Proceedings of the 9th International Conference on Head-driven Phrase Structure Grammar

Kyung Hee University

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Editors' Note

The 9th International Conference on Head-driven Phrase Structure Grammar (2002) was held at Kyung Hee University, Seoul in Korea. The conference featured three invited talks and 22 papers (18 in presentations and 4 in poster sessions), selected by the program committee. The proceedings include all the papers except those by by Robert Borsley, Gunter Neumann and Dan Flickinger, and Marianne Desmets.

Stephen Wechsler was the program chair, and would like to thank the members of the program committee: Olivier Bonami, Chan Chung, Takao Gunji, Andreas Kathol, Jong-Bok Kim, Louise McNally, Tsuneko Nakazawa, Carl Pollard, Frank Richter, Ivan Sag, Peter Sells, Melanie Siegel, and Eun-Jung Yoo. In charge of local arrangements were Byung-Soo Park and Jong-Bok Kim, and they would like to thank the Linguistic Society of Korea and the whole helping group from the School of English for their logistic assistance, both during the conference and during the preceding 2002 Linguistic Society of Korea International Conference.

As has been customary in the past, the program chair and the local organizer(s) are responsible for making the work presented at the conference available to a wider audience. In order to do this as fast as possible we have chosen an unrefereed electronic format.

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Gender Mismatches in Spanish and French N_1/A *de* N_2 Affective Constructions: Index agreement vs. Morphosyntactic Concord

Luis D. Casillas Martínez

1.1 Introduction

I examine Spanish and French agreement in sentences with "affective" *N/A de N* constructions, in terms of an agreement theory growing out of Pollard and Sag (1994, §2) and Kathol (1999), with a distinction between two kinds of agreement relations: *index agreement* and *morphosyntactic concord*. The application of this theory to *hybrid nouns* (Wechsler and Zlatić, 2000) extends straightforwardly to affective constructions. Furthermore, Kathol's characterization of the difference between hybrid nouns in Spanish and French, which I pair with an interpretation in terms of the default unification mechanism of Lascarides and Copestake (1999), turns out to make correct predictions about subtle differences in predicate agreement with affective constructions in the two languages.

(1) Esa mierda de libro es aburrido/*aburrida.
that.F shit[F] of book[M] is boring.M/*.F
'That shitty book is boring.' (Casillas Martínez, 2001b)[1]

[1] As per the distinction discussed in Section 1.2, I gloss the inherent gender of an agreement source with 'M' or 'F' in square brackets, and inflectional gender of an agreement target with a period followed by a letter.

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Jong-Bok Kim and Stephen Wechsler.

(2) Ton phénomène de fille est bien distraite/*distrait.
your.M phenomenon[M] of girl[F] is quite distracted.F/*.M
'That character of a daughter of yours is quite absent-minded'
(Hulk and Tellier, 1999, 2000)

The sentences I work with are of the general type exemplified by examples (1) and (2). The subject NP is of the form N_1/A_1 *de* N_2, which is in a sense "backwards"; the apparent structural head denotes some kind of affective evaluation of the NP's referent, and it is N_2, which looks very much like a prepositional object, properly designates the referent.[2] The determiner agrees with the first item, while the predicate adjective agrees with the second one.

1.2 Inherent gender vs. inflectional gender

An important distinction that I must make before delving into these constructions at depth is that between *inherent gender classification* and *gender inflection*.

- An *inherently gendered lexeme* comes from the lexicon with a fixed gender value. Most inanimate common nouns in Spanish and French are of this kind—but there are exceptions.
- An *inherently ungendered lexeme* does not have lexical gender. It may be *inflecting*, with a form for each gender, or *noninflecting*, with a unique, gender-unselective form. Many animate nouns are not inherently gendered, and show distinct inflectional forms; e.g. Sp. *amigo, amiga* 'friend (.M, .F)'. Some ungendered adjectives and nouns don't inflect (e.g. Fr. *imbécile* and *idiot*).

Milner (1978), the classic treatment of constructions of this sort in French, misses this distinction, and goes wrong with examples like *ton vache de frère* (literally 'your.M cow of brother[M]'). On the supposed grounds that *vache* is feminine, he sees the article as agreeing with N_2. Thus he mistakenly concludes that the article sometimes agrees with N_1 as in (2), and other times with N_2 as in the *vache* example.

I take the correct analysis to be the one suggested by Noailly-Le Bihan (1983) in her criticism of Milner. In the majority of examples the determiner shows a form corresponding to N_1; exceptions occur with specific words like *vache* 'cow [F]', *saloperie* 'filth, rubbish [F]' *canaille* 'scoundrel [F]' and *diable* 'devil [M]', whose meaning in this construction is not necessarily predictable from their meaning when used as

[2] This should not be read as a claim about the syntactic structure of these NPs. This paper remains agnostic about questions such as whether one should call one or another element the "head" of the NP; the only structural assumption that I make is that both are potential agreement sources.

fully referential nouns.[3] The simplest grammar is thus one where the determiner always agrees with N_1, and the apparent counterexamples are listed as exceptional, not inherently gendered, zero-derived lexemes, along with their special meaning in this construction.[4] Gérard (1978) has a similar analysis for a comparble construction in Quebec French, which posits two identical versions, masculine and feminine respectively, of a class of invariable N_1 words in that dialect. As Gérard points out, this should be no more problematic than the uncontroversial fact that Fr. *imbécil* 'imbecil' has only one form for both genders.

1.3 The affective constructions

There is a range of affective constructions that fit the general mold *A/N*$_1$ *de N*$_2$, but not all of them show real agreement mismatches. In this section I delineate the constructions and conditions that result in genuine mismatches, setting them apart from apparent cases.

1.3.1 Spanish adjectival construction

There are two different affective constructions in Spanish, which I call "adjectival" and "nominal." The adjectival construction is illustrated in (3), and its properties defined in (4). The external syntax of the higher word is that of an adjective; it's possible to modify it with *muy* 'very', and it can show up as a predicate adjective on its own (i.e. there is no need for an indefinite article to accompany it).

(3) a. el tonto del vecino
the.M dumb.M of-the.M neighbor.M
'the dumb neighbor (male)' (Suñer Gratacós, 1999, 90a)

b. la tonta de la vecina
the.F dumb.F of the.F neighbor.F
'the dumb neighbor (female)' (90b)

(4) **Spanish adjectival type: Det$_1$ A de (Det$_2$) N$_2$**
Can only be used for animate/gendered referents. Higher item is always adjectival; apparent counterexamples are denominal adjectives. Lower determiner is possible, and usually required; complex set of constraints on determiner combination, sensitive to

[3] Knowing that *vache* normally means 'cow' doesn't help much in knowing what *ton vache de frère* means.

[4] This point is also tied to a conjecture: words that occur frequently in the higher position in this sort of construction may tend to lose their inherent gender. E.g. in standard varieties of Spanish, the noun *poco* 'bit [M]' is masculine, and requires a masculine determiner in measure phrases: *un poco de agua fría* 'a.M bit[M] of water[F] cold.F'. But in many colloquial varieties it inflects, and accommodates to the gender of N$_2$: *una poca de agua fría*.

determiner type and the presence of a restrictive relative clause (Español-Echevarría, 1998). **No real agreement mismatches**; the adjective always[5] has a form compatible with the gender on N_2.

Suñer Gratacós (1999) cites some apparent exceptions to my claim that these sentences don't show agreement mismatches, on the basis that the determiner mismatches the higher item:[6]

(5) a. el gallina de Juan
the.M chicken[F] of Juan[M]
'Juan, that coward'

b. el pelota de González
the.M ball[F] of González
'González, that suck-up'

c. la cerebrito de tu hermana
the.F brain[M].DIM of your sibling.F
'Your sister, that brainy girl'

But this is a confusion similar to Milner's as discussed in Section 1.2. The higher word is an ungendered, noninflecting, denominal adjective. Its meaning is idiosyncratic as compared to the base, and it occurs in adjectival contexts:

(6) a. el muy gallina de Juan
the.M very chicken of Juan[M]

b. Juan es bien gallina.
Juan[M] is very chicken
'John is very cowardly.'

Therefore, there is no reason to take these as counterexamples to the claim that the article agrees with the higher item. Again, the simpler grammar is the one where the determiner agrees with the higher item, and apparent exceptions arise from noninflecting lexemes.

1.3.2 Spanish nominal construction

This is the Spanish construction that can show agreement mismatches under the appropriate conditions:

[5] I have found one striking kind of exception to this claim. In Puerto Rican Spanish, the adjective *loca* 'effeminate male homosexual (literally, crazy.F)' occurs in this construction and can trigger agreement mismatches; similar facts hold for semantically similar words in other Spanish varieties. These are candidates for the label 'inherently gendered adjective'.

[6] The gloss 'DIM' in (5c) stands for diminutive.

(7) Ese espanto de puerta está rota.
that.M fright[M] of door[F] is broken.F
'That frightful door is broken.'

(8) **Spanish nominal type: Det N_1 de (*Det) N_2**
May be used for either class of referent (animate/inanimate). No determiner is ever possible for N_2. The higher item is always a noun, and the determiner always agrees with it. These can show agreement mismatches; if N_1 is an inherently gendered noun of a different gender than N_2, the gender of the determiner will match N_1, while NP-external targets will match N_2. Otherwise, N_1 has a form compatible with the gender on N_2 (e.g. if N_1 is an ungendered noun).

The crucial factor behind true gender mismatches is having an N_1 and N_2, both inherently gendered, but with different genders. If N_1 is ungendered, then it will always have a form compatible with N_2, which will be chosen as its realization, and thus all conflict can be avoided. It is only when N_1 can't inflect for the gender of N_2 that we get the mismatches.

1.3.3 French constructions

There is a large literature on the French constructions, most of which is cited in Casillas Martínez (2001b,a). I will not classify them in this paper, but I will offer the following observations:

- In French, no determiner is ever possible on N_2. There is no structural distinction between adjectival and nominal constructions as clear-cut as in Spanish. The structural pattern in French is A/N_1 *de/à* N_2.[7]
- Inherently gendered items play the same role in mismatches as they do in Spanish; only if N_1 is inherently gendered can a mismatch occur.

1.4 The agreement theory

The agreement theory I apply to the mismatches is based on the analysis of *hybrid nouns* in Kathol (1999) and Wechsler and Zlatić (2000). Hybrid nouns (Corbett, 1991, §8) trigger different agreement on different targets within the same clause, e.g. the classic "majesty" nouns in Spanish and French (Corbett, 1991, Kathol, 1999):

[7] To the best of my knowledge constructions with the preposition *à* are found only in Quebec French, specially with proper names as N_2: *l'idiot à Jean* 'Jean, that idiot'.

(9) a. Spanish *Majestad*
(M referent, triggers F inside NP, but M elsewhere in S)
Su Majestad Suprema está contento.
your majesty[F] supreme.F is happy.M
'Your Supreme Majesty is happy.'

b. French *Majesté*
(M referent, triggers F throughout S, can trigger M outside S)
Sa Majesté Supreme est contente.
your.F majesty[F] supreme.F is happy.F

The theories posit two sets of agreement features: *concord features* (under an AGR(EEMENT) or CONC(ORD) feature inside SYN) and *index features* (under INDEX). Agreement constructions subdivide into morphosyntactic agreement (which unifies AGR features) and index agreement (unification of the target AGR with the source INDEX features). In (9a), NP-internal agreement is morphosyntactic, and subject-predicate agreement is index-based. *Majestad* is [AGR *fem*] but [INDEX *masc*], thus the split; the attributive adjective unifies AGR with *Majestad*'s [AGR *fem*], but the predicate adjective unifies it's AGR with the NP's [INDEX *masc*].

For law-abiding, shoelaces-tied, shirt-tucked-in nouns, AGR|GEND and INDEX|GEND are lexically identified by an *Index to Concord* constraint, and the INDEX|GEND is contextually anchored by *Index to Semantics* constraints to appropriate conditions in CONTEXT, so all agreement domains match with each other, and with the natural gender of the referent if it has one. Hybrid nouns are nouns where this identification is exceptionally broken; Spanish *Majestad*, for instance, has AGR|GEND *fem*, INDEX|GEND *masc*, and CONTEXT specifies that its referent is masculine. French has *fem* for both agreement features, but CONTEXT still indicates a masculine referent.

1.5 My analysis

I adapt the Kathol and W&Z hybrid noun analyses to my affective constructions; N_1 and N_2 are part of separate *concord domains* (sets of words that structure-share AGR), but share one and the same INDEX. The gender value of the index is constrained *by default* to be identical to both nouns, and to stand in the appropriate relation to the natural gender of the referent. Mismatches arise in the N_1 *de* N_2 constructions because of the nouns provide conflicting default specifications on the value of INDEX|GEND. The idea is illustrated in Figure 1 on the facing page. This model, with two agreement feature sets and relations, captures two important features of the data, which we are about to

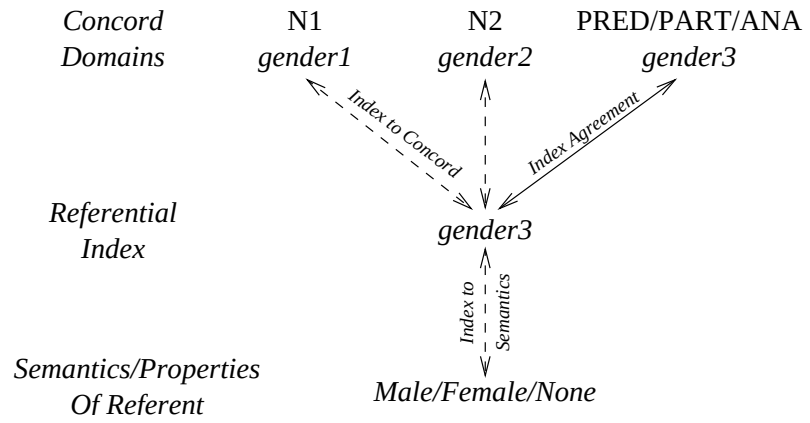

FIGURE 1 My model. Dashed lines represent default gender identifications, while solid lines represent indefeasible ones.

discuss:

1. the sensitivity of subject-predicate agreement to semantic gender, and in particular the fragility and variability in the mismatching inanimate N_1 *de* N_2 cases (given that the link between the index and morphosyntactic levels is only a *default*);
2. the fact that determiner and attributive adjective agreement exhibit no such behavior (given that they are in the same concord domain as their controller, and directly unify their AGR values with it).

1.6 The difference between Spanish and French

This model allows us to state a difference between Spanish and French that will not only account for the behavior of nouns like *Majestad/Majesté*, but which will account for very subtle differences in the agreement in affective constructions:

(10) **The big difference between Spanish and French**
In both French in Spanish, intra-NP gender agreement is morphosyntactic, and subject-predicate gender agreement is index agreement; this is not a locus of difference. However, in the determination of the gender of an index, *morphosyntactic gender has priority in French* (with one exception), *and natural gender in Spanish.*

This is a proposal from Kathol (1999, §4.1):

> From this perspective, the difference among various languages is a function of which of the two determining factors wins out for what kinds of cases. In Spanish, the generalization seems to be that INDEX information is determined in terms of what is encoded in AGR unless there is a personal referent, in which case the general constraint that "natural gender/number dtermines grammatical gender/number" takes precedence. In French, on the other hand, this rule only appears to apply for polite pronominals.

This is different from the usual proposal, e.g. Corbett (1991), that subject-predicate agreement is "semantic" in Spanish but "formal" in French. In Kathol's analysis, the same agreement relation holds in the predicative constructions in both languages. French predicate agreement is neither strictly formal (i.e. morphosyntactic) nor strictly semantic/pragmatic, but rather based on indices, which interface morphosyntax with semantics.

The crucial fact that I add in support of Kathol's account is the following:

(11) **French reverts to semantic subject-predicate agreement** In French, if N_1 has inherent gender, and it mismatches that of N_2, *the language reverts to semantic agreement.* Agreement is formal in all other cases. (Hulk and Tellier, 1999, 2000)

In the default-based setup of Casillas Martínez (2001b), Kathol's proposal extends to the N_1 *de* N_2 constructions, and makes the following predictions, which are correct for the two languages:

1. NP-internal agreement will always be formal in both languages, given that it's morphosyntactic agreement.
2. With regular NPs (i.e. not N_1 *de* N_2), Spanish will show semantic subject-predicate agreement. French will show apparent formal agreement, since the the subject head noun's morphosyntactic gender will take precedence in determining the index. This accords with what has been observed about the two languages (see e.g. Corbett (1991, §8)).
3. In the N_1 *de* N_2 cases, if N_1 and N_2 are the same gender, the languages will behave exactly the same as in the simple NP case; Spanish will show semantic agreement, French formal.
4. However, if N_1 and N_2 mismatch, *both languages will show semantic agreement at least for naturally gendered referents.* In Spanish this follows straightforwardly. In French it follows because the gender clash between N_1 and N_2 will prevent either from determining the gender on the index, which will allow semantic gender to take over. Thus despite showing predominantly formal agree-

ment, *French will revert to semantic agreement when there is a gender conflict within the subject NP.*

1.7 My analysis, illustrated

1.7.1 The hybrid noun case

First I illustrate in Figure 2, as a simple example, the case of hybrid nouns like Sp. *Majestad* and Fr. *Majesté* 'Majesty', with the sentences in (9) from p. 6.

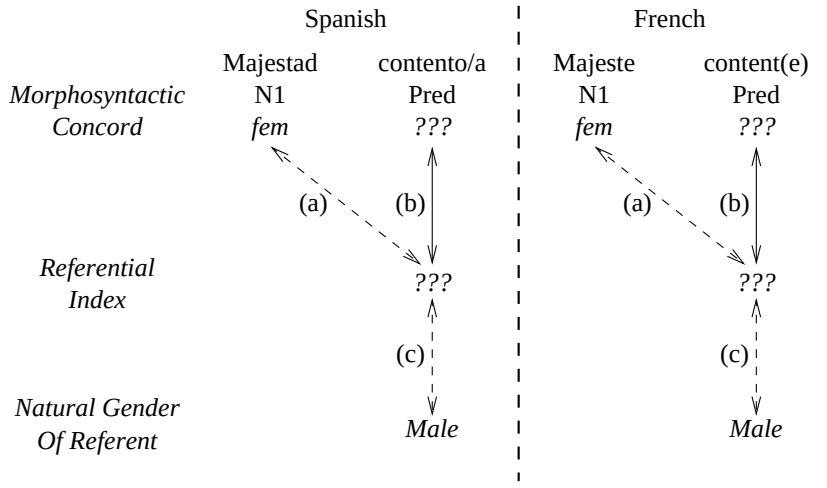

FIGURE 2 The case of hybrid nouns.

The way we interpret Figure 2 is by seeing default identification arrows (the broken lines) as partially ordered by "importance" or priority, and proceeding by "rounds" where compatible information is kept, but incompatible information discarded. In the case of French, the two Index-to-Concord (a) arrow has higher priority than the Index-to-Semantics (c) arrow. The "first round" of default unification attempts to identify the undetermined index gender with the concord value *fem* of *Majesté*, and succeeds. The second round tries to identify the index gender with the semantic gender *Male*; this information is incompatible with that established in the previous round, and is discarded. Since the predicate's morphosyntactic gender is identified indefeasibly with the index, we see the feminine form *contente*. In Spanish however the (c) arrow has priority over the (a) arrow. The first round determines the value of the index on semantic grounds, and the second round discards

the morphosyntactic information.

1.7.2 The mismatched animate case

As noted by Hulk and Tellier (1999, 2000) for French, Italian and Spanish, and my own work on Spanish and French, if N_2 is animate[8] it determines the external agreement for the NP in case of a conflict. This is shown in Figure 3 for (12).

(12) Ton phénomène de fille est bien distraite.
your.M phenomenon[M] of girl[F] is very absent-minded.F
'That character of a daughter of yours is very absent-minded.'

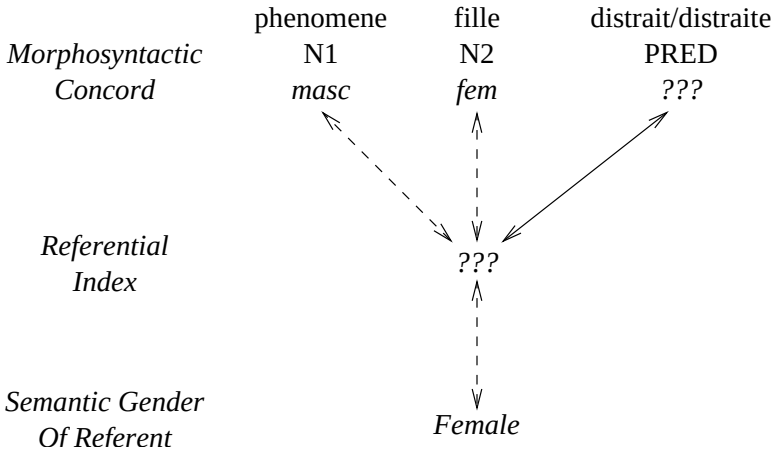

FIGURE 3 The animate case: *Ton phénomène de fille est bien distraite.*

This is the crucial phenomenon of French reverting to semantic agreement in case of conflict, pointed out in (11). We can predict this in terms of our assumptions and the "rounds" model. In the first round, we attempt to set the value of the index to both *masc* and *fem*. Since this information is incompatible, it has no effect.[9] In the second round, however, the Index-to-Semantics arrow succeeds in setting the gender of the index to that specified by the semantics. Thus we get a feminine predicate.

[8] Or differentiated for gender; it is hard to tease these variables apart for a language where grammatical gender is based on actual gender differentiation. I will talk of "animacy" and "gender differentiation" indistinctly.

[9] In the terms of Lascarides and Copestake (1999), the result is the least upper bound of *masc* and *fem*, the type *gender*

In the equivalent Spanish examples, the priority is different. The first round succeeds in identifying the semantic gender with the index gender. Once this happens, the conflicting morphosyntactic information can't affect it in the second round.

It is crucial to note in the French case that the semantic agreement is the result only when the morphosyntactic information is in conflict. If N_1 and N_2 have the same morphosyntactic gender, this gender will be imposed on the index in the first round, regardless of the semantic gender. Based on the data in Hulk and Tellier (1999, 2000), this seems to be exactly right.

1.7.3 The mismatched inanimate case

There is a variety of (non)solutions when there is a gender conflict, but the referent does not have a natural gender classification.

Failure of external agreement

In French (Hulk and Tellier, 1999, 2000) there is a failure of external agreement when there is a gender conflict and an inanimate referent. This failure only happens when N_1 and N_2 conflict; otherwise they unproblematically determine the gender on the predicate. The examples are typically rather difficult for speakers to judge, and invariably, regardless of the mismatching gender combination chosen for N_1 and N_2, a masculine predicate is preferable to feminine. This gender inflection, according to H&T, doesn't represent agreement but a default realization. This is illustrated with example (13) and Figure 4 on the next page. Neither Index to Concord constraint determines the index gender, nor does the semantics. If the issue is to be resolved at all, it must be by invoking some third default.

(13) Ce bijou de symphonie sera inscrit/*inscrite
that.M jewel[M] of symphony[F] will-be included.M/*.F
'This jewel of a symphony will be included.'
(Hulk and Tellier, 1999, (9a), my adaptation for length)

Agreement determined by N_2

In Spanish (and Italian, according to Hulk and Tellier), a common solution is for predicate agreement to be determined by N_2:

(14) Ese horror de película es aburrida.
that.M horror[M] of movie[M] is boring
'That horror of a movie is boring.'

This can be crudely modeled under my account by an additional stipulation: in Spanish, a miracle occurs, and speakers learn that the Index to Concord arrow linking N_2 to the Index has priority over the

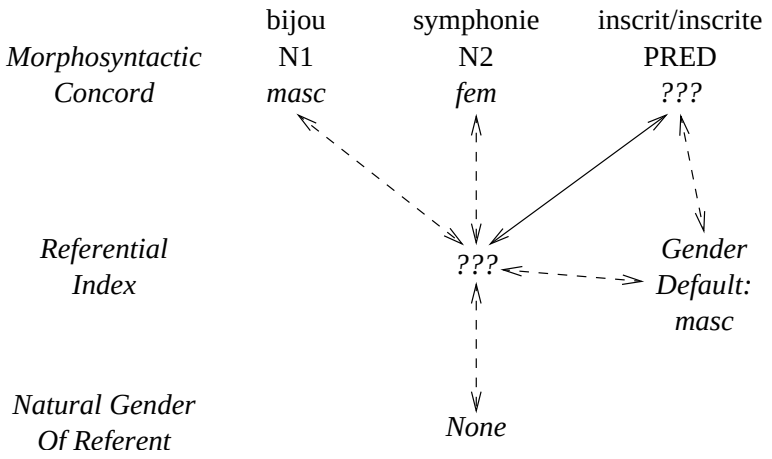

FIGURE 4 The problem in *Ce bijou de symphonie sera inscrit/*inscrite.*

one linking the Index to N_1, as illustrated in Figure 5 on the facing page. But, in France secularism reigns, and neither arrow has priority.

This, as my wording should subtly suggest, is a hack. While I have in (10) above what I think is reasonable account for the difference between Spanish and French in the animate case, I'm still looking for a similarly compelling reason for the difference in the inanimate case.

Other splits

Hulk and Tellier (1999) report that for a group of Spanish speakers they consulted, external agreement varied on two factors: (a) the choice of predicate constructions; adjectival past participle in (15) vs. passive in (16); (b) lexical choice of N_2, with e.g. *tabernáculo* in (17):

(15) Ese horror de mesa es apreciado/*a ...
that.M horror[M] of table[F] is appreciated.M/*.F

(16) Ese horror de iglesia fue diseñada/*o ...
that.M horror[M] of church[F] was designed.F/*.M

(17) Esa joya de tabernáculo fue decorada/?o ...
that.F jewel[F] of tabernacle[F] was decorated.F/?.M

Hulk and Tellier report similar similar results with Italian speakers. The range of existing systems and how to model them all are still open questions.

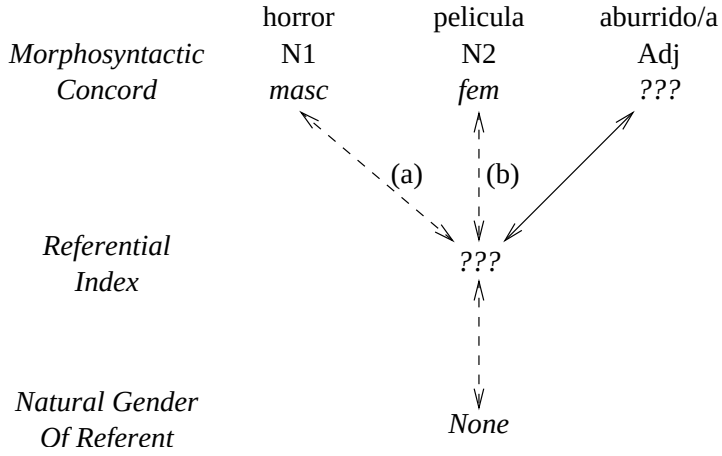

FIGURE 5 The representation for (14), *Ese horror de película es aburrida.* Arrow (b) has priority over (a).

1.7.4 "Elided" constructions

There are constructions in Spanish and French very much like the ones I have illustrated, but lacking the preposition and N_2 altogether. For these, speakers exist which offer different agreement possibilities in Spanish. I illustrate in (18) and (19) my judgements for animate and inanimate referents, but some speakers prefer to render both examples with the same gender as N_1, while others render both types of example with the gender of the elided noun. The situation is diagrammed in Figure 6 on the next page.

(18) María acaba de publicar su libro.
'María has just published her book[M].'
Pero esa mierda no hay quien la/??lo lea.
but that.F shit.F no be who 3SG.F/??.M 3SG.read
'But that shit[F], nobody can read it[F/??M].'

(19) Mi vecina es maravillosa, pero se ha metido en problemas.
'My neighbor (.F) is marvelous, but she's gotten in trouble.'
A ese amor la/*lo buscan para matarla/*lo.
to that.M love[M] her/*him seek for kill-her/*-him
'That love[M] (of a person), they're looking for her/*him to kill her/*him.'

My French consultants, however, report that they prefer formal agreement in the corresponding French examples, even with animate referents of semantic gender mismatching the overt noun. This is, again,

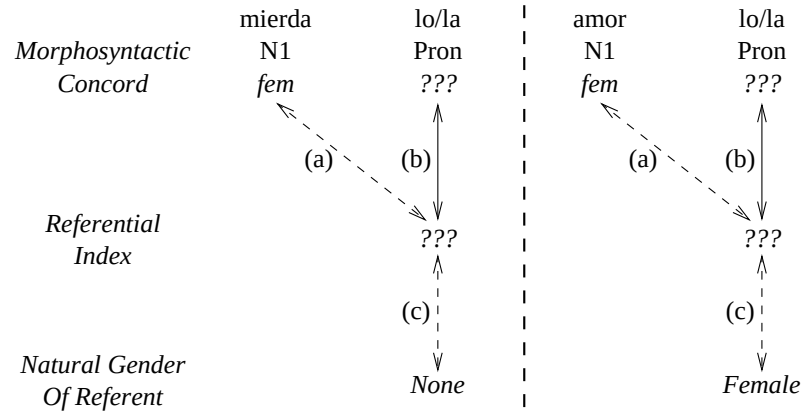

FIGURE 6 The contrast between (18a) and (19a).

exactly what my account predicts; the morphosyntactic information wins out in the absence of a conflicting noun.

1.8 Implementation

While the discussion of the mechanics of my account has been informal, it is trivially implementable in terms of the default unification mechanism of Lascarides and Copestake (1999). This framework provides a notion of priority ordering of default information that accommodates my account. In Casillas Martínez (2001b), I show a toy grammar that implements the mechanics my account using that constraint framework. The analysis is quite outdated relative to the present paper, but is trivially updateable to the proposal here.

This does not however exclude the possibility of implentating my account in terms of other mechanisms. I see no reason why a theory with violable constraints, such as Optimality Theory, could not provide an interpretation for my model. It is also quite easy to find onself talking about my accounts in localist connectionist terms, thinking of the tiers as sets of nodes, and the arrows as connections with different strengths. And in fact there may be some data relevant to these constructions which such models might be more appropriate to deal with, e.g. the reversal illustrated in example (20) from Puerto Rican Spanish:

(20) a. Esa mierda de libro es aburrido/*a
that.F shit[F] of book[M] is boring.M/*.F
'That shit of a book is boring.'

b. La fucking jodia cabrona puñetera mierda aburrida
the.F fucking ADJ.F ADJ.F ADJ.F shit[F] boring.F
esa de libro de pintar redondo tuyo está tan
that.F of book[M] of painting round.M yours.M is so
mierdoso/a.
shitty.M/.F
'That (many feminine-inflected expletives deleted)
shit of a round coloring book of yours is SOOO shitty.'

The large number of feminine adjectives modifying N_1 makes the feminine predicate as acceptable as masculine in (20b) to my native judgement. This fact is beyond an unification-based interpretation of my account, but can potentially be dealt with in a "spreading activation" theory.

1.9 Conclusion

The Romance N_1 *de* N_2 constructions further motivate the notion, proposed in many places in the literature (Lehmann, 1988, Corbett, 1991, Pollard and Sag, 1994, Kathol, 1999, Wechsler and Zlatić, 2000) that there is a distinction between two sorts of agreement relations, each sensitive to different aspects of linguistic organization and serving different functions. However, it illustrates subtleties that the simplest accounts, based on a distinction between "formal" and "semantic" agreement, miss. In contrast, the notion of index agreement holds up very well in this terrain.

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References

Casillas Martínez, Luis D. 2001a. References on Romance "N_1 de N_2" affective constructions. `http://www.stanford.edu/~casillas/XdeY_bib/`.

Casillas Martínez, Luis D. 2001b. A surface-based account of agreement in Spanish and French *N1/A de N2* constructions. Ms. Stanford University. Available online: `http://www.stanford.edu/~casillas/Papers/`.

Corbett, Greville. 1991. *Gender*. Cambridge: Cambridge University Press.

Español-Echevarría, Manuel. 1998. *N/A of a N* DP's: Predicate raising and subject licensing. In A. Schwegler, B. Tranel, and M. Uribe-Etxebarria, eds., *Romance Linguistics: Theoretical Perspectives*. Amsterdam: John Benjamins.

Gérard, Josselyne. 1978. Mon ostie de .... *Cahiers de Linguistique* 8.

Hulk, Aafke and Christine Tellier. 1999. Conflictual agreement in Romance nominals. In J.-M. Authier, B. E. Bullock, and L. A. Reed, eds., *Formal Perspectives on Romance Linguistics*. Amsterdam: John Benjamins.

Hulk, Aafke and Christine Tellier. 2000. Mismatches: Agreement in qualitative constructions. *Probus* 12(1):33–65.

Kathol, Andreas. 1999. Agreement and the syntax-morphology interface in HPSG. In R. Levine and G. Green, eds., *Studies in Current Phrase Structure Grammar*, pages 223–274. Cambridge University Press.

Lascarides, Alex and Ann Copestake. 1999. Default representation in constraint-based frameworks. *Computational Linguistics* 25(1):55–105.

Lehmann, Christian. 1988. On the function of agreement. In M. Barlow and C. A. Ferguson, eds., *Agreement in Natural Language: Approaches, Theories, Descriptions*, pages 55–65. Stanford, California: CSLI Publications.

Milner, Jean-Claude. 1978. *De la syntaxe à l'interprétation: Quantités, insultes, exclamations*. Paris: Éditions du Seuil.

Noailly-Le Bihan, Michèle. 1983. Encore des insultes. *Cahiers de Grammaire* 6:101–125. Université Toulouse-Le Mirail.

Pollard, Carl and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: The University of Chicago Press.

Suñer Gratacós, Avelina. 1999. La aposición y otras relaciones de predicación en el sintagma nominal. In I. Bosque and V. Demonte, eds., *Gramática Descriptiva de la Lengua Española*. Madrid: Espasa.

Wechsler, Stephen and Larisa Zlatić. 2000. A theory of agreement and its application to Serbo-Croatian. *Language* 76(4):799–832.

2

Downward Unbounded Discontinuities in Korean: An IPSG Analysis of Concord Adverbial Constructions

Hee-Rahk Chae

2.1 Introduction

Although there is a lot of literature dealing with the classification and distribution of Korean adverbials, there does not seem to be any satisfactory work. This is partly due to the properties of the adverbials themselves, whose classification and distribution vary depending not only on the lexical properties of each adverbial but also on its distributional environment. However, the distinction between "regular adverbials" and "concord adverbials (CAs)" is very clear and plays a significant role in elucidating the properties of the adverbials as a whole. The former have only the function of modifying other phrases, while the latter show a correspondence to some specified elements in the sentence. One of the major differences between them is that a CA and what it corresponds to can be separated from each other unboundedly across clausal boundaries.

CAs are comprised of such "modality adverbials" as those indicating 'concession,' 'condition,' 'possibility,' 'necessity,' and so on (Chae 2002). These adverbials require the existence of a verb with a particular ending ("VE," henceforth) in the sentence, as in (1):

(1) a. pilok yengca-ka ttena-ess-telato,
CA Youngja-Nom leave-Past-VE/although,

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(ke peulo-nun po-l manha-e).
that program-Top see-Fut be worth-Decl
'Although Youngja doesn't appear, (that program is worth watching.)'

b. *pilok yengca-ka ttena-ess-tamyen...

Here the CA *pilok* requires that the clause-final verb have an ending with a specific meaning/function, i.e. *-telato* or *-eto*. Constructions containing CAs ("Concord Adverbial Constructions: CACs") show some special properties which cannot be easily accounted for. One such property in (1) is that the CA and the verb with the VE are not always adjacent.

In this paper, we will provide an "Indexed Phrase Structure Grammar (IPSG)" analysis of CACs. One of the most noticeable properties of these constructions is that they exhibit downward unbounded discontinuities. In section 2, we will elucidate their downward movement properties. In section 3, we will examine how the relationships between the CA and the VE can be characterized. The best hypothesis is to assume that the CA licenses the VE syntactically. In section 4, we will explore some frameworks of Head-driven Phrase Structure Grammar (HPSG) to see if they can be adapted to analyze the CAC properties. Lastly, in section 5, we will introduce an IPSG framework developed in Chae (1992). We will see that the unusual properties of CACs can be accounted for very effectively under this framework.

2.2 Downward Unbounded Discontinuities

We have seen in sentence (1) that the CA and the VE do not occur contiguously in CACs even though they are related closely. They show discontinuous dependencies within a clause. In addition, they can be separated from each other across clause boundaries, as well:

(2) salam-tul-i [[yengca-ka pilok ttena-se] caemi-ka
people-Pl-Nom [[Youngja-Nom CA leave-as] interest-Nom
telhata-ko] ha-telato, ...
be less-Comp] do-VE/although
'Although people say that (it) is less interesting because Youngja left, ...'

Here the CA *pilok* occurs two clauses down from the clause containing the VE *-telato*, which indicates that CACs have characteristics of unbounded discontinuities.

Recently some Korean grammarians noticed that such adverbials as in (1-2), i.e. CAs, behave differently from regular adverbials (Kim 1996, Im 1998). However, they did not realize the unboundedness of the CA-

VE relationship. What is more interesting is the behavior of the CA as (a part of) a modifier phrase. In some cases, the CA can modify a predicate in an upper clause, which shows that the CA modifier and what is modified by it can also be separated from each other unboundedly:

(3) chelswu-nun [[cikwu-ka amuli yelsimhi
Chulsoo-Top [[earth-Nom CA/however laboriously
phenphenhata-ko] wuki-taka] kkwucilam-ul tut -eto
be flat-Comp] argue-Comp] be scolded -VE/although
'Even though Chelsoo has been scolded (severely) by arguing very tenaciously that the earth is flat, ...'

In this sentence the CA *amuli*, which is in the lowest clause, modifies the predicate in the intermediate clause, together with the manner adverb *yelsimhi*. Notice that *amuli yelsimhi* is not compatible with the lowest or the highest predicates (*phenphenha-* or *kkwucilam-ul tut-*). If they are compatible, the sentence would be ambiguous.

We have seen that there are two different types of unbounded relationships involved in the CACs. One is the relation between the CA and the VE. The other is the relation between the CA as a modifier and the predicate which is modified by it. The two types of unbounded relationships in such sentences as (2-3) can be represented schematically as follows: s [s [s [CA ... Pred3] ... Pred2] ... Pred1-VE] . The CA which occurs in the clause of Pred3 or Pred2 can license the VE in the highest clause of Pred1. In addition, the CA can modify not only Pred3 but also Pred2 or Pred1, depending on their compatibility.

These CA-VE and modifier-modified relationships are not ordinary ones because they exhibit "downward movement" phenomena rather than "upward movement" phenomena. Firstly, the CA can only be on the same clause as or on a lower clause than the one containing the VE. For example, in (2), the CA sits on the lowest clause while the VE is on the highest clause. It can also occur in a higher clause as far as it does not stay outside of the clause containing the VE:

(4) a. salam-tul-i [[yengca-ka ttena-se] pilok caemi-ka telhata-ko] ha-telato, ...
b. salam-tul-i [pilok [yengca-ka ttena-se] caemi-ka telhata-ko] ha-telato, ...
c. salam-tul-i pilok [[yengca-ka ttena-se] caemi-ka telhata-ko] ha-telato, ...
d. pilok salam-tul-i [[yengca-ka ttena-se] caemi-ka telhata-ko] ha-telato, ...

The CA can occur in the middle clause as in (a-b) or in the highest clause as in (c-d)[1]. Although all of these sentences including (2) are just fine, sentence (4c) or (4d), where the CA occurs in the clause containing the VE, is the most "unmarked" one intuitively. Most of the CAC sentences we encounter are of this type. Hence, from a "deep structure" point of view, the CA should be on the same clause as the VE. On the surface, however, it can stay on a lower clause doing its own function of, at least, indicating focus[2].

Secondly, the CA in a lower clause can modify not only its clausemate predicate but also a predicate in a higher clause. When it modifies an upper clause predicate, it is interpreted as being in that clause even though it is sitting in the lower clause. The unmarked "default" version of sentence (3) would have to be the following, as the CA *amuli* and the adverbial *yelsimhi* modifies the predicate *wuki-* in the middle clause:

(5) chelswu-nun [[cikwu-ka phenphenhata-ko] amuli yelsimhi wuki-taka] kkwucilam-ul tut-eto, ...

Advocates of movement approaches would have to posit that sentence (3) is derived from this sentence, which has the modifier phrase in the middle clause.

These downward movement phenomena may or may not be problematic to mono-stratal approaches, depending on the specific mechanisms employed. However, they pose a serious problem to multi-stratal approaches with the movement operation, including Minimalist Programs. Note that all the frameworks of movement approaches following the Transformational Grammar tradition are constructed under the assumption that there are only upward movement phenomena in natural languages. Even if one can manage to get over this problem, he will face a conflicting situation in accounting for CACs. From the viewpoint of the CA-VE relationship, the underlying structure has to be the sentence where the CA occurs on the same clause as the VE (cf. (2) and (4)). However, from the viewpoint of the modifier-modified relationship, in such cases involving (3) and (5), the underlying structure have

[1] The words in (b) and (c) occur in the same linear order, but the two sentences concerned have different structures. They seem to have different focus structures as well.

[2] Shuichi Yatabe (p.c.) suggested to me that the sentences in (2) and (4) can be analyzed as showing upward movement phenomena. For example, under the assumption that sentence (4c) is the underlying structure, sentences (2) and (4a) can be derived by moving *yengja-ka* and *yengja-ka ttena-se* in the lowest clause to the highest clause, respectively. However, these "moved" elements do not show any properties they would have if they were members of the highest clause. In addition, there would not be any plausible way of deriving (4b) from (4c).

to be a sentence where the CA occurs in a lower clause. There is no way of deciding the underlying structure in this conflicting situation.

In order to avoid the above-mentioned problems, one might propose that the CA's "original position" is in the lowest clause and it moves upward when necessary. Then, sentence (2) would be the underlying structure of the sentences in (4) and sentence (3) would be that of sentence (5). However, this approach has problems. Firstly, it cannot capture native speaker's intuition about unmarked sentences. Generally sentences which have the CA in the same clause as the VE are regarded as default ones: e.g. sentence (4c) or (4d) rather than sentence (2). Secondly, we need to come up with a special explanation why the CA can move only up to the clause containing the VE.

(6) *pilok salam-tul-i [[yengca-ka ttena-telato]
CA people-Pl-Nom [[Youngja-Nom leave-VE/although]
caemi-ka iss-ul kes-i-lako] ha-n-ta.
be interesting-Comp] do-Pres-Decl
'People say that (it) will be interesting even though Youngja does not appear.'

This sentence is ungrammatical because the CA is outside of the clause containing the VE. This kind of restriction is not likely to exist if CACs are upward movement constructions. Lastly, there are cases where we have to posit an ungrammatical sentence as the underlying structure. The underlying structure of (5) would have to be a string like (3). However, this string is problematic as an underlying structure, where the (truth-conditional) meaning of the sentence is to be determined. As we noted above, the degree phrase *amuli yelsimhi* is not compatible with the lowest predicate *phenphenha-*.

In the face of these problems, even advocates of multi-stratal approaches have to admit that the original position of the CA is in the VE clause and that it has moved downward when it occurs in a lower clause. Thus, we can conclude that CACs are downward-movement constructions rather than run-of-the-mill upward-movement constructions.

2.3 The Nature of the Unbounded Relationships

We have seen two different unbounded dependency relations in CACs: the CA-VE and modifier-modified relations. In this section, we will focus on elucidating the nature of these relationships: whether the two elements concerned have only a semantic relation or they have a syntactic relation as well. In addition, we need to consider which of the two elements licenses the other. If there is only a semantic relationship between them, we have to assume that the VE licenses the CA. Even

though the CA can be assumed to be under the semantic scope of the VE, the VE cannot be under the semantic scope of the CA in all cases. Remember that the CA can only be placed on the same clause as or on a lower clause than the VE clause. The CA on a lower clause cannot have the VE in its semantic scope.

Then, there remain three possible hypotheses to be made on the relationships between the CA and the VE. Firstly, we can assume that there is only a semantic relationship between them and the VE licenses the CA. Secondly, we can assume that there is a syntactic relationship and the VE licenses the CA. Thirdly, we can assume that there is a syntactic relationship and the CA licenses the VE. Let us consider which hypothesis is the most appropriate of all these alternatives. We have to keep in mind that, except some special cases, if two elements are related syntactically they are related semantically as well.

The semantic hypothesis is to assume that the CA is licensed by the VE semantically. We can say that the CA is licensed by the VE in case it is under the semantic scope of the VE. Such a semantic approach could account for the CA-VE unboundedness because the CA can be analyzed as being under the VE's scope however deep it may be located. As the information represented by the VE is realized as a verbal ending and the whole clause carries that information, the VE can be treated as a HEAD feature. For example, in sentence (1a) (repeated below as (7)), the meaning of the VE *-telato/eto*, i.e. 'concession,' can be represented as a HEAD feature like [CONCESSION +] .

(7) pilok yengca-ka ttena-ess-telato,
CA Youngja-Nom leave-Past-VE/although
(ke peulo-nun po-l manha-e.)
that program-Top see-Fut be worth-Decl
'Although Youngja doesn't appear, (that program is worth watching.)'

As a HEAD feature the information will pass up to the whole clause through the head projection line. Then, the CA would be under the semantic scope of the VE wherever it may be located.

It seems to be true that the VE licenses the CA semantically: the CA cannot stand alone although the VE can, and the CA is always under the semantic scope of the VE. However, semantics-only approaches would fail to handle multiple dependency constructions like the following:

(8) a. [ney-ka pilok ton ttaymun-ey manyak kwun-ey
you-Nom CA_1 money because of CA_2 military-at

ka-key toy-myen] yengja-ka ttena-lcilato
go-Comp become-VE_2 Youngja-Nom leave-VE_1
'Even though Youngja may leave you, if you join the armed service because of money, ...'

b. * [ney-ka manyak ton ttaymun-ey pilok kwun-ey ka-key toy-myen] yengja-ka ttena-lcilato

As both of the two CAs are under the semantic scope of the two VEs here, sentence (8b) is also expected to be grammatical. The sentence would have to be grammatical in whatever order the CAs are, as far as they are under the scope of their VEs. However, the grammaticality is sensitive to the relative order of the CAs in relation to their VEs, which is unusual from a semantic point of view. On the other hand, from a syntactic point of view, it is well-established that only nested dependencies are allowed in multiple-dependency constructions (*manyak* triggers *myen* 'if' and *pilok* triggers *-lcilato* 'although'). These examples imply that there is a syntactic connection between the CA and the VE, because crossed dependencies are also allowed when the dependencies are only semantic. If at least one of the two relations involved is purely semantic, crossed dependencies are allowed:

(9) a. manyak *amuto* hakkyo-ey o-ci
CA nobody school-at/to come-Comp
ahn-ulyeko ha-myen
not-Intention do-VE/if
'If nobody intends to come to school, ...'

b. *amuto* manyak hakkyo-ey o-ci *ahn*-ulyeko ha-myen

There is no syntactic relationship between the negative polarity item *amuto* and the negation auxiliary verb *(-ci) ahn-* (Chae 2002). In this case, both the nested and crossed dependency sentences are grammatical.

The unboundedness of the modifier-modified relationship is more difficult to account for under a semantic approach. There would be no easy way of accounting for the fact that *amuli yelsimhi* in a lower clause modifies *wuki-* in an upper clause in (3).

(3) chelswu-nun cikwu-ka amuli yelsimhi
Chulsoo-Top earth-Nom CA/however laboriously
phenphenhata-ko wuki-taka kkwucilam-ul tut -eto
be flat-Comp argue-Comp be scolded -VE/although
'Even though Chulsoo has been scolded (severely) by arguing very tenaciously that the earth is flat, ...'

The fact that a lower element can modify a higher element cannot

be attributable to the semantic relationship between the CA and the VE. All the special properties of CACs seem to arise from a strong "attracting force" between them. We cannot account for this force by simply assuming that the CA is under the semantic scope of the VE. There must be some formal mechanisms to connect them.

As we have shown that the two elements are related syntactically, we have two hypotheses remaining to be tested. First of all, we can assume that the CA licenses the VE. We are pursuing this option in this paper. Under this assumption, we can account for the problems posed by a semantic approach. As for the multiple dependency constructions in (8), we do not need to provide any special explanation because crossed dependencies are not allowed syntactically. The modifier-modified relationship can also be handled more easily once we have a syntactic mechanism connecting the two elements.

The other option is to assume that the VE licenses the CA. However, this option is not tenable. Empirically, this approach would be problematic in accounting for the ungrammaticality of such sentences as (10a):

(10) a. *pilok yengca-ka ttena-ess-tamyen (cf. (1))
CA Youngja-Nom leave-Past-VE/if

b. yengca-ka ttena-ess-tamyen
Youngja-Nom leave-Past-VE/if
'If Youngja left, ...'

c. manyak yengca-ka ttena-ess-tamyen
CA Youngja-Nom leave-Past-VE/if
'If Youngja left, ...'

Expression (10a) has a wrong VE: *pilok* goes with *-telato/eto/lcilato* rather than *-tamyen*. As we can see in (10b), it becomes grammatical when the adverb *pilok* is not present. This means that the VE doesn't have to license any CA, i.e. it would be an optional licensor. Therefore, we need some special mechanisms to account for the ungrammaticality of (10a). As the VE does not have to license a CA, the only possible way of ruling out (10a) is to rely on semantics or pragmatics. We can assume that the CA *pilok* cannot combine with the rest of the sentence, which has a conditional meaning, because there is a mismatch between them[3]. Then, however, we will be in an awkward situation because we have to say that *pilok* in (10a) is not allowed due to a semantic or pragmatic problem while the CA *manyak* in (10c) is licensed by a syntactic mechanism. In other words, all ungrammatical sentences would have a

[3]It is not clear whether the CA *pilok* has any truth-conditional meaning at all.

semantic/pragmatic problem while all grammatical sentences would be licensed syntactically. Remember that we are now testing a hypothesis which says that the VE syntactically license the CA.

A more serious problem arises when the CA in a lower clause is not compatible with the VE in an upper clause (cf. (2)):

(11) *salam-tul-i [[yengca-ka pilok ttena-se]
person-Pl-Nom [[Youngja-Nom CA leave-as]
caemi-ka telhata-ko] ha-n-tamyen, ...
interesting be less-Comp] do-Pres-VE/if

Under the present hypothesis, this sentence is ungrammatical because the meaning of the CA *pilok* cannot combine with that of the VE *-tamyen*. However, we need to concoct a special mechanism to make the meaning of *pilok* available at the clause where the VE is. In general, the meaning of an adverb in an (non-head) embedded clause cannot be transported to an upper clause.

From a technical point of view, it would not be easy to "locate" the CA, which is to be licensed by the VE, because it can sit in a lower clause than the VE. Assuming that the CA has a FOOT feature is not a good solution because we have to introduce a set of semantically oriented FOOT features such as CONDITION, CONCESSION and the like. To the worse, these features have the properties of HEAD features, as shown above.

We are now left with the last hypothesis that the CA licenses the VE syntactically. We have seen above that we can handle all the difficulties with the semantics-only hypothesis under this hypothesis. We do not face any of the problems of the second hypothesis, either. As the CA licenses the VE obligatorily, all the data in (10) can be treated naturally. Sentence (a) is ungrammatical because the VE *-tamyen* is not what is required by the CA *pilok*. The CA has to license a VE which is required by it, i.e. *-telato/eto*. Sentence (b) has nothing to do with the CA. The VE *-tamyen* itself has the meaning of condition. In sentence (c), the CA *manyak* licenses what is required by it, i.e. the VE *-tamyen*.

We have considered the nature of the unbounded relationships in CACs in this section. Although we have focused on the nature of the CA-VE relationship, the modifier-modified relationship seems to have the same properties. We have found out that there is a syntactic relation between the CA and the VE, and that the CA licenses the VE. Now we can say that the CA triggers the existence of the VE and characterizes the whole CAC construction. In this respect, we will call the CA the "trigger," and what is triggered by it, i.e. the VE, the "target."

2.4 Difficulties with HPSG Analyses

We have seen that CACs in Korean show the properties of downward unbounded discontinuities. They exhibit two different types of unbounded dependencies: the trigger-target relationship and the modifier-modified relationship. The trigger in the former relationship is the same as (a part of) the modifier in the latter relationship. These relationships can best be characterized as indicating a syntactic relationship, where the trigger licenses the target.

CACs have many properties which cannot be easily accounted for. One of them is the discontinuity between two elements. There are sentences which contain two closely related parts which are separated from each other. This relationship cannot be captured by regular tree structures because "line crossing" is not allowed[4]. The relationship between a gap and its filler, e.g. in *wh*-question constructions, is analyzed successfully by way of such mechanisms as the SLASH feature in the Generalized Phrase Structure Grammar (GPSG) tradition. However, true discontinuities like the one in the result clause construction in English, i.e. the *so...that* construction, have not been treated successfully (but cf. Chae 1992). In the Transformational Grammar tradition, they are treated on the basis of the underlying-surface structure dichotomy. In the Categorial Grammar tradition, some of them are treated with a "wrapping" operation. However, none of them seem to be successful, especially from a mono-stratal point of view.

The unboundedness between discontinuous elements is not so easy to analyze properly, either. In the GPSG tradition, mechanisms with the SLASH feature are used to deal with the unboundedness between a gap and its filler or binder. By way of this feature we can successfully transfer the information that some category is missing from a lower clause to a higher clause. However, the feature can only carry the information that a category is missing. It cannot capture the discontinuous relationship between two elements which are not empty categories. No feature introduced thus far, except the LICENSOR feature in Chae (1992), can indicate the fact that a particular lexical item has the property of licensing another part of the sentence, which can be separated from the licensor unboundedly[5].

From a multi-stratal point of view, the most difficult aspect of

[4]However, some theoretical frameworks like that in McCawley (1982) allow line crossing.

[5]The EXTRA feature introduced in Bouma, Malouf & Sag (2001) has a function similar to that of the LICENSOR feature. However, it is not clear whether their mechanism is supposed to deal with unboundedness. It is used to account for extraposition phenomena, which are clause-bound.

CACs is the downward movement property. This downward unboundedness will pose insurmountable problems to the movement approaches because rules and principles are constructed under the assumption that there are only upward movement constructions. Mono-stratal approaches do not have such problems as being caused by movement. However, even these approaches are not readily available to account for the facts here. Constructions like CACs in Korean have not been under consideration in the literature yet. These are new constructions to be dealt with. Even though their special properties may be less lethal to mono-stratal approaches than to multi-stratal approaches, they will still be a serious challenge to mono-stratal approaches as well.

In this section, we will consider how Korean CACs can be analyzed under HPSG frameworks. As no previous analyses of them have been provided yet (not only in HPSG approaches but also in other approaches), we will just try to find out whether the properties of them can be accounted for with currently available HPSG mechanisms.

We will start by going over HPSG analyses of some constructions which share similarities with the Korean CACs. One of the best candidates to consider is *tough*-constructions in English. These two types of constructions are similar in the sense that a particular lexical item is responsible for the existence of some other part in the sentence, and the trigger and (a part of) the target show an unbounded relationship.

(12) Robin isn't easy for me [to keep Dana from [criticizing *e*]] .

In this sentence the lexical item *easy* triggers the existence of a gapped VP and hence characterizes the construction. In addition, the trigger *easy* and the gap, a part of the target, can be separated from each other unboundedly.

In HPSG, as in GPSG (cf. Gazdar, et al. 1985), the *tough*-adjective is analyzed as being responsible for licensing a VP with an accusative NP gap. For example, *easy* is represented as follows (Pollard & Sag 1994: 167).

(13)
$$\left[\begin{array}{l} \text{LOC}\,|\,\text{CAT}\,|\,\text{SUBCAT} \left\langle \begin{array}{l} \text{NP}_{\boxed{1}},\ (\text{PP[for]},) \\ \text{VP[inf, INHER}\,|\,\text{SLASH} \left\{ \boxed{2}\text{NP[acc]:ppro}_{\boxed{1}},\ldots \right\} \end{array} \right\rangle \\ \\ \text{NONLOCAL}\,|\,\text{TO-BIND}\,|\,\text{SLASH} \left\{ \boxed{2} \right\} \end{array}\right]$$

As the adjective subcategorizes for an infinitive VP with a gap, which is represented by SLASH, the adjective itself takes care of discharging the gap. And the SLASH feature accounts for the unboundedness.

The HPSG analysis above captures major properties of such *tough*-sentences as (12). However, it cannot account for the following sen-

tences, which have largely the same properties as *tough*-constructions:

(14) a. John is [too nasty] to ask Mary to make friends with *e*.
b. Tom is [tall enough] to imagine my little son could have seen *e*.
c. *John is very nasty to ask Mary to make friends with *e*.

(15) Kevin is an [easy man] to please *e*.

It is clear that the underlined lexical items are the trigger of the construction concerned. Notice that sentence (14c) is ungrammatical even though it has the same structure as that of sentence (14a). Then, we have to assume that the underlined words license the gapped VP in these sentences as well. But we cannot provide an analysis like (13) for these sentences. Notice that the words do not subcategorize for the gapped VP. They are not heads but modifiers of the following or preceding elements. Therefore, they cannot have lexical specifications like (13) in the sentences of (14a-b) and (15).

Flickinger & Nerbonne (1992) provide an HPSG analysis to account for such data as (14-15). They assume that the adjuncts in question, i.e. *too, enough* and *easy*, subcategorize for a gapped VP and that these complements can be transferred from adjuncts to heads. The complements here must be marked as "transferable" in the lexical entry because not all complements can be transferred. These transferable complements are subject to the following principle (p. 293)[6]:

(16) Transferable Complement Principle:
When a transferable complement on a daughter in a local subtree is not associated with some sister in that subtree, the complement becomes part of the corresponding SUBCAT list of the head daughter in that subtree.

According to their analysis, the complements of *too/enough/easy* will be transferred to their heads and these heads will take care of subcategorization.

