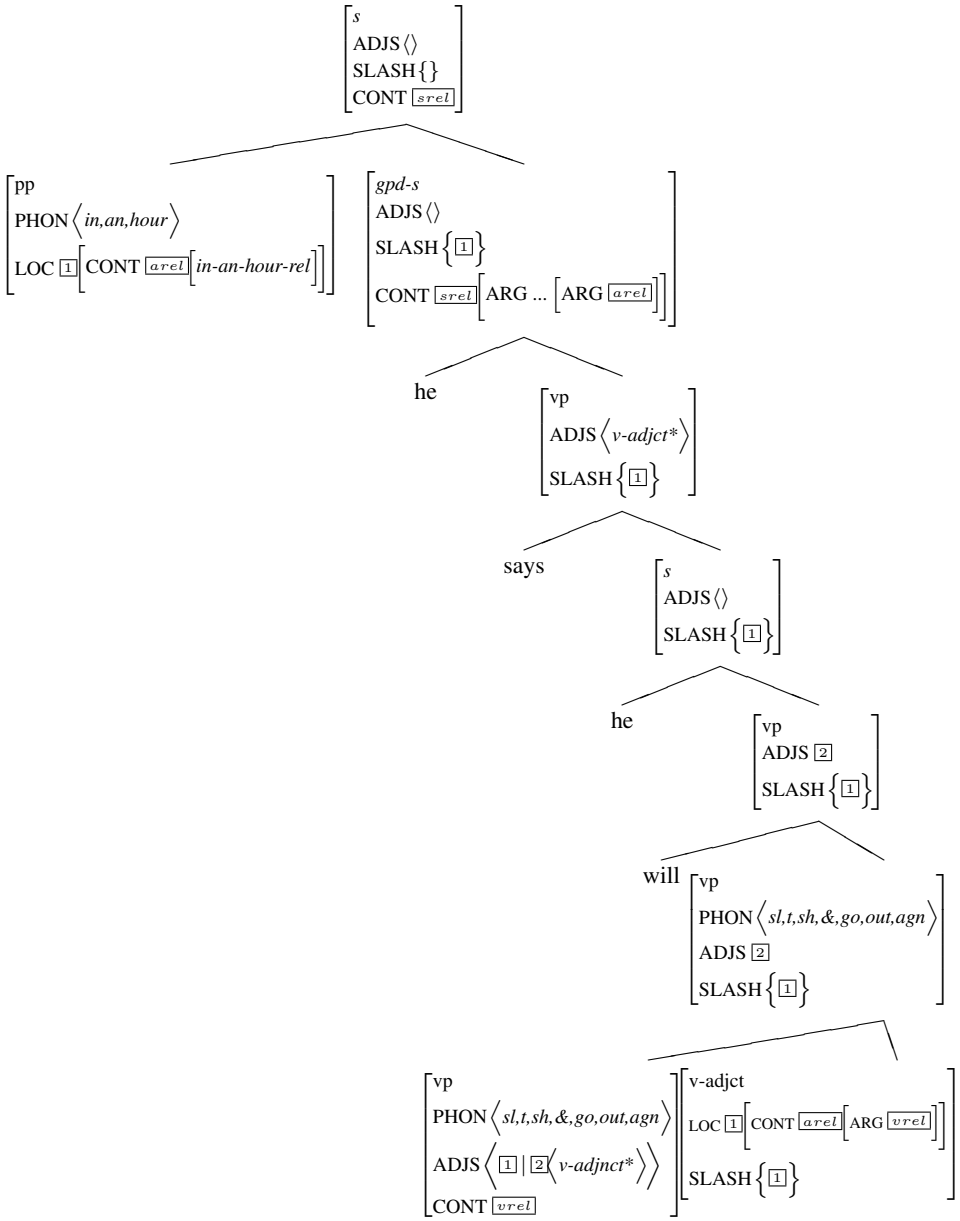

Figure 5: Cumulatively scoping adjunct extracted

applies (successfully) in subordinate clauses, despite the systematic ambiguity of *any* lexical head between the non-gapped and adjunct-gapped (post-AELR) cases. Although we share the idea with PS94 that a lexical head is systematically ambiguous in terms of adjunct gaps, we do avoid this generality problem. The same set of mechanisms —lexical ADJS values, the Valence Principle and the (revised) Head-Adjunct Schema— is used throughout, with an addition of the SLASH percolation if an adjunct appears non-locally.

We will conclude this section with a brief comparison with an alternative approach, LH06, who also adopt a same-named list feature, ADJS, for adjuncts but treat its values as *non-valents*, unlike our approach. The main motivation for this move is, partly like us, to assimilate to a degree the percolation mechanism of adjuncts to that of complements for uniformity of extraction phenomena while making it possible to retain a traditional adjunction-type Head-Adjunct Schema. In order to achieve this, LH06 inherit the use of a lexical DEPS list from BMS01 as the source of adjunct values capable of extraction, but create an alternative percolation path —a special non-valence feature— so that an adjunct will not be subjected to the valence-discharge Schemata such as the Head-Complement Schema but instead to the Head-Adjunct Schema only.