Although their analysis can account for the data in (14-15), it is not very satisfactory. Firstly, it is not convincing to assume that adverbs like *too* and *enough* can have their complements. It is evident that the existence of the gapped VP in (14) is due to these adverbs. However, the VP does not have properties of regular complements. Most of all, it is not a sister of its head. Secondly, it would not be easy to provide a formal mechanism to implement the Transferable Complement Principle. This principle requires that the SUBCAT value of a non-head daughter to be transferred to its head daughter sister. However, this

[6] They use the term "subcats" for complements.

operation will bring about damage to other parts of the system because SUBCAT is a HEAD feature. The information which is carried by a HEAD feature can only be propagated through the head projection line. Lastly, examples of the following cannot be easily accounted for (Chae 1992: 63, 69):

(17) a. This is [[too heavy] [a ball]] to throw *e*.
b. This is [a [light enough] ball] to throw *e*.

(18) Mary is [angry enough with John] to talk to *e* about him. (Hukari & Levine 1991: 124)

In (17a) the VP complement of *too* will be transferred to *heavy*, and then the complement of *too heavy* to *a ball*. By applying the principle (16) successively, the whole NP will have the gapped VP as its complement. However, this leads to a problem because the NP, which has to be saturated with respect to its complements, have undischarged complements. The value of a SUBCAT feature must be discharged within its maximal projection. The other examples have the same kind of problems.

Bouma, et al. (2001: 20) proposes a "lexicalist alternative to configurational theories of SLASH." Here the Nonlocal Feature Principle in Pollard & Sag (1994: 164) is replaced by a lexical constraint on heads (SLASH Amalgamation) and a constraint on phrases (SLASH Inheritance) (cf. Sag & Fodor 1994, Sag 1996):

(19) SLASH Amalgamation:

$$word \Rightarrow \begin{bmatrix} \text{LOC} \begin{bmatrix} \text{DEPS} \left\langle [\text{SLASH } \boxed{1}], ..., [\text{SLASH } \boxed{n}] \right\rangle \\ \text{BIND } \boxed{0} \end{bmatrix} \\ \text{SLASH } (\boxed{1} \uplus, ... \uplus \boxed{n}) \ominus \boxed{0} \end{bmatrix}$$

(20) SLASH Inheritance:

$$hd\text{-}val\text{-}ph \Rightarrow \begin{bmatrix} \text{SLASH } \boxed{1} \\ \text{HD-DTR} \left[\text{SLASH } \boxed{1} \right] \end{bmatrix}$$

The constraint in (19) "ensures that if a dependent is slashed, then the head which selects it will also be slashed" and the constraint in (20) ensures that the values of SLASH will be inherited only from a phrase's head daughter.

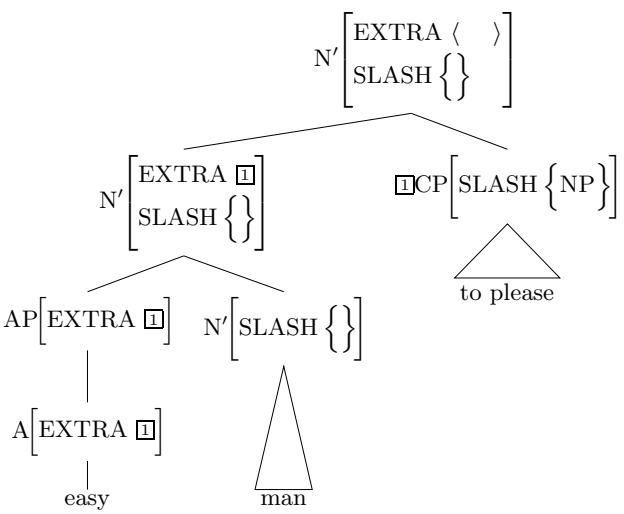
On the basis of these mechanisms, Bouma, et al. (2001) provide an alternative to Chae's (1992) LICENSOR approach (cf. footnote 17, p. 35). To handle such sentences as (14a-b) and (15), they introduce a new NONLOCAL feature EXTRA and assume that (a degree phrase

like *too/enough* and) an attributive *tough*-adjective like *easy* carries this feature with a VP/NP value. Assuming the lexical entry in (21a) for the attributive adjective *easy*, they analyze (15) as in (21b) (pp. 31-32):

(21) a.

$$\text{easy:}\begin{bmatrix}\text{BIND} & \{\boxed{2}\}\\ \text{SLASH} & \{\ \}\\ \text{EXTRA} & \langle(\text{LOC CP[to]}, \text{SLASH}\{\boxed{2}\})\ \rangle\end{bmatrix}$$

b.



The lexical item *easy* is specified as having [EXTRA⟨CP[SLASH{NP}⟩] in the lexicon. This feature will be transferred from A to AP via the SLASH Inheritance constraint in (20). Next, the feature is supposed to be transferred from AP to the N' category dominating *man* via the SLASH Amalgamation constraint in (19). Then, it will propagate through the nominal projection line according to SLASH Inheritance again. The SLASH feature on the CP node will not propagate to the top N' node or above because the feature is specified as being bound by the adjective *easy* itself (cf. (21a)).

This approach does not have the problems of Flickinger & Nerbonne (1992). Firstly, Bouma, et al. (2001) do not analyze the gapped VP as a complement of *too/enough* or *easy*. In addition, they provide formal mechanisms to handle the transfer of the information about the gapped VP from the adverb/adjective to higher units. As the gapped VP is not a complement of the adverb/adjective, they do not have the saturation problem observed in (17-18). We can assume that a sat-

urated phrase can have undischarged EXTRA values even though it cannot have undischarged complements.

However, the EXTRA approach suffers from some difficulties as well[7]. Firstly, the amalgamation constraint (19) must be reformulated so that the head can collect the NONLOCAL specifications not only of their complements and specifiers but also of their modifiers (to deal with such data as in (15)). This extension will probably lead to a problem in case parasitic gaps can occur in the specifier or modifier phrases[8]. Secondly, the EXTRA feature on the N' dominating *easy man* is an instantiated feature and hence it must be bound off just like the SLASH feature on the CP node. However, as they do not provide any such mechanism, we need to introduce a new extra schema for its binding. If we cannot provide one, it will propagate upward without restriction. Worst of all, the system does not seem to work as they intended. For example, in (21b), the N' dominating *man* is supposed to collect the information about the EXTRA feature from its AP sister according to the SLASH/EXTRA Amalgamation constraint (19). However, notice that the constraint does not work here because the node dominating *man* is not a lexical head. The constraint operates only on lexical heads. One might propose that the node dominating *man* can be analyzed as a lexical item N rather than as a N'. However, such an analysis is not plausible at all for examples like the following:

(22) a. Robin is [[too kind] [a person]] to take advantage of *e*.
b. Sally is [[more pleasant] [a boss]] to work for *e* than Sam is. (Chae 1992: 219)
c. [[Too many books] [have been published recently]] for me to be able to read them all. (Gueron and May 1984: 1)

In all these examples, the units containing the underlined word (i.e. the trigger of the (gapped) VP) are not the head of the phrase concerned. However, it is very clear that their heads, *a person, a boss* and *have been published recently* cannot be analyzed as lexical heads. Therefore, we can conclude that the mechanism with the EXTRA feature does not work here. The EXTRA feature cannot be transferred, for example, from the phrase *too kind* to the phrase *a person* because this latter phrase is not a lexical item.

Thus far, we have considered how we can account for *tough*- and

[7]Bouma, et al. (2001) have to posit two different lexical entries for the *tough*-adjective: one for regular *tough*-constructions like (12) and one for "attributive *tough*-constructions" like (15).

[8]Notice that the existence of parasitic gaps makes Sag (1996: 77) assume that the subject's SLASH value is "neither amalgamated nor required to be empty."

similar constructions in English within some HPSG frameworks. We saw that these frameworks cannot account for the discontinuities between the *tough*-adjective and the gapped VP. For a system with the EXTRA feature to be successful, it must have a new version of the SLASH/EXTRA Amalgamation constraint. In addition, the new version has to be a phrasal constraint rather than a lexical constraint to account for such examples as (22), which would make the SLASH/EXTRA Inheritance constraint (partly) redundant in its function.

The *tough*- and related constructions and the constructions which we are going to analyze, i.e. CACs in Korean, share the property of lexically triggered unbounded dependencies. However, CACs have some more difficult properties to handle properly. Let us consider these properties with reference to those of *tough*-constructions. Firstly, in the *tough*-construction, the adjective which triggers the existence of the gapped VP is in a fixed position. However, in CACs, the trigger, i.e. the CA, itself can "move around," which shows downward movement phenomena. Secondly, in the *tough*-construction, we can designate a specific lexical item or rule/schema which can take care of the discharge of the target. For example, in (12), we can refer to the gapped VP in the lexical specification or rule describing the adjective *easy* because they can be analyzed as belonging to the same local tree. Even in such cases as (14-15) and (17-18), we can manage to invent mechanisms to bring about the effect that they can be related even though they are not in the same local tree. The nonlocality here, however, cannot be extended outside of the clause concerned. That is, the trigger and the gapped VP cannot be in different clauses even though the gap can originate from a different clause. Therefore, the target must be discharged in the clause where the trigger is. In CACs, on the other hand, the target can be in a higher clause than the trigger. Hence, we need a mechanism which can truely handle unbounded discontinuities.

2.5 An IPSG Analysis

In this section, we will show that the special properties of CACs can be accounted for effectively under an Indexed Phrase Structure Grammar (IPSG) approach. Chae (1992), based on Gazdar (1988), develops an IPSG framework to provide a unified account of "lexically triggered unbounded discontinuities" in English:

(23) Type A Constructions
  a. This paper was tough for me to try to finish *e* in a week.
  b. The game was a breeze for Tom to convince her to win *e*.

c. The house is ready for Tom to force Jim to buy *e*.
d. John is too nasty to ask Mary to make friends with *e*.
e. Tom is tall enough to imagine my little son could have seen *e*.
f. Kevin is a tough man to convince Mary to talk to *e*.
g. The cake took Mary all day to bake *e*.

(24) Type B Constructions:
a. Jane is more beautiful *than* I thought she would be.
b. I told her that so many people attended last year's concert *that* I made Mary nervous.

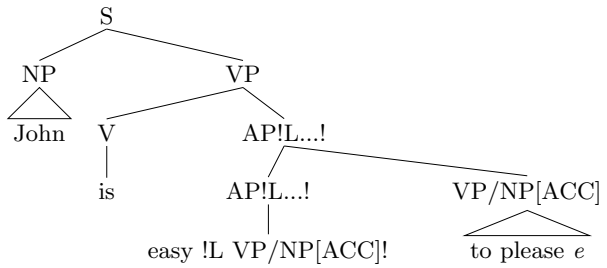
"Type A" constructions comprise *tough*- and similar constructions, and "Type B" comparative constructions and result clause constructions. These constructions contain particular lexical items (i.e. the underlined words) which characterize them, and trigger the existence of other parts in them: a gapped VP in (23) and a *than/that*-clause in (24). The trigger and the target can be separated from each other by other elements (hence, they are discontinuous). In addition, the trigger and (a part of) the target might not be elements of the same clause (hence, they are unbounded).

The main point of the present framework is that each lexical item which induces a particular construction has a "LICENSOR feature" in the stack (hence, an Indexed Grammar) as a part of its syntactic information in the lexicon. The value of this feature is what is licensed by the trigger, i.e. the target. For example, *so* in (24b) has [LICENSOR S [COMP *that*]] in the stack as a part of its lexical representation. The feature propagates through the tree as a FOOT feature, which is subject to such principles as the FOOT Feature Principle in Gazdar, et al. (1985). Popping out of the stack, it licenses the target according to the following principle:

(25) The Principle of LICENSOR Discharge:
[LICENSOR XP] in the stack of a node (pops out of the stack and) licenses one of this node's daughters when the specification of the LICENSOR's value (i.e. XP) is the same as that of this daughter node.

(26) a. John is easy to please.

b.



The lexical item *easy* has a stacked LICENSOR feature whose value is a VP with an accusative gap, i.e. !L(ICENSOR) VP/NP [ACC] ! (the stack is represented as a set of exclamation marks, !...!). This feature propagates through the tree. When it is instantiated on the upper AP node, it pops out of the stack to license the VP/NP [ACC] daughter, according to the discharge principle (25). Notice that the specification of the licensed node is the same as that of the feature's value.

Here we can effectively account for the fact that a particular lexical item is responsible for the existence of the construction concerned. In addition, there are two different kinds of relationships involved: constituency and dependency. In (24b), for example, the trigger *so* forms a constituent with *many* but it forms a dependency relation with the *that*-clause. It is difficult to capture these two relations in a single tree. However, we can do that very easily: one with the constituent structure and the other with the LICENSOR mechanisms.

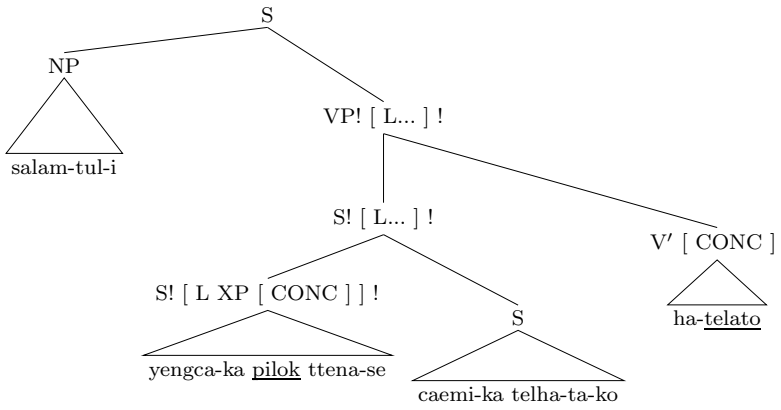
Note that we do not have any of the problems of the HPSG system employing the EXTRA feature. The LICENSOR feature, which corresponds to the EXTRA feature, binds off automatically when it licenses its value. It propagates only through the stack and it pops out of the stack when it licenses the value. On the other hand, the EXTRA feature must be licensed by a schema or a lexical item at the top so that it cannot propagate upward after it binds off the gapped VP. As for the propagation of the feature in the middle, the LICENSOR feature need not necessarily follow such constraints as SLASH Amalgamation and SLASH Inheritance even in the framework of Bouma, et al. (2001). Even though it is a FOOT feature, it is not a regular FOOT feature like SLASH but a stacked feature. Hence, it can be regarded as being subject to a different constraint/principle. Unlike regular FOOT features, it propagates through the tree only via the stack. When it gets out of the stack, the flow of the information stops.

Under the present IPSG framework, we can account for the properties of CACs in Korean without employing any additional mechanisms. We just need to assume that the CA in Korean has a LICENSOR fea-

ture with an appropriate value. For example, the adverbial *pilok* in (2) has [L XP [CONC(ession)]] in the stack[9]. The licensing mechanisms involved are exactly the same as those for the constructions in (23) and (24). We can analyze sentence (2) as in (27):

(2) salam-tul-i [[yengca-ka pilok ttena-se]
person-Pl-Nom [[Youngja-Nom CA leave-as]
caemi-ka telhata-ko] ha-telato, ...
interest-Nom be less-Comp] do-VE/although
'Although people say that (it) is less interesting because Youngja left, ...'

(27) An IPSG analysis of sentence (2):



The stacked [L XP [CONC]] (i.e. ! [L XP [CONC]] !), which originates from *pilok*, propagates through the tree "until it reaches" the VP node which has V' [CONC] as one of its daughters. The propagation stops at this node because the LICENSOR pops out of the stack to license the target. Remember that the LICENSOR feature propagates through the tree only when it is in the stack.

Let us now consider how the IPSG framework can account for the special properties of Korean CACs observed in this paper. Firstly, they exhibit downward unbounded discontinuities. The discontinuities here are real ones: neither the trigger nor the target consists only of the gap. The mechanisms involving the LICENSOR feature deal with this property very naturally. The feature originates from the trigger and licenses its target even though the target may be separated from it unboundedly. The downward movement phenomena do not matter at all, because the trigger can license the target in whatever clause it may

[9]The category XP represents a verbal category of any bar-level.

be located as long as it is not on a clause higher than the one with the target. The original position of the trigger is the place where it stands and it performs its own function in that place. Secondly, we saw that the CA syntactically licenses the VE in the CA-VE relationship although the latter licenses the former semantically. The nature of this relationship can be accounted for by assuming that the CA is the trigger/licensor and the VE is what is licensed by the trigger, i.e. the target. The LICENSOR feature connecting the trigger and the target is a syntactic feature, which captures the syntactic relationship between them. Notice that once the VE is licensed by the CA syntactically, the CA is guaranteed to be under the semantic scope of the VE, which establishes their semantic relationship. Thirdly, we do not have any of the difficulties with the EXTRA feature analysis. The LICENSOR feature is bound off automatically when it pops out of the stack to license its target. And the LICENSOR feature does not have to be constrained by the same principles as those for other FOOT features. It is a special FOOT feature, a stacked feature.

To account for the modifier-modified relationship, we can assume that the CA has two features in the stack: a LICENSOR and a MODIFIER. Note that only those CAs exhibit this relationship which indicate 'degree' as well as 'concession': *amuli* and *amman* (Chae 2002)[10]. The MODIFIER feature is on the top of the stack because there is no case where the target of the MODIFIER comes later than that of the LICENSOR. The LICENSOR feature will be discharged at the same node as or at a higher node than that of the MODIFIER feature, depending on the position of the XP [CONC] node.

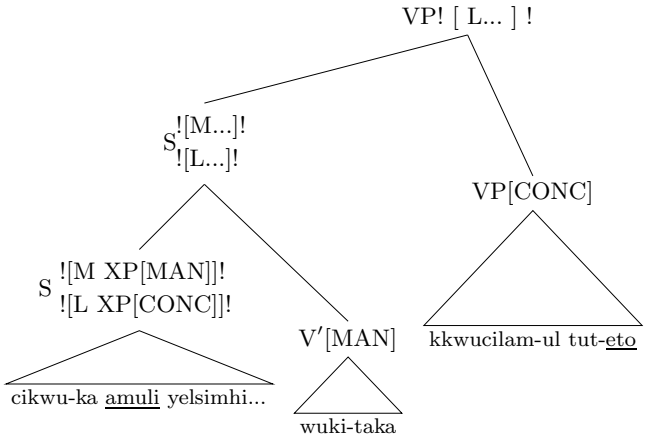
Let us consider how the modifier-modified relationship in sentence (3) can be accounted for under this extended framework:

(3) chelswu-nun [[cikwu-ka amuli yelsimhi
Chulsoo-Top [[earth-Nom CA/however laboriously

phenphenhata-ko] wuki-taka] kkwucilam-ul tut -eto
be flat-Comp] argue-Comp] be scolded -VE/although
'Even though Chulsoo has been scolded (severely) by arguing very tenaciously that the earth is flat, ...'

[10]The two CAs *amuli* and *amman* are similar in their meanings. The latter is more colloquial than the former.

(28) An IPSG analysis of sentence (3):



The trigger *amuli* has [M(ODIFIER) XP [MAN(ner)]] and [L XP [CONC]] in the stack[11]. The former feature will be discharged on the S node dominating the V' [MAN] node. The latter feature will be discharged on the upper VP node which has VP [CONC] as its daughter. This system can effectively account for the fact that the CA *amuli* in the lowest clause modifies (together with the manner adverbial *yelsimhi*) the predicate in the middle clause. Notice that neither the lowest predicate nor the highest predicate has the MAN feature.

2.6 Conclusion

In this paper, we have explored some properties of CACs in Korean. These constructions have special characteristics which have not been dealt with much in the literature. They exhibit unbounded discontinuities and the unboundedness shows downward movement phenomena. These phenomena themselves pose a serious problem to those approaches which follow the Transformational Grammar tradition. Assuming that the CA licenses the VE syntactically, we examined some HPSG frameworks. Not all the properties of CACs can be treated in these frameworks. We found out that the properties can be accounted for most successfully under an IPSG framework.

The downward unbounded discontinuity is the most peculiar property of CACs. This property seems to be induced by the "attracting

[11] We are not sure whether the value of the MODIFIER feature can only be an element with the MAN feature. This feature is related to the manner adverbial *yelsimhi*, which occurs after the CA. If other types of adverbials modified by the CA can induce the same kind of unbounded relationship, we need to have a mechanism to make the adverbial type as the value of the MODIFIER feature.

force" between the trigger and the target. We think that the effect of this force is nicely implemented into the IPSG licensing system and, accordingly, the special properties induced by this force can be accounted for naturally. Even though HPSG frameworks in their current state cannot handle the facts about CACs in Korean easily, we might be able to modify the system. One of the easiest and effective ways of handling them would be to simulate the operations of the IPSG mechanisms above into the HPSG framework. Then, the system would be an Indexed Grammar version of HPSG. Whatever framework we might end up getting at, we would have a strong case against the multi-stratal approaches adopting movement operations.

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References

Bouma, Gosse, Rob Malouf, and Ivan Sag (2001) "Satisfying Constraints on Extraction and Adjunction," *Natural Language and Linguistic Theory* 19.1.

Chae, Hee-Rahk (1992) *Lexically Triggered Unbounded Discontinuities in English: An Indexed Phrase Structure Grammar Approach*, Ph.D. dissertation, Ohio State Univ.

Chae, Hee-Rahk (2002) "On the Classification and Distribution of Korean Adverbials: Focusing on the Distinction between Regular and Concord Adverbials" (written in Korean), *Language and Linguistics* 29, Hankuk Univ. of Foreign Studies.

Dowty, David (1991) "Toward a Minimalist Account of Syntactic Structure," *Proceedings of the Symposium on Discontinuous Constituency*, Institute for Language Technology and Artificial Intelligence, Tilburg Univ.

Flickinger, Dan and John Nerbonne (1992) "Inheritance and Complementation: A Case Study of *Easy* Adjectives and Related Nouns," *Computational Linguistics* 18.3.

Gazdar, Gerald (1988) "Applicability of Indexed Grammars to Natural Languages," in U. Reyle and C. Rohrer (eds.), *Natural Language Parsing and Linguistic Theory*, D. Reidel.

Gazdar, Gerald, Ewan Klein, Geoffrey Pullum, and Ivan Sag (1985)

Generalized Phrase Structure Grammar, Blackwell.

Gueron, Jacqueline and Robert May (1984) "Extraposition and Logical Form," *Linguistic Inquiry* 15.1.

Hukari, Thomas and Robert Levine (1991) "On the Disunity of Unbounded Dependency Constructions," *Natural Language and Linguistic Theory* 9.

Im, Yoo-jong (1998) "A Study on Subclassification of Adverbs in Korean" (written in Korean), *Language Research* 34.1, Seoul National Univ.

Kim, Kyung-hun (1996) *A Study on Adverbials in Present-day Korean* (written in Korean), Ph.D. dissertation, Seoul National Univ.

McCawley, James D. (1982) "Parentheticals and Discontinuous Constituent Structure," *Linguistic Inquiry* 13.1.

Pollard, Carl and Ivan Sag (1994) *Head-Driven Phrase Structure Grammar*, The Univ. of Chicago Press.

Sag, Ivan (1996) "Constraint-Based Extraction (Without a Trace)," *Korean Journal of Linguistics* 21.1/2.

Sag, Ivan and Janet Dean Fodor (1994) "Extraction without Traces," *Proceedings of the West Coast Conference on Formal Linguistics* 13.

3

Differences between Externally and Internally Headed Relative Clause Constructions

Chan Chung and Jong-Bok Kim

3.1 Introduction

In terms of truth conditional meanings, there is no clear difference between (Korean) IHRCs (internally head relative) like (1)a and EHRCs (externally headed relative) like (1)b.

(1) a. Tom-un [sakwa-ka cayngpan-wi-ey iss-nun kes]-ul
Tom-TOP apple-NOM tray-TOP-LOC exist-PNE KES-ACC
mekessta.
ate
'Tom ate an apple, which was on the tray.'

b. Tom-un [__ cayngpan-wi-ey iss-nun sakwa]-ul mekessta.
Tom-TOP tray-TOP-LOC exist-PNE apple-ACC ate
'Tom ate an apple that was on the tray.'

They all describe events of an apple's being on the tray and Tom's eating it. But, there exist several intriguing differences between the two constructions. One crucial difference between the IHRC and EHRC comes from the fact that the semantic object of *mekessta* 'ate' in IHRC examples like (1)a is the NP *sakwa* 'apple' buried inside the embedded clause followed by *kes*. It is thus the subject of the embedded clause *apples* that serves as the semantic argument of the main predicate.

In the analysis of such IHRCs, of central interest are thus (a) how we can analyze the constructions in syntax and (b) how we can associate the internal head of the IHRC clause with the matrix predicate so that the head can function as its semantic argument, and (c) what makes

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the differences between the two constructions. This paper is an attempt to provide answers to such recurring questions within the framework of HPSG.

3.2 Syntax of the IHRC

3.2.1 Internal Syntax

One noticeable morphological property of the IHRC construction is that as shown in (1)a, the embedded clausal predicate should be in the adnominal form of *(n)un*, followed by *kes*.[1] This is another main difference from EHRC, in that the predicate in EHRCs can have three different types of suffixes sensitive to tense information. This contrast is given in (2):[2]

(2) a. Tom-i $\_\__i$ ilk-nun/un/ul chayk$_i$
Tom-NOM read-PRES.PNE/PST.PNE/FUT.PNE book
'the book that Tom reads'

b. Tom-un [sakwa-ka cayngpan-wi-ey **iss-nun/*ul** kes]-ul
Tom-TOP apple-NOM tray-TOP-LOC exist-PNE KES-ACC
mekessta.
ate
'Tom ate an apple, which was on the tray.'

In the traditional Korean grammar, *kes* in the IHRC is called a 'dependent noun' in that it always requires a verb of an adnominal form and cannot exist alone as a word:

(3) (Na-nun totwuk-i unhayng-eyse) *(nao-nun) kes-ul
I-TOP thief-NOM bank-from come-out-PNE KES-ACC
capassta.
caught

Example (3) shows that the adnominal verb *nao-nun* is neither optional nor can be realized as an empty category.

A tight syntactic relation between the clausal predicate and the noun *kes* can also be found from the optionality of the IHRC in (4):

(4) a. Na-nun *(kangto-ka unhayng-eyse nao-nun) kes-ul
I-TOP robber-NOM bank-from come-out-PNE KES-ACC

[1] The restriction on the types of adnominal form seems to be related to semantic and pragmatic constraints. See section 4.

[2] These three basic kinds of tense-sensitive prenominal markers in the EHRC can be extended to denote aspects when combined with tense suffixes. Thus the possible prenominal verb forms are *ilk-ten* 'read-progressive', *ilk-essten* 'read-past progressive', *ilk-essul* 'read-past conjecture', *ilk-essessul* 'read-past perfective conjecture', *ilk-ko issten* 'past perfective progressive'

capassta.
caught
'I arrested the robber who was coming out of the bank.'

b. Na-nun (unhayng-eyse nao-nun) kangto-ul capassta.
I-TOP bank-from come-out-PNE kangto-ACC caught
'I arrested the robber who was coming out of the bank.'

The IHRC example in (4)a indicates that the adnominal IHRC clause as well as its predicate is an obligatory element. However, the entire EHRC clause in (4)b is optional.

The point to note is that in canonical control constructions the matrix verb can exist as an independent word, without the governed verb as in (5)a. This is different from a canonical complex predicate construction as in (5)b:

(5) a. (Na-nun John-hanthey sakwa-lul mek-ulako) seltukhayssta.
I-TOP John-DAT apple-ACC eat-PNE persuaded
'I persuaded John to eat an apple.'

b. na-nun sakwa-lul mek-e poassta
I-TOP apple-ACC eat-COMP tried
'I tried to eat an apple.'

Such observations support the assumption that the pre-adnominal verb and *kes* forms a syntactic unit, possibly functioning as a complex predicate, as argued by Chung (1999).

There seems to exist additional phenomena showing the parallelism between the IHRC and verbal complex constructions. One such phenomenon is the so-called afterthought expression construction:

(6) a. *Na-nun kes-ul capassta, totwuk-i unhayng-eyse nao-nun.
I-TOP KES-ACC arrested thief-NOM bank-from come-out-PNE
'I arrested the thief who was coming out of the bank.'

b. na-nun totwuk-ul capassta, unhayng-eyse nao-nun.
I-TOP thief-ACC arrested bank-from come-out-PNE

Sentence (6)a is an instance of the IHRC construction, where the IHRC is used as an afterthought expression. It shows that the IHRC cannot be used as an afterthought expression differently from the EHRC in (6)b. It suggests that *kes* and the adnominal verb constitute a syntactic unit and that they cannot be separated. The same pattern is also observed in the verbal complex construction:

(7) a. *Na-nun poassta, sakwa-lul mek-e.
I-TOP tried apple-ACC eat
'I tried an apple.'

b. Na-nun seltukhayssta, John-hanthey sakwa-lul mekulako.
I-TOP pesuaded John-DAT apple-ACC eat
'I persuaded John to eat an apple.'

(7)a is an instance of the verbal complex where the auxiliary verb and its governed verb cannot be separated, while (7)b is an instance of the control verb construction where the matrix verb and its complement are separable.

Besides the arguments based on the lexical integrity, another parallelism between the IHRC and verbal complex constructions arises from the fact that the heads of the constructions, namely, *kes* in the IHRC and the auxiliary verb in the verbal complex, are a kind of clitics, diachronically derived from independent words whose phonetic forms are the same. For example, the auxiliary verb *pota* 'try as a test' in (5)b and (7)a, has a non-auxiliary-verb counterpart *pota* 'see', which can be used as an independent word. The same observation can be made in the IHRC. The head *kes* in the IHRC can never be used as a referring expression and never takes a specifier such as *ku* 'the' and *ce* 'that':

(8) a. *Na-nun totwuk-i unhayng-eyse nao-nun ku
I-TOP thief-NOM bank-from come-out-PNE the
kes-ul capassta.
KES-ACC caught
'I arrested the thief who was coming out of the bank.'

However, there exists a referential noun counterpart kes 'thing', which can be used as a referring expression and can take a specifier:

(9) Na-nun ku kes-ul sassta.
I-TOP the thing-ACC bought
'I bought the thing (it).'

To sum up, there are some parallelisms between the verbal complex and the combination of "adnominal verb + kes" in the IHRC phrase. It suggests that the combination in the IHRC needs to be treated as a syntactic unit, namely, as a complex noun.

The contrast in (10) shows that whereas more than one EHRC clause can be stacked together, only one IHRC clause is possible:

(10) a. *kyongchal-i [**kangto-ka unhayng-eyse nao-nun**]
police-NOM [robber-NOM bank-from come.out-PNE]
[ton-ul hwumchi-in] **kes**-ul chephohayssta
money-ACC steal-PNE KES-ACC arrested
'(int.) The police arrested a thief coming out of the bank, stealing money.'

b. kyongchal-i [__ **unhayng-eyse nao-nun**]
police-NOM [bank-from come.out-PNE]
[ton-ul hwumchi-in] **kangto**-lul chephohayssta
money-ACC steal-PNE robber-ACC-ACC arrested
'(int.) The police arrested a thief coming out of the bank, stealing money.'

This contrast implies that the adnominal clause in the IHRC has the canonical properties of a complement clause.

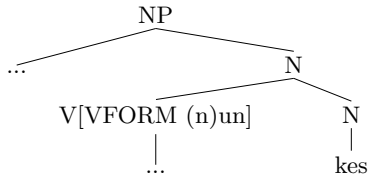
Given these observations showing a strong syntactic bondage between *kes* and the adnominal verb give us enough reason to take the verb *-kes* as a complex element as represented in the following lexical entry:

(11) Lexical Entry for *kes* (first approximation):

$$\begin{bmatrix} \langle \text{kes} \rangle \\ \text{HEAD} \quad \textit{noun} \\ \text{ARG-ST} \left\langle \text{V} \begin{bmatrix} \text{FORM} \ \textit{(n)un} \\ \text{ARG-ST} \ \boxed{a} \end{bmatrix} \right\rangle \oplus \boxed{a} \end{bmatrix}$$

The lexical entry in (11) specifies that the *kes* noun selects as its argument a verbal element as well as the arguments that this verb selects. The argument selection requirements of the adnominal verb are thus passed to the head *kes* with which it combines. This lexical information in turn means that the IHRC will have the following internal structure:[3]

(12)



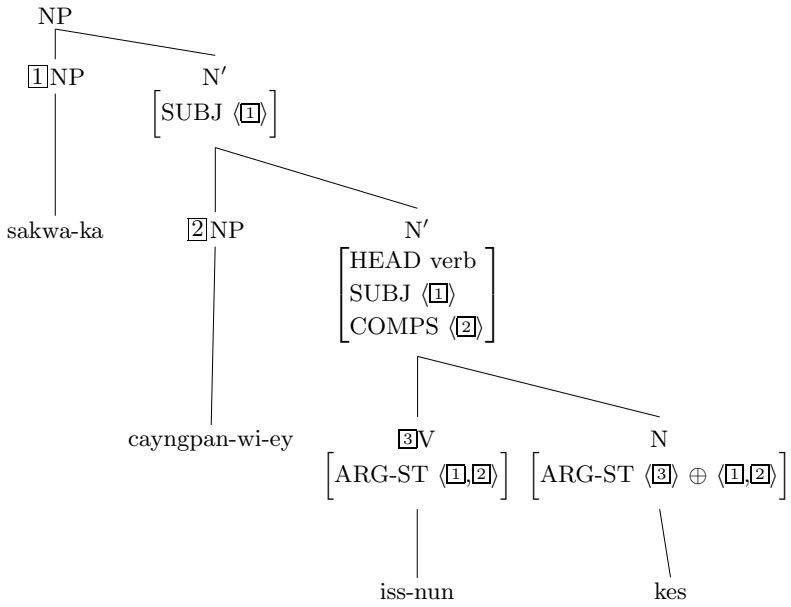
Such a structure, combined with the other universal constraints of the HPSG, will generate the following structure:

[3]Adopting Bratt (1995), we assume that Korean allows two lexical elements to combine to form a subphrasal element:

(i) Lexical Head-Complement Schema:
$X' \rightarrow$ Comp[+LEX], H[+LEX]

This schema captures the constituenthood of the preceding main verb and the following auxiliary verb. See Sells 1995 and Chung 1998 for a similar analysis.

(13)



The verb iss-nun takes a subject and an oblique complement. According to the lexical entry given in (11), the *kes* selects this verb as well as arguments via the argument composition mechanism (indicated by $\oplus$). When the *kes* combines with the verb *iss-nun*, the result still requires its oblique complement. The resulting complex combines with the oblique complement, forming a nominal phrase which in turn combines with the subject NP. We thus eventually can see here that the precise lexical information of the *kes* in the IHRC projects a fully saturated nominal phrase. In what follows, we will further see the nominal properties of the IHRC in its external syntax.

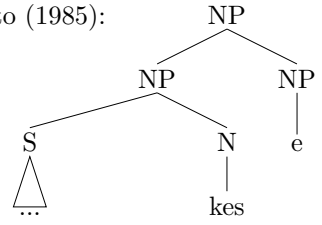
3.2.2 External Syntax

Given the internal syntax of the IHRC, let us see the relationship between the whole IHRC clause including *kes* and the matrix verb.

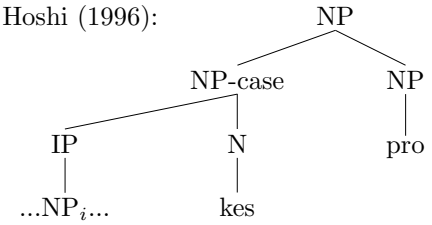
To relate the matrix verb with this 'internal semantic head', the traditional transformational grammar has introduced empty categories. For example, Ito (1985), Watanabe (1992), and Hoshi (1996) introduce an empty head noun approach for Japanese IHRCs. If interpreted for Korean, the structure would be something like the ones given in (14):[4]

[4]In Ito (1985) and Jhang (1994), Japanese *no* and Korean *kes* is taken to be a complementizer.

(14) a. Ito (1985):



b. Hoshi (1996):



Within Ito's head movement analysis, the internal head NP in the embedded sentence moves into the head position in LF. Hoshi's (1996) analysis posits the empty element *pro* is adjoined to an NP headed by *kes* which is modified by an IP. The *pro* is then coindexed with an NP within the IP.

Another direction that movement approaches have taken is to posit an empty head or a *pro* to the right of the subordinate clause and take the IHRC as an adjunct clause (Murasugi 1994, D.H. Chung 1996). In particular, Chung (1996) introduces a null perception predicate PRED, as represented in (15):

(15) Tom-un [sakwa-ka cayngpan-wi-ey iss-nun kes]-ul PRED
Tom-TOP apple-NOM tray-TOP-LOC exist-PNE KES-ACC
pro mekessta.
ate
'Tom ate the apples, which were on the tray.'

His analysis allows the empty PRED to be interpreted as predicates like *know, see, realize*, etc. The empty *pro* is presumably bound by its antecedent in the clause.[5]

Leaving aside the evaluation of such traditional empty-head analyses in detail, we claim that we could capture various properties of the construction even without positing empty elements, and further that there exist ample evidence supporting that the construction is a direct syntactic nominal complement of the matrix predicate.[6]

[5] One of the arguments for the adjunct clause lies on the fact that *kes* can be replaced by a temporal element such as *swunkan* 'moment', *hyoncang* 'place'.

[6] See Y.B. Kim (2002) for detailed criticisms against an adjunct analysis of Chung

A strong argument against an adjunct treatment centers on the passivization of the IHRC clause. As in (16), the object IHRC clause can be promoted to the subject of the sentence.

(16) [Tom-i talli-nun kes]-i Mary-eyeuyhayse caphiessta
Tom-NOM run-PNE KES-NOM Mary-by caught
'Tom, who was running, was caught by Mary.'

If we assume the IHRC clause is an adjunct clause from semantic or syntactic reasons, we would then need to introduce a system that an adjunct clause can participate in the passivization process, contrary to most current practice. In contrast, the present analysis where the IHRC clause is a nominal element would not block the clause from being promoted to the subject from the object.

A related problem of such an empty PRED approach would be that the empty PRED cannot assign nominative case to subject IHRC phrases like (16) and (17) since perception verbs such as *realize*, *see*, etc. assign accusative case to its complement. The case value is purely due to the main predicate *salaciessta*:

(17) [sakwa-ka cayngpan wi-ey iss-ten kes]-i PRED]
apple-NOM tray on-LOC exist-PST-PNE KES-NOM
[*pro* salaciessta]
disappeared
'The apple, which was on the tray, disappeared.'

In addition, if there is an empty *pro* in the sentence with the IHRC, there appears to be no reason to block us from replacing it from an overt pronoun. But such a replacement is not possible:

(18) *[sakwa-ka cayngpan wi-ey iss-ten kes-i PRED]
apple-NOM tray on-LOC exist-PST-PNE KES-NOM
[*ku kes-i* salaciessta]
that one-NOM disappeared
'The apple, which was on the tray, disappeared.'

In addition, the case marking pattern also implies that the construction is a complement. Unlike the so-called complementizer, *-ko*, the word *kes* can attract the nominative and accusative case markings as we have seen above. Some more examples are shown in (19) where *kes* attracts genitive or even instrument case markings:

(19) a. ?[Kangto-ka unhayng-eyse nao-nun kes-uy] chepho
robber-NOM bank-from come-out-PNE KES-GEN arrest
'the arrest of the robber who was coming out of the bank.'

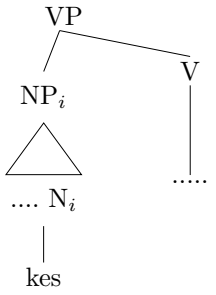
(1996)

b. [Mary-ka ton-ul pill-in kes]-**ulo** chayk-ul sassta
Mary-NOM money-ACC lend-PNE KES-INST book-ACC bought
'Mary lent some money and bought a book with it.'

This case marking pattern shows that the IHRC is a nominal projection. Such a case assignment pattern is a canonical property of a complement, rather than an adjunct.

Based on these observations, we assume the structure (19) for the external structure of the IHRC.

(20)



3.3 Semantic Aspects of the IHRC

Given the internal and external syntax of the IHRC, the remaining issue is how to associate one of the arguments in the IHRC clause as the semantic argument of the matrix predicate. As hinted earlier, the approach we take is to assume that *kes* is a kind of pronoun looking for its antecedent within the adnominal's arguments as represented in (21):

(21) Lexical Entry for *kes* (second approximation):

$$\begin{bmatrix} \langle \text{kes} \rangle \\ \text{HEAD} \quad \textit{noun} \\ \text{ARG-ST } \boxed{b}\langle ...[\ \ ]_i ... \rangle \\ \text{CONTENT} \mid \text{INDEX i} \end{bmatrix}$$

(where $\boxed{b}$ results from the argument composition $\left\langle \text{V}\begin{bmatrix}\text{FORM (n)un}\\ \text{ARG-ST } \boxed{a}\end{bmatrix}\right\rangle \oplus \boxed{a}$)

What this lexical entry tells us is that the index value of *kes* is identical with either the adnominal verb or one of the arguments that the adnominal verb selects (this plays an important role in capturing an event as well as an entity reading). The treatment of *kes* as a kind of pronoun gets strong support from its pronominal properties (cf. D.H. Chung 1996). For example, the target of the internal head in (21) is highly dependent upon context:

(22) [koyangi-ka cwui-lul ccoc-ko iss-nun kes-ul]
cat-NOM mouse-ACC chase-COMP in.state-PNE KES-ACC
capassta
caught
'(He) caught the mouse that the cat was chasing.
(He) caught the cat that was chasing the mouse.'

Depending on the context, the internal head could be either the cat or the mouse or even both. Also, in the IHRC, *kes* can have split antecedents as illustrated in (23).

(23) [koyangi-ka cwui-lul ccoc-nun kes-ul] katwuessta.
cat-NOM mouse-ACC chase-PNE KES-ACC penned
'(I) penned a cat chasing a mouse.'

The target of the verb *katwuessta* 'pen' could be both 'cat' and 'mouse'.[7]

In addition, the *kes* in the construction can even have an implicit antecedent, which is one of the canonical properties of pronouns:

(24) [[khep-uy mwul-i nemchi-n] kes-ul] ttakassta.
cup-GEN water-NOM overflowed-PNE KES-ACC wiped-out
'(I) wiped out the water that overflowed from the one in the cup.'

The interpretation we have for the example (24) is such that what I wiped out isn't the water in the cup but the one that overflowed. There is no overt antecedent for the pronoun *kes*.

Another point to note here is that IHRCs are syntactically very similar to clausal complements. IHRCs and clausal complements both function as the syntactic argument of a matrix predicate. But, in the IHRC (25)a, an internal head within the embedded clause functions as its semantic argument whereas the embedded clausal complement in (25)b itself is the semantic argument of the matrix predicate.

(25) a. John-un [Mary-ka talli-nun kes]-ul **capassta**.
John-TOP Mary-NOM run-PNE KES-ACC caught
'John caught Mary who was running.'

b. John-un [Mary-ka talli-nun kes]-ul **mollassta**.
John-TOP Mary-NOM run-PNE KES-ACC not.know
'John didn't know that Mary was running.'

The only difference between (25)a and (25)b is the matrix predicate. This difference induces the meaning difference. As in (25)a, when the matrix predicate is an action verb such as *capta* 'catch', *chepohata* 'arrest', or *mekta* 'eat', we obtain entity readings. But as in (25)b we have

[7] Like (22), the target could be either *cat* or *mouse* too.

only event readings when the matrix predicate is a type of recognition verb such as *po-ta* 'see', *al-ta* 'know', and *kiekhata* 'remember'.

The key point in our analysis for the IHRC is that its interpretation is dependent upon the type of matrix predicate. What we assume is that the matrix predicate affects the interpretation of the pronoun *kes*. In the lexical entry we sketched in (21), the subcategorization information of a predicate involves not only syntax but also semantics. For example, the verb *capassta* 'caught' in (26) lexically requires its object to refer to a referential individual whereas the verb *mollassta* 'not.know' in (27) selects an object complement whose index can refer to a propositional situation.

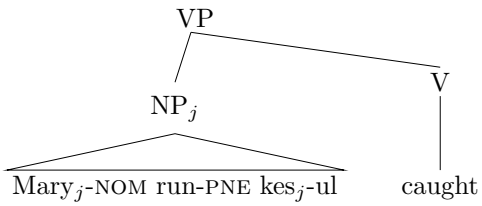
(26)
$$\begin{bmatrix} \langle \text{capassta 'caught'} \rangle \\ \text{ARG-ST } \langle \text{NP}_i, \text{NP}_j \rangle \\ \text{CONT} \mid \text{RESTR} \left\langle \begin{bmatrix} \text{RELATION} & \text{catch} \\ \text{AGENT} & i[\text{MODE } \textit{ref}] \\ \text{PATIENT} & j[\text{MODE } \textit{ref}] \end{bmatrix} \right\rangle \end{bmatrix}$$

(27)
$$\begin{bmatrix} \langle \text{mollassta 'not.know'} \rangle \\ \text{ARG-ST } \langle \text{NP}_i, \text{NP}_s \rangle \\ \text{CONT} \mid \text{RESTR} \left\langle \begin{bmatrix} \text{RELATION} & \text{not.know} \\ \text{EXPERIENCER} & i[\text{MODE } \textit{ref}] \\ \text{THEME} & s[\text{MODE } \textit{sit}] \end{bmatrix} \right\rangle \end{bmatrix}$$

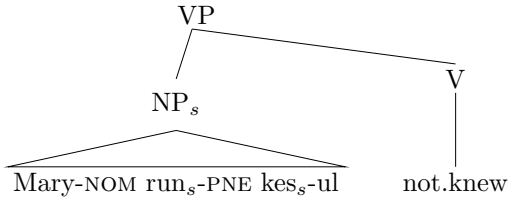
In the IHRC construction, such lexical requirements are in one sense passed on to the head element *kes* and this semantically empty pronoun will look for one (most) salient discourse binder such as either an individual as in (26)a or a propositional event as in (26)b.

Such lexical requirements given in (26) above will ensure that *kes* is properly coindexed with one of its semantic restrictions. For example, our system would generate the structure (28)a for the sentence (25)a and the structure (28)b for the sentence (25)b:

(28) a.



b.



As represented in the structures, the meaning of *kes* in (28)a is identical with the noun phrase *Mary* whereas the one in (28)b is coindexed with the predicate *talli-nun* 'run-PNE'. This is possible due to the lexical entry for *kes* given in (21). Given this lexical entry, the *kes* in (28) will look like the following:

(29)
$$\begin{bmatrix} \langle \text{kes} \rangle \\ \text{HEAD} \quad \textit{noun} \\ \text{ARG-ST} \ \langle \text{NP}[\textit{nom}]_j, \ \text{V}[\text{VFROM} \ \textit{nun}]_s \rangle \\ \text{CONTENT} \,|\, \text{INDEX} \ \textit{j/s} \end{bmatrix}$$

As noted, the INDEX value of *kes* can be coindexed with that of any element in its ARG-ST, either the subject 'Mary-NOM' or the predicate V 'run-PNE'. This would result in assigning a referential reading to the IHRC NP in (29)a as indicated by NP$_j$ whereas a situational (or event) reading to the top NP in (29)b as indicated by NP$_s$.

One clear advantage of such an analysis is a clean account of the near complementary distribution of the clausal complement NP and the IHRC, as well as for their structural identity, which no analyses have paid attention to. The analysis obtains an entity reading when the index value of *kes* identified with that of an argument of the matrix predicate. Meanwhile, the analysis induces an event reading for the IHRC when the index value is structure-sharing with that of the adnominal predicate. This analysis, thus, correctly predicts no cases where two readings are available simultaneously.

The proposed analysis could also account for facts pertaining to floating quantifiers. There is a kind of locality condition (e.g., mutual c-command relation) on the structural relationship between a floating quantifier and its interpretively associated argument NP:

(30) a. Tom-un [**sakwa-ka seykay-ka** iss-nun sangca-ul]
Tom-TOP apple-NOM three-NOM exist-PNE box-ACC
hwumchessta.
stole
'Tom stole the box that had three apples.'

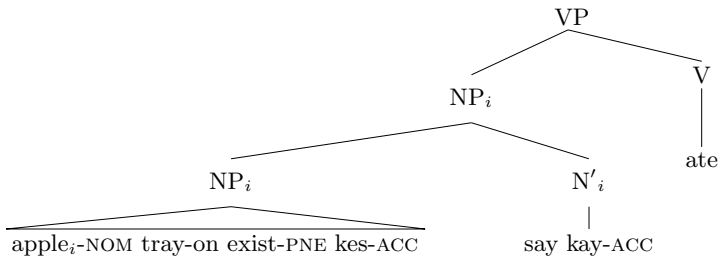
b. *Tom-un [**sakwa-ka** iss-nun sangca-ul] **seykay-ka**
Tom-top apple-nom exist-pne box-acc three-nom
hwumchessta.
stole

The data suggest that the host of a floating quantifier can be only a nominal element in the same clause. Such a locality condition in cases like (30)b can be overridden in the IHRC as in (31):

(31) Tom-un [**sakwa-ka** cayngpanwi-ey iss-nun **kes**]-ul
Tom-top apple-nom tray-acc placed-pne kes-acc
sey-kay-lul/*ka mek-ess-ta.
three-cl-acc/nom eat-past-decl
'Apples were on the tray, and Tom ate three of them.'

In the present analysis, the classifier *say kay* 'three things' in (31) is construed with *kes* whose meaning in turn is identical with that of the target *sakwa* 'apple'. This can be roughly represented as in (32):[8]

(32)



As can be seen from the structure, the pronoun *kes* is identified with 'apple' in the IHRC clause. The semantic index value of this head pronoun NP is passed up to the NP construction. The classifier is then construed with this NP whose index value is again percolated up to the topmost NP which eventually is coindexed with the PP in the clause. One general constraint in the language is that the case value of a floating quantifier should match that of its host NP. Notice that the case marking on the floating quantifier in (32) cannot be nominative but must be accusative. This once again supports our claim that the IHRC construction is a nominal NP that can serve as the antecedent of a floating quantifier. If not, we need to look for a different NP with the accusative case in the same local domain.

One thing to notice here is that though we treat *kes* as a kind of pronoun, the present analysis restricts its antecedent to be within a restrict

[8]Following Sag and Wasow (1999), we assume that the mother's index value is indentical with that of the head daughter.

domain, neither deeply embedded within the IHRC nor located outside the clause. This brings us one welcoming result: it easily captures the fact that the IHRC construction cannot be treated as an instance of the unbounded dependency as in the EHRC construction:

(33) a. Na-nun [kutul-i [__ $_i$ unhayng-eyse nawassta-ko]
I-TOP they-NOM bank-from came-out-COMP
malha-n] kangtoi-lul capassta. (EHRC)
say-PNE robber-ACC caught
'I arrested the robber who they said was coming out of the bank.'

b. *Na-nun [kutul-i [kangtoi-ka unhayng-eyse
I-TOP they-NOM robber-NOM bank-from
nawassta-ko] malha-n] kes$_i$-ul capassta. (IHRC)
came-out-COMP say-PNE KES-ACC caught
'I arrested the robber who they said was coming out of the bank.'

In the EHRC (33)a, the head of the EHRC phrase, *kangto*, is construed with the gap within the deeply embedded clause as in the English relative clause. In (33)b, however, the head of the IHRC phrase, *kes*, cannot be construed with *kangto*, showing that the IHRC phrase does not involve the unbounded dependency.

3.4 Pragmatic Aspects

3.4.1 Implicit Antecedent

One of the remaining issues in the present analysis concerns cases where the pronoun *kes* has an implicit antecedent whose data we repeated here in (34):

(34) [[khep-uy mwul-i nemchi-n] kes-ul] ttakassta.
cup-GEN water-NOM overflowed-PNE KES-ACC wiped-out
'(I) wiped out the water that overflowed from the one in the cup.'

In such cases, the antecedent of the pronoun *kes* is an implicit participant resulted from the event denoted by the IHRC clause.

Interestingly, such a phenomena can be observed in the so-called pseudo relative clauses as in (35) (See Kim 1998):

(35) a. [mwul-i hulu-nun] soli
water-NOM flow-PNE sound
'the sound of water's flowing'

b. [komu-ka tha-nun] naymsay
rubber-NOM burn-PNE smell
'(literally) the smell such that rubber is burning',
'the smell that characterizes the burning of rubber'

What the sentence in (35) describes is one of the possibilities that could happen or result from the event of water's flowing. Informally, such a meaning can be represented as in (36) (see Yoon 1993 also):

(36) λx[sound′(x) & flow′(w) & perceptive-result-event(flow′(w), x)]

There exist the sound x and the event of water's flowing and this x is in the perceptive-event-relation with the event of water's flowing.[9]

When there is no such perceptive-result relation between the clause and the head, the pseudo relative clause is not acceptable:

(37) a. [thayphwung-i cinaka-n] huncek
typhoon-NOM passed.by-PNE debris
'(literally) the debris such that a typhoon passed by'
'the debris that resulted from a typhoon's passing by'

b. *[thayphwung-i cinaka-n] phihay
typhoon-NOM passed.by-PNE damage
'(intended) the damage caused from a typhoon'

Though the debris could be a result of a typhoon we can perceive, the abstract NP *phihay* 'damage' is not.

We accept that such a pragmatic relation also holds in the IHRC construction too. We may attribute such a pragmatic relation to constructional constraints on the phrase that combines an adnominal element with a limited set of head elements including *kes*:[10]

(38) Constraints on *head-adnom-comp-ph*:

head-adnom-comp-ph →

[9]Yoon's (1993) analysis takes this 'perceptive-result-event' relation as pragmatic R-relation (relative clause relation) for all types of relative clauses. A support for such an interpretation could be found from the fact that the appropriate paraphrasing of the psuedo relative clause (35)b into the canonical relative clauses is something like (i):

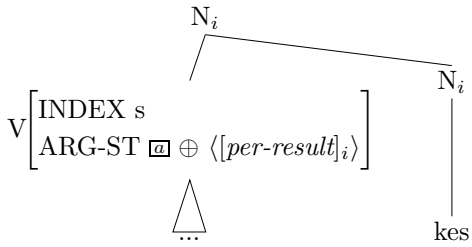
(i) [[komu-ka tha-lttay] na-nun] naymsay
rubber-NOM burn-when come.out-PNE smell
'the smell that comes out when rubber is burning'

[10]We assume that *head-adnom-comp-ph* has at least two subtypes *head-pseudo-ph* and *head-ihrc-ph* (cf. Kim 1998).

$$\left[\begin{array}{l}\text{INDEX s}\\ \\ \text{ARG-ST } \boxed{a} \oplus \left\langle \left[\begin{array}{l}\text{RELN } \textit{perceptive-result}\\ \text{ARG1 s}\end{array}\right] \right\rangle\end{array}\right] \qquad \mathbf{H}[\ \ ]$$

The constraint in (38) tells us that in an instance of *head-adnom-comp-ph*, the adnominal predicate (denoting a situation *s*) can add to its ARG-ST an additional argument denoting a salient participant (perceptive-result) *i* generated from the situation which we obtain from the result of the event *s*. This can be roughly represented in (39):

(39)



The notion of this context-based argument is similar to a shadow argument in Pustejovsky (1998). Such an argument refers to semantic content that is not necessarily expressed in syntax and appears only by such pragmatic specifications (cf. Pustejovsky 1998).[11]

The decision of the implicit argument is dependent upon various grammatical factors: lexical, semantic, and pragmatic. For example, when context prefers an overt element to be the antecedent of *kes*, this explicit antecedent is preferred over an implicit argument produced from the constraint in (39). Consider the pairs in (40):

(40) a. [paci$_i$-ka telewe ci-n kes$_j$-ul] ttakanayssta
pants-NOM dirty become KES-ACC wiped out
'The pants became dirty and (I) washed out the dirt from them.'

b. [paci$_i$-ka telewe ci-n kes$_i$-ul] ppalassta
pants-NOM dirty become KES-ACC washed
'The pants became dirty and I washed them.

Though the semantic argument of the matrix predicate in (40)a is an implicit argument, the one in (40)b is the subject. We cannot wipe out the pants themselves, but the dirt itself as in (40)a. Though we can wash the dirt or the pants, the preferred antecedent is an overt one,

[11] Since such a constraint is specified on the supertype of the pseudo relative clause and the IHRC, it catpures the generalizations of the two types which otherwise we would miss.

the subject.

3.4.2 Relevancy Condition

We accept the view that pragmatic conditions such as 'relevance condition or simultaneity condition' (Kuroda 1976) also play important roles in selecting its own semantic restriction value. For example, the relevancy condition specifies that an IHRC clause should be interpreted as pragmatically in such a way as to be directly relevant to the pragmatic content of its matrix clause (see Uda 1998, Kim 2002 for detailed discussion). This condition accounts for the following contrast:

(41) a. Tom-un [sakwa-ka cayngpan-uy-ey iss-nun kes]-ul
Tom-TOP apple-NOM tray-TOP-LOC exist-PNE KES-ACC
mekessta.
ate
'Tom ate the apple that was on the tray.'

b. #Tom-un [sakwa-ka eche cayngpan-uy-ey iss-ess-ten
Tom-TOP apple-NOM yesterday tray-TOP-LOC exist-PST-PNE
kes]-ul onul mekessta.
KES-ACC today ate
'Today Tom ate the apples, which were on the tray yesterday.'

The difference between these two sentences is that in the IHRC of (41)b there is a time adverb *yesterday* and the adnominal verb has the past form *iee-ess-ten*. The existing condition is that the two events described by the matrix and the embedded clause should be in the identical temporal location.

Observe that such a condition does not exist in the EHRC:

(42) Tom-un [ecey cayngpan-uy-ey iss-ess-ten sakwa]-ul
Tom-TOP yesterday tray-TOP-LOC exist-PST-PNE apples-ACC
onul achim-ey mekessta.
this morning ate
'This morning Tom ate the apple that was on the tray yesterdy.'

In a similar fashion, As also claimed by Y.B. Kim (2002), there appears to exist a strong 'meaningful' relationship between the IHRC and the matrix clause.[12]

[12] We leave open how to formalize this condition within the HPSG feature system. Informally, what we can say is, following Kim (2002), that the event denoted by the IHRC is relevant to the matrix event when both events are in the set of relations retrievable from the background of the discourse participants.

3.5 Information Packaging and More on the Differences

One telling property that differentiates the IHRC from the EHRC is that unlike the EHRC, the IHRC cannot function as an answer to a *wh*-question, as we observe in (43):

(43) A: kyongchal-i nwukwu-lul capasstako?
policeman-NOM who-ACC caught
'Who did you say the policeman caught?'
B: [[unhayng-eyse nao-nun] kangto-lul] capasse.
bank-from come.out-PNE robber-ACC caught
'(They) caught the robber coming out from the bank.'
B′: #kangto-ka unhangy-eyse nao-nun kes-ul capasse.
robber-NOM bank-from come.out-PNE KES-ACC caught

This paper claims that such a difference between the IHRC and the EHRC are basically due to what is focused: In the IHRC, the event described by the IHRC clause, that is, denoted by the adnominal predicate, is newly conveyed information whereas in the EHRC no such a restriction holds. We could attribute this as a lexical constraint on the pronoun *kes* as represented in (44) (cf. Engdahl and Vallduví (1996)):

(44) Lexical Entry for *kes* (final):

$$\begin{bmatrix} \langle \text{kes} \rangle \\ \text{HEAD} \quad \textit{noun} \\ \text{ARG-ST} \ \boxed{b}\langle \ldots [\ \ ]_i, \ldots [\ \ ]_s \ldots \rangle \\ \text{CONTENT} \mid \text{INDEX} \ i/s \\ \text{INFO-ST} \mid \text{FOCUS} \ s \end{bmatrix}$$

(where $\boxed{b}$ results from the argument composition $\left\langle \text{V}\begin{bmatrix} \text{FORM} \ \textit{(n)un} \\ \text{ARG-ST} \ \boxed{a} \end{bmatrix} \right\rangle \oplus \boxed{a}$)

The lexical entry means that the pronoun *kes* constructionally assigns focus value to the preceding adnominal predicate. What this implies is that the embedded IHRC clause carries focus and conveys new information about the event represented by the clause predicate. That is, following Ohara (1996), we also accept the view that the IHRC clause has a function of event reporting.) We could observe that an IHRC cannot be used when the event described by the IHRC is given in a previous context. For example, when the information such that John was eating apples was already given in prior context, unlike the EHRC in (45)b, the IHRC in (45)c is an inappropriate statement:

(45) a. [A:] .... John-i sakwa-lul mek-ko issessta...
John-NOM apple-ACC eat-COMP in.progessive
'...John was eating an apple...'

b. [B:] kuttay kapcaki nwukwunka-ka [sakwa-lul mek-ko
then suddenly someone-NOM apple-ACC eat-COMP
iss-nun] John-ul pwulessta
is-PNE John-ACC called
'Then suddenly somebody called John, who was eating apples.'

c. [B:] #kuttay kapcaki nwukwunka-ka [John-i sakwa-lul
then suddenly someone-NOM John-NOM apple-ACC
mek-ko iss-nun] kes-ul pwulessta
eat-COMP is-PNE KES-ACC called

In our analysis, (45)b is not a natural continuation when the information that John's eating the apples is given information. This is because the event of John's eating an apple has already been introduced and cannot function as carrying new information. In this sense, the IHRC represents 'information focus', conveying new, nonpresupposed information without expressing exhausitive identification performed on a set of contextually or situationally given entities (cf. Kiss 1998).

This implies that the IHRC construction cannot serve as an expression referring to an individual, but can function only as a reply to an event asking query. Such a fact can be attested by another example. An IHRC can be an answer only to an event asking query like (46)A:

(46) A: kyongchal-i totuk-ul etteskey capasstay?
police-NOM robber how caught?
(Do you know) how the police caught the robber?'

B: Kyongchal-i [totwuk-i ton-ul hwumchi-nun kes-ul]
police-NOM thief-NOM money steal-PN KES-ACC
capass-tay.
caught-said
'(People) said that the police arrested the robber who was stealing money.'

Once we accept the proposed view, we can provide a streamlined analysis for several complicated properties of the IHRC construction as well as the differences between IHRCs and EHRCs. As we have seen earlier, various phenomena indicate that the IHRC construction has some nominal properties: nominal case markings and passivization. However, unexpected from these nominal properties, we cannot cleft the construction as in (47) because of the mismatch in what is focused.

(47) a. [Mary-ka cap-un kes]-un talli-nun [Tom-i-ta].
Mary-NOM catch-PNE KES-PNE run-PNE Tom-NOM COP-DECL
'(int.) What Mary caught was Tom, who was running.'

b. *[Mary-ka cap-un kes]-un [Tom-i talli-nun
Mary-NOM catch-PNE KES-PNE Tom-NOM run-PNE
kes]-i-ta.
KES-COP-DECL
'(int.) What Mary caught was Tom, who was running.'

As a canonical constraint on the cleft-construction, the focused value cannot be a VP or an event. The canonical focused value is an NP nominal. Under our assumption, the IHRC construction, though syntactically an NP, focuses an event whereas the focused element in the cleft is generally an NP referring to an individual.

Another welcoming consequence of the analysis is that it can provide a clue as to why it is not possible to have an unaccusative verb or a verb in IHRC that describes an intrinsic property of an entity as in (48): The most natural class of verb that can report an event or describe an event is a stage level predicate.[13]

(48) *Tom-un [John-i **hyonmeyongha-n** kes]-ul
Tom-TOP John-NOM smart-do-PNE KES]-ACC
chochenghayessta.
invited
'(int.) Tom invited John, who was smart.'

It has been also noted that the IHRC cannot be in the form of negative as in (49)a.

(49) a. #John-i [[Tom-i **an talli-nun**] kes]-ul capassta.
John-NOM Tom-NOM not run-PNE KES-ACC caught
'John caught Tom, who was not running.'

b. John-i [[Tom-i **memcwuci anh-nun**] kes]-ul
John-NOM Tom-NOM stop not-PNE KES-ACC
capassta.
caught
'John caught Tom, who wasn't stopping.'

Such a condition can also be found in English locative inversion:

(50) a. *On the wall never hung a picture of U.S. Grant.
b. On the wall hangs not a picture of U.S. Grant but one of Jefferson Davis. (Aissen 1975)

[13]The EHRC counterpart is grammatical.

According to Aissen (1975), the locative phrase functions as a backdrop, and the assertion that such a scene does not exist cannot serve this purpose. We conjecture that such a condition also holds in the Korean IHRC. Within our theory, this is so because there is no event to be focused. But if the negative IHRC entails an event that is happening or happened, we could focus the IHRC construction as shown in (50)b. The IHRC in (50)b entails that Tom remained as he was and John caught him. Thus what is focused would be the semantic content of the IHRC that includes a resultant event from the clause.

In sum, what the present analysis shows us is that the IHRC is syntactically and semantically a nominal construction whereas in terms of information packaging it has sentence-like properties in that the event described by the clause is focused.

3.6 Conclusion

We have shown that the Korean IHRC is formed by a complex-predicate mechanism of the semantically empty pronoun, *kes*: the pronoun combines with an adnominal verb, forming a strong syntactic unit. And the selection of the internal head is dependent upon the semantics of the matrix predicate and context in question.

We have also claimed that the IHRC reading is obtained when the pronominal *kes* is coindexed with one argument of the adnominal verb. Meanwhile, we obtain an event reading when the pronominal is coindexed with the eventive relation of the adnominal verb. The present analysis claiming what is focused differentiates between the IHRC and the EHRC provides a clean account of their differences in various phenomena. This line of lexicalist, nonderivational analysis could avoid the postulation of any phantom formatives (such as *pro*), and eventuallly provides us with a clearer and simpler grammar of Korean (and possibly Japanese too).

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References

Aissen, Judith. 1975. Presentational-*there* insertion: A cyclic root transformation. *Chicao Linguistic Society* 11: 1–14.

Bratt, Elizabeth. 1995. *Argument Composition and the Lexicon: Lexical and Periphrastic Causatives in Korean*. Doctoral Dissertation. Stanford University.

Chung, Chan. 1998. Argument composition and long-distance scrambling in Korean: an extension of the complex predicate analysis. *Syntax and Semantics* 30: 159-220. Academic Press: New York.

Chung, Chan. 1999. Complex noun, Multiple inheritance and Internally Headed Relativization in Korean. *BLS* 29.

Chung, Dae-Ho. 1996. On the structure of the so-called head internal relative Construction. *Proceedings of the Pacific Asia conference on Language, Information and Computation*, 11: 393–402.

Cole, Peter. 1987. The Structure of Internally Headed Relative Clauses. *Natural Language and Linguistic Theory* 5, 277-302.

Culy, Christopher. 1990. *The Syntax and Semantics of IHRCs.* Doctoral Dissertation. Stanford University.

Engdahl, Elizabeth and Enric Vallduví. 1996. Information packaging in HPSG. In Claire Grover and Enric Vallduvi (eds.), *Studies in HPSG*: Edinburgh Working Papers in Cognitive Science, 1–31.

Hoshi, Koji. 1996. The head-internal relative clause in Japanese: An empty head noun approach. *Japanese and Korean Linguistics*, 5: 253–268.

Ito, Junko. 1986. Head-Movement at LF and PF: The Syntax of Head-Internal Relatives in Japanese. In *University of Massachusetts Occasional Papers in Linguistics 11.*

Jhang, Sea-Eun. 1991. Internally-headed Relative Clauses in Korean. *Harvard Studies in Korean Linguistics*, 4: 269-280.

Kathol, Andreas and Ken Vanbik. 1999. Morphology-Syntax Interface in Lai Relative Clauses. In Pius Tamanji, Masako Hirotami, and Nancy Hall (eds.) *Proceedings of the 29th Annual Meeting of the North Eastern Linguistic Society*, GLSA, University of Massachusetts, Amherst. pp. 427–441.

Kim, Yong-Beom. 2002. Relevance in internally headed relative clauses in Korean. *Lingua* 112: 541–559.

Kim, Jong-Bok. 1999. Grammatical Interfaces in Korean Internally Headed Relative Clause Construction. *Language Research* 17: 257–275.

Kim, Jong-Bok. 1998. On the Mixed Properties of Pseudo Relative Clauses. In B.S. Park and J. Yoon (eds), *Proceedings of the 11th International Conference on Korean Linguistics*, 83-93. ICKL

Kiss, Katalin. 1998. Identificational Focus versus Information Focus. *Language* 74: 245–273.

Kuroda, S.-Y. 1976. Headless Relative Clauses in Modern Japanese and the Relevancy Condition. *BLS* 7.

Murasugi, Keiko. 1994. Head-internal Relative Clauses as Adjunct Pure Complex NPs. In Shuji Chiba (ed.), *Synchronic and Diachronic Approaches to Langauge*, 425–437.

Ohara, K. H. 1996. *A Constructional Approach to Japanese Internally-Headed Relativization.*. Ph.D. Dissertation. UC Berkeley.

Park, Byung-Soo. 1994. Modification vs. Complementation: The so-called internally headed relative clauses reconsidered. In Ishikawa, A and Y. Nitta (eds.), *Proceedings of the 1994 Kyoto Conference: A Festschrift for Professor Akira Ikeya.* The Logico-Linguistic Society of Japan, Kyoto, Japan.

Pustejovsky, James. 1998. *The Generative Lexicon.* Cambridge, Massachusetts: The MIT Press.

Sag, Ivan and Tom Wasow. 1999. *Syntactic Theory: A Formal Approach.* Stanford: CSLI Publications.

Sells, Peter. 1995. Korean and Japanese morphology from a lexical perspective. *Linguistic Inquiry* 26.2. 277-325.

Uda, Chihara. 1998. A Multiple Inheritance Analysis of the Internally-headed Relative Clause in Japanese. *Proceedings of the Pacific Asia Conference on Language, Information and Computation*, 12: 82–93

Watanabe, Akira. 1992. Subjacency and s-structure movement of wh-in-situ. *Journal of East Asian Linguistics* 1: 255-291.

Yoon, Jae-Hak. 1993. Different Semantics for Different syntax: Relative Clauses in Korean. *OSUWPL* 42: 199-226.

4

Clitic Climbing Revisited

Berthold Crysmann

Presently, there is overall consent among researchers on Romance in HPSG (Miller and Sag, 1997, Abeillé et al., 1998, Monachesi, 1996, 1999) that bounded clitic climbing (CC) is best understood in terms of argument composition. Despite the fact that all current analyses of CC are based on the same core idea, individual analyses of this phenomenon differ, though, as to the technical implementation: in particular, there does not appear to be agreement as to which structure, ARG-ST (Miller and Sag, 1997) or COMPS (Monachesi, 1996, 1999), provides the primary basis for composition. Furthermore, they all make use of book-keeping devices, be it the CLTS list, or the subtyping of lexical signs, *synsem* objects and HEAD values, whose specific workings are highly tailored to the particular language under discussion. As a result, the CLTS-list Monachesi (1996, 1999) invokes for Italian is in itself insufficient to capture the facts about participle agreement in French. Similarly, Miller and Sag's (1997) approach can only cover the Italian data at the expense of auxiliary types whose explanatory potential is fairly limited.

In this paper, I shall propose a unified approach that will be applicable to CC in both French and Italian. The approach will be cast entirely in terms of valence lists, argument structure and SLASH, such that construction- or language-specific book-keeping devices can be eliminated. As a side-effect, this approach provides a more strengthened view of lexical integrity, in that morphological information, i..e. an argument's mode of realisation, will not be directly accessible for subcategorisation.

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Jong-Bok Kim and Stephen Wechsler.

4.1 Clitic climbing: the state of the art

4.1.1 French

Based on the rigorous application of the Zwicky and Pullum (1983) criteria, Miller (1992) has shown convincingly that French clitics bear much more resemblance to lexical affixes than to true postlexical clitics, and that they should best be derived in the lexical component. Still, the placement of these elements is not strictly local, in that they may attach to a host they are not directly an argument of. The most salient examples of non-local attachment certainly is CC in auxiliary-participle and causative constructions. Another instance where a clitic attaches to a host that does not assign it a semantic role is *en*-cliticisation: here, the clitic does not express a direct complement of the verb, but rather a complement of one of the verb's arguments. Another property of French clitics, which constitutes a challenge for a strictly lexical approach, is the observable parallelism between extraction and cliticisation with respect to participle agreement. In order to reconcile the bounded non-local placement of pronominal affixes with the lexicalist perspective, Miller and Sag (1997) build on Abeillé and Godard (1994) and Abeillé et al. (1998) who demonstrate that constituency tests suggest that the complement of the auxiliary, or the causative verb does not form a VP constituent. Following a proposal by Hinrichs and Nakazawa (1990), all these works assume that the upstairs verb not only subcategorises for a verbal complement but also for all the complements the verbal complement may take. Technically, this is achieved by composing the unsaturated ARG-ST list of the verbal complement onto the ARG-ST list of the upstairs verb, as in (1).

With the arguments of the downstairs verb represented on the ARG-ST list of the auxiliary or causative, bounded non-local cliticisation can be accounted for in a strictly lexical fashion, on a par with ordinary local realisation. In essence, affixation of a pronominal clitic lexically expresses (and therefore: suppresses) a corresponding member of the valence lists on the morphological host.

(1)
$$\left[\begin{array}{l}\textsc{ss}\mid\textsc{loc}\left[\begin{array}{l}\textsc{cat}\left[\begin{array}{ll}\textsc{head} & \textit{verb}\\ \textsc{arg-st} & \left\langle \boxed{1}, \mathrm{V}\left[\begin{array}{ll}\textsc{vform} & \textit{past-p}\\ \textsc{arg-st} & \langle\boxed{1}\rangle \oplus \boxed{2}\end{array}\right]\right\rangle \oplus \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]$$

Participle agreement A phenomenon that deserves special care, however, is French participle agreement: while past participles do not agree with any locally realised direct object NP, agreement in number and gender is obligatory, once the direct object is realised as a

pronominal affix or features in an unbounded dependency.

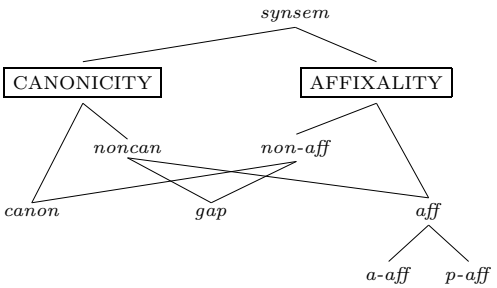
(2) a. Marie a écrit / *écrite la lettre.
Marie has written the letter
'Marie has written the letter.'

b. Marie l'a *écrit / écrite.
Marie her-has written
'Marie has written it (=the letter).'

c. la lettre que Marie a *écrit / écrite.
the letter that Marie has written
'the letter that Marie wrote' (Miller and Sag, 1997, 624)

It appears, thus, that the mode of realisation is visible to the participle, even if this realisation is actually a morphological property of the upstairs verb. In order to make the mode of realisation visible on the participle as well, Miller and Sag (1997) propose to organise *synsem* objects into a hierarchy of realisational types: *canon(ical)-ss*, which corresponds to local syntactic dependents, and *non-canon-ss*, which subsumes *gap-ss* and *aff-ss*. While synsem objects of type *gap-ss* correspond to a member in the head's SLASH value by virtue of the principles of head-driven extraction (Bouma et al., 2001), the specification of an ARG-ST member as *aff-ss* is tied to the morphological constraints which spell out arguments thus marked as a pronominal affix.

(3)



(Miller and Sag, 1997)

To account for the apparent valence reduction involved with affixal realisation, Miller and Sag (1997) distinguish between plain words (*pl-wd*), which do not realise any of their arguments morphologically, and cliticised words (*cl-wd*). The effect of valence reduction is achieved by constraining the COMPS list of words of type *cl-wd* not to contain any members of type *aff-ss*.

(4)
$$\begin{bmatrix} \textsc{phon} & \langle \text{l'a} \rangle \\ \textsc{subj} & \langle \boxed{1} \rangle \\ \textsc{comps} & \langle \boxed{2} \mid \boxed{5} \rangle \\ \textsc{arg-st} & \left\langle \boxed{1},\boxed{2}\begin{bmatrix} \textsc{vform} & \textit{past-p} \\ \textsc{arg-st} & \langle \boxed{1} \mid \boxed{3} \rangle \end{bmatrix} \right\rangle \oplus \boxed{3}\langle \text{NP}[\textit{acc,p-aff}] \mid \boxed{5} \rangle \end{bmatrix}$$

(5)
$$\begin{bmatrix} \textsc{phon} & \langle \text{a} \rangle \\ \textsc{subj} & \langle \boxed{1}\text{NP}[\textit{nom}] \rangle \\ \textsc{comps} & \langle \boxed{2} \rangle \\ \textsc{arg-st} & \left\langle \boxed{1},\boxed{2}\begin{bmatrix} \textsc{vform} & \textit{past-p} \\ \textsc{arg-st} & \langle \boxed{1} \mid \boxed{3} \rangle \end{bmatrix} \right\rangle \oplus \boxed{3}\left\langle \text{NP}\begin{bmatrix} \textit{gap} \\ \textsc{loc} & \boxed{4} \\ \textsc{slash} & \{\boxed{4}\} \end{bmatrix} \mid \boxed{5} \right\rangle \\ \textsc{slash} & \{\boxed{4}\} \end{bmatrix}$$

As the authors further assume that argument composition in auxiliary-participle constructions proceeds via ARG-ST, it is clear that constraints imposed by the upstairs verb on any of the raised dependents will also be visible on the ARG-ST list of the downstairs verb, thanks to structure-sharing. Thus, participle agreement will be triggered by a specification for a non-canonical, i.e. *gap-ss* or *aff-ss*, accusative NP on the participle's ARG-ST list. Again, what appeared as a syntactic dependency could be resolved in an entirely lexicalist fashion.

If both the auxiliary and the participle have affixal synsem objects on their ARG-ST lists, we would actually expect morphological realisation both on the upstairs and on the downstairs verb. As argued by Miller and Sag (1997), French participles can never function as clitic hosts, independent of the auxiliary-participle construction. Consequently, they suggest to solve this problem morphologically: while tensed verbs and infinitives realise affixal arguments by means of affixation of appropriate clitics, the function that realises affixal arguments of a participle is the identity function.

(6) F_{PRAF} (X, Y, Z) = W, where W

(1) $= \text{X}$, if $\text{Y} = \begin{bmatrix} \textsc{vform} & \textit{past-p} \end{bmatrix}$

(2) $= \begin{bmatrix} \textit{encl-fm} \\ \textsc{base} & \text{X} \end{bmatrix}$, if $\text{Y} = \begin{bmatrix} \textsc{vform} & \textit{imp} \\ \textsc{neg} & - \end{bmatrix}$

(3) $= \begin{bmatrix} \textit{procl-fm} \\ \textsc{base} & \text{X} \end{bmatrix}$, otherwise.

(Miller and Sag, 1997, 594)

While this certainly solves the issue in auxiliary-participle construction, it will also predict that zero affixation is a potential mode of real-

isation for pronominal arguments in participial constructions, contrary to fact.

Causatives and "clitic trapping" The causative construction in French provides another challenge: in general, upstairs realisation of pronominal arguments is obligatory[1], unless the downstairs verb specifies any intrinsic clitics on its argument structure. In this case, no raised dependent can be expressed by a pronominal affix on the causative verb, but instead affixal realisation has to apply on the downstairs verb, a phenomenon referred to as clitic trapping.

(7) a. Marie le fait lire à Paul
marie it makes read to Paul
'Marie is making Paul read it.'

b. Jean y fait aller Paul
Jean there makes go Paul
'Jean makes Paul go there.'

(8) a. * Tout leur en fait vouloir à Paul.
everything to.them thereof makes want to Paul

b. Tout leur fait en vouloir à Paul.
everything to.them makes thereof want to Paul
'Everything makes them angry at Paul.'

c. Tout leur fait lui en vouloir.
everything to.them makes to.him thereof want
'Everything makes them angry at him.' (Miller and Sag, 1997, 610)

Intrinsic clitics, as opposed to argument clitics, do not alternate with any full NP arguments. Miller and Sag (1997) and Abeillé et al. (1998) therefore assume that verbs featuring intrinsic clitics have these prespecified as affixal members on ARG-ST, yet not on COMPS. In order to block upstairs cliticisation for all pronominal arguments of a verb featuring non-argument clitics, they propose to subclassify verbs into *red-vb* and *bas-vb* (for reduced valence and basic valence, resp.). While *pl-wd* verbs will always have a HEAD value of type *bas-vb*, *cl-wd* will carry a *default* specification of [HD *red-vb*]. Verbs that come with an intrinsic clitic on their argument structure are said to override this

[1] I will limit the discussion here to the construction referred to as "composition faire". For a more detailed overview including non-composition faire, see Abeillé et al. (1998).

default, carrying a specification of [HD *bas-vb*], despite their being of type *cl-wd*.

In contrast to auxiliary-participle constructions, where no effects of trapping could be observed, composition with causative *faire* does not target the ARG-ST list of the downstairs verb. Instead, it is the COMPS value of the verbal complement which is appended onto the ARG-ST list of the causative verb. Furthermore, the causative requires its verbal complement to have a HEAD value of type *bas-vb*. As only intrinsic clitic verbs and plain verbs do possess a HEAD value of this type, the effect of clitic trapping will be captured as follows: if the downstairs ARG-ST specifies an intrinsic clitic, the entire lexical sign will be of type *cl-wd*. As a consequence, morphological constraints will spell-out all affixal members on the downstairs ARG-ST as appropriate pronominal affixes. Owing to the restriction mentioned above that bans affixal synsem objects from the COMPS list of cliticised verbs, upstairs realisation is effectively ruled out. If, however, the downstairs verb does not specify any non-argument clitics, it must be a *pl-wd*: as the morphological constraints regulating affixal realisation only apply to *cl-wd*s, downstairs cliticisation will be impossible.

(9)
$$\left[\begin{array}{l}\textsc{ss}\,|\,\textsc{l}\left[\begin{array}{ll}\textsc{cat} & \left[\begin{array}{ll}\textsc{arg-st} & \left\langle \mathrm{NP}_i, \mathrm{V}\left[\begin{array}{ll}\textsc{trans} & + \\ \textsc{head} & \left[\begin{array}{ll} \textit{bas-vb} \\ \textsc{vform} & \textit{inf}\end{array}\right] \\ \textsc{subj} & \langle \mathrm{NP}_j \rangle \\ \textsc{comps} & \boxed{2} \\ \textsc{cont} & \boxed{1}\end{array}\right], \mathrm{NP}[\textit{dat}]_j \right\rangle \oplus \boxed{2}\end{array}\right] \\ \textsc{cont} & \left[\begin{array}{ll}\textit{caus-rel} \\ \textsc{actor} & i \\ \textsc{undergoer} & j \\ \textsc{result} & \boxed{1}\end{array}\right]\end{array}\right]\end{array}\right]$$

Composition *faire* (transitive complement)(Abeillé et al., 1998, 20)

To summarise: in order to capture the climbing properties of French clitics in auxiliary-participle and causative constructions, Miller and Sag (1997) introduce a threefold distinction for French verbs: plain verbs, which are lexical signs of type *pl-wd* with HEAD value *bas-vb*, ordinary clitic verbs, which are lexical signs of type *cl-wd* whose HEAD value is *red-vb*, and intrinsic clitic verbs, again words of type *cl-wd*, but whose HEAD value is set to the type *bas-vb*. However, to derive the effect of trapping Miller and Sag (1997) are forced to assume that

the presence of true argument clitics on an intrinsic clitic verb does not have any bearing on the HEAD value. To give an example, a verb like *lui en vouloir* is regarded as a *bas-vb*, regardless of the fact that the clitic *lui* 'to him/her' is actually the morphological realisation of a suppressed valency, i.e. the indirect object. Thus, the entire distinction between reduced and basic verbs, though partially motivated in other cases, must appear somewhat arbitrary once trapping of an argument clitic is involved.

Another issue related to the encoding of valence information by means of HEAD values becomes apparent once we consider coordination: if the mode of realisation of a verb's argument is encoded not only on ARG-ST but additionally on the HEAD value, we will actually expect any coordination of a VP or sentence to fail, as soon as one conjunct is headed by a plain verb ([HEAD *bas-vb*]) and the other by a cliticised verb ([HEAD *red-vb*]).

(10) En 1978, il est réélu à la présidence de l'Assemblée
in 1978 he is reelected to the presidency of the.assembly
nationale contre Edgar Faure et y restera jusqu'en
national against Edgar Faure and there will.stay until
1981.
1981

'In 1978, he was reelected president of the National Assembly against Edgar Faure and remained it until 1981.'

However, as illustrated by the example above, this prediction is not borne out. The coordination data therefore underline that a valence-related distinction as subtypes of a HEAD value is quite oddly placed with respect to the feature geometry.

4.1.2 Italian

Italian tense auxiliaries, much like their French counterparts obligatorily trigger CC, and, still parallel, they do so irrespective of the argument status of the clitic. Past participles in Italian, however, are not inherently incapable of hosting a clitic. Rather, pronominal affixation to a past participle is only banned in auxiliary-participle constructions.

(11) a. Vistolo, fu facile decidere.
seen it was easy to decide

'Having seen it, it was easy to decide.' (Monachesi, 1996, 47)

b. Rocco lo ha letto.
Rocco it has read
'Rocco has read it.' (Monachesi, 1996, 194)

c. * Rocco ha lettolo
Rocco has read it
(Monachesi, 1996, 194)

Thus, in contrast to French, downstairs realisation appears to be blocked by the obligatoriness of argument composition, not by any morphological restriction on participles.

Besides auxiliaries, Italian witnesses a set of so-called restructuring verbs that optionally permit CC. Although these verbs are compatible with either upstairs or downstairs cliticisation, split realisation of the cluster is ruled out.

(12) a. Martina lo vuole leggere.
Martina him wants read
'Martina wants to read it.' (Monachesi, 1999, 137)

b. Martina vuole leggerlo.
Martina wants read-him
'Martina wants to read it.' (Monachesi, 1999, 138)

c. * Vito lo voleva spedirgli.
Vito him wanted send-to.him
(Monachesi, 1999, 157)

d. Vito glielo voleva spedire.
Vito to.him-him wanted send
'Vito wants to send it to him.' (Monachesi, 1999, 157)

Thus, precise control over the place of cliticisation is of major concern for any grammar of Italian cliticisation. Monachesi (1996, 1999), who builds on an earlier proposal by Miller and Sag, postulates a lexical rule that removes a valency from COMPS and appends it to a list-valued feature CLTS, a feature she considers to be the interface for morphological realisation.

(13)
$$\begin{bmatrix} \textit{word} & \\ \textsc{head} & \textit{verb} \\ \textsc{clts} & \textit{elist} \\ \textsc{val}\,|\,\textsc{comps} & \boxed{1} \bigcirc \boxed{2} \end{bmatrix} \mapsto \begin{bmatrix} \textsc{clts} & \boxed{2}\ \textit{list}\big(\textit{cl-ss}\big) \\ \textsc{val}\,|\,\textsc{comps} & \boxed{1} \end{bmatrix}$$

(Monachesi, 1999, 271)

Verbs undergoing argument composition impose the additional requirement that their verbal complement be a lexical sign whose CLTS value is the empty list.

(14)
$$\left[\begin{array}{ll}\text{SS}\mid\text{L}\mid\text{CAT} & \left[\begin{array}{ll}\text{HD} & \textit{verb}\\ \text{VAL} & \left[\begin{array}{ll}\text{SUBJ} & \langle \boxed{1}\text{NP}\rangle\\ \text{COMPS} & \left\langle \boxed{2}\left[\begin{array}{ll}\textit{w-ss} & \\ \text{VAL} & \left[\begin{array}{ll}\text{SUBJ} & \langle\text{NP}\rangle\\ \text{COMPS} & \boxed{3}\end{array}\right]\\ \text{CLTS} & \langle\rangle\end{array}\right]\right\rangle \oplus \boxed{3}\\ \text{ARG-ST} & \langle \boxed{1},\boxed{2}\mid\boxed{3}\rangle\end{array}\right]\end{array}\right]\end{array}\right]$$

Argument composition verb; adapted from Monachesi (1999, 151)

This ensures that with tense auxiliaries, which obligatorily compose, downstairs realisation will be impossible. Likewise, in the case of restructuring verbs, split realisation is effectively barred.

Discussion

If we try and apply Miller and Sag's (1997) proposal to the Italian facts, we will soon be faced with a fundamental problem: while subtyping of *synsem* objects according to the mode of realisation was quite handy for French participle agreement, we will be hard pressed to rule out simultaneous upstairs and downstairs affixation in Italian auxiliary-participle constructions. As witnessed by (11), we cannot invoke morphological restrictions to block cliticisation to the participle. Exactly the same problem will arise with restructuring verbs: if argument composition applies and a clitic is attached to the upstairs verb, the specification of the corresponding argument as *aff-ss* will inevitably be present on the downstairs verb as well, due to structure-sharing. As suggested to me by Sag and Godard (p.c.), one can invoke the distinction of (verbal) HEAD values into *bas-vb* and *red-vb* and postulate that auxiliaries and restructuring verbs require the HEAD path of their verbal complement to be of type *bas-vb*. However, this solution appears to be an essentially technical one: as intrinsic clitics in Italian may undergo clitic climbing (see the next section), this move will entail that intrinsic clitic verbs in this language must bear a HEAD-value of type *red-vb*, in contrast to French, where these verbs are considered *bas-vb* under the approach of Miller and Sag (1997). Thus, it becomes apparent that the *bas-vb*/*red-vb* distinction is devoid of any deeper linguistic, let alone cross-linguistic, motivation.

Monachesi's (1996, 1999) approach, however, does not fare any better, when applied to French: as neither the (non-empty) CLTS list, nor the reduced COMPS list of the upstairs verb are visible on the downstairs participle, agreement cannot be tied to the presence of a clitic.

As both Miller and Sag (1997) and Monachesi (1996, 1999) motivate their respective devices with the necessity of providing an interface to morphology, this amounts to the claim that interfaces between major grammatical modules should indeed be language-specific: quite an unsatisfactory result. I will therefore eliminate both devices from the grammars of French and Italian and explore whether the restrictions they serve to model cannot be derived directly by means of features which are widely accepted as universal.

4.2 Reanalysis

Italian If we reconsider the Italian facts, it becomes apparent that the central task accomplished by the CLTS feature is to ensure, together with the subcategorisation for a word-level verbal complement, that the valence lists of the downstairs verb be intact, whenever argument composition applies. While the restriction to non-phrasal verbal complements is certainly sufficient to inhibit syntactic saturation of valencies, it cannot block lexical valence reduction, as performed by a cliticisation lexical rule. However, this effect can easily be obtained without any diacritic features, if we make reference to argument structure and valence directly: for argument composition verbs in Italian, it is therefore sufficient to require that the ARG-ST value of the verbal complement be identical to a shuffle of the valence features with a list of gaps. An argument composition *lexeme* will then have a representation as below (both in Italian, and in French, unless stated otherwise):

(15)
$$\left[\begin{array}{ll} \textit{arg-composing-lxm} & \\ \textsc{comps} & \langle \boxed{1} \rangle \oplus \boxed{4} \oplus \boxed{2} \\ \textsc{arg-st} & \left\langle \left[\ \right] \right\rangle \oplus \left\langle \boxed{1} \left[\begin{array}{ll} \textsc{head} & \textit{verb} \\ \textsc{comps} & \boxed{2} \\ \textsc{arg-st} & \langle [] \rangle \oplus \boxed{3}\left(\boxed{2} \bigcirc \textit{list}(\textit{gap})\right) \end{array}\right] \right\rangle \oplus \boxed{4} \oplus \boxed{3} \end{array}\right]$$

If we follow Monachesi (1996, 1999) and assume that affixal realisation in Italian involves valence reduction, the verbal complement of an argument-composition verb will simply have no chance to realise any of its valencies locally: neither syntactically, nor lexically.

As to the interface to morphology, it is hard to see what can be gained by breaking up valence reduction and morphological realisation into a two-step operation, if all the information present on CLTS may

equally well be retrieved from COMPS directly, provided that valence reduction and spell-out apply in tandem. The only place in Monachesi's (1999) analysis where the CLTS feature is actually non-redundant is the representation she proposes for inherent clitic verbs, e.g. *si arrabbia* 'gets angry':

(16)
$$\begin{bmatrix} \text{HD} & \begin{bmatrix} \textit{verb} \\ \text{AGR} \quad \boxed{1} \end{bmatrix} \\ \text{SUBJ} & \langle \text{NP} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CLTS} & \left\langle \text{NP}\left[\textit{mark-ss},\ \text{AGR}\ \boxed{1}\right] \right\rangle \end{bmatrix}$$

(Monachesi, 1999, 113)

Monachesi (1999) observes that inherent clitics do not alternate with any full argument XPs, and she therefore suggests that these clitics are lexically represented directly on CLTS. Thus, unlike argument clitics, they do not correspond to a valence of the verb, and are therefore neither represented on any valence list, nor is their appearance on CLTS related to a valence by application of the cliticisation lexical rule. Although initially plausible, this move, however, precludes an account of clitic climbing on the basis of argument composition in these cases, and actually predicts that inherent clitics should not be able to climb. However, as illustrated by the data below, inherent clitics, on a par with argument clitics, do undergo clitic climbing, both with restructuring verbs and with auxiliaries.

(17) a. Non ci si può arrabbiare con una persona della quale
not us self can get angry with a person of which
non si ha stima.
not self has esteem

'One cannot get angry with someone one does not hold in high esteem.'

b. Il direttore si é arrabbiato un pò, perché nessuno
the director self is got angry a bit because no one
sapeva ancora bene la propria parte a memoria.
knew yet well the own part by heart

'The director has got a bit angry, because no one knew his part by heart yet.'

To conclude, as the CLTS-list is for the most part fully redundant, or else, makes empirically wrong predictions, this language-specific bookkeeping feature can safely be dispensed with.

French participle agreement The situation in French is slightly more tricky. The key to a reanalysis of CC in French, as I believe, can be found by reviving an earlier version of Miller and Sag's approach, i.e. the kind of analysis advanced in Sag and Godard (1993) and Miller and Sag (1995): these authors propose that cliticisation does not operate directly on argument structure, but instead takes as input the output of the Complement Extraction Lexical Rule (CELR; Pollard and Sag, 1994). This latter rule removes a subcategorisation requirement for a local dependent from the COMPS list and inserts it into SLASH, providing the basis for a traceless theory of extraction:

(18)
$$\begin{bmatrix} \textsc{comps} & \boxed{0} \oplus \left\langle \boxed{2}\left[\textsc{loc} \quad \boxed{3}\right] \right\rangle \oplus \boxed{1} \\ \textsc{arg-st} & \left\langle \ldots, \boxed{2}, \ldots \right\rangle \\ \textsc{slash} & \boxed{4} \end{bmatrix} \mapsto$$
$$\begin{bmatrix} \textsc{comps} & \boxed{0} \oplus \boxed{1} \\ \textsc{arg-st} & \left\langle \ldots, \boxed{2}\begin{bmatrix} \textsc{loc} & \boxed{3} \\ \textsc{slash} & \left\{\boxed{3}\right\} \end{bmatrix}, \ldots \right\rangle \\ \textsc{slash} & \boxed{4} \cup \left\{\boxed{3}\right\} \end{bmatrix}$$

(CELR; adapted from Miller and Sag, 1995)

The Complement Affixation Lexical Rule (CALR) then operates on the output of the CELR, and moves an element of SLASH into the PRAS feature. This feature serves the purpose of providing an interface to realisational morphology, a feature basically identical to the CLTS list of Monachesi (1996, 1999). In itself, it is essentially redundant once morphological schemata can be tied directly to the change in SLASH specifications.

(19)
$$\begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{slash} & \boxed{2} \cup \left\{\boxed{0}\right\} \\ \textsc{pras} & \boxed{1} \end{bmatrix} \mapsto \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{slash} & \boxed{2} \\ \textsc{pras} & \boxed{1} \cup \left\{\boxed{0}\right\} \end{bmatrix}$$

(CALR; adapted from Miller and Sag, 1995)

What is noteworthy about the formulation of the CELR, is that it leaves a "trace" of its application on the corresponding member of ARG-ST: with argument-composition verbs, the application of the CELR on the higher verb can thus be detected on the lower verb as well, thanks to structure-sharing. In this version of Miller and Sag's theory of French cliticisation, French past participle agreement with non-local dependents and with clitics can easily be accounted for by reference to an accusative argument on ARG-ST whose local value is token-identical with

the element in its singleton SLASH set. This approach to past participle agreement, in contrast to its more recent incarnation, can capture the salient parallelism between cliticisation and extraction directly, without having to stipulate the relatedness in terms of a particular setup of the hierarchy of *synsem* types.

In the past, the CELR has been subject to mainly two objections. As noted by Müller (1994), in its most general (and most useful) formulation the CELR can be applied recursively to its own output. While this gives sound results with words whose argument structure is fully specified, it leads to the generation of infinite lexica when applied to underspecified valence lists, as typically found with argument composition verbs. Furthermore, in the context of classical SLASH passing, as in, e.g., Pollard and Sag (1994), it may give rise to spurious ambiguities whenever argument composition is involved: as the CELR may equally well apply to the downstairs and the upstairs verb, every unbounded dependency construction that happens to feature an argument composition verb will give rise to two structural descriptions, one where SLASH is introduced on the upstairs verb, and one where it is introduced on the downstairs verb.

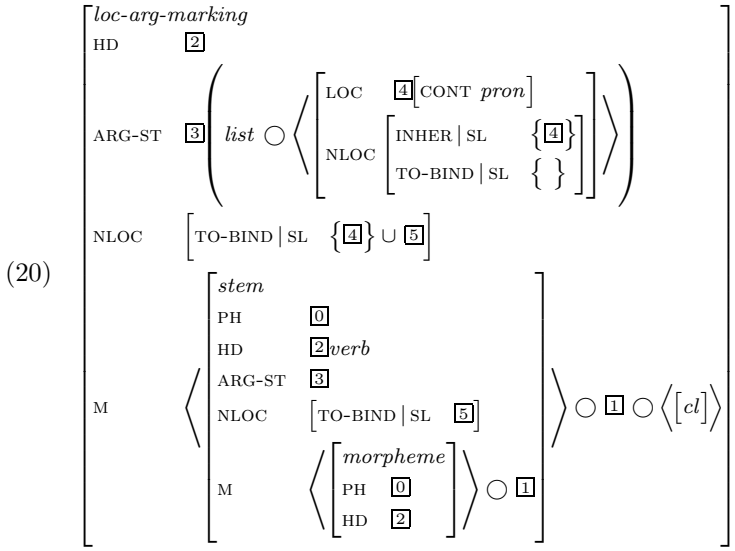
With the advent of head-driven extraction (Sag, 1997, Bouma et al., 2001), these issues have been resolved, as SLASH values are now defined by means of relational constraints, determining the SLASH of the lexical head as the union of the SLASH values of its arguments. Similarly, generation of infinite lexica has also become a non-issue.[2] Still, the sad story is that an analysis in terms of the CALR, like the one suggested in Miller and Sag (1995), cannot be carried over unmodified: Miller and Sag (1997) note that the locality of cliticisation is defined by the availability of argument composition and contrast this observation with *en*-cliticisation where locality is not observed in the same strict sense. With SLASH amalgamation, as formulated in Sag (1997), an unmodified CALR would predict affixal realisation of unbounded non-local dependents: a prediction which is clearly inadequate. Consequently the authors maintain a SLASH-based analysis of *en*, while for all other clitics, including accusatives, cliticisation operates on ARG-ST members directly. However, as we have seen, this reformulation necessitates the use of additional book-keeping, e.g. by means of a distinct *synsem* type.

Yet, the good news is that, even for clitics other than *en*, Miller and Sag's (1995) approach can be ported to the framework of head-driven extraction quite naturally. All we have to do is to tie the lexical

[2]Generation of infinite lexica is certainly only problematic in the context of otherwise static lexica with meta-level lexical (redundancy) rules. In a dynamic approach to lexical productivity, such as Koenig's (1999), no problem should arise.

binding of a non-local dependency to the presence of a gap on the local ARG-ST.[3]

(20)



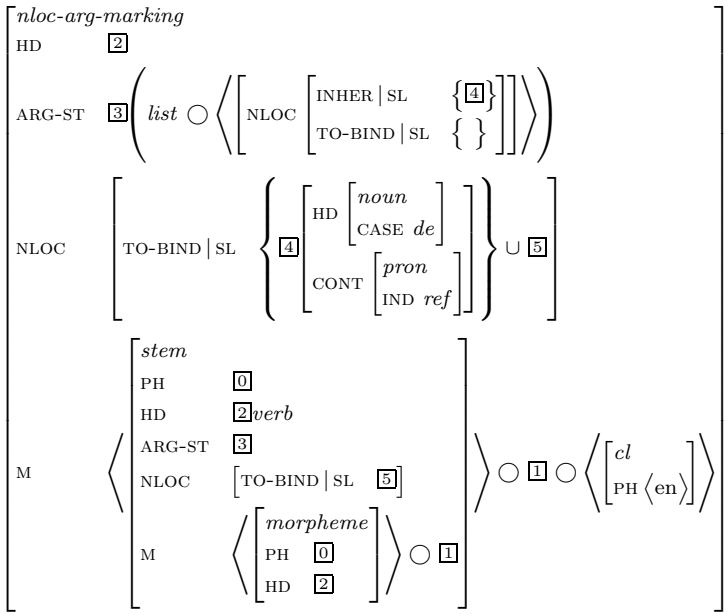
As specified in (20) above, introduction of a pronominal affix (*cl*) onto morphological structure, i.e. the M(ORPH) list, is paired with the introduction of an element into the NLOC|TO-BIND|SL value.[4] The locality of affixal realisation is captured by requiring that the non-local dependency "bound" by the cliticised verb originate on a local argument, which is identified by the structure-sharing of its LOC value with the only element in its NLOC|INHER|SL. In contrast to locality-sensitive cliticisation, which characterises almost all French clitics, the morphological schema introducing *en* is less restrictive in that it lexically binds a non-local dependency, regardless of whether the non-local dependency originates on a local dependent or not. In essence, the schema given in (21) is equivalent to the *en*-cliticisation rule defined in Miller and Sag

[3]Throughout the analysis, I use the type *gap* as a mere shorthand for feature structures where the LOC value is token-identical to the only member in SLASH.

[4]The above formulation assumes that argument marking recursively adds formatives to a flattened morphological representation suitable to express morphotactic constraints between different clitics (see Crysmann, 2002). For present purposes, nothing hinges on this particular perspective on templatic morphology: A schema may just as well introduce multiple clitics simultaneously. See also Crysmann (1999, 2000) for arguments in favour of a flat MORPH list comprising morphemes alongside non-morphemic affixal exponents.

(1997).[5]

(21)



In both cases, lexical introduction of an element in TO-BIND|SL is sufficient to block further percolation of the corresponding INH|SL value: the Slash Inheritance Principle states that the INH|SL value of the mother is the set difference of the INH|SL and TO-BIND|SL values of the head daughter (Sag, 1997).

Let us consider the case of local argument marking again. With simple tenses, its application is trivial: a gap argument of the verb is realised as a pronominal affix and the non-local dependency is bound by a lexical binder before it actually gets a chance of percolating up the tree. With complex tenses that involve argument composition, the arguments the auxiliary inherits from its past participle complement are local members of the auxiliary's ARG-ST list. It follows that application of a *loc-arg-marking* schema can introduce a pronominal affix onto the auxiliary's MORPH list, and restrict the corresponding (raised) argument to be a gap that is lexically bound by the argument marking auxiliary. As argument composition means token-identity between the ARG-ST value of the participle and a sublist of the auxiliary's ARG-ST, it is clear that one of the participle's arguments is constrained to be a

[5]The restriction to referential *en* was introduced to inhibit long-distance cliticisation for "trapped" intrinsic clitic *en*, as discussed in the next section.

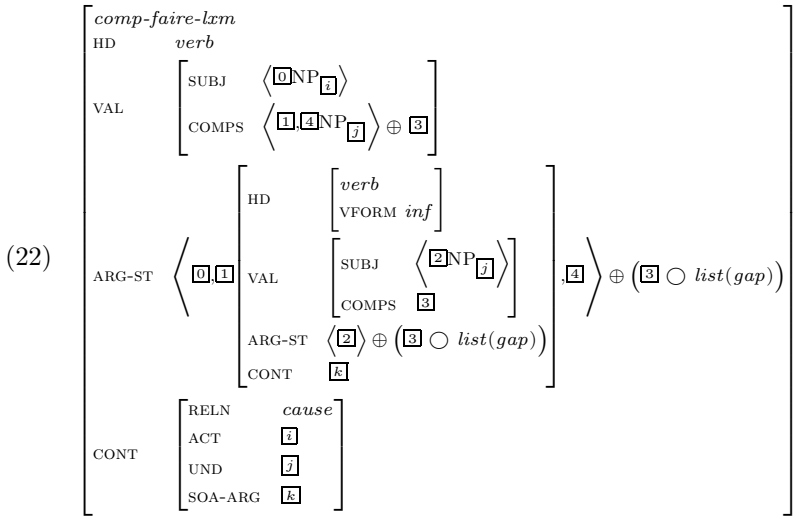
gap, too.

Thus, participle agreement can be captured in a uniform fashion as agreement in number and gender with an accusative gap on the participle's ARG-ST, exactly as proposed by Miller and Sag (1995). The effect of valence reduction on the participle and, hence, the auxiliary is actually predicted by the principle of Argument Conservation (Miller and Sag, 1997) which states that a shuffle of the valence features SUBJ, COMPS, and SPR is token-identical to the list of non-gap members on ARG-ST.

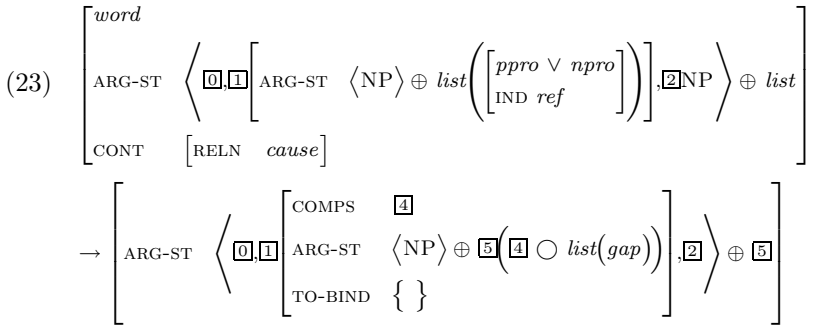
Causatives Before we can delve into an account of CC and clitic trapping with French causatives, let us briefly discuss what a suitable representation of intrinsic clitics may look like. Miller and Sag (1997) argue to represent them as members of ARG-ST that fail to be represented on COMPS. While such an analysis would probably still work with the account of French defended here, it will not blend easily with our analysis of Italian outlined above. Thus, I will suggest that intrinsic clitics (in both languages) should be distinguished from argument clitics by means of their INDEX value, which I take to be of type *expl*. Failure of inherent clitics to alternate with syntactic dependents will then be related to the non-existence of free expletive pronouns in the French lexicon.

Composition *faire* enforces upstairs cliticisation whenever the downstairs verb does not specify any expletive pronominal arguments, whereas it blocks upstairs cliticisation with intrinsic clitic verbs. It follows that the argument composition properties of *faire* are not as strict as those of tense auxiliaries, in that they do not require unconditionally that the verbal complement has an empty TO-BIND|SL. If the mechanism of composition itself imposes less restrictions, we can, instead, formulate the relevant constraints as conditions on upstairs cliticisation. To achieve this, I will relax the restrictions on the lexeme *faire*, and complement it with constraints on the set of words that can be derived from such a lexeme by means of pronominal affixation. Thus, the entry for the lexeme would look roughly like (22), which is compatible with both upstairs and downstairs cliticisation.[6]

[6]The entry for composition *faire* given below must of course be further diferentiated, by means of subtypes, as to the case of the controller argument (direct vs. indirect object). See, e.g., Abeillé et al. (1998) for details.

(22)


The condition on upstairs cliticisation is imposed on the resulting word-level *sign*, the morphological top-level: if the ARG-ST value of the complement verb only consists of elements whose INDEX is *ref*, we can impose the further restriction that the TO-BIND|SL of the verbal complement be empty, and that both gap and non-gap arguments of this verb have to raise onto the ARG-ST of the causative verb. Thus, in the absence of any intrinsic clitics on the verbal complement's ARG-ST, gap-raising is enforced.

(23)


Conversely, if the ARG-ST value of the complement contains the specification for an expletive object, clitic climbing will be blocked by requiring all raised downstairs arguments to be direct syntactic dependents of the upstairs verb, i.e. members of COMPS. In other words, clitic trapping will be modelled by means of gap-trapping.

(24)
$$\begin{bmatrix} \textit{word} \\ \textsc{arg-st} & \left\langle \boxed{0},\boxed{1}\begin{bmatrix}\textsc{arg-st} \left\langle \text{NP} \right\rangle \oplus \left(\left\langle \left[\textsc{ind}\ \textit{expl}\right] \right\rangle \bigcirc \textit{list} \right)\end{bmatrix}, \boxed{2}\text{NP} \right\rangle \oplus \textit{list} \\ \textsc{cont} & \left[\textsc{reln}\quad \textit{cause}\right] \end{bmatrix}$$
$$\rightarrow \begin{bmatrix} \textsc{comps} & \left\langle \boxed{1} \right\rangle \oplus \textit{list} \oplus \boxed{4} \\ \textsc{arg-st} & \left\langle \boxed{0},\boxed{1}\begin{bmatrix}\textsc{comps} & \boxed{4} \\ \textsc{arg-st} & \left\langle \text{NP} \right\rangle \oplus \left(\boxed{4} \bigcirc \textit{list}(\textit{gap}) \right)\end{bmatrix}, \boxed{2} \right\rangle \oplus \boxed{4} \end{bmatrix}$$

While enforcing upstairs cliticisation in the absence of any intrinsic arguments is pretty straightforward, I feel that the constraint on downstairs cliticisation deserves some explanation: as stated in (24) above, a causative *word* whose verbal complement selects an "expletive" complement must realise all arguments it inherits syntactically, a restriction which is captured by having the raised arguments (tag 4) represented on both the ARG-ST and the COMPS list of the causative. As this is a constraint on feature structures of type *word*, which is a syntactic atom and a morphological top-level, it is clear that no cliticisation rule can realise any raised valency as a lexical affix on the causative. Thus, if an intrinsic clitic were indeed raised, the only option is syntactic realisation. However, it appears that the French lexicon does not provide any expletives other than lexical affixes. As a consequence, a subcategorisation requirement for an "expletive" syntactic dependent can never be satisfied upstairs. As composition *faire* takes a lexical sign as its verbal complement (indicated by the fact that only gaps can escape representation on the valence lists of the downstairs verb), the latter cannot discharge any subcategorisation requirements as local syntactic dependents. Thus, there are only two ways in which a mismatch between ARG-ST and the valence lists may arise: lexicalised extraction and morphological realisation. While both options are available to realise referential arguments, only morphological realisation can deal with intrinsic arguments, due to the lack of non-affixal expletives in the French lexicon.

4.2.1 Reflexive clitics

So far, our reanalysis has concentrated on a discussion of the clear-cut cases such as the climbing properties of pronominal arguments and intrinsic non-argument clitics. We have not, however, provided an account of the clitic *se* 'self', in all its different uses, i.e. true reflexive, medio-passive and inherent pronominal. As described in Abeillé et al. (1998), medio-passive and inherent *se* essentially pattern with other

intrinsic clitics as far as the causative construction is concerned:

(25) a. Le snobisme fait se vendre bien les classiques.
the snobism makes self sell well the classics

'Snobism makes the classics sell well.'

b. La chaleur a fait s'évanouir Paul.
the heat has made self.faint Paul

'The heat made Paul faint.'

c. (*) Marie a fait se laver les enfants.
Marie has made self wash the children

'Marie has made the children wash themselves.' (Abeillé et al., 1998, 24)

Within the context of our analysis sketched above, it is quite straightforward to integrate non-argument clitic *se*: essentially, it will be sufficient to classify the corresponding members of the downstairs ARG-ST to bear an INDEX of type *expl*. Accordingly, inherent reflexive and medio-passive verbs will only be licit as a complement of the "gap-trapping" variant of causative *faire*, as licensed by (24). Gap-raising, however will be impossible with these verbs, as their ARG-ST list will contain at least one member whose INDEX is not of type *ref*.

With true reflexive clitics, the empirical situation is not as clear-cut: while for some speakers (=variety A) true reflexives pattern with medio-passive and inherent *se*, in that they allow the reflexive marker on the downstairs infinitive, others (=variety B) are unable to embed true reflexive verbs under composition *faire*. How can we make sense of this inter-speaker variation in the light of the present approach?

Let us begin with variety A: apparently, what happens here, is that true reflexives are subject to exactly the same constraints as intrinsic clitics, so a natural extension to the above analysis would be to simply add another implicational constraint which licenses the gap-trapping variant of *faire*, just in case the ARG-ST of the verbal complement should contain an anaphor ([CONT *ana*].

(26)
$$\left[\begin{array}{ll} \textit{word} & \\ \textsc{arg-st} & \left\langle \boxed{0}, \boxed{1}\left[\textsc{arg-st}\left\langle \mathrm{NP}\right\rangle \oplus \left(\left\langle \left[\textsc{cont}\ \textit{ana}\right]\right\rangle \cap \textit{list}\right)\right], \boxed{2}\mathrm{NP}\right\rangle \oplus \textit{list} \\ \textsc{cont} & \left[\textsc{reln}\quad \textit{cause}\right] \end{array}\right]$$

$$\rightarrow \begin{bmatrix} \textsc{comps} & \langle \boxed{1} \rangle \oplus \mathit{list} \oplus \boxed{4} \\ \textsc{arg-st} & \left\langle \boxed{0}, \boxed{1}\begin{bmatrix} \textsc{comps} & \boxed{4} \\ \textsc{arg-st} & \langle \mathrm{NP} \rangle \oplus \left(\boxed{4} \bigcirc \mathit{list}(\mathit{gap}) \right) \end{bmatrix}, \boxed{2} \right\rangle \oplus \boxed{4} \end{bmatrix}$$

Thus, in this variety, gap-trapping is licensed in case of the presence of an intrinsic (24) or reflexive (26) argument, whereas gap-raising is only enforced in the complementary situation, where the ARG-ST list of the downstairs verb consists entirely of referential (pro)nouns.

Speakers of variety B, however, display an interesting gap with referential reflexives. It seems that the constraints that enforce/inhibit gap-raising do not exactly match up in this variety. Thus, if we assume that these speakers have a slightly more general version of (23), yet share all the constraints enforcing gap-trapping with speakers of the A-variety, the ungrammaticality of (25) is readily accounted for:

(27)
$$\begin{bmatrix} \mathit{word} \\ \textsc{arg-st} & \left\langle \boxed{0}, \boxed{1}\begin{bmatrix} \textsc{arg-st} & \langle \mathrm{NP} \rangle \oplus \mathit{list}\left(\left[\textsc{ind} \ \mathit{ref} \right] \right) \end{bmatrix}, \boxed{2}\mathrm{NP} \right\rangle \oplus \mathit{list} \\ \textsc{cont} & \left[\textsc{reln} \quad \mathit{cause} \right] \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} \textsc{arg-st} & \left\langle \boxed{0}, \boxed{1}\begin{bmatrix} \textsc{comps} & \boxed{4} \\ \textsc{arg-st} & \langle \mathrm{NP} \rangle \oplus \boxed{5}\left(\boxed{4} \bigcirc \mathit{list}\left(\mathit{gap} \right) \right) \\ \textsc{to-bind} & \{ \ \} \end{bmatrix}, \boxed{2} \right\rangle \oplus \boxed{5} \end{bmatrix}$$

Put differently: in this variety the constraint inhibiting gap-trapping given above is simply not lax enough to permit downstairs cliticisation in all and every case where gap-raising is banned: in essence, the constraint in (27) is largely identical to the one for the A-variety given in (23), except that the restriction to non-reflexives is dropped. As a consequence, presence of a referential reflexive will lead to a situation where both the antecedent of (26) and of (27) will simultaneously be satisfied. The respective consequents of these two constraints, however, are mutually incompatible, banning gap-raising in the former, while requiring it in case of the latter. Speakers of the A variety appear to have closed the gap by tightening the restriction on gap-raising (23) in such a way that the kind of over-specification characteristic of the grammar of B speakers will be avoided.