This move is indeed 'nontrivial' (LH06, p.168), since it then becomes necessary to secure an independent mechanism to pass up ADJS values, which are now outside the remit of the Valence Principle. This is exactly what LH06 do, in the form of the 'Adjunct Principle' along with other modifications that become required. However, this percolation mechanism itself is near-identical to that of the Valence Principle: the ADJS feature seems to be conceived not so much with an independent motivation as for the sole purpose of securing a percolation route that is parallel to that of valence features but is not affected by valence discharge. Considering the significant theoretical overheads as a consequence of such a move, we believe a more conservative approach is preferable that modifies the familiar apparatuses to make them work better for the problematic phenomena. Now that we have dealt with the extraction issue, we turn to the other major problem that needs to be addressed, i.e. the issue of adjunct case-marking.

3.2 Korean adverbial case-marking

We saw earlier, in the Korean examples (reproduced below), that the strong indication of a lexical influence on adverbial case-marking gives an additional support to the valence-like nature of adjuncts. Now equipped with the bi-directional selectional properties of both the head and the adjunct over each other, we are now prepared to accommodate such 'valencehood' with the standard Head-Adjunct Schema.

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

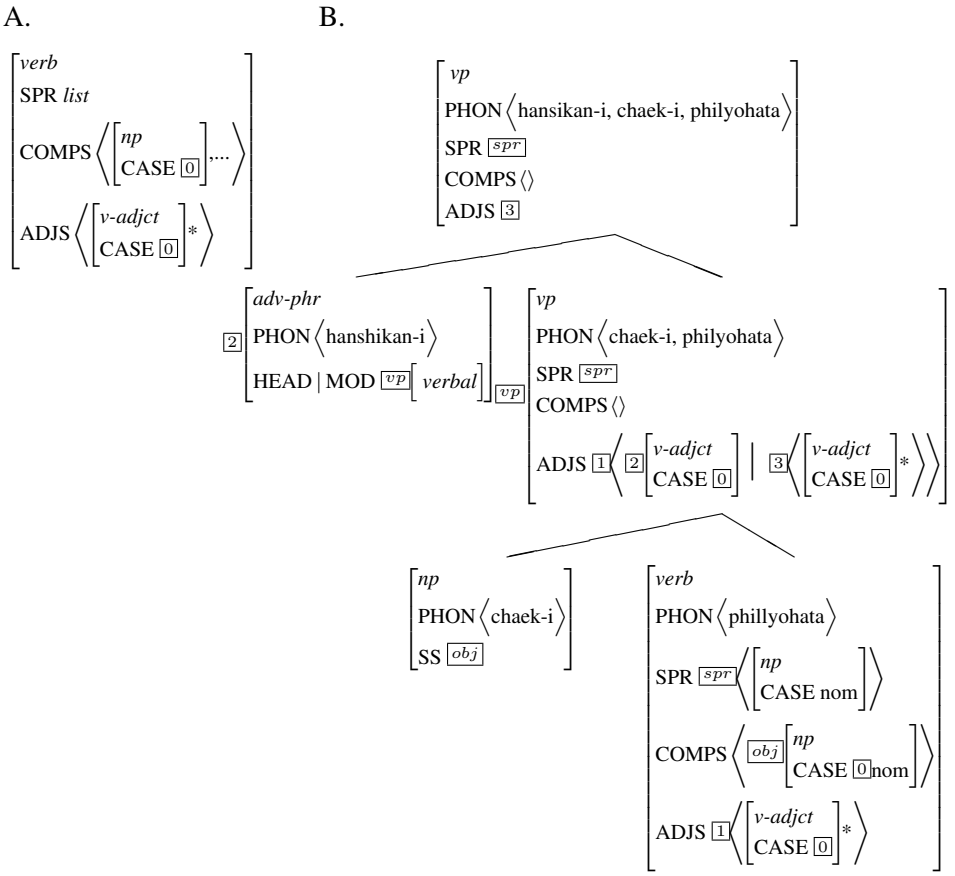

Figure 6: Korean adverbial case-marking

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')

The analysis of (5b) is shown in Figure 6. This case-assignment pattern, where an adverbial attaching to a VP receives the same case as the VP's external argument, is accounted for as an indirect structure sharing between a COMPS element of the verb and the adverbial. The feature structure on the left, (A) in Figure 6, is that of Korean verbs in general with the ADJS list. Notice that the top element of the COMPS list is unified with the 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 the projections with the case-marked adjunct *hansikan-i* ('for an hour') of the verb *philyohata* ('need'), which selects for the nominative case for its external argument. 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.