4.3 Conclusion

To conclude our discussion of clitic climbing in French, we have shown that idiosyncratic book-keeping devices such as the typing of ARG-ST

members as to their affixal realisation can be eliminated in favour of an approach that exclusively relies on valence features, argument structure, and non-local features. In doing this, we have offered a more uniform picture of French cliticisation. As a side effect, empirically and conceptually questionable mechanisms such as the vacuous application of affixal realisation to past participles have become obsolete. The current approach, which is partly a reformulation, in the context of head-driven extraction, of an earlier proposal by Miller and Sag (1995), is able to capture more directly the observed parallelism between extraction and cliticisation in French past participle agreement.

Similarly, I have sketched in this paper how the salient property of clitic climbing in Italian, i.e. the ban on split cliticisation, can be captured by reference to valency and argument structure alone. Thus, the elimination of different language-specific book-keeping devices from the grammars of French and Italian clitic climbing paves the way for more insightful comparative studies of Romance cliticisation: while in both languages argument composition is crucial to define the locality of CC, the major syntactic difference can be traced to a single distinction: Italian clitics are lexical realisations of arguments, whereas French clitics are lexical binders of (local) gaps.

References

Abeillé, Anne, Danièle Godard, and Ivan Sag. 1998. Two kinds of composition in French complex predicates. In E. Hinrichs, A. Kathol, and T. Nakazawa, eds., *Complex Predicates in Nonderivational Syntax*. New York: Academic Press.

Abeillé, Anne and Danièle Godard. 1994. The complementation of French auxiliaries. In *West Coast Conference on Formal Linguistics*, no. 13. Stanford: CSLI Publications/SLA.

Bouma, Gosse, Rob Malouf, and Ivan A. Sag. 2001. Satisfying constraints on extraction and adjunction. *Natural Language and Linguistic Theory* 19(1):1–65.

Crysmann, Berthold. 1999. Morphosyntactic paradoxa in Fox. In G. Bouma, E. Hinrichs, G.-J. Kruiff, and R. Oehrle, eds., *Constraints and Resources in Natural Language Syntax and Semantics*, Studies in Constraint-Based Lexicalism, pages 41–61. Stanford: CSLI publications.

Crysmann, Berthold. 2000. Syntactic transparency of pronominal affixes. In R. Cann, C. Grover, and P. Miller, eds., *Grammatical Interfaces in Head-driven Phrase Structure Grammar*, Studies in Constraint-based Lexicalism, pages 77–96. Stanford: CSLI Publications.

Crysmann, Berthold. 2002. *Constraint-based Coanalysis. Portuguese Cliticisation and Morphology-Syntax Interaction in HPSG*. Ph.D. thesis, Saarland University.

Hinrichs, E. and T. Nakazawa. 1990. Subcategorization and VP structure in German. In Hughes, Shaun, and Salmons, eds., *Proceedings of the Tird Symposium on Germanic Linguistics*. Amsterdam: Benjamins.

Koenig, Jean-Pierre. 1999. *Lexical Relations*. Stanford: CSLI publications.

Miller, Philip. 1992. *Clitics and Constituents in Phrase Structure Grammar*. Outstanding Dissertations in Linguistics. New York: Garland.

Miller, Philip and Ivan Sag. 1995. French clitic movement without clitics or movement. ms, Université de Lille 3, Stanford University.

Miller, Philip and Ivan Sag. 1997. French clitic movement without clitics or movement. *Natural Language and Linguistic Theory* 15(3):573–639.

Müller, Stefan. 1994. Problems with Complement Extraction Lexical Rules. ms, Humboldt-Universität Berlin.

Monachesi, Paola. 1996. *The Syntax of Italian Clitics*. Ph.D. thesis, Tilburg.

Monachesi, Paola. 1999. *A Lexical Approach to Italian Cliticization*. CSLI Publications.

Pollard, Carl and Ivan Sag. 1994. *Head–Driven Phrase Structure Grammar*. Stanford: CSLI and University of Chicago Press.

Sag, Ivan. 1997. English relative clause constructions. *Journal of Linguistics* 33(2):431–484.

Sag, Ivan A. and Danièle Godard. 1993. Extraction of *de*-phrases from the French NP. In *Proceedings of the North East Linguistic Society 24*. Department of Linguistics, University of Massachusetts: GLSA.

Zwicky, A. and G. K. Pullum. 1983. Cliticization vs. inflection: English *n't*. *Language* 59:502–513.

5

Subjects in Fronted German VPs and the Problem of Case and Agreement: Shared Argument Structures for Discontinuous Predicates

Andreas Kathol

5.1 Introduction

Few ideas have proven as influential within the HPSG-based literature on German verb clusters as Hinrichs and Nakazawa's (1989) idea of argument composition. Its basic idea is that in verb clusters, the arguments of a main verb are realized as the dependents of the auxiliary which governs that main verb, and not directly as dependents of the main verb. Thus, for instance in (1a), the tense auxiliary *haben* governs the transitive main verb *gewinnen*. As the head of the cluster *gewonnen hat*, the auxiliary *haben* effectively takes over the arguments from the main verb. The resulting head-governee phrase then combines with the main verb's dependents, for instance in a structure along the lines illustrated in (1b):[1]

(1) a. daß ein Außenseiter das Rennen gewonnen hat.
that an outsider the race win will
'that an outsider will win the race.'

[1]Here, ⟨ ... ⟩ represents valence information (e.g., SUBCAT ⟨ ... ⟩, or some combination of SUBJ and COMPS). I ignore here the issue of how the governor selects its governee (for instance by means of a VCOMPL feature, see Kathol 1998).

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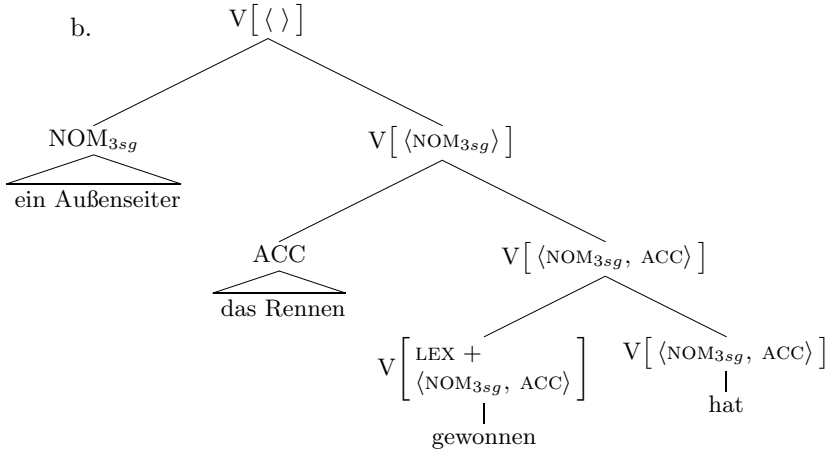
Jong-Bok Kim and Stephen Wechsler.

b.



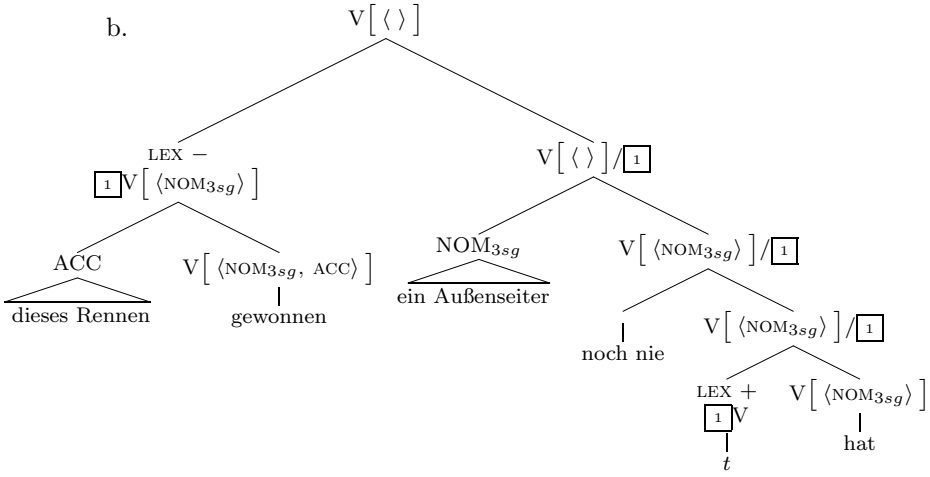
Another wide-spread assumption has been that nominative case marking and subject agreement are properties of finite verbs. That is, *ein Außenseiter* in (1) is nominative because it is a third singular valence element of the finite verb *hat*. This can be expressed in terms of a constraint along the lines listed in (2):

(2) $\begin{bmatrix} \text{V}[\text{FINITE}] \\ \langle\ \text{NP}[\text{STR}],\ ...\rangle \end{bmatrix} \rightarrow \left[\ \langle\ \text{NP}[\text{NOM}],\ ...\rangle\ \right]$

The phrase structure assumed under the argument composition analysis at first appears to be at odds with constructions in which the main verb is fronted together with some or all of its dependents, as for instance in (3a). However, as has been shown by Müller (1996) and Meurers (1999b), such constructions can be accommodated if the governor is allowed to take phrasal verbal dependents ([LEX −]) whenever such dependents are preposed by means of a filler-gap relation, as illustrated in (3b):

(3) a. [Dieses Rennen gewonnen] hat ein Außenseiter noch nie.
this race won has an outsider yet never
'No outsider has ever won this race.'

b.



I should note at this juncture that the structure in (3) ignores the issue of how the finite element *hat* takes second position in the declarative clause. One possible solution of this issue is offered within the linearization framework outlined in Kathol (2000).[2].

As has been pointed out by Grewendorf (1988), Haider (1990), and others,[3] fronted partial VPs in German may sometimes contain a subject, as illustrated in (4) with intransitive *gewinnen*.

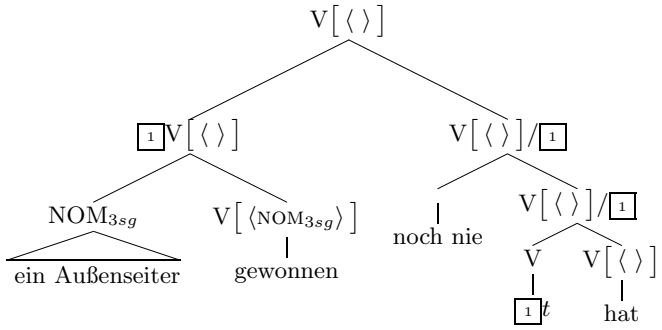
(4) [Ein Aussenseiter gewonnen] hat hier noch nie.
an outsider won has here still never
'No outsider has yet won here.'

Recent work by Meurers (1999c,a) has pointed out that such data present a severe challenge to HPSG analyses of the argument composition kind. Simply put, the problem is that the subject forms a phrase with the participle *gewonnen* and—due to ordinary HPSG valence saturation—disappears from the valence list of the phrase *ein Außenseiter gewonnen*, as is illustrated in (5).

[2]Note also that the use of a trace (t) in (3b) is entirely for expository convenience. Everything we state is fully compatible with a traceless implementation

[3]Grewendorf (1988, 295) credits unpublished work by Haider and Tappe from 1982 as being the first to point out such structures.

(5)



As a result, there is no "communication" between the governing auxiliary *hat* and the phrase-internal subject *ein Außenseiter*. The standard mechanisms for nominative case marking and agreement (cf. (2) above) cannot apply; yet the construction leaves no choice concerning nominative case on the subject (6a) or agreement with the auxiliary (6b):

(6) a.*Einen Außenseiter gewonnen hat hier noch nie.
an outsider.ACC won has here still never

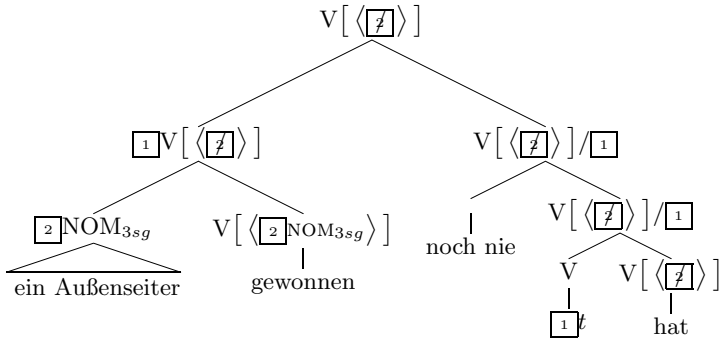
b.*Außenseiter gewonnen hat hier noch nie.
outsider.PL won has here still never

The solution offered for this problem by Meurers (1999c, 1999a) is in terms of "raising spirits". These are representations of dependents which remain on valence-related lists even though the valence requirements have been locally realized. As a result, raising spirits become "accessible" outside the fronted phrase for purposes of case assignment and agreement.

In (7), for instance, the subject requirement of *gewonnen* is satisfied within the fronted phrase, represented as "2". Rather than being removed from the valence list, (as in (5) above), however, the subject remains part of the valence list of the mother node. To render raising spirits combinatorially inert, that is, to indicate at a higher node that an element has been "found" inside that phrase, Meurers assigns them a special marking. Thus in (7), "$\not{2}$" points toward the same informational content as "2", except that in the former, the NP[NOM] bears a marking as "realized".[4] The resulting structure is given in (7) (Meurers and De Kuthy 2001:28):

[4]Technically, this is achieved by means of a relational constraint that maps representations containing a LOCAL value of type *unrealized* into one that is of type *realized* (cf. Meurers 1999a:200).

(7)



Since 2 and 1 both contain the same information content as far as case and agreement features are concerned, the puzzle of how to get the finite verb to communicate with the phrase-internal subject appears solved.

However, I believe the solution comes at a steep price. The notion of a "spirit" is antithetical to the overall design of the HPSG theory, in which, as I noted above, syntactic combination is primarily driven by the notion of saturation level. Thus, valence lists with spirits are burdened with information that they were not originally designed to bear. Furthermore, it is not clear whether there is any independent evidence for the notion of spirit apart from the problematic VP fronting construction with subjects in German.

Thus it seems highly desirable to eliminate the notion of spirits from the HPSG theory if the problem of phrase-internal subjects can be solved by means that do not require an extension of the basic theory. As I will show in Section 5.2, this is indeed the case once the independently motivated notion of argument structure is used to link the various components of a periphrastic predicate.

5.2 Argument sharing and periphrastic predicates

5.2.1 Valence vs. argument structure

The idea of a single representation of all the dependents of some predicator has recently been revived in the form of the ARG-ST feature on lexical elements. By default, the elements of the ARG-ST list are identical with the valence elements given by SUBCAT[5] at the lexical level. The two lists do not always line up in this fashion and the possiblity of mismatches has given rise to a number of analyses of otherwise puzzling phenomena, such as "*pro*-drop".

The standard approach to missing subjects in finite environments

[5] Or SUBJ/COMPS, cf. footnote 1 above.

has been to posit a null pronoun (*pro*) that instantiates the syntactic subject position. In keeping with HPSG's general avoidance of unpronounced syntactic material, we can instead analyze the unexpressed subject as an ARG-ST element that does not have a corresponding valence expression. The example in (8a) from Italian and the corresponding lexical description of the verb *mangia* in (8b) illustrate this idea:

(8) a. Mangia un gelato.
eat.3SG a ice cream
'S/he is eating an ice cream.'

b. $\begin{bmatrix} \text{ARG-ST} & \langle \boxed{1}\text{NP}[3\text{SG}], \boxed{2}\text{NP} \rangle \\ \text{SUBCAT} & \langle \boxed{2} \rangle \end{bmatrix}$

Dependencies in which the subject participates, such as binding or agreement, can be accommodated straightforwardly if we assume that their description references the first ARG-ST element, rather than the first member of the SUBCAT list.

While SUBCAT as a valence feature records the level of syntactic saturation for each higher phrase in the tree, ARG-ST is usually taken to be a static representation of the dependents of the lexical head and does not project to higher nodes in the structure (cf. for instance Sag and Wasow 1999:387 on this point). The rationale behind this assumption is that non-projecting ARG-ST information gives rise to a stronger notion of syntactic locality. That is, if a phrase retains no record of its internal dependents by means of ARG-ST, then selectional dependencies are severely restricted. Thus many nonexisting dependencies are accounted for because the grammatical framework gives us no way to express them. Examples of such nonexisting dependencies are verbs that require finite complement clauses with ditransitive heads.

The idea that ARG-ST is limited to word-level expressions has recently been challenged by Przepiórkowski (2001, 268–271). He cites evidence from Polish constructions showing that argument structure needs to be projected to the phrasal level. His arguments involve the visibility of the subject on the embedded ARG-ST list. This could be taken to mean that only subject information is passed to the mother level, while other ARG-ST information is non-projective, as originally proposed. However, there is suggestive evidence from ergative languages that this conclusion does not hold up either.

One such piece of evidence comes from light verb constructions in Urdu, discussed by Andrews and Manning (1999, 68) and shown here in (9):

(9) Anjum ne **d-ii** Saddaf ko [**ciṭṭ^{h}ii** lik^{h}-ne].
Anjum ERG give-PERF.F.SG Saddaf DAT letter.F.NOM write-INF
'Anjum let Saddaf write a letter.'

Andrews and Manning present convincing evidence for the constituent status of *lik^{h}-ne* ('write') and its object *ciṭṭ^{h}ii* ('letter'). At the same time, since this particular construction displays an ergative case and agreement pattern, the light verb *d-ii* agrees in gender with the object *ciṭṭ^{h}ii* ('letter'). As Andrews and Manning point out, on an analysis based solely on argument composition, the light verb has no access to the embedded object by means of a valence list, hence there is no way to effect the agreement between the light verb and the embedded object. One possible objection may be that, according to Manning's (1996) "inverse linking" hypothesis, the embedded object *ciṭṭ^{h}ii* ('letter') may actually be linked to the grammatical function of subject. If subject information is projected, then this element should be visible at the phrasal level. However, Manning's idea of inverse linking only applies in cases of syntactic ergativity, for which there is no evidence in a language such as Urdu. Hence, even under Manning's approach to ergativity, the phrase *ciṭṭ^{h}ii* ('letter') would count as a grammatical object.

On the analysis proposed here, the entire ARG-ST list of the dependent predicate *lik^{h}-ne* ('write'), including both subject and object, is projected to the phrasal level, and thus the agreement marking facts can be readily accommodated.

A similar argument comes from long-distance agreement in Tsez, reported by Polinsky and Comrie (1999). As the following examples show, the matrix predicate ('know') agrees in gender class, not with the matrix dative subject (*enir*), but rather with the absolutive-marked element of the embedded clause. In (10a), this element is the subject, but in (10b), it is the notional object that is marked absolutive.

(10) a. Eni-r [**uži** āy-ru-λi] **iy-xo**.
mother-DAT boy.ABS I.arrive-PT.PART-NMLZ I-know-PRES
'The mother knows that the boy arrived.'

b. Eni-r [už-ā **magalu** b-āc'-ru=λi]
mother-DAT boy-ERG bread.III.ABS III-eat-PT.PART-NMLZ
b-iy-xo.
III-know-PRES
'The mother knows that the boy ate the bread.'

As before with Urdu, one may think that Manning's (1996) inverse mapping analysis would treat the notional object as a grammatical subject and hence predict visibility, but this proposal has the obvious drawback that it would posit an inverse linking structure for a language

that does not elsewhere show any signs of syntactic ergativity (Maria Polinsky, p.c.).

I will show in Section 5.2.2, projecting entire argument structures to the phrasal level also allows us to establish a tighter link among the elements of a verb cluster. In turn, this will allow the agreement and case marking facts involving subjects in fronted verbal constituents to fall out naturally.

5.2.2 Predicates

Ackerman and Webelhuth (1998) develop a unified theory in which *predicates* are treated as unitary elements of syntactic description regardless of their morpho-syntactic realization. That is, depending on the (sometimes idiosyncratic) details of morphological realization, a given lexeme may be mapped onto a single word or a periphrastic construction involving auxiliaries or other elements. Applied to a concrete example, this means that, in addition to the synthetic tense forms, the German verb *gewinnen* also possesses a number of complex realizations involving tense and other auxiliaries, sketched here in (11):

(11) **Extended paradigm for *gewinnen***

	present indicative	past indicative	...	present perfect	...
1sg	gewinne	gewann		gewonnen habe	
...					
3sg	gewinnt	gewann		gewonnen hat	
...					

Ackerman and Webelhuth (1998) propose that the main verb is the basis for the predicate with accompanying elements selected by means of features such as "AUX". This, however, is at odds with standard HPSG assumptions about the governor–governee relationships holding in such constructions, for instance the fact that the auxiliaries determine the particular form of a main verb, but not the other way round. If the auxiliary is considered the governor, then this situation is fully in line with other head–dependent relationships, such as prepositions governing particular cases on their NP complements.

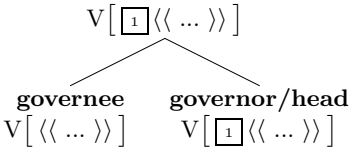
Despite these implementational differences, however, the thrust of Ackerman and Webelhuth's (1998) idea can be preserved if we assume that a predicate in its periphrastic realization is the domain of a common argument structure list (ARG-ST). That is, in addition to linkages among its parts that are based on valence, the integrity of a predicate is manifested in terms of a common argument structure shared among all of its parts. This is achieved first by assuming that—in valence-

preserving cases—the governing element has the same ARG-ST value as its governee (i.e., [1]), as shown in (12):

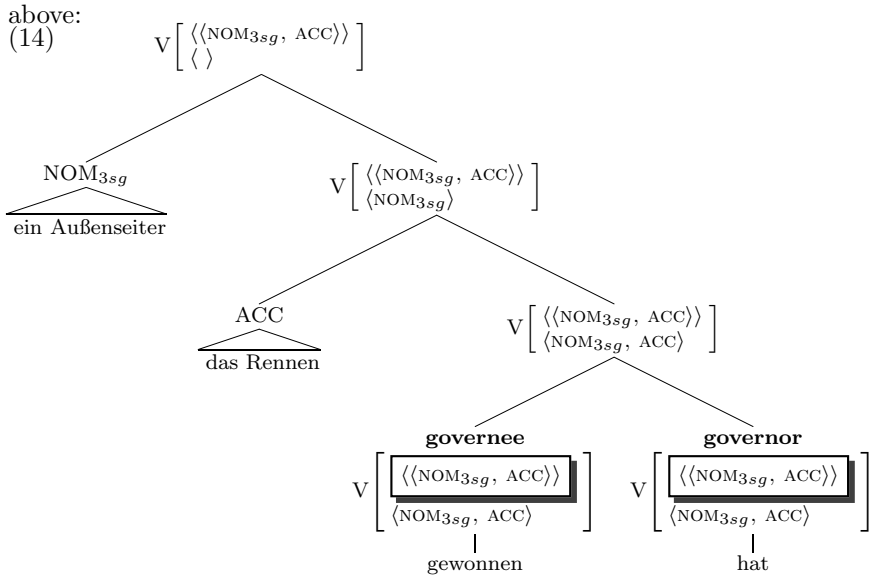
(12)
$$\begin{bmatrix} \text{ARG-ST } \boxed{1} \\ \text{SUBCAT } \boxed{2} \\ \text{VCOMPL } \left\langle \begin{bmatrix} \text{V} \\ \text{ARG-ST } \boxed{1} \\ \text{SUBCAT } \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$$

Valence information continues to be shared between governee and governor (here: [2]). If there is is no extraction from a verb cluster, ARG-ST and SUBCAT are identical at the lexical level, but, as we will see below, they crucially do not always have to be.

Second, I follow Przepiórkowski (2001) in assuming that the argument structure of the phrasal mother is the same as that of the head, as shown in (13). (For ease of readibility, I will from now on abbreviate "[ARG-ST ⟨...⟩]" as "⟨⟨...⟩⟩".)

(13)


As a result, we obtain the analysis in (14) for the structure in (1b) above:

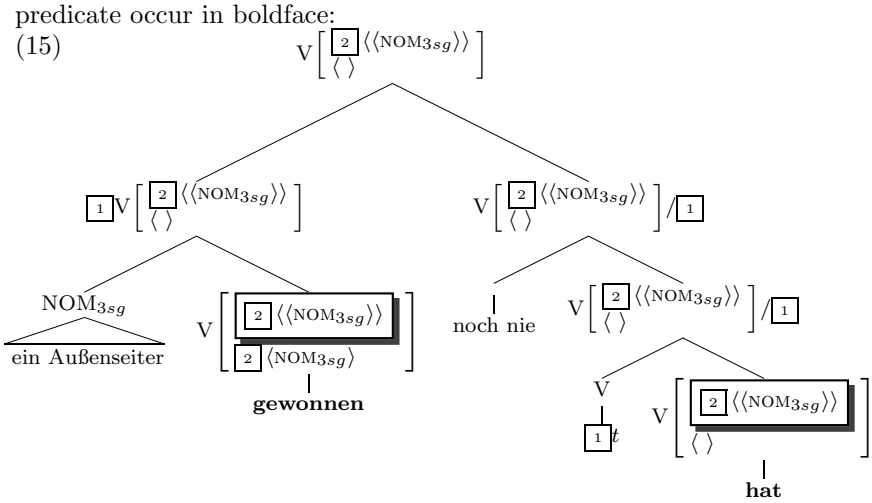
(14)


Once the various elements of a predicate are seen as linked via argument sharing, a new perspective on subjects in fronted VPs becomes

available. Such constructions can now be understood as involving a single predicate (e.g., *gewonnen hat*). Rather than being contained in a single constituent, as in (14), they occur discontinuously in structures such as (4) above. In (14), the finite exponent of this predicate is directly involved in nominative case marking and subject agreement. In the discontinuous case in (4), by comparison, case marking and agreement is mediated by the nonfinite exponent (i.e., the participle *gewonnen*).

Applied to the problem of subjects in fronted VPs, this yields the analysis outlined in (15), in which the two elements of the periphrastic predicate occur in boldface:

(15)



In the lexical representation for the main verb *gewonnen*, the ARG-ST value is identical with its valence list(s), indicated by means of 2. The main verb combines with its sole dependent inside the fronted verbal projection, saturating its valence requirement. While there is no phrasal element on the valence list(s) of the finite auxiliary *hat*, it does have a nonempty ARG-ST list, which is identical to that of its gapped governee (2). Thus, while in both (14) and (15), the argument structure of the governor is identical to that of the governee, only in (14) does the governor also inherit all of the valence elements of the governee. In (15), only those are inherited by the governor (from the gap of the fronted phrase) that have not already been cancelled within the fronted phrase—in this case, this means an empty list of dependents inherited from the main verb part.

If we assume that case and agreement properties of a finite element are linked to the first element on its ARG-ST list, then the singular marking on *hat* is immediately predicted, as is the nominative

case marking on the non-locally realized NP *ein Außenseiter*. This is straightforwardly achieved if case marking is seen not as a constraint on valence representations, but instead on argument structure, as is shown in (16):

(16) $\begin{bmatrix} \text{V[FINITE]} \\ \langle\langle\ \text{NP[STR]}, \ldots\rangle\rangle \end{bmatrix} \rightarrow \left[\ \langle\langle\ \text{NP[NOM]}, \ldots\rangle\rangle\ \right]$

Once case assignment (and agreement) are understood as constraints on ARG-ST, the observed facts fall out without any further stipulation. Thus the analysis proposed here shares with Meurers' solution the idea that information about internal composition needs to remain accessible phrase-externally. However, it approaches the problem from a very different conceptual angle. Instead of seeing the behavior of phrase-internal subjects as a special case that requires modification of the fundamental notion of valence saturation, we can understand it as the result of the convergence of independently justified assumptions about syntactic composition: Przepiórkowski's projectivity of ARG-ST lists and and Ackerman & Webelhuth's conception of "predicate" as unitary element in syntactic description.

5.2.3 Valence increasing constructions

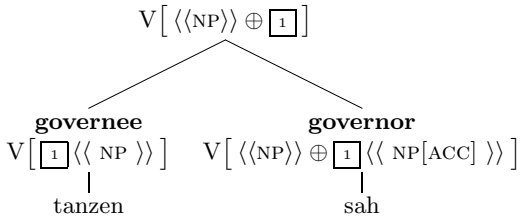
The same proposal can be straightforwardly extended to valence increasing environments, such as embeddings under AcI verbs (*accusativus cum infinitivo*, essentially object-raising verbs) such as *sehen*, as seen in the example in (17) from Meurers (1999a, 293):

(17) [Den Kanzler/*der Kanzler tanzen] sah Oskar.
the Chancellor.ACC/the Chancellor.NOM dance saw Oskar
'Oskar saw the Chancellor dance.'

The problem posed by these constructions is quite similar to the ones seen earlier, except that here it is the accusative case on *den Kanzler* which cannot be predicted on the basis of information that is locally available within the fronted phrase.

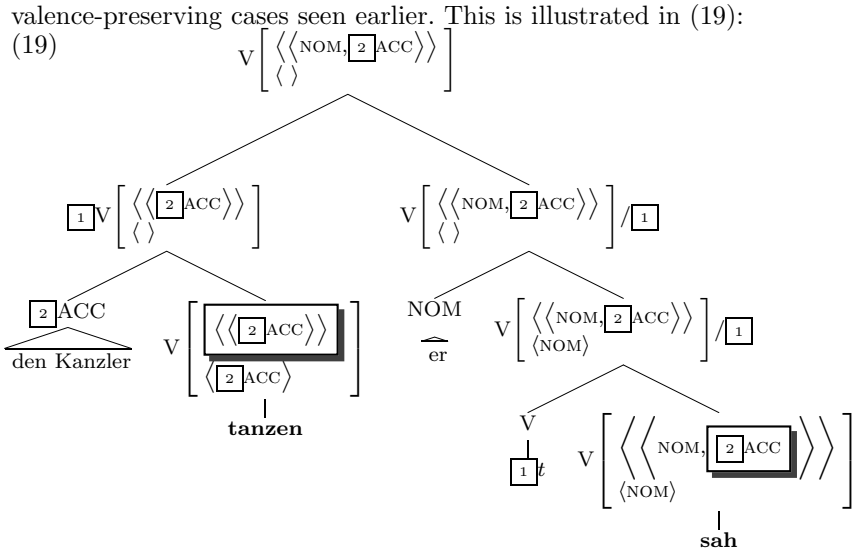
Since we think of the argument structure of a predicate as being projected from its syntactic head, all that is required to account for such examples is a proper understanding of the ARG-ST properties of valence-increasing heads such as *sehen*. In the valence-preserving case discussed earlier, this entails total identity in ARG-ST values across governor and governee. In valence-increasing cases, the two are linked only by partial identity, outlined in (18), where "$\oplus$" stands for list concatenation:

(18)



As a result, the subject requirement of *tanzen* now corresponds to the second element of *sehen*'s ARG-ST list. As the second (structurally case-marked) element on the ARG-ST list of the finite verb *sah*, that NP is marked with accusative case, rather than nominative case, as in the valence-preserving cases seen earlier. This is illustrated in (19):

(19)



In order to ensure that the fronted NP be properly marked with accusative case, we only need to make sure that the constraint on case assignment is defined on ARG-ST, as shown in (20).[6]

(20) $\left[\begin{array}{l}\text{V}\\ \langle\langle\ \text{NP[STR]},\ \text{NP[STR]}\ ...\rangle\rangle\end{array}\right] \rightarrow \left[\ \langle\langle\ \text{NP[STR]},\ \text{NP[ACC]},\ ...\rangle\rangle\ \right]$

5.2.4 An exceptional construction

Verbs such as *anfangen* ('begin') can occur either in so-called "coher-

[6] Again, the more formally precise version of this constraint is as follows:

(i) $\left[\begin{array}{l}\text{HEAD}\ \textit{verb}\\ \text{ARG-ST}\ \langle\ \text{NP[STR]},\ \text{NP[STR]}\ ...\rangle\end{array}\right] \rightarrow \left[\ \text{ARG-ST}\ \langle\ \text{NP[STR]},\ \text{NP[ACC]},\ ...\rangle\ \right]$

Note also that the only way to get two structural cases in a row on an ARG-ST list is for both dependents to be subjects of different predicates which have been combined by means of a valence-increasing predicate.

ent" or "incoherent" constructions. The first, shown in (21a), is generally treated as on a par with verb cluster construction involving auxiliaries, seen above in (1b), see, e.g., Kiss (1995). The second, shown in (21b) involves a dependent VP, which in turn occurs after the verbal complex in *Nachfeld* position.[7]

(21) a. daß der Mond zu scheinen anfing.
that the moon to shine began
'that the moon began to shine.'

b. daß der Mond anfing [zu scheinen].
that the moon began to shine
'that the moon began to shine.'

Meurers (1999a, 291) observes that, in addition to the constructions above, *anfangen* may also cooccur with a postposed verbal projection that contains a nominative subject, as illustrated in (22):

(22) obwohl damals anfing [der Mond zu scheinen].
although then began the moon.NOM to shine
'although the moon began to shine then.'

This construction type thus constitutes the mirror image of the preposed subject+V phrases discussed earlier.

Meurers does not discuss the range of possibilities further and I find such cases are slightly marginal in comparison to the fronted partial VPs containing subjects.[8] Nonetheless, I would like to offer a very simple way of accommodating such cases within the approach pursued here. First, in (23), I present the lexical description for *anfangen* as a VP-embedding predicate, as it occurs in (21b) above.

(23) *anfing* (VP-embedding)

a. $\left[\text{SUBCAT} \left\langle \boxed{1}, \begin{array}{r}\text{VP[ZU-INF]} \\ [\text{SUBCAT} \langle \boxed{1}, \ldots \rangle]\end{array} \right\rangle\right]$

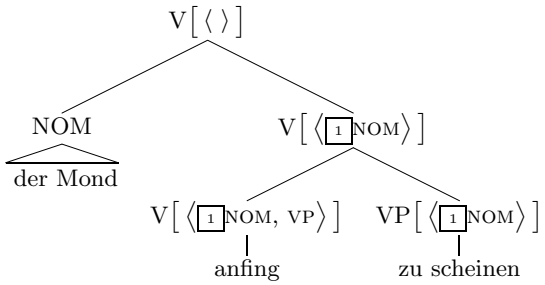
[7] There are well-known complications arising in the form of the "Third Construction", which I will ignore here. See Kathol (2000, 243–250) and Hinrichs and Nakazawa (1998), among others, for some discussion.

[8] In particular, it seems that there is a rather strong requirement that predicates occurring in such constructions take non-agentive subjects, cf. the ungrammaticality of the examples in (i):

(i) a. *weil anfing, [ein Außenseiter zu gewinnen].
because began an outsider to win

b. *weil anfing, [ein Kind zu lachen].
because began a child to laugh

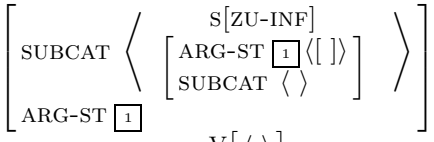
b.



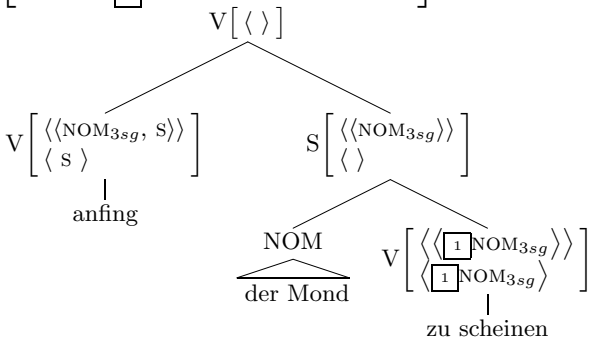
Turning now to the description that is responsible for the unexpected construction in (22), it seems that such cases involve the verb taking a fully saturated ("clausal") verbal projection ([SUBCAT ⟨ ⟩]) whose ARG-ST list is shared with that of clausal dependent. Since the subject of the clausal dependent (*der Mond* in (22)) is now also the subject of the finite predicate *anfing*, nominative case marking on *der Mond* and agreement between *anfing* and *der Mond* are correctly accounted for, as illustrated in (24):

(24) *anfing* (clause-embedding)

a.



b.



To be sure, the account developed earlier for subjects occurring in fronted verbal phrases does not immediately lead us to expect that sentences such as (22) should be possible as well. This is a property shared by Meurers' raising spirits account. Given that the acceptability of (22) is somewhat marginal, this probably is a desired result. Whatever the proper understanding of the constraints exhibited by such constructions, the present proposal provides the proper tools to account for the linkage between the phrase-internal subject and the finite matrix predicate.

5.3 Summary and final remarks

The proposal advanced in this study may appear at first sight to be just a technical variation of Meuers' original proposal for phrase-internal fronted subjects—specifically the idea that information about the internal dependents of the fronted phrase need to become part of the informational content represented on the fronted phrase itself. However, as I have argued above, this result is achieved here in a way that ties a number of strands in recent research together in a natural way. The first is the idea that information about argument structure needs to be projected to the phrasal level, as argued by Przepiórkowski and further supported here on the basis of evidence from ergative languages. The second is the idea that multiple predicate constructions may be linked by a common argument structure, which allows us to give content to Ackerman & Webelhuth's idea of "predicate" as a unit of syntactic description above the word level.

As a result, we are able to solve the puzzle of how to get the finite auxiliary to agree with and assign nominative to the subject in the fronted constituent. In fact under the present proposal, the required dependencies fall out for free, as the nonfinite fronted verb and the finite auxiliary are really, in a sense, different lexical exponents of the same predicate. Unlike in the case of Meurers' analysis, these results could be achieved without changing the fundamental saturation-driven character of syntactic combination in HPSG.

One of the consequences of this proposal, which does not come out as clearly in Meurers' approach is the fact that any approach to syntax that is entirely driven by saturation appears to be inadequate to deal with the data discussed here. For instance, early HPSG (Pollard and Sag 1987) or standard Categorial Grammar appear to supply no means recording subject-related information on the fronted constituent.

In fact, it may seem that the present proposal is too unconstrained in making phrase-internal information "visible" to phrase-external elements. In particular, our proposal may have the drawback of not ruling out a number of potential selectional relations that become available once phrases contain a record of their internal composition in the form of the ARG-ST list. This is indeed a valid concern and I wish to address it in a somewhat new way.

While previously the notion of restrictiveness has been thought of entirely in terms of the grammatical relations that are or are not projected to the phrase level, another possibility is to restrict ARG-ST projection to **nonfinite** environments. That is, only nonfinite heads project their ARG-ST information, while ARG-ST is not an appropriate attribute for

finite phrases. Such a move would severely limit the kinds of selectional possibilities involving dependents within finite clauses. I will leave it for further study to determine whether this proposal makes the right predictions concerning the locality of dependent information in finite contexts.[9]

Acknowledgments

I would like to thank the audience of the Ninth International conference on HPSG for helpful comments and discussion, in particular Ivan Sag. All remaining errors are mine. See Kathol (forthcoming) for an expanded version of this article.

[9]There is some evidence suggesting that, at least in English, subject information must be projected to the clausal level in finite contexts. However, in proposals such as Bender and Flickinger (1999), this has been achieved by accessing the verb's argeement information by means of Kathol's (1999) AGR head feature. This still leaves as an open question whether selectional dependencies ever require access to nonsubject dependents of finite clauses.

Further, as Ivan Sag has reminded me, all of the known cases in which information about phrase-internal elements needs to be "visible" outside that phrase appear to involve a single element. This is also the case in the ergative languages discussed in (9) and (10) above. Among the questions that this observation raises is (1) whether this is empirically correct and (2) if so, whether this is a fact that the grammatical framework should account for in a principled way (for instance by channeling all information about phrase-internal dependents through the AGR feature). Such questions will have to be left for further research.

References

Ackerman, Farrell and Gert Webelhuth. 1998. *A Theory of Predicates*. Stanford: CSLI Publications.

Andrews, Avery and Christopher Manning. 1999. *Complex Predicates and Information Spreading in LFG*. Stanford, CA: CSLI Publications.

Bender, Emily and Dan Flickinger. 1999. Peripheral constructions and core phenomena: Agreement in tag questions. In G. Webelhuth, J.-P. Koenig, and A. Kathol, eds., *Lexical and Constructional Aspects of Linguistic Explanation*, pages 199–214. Stanford: CSLI Publications.

Grewendorf, Günter. 1988. *Aspekte der Deutschen Syntax*. Tübingen: Gunter Narr.

Haider, Hubert. 1990. Topicalization and other puzzles of German syntax. In G. Grewendorf and W. Sternefeld, eds., *Scrambling and Barriers*, pages 93–112. Amsterdam/Philadelphia: John Benjamins.

Hinrichs, Erhard and Tsuneko Nakazawa. 1989. Flipped out: Aux in German. In *Papers from the 25th Meeting*, pages 193–202. Chicago: Chicago Linguistic Society.

Hinrichs, Erhard and Tsuneko Nakazawa. 1998. Third construction and VP extraposition in German: An HPSG analysis. In E. Hinrichs, A. Kathol, and T. Nakazawa, eds., *Complex Predicates in Nonderivational Syntax*, vol. 30 of *Syntax and Semantics*, pages 115–157. San Diego: Academic Press.

Kathol, Andreas. 1998. Constituency and linearization of verbal complexes. In E. Hinrichs, A. Kathol, and T. Nakazawa, eds., *Complex Predicates in Nonderivational Syntax*, vol. 30 of *Syntax and Semantics*. San Diego: Academic Press.

Kathol, Andreas. 1999. Agreement and the syntax-morphology interface in HPSG. In R. Levine and G. Green, eds., *Studies in Contem-*

porary Phrase Structure Grammar, pages 209–260. Cambridge/New York: Cambridge University Press.

Kathol, Andreas. 2000. *Linear Syntax*. Oxford, UK: Oxford University Press.

Kathol, Andreas. forthcoming. Case assignment in fronted partial VPs: an argument-sharing analysis. In P. Seuren and G. Kempen, eds., *Verb Clusters in Dutch and German*, Current Issues in Linguistic Theory. Amsterdam/Philadelphia: John Benjamins.

Kiss, Tibor. 1995. *Infinite Komplementation: neue Studien zum deutschen Verbum*, vol. 333 of *Linguistische Arbeiten*. Tübingen: Max Niemeyer.

Manning, Christopher. 1996. *Ergativity: Argument Structure and Grammatical Relations*. Stanford: CSLI Publications.

Meurers, Walt Detmar. 1999a. *Generalizations in the Syntax of German Non-Finite Constructions*. Ph.D. thesis, University of Tübingen.

Meurers, Walt Detmar. 1999b. German partial-VP topicalization revsited. In G. Webelhuth, J.-P. Koenig, and A. Kathol, eds., *Lexical and Constructional Aspects of Linguistic Explanation*, pages 129–141. Stanford, CA: CSLI Publications.

Meurers, Walt Detmar. 1999c. Raising spirits (and assigning them case). *Groninger Arbeiten zur Germanistischen Linguistik (GAGL)* 43:173—226.

Meurers, Walt Detmar and Kordula De Kuthy. 2001. Case assignment in partially fronted constituents. In C. Rohrer, A. Rossdeutscher, and H. Kamp, eds., *Linguistic Form and its Computation*. Stanford, CA: CSLI Publications.

Müller, Stefan. 1996. Yet another paper about partial verb phrase fronting in German. In *Proceedings of COLING-96*, pages 800–805. Copenhagen.

Polinsky, Maria and Bernard Comrie. 1999. Agreement in Tsez. *Folia linguistica* 33:4–25.

Pollard, Carl J. and Ivan A. Sag. 1987. *Information-based Syntax and Semantics*. Vol. 1, CSLI Lecture Notes Series No. 13. Stanford: CSLI Publications.

Przepiórkowski, Adam. 2001. ARG-ST on phrases: Evidence from Polish. In D. Flickinger and A. Kathol, eds., *Proceedings of the Seventh International HPSG Conference, UC Berkeley*, pages 267–284. Stanford, CA: CSLI Publications.

Sag, Ivan A. and Thomas Wasow. 1999. *Syntactic Theory: A Formal Introduction*. Stanford: CSLI Publications.

6

Phrasal typology and the interaction of topicalization, wh-movement, and extraposition

Tibor Kiss

6.1 Introduction

Ever since Chomsky's "On Wh-Movement" (Chomsky 1977) it has been assumed that topicalization and wh-question formation can be analyzed as instances of the same operation. Leaving certain features aside, this proposal carries over to the analysis of unbounded dependency constructions in HPSG since structurally, topicalization does not differ from wh-question formation in the analysis suggested in Pollard & Sag (1994:157-163).[1] In the present paper, we challenge this assumption and suggest an alternative analysis of unbounded dependency constructions. Here, topicalization and wh-question formation are considered as structurally different at least in certain languages. They may, however, be structurally identical in other languages. This difference is empirically reflected in patterns of relative clause extraposition. As has been pointed out by Culicover & Rochemont (1990:28), an extraposed relative clause must not take an antecedent contained in a VP if the VP is topicalized but the relative clause is not.[2]

[1] It must be made explicit, though, that Pollard/Sag (1994) assume that these operations involve different combinations of attributes of the sign. Moreover, Pollard/Sag (1994) illustrate unbounded dependency constructions with topicalization cases and leave a detailed analysis of wh-question formation open. It is still a tacit assumption of this work that both wh-question formation and topicalization are syntactically realized through the Head-Filler Schema (Pollard/Sag 1994:164).

[2] Example (2) could be grammatical if the relative clause would take the subject as its antecedent. This is problematic, however, since the antecedent is a pronoun.

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Jong-Bok Kim and Stephen Wechsler.

(1) The governor said he would meet **a man** at the party **who was from Philadelphia**, and meet a man at the party who was from Philadelphia he did.

(2) *The governor said he would meet **a man** at the party **who was from Philadelphia**, and meet a man at the party he did who was from Philadelphia.

As is illustrated in (3), (4), and (5), the grammaticality distribution is the same if the topicalized phrase itself is the antecedent.[3]

(3) I like micro brews that are located around the Bay Area.

(4) **Micro brews that are located around the Bay Area**, I like.

(5) ***Micro brews**, I like **that are located around the Bay Area**.

Topicalization does not seem to pattern with wh-question formation in this respect. As the following examples show, an extraposed relative clause may take an antecedent that has been wh-moved. This observation is somewhat surprising if topicalization and wh-question formation are analyzed as instances of the same phrase structure schema.[4]

(6) Who$_i$ do you know [that$_i$ you can really trust]?

(7) Which argument$_i$ do you know [that$_i$ Sandy thought was unconvincing]?

One could assume that the contrast illustrated in (1) to (5) can be accounted for by considering the grammaticalized discourse functions of the dislocated phrases. In the ungrammatical cases in (2) and (5), the dislocated phrase can be considered a grammaticalized topic - hence the term topicalization. In the grammatical cases in (6) and (7), the dislocated phrases can be analyzed as the focus of the sentence. In section 6.2 below, however, we will show that such an approach is problematic. Instead, we will suggest that the contrast between (6) and (7) on the one hand, and (2) as well as (5) on the other hand, can be derived from the interaction of two assumptions. The **first assumption** concerns the typology of phrases in HPSG. Pollard & Sag (1994:391) assume that subjects are realized as subject daughters, and that topicalized phrases, wh-subjects, as well as wh-objects are realized as filler

In the examples given, we assume an association between the relative clause and the object, unless otherwise indicated.

[3]If the antecedent of the relative clause is the subject, and not the object, the construction is grammatical, as is witnessed in (i):

(i) Micro brews the men$_i$ mentioned yesterday [who$_i$ came from New York].

(ii) The men who came from New York mentioned micro brews yesterday.

[4]Following Sag (1997:462f.), we assume that *that* can be analyzed as a pronoun.

daughters. Contrary to this assumption, we assume that wh-moved object daughters and 'ordinary' subject daughters in English are specifier daughters, and not filler daughters, or subject daughters, respectively. Topicalized phrases, however, are analyzed as filler daughters. The different typologies are summarized in the table in (8).

(8) Comparison of phrasal typologies:

HPSG (Pollard & Sag 1994)		Present Paper	
SUB DTRS	FILLER DTRS		SPEC DTRS
subjects	wh-subs wh-objs top ph	top ph	subj wh-subj wh-obj
dislocated ±		lexically related ±	

The major difference between the typology suggested in Pollard & Sag (1994) and the present one is that in the former the dislocation of a phrase is the constituting property, while in the latter it is the question whether the phrase is related to a lexical head or not. We assume that if a dislocated phrase is related to a lexical head, it is analyzed as a specifier daughter. If a dislocated phrase is not related to a lexical head, it is analyzed as a filler daughter, which means that filler daughters are adjoined to phrases while specifier daughters are lexically selected.[5] This difference has important empirical ramifications. In particular, we can relate the constrast observed in (1) to (7) to the residual verb-second property of present day English: modifier extraposition from a dislocated phrase is grammatical if the dislocated phrase stands in a certain structural relation to a lexical head. Since it is the lexical relation which is relevant here, and not the property of being dislocated, the analysis can also be carried over to cases where extraposition seems to be a lowering operation, viz. in the case of extraposition from subjects in English as discussed in Culicover & Rochemont (1990:32ff.). This issue will be discussed in more detail in section 6.6. It is thus not the discourse function of the dislocated phrase but the syntactic realization of the phrase that introduces a crucial distinction here.

The **second assumption** concerns the association between an extraposed relative clause and its antecedent. Following Kiss (2002), we will assume that extraposed relative clauses are neither moved nor asso-

[5]Pollard/Sag (1994:363-371) assume that specifiers include a variety of categories, among them numerals in NP and numeral modifiers in PP. Although we do not provide an analysis for these constructions, we assume tacitly that all these constructions are not to be analyzed as specifiers in the sense used here. This issue will be taken up in more detail in section 6.6.

ciated with their antecedents through a 'movement simulation' feature, like EXTRA (cf. Keller 1995). Kiss (2002) assumes that extraposed relative clauses can be adjoined to a given phrase if the phrase contains a suitable antecedent. Such an antecedent can be deeply embedded in the phrase, but the agreement features of the phrase must be compliant with the agreement features of the relative pronoun. Since the association of the relative clause with its NP antecedent must take place in a local tree structure, so-called anchors mediate it. Anchors are introduced into the syntactic structure by nominal projections. They are projected through the set-valued non-local feature ANCHORS. The relative clause requires that the ANCHORS attribute of its syntactic sister contains at least one anchor that can be used for identification. In its relevant parts, the anchor is identical to the index of the nominal projection. It hence follows that the head of the nominal projection and the relative pronoun agree. The projection of anchors is subject to a condition requiring that all anchors become bound if the resulting phrase is an instance of the Head-Filler or Head-Specifier Schema. Hence, Kiss (2002) can account for the fact that relative clause extraposition is not constrained by the Complex Noun Phrase Constraint, but must still obey Upward Bounding. Extraposition is upward bounded, which means that - in terms of movement - an extraposed phrase must not cross an S'-node (cf. Ross 1967/86:174ff.).

These two assumptions interact in a crucial way. Kiss (2002) assumes that in head-specifier phrases, the head's anchors set contains the anchors of its specifier as well. In itself, this is a mere stipulation, but it yields the empirical consequences sketched above, since in a head-specifier structure, the anchors become available once the head has been introduced. Given that anchors mediate the relation between an extraposed relative clause and its antecedent in the present proposal, an extraposed phrase may be adjoined to a phrase that crucially does not contain the antecedent, but only the lexical head whose specifier the antecedent will be. This configuration does not only account for the contrasts given in (1)to (7) but also for the observation that subject-related extraposed relative clauses may be found inside VP, i.e. in a phrase which does not contain the antecedent.

The typology of phrases sketched here for English does not necessarily hold for other languages. In other words, there is nothing inherent in either topicalization or wh-question formation that requires topicalization to be an instance of the Head-Filler schema (Pollard & Sag 1994:164), and wh-question formation to be an instance of the Head-Specifier Schema (Pollard & Sag 1994:362), respectively. Hence, the analysis also accounts for the fact that a contrast between wh-

movement and topicalization does not show up in verb-second (V2) languages such as German, if V2 constructions are analyzed as instances of the Head-Specifier Schema. Grammatical cases of extraposition with topicalization and wh-movement are given in (9) and (10).

(9) Den Mann$_i$ hat sie gesehen, den$_i$ ich gestern getroffen hatte.
The man has she seen who I yesterday met had
'She saw the man that I had met yesterday.'

(10) Wen$_i$ hat sie gesehen, den$_i$ ich gestern getroffen hatte?
Who has she seen who I yesterday met had
'Who did she see that I had met yesterday?'

The following sections illustrate and elaborate the proposal. In section 6.2, we sketch a discourse-based account to the aforementioned contrasts and its problems. Section 6.3 briefly illustrates Kiss' (2002) analysis of relative clause extraposition. Section 6.4 discusses the interaction of extraposition with heads and specifiers. Section 6.5 presents the analysis of the contrast given above. Section 6.6 discusses the treatment of VP-internal subject-related extraposed relative clauses in the light of the present proposal and its implications for the structural relation between relative clauses and their antecedents. Section 6.7 offers an assessment of the conceptual foundations of the present proposal and summarizes the analysis.

6.2 A discourse-based analysis

As was suggested in the introduction, it seems worthwhile to explore whether the contrast exemplified above could be reduced to the discourse functions of the dislocated phrases.[6] In particular, one could assume that focused phrases must not appear in topic position (at least this seems to be forbidden in English clauses), and furthermore that a phrase which is related to an extraposed phrase is necessarily focused. Such a suggestion, however, exhibits a variety of problems once considered under closer scrutiny. Although it is correct that an extraposed phrase shows a focusing effect (cf. Rochemont & Culicover 1990:64), this does not imply that the antecedent of an extraposed phrase necessarily has to be focused as well. To the contrary, Rochemont & Culicover (1990:64) show that the antecedent of an extraposed phrase can even be a topic, while the extraposed phrase is still focused. This is illustrated in the question-answer pair in (11), where capitalization indicates stress.

(11) Q: Did Mary meet any soldiers at the party?
A: Yeah, she met a soldier at the party that she really LIKES.

[6] I would like to thank an anonymous reviewer for raising this issue.

If a soldier in (11) can be classified as a topic, or at least as a clear non-focus, as suggested by Rochemont & Culicover (1990), why is it still impossible for such a phrase to appear in topic position? Example (12) is crashingly ungrammatical, even if it is given as an answer to the question in (11).

(12) *A soldier she met at the party that she really LIKES.

With the ungrammaticality of (12), however, a discourse-based analysis of the contrast exemplified above collapses since such an example would have to be classified as grammatical. We will thus refrain from a discourse-based analysis and instead present a syntactic approach to the contrast in (1) to (7).[7]

6.3 Extraposition as adjunction

The analysis of relative clause extraposition presented in Kiss (2002) is based on the following hypotheses:[8]

- A relative clause can be syntactically adjoined to all kinds of major phrases (D/NP, PP, VP).
- A relative clause semantically modifies the semantic contribution of a phrase that is contained in the phrase to which the relative clause has been adjoined.

So-called anchors mediate the modification. For the present purposes, we may assume that an anchor is identical to the index of a sign.[9] An anchor is introduced by nouns and verbs, and is projected through a set-valued non-local attribute called ANCHORS. The projection is constrained by the following condition:

(13) Anchor Projection Principle:
The INHERITED|ANCHORS value of a headed phrase consists of the union of the INHERITED|ANCHORS values of the daughters less those anchors that are specified as TO-BIND|ANCHORS on the head daughter.

[7] There is a further problem with a discourse-based approach: Even if such an analysis were tenable, it would remain unclear how it could be integrated into HPSG. I admit though that this is less a problem of a discourse-based approach and more one of a theory which started out as an all-integrating approach to natural language.

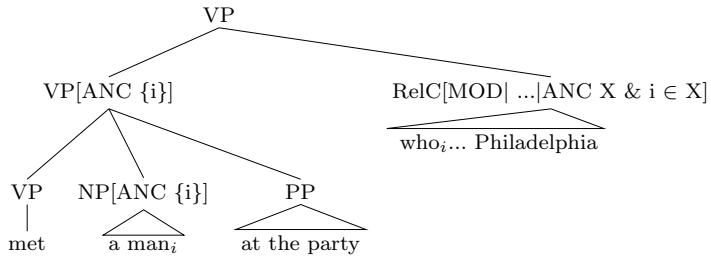
[8] For a detailed account, the reader is referred to Kiss (2002).

[9] This identification immediately accounts for the requirement that a relative pronoun and its antecedent have to agree. The semantic representations used in Kiss (2002) are based on Minimal Recursion Semantics (MRS, cf. Copestake et al. 1995). Since handles in MRS model semantic subordination, an anchor actually consists of an index and its associated handle. This is irrelevant for our present purposes.

In the following examples (14) and (15), the anchor of the object is represented through its index i. It is the effect of (13) that anchors project freely in a syntactic structure, as long as they are not specified as TO-BIND on the head daughter of a phrase. As for the internal structure of relative clauses, the present analysis stays in close correspondence to the analysis developed in Pollard & Sag (1994, chap. 5). There are two crucial differences though, as already mentioned above. First, the relative clause's MOD attribute is not categorially restricted. Hence a relative clause may adjoin to an NP or to a VP or to other phrases.[10] Second, the semantic identification requirement is mediated through the ANCHORS attribute. The identification requirement MOD|... |ANC X & i ∈ X is to be read as follows: the modified phrase must have an ANCHORS value X and this value must contain a compliant anchor i as one of its elements. It is important to realize that this identification requirement is completely independent of a possible extraposition of the relative clause, i.e. the identification requirement accounts both for the extraposed and the non-extraposed case, as can be illustrated in (14) and (15). In (14), the relative clause is adjoined to the VP. Since the VP contains the compliant anchor i, which is inherited from the object NP a man, the structure corresponds to the identification requirement of the relative clause, and hence the adjunction is licensed.[11]

(14) a. John [$_{VP}$ met [$_{NP}$ a man] at the party who was from Philadelphia].

b.



In (15), the relative clause is directly adjoined to the object NP (we have omitted the PP here, for reasons of perspicuity). But since the object NP contains the very anchor of its head noun, the identification

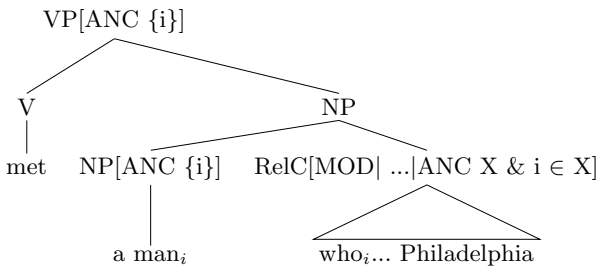
[10] Kiss (2002, section 2.3) shows that an adjunction of relative clauses to phrases other than NPs is empirically justified, unless one wants to pursue an analysis based on short distance extraposition.

[11] Please note that for expository purposes we have shown only the anchor that will be bound by the relative clause. Depending on the PP and the RelC in (14), the RelC could even be associated with the NP complement of the preposition.

requirement of the relative clause is again met.[12]

(15) a. John [$_{VP}$ met [$_{NP}$ a man who was from Philadelphia]] at the party.

b.



The Anchor Projection Principle in (13) is reminiscent to the Nonlocal Feature Principle of Pollard & Sag (1994:164). If an anchor is specified as TO-BIND, its projection is cancelled. We assume that the Head-Filler Schema (as given in Pollard & Sag 1994:164) and the Head-Specifier Schema (as given in Pollard & Sag 1994:362) are constrained to the effect that all anchors of the daughters are specified as TO-BIND—ANCHORS. English clauses are the result of either of the two schemata. It follows immediately that relative clause extraposition is upward bounded, since the Anchor Projection Principle blocks a further projection of the anchors once a structure has been built by either schema. This idea has an interesting but also seemingly unwanted consequence, once we give up the idea that the subject of an English clause is realized as a subject daughter and instead is realized as a specifier daughter, as suggested in (8). If an anchor is cancelled once a specifier daughter is realized, how can a subject related extraposed relative clause be realized at all? To answer this question, let us consider the status of traces with respect to the suggestions already given.

6.4 Traces, head specifier constructions, and extraposition

To exclude ungrammatical examples like (16) and (17), where a phrase has been topicalized but a relative clause is realized in a position where it modifies the trace of the topicalized phrase, Kiss (2002) assumes that

[12] Although it already follows from the Anchor Projection Principle in (13), it should be stressed that the anchor of the NP is not cancelled after an identification with the relative clause takes place in (14) and (15). The empirical reason for not immediately cancelling anchor projection after an identification took place stems from the observation that an anchor may be used more than once, as can be witnessed in (i).

(i) John met a man at the party with blond hair who was from Philadelphia.

traces do not contain anchors.[13]

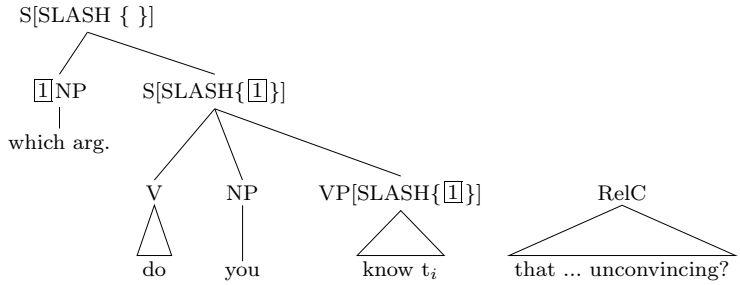
(16) *[Which man]$_i$ did you meet [t$_i$ who was from Philadelphia] at the party?

(17) *[Den Mann]$_i$ hat sie [t$_i$ den ich gestern traf] gesehen. The man has she who I yesterday met seen

This assumption is not only empirically justified by examples like (16) and (17), but also conceptually. Anchors belong to the NONLOCAL features. Since a trace and its antecedent only share their LOCAL features, the presence of an anchor in a trace would not be transmitted to its antecedent. But if a trace does not contain anchors, it remains a mystery how the grammatical examples in (6), (7), (9), and (10) could be derived in the first place. Consider as a first illustration an analysis of example (7) in (18).

(18) a. Which argument$_i$ do you know [that$_i$ Sandy thought was unconvincing]?

b.



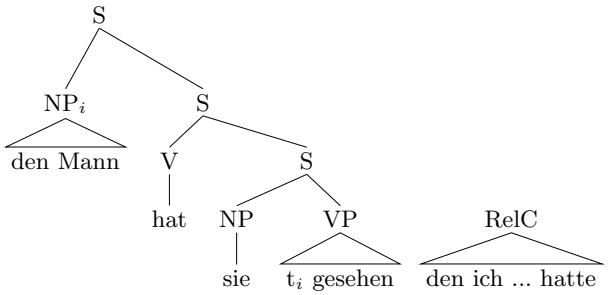
The problem is that it remains rather obscure to which phrase the relative clause should be adjoined. Since traces do not contain anchors, the identification requirement cannot be met by adjoining the relative clause to the VP or to the lower S. Also, the relative clause cannot be adjoined to the higher S since the Anchor Projection Principle requires that all anchors be cancelled as a result of the application of the Head-Specifier Schema. Consequently, it looks as though the analysis suggested so far cannot even account for rather simple cases of extraposition from wh-phrases. Consider as a further illustration example (9) in (19).[14]

[13] The same result could be achieved by assuming that traces do not exist (cf. Sag 1997). As has been pointed out by Kiss (2002), it remains unclear how so-called reconstruction effects are captured in a traceless analysis.

[14] Nothing will be said here about the details of the verb second construction in German. Pollard (1996), e.g. assumes that a verb in second position is a verb with a [INV +] specification. Following Borsley (1989), Kiss (1995) assumes that the verb

(19) a. Den Mann$_i$ hat sie gesehen, den$_i$ ich gestern getroffen hatte.

b.

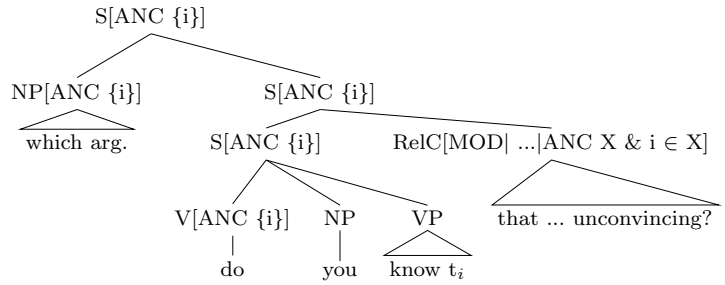


In (19), the same considerations apply: the relative clause cannot adjoin to VP, since the trace in VP does not count as an antecedent. For the same reason, it cannot be adjoined to the lower S nodes either. What is more, it cannot adjoin to the highest S node, since the highest S node does not contain any anchor.

Kiss (2002) solves this problem by applying Pollard and Sag's analysis of tough constructions (1994:166-171) to V2 constructions including English wh-constructions, which are instances of residual V2. Kiss assumes that a verb in second position contains a lexical TO-BIND—SLASH specification. It cancels the SLASH projection of its NP or VP complement and further selects the SLASHed constituent as its specifier. Building on this idea, Kiss (2002) suggests that the anchors of a specifier are also present in the lexical head that selects the specifier. As a consequence, the following analysis of example (7) emerges.

(20) a. Which argument$_i$ do you know [that$_i$ Sandy thought was unconvincing]?

b.

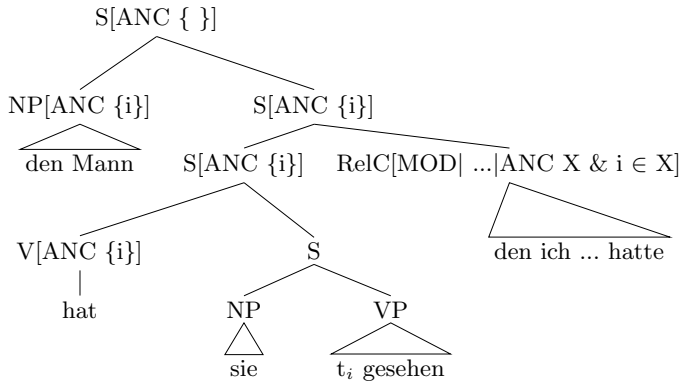


in second position is actually the result of a dislocation (simulated through feature percolation). We follow Kiss' analysis here since it allows a uniform treatment of subject and object extraction. With respect to English, we assume the clause structure given in Pollard/Sag (1994).

Correspondingly, the example (9) can be analyzed by adjoining the relative clause to the lower S node, as is illustrated in (21).

(21) a. Den Mann$_i$ hat sie gesehen, den$_i$ ich gestern getroffen hatte.

b.



The lexical specification of a finite inverted English verb in (22) shows the crucial relationship between the NONLOCAL|INHERITED| ANCHORS value of the verb and its specifier (SPR). The anchors of the specifier are set-unioned with the anchors of the head itself, thus making the anchors of the specifier available once the head has been introduced. A German verb in second position would show the same representation, i.e. the anchors of the topicalized phrase become available once the verb in second position has been realized. There are differences, though, between inversion in English and German, which, however, are tangential to the present discussion and will hence be ignored.[15]

(22) Lexical specification of English inverted verbs:

[15] An association of the relative clause with the subject is blocked since the gender of the subject is not compliant with the gender of the relative pronoun. We can thus safely ignore the anchor of the subject. Similarly, the anchors of the subjects are ignored in the analysis of (5) and (7).

$$\left[\begin{array}{l} \text{LOC}\,|\,\text{CAT}\left[\begin{array}{l} \text{HEAD } \textit{verb}\left[\text{INV } +\right] \\ \text{SPR}\left\langle\left[\begin{array}{l}\text{LOCAL } \boxed{1} \\ \text{NONLOCAL}\,|\,|\,\text{ANCHORS } \boxed{2}\end{array}\right]\right\rangle \\ \text{COMPS}\left\langle \boxed{3}\text{NP, VP}\left[\begin{array}{l}\text{SPR}\left\langle\boxed{3}\right\rangle \\ \text{SLASH}\left\{\boxed{1}\right\}\end{array}\right]\right\rangle \end{array}\right] \\ \text{NONLOCAL}\left[\begin{array}{l}\text{INH}\,|\,\text{ANCHORS } \boxed{2}\cup\boxed{4} \\ \text{TO-BIND}\,|\,\text{SLASH}\left\{\boxed{1}\right\}\end{array}\right] \end{array}\right]$$

As is illustrated in (22), the complement's SLASH is identified with the specifier of the verb. In addition, the anchors of the specifier are set-unioned with the anchors of the verb itself. Hence, they become available once the verb has been introduced into the syntactic structure. The representation in (22) reveals another property of the present analysis: the subject of a verb is not represented through a SUBJ attribute but is also considered a specifier. Hence, we assume that not only the anchors of a dislocated phrase, but also the anchors of subjects become available once the verb is introduced. We are now in the position to offer an answer to the question raised at the end of section 2. A subject-related extraposed relative clause may (in fact must) be realized inside VP since the subject's anchors are present in the verb already. This idea will be explored more deeply in section 5.

6.5 Analyzing the data

The basic tenets of the present analysis can be summarized as follows: Extraposed relative clauses are related to their antecedents through anchors and anchor projection. Anchors are discarded if a phrase is built by the Head-Specifier Schema or the Head-Filler Schema. In a Head-Specifier Schema, the lexical head bears the anchors of its specifier (apart from its own anchor).[16]

[16] Sag (1997:466) mentions cases like (i), where the relative clause can only be related to the whole wh-phrase and not to a part of it.

(i) [Which author$_i$'s book]$_j$ do you know that*$_i$/$_j$ you like?

The ungrammaticality indicated in (i) should not be derived by blocking NP-internal antecedents of a relative clause. As has been discussed by Haider (1996) and Kiss (2002) among others, a general ban against NP-internal antecedents of relative clauses would lead to an undergeneration, since relative clause extraposition is well-known to violate the CNPC (Ross 1967/86). It seems that the ungrammaticality of (i) is related to the fact that the NP-internal antecedent is a specifier itself. Kiss

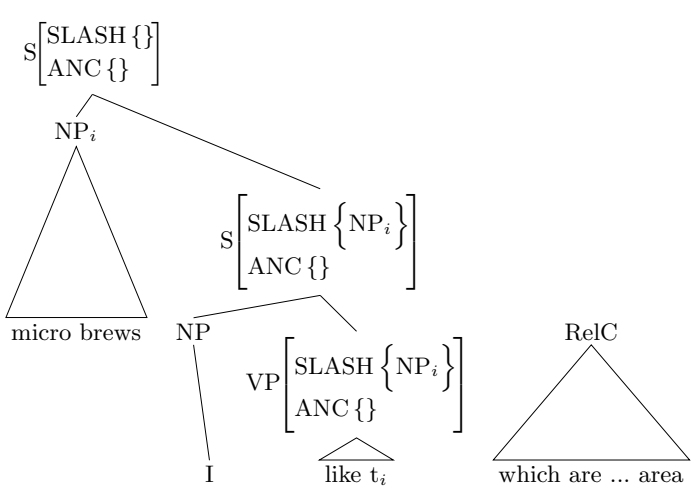
Subjects are specifiers of non-inverted finite verbs. The specifier of an inverted verb originates as SLASH of its complement.[17] Although superficially the bracketed part of (2) resembles the structure of example (21), it becomes obvious under closer scrutiny that (2) resembles (19) more than (21). In the analysis of (2), the topicalized VP is adjoined to another phrase as an instance of the Head-Filler Schema. A filler daughter differs from a specifier daughter in that the former is not related to a lexical head. Such a lexical head, however, would be required to make the anchors of the 'moved' phrase available for the extraposed relative clause. Hence, (2) is excluded because the extraposed relative clause neither finds an antecedent in the VP nor in the S projections.

(2) *The governor said he would meet a man at the party who was from Philadelphia, and [[$_{VP}$ meet a man at the party]$_i$ he did t$_i$ who was from Philadelphia].

Let us now turn to the analysis of (5). Just like (2), example (5) is an instance of the Head-Filler Schema. The topicalized constituent is adjoined to a phrase which does not have a lexical head.

(5) a. *[$_S$ [$_{NP}$ Micro brews]$_i$ [$_S$ I like t$_i$]] which are located around the Bay Area.

b.



(2002) does not provide an analysis of NP-internal specifiers, but generally assumes that only N' parts of an NP project anchors.

[17] We assume that the subject in inverted structures is actually a subject daughter, as suggested in the initial formulation of the Head-Subject-Complement-Schema in Pollard/Sag (1994:388).

As in the analysis of (2), it would only be possible to adjoin the relative clause to the VP or lower S and hence modify the subject, but not to adjoin the relative clause to VP or S and thus to modify the topicalized object. This conclusion follows since the anchor of the object is not present in VP or S. The relative clause cannot be adjoined to the higher S, since according to the Anchor Projection Principle, the resulting S does not contain any anchor.

We have already illustrated that the superficially similar example (7) does not share its structure with example (5). While example (5) is the result of an application of the Head-Filler Schema, example (7) is an instance of the Head-Specifier Schema. These two schemata differ crucially in that the latter allows an identification of the non-head daughter's anchors, but the former does not.

6.6 VP-internal subject-related relative clauses

The present analysis is not the first one to assume a strictly non-movement analysis of extraposition. Notable fore-runners are the proposals by Wittenburg (1987) and Culicover & Rochemont (1990). The present proposal and its two predecessors make rather different predictions about the structural relationship between an extraposed relative clause and its antecedent. These predictions can be summarized as follows. The present proposal assumes with Kiss (2002) that the extraposed phrase must in most cases be configurationally superior to its antecedent. There is a single exception, viz. if the antecedent is a specifier, the antecedent can be configurationally superior to the extraposed phrase, as illustrated in the previous section. Taking a rather different stance on this issue, Wittenburg (1987) proposes that the antecedent must be configurationally superior to the extraposed phrase in all cases. This position is empirically problematic, as can be witnessed by considering the following example:

(23) John talked to the *brother of the man* yesterday who had given him two pillows.

In (23) the relative clause can take the NP the brother of the man or the embedded NP the man as its antecedent. While the former NP can be realized in a configurationally superior position, this is impossible for the latter NP. In other terms, the embedded NP does not c-command the extraposed relative clause and hence cannot be classified as being configurationally superior to it. Wittenburg would thus predict that example (23) is in fact unambiguous with repect to the antecedent of the relative clause. Culicover & Rochemont (1990) actually assume a middle position. Their proposal allows that either the extraposed relative

clause is configurationally superior to its antecedent or the antecedent is superior to the extraposed relative clause. It is interesting to see where the disjunctive formulation of this proposal has its origin. Culicover & Rochemont (1990:32f.) observe that subject-related extraposed relative clauses can be realized inside VP. They offer the following empirical observations to justify their assumption. First, as is illustrated in (24), a subject-related extraposed relative clause can be realized to the left of the complex adverbial *as quickly as possible*. According to Culicover & Rochemont (1990), this adverbial marks the right-hand side of the VP, and hence, material which is realized to its left must be realized inside VP. Second, as is illustrated in (25), elliptical constructions allow a construal where an elided modifier may modify both subjects in a conjunction.

(24) Some women came in who were from Chicago as quickly as possible.

(25) A man with blond hair came in, and a woman did too.

Hence in (25) we find a reading where with blond hair modifies both the first and the second subject. In the present proposal, the examples given in (24) and (25) can be covered without resorting to a disjunctive constraint. As we have illustrated, the anchors of a specifier become available once the lexical head is realized on which the specifier is dependent. Again differing from the analysis in Pollard & Sag (1994), we assume that subjects are also specifiers. As a consequence, a subject-related extraposed clause is not only predicted, but actually forced to appear inside VP. This is so because the anchors of the subject are cancelled after the subject has been realized as a specifier daughter. It follows from the same considerations that object-related extraposed relative clauses must appear inside VP. They can only appear outside VP if the object is realized as a specifier daughter, i.e. in the case of wh-question formation. In all other cases, the anchor of the object is cancelled together with the anchor of the subject, once the subject has been realized. The present proposal thus accounts for two observations made in Culicover & Rochemont (1990). First, object-related extraposed relative clauses must appear inside VP because they can find a compliant anchor only here. There is one notable exception, depending on whether a dislocated object is realized as a filler or as a specifier daughter. Only in the latter case, an extraposed relative clause can adjoin to the phrase which contains the lexical head selecting for the specifier, as was discussed in sections 6.4 and 6.5. Second, subject-related relative clauses also must appear inside VP, which accounts for the observations reported in (24) and (25). We thus can refrain from a

disjunctive constraint on the realization of extraposed relative clauses.

Subjects actually show a behavior similar to other specifiers, and thus justify the move to declare them specifiers themselves. In particular, wh-phrases can be realized in subject position or in dislocated positions. Chomsky (1986:48ff.) has suggested that English subject wh-phrases are actually realized in the same position as subject non-wh-phrases. From the perspective of a typology of phrases which distinguishes subjects from other specifiers, as in Pollard & Sag (1994:391), this is a surprising result. In the present analysis, this result is much less surprising, since both subjects and dislocated objects occupy a specifier position. We would thus assume that an example like (26) does not show a dislocation of the wh-element at all. Instead, it is realized in 'subject' position, where a subject of a verb is analyzed as its specifier.

(26) I wonder who saw Kim.

It is also well known that wh-phrases may appear in indirect questions, although indirect questions are not lexically headed in English and German, as illustrated in (27).

(27) I wonder whom she saw.

A tentative proposal would be to assume that indirect questions are headed by an empty element, hence the relevant structure of (27) would be as given in (28), where e indicates an empty head, the specifier of which would be the wh-phrase.

(28) I wonder [[who] [*e* she saw]]

This empty element would behave exactly like an auxiliary verb in English or a verb in second position in German. Independent justification for empty heads in indirect questions has been provided in Bayer (1984) for Bavarian. An 'empty head' analysis follows the basic tenets of the analysis of relative clauses in Pollard & Sag (1994), which however has recently been critized in Sag (1997) and Sag & Ginzburg (2001). Although we cannot currently provide an exact analysis of interrogative clauses, it would be interesting to explore the consequences of the present proposal for such an analysis.

6.7 Conceptual assessment

While an extraposed relative clause can be related to a 'wh-moved' phrase, it cannot be related to a topicalized phrase. The reason is that the latter is adjoined to a phrase, but the former is realized as a specifier of that phrase. We have offered a syntactic account for the contrast between topicalization and wh-movement in English, and also for the non-contrast between these two constructions in German. This account

relies on the hypothesis that in English, two different structures have to be assumed for topicalization and question formation, while in German topicalization and question formation pattern alike. English topicalization structures are analyzed as being headless, i.e. as not having a lexical head. Since a local relationship between a head and the topicalized phrase cannot be established, a topicalized phrase may not serve as the antecedent of an extraposed phrase. It should be apparent that the analysis suggested relies on a structural difference between sentences with and without inverted verbs. Kathol (2000) has suggested that the structure of German verb final clauses is identical - in the pertinent respects - to German verb second clauses. Transferring his approach to English, one would come to the conclusion that inverted clauses are not structurally different from non-inverted ones. If this conclusion were drawn, however, the contrast in (1) to (7) would remain mysterious. We thus suggest that the present approach is not only descriptively adequate in offering an analysis of the aforementioned contrasts, but in addition makes substantial claims about the structural representation of clauses. We assume that the contrast given is a structural one, i.e. a contrast that can be reduced to different structures of superficially similar clauses.

From a conceptual point of view, we have opted for a typology of phrases which particularly turns subjects into specifiers. Such a move cannot be criticized by pointing out that the notion specifier already has an inherent definition in HPSG, a definition which is possibly at odds with the very notion of a subject itself. But this is actually not the case. The only clear definition of a specifier in HPSG is given through the features which are required to represent a specifier, viz. SPR and SPEC. The class of elements which are considered specifiers in Pollard & Sag (1994) is actually a mixed bag which seems to correspond to the classification of specifiers for English in Jackendoff (1977:103-165). This classification does not rely on an intrinsic property and hence becomes somewhat arbitrary. For many of the elements which are classified as specifiers in Pollard & Sag (1994, chap. 9.4), an alternative analysis suggests itself, e.g. a DP analysis for determiners (cf. Netter 1994).

It should be mentioned though that some conceptual and empirical arguments are presented in Pollard & Sag (1994) to show that certain elements can be carved out as specifiers. One assumption is that a specifier lacks the potential to be a semantic argument (Pollard & Sag 1994:359).[18] But this conclusion does not hold for many elements which

[18] Pollard/Sag (1994:359) also offer control and raising as a distinguishing property: subjects are open to control and raising while the class of elements they call

should be analyzed as specifiers, e.g. for possessives, for specifiers of AP, and of course not for ordinary subjects if these are VP specifiers.

Two empirical arguments against equating subjects and specifiers are presented in Pollard & Sag (1994:359f.). First, Pollard and Sag observe that predicative nouns may have a subject as well as a specifier, as illustrated in (29).

(29) We consider *John* an idiot.

There are various problems to be noted here. To begin with, it is rather unclear that the determiner has to be analyzed as a specifier. Alternatively, as already noted, one could assume that the determiner heads the whole phrase. What is more, the status of John as a subject is dubious as well. This can be witnessed by comparing (29) with (30).[19]

(30) I considered him Cicero.

It strikes me as rather strange that a proper noun should have a subject. Finally, this argument rests on the assumption that it is illicit for any predicate to have more than one subject. Although this idea might be correct, it does not predict anything about the multiple occurrence of specifiers. Since we have not claimed that specifiers are subject, but that subjects are specifiers, showing that more than one subject is intenable does not affect our argument.

The second empirical argument concerns the absolutive construction, where again a subject and a specifier may co-occur. Again, this can only be considered an argument as long as one assumes that a given element may have at most one specifier. Although this assumption is a tacit building block of many analyses of specifier constructions in generative grammar, it has recently been given up by Chomsky (1995:341ff.).

Pollard & Sag (1994:359ff.) argue against the assumption that specifiers are subjects. It should be clear that this position is not defended here either. As Pollard & Sag (1994:359) point out: "We will argue in favor of a ... position ... that specifiers ...

should be regarded in terms of a grammatical relation distinct from subject." Such a criterion of distinctness can be met if we assume that subjects form a subset of the class of specifiers. We can thus explain

specifiers is not. But Pollard/Sag (1994:359fn19) also note that such a property does not account for possessor raising, except if one assumes that possessors are not specifiers but subjects.

[19]Here I am relying on the grammaticality judgments of Bob Borsley and Bob Levine. Bob Levine also points out that although he finds (30) grammatical, he considers the following example to be ungrammatical.

(i) *After close examination, I find him Tully.

the common properties of subjects and other specifiers and still keep the two apart.

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References

Bayer, J. (1984): Comp in Bavarian Syntax. *The Linguistic Review* 3.3, p. 209-274.

Borsley, R.D. (1989): Phrase Structure Grammar and the Barriers Conception of Clause Structure. *Linguistics* 27, p. 843-863.

Chomsky, N. (1977): On Wh-Movement. In: Culicover, P. & A. Akmajian & T. Wasow: *Formal Syntax.* New York: Academic Press, p. 71-132.

Chomsky, N. (1986): *Barriers.* Cambridge & London: The MIT Press.

Chomsky, N. (1995): *The Minimalist Program.* Cambridge & London: The MIT Press.

Copestake, A. & D. Flickinger & R. Malouf & S. Riehemann & I. Sag (1995): Translation using Minimal Recursion Semantics. *Proceedings of the 6th International Conference on Theoretical and Methodological Issues in Machine Translation.* Leuven: KUB.

Culicover, P. & M. Rochemont (1990): Extraposition and the Complement Principle. *Linguistic Inquiry* 21, p. 23-47.

Haider, H. (1996): Downright down to the Right. In: Lutz, U. & J. Pafel (Eds.): *On Extraction and Extraposition in German.* Amsterdam: John Benjamins Publishing Company. p. 245-271.

Kathol, A. (2000): *Linear Syntax.* Oxford: Oxford University Press.

Keller, F. (1995): Towards an Account of Extraposition in HPSG. *Proceedings of EACL,* Dublin, p. 301-306.

Kiss, T. (1995): Merkmale und Reprasentationen. Wiesbaden & Opladen: Westdeutscher Verlag.

Kiss, T. (2002): Semantic Constraints on Relative Clause Extraposition. Forthcoming in *Natural Language and Linguistic Theory.* Available from http://www.linguistics.ruhr-uni-bochum.de/F∼kiss.

Netter, K. (1994): Towards a Theory of Functional Heads: German

Nominal Phrases. In: Nerbonne, J. & K. Netter & C. Pollard (Eds.): *German in Head-Driven Phrase Structure Grammar,* Stanford: CSLI Publications, p. 297-340

Pollard, C. (1996): On Head Non-Movement. In: Bunt, H. & A. van Horck, (Eds.): *Discontinuous Constituency. Natural language processing,* number 6. Berlin, New York: Mouton de Gruyter, p. 279-305.

Pollard, C. & I.A. Sag (1994): *Head-driven Phrase Structure Grammar.* Chicago: University of Chicago Press.

Rochemont, M. & P. Culicover (1990): *English Focus Constructions and the Theory of Grammar.* Cambridge: Cambridge University Press.

Ross, J.R. (1967/86): *Constraints on Variables in Syntax.* MIT Diss. 1967. Printed under the title Infinite Syntax. New York: Ablex Publishers, 1986.

Sag, I.A. (1997): English Relative Clause Constructions. *Journal of Linguistics* 33, p. 431-483.

Sag, I.A. & J. Ginzburg (2001): *Interrogative Investigations. The Form, Meaning, and Use of English Interrogatives.* Stanford: CSLI Publications.

7

Valence Alternations in Modern Greek: an MRS analysis

VALIA KORDONI

7.1 Introduction

The aim of this paper is to provide a semantic account of valence alternations in Modern Greek of the following general form:[1]

(1) NP_k V NP_i [P NP_j] $\rightarrow$ NP_k V NP_j [P NP_i]

In other words, the valence alternations in Modern Greek we focus on in this paper are the ones involving direct internal arguments (i.e., objects) and indirect prepositional complements.

Such alternation patterns in Modern Greek characterize mainly the behaviour of verbal predicates which participate in the so-called Locative Alternation phenomena.

The rest of the paper is structured as follows. In the next section (Section (7.2)) we will give a thorough overview of the behaviour of the relevant classes of verbs in Modern Greek: the so-called *spray/load* verbs, *removal* verbs, and the *impingement* verbs. In Section (7.3) we will present brie¤y previous analyses of valence alternations and we will show why such analyses fail to account for the Modern Greek data that we are interested in. Finally, in the last section (Section (7.4)) we will give a brief overview of Minimal Recursion Semantics (MRS; Copestake et al. (1999)), which the analysis of valence alternations in Modern Greek that we are presenting in the same section is based on.

[1] The indices in (1) denote referential identity.

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7.2 Locative Alternation in Modern Greek: Overview

7.2.1 The verbs of the *spray/load* class

Let us take a look at the following sentences in Modern Greek:

(2) O georgos fortose to ahiro sto karo.
the farmer.N load.PAST.3S the hay.A onto-the wagon
"The farmer loaded the hay on the wagon".

(3) O georgos fortose to karo me ahiro.
the farmer.N load.PAST.3S the wagon.A with hay
"The farmer loaded the wagon with hay".

(4) I diadilotes psekasan tin mpogia sto agalma.
the demonstrators.N.PL spray.PAST.3PL the paint.A onto-the statue
"The demonstrators sprayed the paint onto the statue".

(5) I diadilotes psekasan to agalma me mpogia.
the demonstrators.N.PL spray.PAST.3PL the statue.A with paint
"The demonstrators sprayed the statue with paint".

(2)-(5) are examples of Modern Greek predicates which participate in the so-called Locative Alternation phenomena (see Dowty (1991), Rappaport and Levin (1988), Levin and Rappaport Hovav (1991)). Alternations in Modern Greek with the locative verbs *fortono* (load) and *psekazo* (spray) are of the general form presented in (1) in Section (7.1).

The main features of these verbs in Modern Greek (English and some other languages) is that they are morphologically identical and that they always involve at least two arguments: one denoting a *location* and one denoting the *locatum* (*karo* (wagon)/*agalma* (statue) and *ahiro* (hay)/*mpogia* (paint), respectively, in (2)-(5) above).

(Levin, 1993, pg. 50) describes this class of predicates as follows:

> [Locative alternation] is found with certain verbs that relate to putting substances on surfaces or things in containers, or to removing substances from surfaces or things from containers.

Much of the discussion in the literature has dealt with the so-called holistic interpretation of the English locative verbs *spray* and *load*.

Concerning Modern Greek locative verbs, in (2) all the available hay has been loaded onto the wagon no matter whether the wagon is full or not. In (3) the wagon is completely loaded. Likewise in (4) all the paint has been sprayed on the statue which is not necessarily covered. In (5) all the statue is

covered. The aspect of all the sentences in (2)-(5) above, though, depends on the properties of the object rather than the properties of the oblique.

Not all locative verbs in Modern Greek, though, alternate.

The verbs *gemizo* (£ll) and *skepazo* (cover), for instance, admit a *me*-PP (with-PP) complement only (see also Levin (1993) for the corresponding English verbs):

(6) O Petros gemise tin dexameni (me nero).
the Peter.N £ll.PAST.3S the tank.A (with water)
"Peter £lled the tank (with water)".

(7) *O Petros gemise (to) nero (stin dexameni).
the Peter.N £ll.PAST.3S (the) water.A (into-the tank).
"*Peter £lled water (into the tank)".

(8) O Petros skepase to perivoli (me ena adiavroho).
the Peter.N cover.PAST.3S the garden.A (with a tarpaulin)
"Peter covered the garden (with a tarpaulin)".

(9) *O Petros skepase ena adiavroho (sto perivoli).
the Peter.N cover.PAST.3S a tarpaulin.A (over-the garden)
"*Peter covered a tarpaulin (over the garden)".

On the other hand, the verb *hino* (pour), for instance, appears only with a locative prepositional complement:

(10) O Petros ehise nero sto mbol.
the Peter.N pour.PAST.3S water.A into-the bowl
"Peter poured water into the bowl".

(11) *O Petros ehise to mbol me nero.
the Peter.N pour.PAST.3S the bowl.A with water
"*Peter poured the bowl with water".

7.2.2 Removal Predicates

The *removal* predicates in Modern Greek also take *locatum* and *location* arguments and they are distinguished in the following groups:

1. Predicates which imply a change of state of the *location* argument (for instance, the verb *adiazo* (empty)) when it is realized as the direct object of the verb. These predicates appear as tri-valent with alternative argument structures (see examples (12) and (13) below):

   (12) O Petros adiase tin dexameni (apo to nero).
   the Peter.N empty.PAST.3S the tank.A (of the water)
   "Peter emptied the tank (of water)".

(13) O Petros adiase to nero apo tin dexameni.
the Peter.N empty.PAST.3S the water.A from the tank
“Peter emptied the water from the tank”.

2. Predicates which denote a contact with the *location* (see also Levin and Rappaport Hovav (1991) for the corresponding predicates in English). These predicates may also specify the manner or the instrument related to this action of moving (*skupizo* (wipe)).
They do not allow an inchoative interpretation (example (14)). This is an indication that they do not imply a change of state of the *location* argument. For instance, wiping the oil from a pan does not imply a de£nite change of the state of the pan. That means that the pan is not an *oil-less pan*.
Some of these predicates do not admit an *apo*-PP (of/from-PP) complement when their *location* argument is realized as the direct object. For instance, the verb *skupizo*. *skupizo* (wipe) does not admit an *apo*-PP (of/from-PP) complement when its *location* argument is realized as the direct object (example (15)). In this case *skupizo* does *not* entail the existence of a *locatum* argument. For instance, the act of wiping a pan does not necessarily result in wiping something off it.

(14) *To tigani skupistike apo to ladi.
the pan.N wipe.PAST.INCH.3S of the oil
“*The pan wiped of oil”.

(15) *O Petros skupise to tigani apo to ladi.
the Peter.N wipe.PAST.3S the pan.A from the oil
“*Peter wiped the pan of the oil”.

(16) O Petros skupise to tigani.
the Peter.N wipe.PAST.3S the pan.A
“Peter wiped the pan”.

(17) O Petros skupise to ladi apo to tigani.
the Peter.N wipe.PAST.3S the oil.A from the pan
“Peter wiped the oil from the pan”.

katharizo (trim) is different than *skupizo* (wipe), though, in the sense that “trimming an object” necessarily means “trimming something off this object”:

(18) O Petros katharise to thamno apo ta xera kladia.
the Peter.N trim.PAST.3S the bush.A of the dry branches
“Peter trimmed the bush of the dry branches”.

3. Predicates which denote only some action of contact in relation to the *location*, but do not specify the manner or the instrument used in this action.
   In Modern Greek these predicates do not allow an inchoative interpretation (see example (19) below), but they take an obligatory *apo*-PP (from-PP) (see example (21) below):

   (19) *I tsada vgalthike apo ta psonia.
   the bag.N remove.PAST.INCH.3S of the shopping
   "*The bag removed of the shopping".

   (20) *I Maria evgale tin tsada apo ta psonia.
   the Maria.N remove.PAST.3S the bag.A of the shopping
   "*Maria removed the bag of the shopping".

   (21) I Maria evgale ta psonia apo tin tsada.
   the Maria.N remove.PAST.3S the shopping.A.PL from the bag
   "Maria removed the shopping from the bag".

   (22) *I Maria evgale ta psonia.
   the Maria.N remove.PAST.3S the shopping.A.PL
   "*Maria removed the shopping".

4. The verb *therapevo* (cure) also belongs to the so-called *removal* predicates in Modern Greek:

   (23) To pedi therapeftike apo tin pnevmonia.
   the child.N cure.PAST.INCH.3S of the pneumonia
   "The child cured of pneumonia".

   (24) O yiatros therapefse to pedi apo tin pnevmonia.
   the doctor.N cure.PAST.3S the child.A of the pneumonia
   "The doctor cured the child of pneumonia".

   (25) *O yiatros therapefse tin pnevmonia apo to pedi.
   the doctor.N cure.PAST.3S the pneumonia.A from the child
   "*The doctor cured pneumonia from the child".

7.2.3 Impingement Predicates

A typical impingement verb in Modern Greek is *htipo* (hit).

According to Dowty (1991), the verb *hit* (in English) does not imply any change of state for any of its arguments which may surface syntactically as direct object. The same semantic entailments also hold for the Modern Greek verb *htipo*.

htipo is an assymetric predicate in that when the *location* argument is realized as the direct object of the predicate the *locatum* argument is optional, but when the *locatum* argument is realized as the direct object all arguments are obligatory.

(26) O Petros htipise ton frahti.
the Peter.N hit.PAST.3S the fence.A
"Peter hit the fence".

(27) O Petros htipise ton frahti me to xilo.
the Peter.N hit.PAST.3S the fence.A with the stick
"Peter hit the fence with the stick".

(28) O Petros htipise to xilo sto frahti.
the Peter.N hit.PAST.3S the stick.A onto-the fence
"Peter hit the stick against the fence".

(29) *O Petros htipise to xilo.
the Peter.N hit.PAST.3S the stick.A
"'*Peter hit the stick".

Another impingement verb in Modern Greek is the trivalent verb *spazo* (break), which alternates between a *me* (with) and a *sto* (onto) prepositional complement. Each alternant indicates that the argument which surfaces as the direct object of the verb is entailed to undergo a change of state.

The relationship between the trivalent *spazo* and its bivalent counterpart in Modern Greek is a very interesting one to observe. The bivalent *spazo* (break) does not require that its direct object be either a *location* or a *locatum*:

(30) O Gianis espase to podi tu.
the Gianis.N break.PAST.3S the leg.A his
"John broke his leg".

In other words, on its own *spazo* (break) is not an impingement verb, but a change-of-state predicate (see Gawron (1986) on the English verb *break*).

Moreover, in the trivalent case both oblique arguments are optional and neither is entailed by the verb. This strongly suggests that *spazo* is simply a change-of-state verb, even in its trivalent use:

(31) O Petros espase ton frahti (me to xilo).
the Peter.N break.PAST.3S the fence.A (with the stick)
"Peter broke the fence (with the stick)".

(32) O Petros espase to xilo (ston frahti).
the Peter.N break.PAST.3S the stick.A (onto-the fence)
"Peter broke the stick (against the fence)".

For verbs in the *htipo* (hit) and the *spazo* (break) subclasses in Modern Greek, the *me* (with) alternant (see examples (27) and (31) above) entails that one of the arguments is understood as the instrument ("means") which is used by the causer in order to perform the action denoted by the verb. The *sto* (onto) alternant (see examples (28) and (32) above), on the other hand, entails that one of the arguments (i.e., the *locatum*) undergoes directed motion.

Finally, as we have also pointed out in the case of the verbs of the *spray/load* class in Modern Greek (see Section (7.2.1) above), not all verbs of the impingement class in Modern Greek alternate:[2]

(33) I Maria edire to agori me to xilo.
the Maria.N swat.PAST.3S the boy.A with the stick
"Maria swatted the boy with the stick".

(34) *I Maria edire to xilo sto agori.
the Maria.N swat.PAST.3S the stick.A at/against-the boy
"*Maria swatted the stick at/against the boy".

7.3 Previous analyses of Locative Alternation

7.3.1 Pinker (1989)

Pinker (1989) assumes that the two alternants of the (English) locative verbs *spray* and *load* must have different semantic contents, since according to his analysis the semantic content of lexical entries determines (for the most part) subcategorization:

(35) Peter sprayed the paint onto the statue.
CAUSE (PETER, GO (PAINT, TO (STATUE)))

(36) Peter sprayed the statue with paint.
ACT-ON (PETER, STATUE, BY (CAUSE (PETER, GO (PAINT, TO (STATUE)))))

The problem with such analyses of valence alternations, – i.e., analyses which presuppose that the semantics of the verbs determine their subcategorization, – is that there is no independent semantic motivation for the new metalanguage predicate/keyword BY (see (36) and cf. also Koenig and Davis (2000) for more on this speci£c point).

7.3.2 An HPSG Analysis

Markantonatou and Sadler (1996) use underspeci£ed verb entries in order to provide an HPSG analysis for verb alternations in English which affect speci£cally the choice of direct and indirect internal arguments.

[2]See Dowty (1991) for similar exceptions among the verbs of the impingement class in English.

In their analysis no lexical rules are implicated in relating the two different semantics they assume for the English locative verbs, which correspond to different syntactic argument structures. Instead, for their analysis they rely on the application of the rules of their linking component, the simultaneous satisfaction of different constraints and on type inference.

As an example of how their analysis works, let us take a closer look at their proposal for the English verb *load*, which, as the Modern Greek verb *fortono* (load) in examples (2) and (3) in Section (7.2.1) above, has two alternative forms, each with an optional oblique which is existentially quanti£ed when not syntactically realized:

(37) John loaded the hay on the wagon.

(38) John loaded the wagon on the hay.

The following is the semantic representation that Markantonatou and Sadler (1996) assume for the (active) English verb *load*:

(39)
$$\begin{bmatrix} \text{REL} & \textit{load} \\ \text{ARG1} & \underset{\textit{argtype}}{\boxed{1}\begin{bmatrix}\text{OTHER} & \{\textit{location}\}\end{bmatrix}} \\ \text{ARG2} & \underset{\textit{argtype}}{\begin{bmatrix}\text{LINK} & \textit{causer\_ntc} \\ \text{OTHER} & \{\}\end{bmatrix}} \\ \text{ARG3} & \underset{\textit{argtype}}{\boxed{2}\begin{bmatrix}\text{OTHER} & \{\textit{locatum}\}\end{bmatrix}} \\ \text{SEM.CONS.} & \underset{\textit{contact}}{\begin{bmatrix}\text{REL} & \perp \\ \text{ARG1} & \boxed{1} \\ \text{ARG2} & \boxed{2}\end{bmatrix}} \end{bmatrix}_{\textit{specc}}$$

They presuppose that

> "...the [English] verb *load* has **only one** argument for which properties relevant to linking are expressed. This argument is the argument which will eventually surface as the subject. Otherwise, *load* requires a location and a locatum argument, but it does not de£ne any entailments over these arguments which would enforce any particular linking" (Markantonatou and Sadler, 1996, pg. 52).

According to Markantonatou and Sadler (1996), it is this lack of further speci£cations which permits the location-object locatum-object alternation, and which re¤ects the fact that the two alternants of the verb *load* in English are somehow symmetric with respect to the optionality of oblique arguments. As far as existential quanti£cation is concerned, they assume that arguments

which appear in the lexical entry of *load* as £rst level or embedded (second level) semantic arguments are existentially quanti£ed.

load, according to them, also has a value speci£ed for the attribute SEM.CONS, which indicates that there is an entailment of contact between the ARG1 and the ARG3 of the predicate *load* (the location and the locatum). Markantonatou and Sadler (1996) underline that "the fact that this is the most general type of contact will in turn ensure that the predicate can surface with both *with*-PP and *on*, *in*, *etc*-PP".

As far as linking of the arguments of the verb *load* is concerned, Markantonatou and Sadler (1996) assume that by means of the semantic representation that they propose in (39) two options are possible: "[Either] ARG2 is linked to subject as it has no other choice, and since it is a top level argument which is not also the argument of an embedded predicate, it must be linked. [Or] ARG1 and ARG3 are not speci£ed for any LINK values and therefore they can each link either to the object of the verb or to the object of a predicate that maps an embedded relation.... [Finally] similar argumentation can be developed if one assumes that instead of linking the ARGs £rst, the system links SEM.CONS £rst" (Markantonatou and Sadler, 1996, pg. 52-53).

Finally, the fragment of the hierarchy of *semcons* in Figure (1) below shows how the alternation characterizing the locative verbs like *load* in English is accounted for in the theory proposed by Markantonatou and Sadler (1996), which we have presented brie¤y above.

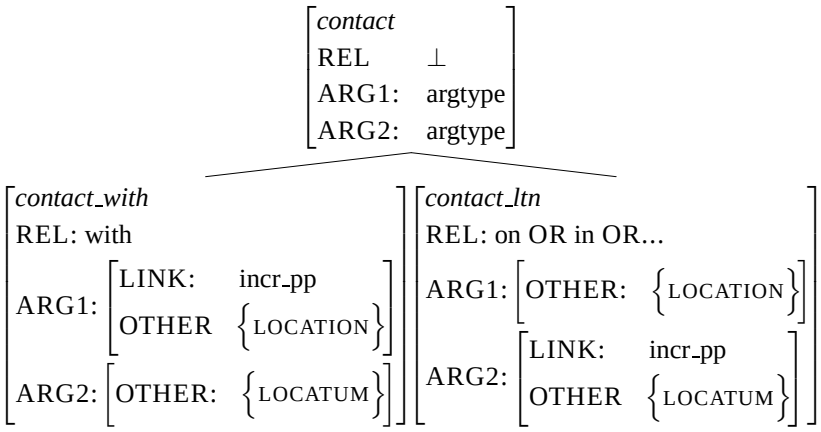

FIGURE 1 The hierarchy of *semcons* that Markantonatou and Sadler (1996) propose for English locative verbs like *load*

7.4 Locative Alternation in Modern Greek: The Analysis

The account we suggest here for locative alternation in Modern Greek (see examples in Section (7.2) above) does not follow the analysis of locative alternation that Markantonatou and Sadler (1996) have proposed and whose main points we have brie¤y presented in the previous section. The reason is that underspeci£cation (of verbal entries and/or of their complements) may be a possible approach to valence alternations, once it has been made sure that overgeneration is excluded (see, for instance, the disjunctive values of the REL feature of the *contact_ltn* type in Figure (1) of section (7.3.2) above).

Instead, we follow the proposal of Koenig and Davis (2000) for valence alternations, including locative alternation in English. Speci£cally, observing that in order to state linking regularities one often needs to resort to otherwise unmotivated predicates or an *ad hoc* feature geometry, the main hypothesis of Koenig and Davis (2000) is that the semantic content of verbs should be considered to consist of a list of elementary predications, one member of which is chosen as the key for determining the verb's linking properties. Arguments within other elementary predications may be realized as objects of prepositions, but not as direct arguments of the verb. According to them, the *lexical list hypothesis*, – as they call the linking theory that they propose, – allows for a motivated analysis of the linking properties of apparent semantic doublets (i.e., what we have called "valence alternants"), as well as for a more restrictive and constrained theory of linking altogether. Their analysis is based on a minimal recursion approach to lexical semantic representation and is formalized using the Minimal Recursion Semantics (MRS) framework of Copestake et al. (1999).

In brief, Minimal Recursion Semantics (MRS; Copestake et al. (1999)) is a framework for computational semantics, in which the meaning of expressions is represented as a ¤at bag of Elementary Predications (or EPs) encoded as values of a LISZT attribute. The denotation of this bag is equivalent to the logical conjunction of its members. Scope relations between EPs are represented as explicit relations among EPs. Such scope relations can also be underspeci£ed. The assumption of current MRS is that each lexical item contributes a single EP, which is referred to as the *KEY* EP.

According to Koenig and Davis (2000), for situation-denoting EPs, which are also most interesting for our purposes here, the following generalizations hold:

1. EPs do not encode recursively embedded state-of-affairs (SOAs).
2. EPs can have one, two, or three arguments.
3. If an EP has three arguments, then one of them is a state-of-affairs, and another is an undergoer co-indexed with an argument of the embedded state-of-affairs.

Finally, as far as direct arguments are concerned, in Koenig and Davis (2000) these are predicted to link off the value of the KEY attribute.

7.4.1 The verbs of the *spray/load* class

Thus, following the *lexical list hypothesis* of Koenig and Davis (2000), i.e., assuming along with Koenig and Davis (2000) that some lexical items include more than one EPs in their semantic content, but lexically they select only one of these EPs as their KEY, we propose that the semantic properties of the arguments of the verb *fortono* (load) in example (3) of Section (7.2.1) above, repeated in (40) below for convenience:

(40) O georgos fortose to karo me ahiro.
the farmer.N load.PAST.3S the wagon.A with hay
"The farmer loaded the wagon with hay".

are captured by the following semantic type:

(41) CONTENT value of *fortono_me* (*load_with*)

$$\begin{bmatrix} \text{KEY } \boxed{3} \begin{bmatrix} \textit{fortono-ch-of-st-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{2} \\ \text{SOA } \begin{bmatrix} \textit{ch-of-st-rel} \\ \text{UND } \boxed{2} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{3}, \begin{bmatrix} \textit{me-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \boxed{3} \end{bmatrix}, \begin{bmatrix} \textit{fortono-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \rangle \end{bmatrix}$$

(41) above captures that the *me* (with) alternant of the Modern Greek locative verb *fortono* (load; examples (3) and (40) above) denotes situations that must be both changes of state and changes of location.

The *sto* (onto) alternant of the Modern Greek locative verb *fortono* (load; example (2) of Section (7.2.1) above, repeated in (42) below for convenience) denotes a single change of location:

(42) O georgos fortose to ahiro sto karo.
the farmer.N load.PAST.3S the hay.A onto-the wagon
"The farmer loaded the hay on the wagon".

Koenig and Davis (2000) have proposed that the semantics of the *onto* alternant of the English locative verb *load* includes only the second member of the LISZT in (41) above.

This will also capture the CONTENT value of the *sto* (onto) alternant of the Modern Greek locative verb *fortono* (load) in examples (2) and (42) above:

(43) CONTENT value of *fortono_sto* (*load_onto*)

$$\begin{bmatrix} \text{KEY } \boxed{5} \begin{bmatrix} \textit{fortono-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA} \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{5} \rangle \end{bmatrix}$$

The analysis presented above holds also for both alternants of the Modern Greek locative verb *psekazo* (spray) (see examples (4) and (5) of Section (7.2.1) above, repeated in (44) and (45) below for convenience), as shown in (46) and (47) below:

(44) I diadilotes psekasan tin mpogia sto agalma.
the demonstrators.N.PL spray.PAST.3PL the paint.A onto-the statue

"The demonstrators sprayed the paint onto the statue".

(45) I diadilotes psekasan to agalma me mpogia.
the demonstrators.N.PL spray.PAST.3PL the statue.A with paint

"The demonstrators sprayed the statue with paint".

(46) CONTENT value of *psekazo_me* (*spray_with*)

$$\begin{bmatrix} \text{KEY } \boxed{6} \begin{bmatrix} \textit{psekazo-ch-of-st-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{2} \\ \text{SOA } \begin{bmatrix} \textit{ch-of-st-rel} \\ \text{UND } \boxed{2} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{6}, \begin{bmatrix} \textit{me-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \boxed{6} \end{bmatrix}, \begin{bmatrix} \textit{psekazo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \rangle \end{bmatrix}$$

(47) CONTENT value of *psekazo_sto* (*spray_onto*)

$$\begin{bmatrix} \text{KEY } \boxed{7} \begin{bmatrix} \textit{psekazo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{7} \rangle \end{bmatrix}$$

7.4.2 Removal Predicates

In the spirit of the MRS-based analysis for the Modern Greek verbs of the *spray/load* class that we have presented above, we propose that the semantic properties of the arguments of one of the most representative verbs of the *removal predicates* class in Modern Greek, the verb *skupizo* (wipe) in example (16) of Section (7.2.2) above, repeated in (48) below for convenience:

(48) O Petros skupise to tigani.
the Peter.N wipe.PAST.3S the pan.A
"Peter wiped the pan".

are captured by the following semantic type:

(49) CONTENT value of *skupizo* (wipe; examples (16) and (48))

$$\begin{bmatrix} \text{KEY } \boxed{3} \begin{bmatrix} \textit{skupizo-rel} \\ \text{ACT } \boxed{1}\left(\textit{o Petros}\right) \\ \text{UND } \boxed{2}\left(\textit{to tigani}\right) \end{bmatrix} \\ \text{LISZT } \langle \boxed{3} \rangle \end{bmatrix}$$

(49) above captures that the Modern Greek removal predicate *skupizo* (wipe) does not allow for a PP (*apo*-PP (of/from-PP)) complement when its *location* argument is realized as the direct object (see examples (15) and (16) in Section (7.2.2) above and example (48) in this section). As has been also pointed out in Section (7.2.2), in this case *skupizo* does *not* entail the existence of a *locatum* argument.

The Modern Greek removal predicate *skupizo* (wipe) does admit a PP (*apo*-PP (of/from-PP)) complement, though, when a *locatum* argument is realized as its direct object (see example (17) in Section (7.2.2) above, repeated in (50) below for convenience):

(50) O Petros skupise to ladi apo to tigani.
the Peter.N wipe.PAST.3S the oil.A from the pan
"Peter wiped the oil from the pan".

In this case we propose that the semantic properties of the arguments of the verb *skupizo* (wipe) are captured by the following semantic type:

(51) CONTENT value of *skupizo_apo* (wipe_from; examples (17) and (50))

$$\begin{bmatrix} \text{KEY } \boxed{5} \begin{bmatrix} \textit{skupizo-ch-of-loc-rel} \\ \text{ACT } \boxed{1}\left(\textit{o Petros}\right) \\ \text{UND } \boxed{4}\left(\textit{to ladi}\right) \\ \text{SOA } \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{5} \rangle \end{bmatrix}$$

Finally, we propose one last semantic type (see (53) below) in order to capture the semantic properties of the arguments of the Modern Greek removal predicate *katharizo* (trim; see example (18) in Section (7.2.2) above, repeated in (52) below for convenience):

(52) O Petros katharise to thamno apo ta xera kladia.
the Peter.N trim.PAST.3S the bush.A of the dry branches
"Peter trimmed the bush of the dry branches".

(53) CONTENT value of *katharizo_apo* (trim_of; examples (18) and (52))

$$\begin{bmatrix} \text{KEY } \boxed{3} \begin{bmatrix} \textit{katharizo-rel} \\ \text{ACT } \boxed{1}\left(\textit{o Petros}\right) \\ \text{UND } \boxed{2}\left(\textit{to thamno}\right) \\ \text{SOA } \begin{bmatrix} \textit{ch-of-st-rel} \\ \text{UND } \boxed{2} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{3}, \begin{bmatrix} \textit{apo-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \boxed{3} \end{bmatrix}, \begin{bmatrix} \textit{katharizo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4}\left(\textit{ta kladia}\right) \\ \text{SOA } \begin{bmatrix} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \rangle \end{bmatrix}$$

(53) above captures that in Modern Greek trimming necessarily results in trimming something off something else; in the case of example (52) above trimming the bush results in trimming the dry branches off the bush. And this is what the semantic type in (53) captures.

7.4.3 Impingement Predicates

As shown in Section (7.2.3) above, a typical impingement verb in Modern Greek is *htipo* (hit) (see examples (26)-(29) in Section (7.2.3), repeated below for convenience):

(54) O Petros htipise ton frahti.
the Peter.N hit.PAST.3S the fence.A
"Peter hit the fence".

(55) O Petros htipise ton frahti me to xilo.
the Peter.N hit.PAST.3S the fence.A with the stick
"Peter hit the fence with the stick".

(56) O Petros htipise to xilo sto frahti.
the Peter.N hit.PAST.3S the stick.A onto-the fence
"Peter hit the stick against the fence".

(57) *O Petros htipise to xilo.
the Peter.N hit.PAST.3S the stick.A

"*Peter hit the stick".

In order to capture the semantic properties of the arguments of the most representative verb of the *impingement predicates* class in Modern Greek, the verb *htipo* (hit) in examples (54)-(57) above, we propose the semantic types in (58) and (59), which are in the spirit of the MRS-based analysis that we have presented in the previous for the verbs of the *spray/load* class and for the *removal* predicates in Modern Greek.

(58) and (59) capture that the Modern Greek impingement verb *htipo* (hit) is an assymetric predicate in that when the *location* argument is realized as the direct object of the predicate the *locatum* argument is optional (see SOA (5) in (58)), but when the *locatum* argument is realized as the direct object all arguments are obligatory (see (59)).

(58) and (59) also capture that the *me* (with) alternant of the Modern Greek impingement verb *htipo* (hit) (see example (55) above) entails that one of the verbal arguments is understood as the instrument which is used by the actor in order to perform the action denoted by the verb. The *sto* (onto) alternant (see example (56) above) entails that one of the verbal arguments (the *locatum*) undergoes directed motion.

(58) CONTENT value of *htipo(_me)* (hit(_with); examples (26), (27)), (54), and (55))

$$\left[\begin{array}{l} \text{KEY } \boxed{5}\left[\begin{array}{l} \textit{htipo-rel} \\ \text{ACT } \boxed{1}\left(\textit{o Petros}\right) \\ \text{UND } \boxed{3}\left(\textit{ton frahti}\right) \end{array}\right] \\ \text{LISZT } \langle \boxed{5}, \left[\begin{array}{l} \textit{me-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4}\left(\textit{to xilo}\right) \\ \text{SOA } \boxed{6}\left[\begin{array}{l} \textit{htipobytouching-rel} \\ \text{ACT } \boxed{4} \\ \text{UND } \boxed{3} \\ \text{SOA } (\boxed{5}) \end{array}\right] \end{array}\right], \left[\begin{array}{l} \textit{htipo-dir\_motion-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \left[\begin{array}{l} \textit{dir\_motion-rel} \\ \text{FIG } \boxed{4} \end{array}\right] \end{array}\right] \rangle \end{array}\right]$$

(59) CONTENT value of *htipo_sto* (hit_against; examples (28) and (56))

$$\begin{bmatrix} \text{KEY } \boxed{7} \begin{bmatrix} \textit{htipo-directed\_motion-rel} \\ \text{ACT } \boxed{1}\left(\textit{o Petros}\right) \\ \text{UND } \boxed{4}\left(\textit{to xilo}\right) \\ \text{SOA } \begin{bmatrix} \textit{directed\_motion-rel} \\ \text{FIG } \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{LISZT } \langle \boxed{7} \rangle \end{bmatrix}$$

7.5 Conclusions

The MRS-based account proposed by Koenig and Davis (2000) for locative alternation in English enables us to capture the semantic differences of the Modern Greek locative constructions we have presented in Section (7.2) without resorting to underspeci£ed verb entries (cf., Markantonatou and Sadler (1996) and Section (7.3.2)) or semantically unmotivated keywords (cf., Pinker (1989) and Section (7.3.1)).