Thus generally speaking, the familiar Valence Principle and our Head-Adjunct Schema allow us to handle the phenomena in which an adjunct receives a case from a lexical head of a lower tree. We have seen an example where an adjunct receives the same case as one of the complements, and admittedly it would require further modifications for the phenomena in which different cases are assigned for arguments and adjuncts, but we believe essentially the same treatment can be extended to handle such cases (we will discuss this issue briefly in the next section).

4 Two remaining issues

To conclude, we would like to raise two of the most important outstanding issues that are amongst the main sources of debates: scope ambiguity and a more 'global' pattern of adjunct case-marking, suggesting the possible directions along the line of the present proposal to pursue these issues further.

4.1 Scope ambiguity

Essentially the present paper has proposed an analysis where multiple adjuncts constitute a configurational structure faithful to the word order, but it is well-documented that there may be discrepancies between word order and scope. In German, for example, the equivalent for English (2b) [Section 1.1, '?*Peter trains daily two hours'*], namely:

(6) Peter trainiert täglich zwei Stunden
trains daily two hours
meaning: 'Peter trains two hours daily'

is perfectly acceptable, suggesting inverse scope readings are available in some languages.[8] 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*.[9]

[8]This does not necessarily mean, however, that the scope direction is not linear, since it is suspect whether a *crossing* reading that made **Peter trains daily every week two hours* worse is available in German, i.e. ?*Peter trainiert täglich jede Woche zwei Stunden*.

[9]Interestingly, the scope ambiguity of a control verb in head-final languages is also adduced as evidence that favours the A-as-C approach (van Noord and Bouma, 1994; Manning et al., 1999). It is argued that, based on the ambiguity of examples such as the following;

(7) Tarô-ga Jirô-o shocchû hashira -seru
-NOM -ACC often run CAUS
'Taro makes Jiro run often'

where it can be either Tarô's causing Jiro to run or Jiro's running that happens often, that the latter reading is unavailable in the traditional approach to adjuncts. This argument is however based on the 'mono-clausal' assumption that the verb-AUX combination (*hashira-seru* in the above example)

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 Bonami and Godard (2007) and 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. Linearisation approaches can complement traditional phrase structure construals by providing more flexible renderings of phrase structures into linear sequences. For example, it is straightforward in the linearisation approach to generate for both the German example above and its English counterpart the same (plausible) semantic interpretation, namely:

(8) ((everyday′(two-hours′(train′(Peter′))))).

This is because linearisation approaches allow discontinuity/interspersal of phrases via the *shuffle* (or *domain-union*) opetation. It would suffice to parameterise the discontinuity property for the two languages, allowing the interleaved realisation of the head and its adjunct for German but not for English, to generate the above meaning in the traditional Head-Adjunct Schema.[10] In fact, the unlimited application of *shuffule* will entirely free up the relationship between linear order and scope readings of all the adjuncts attaching to a head even in the binary adjunction schema, rendering the above 'overspecification' counterargument much less potent.[11]

4.2 'Syntactic' case-marking

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 alteration in Finnish and Korean (Maling, 1993; Wechsler and Lee, 1996). Our approach to the adverbial case-marking, as it is in the present proposal, predicts *all* the adverbials attaching to the same VP to receive the same case, which is contradicted by an example like the following:

(9) hansikan-i/ul nun-i/(*-ul) ota
one hour-NOM/ACC rain-NOM/(*ACC) comes
lit. 'Snow comes for an hour' ('It snows for an hour')

forms a lexically behaving verb-complex through argument composition. The ambiguity can be alternatively accounted for by treating it bi-clausally just like English (Gunji, 1999) while allowing discontinuity (Reape, 1993; Yatabe, 2002; Sato, 2008).

[10] Such a use of the linearisation apparatuses is proposed by Sato (2008), as well as by Bonami and Godard (2007), who account for the scopal behaviour of what they categorise as 'incidental' adjuncts, for which the binary Head-Adjunct Schema is invoked, as in our proposal. Bonami and Godard maintain the A-as-C approach, however, for some 'integrated' adjuncts, where a tigher link between word order and scopal behaviour is reported. This interesting aspect of a possible 'boundary' amongst adjuncts and interrelationsips between them warrants further research.

[11] Sato (2008) discusses a method of effectively *limiting* the available readings.

Note the acceptability of either nominative or accusative case-marking of the adverbial, despite the unacceptability of accusative case-marking of the nominal. Thus it would be necessary, to account for such data, to somehow differentiate case-assignments between adverbials and nominals.

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, although we have avoided their use not to go too far beyond the core interest of the present paper, and to adhere to its general spirit of conservatism.

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