The MRS-based semantic analysis we have presented in Section (7.4) can account, as we have shown in the same section, for a wide range of Modern Greek verbs which participate in valence alternations affecting both their direct and their indirect arguments: the verbs of the *spray/load* class, the so-called *removal predicates*, and the *impingement predicates* in Modern Greek (see Sections (7.2.1), (7.2.2), and (7.2.3), respectively).

As a £nal general comment, we need to underline here that the analysis we have presented in Section (7.4) above is in the spirit of the analysis that Koenig and Davis (2000) proposed in that the semantic content we assume for monomorphemic words in our account consists of a list of Minimal Recursion Semantics (MRS; Copestake et al. (1999)) Elementary Predications (EPs), like Koenig and Davis (2000) have proposed. Because of this, we do not need to introduce semantically unmotivated predicates in order to account for the linking in the case of Modern Greek valence alternations. So linking (also in the case of Modern Greek valence alternations) is simpler, exactly like Koenig and Davis (2000) have envisaged it: each EP can have very few structures and linking of direct arguments only depends on the EP selected as the KEY.

References

Copestake, Ann, Dan Flickinger, Ivan A. Sag, and Carl J. Pollard. 1999. Minimal Recursion Semantics: An Introduction. Ms., Stanford University.

Dowty, David. 1991. Thematic Proto-Roles and Argument Selection. *Language* 67:547–619.

Gawron, Jean Mark. 1986. Situations and Prepositions. *Lingustics and Philosophy* 9:327–382.

Koenig, Jean-Pierre and Anthony R. Davis. 2000. The KEY to Lexical Semantics. Paper presented at the 7th International Conference on Head-Driven Phrase Structure Grammar, h eld on July 22-23, 2000 as part of the Berkeley Formal Grammar Conference 2000.

Levin, Beth. 1993. *English Verb Classes and Alternations. A Preliminary Investigation*. The University of Chicago Press.

Levin, Beth and Malka Rappaport Hovav. 1991. Wiping the Slate Clean: A Lexical Semantic Exploration. In B. Levin and S. Pinker, eds., *Lexical and Conceptual Semantics*, pages 123–152. Blackwell, Cambridge MA and Oxford UK.

Markantonatou, S. and L. Sadler. 1996. Linking Indirect Arguments. *Essex Research Reports in Linguistics* 9:24–63.

Pinker, Steven. 1989. *Learnability and Cognition: the acquisition of argument structure*. Cambridge, MA: MIT Press.

Rappaport, Malka and Beth Levin. 1988. What to do with θ-roles. In W. Wilkins, ed., *Thematic Relations. Syntax and Semantics 21*, pages 7–36. Academic Press Inc.

8

Yet Another HPSG-Analysis for Free Relative Clauses in German

Yusuke Kubota

8.1 Basic properties of free relatives in German

Free relatives in German basically behave as NPs. As is first noticed by Groos and Riemsdijk (1981), an interesting property of free relatives that they do not share with ordinary relative clauses is that the relative pronouns are sensitive to matrix case requirements as well as to subordinate ones.

(1) a. Wer schwach ist, muß klug sein.
who-NOM weak is must clever be-NOM[1]
'Whoever is weak is clever.'

b. *Wer klug ist, vertraue ich immer.
who-NOM clever is trust-DAT I ever
intended: 'I trust whoever is clever.'

c. Was du mir empfiehlst, macht einen guten Eindruck.
what-ACC you me recommend makes-NOM a good impression
'What you recommend me makes a good impression.'

Glancing at (1a,b), it appears that the free relative pronoun must satisfy the matrix and subordinate case requirements at the same time: in well-formed (1a), both the matrix clause and the embedded clause

[1]The case specification on the gloss of the verb here indicates the verb's case requirement on the NP realizing as the free relative clause. I use this notation throughout this paper.

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Jong-Bok Kim and Stephen Wechsler.

require a nominative NP, whereas in ill-formed (1b), the matrix requirement (dative) conflicts with the subordinate one (nominative). However, (1c) suggests that things are slightly more complex. This sentence is fully acceptable even though the two case requirements (i.e. nominative and accusative) are different. It should be noted here that the neuter free relative pronoun *was* has the same morphological form in the nominative and accusative. The correct generalization, then, seems to be that the two case requirements must be identical in terms of the morphological forms of the pronouns, rather than in terms of their exact values. This phenomenon is sometimes referred to as the 'matching effect' of free relatives.

This indeterminate nature of *was*, whereby it appears to satisfy conflicting two requirements at the same time, has been claimed by some authors (Bayer 1996, Bayer and Johnson 1995, Dalrymple and Kaplan 2000 and Ingria 1990) to pose a problem for a treatment of agreement that is solely based on unification: in the standard unification-based agreement mechanisms, where strict atomic identity is always required, if two conflicting values are imposed on a single item, the result would be a feature conflict, wrongly ruling out well-formed sentences like (1c).

However, closer look at the empirical facts reveals that the underlying assumption of these authors that the two requirements are simultaneously satisfied by the free relative pronoun cannot be maintained after all. Free relatives with the masculine free relative pronoun *wer*, when they appear in non-sentence-initial positions (i.e. either in the Mittelfeld or extraposed), no longer obey the above case-form identity requirement. Such deviations are allowed under the condition that the case requirement from the matrix clause is less oblique than that from the embedded clause, as is displayed by the contrast of (2a,b):[2]

[2]According to Müller (1999b), non-matching free relatives are also possible in the sentence-initial position:

(i) Wen der Streße des Tages häufig nicht losläßt, sollte eine
whom-ACC the stress the day-GEN often not leave should a
Entspannungsmethode erlernen, zum Beispiel Autogenews Training.
relaxation method learn for example self hypnosis training

'Those who frequently fall prey to daily stress should make themselves familiar with a relaxation method like self hypnosis.' (Müller 1999b:11)

My informants systematically rejected examples of such pattern. I am not sure why speakers vary in their judgements in such examples.

(2) a. Ich will, wem ich immer vertraue, um Rat
I will whom-DAT I ever trust for advice
bitten.
ask-ACC
'I will for advice ask whoever I always trust.'

b. * Ich vertraue, wen du mir empfiehlst, immer.
I trust-DAT whom-ACC you me recommend ever
intended: 'I always trust whoever you recommend me.'

The data in (2) suggests that an account which simply presupposes that matching effect is ubiquitous is inadequate. Hence, we need a more elaborated system to account for such deviation.

Another interesting property of free relatives is that, when they appear in the sentence-initial position, they often require coreferential demonstrative pronouns to immediately follow them. This is traditionally referred to as the 'left dislocation construction'.

(3) a. Wer klug ist, dem vertraue ich.
who-NOM clever is that-DAT trust I
'I trust whoever is clever.'

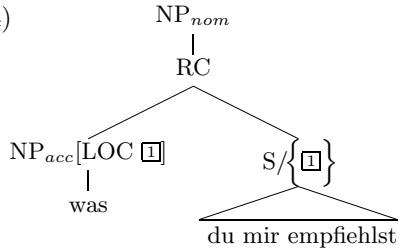
b. Was du mir empfiehlst, das macht einen
what-ACC you me recommend that-NOM makes a
guten Eindruck.
good impression
'What you recommend me makes a good impression.'

This construction is somewhat anomalous as regards its sentence structure. German is often characterized as a verb-second language. As this term suggests, typical finite declarative clauses in German have one constituent in the sentence-initial position immediately followed by the finite verb. Sentences like those in (3) are exceptional in that they apparently have two constituents in the sentence-initial position. Furthermore, in this construction, the free relative pronoun is completely insensitive to the matrix case requirement, which is instead satisfied by the demonstrative pronoun. Thus, the left dislocation position can be considered as a non-argument position. Notice that ill-formed case requirement patterns in the absence of demonstrative pronouns as in (1b) are perfectly acceptable with the help of demonstrative pronouns as in (3a). No previous work on German free relatives has offered an explicit analysis of this construction. In my analysis, this phenomenon will be treated by introducing lexical entries for demonstrative pronouns specifically designed to be used in this construction.

8.2 The internal structure of free relatives

The first explicit HPSG-analysis of German free relative clauses was proposed in Müller (1997). Müller (1999b), which is an elaborated version of Müller (1997), assumes a unary projection schema[3] which projects an RC (relative clause) to an NP. The rough structure of the free relative clause in (1c) in Müller's analysis is shown in (4).

(4)



According to Müller, the reason for assuming such structure is to account for the behavior of free relatives which are "partly like NPs . . . and partly like sentences". In this structure, however, there is no direct relation between the free relative pronoun which is subcategorized by the embedded verb and the projected NP which is subcategorized by the matrix verb. In order to account for the so-called matching effect, he introduces a relational constraint, which, roughly stated, ensures that the case required from the matrix clause and the case required from the embedded clause are identical with respect to their 'morphological case'. (See Müller (1999b) for more detail.) The problem of his analysis is that the structure of unary projection and the relational constraint for maintaining the matching effect are somewhat stipulative.

The claim of this paper is that the matching and non-matching behaviors of free relatives observed in the previous section can be immediately accounted for by simply assuming the free relative pronoun to be the head of the projected NP.[4] By elaborating the lexical entries

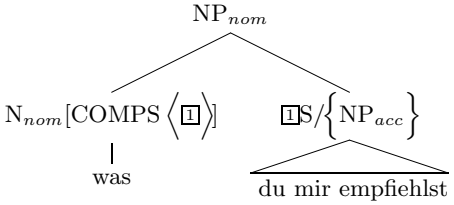
[3]The use of a unary schema for the analysis of free relatives was originally proposed by Koch (1996).

[4]Such a view dates back at least to Bresnan and Grimshaw's (1978) analysis for English free relatives and is sometimes called the 'head analysis' for free relatives. More recently, Kim (2001) adopts the head analysis for English free relatives in the framework of HPSG in which free relatives are assigned a head-modifier structure. My analysis differs from Kim's in that it assumes a head-complement structure rather than a head-modifier structure. The advantage of assuming a head-complement structure is that the structure of the free relative clause can be generated by the general head-complement rule without adding any new structural mechanism to the grammar. If one assumes a head-modifier structure, on the other hand, it seems that one has to introduce a special kind of head-modifier rule with

for this type of pronouns, it is indeed possible to give a suitable account of the entire phenomena within the limitations of the standard assumptions of HPSG.

I propose that the structure of the free relative clause in (1c) is the one shown in (5); the lexical entry for *was* to be used in this tree is sketched in (6).

(5)



(6)

$$\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \begin{bmatrix}\textit{noun}\\ \text{FR}\ +\\ \text{CASE}\ \text{nom}\vee\text{acc}\vee\text{none}\end{bmatrix}\\ \text{VAL}\,|\,\text{COMPS}\ \left\langle \text{S}\left[\begin{array}{ll}\text{INV} & -\\ \text{TOPIC} & \boxed{5}\{-\}\\ \text{SLASH} & \left\{\begin{array}{l}\boxed{2}\text{NP}_{\boxed{1}}\\ [\text{CASE nom}\vee\text{acc}]\end{array}\right\}\end{array}\right]:\boxed{3}\right\rangle\end{array}\right]\\ \text{CONT}\left[\begin{array}{l}\text{INDEX}\ \boxed{1}\begin{bmatrix}\text{PER} & 3\\ \text{NUM} & \text{sg}\\ \text{GEN} & \text{neut}\end{bmatrix}\\ \text{RESTR}\ \left\{\boxed{3}\right\}\end{array}\right]\end{array}\right]\\ \text{NONLOC}\,|\,\text{TO-BIND}\ \begin{bmatrix}\text{SLASH} & \left\{\boxed{2}\right\}\\ \text{TOPIC} & \boxed{5}\end{bmatrix}\end{array}\right]$$

The NP in (5) is licensed by the standard head-complement rule which discharges all the complements flatly at once as shown in (7).

(7) $[\textit{phrase}] \rightarrow \text{H}[\textit{word}],\ \text{C}^*$

That is, the free relative pronoun takes an S/NP as a complement and projects up to an NP. The merit of assuming this structure is that all the necessary constraints for maintaining the matching effect can be specified in the lexical entry for the free relative pronoun (6). The case requirement from the matrix clause is specified as the CASE value of this pronoun as a consequence of its being the head of the projected

enriched information about the modifier and modifiee which is entirely limited in use to the free relative construction.

NP. The case requirement from the embedded clause is specified as the possible CASE value of the unrealized NP on the SLASH value of the complement S. Hence, ignoring the disjunctively added value 'none' of the HEAD|CASE feature, whose purpose will be made clear below, the above entry ensures that the case requirement from either clause can be either nominative or accusative, exactly corresponding to the empirical observation.[5]

As for semantics, the CONTENT value 3 of the embedded clause is picked up and restored in the RESTR set of the free relative pronoun; the free relative pronoun itself has a vacuous content. The index 1 of the NP required from the embedded clause is identified with that of the free relative pronoun itself. Consequently, it is correctly identified with the index of the projected NP since the CONTENT value of the mother is constrained to be identical to that of the head daughter in a head-complement structure by the Semantic Principle.

The complement S is specified as [INV –], since all subordinate clauses in German are verb-final. Free relative pronouns are further specified in the lexicon as having a head feature [FR +], which is passed up to the projected NP by virtue of the Head Feature Principle. It is used in the treatment of the left dislocation construction to distinguish free relatives from other NPs: see the discussion in section 8.3.3.

8.3 Sentence-initial free relatives

In this section I will show how the present proposal can be extended to account for the left dislocation construction and the matching and non-matching contrast of masculine free relative pronoun *wer*. But before proceeding to the specific analyses, I must first clarify the assumptions I have implicitly been making about the sentence structure of German and extend it a bit to satisfy the needs for a precise formulation of such phenomena.

8.3.1 Extraction and the TOPIC constraints

Fronting of constituents to the Vorfeld (sentence-initial position) is considered to be nonlocal. Hence, it is generally treated by the SLASH mechanism in HPSG.[6] I follow this convention.

[5] In the proposed analysis, no theoretical object is postulated that carries the information of the 'case form' of a certain nominal item. Instead, it attains the 'matching effect' by a combination of disjunctive stipulations in the lexicon. An apparent inadequacy of this strategy is that it does not directly capture the generalization in a theoretically consistent way, while its substantial advantage is its relative mechanical simplicity.

[6] This was originally proposed in the GPSG framework by Uszkoreit (1987).

Generally, any constituent can be fronted. However, certain elements sometimes must or must not appear in the Vorfeld. Here, I resolve this issue by introducing a new nonlocal feature[7] called TOPIC whose value is a set which only permits + or – as its members. The basic idea is that phrases specified as [TOPIC {+}] obligatorily appear in the Vorfeld while phrases specified as [TOPIC {–}] never appear in the Vorfeld. Just like other nonlocal features, this feature is inherited from daughter to mother unless the head explicitly specifies to bind off the inheritance. One merit of set values against simpler +/– binary values is that set notation allows the possibility of indicating phrases that are optionally topicalized; the specification [TOPIC {}] is quite suitable for such a purpose. I assume that the vast majority of lexical items are specified as [TOPIC {}] to ensure their optional appearance in the Vorfeld. Another merit is that they fit well with the standard mechanism of nonlocal inheritance.

The V2 head-filler ID rule is formulated as follows so that it can ensure the TOPIC constraints intuitively stated above.[8]

(8)

$$\mathrm{F}\begin{bmatrix}\mathrm{LOC} & \boxed{1} \\ \mathrm{NONLOC}\,|\,\mathrm{INHER}\,|\,\mathrm{TOPIC} & \boxed{2}\,set(+)\end{bmatrix},$$

$$[phrase] \rightarrow \mathrm{H}\left[\begin{array}{ll}\mathrm{LOC}\,|\,\mathrm{CAT} & \left[\begin{array}{ll}\mathrm{HEAD} & \left[\begin{array}{ll} verb & \\ \mathrm{VFORM} & \mathrm{fin} \\ \mathrm{INV} & + \end{array}\right] \\ \mathrm{VAL} & \left[\begin{array}{ll}\mathrm{COMPS} & \langle\rangle \\ \mathrm{SPR} & \langle\rangle\end{array}\right]\end{array}\right] \\ \mathrm{NONLOC} & \left[\begin{array}{ll}\mathrm{INHER} & \left[\begin{array}{ll}\mathrm{SLASH} & \left\{\boxed{1}\right\} \\ \mathrm{TOPIC} & set(-)\end{array}\right] \\ \mathrm{TO\text{-}BIND} & \left[\begin{array}{ll}\mathrm{SLASH} & \left\{\boxed{1}\right\} \\ \mathrm{TOPIC} & \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]$$

According to this head-filler rule, since the filler daughter must satisfy the constraint [TOPIC *set*(+)], a phrase carrying the feature [TOPIC {–}] cannot function as a filler to a finite clause (i.e., they cannot appear in the Vorfeld). On the other hand, since the head daughter must satisfy the constraint [TOPIC *set*(–)], the head of a finite clause can-

[7] The reason I use a nonlocal feature will be made clear in section 8.3.3.

[8] $set(\tau)$ designates a possibly empty set, all of whose members are of type τ. The notation $set(+)$ is equivalent to $\{\}\vee\{+\}$, since there is only one object, namely the atomic value + itself, that instantiates the type +.

not contain a phrase specified as [TOPIC {+}] (i.e. [TOPIC {+}] items must obligatorily appear in the Vorfeld).

Introduction of the SLASH elements is controlled by the Complement Extraction Lexical Rule (CELR), analogous to the one in Pollard and Sag (1994).

(9)
$$\left[\begin{array}{l}\text{LOC}\quad\left[\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \neg prep \wedge \neg\left[\begin{array}{ll} noun & \\ \text{FR} & + \end{array}\right] \\ \text{VAL}\,|\,\text{COMPS} & \boxed{1} \oplus \left\langle [\text{LOC}\ \boxed{2}] \right\rangle \oplus \boxed{3} \end{array}\right]\right] \\ \text{NONLOC}\,|\,\text{INHER}\,|\,\text{SLASH} \quad \{\} \end{array}\right]$$
$$\Longrightarrow \left[\begin{array}{ll}\text{LOC}\,|\,\text{CAT}\,|\,\text{VAL}\,|\,\text{COMPS} & \boxed{1} \oplus \boxed{3} \\ \text{NONLOC}\,|\,\text{INHER} & \left[\begin{array}{ll}\text{SLASH} & \left\{\boxed{2}\right\} \\ \text{TOPIC} & \left\{-\right\}\end{array}\right]\end{array}\right]$$

The HEAD value constraint on the input of this rule prohibits complements of prepositions and free relative pronouns to be extracted, both of which would result in ungrammatical sentences. The output [TOPIC {–}] specification is necessary for excluding the possibility of double extraction.

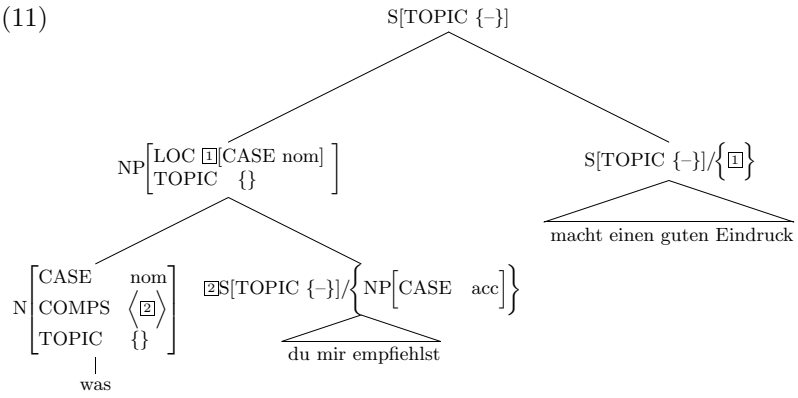
(10) *[Von wem]$_i$ [[ein Bild $\_i$]$_j$ hast du $\_j$ gemalt]?
of whom a picture have you drawn

intended: 'Whom did you draw a picture of?' (Müller 1999a:96)

Since a head from which a complement has been extracted (e.g. the noun *Bild* in (10)) is marked as [TOPIC {–}] by the CELR, a phrase with such a head cannot function as a filler to a main clause because the nonlocal [TOPIC {–}] value of the head daughter would be inherited to the mother and contradict with the constraint [TOPIC *set*(+)] for the filler in the head-filler ID rule (8). Thus, sentences like (10) are ruled out.

The rough structure of the sentence (1c) is shown in (11).

(11)



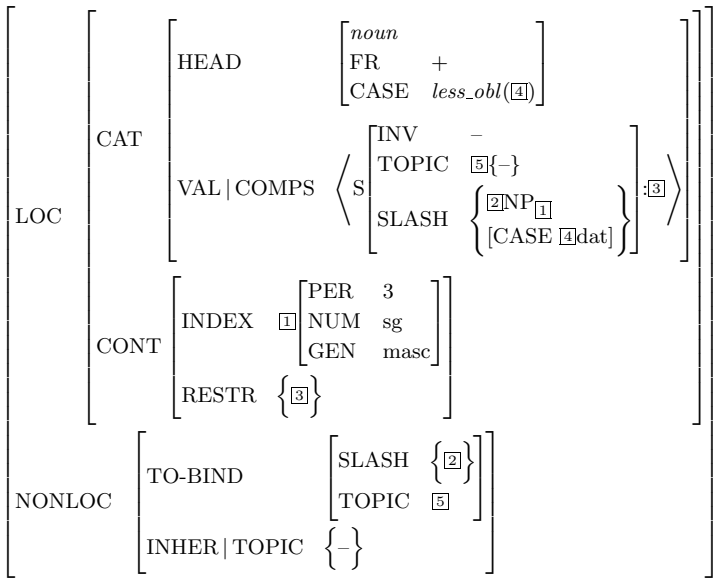
In this sentence, the free relative clause realizes itself as the filler to the main clause. The matrix verb *macht* has undergone the CELR with the effect of having pushed one NP from its COMPS list to its SLASH set, which happens to be a free relative clause. Recall that, in the lexical entry for *was* (6), the TOPIC value[9] as well as the SLASH value of the complement S is lexically bound off. Without this binding of the TOPIC value, free relative clauses would wrongly be excluded from the Vorfeld since it would inherit the [TOPIC {–}] specification from its complement S which would conflict with the structural constraint in the head-filler ID rule (8).

8.3.2 Sentence-initial vs. non-sentence-initial *wer*

The difference of behavior of masculine free relatives in the sentence-initial position and non-sentence-initial positions, namely, that the matching effect is somewhat loosened in the latter environment, can be treated by assigning distinct lexical entries for the free relative pronouns appearing in each environment. I assume that one of them is derived by a lexical rule from the other. (12) displays the lexical entry for *wem*, the dative form of *wer*, introducing free relatives in non-sentence-initial positions.

[9] The original purpose of specifying [TOPIC {–}] on the output of the CELR is to prohibit double extraction, unwanted *structural* realization of SLASHed elements. Hence, this constraint is entirely irrelevant in the cases when SLASH values are *lexically* bound off and should be bound off together with the SLASH value in such cases.

(12)



The CASE value of this lexical item is constrained as *less_obl*(dat),[10] allowing sentences like (2a) in which the case requirement from the matrix clause is less oblique than that from the embedded clause. The specification [TOPIC {–}] ensures that free relatives headed by this pronoun cannot appear in the Vorfeld (i.e. in the sentence-initial position). That is, since TOPIC is a nonlocal feature, this value is inherited to the matrix NP level and obeys the constraints on the head-filler rule (8) introduced above that excludes phrases marked as [TOPIC {–}] from the Vorfeld.

The lexical entry for *wem* which introduces free relatives in the sentence-initial position is derived from the above lexical entry by the Free Relative Topicalization Lexical Rule formulated as (13):

[10] *less_obl*(x) is a relation which relates the input case value x to a less or equally oblique case value in the obliqueness hierarchy (nom < acc < dat ...). For example, the specification *less_obl*(dat) is equivalent to the familiar disjunction 'nom∨acc∨dat'.

(13)
$$\left[\begin{array}{l}\text{LOC}\left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{ll}\textit{noun} & \\ \text{FR} & +\end{array}\right] \\ \text{VAL}\,|\,\text{COMPS} & \left\langle \text{S[SLASH}\left\{\text{NP[CASE }\boxed{1}\text{]}\right\}\text{]}\right\rangle\end{array}\right] \\ \text{CONT}\,|\,\text{INDEX} & \left[\begin{array}{ll}\text{PER} & 3 \\ \text{NUM} & \text{sg} \\ \text{GEN} & \text{masc}\end{array}\right]\end{array}\right] \\ \text{NONLOC}\,|\,\text{INHER}\,|\,\text{TOPIC} \quad \{-\}\end{array}\right]$$

$$\Longrightarrow \left[\begin{array}{l}\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \left[\text{CASE} \quad \boxed{1}\vee\text{none}\right] \\ \text{VAL}\,|\,\text{COMPS} & \left\langle \text{S[SLASH}\left\{\text{NP[CASE }\boxed{1}\text{]}\right\}\text{]}\right\rangle\end{array}\right] \\ \text{NONLOC}\,|\,\text{INHER}\,|\,\text{TOPIC} \quad \{+\}\end{array}\right]$$

This rule identifies the matrix and subordinate case requirements by the tag [1]. Hence, the output lexical entry allows only sentences strictly embodying the matching effect. Again, ignore the CASE value 'none' at the moment. The INDEX specification [GEN masc] on the input limits the application of this rule to masculine free relative pronouns. The specification [TOPIC {+}] constrains the free relatives headed by this pronoun to appear in the sentence-initial position only.

8.3.3 Left dislocation

In the left dislocation construction, the demonstrative pronoun must immediately follow the free relative clause.

(14) a. Wer klug ist, den will ich um Rat bitten.
who-NOM clever is that-ACC will I for advice ask
'I will ask for advice whoever is clever.'

b. *Wer klug ist, ich will den um Rat bitten.

To account for this type of construction without the help of a new structural mechanism, I assume that demonstrative pronouns trigger left dislocation; demonstrative pronouns to be used in the left dislocation construction are lexically specified to have a nonempty SLASH value whose single element is a free relative clause (i.e. NP[FR +]).[11]

[11] Though free relatives are not the only elements that can be left-dislocated, I limit my attention to left dislocation of free relatives in this paper. This does not mean, however, that the perspective presented in this paper cannot be extended to cover left dislocation phenomena of phrases other than free relatives.

The lexical entry for *das* is shown in (15).

(15)
$$\begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{noun} \\ \text{CASE} & \text{nom}\vee\text{acc} \end{bmatrix} \end{bmatrix} \\ \text{CONT}\,|\,\text{INDEX} & \boxed{1}\begin{bmatrix} \text{PER} & 3 \\ \text{NUM} & \text{sg} \\ \text{GEN} & \text{neut} \end{bmatrix} \end{bmatrix} \\ \text{NONLOC}\,|\,\text{INHER} & \begin{bmatrix} \text{SLASH} & \left\{ \text{NP}\boxed{1}\begin{bmatrix} \text{FR} & + \\ \text{CASE} & \text{none} \end{bmatrix} \right\} \\ \text{TOPIC} & \{+\} \end{bmatrix} \end{bmatrix}$$

The [TOPIC {+}] specification in the above lexical entry ensures that this demonstrative pronoun must obligatorily appear in the Vorfeld, ruling out sentences like (14b) above.

With the lexical specification of the SLASH value as in (15), it is possible to characterize the distribution of the left dislocation construction of free relatives without appeal to any kind of new structural mechanism. The rough structure of the sentence (3b) is shown in (16). Here, the SLASH value 3 of the lowest S is discharged by the demonstrative pronoun in the Vorfeld, in parallel to ordinary V2 clauses. However, in this case, the immediate upper S still inherits a SLASH value 1 from its filler daughter, which is discharged by the free relative clause in just another application of the head-filler rule.[12] Note that the [TOPIC

[12] A referee has pointed out to me that some restriction should be needed to rule out sentences like the following:

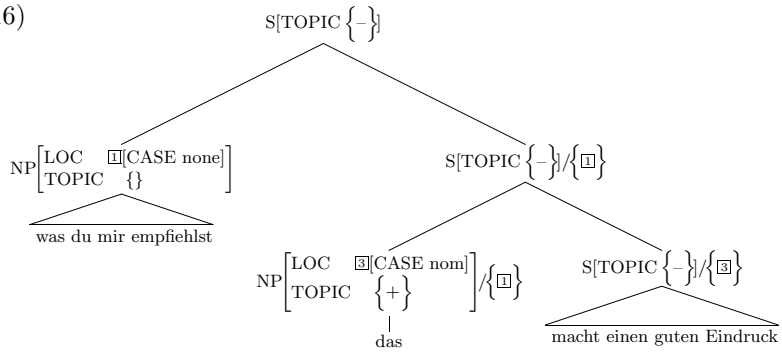
(i) *[Wer klug ist]$_j$, Maria$_i$ [$_{\text{S}/\{\text{NP}_i,\text{NP}_j\}}$ sagt, –$_i$ [$_{\text{S}/\{\text{NP}_j\}}$ den$_j$ will
who-NOM clever is Maria says that-ACC will
sie um Rat fragen]].
she for advice ask
intended: 'Maria says that she will ask for advice whoever is clever.'

Such 'long distance left dislocation' of free relatives are automatically prohibited in my account since in (i) the matrix S illegally contains two phrases in its SLASH value before combining with the Vorfeld NP *Maria*. Note that the head daughter in the V2 head-filler rule in (8) is specified to have exactly one SLASH element. This constraint is independently necessary to prohibit illicit left dislocation in the absence of demonstrative pronouns.

(ii) *[Wen du mir empfiehlst]$_j$, ich$_i$ [$_{\text{S}/\{\text{NP}_i,\text{NP}_j\}}$ will –$_i$ –$_j$ um Rat
whom-ACC you me recommend I will for advice
bitten].
ask

{+}] value of the filler daughter (if there is one) is bound off in the V2 head-filler rule in (8). This enables the recursive application of this ID rule here.

(16)



As is already mentioned, left dislocated free relatives are free from the matrix case requirements. To capture this fact in terms of the non-argument characteristic of the left dislocated constituent, I introduce a new CASE value 'none' here, i.e., I assume that non-argument NPs are marked as [CASE none]. Hence, the slashed element on the lexical entry for the demonstrative pronoun is specified as [CASE none]. In addition, I assume that all free relative pronouns, except for those introducing masculine non-sentence-initial free relatives, are lexically specified as having the possibility of instantiating themselves as [CASE none]. The consequence of these two stipulations is that any free relative, whatever the case requirement from the embedded clause may be, can freely

---

intended: 'I will ask for advice whoever you recommend me.'

This sentence is ruled out for exactly the same reason as (i) above, namely, the violation of the single SLASH element constraint on the head daughter in the head-filler rule (8).

Further, note also that the following sentence, in which the matrix verb and subject are in reverse order as opposed to (i), is correctly predicted to be well-formed in the present theory.

(iii) [Wer klug ist]$_i$, [$_{S/\{NP_i\}}$ glaubt Hans, [$_{S/\{NP_i\}}$ der$_i$ wird
who-NOM clever is thinks Hans that-NOM is
ausgebildet]].
trained
'Hans thinks that whoever is clever will be trained.'

If we assume that the matrix verb *glauben* subcategorizes for S[INV –] (i.e. either V1 or V2 clause), the SLASH value originated in the demonstrative pronoun in the filler position of the subordinate clause is passed up to the matrix S and discharged by the sentence-initial free relative.

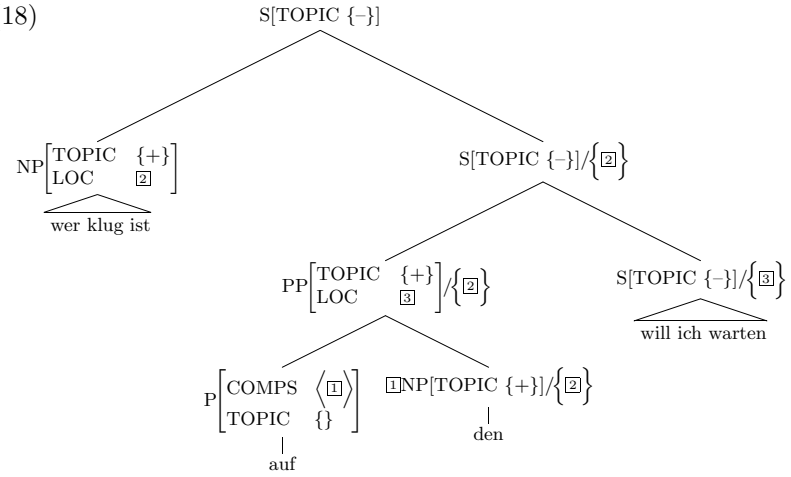
appear in the left dislocated position, to the desired effect.

A further consequence of the present proposal is that it can account for the fact that demonstrative pronouns do not necessarily occupy the Vorfeld position directly by themselves.

(17) Wer klug ist, auf den will ich warten.
who clever is for that will I wait
'I wait for whoever is clever.'

In the lexical treatment of left dislocation presented here, such possibilities are straightforwardly predicted without any further stipulation. The structure of the sentence (17) is shown in (18).

(18)



Note that the nonlocal [TOPIC {+}] specification on the demonstrative pronoun is passed up to the PP by the Nonlocal Feature Principle, correctly assuring the existence of the demonstrative pronoun inside the Vorfeld position. The motivation for using a nonlocal mechanism for the TOPIC value is now clear. If this feature were not nonlocal (for example, if it were a head feature), it would be rather difficult to detect the appearance of the demonstrative pronoun inside the Vorfeld which is embedded as a complement of a preposition.

8.4 Linear order and extraposition

Extraposed free relative clauses exhibit the same distribution as those occurring in the Mittelfeld (i.e. sentence-internal argument position) rather than those occurring in the Vorfeld, that is, when free relatives do not appear in the sentence-initial position, the matching effect is loosened regardless of whether they are extraposed or not:

(19) a. Ich will, wem ich immer vertraue, um Rat
I will whom-DAT I ever trust for advice
bitten.
ask-ACC
intended: 'I will ask for advice whoever I always trust.'

b. Ich will um Rat bitten, wem ich immer vertraue.

c. *Wem du vertraust, will ich um Rat bitten.
whom-DAT you trust will I for advice ask-ACC
intended:'I will ask for advice whoever you trust.'

Although some authors (Keller 1995 and Bouma 1996) argue in favor of treating extraposition via a nonlocal dependency, I follow Hinrichs and Nakazawa (1998) where they assume a flat structure of a finite clause in which an extraposed phrase realizes itself as a sister of the finite verb and other arguments of this verb, being obliged to occupy the rightmost position by some linear order constraint. This simple structure is motivated by the empirical fact that extraposition never occurs crossing a clause boundary, which strongly suggests that this phenomenon is fundamentally a local one.

I assume a binary head feature EXTRAP. Phrases specified as [EXTRAP +] are controlled by the LP rules defined below to obligatorily occur at the rightmost position in a clause, whereas phrases specified as [EXTRAP –] occur in the Mittelfeld (in between the finite verb and the sentence-final verbal constituent).

In German, extraposition of an NP is generally prohibited. Therefore, I assume that all the ordinary nouns are lexically specified as [EXTRAP –]. In contrast, free relatives can be extraposed freely. Hence, I drop this specification from the lexical entries for free relative pronouns, leaving this value underspecified. As a consequence, a free relative pronoun can have either + or – value for this head feature, which will then be inherited to the projected NP by virtue of the Head Feature Principle, thus predicting their optional extraposability.

I assume the following LP rules:

(20) $\left[\begin{array}{l}\text{HEAD}\,|\,\text{EXTRAP}\ -\\ \text{VAL}\left[\begin{array}{ll}\text{COMPS} & \langle\rangle\\ \text{SPR} & \langle\rangle\end{array}\right]\end{array}\right] \prec \left[\text{HEAD}\left[\begin{array}{ll}\textit{verb}\\ \text{INV} & -\end{array}\right]\right]$

(21) $\text{H}\left[\text{HEAD}\left[\begin{array}{ll}\textit{verb}\\ \text{INV} & +\end{array}\right]\right] \prec \text{C}$

(22) $\text{F} \prec \text{H}$

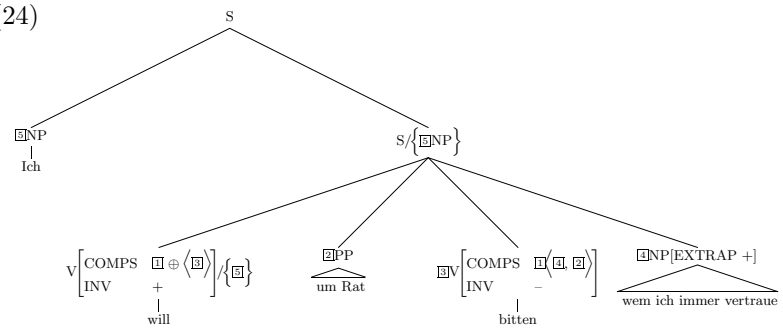
(23) $$\left[\text{HEAD}\ \left[\begin{matrix}\textit{verb}\\ \text{INV}\ \ -\end{matrix}\right]\right] \prec \left[\begin{matrix}\text{HEAD}\,|\,\text{EXTRAP}\ +\\ \text{VAL}\ \left[\begin{matrix}\text{COMPS}\ \ \langle\rangle\\ \text{SPR}\ \ \ \langle\rangle\end{matrix}\right]\end{matrix}\right]$$

(20) and (21) constrain the order of elements inside a finite clause. (20) ensures that a phrase specified as [EXTRAP –] precedes the sentence-final verbal complement. (21) ensures that the finite verb appears first in the clause before it combines with a filler preceding it (hence, the V2 position).

(22) constrains the order of a head and its filler. (23) ensures that a phrase specified as [EXTRAP +] appears after the sentence-final verbal constituent, i.e., at the sentence-final position. The empty valence specifications on the extraposed element prevent its unwanted application inside the extraposed constituent; the head specified as [EXTRAP +] carries nonempty valence specifications inside the phrase where it combines with its complements and specifiers. Hence, the LP rule (23) does not apply there.

These LP rules interact with the ID rules and the lexical specifications already introduced to precisely distinguish well-formed structures from ill-formed ones. The structure (24) is assigned to the sentence (19b). Note that the free relative clause is obliged to appear at the rightmost position inside the matrix clause by the LP rule (23) since it happens to instantiate itself as NP[EXTRAP +].

(24)



8.5 Open problem

In this final section, I discuss some problematic data for my analysis. As in English, free relative pronouns in German can also be pied-piped as is shown in (25) - (27):

(25) a. Mit wem du arbeitest, dem mußt du
with whom-DAT you work, that-DAT must you
vertrauen.
trust.
'You must trust whoever you work with.'

b. Auf was sie Appetit hat, (das) schmeckt gut.
on what-ACC she appetite has that-NOM tastes well
'What she has appetite for is delicious.'

c. * Ich warte auf, auf wen du wartest.
I wait for for whom you wait
intended: 'I wait for whoever you wait for.'

(26) a. Wessen Eltern gestorben waren, der wurde ins
Whose parents dead were, that-NOM was to-the
Waisenhaus geschickt.
orphans' home sent.
'Whoever's parents were dead, was sent to the orphans' home.'

b. Mit wessen Schwester du verheiratet bist, den mußt
with whose sister you married are that must
du als Bruder akzeptieren.
you as brother accept
'You must accept whoever's sister you are married with as your brother. '

c. Wessen Schwesters Tochter du liebst, den mußt du als
whose sister's daughter you love that must you as
Vater akzeptieren.
father accept
'You must accept whoever's sister's daughter you are married with as your father. '

(27) a. Ihr könnt beginnen, mit wem ihr wollt.
you can begin with whom you will
'You can begin with whoever you want to (begin with).' (Bausewein 1990:155)

b. Worüber du redest, muß ich nachdenken.
on-what you talk must I ponder
'I must ponder on what you talk about.'

Data concerning sentences like these are fairly uncertain. My informants showed considerable variation as regards the acceptability of the

sentences listed above. Furthermore, it turned out that the precise condition under which the demonstrative pronouns can be omitted is also unclear and difficult to pinpoint. But what seems to be undeniable is that there are certain number of native speakers who find some of these sentence acceptable.

Unfortunately, my analysis does not extend naturally to cover cases like these. As for the examples in (25) where the category of the relative word and the projected phrase coincide (both are nominal here), it might still be possible to maintain the hypothesis that the free relative pronoun is the head of the projected phrase, that is, we could account for the fact that projected phrases turn out to be NPs if we assumed that the free relative pronoun subcategorizes for a preposition and an S/PP as complements in such cases.[13]

As for the examples in (26) and (27) where the category of the relative word (determiner in (26) and noun in (27), respectively) and the projected phrase (NP in (26) and PP in (27), respectively) do not coincide, a further difficulty arises. In these cases, it is impossible to attribute the category of the projected phrase to that of the relative word. I have no explanation for these data.

8.6 Conclusion

In this paper, I argued that German free relatives can best be analyzed as NPs headed by the free relative pronouns inside them. The proposed analysis, which I believe is in line with the spirit of HPSG that most of the constraints necessary for building up phrases can be encoded in the lexical information of the heads of the phrases, is free from any kind of empty categories or ad hoc structural stipulations. Thus, it straightforwardly captures the typical distributions of free relatives as argument NPs in the matrix clause. It also successfully captures the distribution of the left dislocation construction of free relatives, which has never been explicitly analyzed so far, by use of lexical specification of the SLASH value and the general head-filler structure without introducing any kind of new mechanism.

Acknowledgements

I would like to thank Tsuneko Nakazawa and Stefan Müller as well as the participants and two anonymous referees of the 9th International

[13]The unacceptability of (25c) would be a mystery for any account which treats the free relative clauses in (25a,b) as NPs. The internal structures of the free relatives in (25a,b) and (25c) should be the same and if such free relatives could really be projected to NPs, there should in principle be no reason why they cannot appear as complements of prepositions.

Conference on Head-Driven Phrase Structure Grammar for comments and criticisms on earlier versions of this paper. I would also like to thank Gabriele Stumpp and Peter Giacomuzzi for providing me acceptability judgements.

References

Bausewein, Karin. 1990. Haben kopflose Relativsätze tatsächlich keine Köpfe? In Gisbert Fanselow and Sascha W. Felix, eds., *Strukturen und Merkmale Syntaktischer Kategorien.* 144-158. Studien zur Deutschen Grammatik, Vol. 39. Tübingen: Gunter Narr Verlag.

Bayer, Samuel. 1996. The coordination of unlike categories. *Language* 72.3:579-616.

Bayer, Samuel and Mark Johnson. 1995. Features and agreement. *Proceedings of the Thirty-Third Annual Meeting of the ACL.* 70-76. Boston. Association for Computational Linguistics.

Bouma, Gosse. 1996. Extraposition as a nonlocal dependency. In *Proceedings of Formal Grammar 96.* 1-14. Prague.

Bresnan, Joan and Jane Grimshaw. 1978. The syntax of free relatives in English. *Linguistic Inquiry* 9.3:331-392.

Dalrymple, Mary and Ronald Kaplan. 2000. Feature indeterminacy and feature resolution. *Language* 76.4:759-798.

Groos, Anneke and Henk van Riemsdijk. 1981. Matching effects in free relatives: A parameter of core grammar. In Adriana Belletti, Luciana Brandi and Luigi Rizzi, eds., *Theory of Markedness in Generative Grammar.* 171-216. Pisa: Scuola Normale Superiore.

Hinrichs, Erhard W. and Tsuneko Nakazawa. 1998. Third construction and VP extraposition in German: An HPSG analysis. In Erhard Hinrichs, Andreas Kathol and Tsuneko Nakazawa, eds., *Complex Predicates in Nonderivational Syntax.* 115-157. Syntax and Semantics, Vol. 30. San Diego: Academic Press.

Ingria, Robert J. P. 1990. The limits of unification. *Proceedings of the Twenty-Eighth Annual Meeting of the ACL.* 194-204. Pittsburgh, Pennsylvania. Association for Computational Linguistics.

Keller, Frank. 1995. Toward an account of extraposition in HPSG. *Proceedings of the Seventh Conference of the European Chapter of the Association for Computational Linguistics.* 301-306. Dublin.

Kim, Jong-Bok. 2001. Constructional constraints in English free relative constructions. *Language and Information* 5.1:35-53.

Koch, Ulrich. 1996. Deutsche Relativsätze in HPSG. Studienarbeit, Universität Koblenz-Landau.

Müller, Stefan. 1997. An HPSG-analysis for free relative clauses in German. In *Proceedings of Formal Grammar.* 179-188. Aix-en-Provence.

Müller, Stefan. 1999a. *Deutsche Syntax deklarativ. Head-Driven Phrase Structure Grammar für das Deutsche.* Linguistische Arbeiten, Vol. 394. Tübingen: Max Niemeyer Verlag.

Müller, Stefan. 1999b. An extended and revised HPSG-analysis for free relative clauses in German. Verbmobil Report, Vol. 225. Saarbrücken: Deutsches Forschungszentrum für Künstliche Intelligenz. Also published as An HPSG-analysis for free relative clauses in German. 1999. *Grammars* 2.1:53-105.

Pollard, Carl J. and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar.* Chicago: University of Chicago Press.

Uszkoreit, Hans. 1987. *Word order and constituent structure in German.* Stanford: CSLI Publications.

9

Korean Resultative Constructions

Junkyu Lee and Chungmin Lee

9.1 Introduction

This paper aims to investigate the typology of resultative constructions (henceforth RC) in Korean, to provide their relevant constraints and finally to propose formal structures of RCs in a unified way.

RCs refer to a formation that combines a simple sentence with a result phrase[1] or an expression denoting the result of an action. For example, *red* in *Lee painted the wall red*, a result phrase can be paraphrased as "*Lee painted the wall*; and, as a result, *the wall was red*." In other words, the sentence *Lee painted the wall red* holds the causal relation between Lee's painting action and the result state 'the wall is red'.

The traditional transformational approaches (Simpson, 1983, Carrier and Randall, 1992) assumed that the subject of an intransitive RC derives from the deep or underlying object position, supporting *the Unaccusative Hypothesis* by Perlmutter (1978). Despite the existence of RCs, however, it is not so easy to provide syntactic evidence for unaccusativity in such languages as Korean. We argue that RCs can be explained by type-specific but cross-linguistically plausible properties of the constructions and their relevant constraints by introducing the extended feature descriptions of RCs in connection with eventuality, i.e. telicity or delimitedness. The analysis is formulated, partially adopting Generative Lexicon Theory, in the framework of Head-Driven Phrase Structure Grammar (HPSG).

[1] Result phrases must be distinguished from depictive secondary predicates which lack this result meaning, such as the predicate *drunk* in *The chairman came to the meeting drunk.*

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9.2 Basic Facts

9.2.1 Result Expressions: A Cross-linguistic Perspective

A result expression in RCs deduces the result or causal interpretations. There is typological variation to express the phrases denoting the result state. The italicized parts in (1), for instance, demonstrate the result expression in English, Chinese, and Japanese.

(1) a. Kim painted the wall *red*
b. Lee washed the shirt *clean*
c. Ta Tu *hong le* qiang (Li and Thompson 1981)
she paint red ASP wall
'She painted the wall red.'
d. Ta (ba) chen-yi xi gan-jing le (Li and Thompson 1981)
He OBJ shirt wash clean ASP
'He washed the shirt clean.'
e. John-ga kabe-o aka-ku nutta (Washio 1997)
John-NOM wall-ACC red-KU painted.
'John painted the wall red.'
f. Kare-wa teeburu-o kirei-ni aratta (Washio 1997)
He-TOP table-ACC clean-NI washed
'He washed the shirt clean.'

In the above three languages, RCs involve different forms to express the result meaning; an adjective in English, a resultative verb compound in Chinese, and *-ku/-ni*[2] morpheme in Japanese. In addition, the productivity of some result expressions is cross-linguistically constrained. Some RCs are, for examples, available in English and Chinese, while the counterparts are more restricted in Japanese.

(2) a. John cried himself hoarse.
b. Ta (dou) han ya le sangzi. (Uehara et al. 2001)
he EMP cry hoarse ASP throat
'He cried his throat hoarse'
c. Kare-wa nodo-ga kasakasa-ni sakenda.(Uehara et al. 2001)
he-TOP throat-NOM hoarse-NI cried.
'He cried his throat hoarse'
d. Kim-wa hankachi-ga bisshorini naita.
Kim-TOP handkerchief-NOM wet-NI wept
'Kim wept his handkerchief wet'

[2] *-ku* is used with those in the canonical adjective category whereas *-ni* is used with those in nominal adjective category(Uehara et al. 2001).

In Japanese it is essential to add either change of state verbs like *naru* 'become' or a conjunctive particle *hodo* 'to the extent' as in (3) to make the sentence (2c) and (2d) grammatical (Uehara et al. 2001):

(3) a. Kare-wa [nodo-ga kasakasa-ni naru hodo] sakenda.
he-TOP throat-NOM hoarse-NI become degree cried.
'He cried to the extend that his throat became hoarse'

b. Taroo-wa [hankachi-ga bisshori-ni naru hodo]
Taroo-TOP handkerchief-NOM wet-NI become degree
naita.
weep
'Taroo wept to the extend that his handkerchief became wet.'

9.2.2 Distribitions of Korean Result Morphemes: *-key/-tolok*

In Korean RCs are closely related to the morphology. There are two main morphemes, *-key* and *-tolok*, employed in result expressions in Korean.[3] These morphemes can be cross-classified with the combination of the morphemes with syntactic constituents as well as with the interchangeability of the morphemes. First, *-key* is combined not only with a predicate, but also with a clause. On the other hand, *-tolok* is combined only with a clause. Furthermore, a morphological alternation between *-key* and *-tolok* is allowed only in the combination of result morpheme with sentential argument.

(4) a. elkul-i [kem-*key*/*-*tolok*] tha-ess-ta.
face-NOM black burn-PAST-DEC
'The face burned black.'

b. Lee-ka pyek-ul [pwulk-*key*/*-*tolok*] chilha-yess-ta.
Lee-NOM wall-ACC red paint-PAST-DEC
'Lee painted the wall red.'

c. Kim-i [sinpal-i talh-*key*/*-*tolok*] talli-ess-ta.
Kim-NOM shoes-NOM threadbare ran
'Kim ran his shoes threadbare.'

9.2.3 Two Types of Result Phrases in Korean

In terms of the distribution of result morphemes *-key* and *-tolok*, this paper assumes the two types of result phrases: *non-subject-result-phrase* (henceforth *Type 1*) and *subject-result-phrase* (henceforth *Type 2*). The

[3] In Korean, clausal resulatives using connectives like *-se* are more commonly used than resultative predicates combined with result morphemes. This paper narrows down the discussion to the case in which two result morphemes in Korean are involved in RCs.

examples in (5) illustrate a rough sketch of two kinds of Korean result expressions to be treated here.

(5) · *non-subject-result-phrase* (*Type 1*)

a. kang-i [tantanha -*key*/*-*tolok*] el-ess-ta.
lake-NOM solid so that freeze-PAST-DEC
'The lake froze soild.'

b. John-i pyek-ul [pwul-*key*/*-*tolok*] chilha-ass-ta.
John-NOM wall-ACC red paint-PAST-DEC
'John painted the wall red.'

· *subject-result-phrase* (*Type 2*)

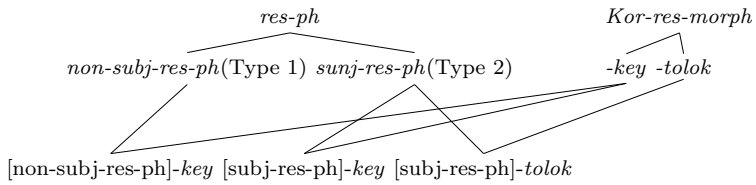
c. John-i [mok-i swi-*key*/-*tolok*] oi-chi-ess-ta.
John-NOM throat-NOM hoarse shouted
'John shouted his throat hoarse.'

The grammatical status of -*key*, as in (5a), is controversial: adverbs vs predicates. Wechsler and Noh (2001) have agreed to an assumption that -*key* marks adverbs, challenging the proposals (Kim and Mailing 1996, Kim 1999, and Jang 2000) that the grammatical status of suffix -*key* is not an adverbial but a predicative. In particular, they have put -*key* of (5a) in question, though admitting the predicativeness of the other -*key*. Their exclusion, however, is somewhat questionable.[4]

This paper argues that result expressions in *Type 1* has predicative properties and requires a semantic argument. To put differently, *Type 1* is a sort of sentential phrase, not having the syntactic subject.

To sum up, the multiple inheritance hierarchy in (6), adopted and extended from Sag and Wasow (1999), illustrates the crosscutting generalization of the classification of Korean result phrases.

(6)



[4] A piece of evidence is related to Korean morphology; specifically, -*key* formation of change of color predicates. The word 'change' or 'transition' has already implied the result state of event. Interestingly, there is no '-*i*' adverbial to express change of color in Korean; **pulk-i/pulkey*, **pulu-i/pulu-key*, **nolah-i/nolah-key*.

(i) tanphwung-i pwulk-key/*pwulk-i multul-ess-ta.
maple-NOM red get dye

9.2.4 Verb Classes and their relations to Resultatives

Much of the literature on RCs has agreed that the types of RCs are sensitive to the semantics of verbs or verb classes. There are four main verbs treated in RCs; unaccusative, unergative, passive, and transitive verbs. In Korean *Type 1* or *non-subj-re-ph* is selected in the case the main verb is unaccusative, passive and transitive verbs, as similar to English and Japanese.

(7) a. khepi-ga [*chagap-key*] **sik**-ess-ta.
coffee-NOM cold cool-PAST-DEC
'Coffee cooled cold'

b. ttang-i [*tantanha-key*] **kut**-ess-ta.
Ground-NOM solid harden-PAST-DEC
'The ground harden solid'

c. elkul-i [*kem-key*] **tha**-ess-ta.
face-NOM black burn-PAST-DEC
'The face burned black'

d. Kim-i [*holccwukha-key*] **yawui**-ess-ta.
Kim-NOM thin become-thin-PAST-DEC
'Kim became thin'

e. sacen-i [*nedelnedelha-key*] **talh**-ess-ta.
dictionary-NOM to tatters has been worn
'The dictionary has been worn to tatters'

(8) a. os-i [*netelnetelha-key*] **ccic**-eci-ess-ta.
cloth-NOM to rags tear-PASS-PAST-DEC
The cloth tore to rags'

b. khwuki-ga [*norah-key*] **kwu**-eci-ess-ta.
cookie-NOM yellow bake-PASS-PAST-DEC
'Cookies baked yellow'

(9) a. Kim-i teipul-ul [*kaekkukha-key*] **takk**-ass-ta.
Kim-NOM table-ACC clean wipe-PAST-DEC
'Kim wiped the table clean'

b. Lee-ka pyek-ul [*norah-key*] **chilha**-ess-ta.
Lee-NOM wall-ACC yellow paint-PAST-DEC
'Lee painted the wall yellow'

In (7) all main verbs like *sik-* (cool), *kut-* (harden), *tha-* (burn), *yawui-* (become thin), and *talh-* (worn) are a subtype of intransitives, so-called unaccusative verbs that inherently have an agentless argument

in the subject position and express change of state.[5] Passive verbs also lack an agent argument but have a theme or a patient argument in the subject position. They show a similar pattern to the case involving unaccusatives, as in (8). Transitive verbs in (9) such as *tak-* (wipe) and *chilha-*(paint), realized in RCs, usually represent the meaning of change of state.

Unlike *Type 1*, the main verbs (V2) of *Type 2* must be another subtype of intransitives, so-called unergative verbs that inherently have an agent argument and express activity but not change of state. Contrary to those unaccusatives lexically entailing change of state, *Type 2* newly introduces result or causal interpretation in the construction.

(10) a. John-i [*mok-i* *swi-key/-torok*] **oyichi**-ess-ta.
John-NOM throat-NOM hoarse shouted
'John shouted his throat hoarse'

b. Kim-i [*sinpal-i* *talh-key/-torok*] **talli**-ess-ta.
Kim-NOM shoes-NOM threadbare ran
'Kim ran his shoes threadbare'

To recapitulate, the verb classes are bound to constrain the syntactic realization of result phrases or to license the two types of result phrases restrictedly. Thus, this paper tries to offer some explanation of the complex properties of RCs by introducing the extended lexical semantic structure of verbs.

9.2.5 Lexical Semantic Structure of Korean Intransitives

Within a modified framework of Pustejovsky (1995)'s Generative Lexicon Theory[6] by Lee et al. (1997) and Lee (1998), unaccusative and unergative verbs roughly illustrate the following distinction in representation:

(11) Unaccusative

[5] Unaccusative verbs belong to two subtypes; the change of state (such as *nok-* (melt)) and the change of location (such as *tochakha-* (arrive)) in terms of the lexical conceptual paradigm. Korean unaccusatives representing the change of location select the default locative argument rather than a predicate denoting the result state of the unaccusatives.
John-i Seoul-yeok-ey/*haengbokha-key tochakha-ess-ta
John-NOM Seoul-station-LOC/happily arrived

[6] Nightingale (1999) suggested the possibility to incorporate Generative Lexicon Theory into HPSG in the explanation of Japanese polysemy.

$$\begin{bmatrix} \text{EVENT-STR} & \begin{bmatrix} \text{E1=e1:process} \\ \text{E2=e2:state} \\ \text{HEAD=e2} \end{bmatrix} \\ \text{ARG-STR} & [\ \text{arg1=x}\ ] \\ \text{QUALIA-STR} & \begin{bmatrix} \text{FORMAL=Vresult-state(e2,x)} \\ \text{AGENTIVE=Vprocess(e1,x)} \end{bmatrix} \end{bmatrix}$$

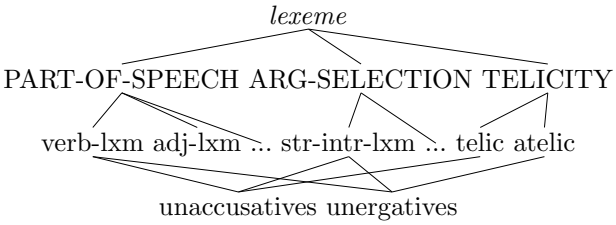
(12) Unergative

$$\begin{bmatrix} \text{EVENT-STR} & \begin{bmatrix} \text{E1=e1:process} \\ \text{HEAD=e1} \end{bmatrix} \\ \text{ARG-STR} & [\ \text{arg1=x}\ ] \\ \text{QUALIA-STR} & [\ \text{AGENTIVE=Vact(e1,x)}\ ] \end{bmatrix}$$

As shown above, the main difference between unaccuastive and uneragive verbs lies in EVENT structure: Unaccusative verbs assume the result state of an event while unergative verbs do not. In light of telicity or delimitedness, an unaccusative verb lexically has a telic or delimited event, in contrast with an inherent atelic or undelimited event of an unergative verb.

This paper proposes the extended lexeme hierarchy to capture the notion of telicity by introducing another dimension: TELICITY. Thus, an unaccusative is telic intransitive while an unergative is atelic intransitive.

(13)



9.3 Syntax and Semantics of RCs

9.3.1 Syntactic structures of Korean RCs

In this section, we investigate the syntactic structures of RCs, focussing on the distinction between two types of intransitives. We further argue that in unergatives, the agent employs his/her (in-)alienable part for the action involved but there is no such process in unaccusatives.

There are, as Carrier and Randall (1992) suggested, two main analyses of the syntactic structure of the English resultative construction; the Binary Small Clause Analysis and Ternary Analysis.

Given the above distinction between two types, it is reasonable to use the so-called Hybrid Analysis of Korean RCs (Kim 1999). With respect to *Type 1*, we propose that result expressions be predicative properties and have a semantic subject, thus treated as a sort of phrase. Another syntactic properties of *Type 1* or *non-subj-res-ph* is that it can license the 'Predicate-*key*' result phrase, rather than a clause as in (14).

(14) a. kang-i [(?*phyomyen-i*) tantanha-key] el-ess-ta.
river-NOM surface-NOM solid freeze-PAST-DEC
'The surface of a river froze solid.'

b. khepi-ka [(?*onto-ka*) chakap-key] sik-ess-ta.
coffee-NOM temperature-NOM cold cool-PAST-DEC
'The temperature of coffee cooled down'

c. Kim-i [(?*mom-i*) holccwukha-key]
Kim-NOM body-NOM thin
yawui-ess-ta.
become-thin-PAST-DEC
'The body of Kim became thin'

To put differently, *Type 1* does not license a visible syntactic subject in its phrase. Kim and Mailing (1996) suggested an interesting example that could be a counterexample (15a) of the classifications of result phrases dealt with in this paper (Kim and Mailing 1996):

(15) a. Kil-i cilphenha-key nwun-i nokassta.
Road-NOM slushy-KEY snow-NOM melted

b. ?Kil-i nwun-i cilphenha-key nokassta.
Road-NOM snow-NOM slushy-KEY melted

c. Kil-ui nwun-i cilphenha-key nokassta.
Road-GEN snow-NOM slushy-KEY melted

d. Kil-ey nwun-i cilphenha-key nokassta.
Road-LOC snow-NOM slushy-KEY melted

However, the cross-linguistic considerations provide us with a piece of evidence to support the validity of our classification. Consider the following examples where a Japanese unaccusative verb *toke*-(melt) is involved with RCs; (16a), a counterpart of (15a), is never acceptable in Japanese.

(16) a. *Miti-ga dorodoro-ni yuki-ga toke-ta.
Road-NOM slushy-NI snow-NOM melted.

b. *Miti-ga yuki-ga dorodoro-ni toke-ta.
Road-NOM snow-NOM slushy-NI melted.
c. Miti-no yuki-ga dorodoro-ni toke-ta.
Road-GEN snow-NOM slushy-NI melted.
d. Miti-de yuki-ga dorodoro-ni toke-ta.
Road-LOC snow-NOM slushy-NI melted.

Both Korean and Japanese are grammatical in case that *kil* and *miti* have locative markers *-e* and *-de*, respectively, which have been traditionally classified as adjuncts. Intuitively, "the road is slushy" means "snow there but not road itself is slushy". In other words, when saying that the road is slushy, we already assume there is something that melted or liquid in the road. Hence, it is perfectly grammatical in the case that *Kil-i* in (15a) and *miti-ga* in (16a) are removed.

Type 2 or *subj-re-ph* reveals some of the different syntactic constraints from *Type 1*. First, it requires that NP 2 or the subject of a result clause be obligatory.

(17) a. John-i [mok-i swi-key] oyichi-ess-ta.
John-NOM throat-NOM hoarse shouted
b. *John-i [swi-key] oichessta.
John-NOM hoarse shouted
c. *John-i [Mary-ui mok-i swi-key] oichessta.
John-NOM Mary-GEN throat-NOM hoarse shouted
d. Kim-i [sinpal-i talh-key] talliessta.
Kim-NOM shoes-NOM threadbare ran
e. *Kim-i [talh-key] talliessta.
Kim-NOM threadbare ran
f. *Kim-i [Mary-ui sinpal-i talh-key] talliessta.
Kim-NOM Mary-GEN shoes-NOM threadbare ran

Unlike English, the Korean RC with *Type 2* cannot be passivized (Goldberg 1995).[7]

(18) a. Kim-i [mok-i swi-key] oichiessta.
Kim-NOM throat-NOM hoarse shouted
b. *mok-i swi-key oichi-eci-essta.
throat-NOM hoarse shout-PASSIVE-Past

[7] Consider these examples in English:

(i) a. The joggers ran their Nikes threadbare.
a'. Their Nikes were run threadbare.
b. The joggers ran the pavement thin.
b'. The pavement was run thin.

Thus, this fact implies that RCs with *Type 2* are different from the English unergative resultative construction. Alternatively, we can say that the Korean resultative does not take the ECM parameter. It is just a matter of whether the underlying embedded subject is raised/EC-marked or not. But both for English and Korean the part-whole constraint holds. Finally, in preposing or topicalzation, both the nominative NP and its predicate in *Type 2* must be fronted together as a clausal unit at the one time. The ungrammaticality arises if either the NP or its predicate undergoes preposing separately.

(19) a. [mok-i swi-key/-tolok] Kim-i oichessta.
throat-NOM hoarse Kim-NOM shouted.

b. [sinpal-i talh-key/-tolok] Lee-ka talliessta.
shoes-NOM threadbare Lee-NOM ran.

c. ?*mok-i Kim-i swi-key/-tolok oichessta.
throat-NOM Kim-NOM hoarse shouted.

d. ?*sinpal-i Lee-ka talh-key/-tolok talliessta.
shoes-NOM Lee-NOM threadbare ran.

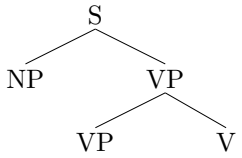
e. *swi-key/-tolok Kim-i mok-i oichessta.
hoarse Kim-NOM throat-NOM shouted.

f. *talh-key/-tolok Lee-ka sinbal-i talliessta.
threadbare Lee-NOM shoes-NOM ran.

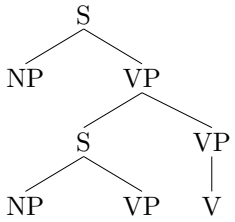
Unergative verbs selecting *Type 2* license only a clausal constituent. There is a part-whole relation between the topic/subject of the main clause and the subject of the embedded clause and they are causally connected in internal causation involved in unergative processes. An intense unergative process causes the result state concerned. This is why a reflexive pronoun or part nominal, as in *Mary cried herself hoarse*, is employed as a raised or exceptional object in English. In a depictive construction, such a reflexive is not allowed. In English the object and a result state expression such as a past participle or adjective is underlyingly clausal and thus possible differences among languages are simply apparent.

In short, we introduce different syntactic structures or hybrid analysis in Korean RCs. Nevertheless, they commonly lead to the causal interpretation.

(20) RC with *Type 1*



(21) RC with *Type 2*



9.3.2 Result Interpretation by Event Inheritance

From the discussion so far, we point out that there are two types of RCs in Korean and propose two different syntactic structures. Let us now turn to the semantics of RCs. RCs are aspectually constrained, as many researchers argued(Dowty 1979, Levin and Hovav 1995). It is important here to differentiate the telicity of lexical items from the causal interpretation. We can say that the result predicate denotes the result state of an event. That is, result phrases must have a delimiting or telic function.[8] Hence, the result phrase is responsible for the result state in causal relation.

The main verb of *Type 1*, as discussed in (9.2.5), is an unaccusative denoting a telic or delimited event. In other words, unaccusatives itself imply the causal relation in its lexical respresentation. In *Type 1* with a lexically delimited unaccusative main verb, as Levin and Hovav (1995) noted, the result expression provides a further specification of the result or achieved state.

(22) Kang-i (*han sikan-tongan) tantanha-key el-ess-ta
Lake-NOM (for one hour) solid froze

(23) Kang-i han sikan-maney tantanha-key el-ess-ta.
Lake-NOM in one hour solid froze

In RC with *Type 1* the existence of the result expression does not have new effects on result interpretation since unaccusative verbs inherently assume the telicity of an event.

[8] Consider these examples:
a. The waiter wiped the table (in/for two minutes).
b. The waiter wiped the table dry (in/*for two minutes).

Contrary to unaccusatives, unergatives do not imply the causal relation in its lexical respresentation. Interestingly enough, RC with *Type 2* is related to the combination of atelic unergative main verbs with telic result expression. With regard to this type, many researchers (see **?**) have assumed the 'event shift' from atelic to telic. It could also be predicted that there might be changes of the event in the merge of atelic main verb and telic result expressions into RCs. This incorporation, however, brings about somewhat different consequence compared to RC with *Type 1*. Both *-maney* and *-tongan* are compatible with RCs, though with different readings as in (24) and (25):

(24) John-i ilnyen-**maney** sinpal-i **talh**-key ttwi-ess-ta.
John-NOM in a year shoes-NOM thredbare ran

(25) John-i ilnyen-**tongan** sinpal-i talh-key **ttwi**-ess-ta
John-NOM for a year shoes-NOM thredbare ran

(24) implies that *sinpal* 'shoes' became threadbare, but (25) does not. The meaning of the result phrase in (25) is a kind of hyperbole, i.e., (25) could be paraphrased as 'ran very hard.' We can conclude that *-mane* modifies the result event of the result predicate, while *-tongan* does the process event of the main verb or *ttui-ta*. This consequence of scope difference has led to the assumption that RC with *Type 2* inherit their type-specific lexical eventuality to the construction, rather than necessarily involve an event shift from atelic to telic but they. A telic point of being completely threadbare as in RC with *Type 1* must be in the speaker's mind but in reality the unergative process is salient and telicity fades away in vagueness. The example of modification by duration in the progressive of an accomplishment verb as in *Mary is building a house for a year* may be considered in a similar fashion.

9.3.3 Selectional Restriction on Result Phrases

In this section we overview selectional restrictions on the result phrase in English and Japanese, offered by Wechsler (1997) and Washio (1997). Next, we examine the characteristics of Korean result phrase, in contrast to that in English and Japanese. Let us consider the following English examples.

(26) a. Kim ran clear of the fire/free of the car/*exhausted (Control / Weak)

b. *We yelled hoarse. (Control / Weak)

c. The joggers ran themselves exhausted. (ECM / Strong)

d. The joggers ran their Nikes threadbare. (ECM / Strong)

Wechsler (1997) argues that there are two types of resultatives, i. e. Control resultatives and ECM resultatives, and explain the semantic restriction of English RCs in light of Canonical Result Restriction. He argues that Control resultatives are subject to semantic sortal restrictions imposed by the verb, while ECM resultatives lack this type of restriction. The insight of Washio (1997), for the sake of reader's convenience, can be understood in a similar fashion to Wechsler (1997). For instance, Washio's strong and weak resultatives are parallel to Wechsler's ECM and Control resultatives, respectively. Washio claims that English allow both strong and weak resultative whereas Japanese allow only weak resultative.

In Korean, RCs with *Type 1* demonstrate similar semantic restriction patterns to Control or weak resultative:

(27) elum-i tantanha-key/?kut-key/*ttwukep-key el-ess-ta.
ice-NOM soild/hard/hot froze-PAST-DEC

In *Type 1*, the unaccusative main verb should subcategorize a result phrase that is compatible with the event of the main verb. In (27), for instance, the normal result state of *el-* (freeze) must be solid, but not liquid or thermic; thus, *ttwukep-key* (hot) cannot be a resultative phrase of *el-*. *Type 2*, in contrast to *Type 1*, is not subject to semantic restrictions imposed by the verb. Let us turn to *Type 2* in Korean:

(28) Kim-i [mok-i swi-key] oichi-ess-ta.
Kim-NOM throat-NOM hoarse shouted

(29) a. Kim-i sonswuken-i cec-/*malu-key wul-ess-ta.
Kim-NOM handkerchief-NOM wet/dry cried

b. Kim-i pal-/*son-i tahl-key tahli-ess-ta.
Kim-NOM foot/hand-NOM worn ran

c. Kim-i paekkop-i/*kho-ka ppaci-key wus-ess-ta.
Kim-NOM bellybutton-/nose-NOM come out smiled.

The normal result state of *oichi-* (shout) could not be postulated since *oichi-* lexically does not imply the result state but a process to utter a sudden loud cry; nevertheless *mok-i swi-key* is compatible with *oichi-* (shout). *Type 2* is limited to some restricted expressions. The meaning of *Type 2* in the constructions could be considered some kind of frozen expression. They have a tendency not to be substituted by other expression easily, as in (29). With reference to Wechsler (1997) and Washio (1997), Korean RCs allows both strong/ECM and weak/Control resultatives. However, strong/ECM resultatives in Korean is highly restricted, compared to English.

9.3.4 A Further Constraint on *Type 2*

There is a remaining issue related to *Type 2*. The example in (30) has the same syntactic configuration as the typical *Type 2* in (28). Hence, we can predict the causal interpretation.

(30) Kim-i [mok-i theci-key] oichi-essta.
Kim-NOM throat-NOM blown out shouted

However, the predicted interpretation does not occur in the change of the result predicate from *swi*-'hoare' to *theci*- 'be blown out'. Only the durative time adverbial *-tongan* is compatible as in (31), which means there is no result meaning or no causal relation between main clause and embedded clause.

(31) Kim-i ilpun-tongan mok-i theci-key oichi-ess-ta.
Kim-NOM for a minute a throat-NOM blown-out shouted

(32) *Kim-i ilpun-maney mok-i theci-key oichi-ess-ta.
Kim-NOM in a minute a throat-NOM blown-out shouted

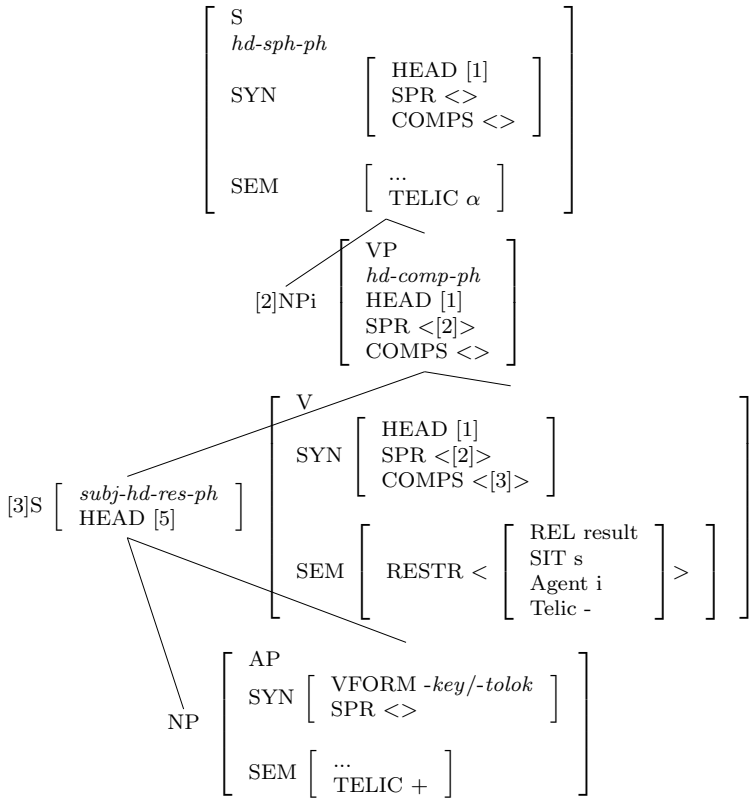
The contrast between *mok-i swui-key* and *mok-i theci-key* appears to be pragmatic constraints. Our world knowledge could allow us to understand a situation where the throat has become hoarse. It is implausible, however, to make out a situation where the throat is blown out, except for a hyperbolic or exaggerated contextual meaning. The constraint in (33) guarantees the case with only an atelic interpretation occurring in *Type 2*.

(33) Pragmatic Constraint of *Type 2*
In *Type 2*, the telicity of a resultative clause should not be inherited if a resultative clause has a hyperbolic meaning.

9.4 Toward Formalization

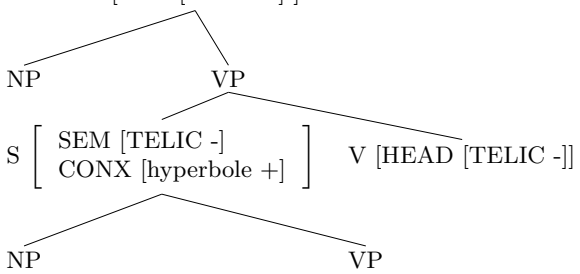
In this final section, we propose some formalization of Korean RCs based on the previous observations. With respect to *Type 2*, we argue that both telic and atelic interpretations arises. The possibility of telic/atelic interpretation in *Type 2* construction is represented by [TELIC α]. Within a HPSG framework, *Type 2* roughly has the following feature structures:

(34)



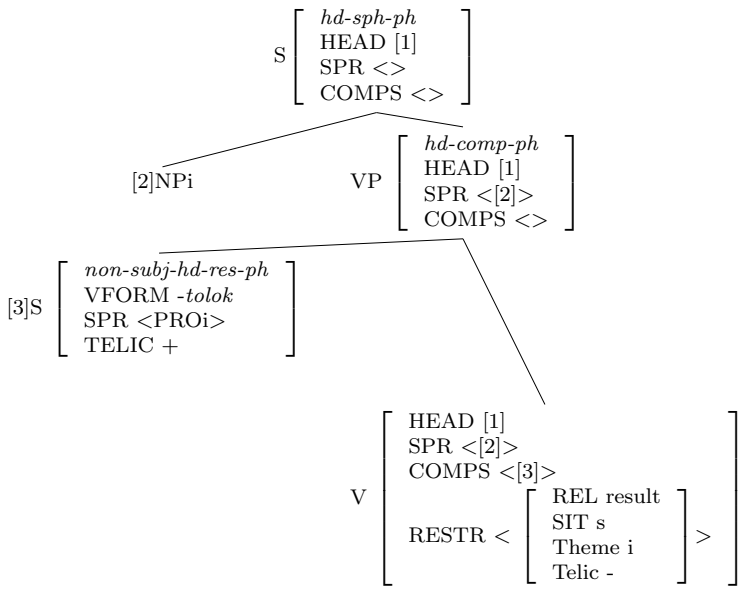
A constraint on *Type 2* in (33) is added to provide the explanation for the case where only hyperbolic or figurative meaning arises.

(35)



Type 1 provides a further specification of the achieved state since unaccusatives are lexically delimited. [SEM TELIC +] means RC with *Type 1* has only telic or resultative reading.

(36)



9.5 Conclusion

The complexity of resultative construction cannot be explained by purely syntactic or purely semantic approaches. We propose that there are two kinds of result phrases in Korean and each type has its own constraints. Also, we claim that highly restricted constraints should be taken into consideration to provide adequate explanations for RCs. The interaction of RCs with constraints concerned leads to reasonable result or causal interpretations. In a nutshell, Korean RCs can be explained by type-specific but cross-linguistically plausible properties of the constructions and their relevant constraints.

Acknowledgement

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References

Carrier, Jill and Janet Randall. 1992. The argument structure ans syntactic structure of resultatives. *LI* 23(2):173–234.

Dowty, David. 1979. *Word Meaning and Montague Grammar*. Dordrecht: Reidel Publishing co.

Goldberg, Adele. 1995. *Constructions*. Chicago and London: University of Chicago Press.

Jang, Youngjun. 2000. *A New Perspecive on Korean Syntactic Structures(in Korean)*. Seoul: Top Publishing co.

Kim, Jongbok. 1999. Constraints on the formation of korean and english resultative constructions. *NELS* 29:137–151.

Kim, Soowon and Joan Mailing. 1996. Resultative formation: English vs. korean. *Proceedings of the 7th Japanese/Korean Linguistics Conference* .

Lee, Chungmin, Beommo Kang, and Seungho Nam. 1997. Argument structure and the role of theme. *Proceedings of the ICCS'97* .

Lee, Junkyu. 1998. *The Lexical Semantics of Korean Unaccusative Verbs(in Korean)*. Master's thesis, Dept. of Linguistics, Seoul National University, Seoul.

Levin, Beth and Malka Rappaport Hovav. 1995. *Unaccusativity: At the Syntax-Lexical Semantics Interface*. Cambridge: MIT Press.

Li, C. and S. Thompson. 1981. *Mandarin Chinese: A Functional Reference Grammar*. Berkeley: University of California Press.

Nightingale, Stephen. 1999. *Polysemy and Homonymy in Japanese Verbal Alternations*. Ph.D. thesis, University of Edinburgh.

Perlmutter, David. 1978. Impersonal passives and the unaccusative hypothesis. *BLS* 4.

Pustejovsky, James. 1995. *The Generative Lexicon*. Cambridge: MIT Press.

Sag, Ivan and Thomas Wasow. 1999. *Syntactic Theory: A Formal Introduction*. Stanford: CSLI Publications.

Simpson, Jane. 1983. Resultatives. *Papers in Lexical Functional Grammar* .

Uehara, S., Q. Li, and Thepkanjana. 2001. A contrastive study of resultative constructions in japanese, korean and mandarin chinese: A cognitive approach. *the Proceedings of the 1st Seoul International Conference on Discourse and Cognitive Linguistics* .

Washio, Ryuichi. 1997. Resultatives, compositionality and language variation. *Journal of East Asian Linguistics* 6:1–49.

Wechsler, Stephen. 1997. Resultative predicates and control. *Proceedings of the 1997 Texas Linguistic Societ Conference on the Syntax and Semantics of Predication* .

Wechsler, Stephen and Bokyung Noh. 2001. Predication and anaphora: Parallels between korean and english resultatives. *Language Sciences* 23:391–423.

10

Korean *Tough* Constructions and Double Nominative Constructions

Sun-Hee Lee

10.1 Introduction

In English a certain class of predicates that includes adjectives like *easy*, *hard*, and *impossible* occurs in a syntactic construction that is traditionally referred to as the *tough* construction.

(1) This book$_i$ is tough to read ___$_i$

In (1), the subject NP is coindexed with the missing object of the embedded predicate. This connectivity is unbounded because there is in principle no bound on the depth of embedding of the missing object. In Korean, a group of adjectives that is semantically similar to English *tough* predicates shows the same dependency. This group includes *himtulta* 'tough', '*swipta* 'easy', *elyepta* 'hard', *pulkanunghata* 'impossible', etc., and examples are given in (/refexa).

(2) a. i chayk$_j$ -i [___$_j$ ilk - ki]-ey himtulta
this book- NOM read-NML -for tough
'This book is tough in terms of reading.'

b. i chayk$_j$-i [___$_j$ ilk - ki]-ka himtulta
this book-NOM read- NML -NOM tough
'This book is tough to read'

In (2), the nominative NP is conindexed with the missing object of the embedded predicate. Given that an object NP of the embedded clause cannot be assigned nominative case *in situ*, we know that the first NP occurs outside of the embedded clause. Syntactic properties of Korean *tough* constructions (TCs) have been discussed in Lee (2002) and can be briefly summarized as follows: First, the formation of TCs in Korean is

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Jong-Bok Kim and Stephen Wechsler.

less restricted as compared to English; the subject NP can be linked not only to an accusative NP but also to a locative, dative, instrumental, or goal NP.[1] Second, the embedded phrases with nominative case are nominalized gerund phrases (NGPs) taking the affix *ki*. The *ki* NGP can take two kinds of case markers: *ey* as in (2a) and the nominative *ka* (or its phonological variant *i*) as in (2b). We refer to these two kinds as *ki-ey* TCs and *ki-ka* TCs. Although the two types show different properties, an unbounded dependency holds in both TCs. Interestingly, the same kind of dependency can be found in double nominative constructions (DNCs) that have similar syntactic and semantic properties as *ki-ka* TCs.

In this paper, we focus on *ki-ka* TCs. We argue that these TCs form a subclass of DNCs and that the unbounded dependency analysis of *ki-ka* TCs can be extended to DNCs. Section 2 is devoted to proving that the dependencies in TCs can be captured by non-local SLASH feature percolation and binding in the lexical entries of *tough* predicates as suggested in Pollard & Sag (1994). Section 3 discusses similarities between TCs and DNCs. Relevant DNC classification will be presented as part of a background discussion. Lexical constraints will be also provided to handle the relationship between single nominative constructions and DNCs.

10.2 Unbounded dependencies and formation of *tough* constructions

Long-distance dependency between a subject NP and a missing element in a gerund NP can be found in the following example.

(3) Kim$_j$-i [VP salamtul-eykey [VP _$_j$ hwecang-ulo ppopulako]
Kim-NOM people-to president-as elect
seltukha-ki]-ka himtulta.
persuade-NML-NOM tough
'Kim$_j$ is tough to persuade people to elect him$_j$ president.'

Whether a missing element is a trace or a phonologically null pronominal (or *pro* in GB terms) has been controversial because a missing

[1] Some examples of non-object TCs are given as follows.

i Lazarus$_j$-ka [___$_j$ shyophingha-ki]-ka/ey swipta (Locative)
Lazarus-NOM do shopping-NML -NOM/for easy
'Lazarus is easy to do shopping (in)'

ii yenphil$_j$ -i [___$_j$ kulssi-lul sseu-ki]-ka/ey himtulta (Instrumental)
a pencil-NOM letters- ACC write-NML -NOM/for tough
'A pencil is tough to write letters (with).'

element in (3) can be replaced by an overt pronoun *ku-lul* 'him'. We argue that the pronoun appearing in the gap position is a resumptive pronoun, which is as another form of trace following Vaillette (2001) and Georgopoulos (1991). Otherwise, obligatory binding between the subject NP and a missing element in a sentence is hard to explain. Our gap analysis of TCs is cross-linguistically consistent with strong crossover phenomena. The ungrammaticality of (4) can be explained as a strong crossover violation; the trace cannot be bound by the intervening pronoun.

(4) a. *Kim$_j$-i [ku papo$_j$-eykey [_$_j$ hoycang-ulo ppopulako]
Kim that idiot-to president-as elect
seltukha-ki]-ka himtulta
seltukha-NML-NOM hard
(lit.) '*Kim$_j$ is tough to persuade that idiot$_j$ to elect him$_j$ to be* the president'

b. *Kim$_j$ -i [ku papo$_j$-eykey [ku$_j$-lul hoycang-ulo
Kim that idiot-to he- ACC president-to
ppopulako] seltukhaki]-ka himtulta.
elect persuade-NOM hard
(lit.) '*Kim$_j$ is hard to persuade that idiot$_j$ to elect him$_j$ to be* the president.'

We use the epithet *ku papo* 'that idiot', which has the same index value as the preceding subject *Kim*, instead of a pronoun in (4). That is because a pronoun in those positions can be interpreted as a resumptive pronoun in Korean. An epithet eliminates the ambiguity and guarantees that the pronoun in the deepest clause is another form of a trace. In (4), a gap and a trace show the same behavior in the same position. The strong crossover violation can also be found in other unbounded dependency constructions including topic constructions and relative clauses.

Additional supporting evidence for the gap analysis of TCs comes from coordination phenomenon. In general, the Coordinate Structure Constraint (CSC) is observed in Korean coordinate structures as argued in Cho (1995) and Yoon (1997).[2] The examples (5b) and (5c)

[2]Cho (1995) and Yoon (1997) argue that constructions with the conjunction ending 'ko' (and) are divided into true conjunction and adjunction by providing various grammatical differences between them. In general, two conjuncts can change their positions only in true conjunction. In contrast, adjunct conjuncts can be replaced by attaching a temporal or causal ending to the conjunction as in *V- ko-se* and *V-ko-nun*. They confirm that true coordination but not adjuction follows the Coordinate Structure Constraint which disallow asymmetric extraction out of one conjunct.

are ungrammatical because the topicalized element is extracted out of one conjunct. However, the example (5a) is grammatical because the topicalized element refers to the missing element in both conjuncts.

(5) a. Kim$_j$-un aitul-i e$_j$ cohaha-ko elun-i e$_j$ silehay.
Kim-TOP kids-NOM like-CONJ adults-NOM dislike
'As for John$_j$, kids like (him$_j$) and adults dislike (him$_j$).'

b. *Kim$_j$-un aitul-i e$_j$ cohaha-ko elun-i Jay-ul silehay.
Kim-TOP kids-NOM like-CONJ adults-NOM Jay-ACC dislike
(lit.) *'As for Kim$_j$, kids like (him$_j$) and adults dislikes Jay.'*

c. *Kim$_j$-un aitul-i Jay-ul cohaha-ko elun-i e$_j$ silehay.
Kim-TOP kids-NOM Jay-ACC like-CONJ adults-NOM dislike
(lit.) *'As for Kim$_j$, kids like Jay and adults dislike (him$_j$).'*

In addition, the first conjunct alone does not license a so-called *pro* as in (6c), while the second conjunct does.

(6) a. Johnn$_i$-i Min$_j$-eykey [*pro*$_i$/$_k$ salangha-ko *pro*$_i$/$_k$
John-NOM Min-DAT like-CONJ
tolpoa talla-ko] haysse.
care-COMP told
'John$_i$ told Min$_j$ to love (him$_i$/$_k$) and take care of (him$_i$/$_k$).'

b. John$_i$-i Min$_j$-eykey [ku$_i$/$_k$-lul salangha-ko *pro*$_i$/$_k$
John-NOM Min-DAT him-ACC love-CONJ
tolpoa talla-ko] haysse
care-COMP told
'John$_i$ told Min$_j$ to love him$_i$/$_k$ and take care of (him$_i$/$_k$).'

c. *John-i Min-eykey [*pro*$_i$/$_k$ salangha-ko ku$_i$/$_k$-lul
John-NOM Min-DAT love-CONJ him-ACC
tolpoa talla-ko] haysse.
care-COMP told
'John$_i$ told Min$_j$ to love (him$_i$/$_k$) and take care of him$_i$/$_k$.'

Based on the fact that the CSC is observed and the *pro*s do not appear only within the first conjunct, we can conclude that the pronominal element in the following example has the status of a gap.

(7) a. i chayk-i$_j$-i [ai-ka e_j ilk-ko elun-i
this book-NOM child-NOM read-CONJ adult-NOM
e_j ihayhaki]-ka swipta
understand-NOM easy
' This book$_j$ is easy for a child to read e_j and for an adult
to understand e_j'

b. i chayk$_j$-i [ai-ka kukes$_j$-ul ilk-ko elun-i
this book-NOM child-NOM it-ACC read-CONJ adult-NOM
e_j ihayhaki]-ka swipta
understand-NOM easy
(lit.)'This book$_j$ is easy for a child to read it$_j$ and for an adult
to understand e_j'

c. i chayk$_j$-i [ai-ka e_j ilk-ko elun-i
this book-NOM child-NOM read-CONJ adult-NOM
kukes$_j$-ul ihayhaki]-ka swipta
it-ACC understand-NOM easy
(lit.)'This book$_j$ is easy for a child to read e_j and for an adult
to understand it$_j$'

As we see in (7b) and (7c), the pronominal *kukes* in a conjunct does not cause a violation of the coordinate structure constraint like (7a). In particular, the pronoun appears within the first conjunct where a *pro* cannot appear. Thus, we can conclude that the pronominal element does not correspond to *pro* but replaces a gap in TCs.

Now, on the basis of long-distance connectivity and the trace status of the missing element, we analyze Korean TCs as weak unbounded dependency constructions, following Pollard & Sag (1994); there is no overt filler in the nonargument position and connectivity holds between the subject NP and the trace. In (8), we provide a lexical entry for *swipta* 'easy', which has two elements in the SUBJ list.

(8)
$$\left[\begin{array}{l}\textsc{phone}\left\langle \textsf{swipta} \right\rangle \\ \textsc{ss}\left[\begin{array}{l}\textsc{l}\,|\,\textsc{c}\,|\,\textsc{as}\left[\begin{array}{l}\textsc{subj}\left\langle \textsc{np}[\textsf{nom}]\boxed{1}\ ,\ \textsc{ngp}\left[\begin{array}{l}\textsc{head}\left[\begin{array}{l}\textit{verb}\\ \textsc{vform}\ \textit{ki nom}\end{array}\right]\\ \textsc{case}\ \textsf{nom}\\ \textsc{inher}\,|\,\textsc{slash}\left\{\boxed{2}\textsc{np}\boxed{1}\right\}\end{array}\right]\right\rangle\end{array}\right]\\ \textsc{nonlocal}\ |\textsc{to-bind}\ |\textsc{slash}\left\{\boxed{2}\right\}\end{array}\right]\end{array}\right]$$

The predicate *swipta* subcategorizes for a *ki* nominalized gerund phrase (NGP), which contains a gap coindexed with the first subject NP. This is represented by the SLASH feature in the lexical entry of *swipta*. Based on Lee (2002), we assume that the NGP has the HEAD value of *verb* and that *ki* is a complementizing suffix that adds the VFORM value *ki nominal* to the verb. We also argue that the CASE feature is not a HEAD feature of a noun and can appear in a phrase with a certain complementizers such as *ki*, *um*, *ci*, *nya*, *kka* in Korean. For a detailed discussion, refer to Lee (2002).[3]

10.3 A new analysis of double nominative constructions

In this section, we argue that *ki-ka* TCs form a subclass of DNCs and that their unbounded dependency account can be applied to some other DNCs. Before we get into that, however, one notable point is that the structures of *ki-ka* TCs are hard to analyze when the first nominative NP corresponds to the subject of the embedded clause as in the following examples.[4]

(9) aitul-i yenge-lul paywu-ki-ka swipta
children-Nom English-Acc learn-NML-Nom easy
'It is easy for children to learn English.'

Note that Korean *tough* predicates can take a whole S as their single argument. Chae (1988) actually argues that the subject of the embedded clause does not appear in the subject position of a *tough* predicate. However, adverb insertion and proform substitution support the idea that the first nominative NP in (9) appears outside of the embedded clause.

[Adverb Insertion]
In Korean, an adverb modifying the matrix clause or the matrix verb does not intervene among the elements of the embedded clause as in

[3] In Lee (2002), the MARK(ING) feature has been used instead of using the VFORM feature to deal with 'ki' nominalization. Without introducing a new feature MARK, we think that NGPs can be handled by *ki nom(inal)* value as the VFORM feature of a predicate.

[4] Sentence (9) is actually ambiguous. It can also be interpreted as 'it is likely that children learn English'. Song (1988) distinguished *swipta* into two lexical entries: *swipta1* corresponds to 'easy' and *swipta2* to 'likely'. He points out that the meaning of 'swipta' shifts from *swipta1* 'easy' to *swipta2* 'likely' when a tense marker is added onto the embedded predicate. In addition, *swipta2* is allowed to occur when the embedded predicate consists of a descriptive adjective, the copula, or an existential verb like 'exist'. This paper deals with *swipta1* 'easy' but not *swipta2*.

(10).

(10) a. tahaynghito [Mary-ka yenge-lul paywess-um] -i
fortunately Mary-Nom English-Acc studied-Nml -Nom
pwunmyenghata.
obvious
'Fortunately, it is obvious that Mary learned English.'

b. *[Mary-ka tahyanghito yenge-lul paywess-um] -i
Mary-Nom fortunately English-Acc studied-Nml -Nom
pwunmyenghata.
obvious
'Fortunately, it is obvious that Mary learned English.'

c. *[Mary-ka yenge-lul tahaynghito paywess-um] -i
Mary-Nom English-Acc fortunately studied-Nml -Nom
pwunmyenghata.
obvious
'Fortunately, it is obvious that Mary learned English.'

An adverb modifying the matrix predicate can follow the subject NP as in (11b), while it cannot intervene between the embedded predicate and its argument as in (11c). This shows that the first NP of (9) does not appear in the embedded clause.

(11) a. tahaynghi aitul-i yenge-lul paywu-ki-ka swipta.
fortunately children-Nom English-Acc learn-NML-Nom easy
'Fortunately, it is easy for children to learn English.'

b. aitul-i tahaynghi yenge-lul paywu-ki-ka swipta
children-Nom fortunately English-Acc learn-NML-Nom easy
'Fortunately, it is easy for children to learn English.'

c. *aitul-i yenge-lul tahaynghi paywu-ki-ka swipta
children-Nom English-Acc fortunately learn-NML-Nom easy
'Fortunately, it is easy for children to learn English.'

[Proform Substitution]

(12) a. aitul-i yenge-lul paywu-ki-ka swiwe
children-Nom English-Acc study-NML-Nom easy
'It is easy for children to learn English.'

b. aniya, elun-to kulay.
no adults-also is so
'No, itt is so for adults .'

Sentence (12b) can be uttered in response to the statement of (12a); the proform *kulay* (is so) replaces *yeune-lul paywuki-ka swiwe* (be easy to

learn English). This suggests that the first NP does not appear inside of the embedded clause. Thus, there are two separate phrases with nominative case.

10.3.1 Classification of DNCs

In Korean, DNCs are very common and show interesting semantic and syntactic relationships. DNCs are divided into three major types based on the grammatical relationship between the subject and the predicate. Then, each type is classified into several subtypes according to various relations between two subjects. Type I contains DNCs where the first nominative NP is not required by the main predicate. In Type II, the two nominative NPs are required by the predicate as arguments. Type III includes DNCs where one NP provides some sort of semantic specification to the other.

1. TYPE I
   In Type I DNCs, the first nominative NP corresponds to the genitive NP of the second nominative NP. However, there is no direct argument-predicate relation between the first NP and the main predicate. This type can be divided into four subtypes according to different syntactic and semantic relation holding between two NPs.
   1) Whole-part Constructions
      The second NP refers to a part of the first NP. This kind of relation has been referred to as inalienable possession.

      (13) a. John-uy son-i cakta
              John-Gen hands-Nom small
              'John's hands are small'
           b. John-i son-i cakta
              John-Nom hands-Nom small
              'John has small hands '
   2) Relation Constructions
      A kinship term related to the first NP appears as the second NP.

      (14) a. John-uy atul-i cakta
              John-Gen son-Nom short
              'John's son is short'
           b. John-i atul-i cakta
              John-Nom son-Nom short
              'John has a short son'
   3) Possessor-possessed Constructions
      The first NP is a possessor and the second NP is a possession.

(15) a.John-uy cip-i cakta
John-Gen house-Nom small
'John's house is small'
b.John-i cip-i cakta
John-Nom house-Nom small
'John has a small house.'

4) Verbal-noun Constructions
The first NP is an argument of the second NP, which is a verbal noun. A verbal noun, generally borrowed from a verb form of Chinese or a foreign language, subcategorizes for arguments like other predicates.

(16) a.i mwunce-uy haykyel-i swipta.
this problem-Gen solution-Nom easy
'The solution of this problem is easy.'
b.i mwunce-ka haykeyl-i swipta.
this problem-Nom solution-Nom easy
'This problem has an easy solution.'

2.TYPE II
In Type II DNCs, two NPs are separately required by a predicate.

This type is divided into two classes; the first includes locative subject constructions and the second includes nominative NP constructions.

1) Locative Subject Constructions
The first nominative NP corresponds to a Locative or Experiencer NP that can take *ey* (at) and *eykey* (to) instead of nominative case.

(17) a.i san-ey namwu-ka manhta
this mountain-at trees-Nom abundant
'There are many trees at this mountain.'
b.i san-i namwu-ka manhta
this mountain-Nom trees-Nom abundant
'This mountain has many trees.'

(18) a.John-eykey komin-i saynggi-ess-ta
John-To worry-Nom become-to-exist
(lit.) *'To John, there happen to be some worries.'*
b.John-i komin-i saynggi-ess-ta
John-Nom worry-Nom become-to-exist
(lit.) *'John has gotten some worries.'*

2) Nominative Object Constructions
These predicates require two nominative NPs, but those NPs cannot take any other case marker. In this type, the second NP works like an object. This type includes so-called psych-adjectives as in (19) and two place predicates like *anita* (be-not) and *toyta* (become).

(19) a.John-i Mary-ka cohta
John-Nom Mary-Nom be fond of
'John is fond of Mary'

b.nay-ka tongsaying-i mipta
I-Nom brother-Nom hate
'I hate my brother.'

(20) a.John-i kasu-ka anita
John-Nom singer-Nom be-not
'John is not a singer.'

b.Mary-ka uysa-ka toyessta
Mary-Nom doctor-Nom became
'Mary became a doctor.'

3.TYPE III
There are two subclasses in Type III DNCs; namely, specification constructions and classifier constructions.

1) Specification Constructions
The first NP includes the second NP in its category. In other words, the second NP is a hyponym of the first NP. In general, the first NP can also take the topic marker *un/nun*, which has been called a based-generated topic. The second NP provides semantic specification to the preceding NP.

(21) a.kwail-i sakwa-ka masissta.
fruit-Nom apples-Nom tasty
(lit.)*'As for fruit, apples are tasty.'*

b.*kwail-uy sakwa-ka masissta.
fruit-Gen apples-Nom tasty
(lit.)*'As for fruit, apples are tasty.'*

2) Classifier(Cl) Constructions
A classifier phrase which is composed of a number and a classifier appears in the position of the second NP and modifies the first NP. A classifier phrase can precede the first NP by taking the genitive case marker. However, it cannot precede the first NP when it has the nominative case marker.

(22) a.twu-kay-uy sakwa-ka ssekessta.
two-Clf-nom apples-Nom rotten
(lit.) *'Two apples are rotten.'*
b.sakwa-ka twu-kay-ka ssekessta.
apples-Nom two-Cl-Nom rotten
(lit.) *'Two of the apples are rotten.'*

10.3.2 Similarities of *ki-ka* TCs and certain DNCs

Even though the previous discussion of DNCs focused on constructions containing simple nouns as opposed to constructions with nominalized VP or S, *ki-ka* TCs are classified here as a subclass of DNCs. We will provide evidence showing that *ki-ka* TCs exhibit the same structural features as other DNCs; namely, connectivity between the subject and a missing element, scrambling facts, relativization, and long-distance dependency.

[Connectivity of Arguments]

As in TCs, there is connectivity between the first NP and a missing element of the second phrase in DNCs. Consider the following examples.

(23) a. [i sacen-ul sayongha-ki-ka] swipta.
this dictionary-Acc use-NML-Nom easy
'It is easy to use the dictionary.'
b. i sacen$_j$ -i [___$_j$ sayongha-ki]-ka swipta.
this dictionary-Nom use-NML-Nom easy
'This dictionary is easy to use.'

(24) a. [i sacen-uy sayongpep-i] swipta.
this dictionary-Gen usage-Nom easy
(lit.) *'The usage of the dictionary is easy.'*
b. i sacen$_j$ -i [___$_j$ sayongpep]-i swipta.
this dictionary-Nom usage-Nom easy
(lit.) *'The usage of this dictionary is easy.'*

Comparing (23b) and (24b), we can see that the first nominative NPs are coindexed with the missing elements of the second NPs. The only difference is that a noun *sayongpep* 'usage' appears in (24) instead of a verb, *sayongha-* 'use'.[5]

[5]The verb *sayongha-* is composed of a verbal noun *sayong* and a supporting verb *hata* 'do'. In Korean, a verbal noun combines with *hata* 'do' to form a verb.

(25) a. *sayongha-ki-ka swipta.
use-Nml-Nom easy
'It is easy to use.'
b. *sayongpep-i swipta.
usage-Nom easy
'The usage is easy'

The noun *sayongpep* (usage) is a relational noun whose meaning cannot be understood without reference to another entity in a sentence or at least in the context. For example, unlike common nouns such as 'desk' and 'chair', the meaning of a relational noun like '*father*' cannot be construed without reference to another entity, in this ase a child or children. We can capture general properties of Type I DNCs in terms of a relational noun.[6]

[**Scrambling**]

Even though Korean has relatively free word order, the sentence becomes ungrammatical in both TCs and DNCs if the second NP precedes the first NP. This seems to be caused by the syntactic and semantic relationship between the nominative NPs in these constructions. In general, whole NP precedes part NP and possessor precedes possessed. An NP having an argument-predicate relationship with the first nominative NP follows its arguments as we see in the following examples.

(26) a. sacen-i sayongha-ki-ka swipta.
dictionary-Nom use-NML-Nom easy
'A dictionary is easy to use.'
b. *sayongha-ki-ka sacen-i swipta
use-NML-Nom dictionary-Nom easy

(27) a. sacen-i sayongpep-i swipta.
dictionary-Nom usage-Nom easy
(lit.)*'The usage of a dictionary is easy.'*
b. *sayongpep-i sacen-i swipta
usage-Nom dictionary-Nom easy

This combination can be analyzed as a complex predicate when the accusative case marker intervenes between a verbal noun and *hata*. For further discussion, refer to Lee (2000).

[6] J-M. Yoon (1997) discusses multiple nominative and accusative constructions having relational nouns. The discussion of relational nouns is intimately related to these constructions, which are divided into different subclasses. In this paper, we limit ourselves to pointing out that the second NP is possibly classified as a relational noun, but postpone detailed analysis to a future study of multiple nominative and accusative constructions.

[Relativization]

The second NP cannot be the head noun of a relativized construction while the first NP can. We can verify this in the following examples.

(28) a. *sacen-i swiwu-n sayongha-ki
dictionary-Nom easy-REL use-NML
(lit.) *'the usage that the dictionary is easy'*

b. sayongha-ki-ka swiwu-n sacen
use-NML-Nom easy-REL dictionary
'The dictionary that is easy to use'

(29) a. *sacen-i swiwu-n sayongpep
dictionary-Nom easy-REL usage
(lit.) *'the usage that a dictionary is easy'*

b. sayongpep-i swiwu-n sacen
usage-Nom easy-REL dictionary
'the dictionary that is easy to use'

[Long-distance Dependency]

There is a long-distance dependency between the two NPs. Consider the following examples.

(30) a. Kim$_j$-i [NP[S salamtul-i e_j hyocang-ulo senchulha-nun]
Kim-Nom people-Nom president-as elect-REL
kwaceng-i] himtul-ess-ta.
process-Nom tough-Past-Ending
'The process of electing Kim as president was tough for people.'

b. yenge$_j$-ka [NP[NP[REL e_j hyokwacekulo kyoyukha-nun]
English-Nom effectively educate-REL
kyocay-uy] kyepal-i] elyepta
materials-Gen development-Nom hard
(lit.) *'English is hard to develop the materials for educating*
(it) effectively.'

In (30a), the first NP, *Kim*, is connected to a missing element in the appositive clause of the head noun *'kwaceng'* (process). In (30b), *yenge* (English) is connected to an element located in the object position of the relative clause. The relative clause modifies the genitive NP of the head noun *kyepal* (development). Even though a long-distance dependency in DNCs has not been the focus of previous studies, the relation between the first NP and a missing element is unbounded, as in TCs.

Discussing relativization, Kim (1999) argues that there are some relative constructions that originate from double nominative constructions. Consider the following examples.

(31) a. chinkwu$_i$-ka [e_i salko iss-nun] aphatu-ka acwu khuta.
friend-Nom live is-Rel apartment-Nom very big
(lit.) *'As for the friend, the apartment where he lives is very big.'*

b. [chinkwu$_i$-ka e_j salko iss-nun] aphatu$_j$-ka acwu khuta.
friend-Nom live is-Rel apartment-Nom very big
'The apartment$_j$ where the friend lives e_j is very big.'

c. [e_i e_j salko iss-nun] aphatu$_j$-ka acwu khu-un chinkwu$_i$
live is-Rel apartment-Nom very big-Rel friend
(lit.) *'The friend$_i$ whose apartment$_j$ where$_j$ e_i lives e_j is very big.'*

According to Kim, the head noun *chingwu* (friend) in (31c) is not related to the embedded subject of the relative clause as in (31b) but to the subject of a DNC as in (31a). He points the fact that relativization is only possible when the head appears as the first subject of a DNC.[7] This indirectly shows that there is a long-distance dependency in DNCs; the first nominative NP in a DNC is connected to an element in the relative clause but not to the head noun.[8] This connectivity is required because the empty subject in the relative caluse in (31a) cannot be replaced by an element having a different index value from that of the first nominative phrase *chinkwu* (friend).

In addition, Gunji (1987) treated Japanese DNCs, which have similar properties to Korean DNCs, as unbounded dependency constructions.

[7] He provides the following examples to show the connection between so-called double relative constructions and the DNCs.

ia.*[e_i e_j tulkoiss-nun ai$_i$]-ka pappu-n wusan$_j$
holding-Rel child-Nom busy-Rel umbrella
(lit.) *'the umbrella that the child who is busy is holding'*

ib.*wosan-i ai-ka papputa
umbrella child-Nom busy

iia.[e_i e_j ipkoiss-nun os$_j$]-i mesci-n sinsa$_i$
wearing-Rel clothes-Nom stylish-Rel gentleman
(lit.) *'the man$_i$ whose clothes$_j$ that e_i is wearing e_j are stylish'*

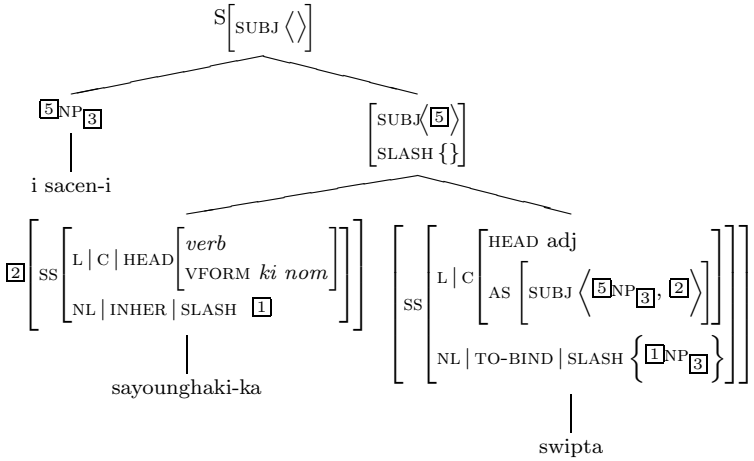
iib.ku sinsa-ka os-i mescita
that man-Nom clothes-Nom stylish
'The man's clothes is stylish.'

As we see in the above examples, relativization is only possible when the head can appear as the first subject of a DNC. He also notes that the semantic relationship of the two head nouns in (iia) is similar to that of the two subject NPs in (iib).

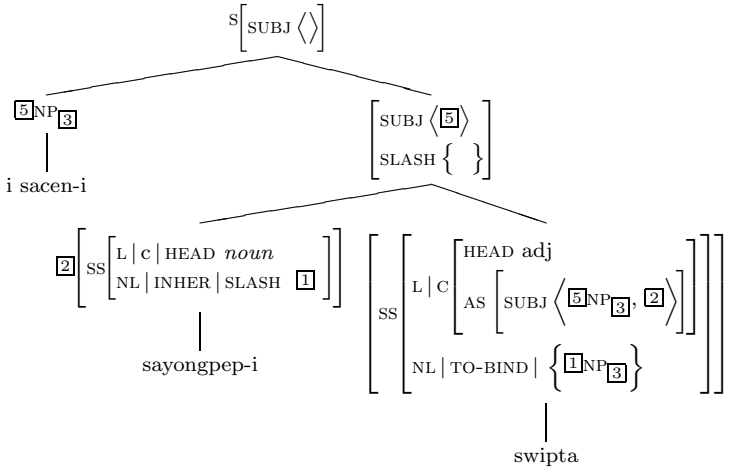
[8] Even though Kim analyzed the embedded subject in (31a) as *pro*, the missing element can be analyzed as a gap, as we already discussed in 2.

We can use the SLASH value to capture the semantic connectivity in DNCs, just as we did for TCs. This accords with the semantic and syntactic similarities between TCs and DNCs. Furthermore, we argue that *ki-ka* TCs and Type I DNCs share the same kind of structure; namely, one that licenses a constituent formed by the second NP and a predicate. The structure of *ki-ka* TCs and related DNCs can be presented as follows.

(32) a. *swipta* in TCs



b. *swipta* in DNCs



10.3.3 A lexical analysis of TCs as DNCs

As we have seen in the previous section, Korean TCs belong to Type I DNCs, where the first subject is related to a missing element of the second NP or GNP. Moreover, there exists a correspondence between predicates with a single nominative NP and those with double nominative NPs. We can provide a descriptive-level lexical rule to capture the relationship between predicates that have different argument realizations in spite of having lexical similarities in the PHON value and semantic interpretation. The Subject Insertion Lexical Rule (35) captures the relationship between single nominative constructions and double nominative constructions as in the following examples.

(33) a. [i sacen-ul sayongha-ki] -ka swipta.
this dictionary-Acc use-NML -Nom easy
'It is easy to use this dictionary.'

b. i sacen$_j$ -i [___$_j$ sayongha-ki] -ka swipta.
this dictionary-Nom use-NML -Nom easy
'This dictionary is easy to use.'

(34) a. [i sacen-uy sayongpep] -i swipta.
this dictionary-Gen usage -Nom easy
'The usage of the dictionary is easy.'

b. i sacen$_j$ -i [___$_j$ sayongpep] -i swipta.
this dictionary-Nom usage -Nom easy
(lit.)*'The usage of this dictionary is easy.'*

(35) Subject Insertion Lexical Rule

$$\left[\text{SS}\mid\text{L}\left[\begin{array}{l}\text{C}\mid\text{AS}\left[\begin{array}{l}\text{ERG } \boxed{3}\left\langle \boxed{1}\text{NP}\right\rangle\\ \text{SUBJ } \boxed{3}\end{array}\right]\\ \text{CONT } \boxed{6}\end{array}\right]\right]\mapsto$$

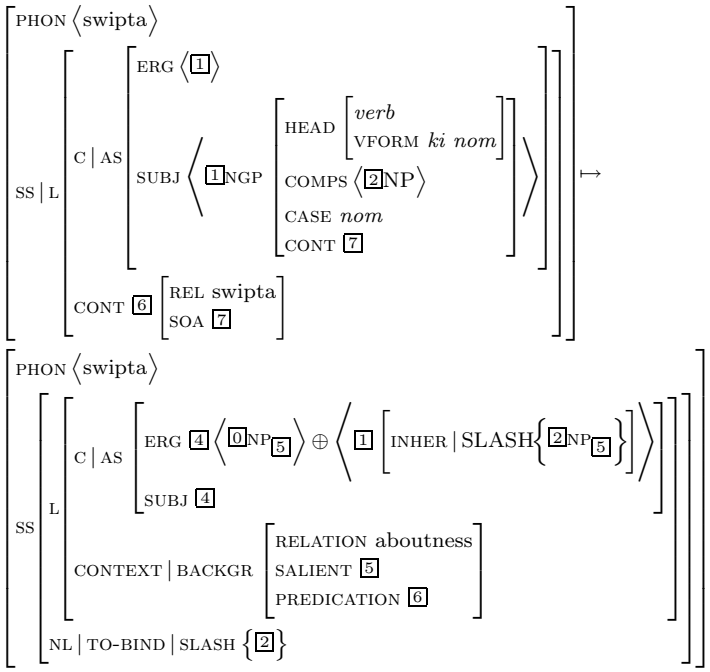
$$\left[\text{SS}\left[\text{L}\left[\begin{array}{l}\text{C}\mid\text{AS}\left[\begin{array}{l}\text{ERG } \boxed{4}\left\langle \boxed{0}\text{NP}_{\boxed{5}}\right\rangle \oplus \left\langle\left[\text{INHER}\mid\text{SLASH}\left\{\boxed{2}\text{NP}_{\boxed{5}}\right\}\right]\right\rangle\\ \text{SUBJ } \boxed{4}\end{array}\right]\\ \text{CONTEXT}\mid\text{BACKGR}\left[\begin{array}{l}\text{RELATION } \textit{aboutness}\\ \text{SALIENT } \boxed{5}\\ \text{PREDICATION } \boxed{6}\end{array}\right]\end{array}\right]\right]\right]$$

$$\text{nl}\mid\text{TO-BIND}\mid\text{SLASH}\ \left\{\boxed{2}\right\}$$

The Subject Insertion Lexical Rule (SILR) introduces a subject NP that has the same index value of the SLASH NP of an NP or GNP that is in the ARG-ST of a predicate. In Korean, the SUBJ list can take more than one element. The lexical rule works for unaccusative predicates in Korean because DNCs are possible only for those predicates.[9] We use the ergative feature (ERG) to show that the rule works only for unaccusative predicates. ERG encodes that the predicate takes an element which behaves like a primary object in subject position, as suggested by Pollard (1994). We can capture the relationship of single subject and double subject constructions by applying the lexical rule (35). As an example, the application of the SILR to the lexical entry of *swipta* is presented in (36).

[9]The fomation of DNCs is a characteristic of unaccusative predicates in Korean. The definition of unaccusative predicates is based on the semantic properties of a predicate. Unaccusative predicates in Korean includes predicates which take an involuntary element having a thematic role of Patient, Theme, or Proto-Patient in the subject position while not taking any object argument. Dowty (1990) discussed thematic Proto-roles and the notion of unaccusativity based on various entailments that a predicate provides. We classify Korean unaccusatives as predicates licensing a non-Agent-like element or a Proto-Patient in the subject position following Lee (2000). Some stative verbs, including *cwukta* 'die', *nokta* 'melt', and *elta* 'freeze', and most adjectives can be classified as the semantic category of unaccusative predicates. Unaccusative predicates are different from any intransitive verbs taking an Agent element in the subject position, which do not license DNCs as in the following example.

(i)*John-i aika ttyukoissta
John-Nom child-Nom running
'John's child is running.'

(36)


In lexical rule (35), we include the BACKGROUND value of the'aboutness' relation that has used in Kang (1988) and O'Grady (1991). In general, the combination of the second subject and a predicate works as a sort of predicate and describes the event or state that is directly related to the first subject. This kind of semantic and pragmatic relation can be referred to as 'aboutness'. DNCs are licensed when the speakers get the relevant 'aboutness' relation between the first subject and a pseudo-predicate composed of the second NP and the predicate. Otherwise, the sentence becomes awkward. Consider the following examples.

(37) a. John-i nun-i khuta
John-Nom eyes-Nom big
'John has big eyes.'

b. John-i atul-i khuta
John-Nom son-Nom big
'John has a big son.'

c. John-i cip-i khuta
John-Nom house-Nom big
'John has a big house.'

d. ?#John-i kay-ka khuta
John-Nom dog-Nom big
'John has a big dog.'

e. # John-i haksayng-i khuta
John-Nom student-Nom big
'John has a big student.'

In the given examples, we can find a similar kind of possessive relation between the first subject and the second subject. However, acceptability of these examples is not uniform. When the second NP and a predicate describe properties which are more permanent and pertinent to, John, as in (37a)-(37c), a DNC is easily licensed. However, when the predication provided by the second NP and a predicate is hard to interpret as something about the first subject, the sentence becomes unacceptable as in (37d) and (37e). A similar characterization of 'exhaustivization' has been provided in Gunji (1987) to explain Japanese DNCs. This has been called exhaustive listing in Kuno (1973). Exhaustivization refers to the semantic interpretation that if some property is predicated about a subject marked by nominative case, then the default assumption is that it is the only the subject that possesses the property. Consider the following example.

(38) John-i apeci-ka kyoswu-ita
John-Nom father-Nom professor-Copula
'John's father is a professor.'

According to the 'exhaustivization' analysis, the sentence is interpreted to exclude other people in the context and to provide a description only about the first subject. Thus, in (38) the default assumption is that John is the only one whose father is a professor and nobody else is. The notion of 'exhaustivation' is more restricted than the 'aboutness' relation because it is hard to accept that the speaker assumes that the first subject is a unique entity. We admit, however, that the first NP is a salient entity that is predicated by the combination of the second NP and the predicate. This is quite similar to the Topic-Comment relation. Hong (1997) actually analyzes DNCs as Topic-Comment Constructions. Since a separate Topic marker exists, we do not assume a Topic-Comment relation for DNCs, but instead consider the first NP as referring to a salient object in the context. This sort of saliency can be connected to the pragmatic notion of foreground, which contrasts with background, as suggested in Fillmore (1968). In general, the subject NP refers to the most salient object in the context. Thus, we introduce into the BACKGROUND feature a *psoa* that provides some predication about a salient element, and the given lexical rule will be used when

the pragmatic relationship is easily captured. Even the bad example in (37d) can be licensed in the context where some people go for walk with a dog and compare whose dog is bigger.

The lexical rule provides the prediction that if there were an unaccusative predicate like *swipta* (easy) that took a single NP, there could be another *swipta* (easy) that would take two nominative NPs that would be semantically related to each other. In the latter case, the first NP could be coindexed with a SLASH NP in the second NP. The first NP would refer to the salient element that would described by the combination of the second NP and a predicate.

10.4 Conclusion

Long-distance dependencies in Korean *tough* costructions can be captured by nonlocal SLASH feature percolation. Some *tough* constructions have two nominative case marked elements, which suggest that they belong to the DNC. Empirically, similar syntactic and semantic behaviors between these TCs and Type I DNCs support categorization of them into one syntactic construction. Furthermore, noting similar long-distance dependencies in DNCs, we argue that an unbounded dependency analysis can be applied to DNCs in Korean, as has been already proposed for Japanese by Gunji (1987). The Subject Insertion Lexical Rule has been proposed to capture the correspondence between single subject and double subject constructions of phonologically identical predicates in som TCs and DNCs both. Although we classified DNCs into three types and provided their subclassification in this paper, the detailed discussion on DNCs is not complete and will be postponed for future study.

Acknowledgements

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References

Hee-Rahk Chae. A comparative analysis of *tough*- and comparative constructions in English and Korean. *Language Research*, 34-1:33–71, 1998.

Sae Youn Cho. Untensed phrases in Korean verbal coordination. *Harvard Studies in Korean Linguistics*, VI:157–172, 1995.

Peter Cole. Null objects in universal grammar. *Linguistic Inquiry*, 18-4: 597–612, 1987.

Charles J. Fillmore. The case for case. In Emmon Bach and Robert T. Harms, editors, *Universals in Linguistic Theory*, pages 1–88. Holt, Reinhart and Winston, New York, 1968.

Carol Georgopoulos. *Syntactic Variables: resumptive pronouns and A' binding in Palauan*. Kluwer, Dordrecht, 1991.

Takao Gunji. *Japanese Phrase Structure Grammar*. Reidel, Dordrecht, 1987.

Ki-Sun Hong. Subjecthood test in korean. *Langauge Research*, 30-1: 99–136, 1994.

Jong-Bok Kim. A head-driven and constraint-based analysis of Korean relative clause constructions. *Language Research*, 34.4:1–41, 1998.

Susumu Kuno. *The Structure of the Japanese Language*. MIT Press, Cambridge, MA, 1973.

Sun-Hee Lee. *Korean Accusative Case -lul and Its Grammatical Realization*. PhD thesis, Yonsei University, Seoul, Korea, 1999.

Sun-Hee Lee. Unbounded dependency in Korean *tough* constructions. In *The Proceedings of LSK International Summmer Conference 2002*. Linguistics Society of Korea, 2002.

William O'Grady. *Categories and Case: the Sentence Structure of Korean*. John Benjamin Publishing Co., Amsterdam, 1991.

Carl Pollard. Toward a unified account of passive in german. In John Nerbonne, Klaus Netter, and Carl Pollard, editors, *German in Head-driven Phrase Structure Grammar*, pages 273–296. CSLI, Stanford, CA, 1994.

Carl Pollard and Ivan A. Sag. *Head-driven Phrase Structure Grammar*. The University of Chicago Press, Chicago, 1994.

Peter Sells. *Syntax and Semantics of Resumptive Pronouns*. PhD thesis, University of Massachusetts, Amherst, MA, 1984.

Seok Choong Song. It is tough to interprete the word *swipta* 'easy'. In Seok Choong Song, editor, *Explorations in Korean Syntax and Semantics*. Berkeley, 1988.

Nathan Vaillette. Hebrew relative clauses in HPSG. In D. Flickinger and A. Kathol, editors, *The Proceedings of the 7th International Conference on Head-Driven Phrase Structure Grammar*. CSLI, 2001.

James Hye Suck Yoon. Coordination (a)symmetries. *Harvard Studies in Korean Linguistics*, 7:3–20, 1997a.

Jeong-Me Yoon. The argument structure of relational nouns and inalienable possessor constructions in Korean. *Language Research*, 33, 1997b.

11

Adjunct valents, cumulative scopings and impossible descriptions

Robert D. Levine

My focus in this talk is on the consequences of different approaches to extraction phenomena for hypotheses about the syntactic status of adjuncts. So we need to start by looking at the two leading approaches to extraction currently on offer in the HPSG theoretical marketplace.

11.1 Two stories about extraction

11.1.1 Pollard & Sag 1994 (Ch.4)

In constraint-based theories, extraction phenomena have standardly been treated as comprising three components: linking the filler to a SLASH feature which carries the relevant information; propagating that information over arbitrary syntactic distances; and terminating the propagation at possible gap sites. In the Pollard-Sag extraction proposal, SLASH is matched to the filler's LOC properties via the Head-Filler schema given in (1):

(1) Launching SLASH: the Head-Filler Schema

$$\textit{head-filler-phrase} \supset \left[\begin{array}{l} \texttt{SYNSEM} \left[\begin{array}{l}\texttt{HEAD}\ \textit{verb}\\ \texttt{SUBJ}\ \langle\rangle\\ \texttt{COMPS}\ \langle\rangle\end{array}\right] \\ \texttt{DTRS} \left[\begin{array}{ll} \texttt{HEAD-DTR|SS|NONLOC} & \left[\begin{array}{l}\texttt{INHERITED|SLASH}\ \left\{\boxed{1}\right\}\\ \texttt{TO-BIND|SLASH}\ \left\{\boxed{1}\right\}\end{array}\right] \\ \texttt{FILLER-DTR|SS|LOC}\ \boxed{1} & \end{array}\right] \end{array}\right]$$

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Jong-Bok Kim and Stephen Wechsler.

From the point of its introduction to the point its path terminates, SLASH must be shared between mother categories and at least one daughter as per the NFP quoted in (2).

(2) Propagating SLASH: the Nonlocal Feature Principle
In a headed phrase, for each nonlocal feature F = SLASH, QUE, or REL, the value of SYNSEM|NONLOCAL|INHERITED|F is the set difference of the union of the values on all the daughters and the value of SYNSEM|NONLOCAL|TO-BIND|F on the HEAD-DTR.

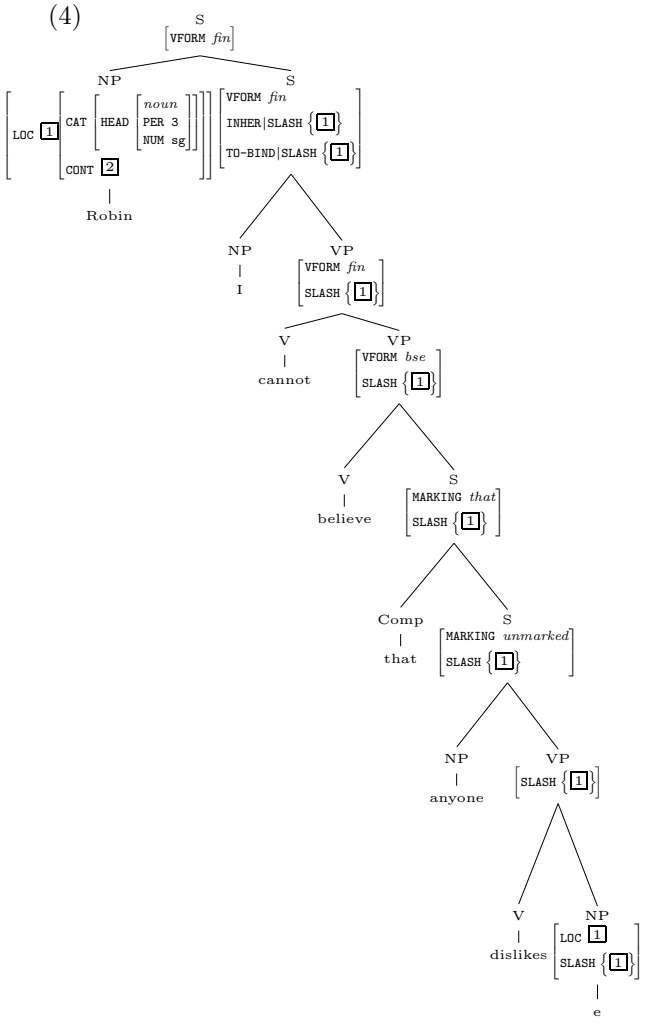
If some daughter category happens to have LOC properties identical to those of a SLASH specification that it shares with its mother category under the NFP, then it will appear as an phonologically empty category under the constraint stated in the lexicon that is conventionally referred to as 'trace':

(3) Terminating SLASH: the lexical entry for trace

$$\begin{bmatrix} \text{PHON } \langle\rangle \\ \text{SYNSEM} \begin{bmatrix} \text{SLASH } \{\boxed{1}\} \\ \text{LOC } \boxed{1} \end{bmatrix} \end{bmatrix}$$

The three components interact as illustrated in (4) to yield a typical extraction dependency:

(4)

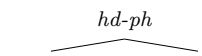


11.1.2 Bouma et al. 2001

In the Bouma et al. (2001) hypothesis, the first component is essentially the same as in Pollard and Sag (1994), with a *hd-filler* phrasal type at the 'top' of the dependency, and needs no further comment. But the remaining two differ significantly. For propagating the distribution of SLASH we have the SIP, given in (5)—in all structures except *hd-filler* phrases, SLASH specifications are shared between mother and head daughter—and the SAP given in (6): any SLASH that shows up on a

lexical head must also appear as part of some *synsem-object* on the head's DEPS list, and vice versa.

(5) Propagating SLASH: the Slash Inheritance Principle



c. $\textit{hd-val-ph} \supset \begin{bmatrix} \texttt{SLASH}\ \boxed{1} \\ \texttt{HD-DTR|SLASH}\ \boxed{1} \end{bmatrix}$

(6) Propagating SLASH: SLASH Amalgamation

$$\textit{word} \supset \begin{bmatrix} \texttt{LOC|CAT} \begin{bmatrix} \texttt{DEPS} \left\langle \left[\texttt{SLASH}\ \boxed{1}\right], \ldots, \left[\texttt{SLASH}\ \boxed{n}\right] \right\rangle \\ \texttt{BIND}\ \boxed{0} \end{bmatrix} \\ \texttt{SLASH}\ \bigcup_{j=1}^{n} \boxed{j} - \boxed{0} \end{bmatrix}$$

SIP and SAP jointly enforce a lexical threading of SLASH propagation through syntactic structures to the point where SLASH cashes out as a gap, an outcome effected by a combination of SAP, the identification of a DEPS list element with structure-shared LOC and SLASH set membership as a *gap-ss* object via the *gap-ss* constraint, and the Argument Realization Principle, both exhibited in (7):

(7) Terminating SLASH: SLASH Amalgamation + Argument Realization + the *gap-ss* type definition

The *gap-ss* constraint:

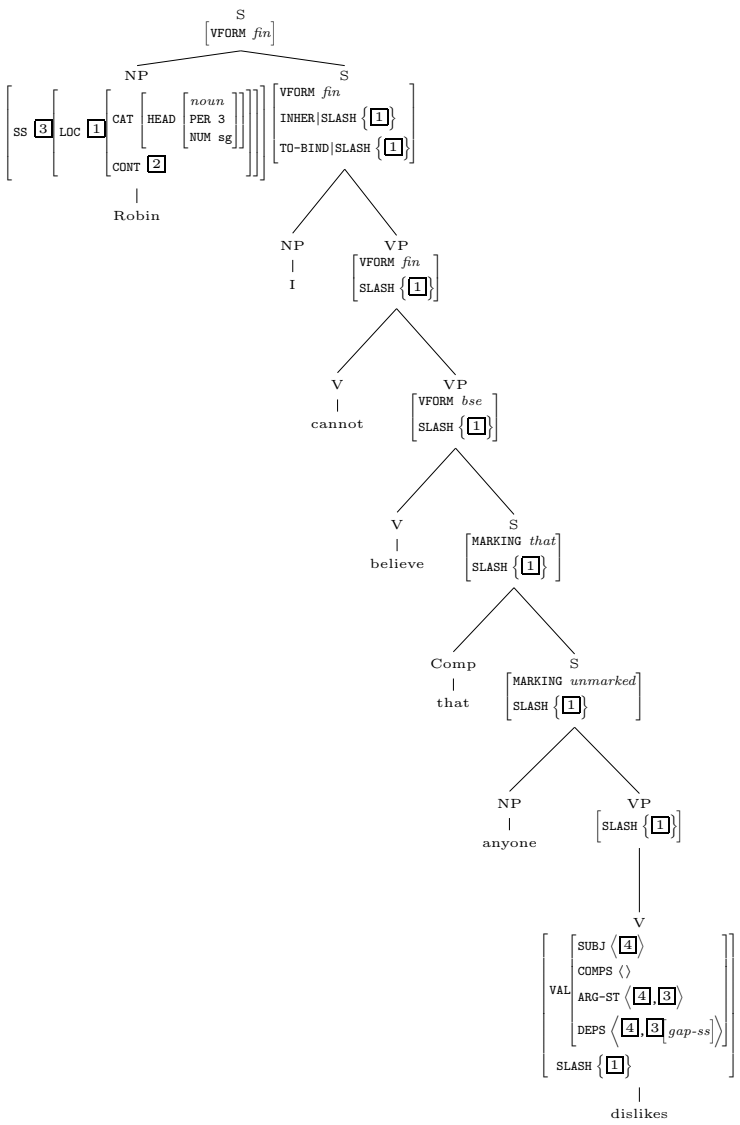
$$\textit{gap-ss} \equiv \begin{bmatrix} \texttt{LOC}\ \boxed{1} \\ \texttt{SLASH}\ \left\{\boxed{1}\right\} \end{bmatrix}$$

Argument Realization Principle (ARP):

$$\textit{word} \supset \begin{bmatrix} \texttt{SUBJ}\ \boxed{1} \\ \texttt{COMPS}\ \boxed{2} \ominus \textit{list}(\textit{gap-ss}) \\ \texttt{DEPS}\ \boxed{1} \oplus \boxed{2} \end{bmatrix}$$

SLASH threads lexically as already sketched out to a point in the structure where a lexical head shares that SLASH specification with a DEPS list element satisfying the the *gap-ss* definition in (7), which therefore fails to appear on the head's COMPS list as per the ARP. (8) illustrates the licensing in more detail.

(8)



11.2 Adjunct extraction in the BMS framework

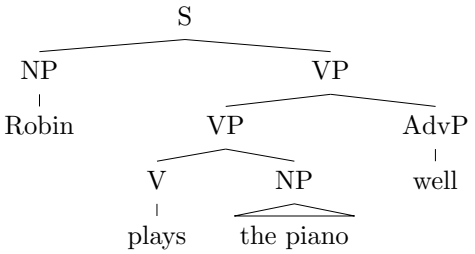
How does the extraction of adjuncts fit into these respective pictures? On the Pollard and Sag (1994) treatment of adjuncts as actually adjoined, along the lines of (9), there is little to say. Adverbs, for example, take VP sisters, whose denotations they scope over, and appear in

structures such as (9) under Pollard and Sag's Head-Adjunct Schema:

(9)

a. Robin plays the piano well.

b.



Given this structure, a SLASH matching an adverbial filler in the usual way can propagate to the point where it comes to rest on the AdvP in (9) and, if the same matching holds there, can terminate as a trace just as the complement does in example (4). But how can an adjunct be extracted in the BMS proposal, given that SLASH termination requires a dependent of a verb, a status limited in the ARP to subjects and complements, to have the crucial *gap-ss* type that allows it to then fail to appear (via one of two rather distinct mechanisms). The straightforward solution of course is that BMS reanalyze *extractable* adjuncts as modifier complements, a solution first formally implemented as far as I am aware in van Noord and Bouma (1994). BMS effect this result in rather different fashion, however, employing the relational constraint given in (10) rather than a lexical rule as in previous instantiations of this idea.

(10) Argument Structure Extension

$$\textit{verb} \supset \left[\begin{array}{l}\texttt{SS}\ \boxed{4}\left[\begin{array}{l}\texttt{HEAD}\ \boxed{3}\\ \texttt{ARG-ST}\ \boxed{1}\\ \\ \texttt{DEPS}\ \boxed{1} \oplus \textit{list}\left(\left[\texttt{MOD}\ \boxed{4}\left[\begin{array}{l}\texttt{HEAD}\ \boxed{3}\\ \texttt{KEY}\ \boxed{2}\end{array}\right]\right]\right)\end{array}\right]\end{array}\right]$$

With this apparatus in place, adjunct extraction works along the following lines. An adverbial sign such as *well* will include the properties displayed in (11):

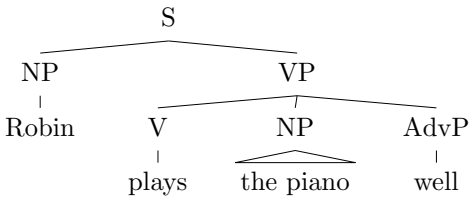
(11)
$$\begin{bmatrix} \textsc{phon} \ \textsc{well} \\ \textsc{synsem} \ \boxed{2} \begin{bmatrix} \textsc{loc} \begin{bmatrix} \textsc{head|mod} \ \boxed{1} \begin{bmatrix} \textsc{loc} \begin{bmatrix} \textsc{cat|val|comps} \ \boxed{5} \oplus \left\langle \boxed{2} \right\rangle \\ \textsc{cont|key} \ \boxed{4} \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \textsc{cont} \ \boxed{3} \begin{bmatrix} \textit{well-reln} \\ \textsc{psoa-arg} \ \boxed{4} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Note that Argument Structure Extension will impose the relevant identifications involving the selecting head on the one hand and the MOD value of the selected adverb on the other. *Robin plays the piano well* will now be licensed along the lines of (12):

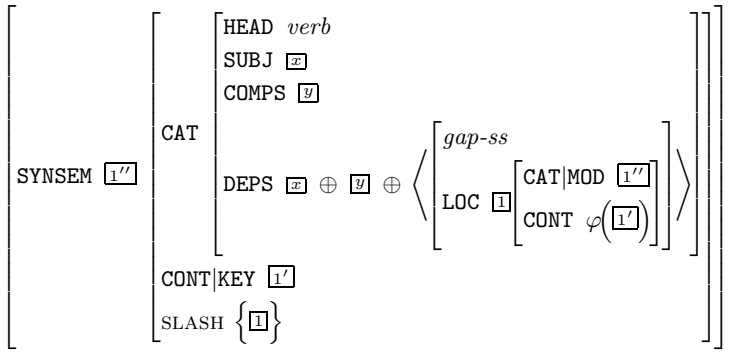
(12) a. Robin plays the piano well.

b.
$$\begin{bmatrix} \textsc{phon} \ \textsc{plays} \\ \textsc{synsem} \ \boxed{1} \begin{bmatrix} \textsc{subj} \left\langle \textsc{np}_{\boxed{i}} \right\rangle \\ \textsc{comps} \left\langle \textsc{np}_{\boxed{j}}, \ \boxed{3}\textsc{advp}: \ \varphi(\boxed{2}) \right\rangle \\ \textsc{arg-st} \left\langle \textsc{np}_{\boxed{i}}, \textsc{np}_{\boxed{j}} \right\rangle \\ \textsc{deps} \left\langle \textsc{np}_{\boxed{i}}, \textsc{np}_{\boxed{j}}, \ \boxed{3} \right\rangle \\ \textsc{cont|key} \ \boxed{2} \end{bmatrix} \end{bmatrix}$$

c.



Adjunct extraction now is no different from complement extraction, given that extractable adjuncts aren't adjuncts but rather complements, and is licensed by the interaction of SIP, SAP and ARP in the same way as extraction of nonmodifier complements. There is, however, a crucial aspect of modifier complement extraction which differs fundamentally from 'normal' complement extraction. (13), schematically exhibiting properties which characterize *any* verb from which a modifying adverbial complement has been extracted, makes this difference explicit.

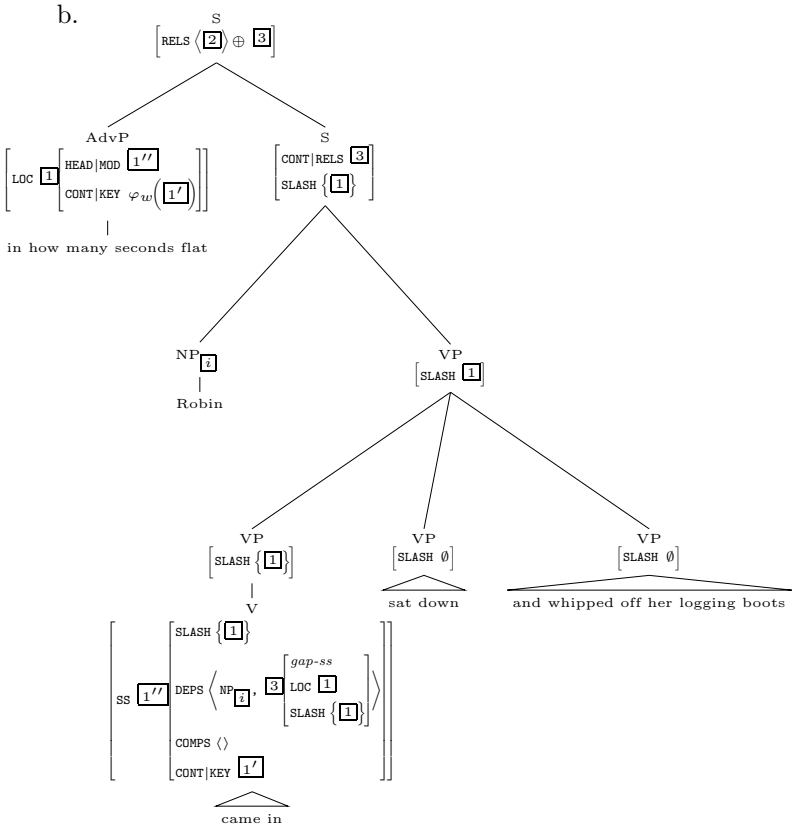
(13)


There will, of course, be no *synsem-object* corresponding to the extracted complement modifier; but because the MOD and CONT|KEY specifications of the *gap-ss* object on the head's DEPS list are mandated by Argument Extension to be token-identical to specific properties of the selecting head, it follows that an extracted modifier complement filler, unlike an extracted nonmodifier, is constrained to be consistent with the description of a single selecting head. This is a fact which will come back to haunt us.

A concrete example of adverb extraction is given in (14), where φ_w denotes the interrogative operator that *how well* denotes. SLASH is linked to the filler by the usual *head-filler-phrase* constraints and lexical threading requirements, and, though BMS never spell this out, we can assume that the compositional inheritance of all RELS as in MRS will yield the root clausal properties in (14) making the KEY of *Robin plays the piano* (or the associated event variable, possibly) the argument of φ_w:

(14) a. I wonder how well Robin plays the piano.

b.



11.3 Cumulative scoping adverbials

With this much in hand, let's now consider what we have to do to account for the examples in (15), particularly (15)b, under the BMS proposal, where (15)c gives what is the overwhelming and for most speakers I believe exclusive reading of this example under the following prosody [pronounce].

(15) a. Robin came in, found a chair, sat down, and whipped off her logging boots in fifteen seconds flat.

b. In how many seconds flat did Robin find a chair, sit down and whip off her logging boots?

c. 'The total time occupied by the serial occurrence $\widehat{\mathsf{e}_1\mathsf{e}_2\mathsf{e}_3}$ of the events e_1, e_2, e_3 such that e_1 is the event in which Robin

found a chair, e_2 the event in which Robin sat down, and e_3 the event in which Robin whipped off her logging boots, was fifteen seconds, and this time interval is markedly small relative to the amount of activity represented by $\widehat{e_1 e_2 e_3}$.'

The construction involves a coordination, a nonheaded structure, and so strictly speaking the SIP doesn't apply to it. What we have to decide then is the question in (16):

(16) What regulates SLASH propagation into coordinate structures?

Possibility 1: Nothing (coordinate structures are not headed).

Possibility 2: The NFP/SIP *anyway*.

Possibility 3: Something stronger than the NFP/SIP.

Suppose we assume Possibility 1. Then (17) is allowed as a possibility, clearly an unacceptable consequence. So even with a coordination, there has to be some kind of gap within it if there's a filler outside it.

(17) Re Possibility 1:

*Which books did Leslie read a newspaper and Terry try to get certain magazines banned from the library?

What about the second possibility?

(18) Re Possibility 2:

a. *Which books did Leslie read a newspaper and Terry try to get banned __from the library?

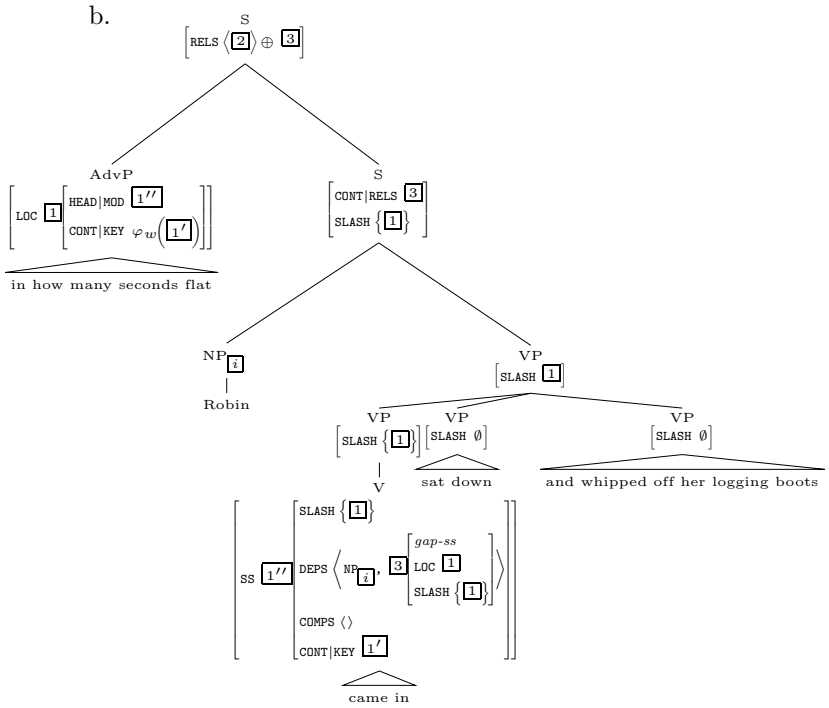
b. It's the kind of book which you wind up walking around aimlessly and thinking about __all the time you're reading it.

So the facts could go either way here. Assume that nothing stronger than the NFP/SIP is involved. What would that lead us to posit as the structure of sentences like (15)b? The answer is that for (19)a, we get (19)b, which directly translates into the interpretation (19)c:

(19) Re Possibility 2:

a. I wonder in how many seconds flat Robin came in, sat down and whipped off her logging boots.

b.



c. 'There was a serial occurrence $\widehat{\mathsf{e}_1\mathsf{e}_2\mathsf{e}_3}$ of the events e_1, e_2, e_3 such that e_1 is the event in which Robin found a chair, e_2 the event in which Robin sat down, and e_3 the event in which Robin whipped off her logging boots, and I wonder what time interval was occupied by e_1.'

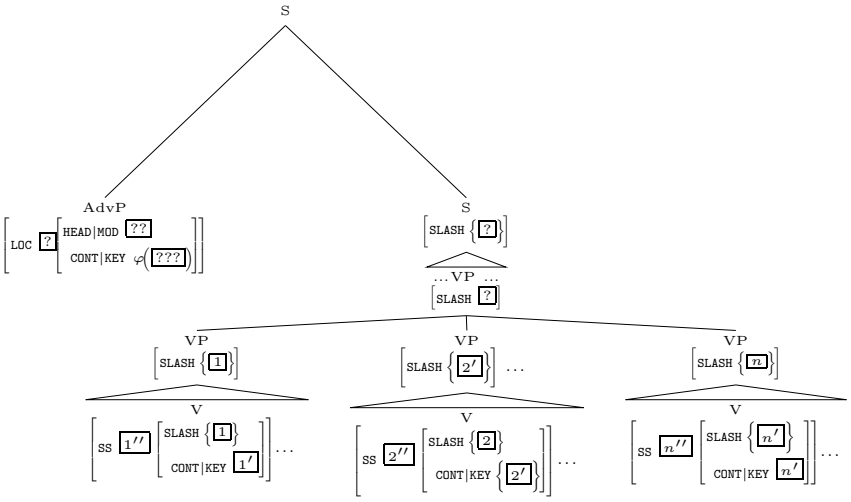
Clearly, this too is an undesired outcome.

We still have possibility 3 to consider. Suppose we adopt something like the 'Weak Coordination Principle' briefly considered in Pollard and Sag (1994), given in (20)—would that give us the result we want?

(20) The 'Weak Coordination Principle' (Pollard and Sag (1994), p.203): in a coordinate structure, the CAT and NONLOC values of each conjunct daughter are subsumed by those of the mother.

What we wind up with is displayed in (21):

(21) Re Possibility 3:



What we have here is a description that would be impossible for any sign to satisfy: a single filler must simultaneously satisfy an arbitrary number of mutually exclusive identities. Careful examination of (13) makes clear that *every single head* in the coordination will require the modifier complement *gap-ss* object on its DEPS list to incorporate the identities specified in (13). But those identities will involve distinct values for MOD and KEY in each conjunct, so that each of the *gap-ss* objects corresponding to the extracted filler will be token-distinct. Yet the *head-filler-phrase* constraints, the SIP and the SAP jointly require the single filler's LOC value to be simultaneously equal to *n gap-ss* LOC values, none of which are equal to any of the others—an impossible outcome. Or, looking at it from another angle, we have an inevitable breakdown in one of our other necessary assumptions—the Weak Coordination Principle, the SAP or SIP—somewhere along the line. Clearly, some changes are in order.

11.4 Possible responses

11.4.1 Allow selection/scoping mismatches in head/adjunct relations?

The source of the difficulty we have identified with the BMS account of adjunct extraction arises from the confrontation between the filler's specifications on the one hand and the distinct properties of each selecting head on the other. To ameliorate this conflict, we might consider

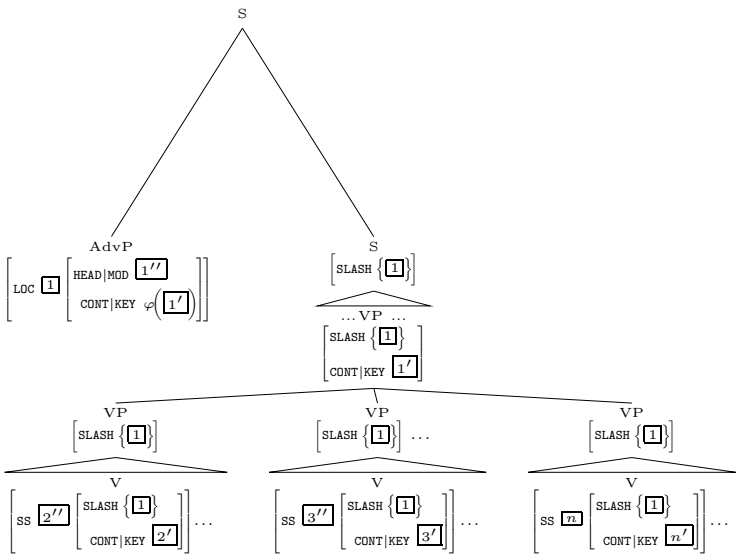
but what we *can* modifying the BMS formulation of Argument Structure Extension, itself a leftover from the Pollard/Sag MOD principle. The two technologies apparently turn out to fit together poorly; to do BMS-style adjunct syntax, it might appear, we need instead the version in (22):

(22) Revised Argument Structure Extension:

$$verb \Rightarrow \begin{bmatrix} \textsc{head}\ \boxed{3} \\ \textsc{deps}\ \boxed{1} \oplus \mathit{list}\left(\left[\textsc{mod}\ \begin{bmatrix}\textsc{head}\ \boxed{4} \\ \textsc{cont}|\textsc{key}\ \boxed{5}\end{bmatrix}\right]\right) \\ \textsc{arg-st}\ \boxed{1} \\ \textsc{cont}|\textsc{key}\ \boxed{2} \end{bmatrix}$$

Compare (21) with (23) to see what this change in the ASE lets you do:

(23)



This structure seems to get the story right: there is a selected adjunct in each conjunct which is extracted, but the adjunct in each conjunct has the same LOC value as the other adjuncts, and the CONT value of that LOC specification is identical to the CONT of the entired coordinate VP.

But matters are more complicated than this. What constrains the relationship between the argument of the adjunct functor on the one hand and the semantics of the selecting verb on the other? Without some explict restrictions, we admit possible objects like the one in (24), corresponding to outlandish interpretations that *no one* gets. Unless we can force the right identifications so as to have adjuncts in situ scope over the VPs they actually combine with, for example, nothing will block the identities in (24)b, giving rise to the interpretation (24)c for (24)a. This is clearly an outcome we don't want. And the possibilities for coordinate constructions with adjuncts in the different conjuncts allow this kind of misinterpretation to run rampant. The description in (25), for example, leads in the absence of further restrictions to the interpretation in (26).

(24) a. That Robin plays the piano often, I believe that Leslie has noted.

b. *often*:

$$\begin{bmatrix} \textsc{mod}\ \boxed{1}|\textsc{ind}\ \mathsf{e}_{\omega} \\ \textsc{key}\ \varphi(\mathsf{e}_{\omega}) \end{bmatrix}$$

noted:

$$\left[\boxed{1}\left[\textsc{cont}\ \left[\begin{array}{l} \textsc{ind}\ \mathsf{e}_{\omega} \\ \textsc{rels}\ \left\langle \boxed{2}\begin{bmatrix} \textit{note} \\ \textsc{event}\ \mathsf{e}_{\omega} \\ \textsc{arg1}\ \boxed{3} \\ \textsc{arg2}\ \boxed{4} \end{bmatrix} \right\rangle \\ \textsc{key}\ \boxed{2} \end{array}\right]\right]\right]$$

c. 'I believe that there have been a large number of events in which Leslie has noted that Robin plays the piano.'

(25)

$$\textit{verb} \Rightarrow \left[\begin{array}{l} \textsc{head}\ \boxed{3} \\ \textsc{deps}\ \boxed{1} \oplus \textit{list}\left(\left[\textsc{mod}\ \left[\begin{array}{l} \textsc{head}\ \boxed{4} \\ \textsc{cont}|\textsc{key}\ \boxed{5}\left[\textsc{event}\ \mathsf{e}_{\omega}\right] \end{array}\right]\right)\right) \\ \qquad\qquad \left(\textsc{cont}|\textsc{key}\ \boxed{2}\left[\varphi(\mathsf{e}_{\Omega})\right]\right) \end{array}\right]$$

where $\mathsf{e}_{\Omega} = \widehat{\ldots\mathsf{e}_{\omega}\ldots}$

(26) a. Robin came in, found a chair, sat down, changed seats four times and whipped off her logging boots in fifteen seconds flat.

b. 'There were four separate events each of which comprised Robin coming in, finding a chair, sitting down, changing seats and whipping off her logging boots, and the duration of these separate events was fifteen seconds, etc.'

What kind of restriction should we impose to avoid such difficulties? One plausible candidate would be to restrict the possible modification target of a selected adverbial to a (possibly) complex event of which the event corresponding to the selecting head is a part. This is, after all, the kind of interpretation that we wish to derive in (24) (23), and it would be reasonable to hope that such a restriction, embodied for example in some further revision of BMS's Argument Structure Extension constraint, would do the trick. But this specific restriction *doesn't*. So consider (26)a. The adverbial phrase *in fifteen seconds flat* strongly encourages interpretation of the conjunction as a complex event, one of whose subevents is a seat-changing event. Therefore, the adverbial modifier of *change* in this VP conjunction could, under the restriction I've just sketched, identify its MOD value with that of the complex event corresponding to the entire coordinate VP, yielding the interpretation in (25)b—again, not an inference sanctioned by the grammar of English with respect to (25)a.

(27) a. Robin came in, found a chair, sat down, changed seats four times and whipped off her logging boots in fifteen seconds flat.

b. 'There were four separate events each of which comprised Robin coming in, finding a chair, sitting down, changing seats and whipping off her logging boots, and the duration of these separate events was fifteen seconds, etc.'

11.4.2 A special construction type?

An alternative possibility is that to get the right outcome, it is gong to be necessary posit a special construction type. You can do it explicitly in the syntax, or you can in effect build it into the syntax/semantics interpretation principles along the lines of constructionally imposed handle equations in MRS, except that I suspect you will find the conditions on quantifier scoping far easier get exactly right than modifier scoping. For example, to get the revised version of Argument Structure Extension to work, you need to state something that looks like (28):

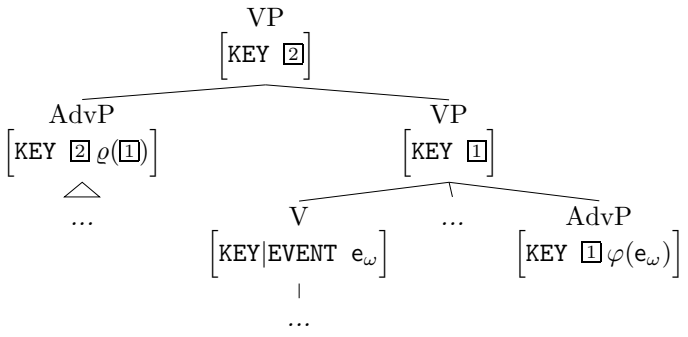
(28)
$$\left[\begin{array}{l} \textit{cumulative-adverbial-scope-coord-struct} \\ \texttt{SYNSEM}\ \boxed{1}|\texttt{KEY}|\texttt{EVENT}\ \mathsf{e}_{\Omega} \\ \\ \texttt{COORD-DTRS}\ \bigoplus_{j=1}^{n}\left\langle \boxed{j}\left[\begin{array}{l}\textit{phrase}\\ \left[\texttt{HEAD}\ \boxed{j'}\textit{verb}\right]\\ \texttt{SLASH}\ \boxed{2}\end{array}\right]\right\rangle \end{array}\right]$$

$$\bigwedge \forall j' \left[\begin{array}{l} \textit{word} \\ \texttt{HEAD}\ j' \\ \\ \texttt{COMPS}\ \boxed{3}\oplus\left\langle \boxed{4}|\texttt{LOC}\ \boxed{2}\left[\begin{array}{l}\texttt{MOD}\ \boxed{1}\\ \texttt{KEY}\ \varphi(\mathsf{e}_{\Omega})\end{array}\right]\right\rangle \end{array}\right]$$

Informally, this constraint on a coordinate structure of type *cumulative-adverbial-scope-extraction-coord-struc* allows such a structure to be linked to a filler whose interpretation follows from application of a functor reflecting the denotation of the filler to an argument denoted by the coordinate VP, or perhaps more correctly, to the conjunction of event variables bound respectively to each of the VP conjuncts.

This account is, however, still not sufficient; it is still necessary to provide for multiple scoping possibilities between selected modifiers on the right, sisters of the selecting head, and true adjuncts, combining with whole VPs. The BMS system seems to suggest that the latter will always outscope the former, and BMS in a footnote seem to claim this explicitly. Given a simple approach to the syntax/semantics interface, that is, we can expect the situation in (29), where the assumption seems to be that the selected modifier will scope only over its context of appearance.

(29)



But the facts do not support this claim. It is not at all difficult to construct cases which can go both ways, e.g.:

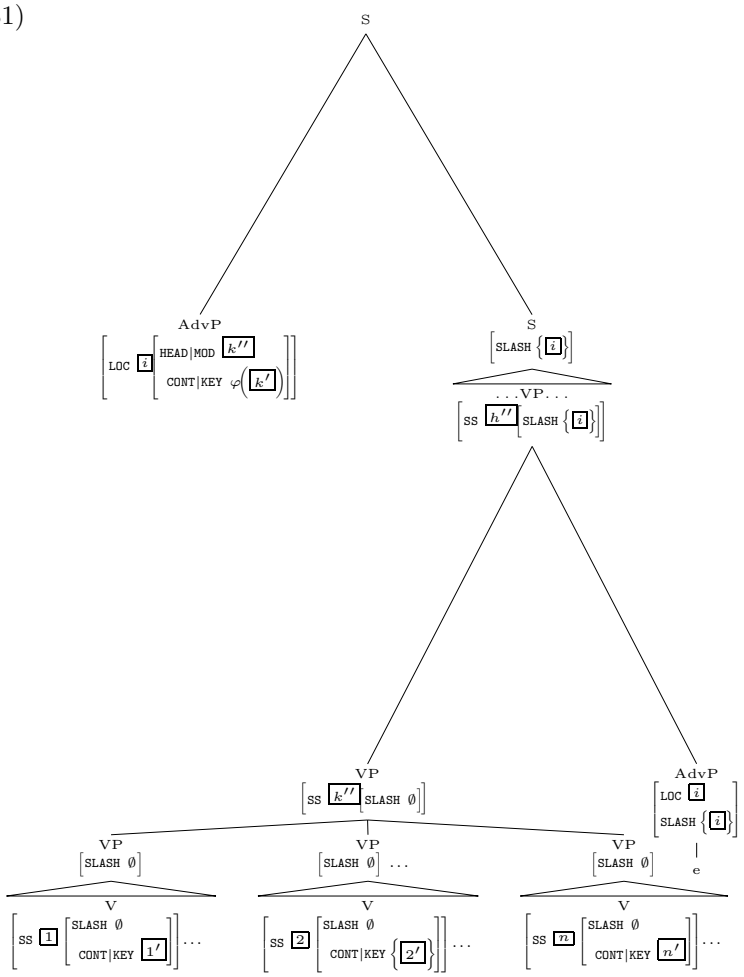
(30) a. How many times did Robin fall asleep?
b. Robin almost fell asleep a record-breaking number of times.

There are two readings here: Robin came close to breaking a record for falling asleep, or Robin actually broke a record for almost falling asleep.

11.5 Pollard & Sag 1994 revisited

It is worth stressing at this point that all of the facts discussed so far—the possibility and correct interpretation of adjunct extractions involving cumulative scoping, the correct interaction between adjunct scoping in various parts of complex structures, the scoping ambiguities that hold between right-adjoined unextractable modifiers and extractable modifiers on the left—fall out unremarkably from the Pollard and Sag (1994) treatment of adjuncts that I started this talk by sketching, along with the assumption that adjuncts in adjoined positions can extract. Since, on my analysis, real adjuncts occur on the right as well as the left, SLASH termination cannot involve a DEPS list element (or an ARG-ST list element, in the case of a BMS-style of analysis which dispenses with DEPS entirely). Powerful locality considerations mandate that such properties be confined to lexical heads. And that means that SLASH paths be terminated by traces. To see how this works just with the cumulative scoping extraction phenomena, compare (21), or (23) plus (28) plus whatever, with (31):

(31)



There's virtually nothing to say beyond this structure, which has the adjunct functor taking exactly the data structure it needs to—the complex event description corresponding to the trace's VP sister—to yield exactly the right result. And the other phenomena I've referred to fall out equally directly on the traceful analysis.

At this point, it would be reasonable to suggest that I'm not really off the hook, that extractability isn't the only reason for making modifiers complements. The range of other phenomena taken to constitute particularly strong support of such a move is conveniently summarized in BMS as follows:

> we find in many languages types of adverbials that defy any simple analysis in terms of the syntactic combination of modifiers and head. In particular, it has been argued that cliticization (Miller 1992), word order (van Noord and Bouma 1994; Abeillé and Godard 1997), scope (Manning et al. 1999; van Noord and Bouma 1994; Kim and Sag 1995; Przepiórkowski 1999a), and case marking (Przepiórkowski 1999b,c) suggest that certain adverbial phrases must be selected for by the same mechanism which accounts for the selection of complements.

Space considerations preclude a detail treatment of all of these issues. But I think I CAN outline a straightforward treatment of at least one of the phenomena that have been claimed to defy any simple account on Pollard and Sag (1994)'s adjunct syntax, and maybe hint at how the other alleged difficulties for that syntax can be treated.

The original call for the kind of analysis of adjuncts defended in BMS, first proposed in van Noord and Bouma (1994), actually invokes extractability only casually in passing. Much more urgent in demanding a reanalysis of adjuncts as complements are the properties of predicate complexes such as that exhibited in 32:

(32) dat Arie vandaag Bob wil slaan
that Arie today Bob want to-hit
'that Arie wants to hit Bob today'

van Noord and Bouma observe that

> [Such examples]are systematically ambiguous between a wide-scope reading (adjunct modifies the event introduced by the auxiliary) or a narrow-scope reading (adjunct modifies the even introduced by the main verb)...The main problem for [the Pollard & Sag] treatment of adjuncts is that it cannot explain the narrow-scope reading... If adjuncts modify the head of the phrase they are part of then we will only obtain the wide-scope readings.

This argument is essentially recapitulated for parallel facts in Japanese in Manning et al. (1999). But does it necessarily hold up? In the following discussion I draw both on independent work by Nick Cipollone presented in Cipollone (2001) and also on my current joint with Nick.

Consider the following two possibilities:

- propositions are not atomic but rather are structured objects, along lines proposed in, e.g., Creswell and von Stechow (1982), Creswell (1985), and much other work since, and explicitly built into current type-logical variants of categorial grammar via the π functions that operate on dot-product expressions in the Lambek calculus;

- semantic representations in HPSG CONTENT specifications should incorporate representations expressed in convention lamba calculi, a proposal currently actually realized in much very current work on HPSG semantics.

What I'm proposing here is therefore not particular outré or even novel. Encoding lambda expressions in AVM notation is also quite straightforward. Consider an expression of propositional type in ordinary Montegovian IL, as in (33)a. It can of course be rewritten as (33)b, and which in turn can be notated in AVM format as (33)c:

(33) a. $\psi(\varphi(r))$
b. $\lambda p[\psi(p)]\,\lambda q[\varphi(q)] \cdot r$
c. $\left\langle \begin{bmatrix} \texttt{LAMBDA} & p \\ \texttt{PSOA} & \psi(p) \end{bmatrix}, \begin{bmatrix} \texttt{LAMBDA} & q \\ \texttt{PSOA} & \psi(q) \end{bmatrix}, r \right\rangle$

Taking the structured meaning view of propositions, however, we distinguish the objects in (33)a and b, while still allowing β-reduction to be truth-preserving. Thus in (34), we allow a. and b. to differ as objects even though the former reduces to the latter:

(34) a. $\lambda p[cause'(x,p)](run'(y))$
b. $cause'(x, run'(y))$

Note that only unreduced λ-expressions of the form in (35) are allowed:

(35) $\lambda p[\psi(p)](\cdot)$ where p is a variable over propositions (soas)

The framework I'm assuming here does not provide for arbitrary λ-expressions.

To map ordinary CONT specifications the lamba-enriched version I advocate here, simply replace all *content* values of type *psoa* with lists of elements of a new type, *psoa-abstract*, with appropriate features as in (36).

(36) $\begin{bmatrix} \textit{psoa-abstract} & \\ \texttt{LAMBDA} & \textit{var(psoa)} \vee \textit{none} \\ \texttt{PSOA} & \textit{psoa} \end{bmatrix}$

*psoa-abstract*s with LAMBDA values of type *psoa* represent λ-abstracts over *psoa*s, while those with LAMBDA equal to *none* are the equivalent of simple *psoa*s. A list of *psoa-abstract*s is interpreted as a chain of functional application.

This encoding makes embedded *psoa*s accessible to modification by 'external' adverbs. A typical modifier in this setup has the form in (37).

(37) $$\left[\begin{array}{l} \mathtt{MOD|CONT}\ \boxed{1} \oplus \left\langle \left[\begin{array}{l}\mathtt{LAMBDA}\ \boxed{2}\\ \mathtt{PSOA}\ \boxed{3}\end{array}\right]\right\rangle \oplus \boxed{4} \\ \mathtt{CONT}\ \boxed{1} \oplus \left\langle \left[\begin{array}{l}\mathtt{LAMBDA}\ \boxed{2}\\ \mathtt{PSOA}\ \varphi(\boxed{3})\end{array}\right]\right\rangle \oplus \boxed{4} \end{array}\right]$$

Now let's rejoin van Noord and Bouma's example, taking *vendaag* to have the partial description in (38):

(38) *vendaag*:

$$\left[\begin{array}{l} \mathtt{MOD|CONT}\ \boxed{1} \oplus \left\langle \left[\begin{array}{l}\mathtt{LAMBDA}\ \boxed{2}\\ \mathtt{PSOA}\ \boxed{3}\end{array}\right]\right\rangle \oplus \boxed{4} \\ \mathtt{CONT}\ \boxed{1} \oplus \left\langle \left[\begin{array}{ll}\mathtt{LAMBDA}\ \boxed{2} & \\ \mathtt{PSOA|NUC} & \left[\begin{array}{ll}\textit{temporal-location} & \\ \mathtt{LOCATION} & \textit{yesterday}\\ \mathtt{EVENT}\ \boxed{3} & \end{array}\right]\end{array}\right]\right\rangle \oplus \boxed{4} \end{array}\right]$$

In our lambda-enriched CONT specification, the representation of *Arie vandaag Bob wil slaan* in (39)a will be that (39)b:

(39) a. Arie vendaag Bob wil slaan

b. $$\left[\mathtt{CONT}\ \boxed{1}\left\langle \boxed{5}\left[\begin{array}{ll}\mathtt{LAMBDA}\ \boxed{3} & \\ \mathtt{PSOA|NUC} & \left[\begin{array}{ll}\textit{want-reln} & \\ \mathtt{ARG1}\ \boxed{2} & \\ \mathtt{ARG2}\ \boxed{3} & \end{array}\right]\end{array}\right], \boxed{6}\left[\begin{array}{ll}\mathtt{LAMBDA\ none} & \\ \mathtt{PSOA|NUC} & \left[\begin{array}{ll}\textit{hit-reln} & \\ \mathtt{HITTER}\ \boxed{2} & \\ \mathtt{HITTEE}\ \boxed{4} & \end{array}\right]\end{array}\right]\right\rangle\right]$$

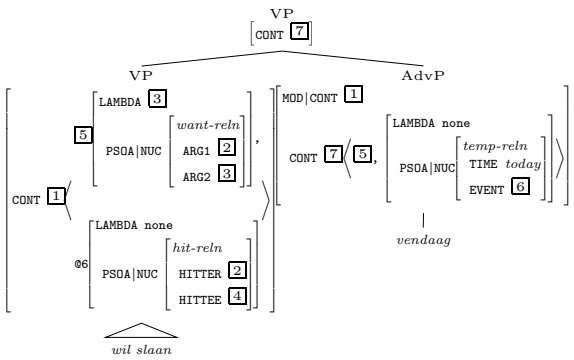
Notice how this CONT specification interacts with the specification for *vendaag* in (38). To get wide scope for the main verb *wil*, we nondeterministically allow $\boxed{1}$ in (38) to be (40), and $\boxed{2}$ to be (41).

(40) $$\left[\begin{array}{ll}\mathtt{LAMBDA}\ \boxed{3} & \\ \mathtt{PSOA|NUC} & \left[\begin{array}{ll}\textit{want-reln} & \\ \mathtt{ARG1}\ \boxed{2} & \\ \mathtt{ARG2}\ \boxed{3} & \end{array}\right]\end{array}\right]$$

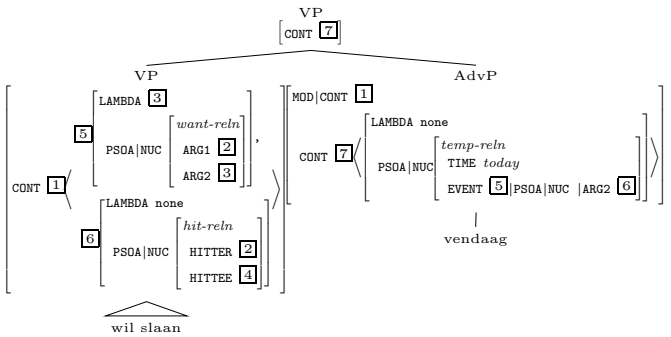
(41)
$$\begin{bmatrix} \textsc{lambda}\ \textit{none} \\ \textsc{psoa|nuc} \begin{bmatrix} \textit{hit-reln} \\ \textsc{hitter}\ \boxed{m} \\ \textsc{hittee}\ \boxed{n} \end{bmatrix} \end{bmatrix}$$

Then the ordinary Pollard/Sag syntax for adjunct will yield the supposedly unavailable wide scope reading for *wil*, as shown in (42)a. Taking 1 to be the empty list, we get (42)b, yielding wide scope for *vendaag*.

(42) a.



b.



11.6 Conclusion

The preceding sketch of a structured-proposition compositional semantics is not intended to be definitive; and it is entirely possible that some alternative which allows the same range of scoping alternatives exists which is preferable. My point is rather to offer a proof of existence for a view of the syntax/semantics interface which undercuts the crucial assumption in van Noord and Bouma (1994) and Bouma et al. (2001) that adjunct syntax along the lines of Pollard and Sag (1994) is incompatible with the scoping possibilities of adjunct modifiers.

More generally, I hope to have shown that there are significant open questions bearing on the viability of any treatment of extractable adjuncts which assimilates their status to that of full complements—questions which do not arise on the picture of adjunct syntax in Pollard and Sag (1994). Space considerations preclude exploration of further issues that arise in this connection, such as the semantic difficulties which emerge when one attempts to apply BMS' specification of the Argument Structure Extension constraint to instances of iterated modification, as in *Robin played the piano well only once*, or the range of data BMS allude to in which adjuncts appear to undergo case marking and other processes in a manner strictly parallel to complements. These questions deserve—and will, I hope, shortly receive—much fuller discussion. For the moment, the crucial point seems to me to be that there of extractable adjuncts as COMPS list element, and that these consequences need to be faced squarely, and in detail, before such a move can be considered fully secure.

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References

Bouma, Gosse, Rob Malouf, and Ivan Sag. 2001. Satisfying constraints on extraction and adjunction. *NLLT* 19:1–65.

Cipollone, Dominic. 2001. Morphologically complex predicates in japanese and what they tell us about grammar architecture. In M. Daniels, D. Dowty, A. Feldman, and V. Metcalf, eds., *Ohio State University Working Papers in Linguistics 56: Varia*. Ohio State University Department of Linguistics.

Creswell, Max and Arnim von Stechow. 1982. De re belief generalized. *Linguistics and Philosophy* 5:5o5–535.

Creswell, M. J. 1985. *Structured Meanings*. Cambridge, Mass: MIT Press.

Manning, Chris, Ivan Sag, and MKasayo Iida. 1999. The lexical integrity of japanese causatives. In *Studies in Contemporary Phrase Structure Grammar*. Cambridge, U. K.: Cambridge University Press.

Pollard, Carl J. and Ivan Sag. 1994. *Head–Driven Phrase Structure Grammar*. Chicago: University of Chicago Press.

van Noord, Gertjan and Gosse Bouma. 1994. Adjuncts and the processing of lexical rules. Proceedings of COLING.

12

Bulgarian Vocative in HPSG

Petya N. Osenova and Kiril Iv. Simov

12.1 Introduction

Crosslinguistically vocatives are an underexplored linguistic phenomenon and in different languages they can be highly idiosyncratic and complex (Levinson, 1987, p.71). Therefore, the problem, which is discussed in this paper, is not a language-specific one, in spite of the fact that most of the languages have their own repositories for marking the role of the addressee in the communicative utterances.

In our opinion this linguistic phenomenon needs its adequate treatment in HPSG because of three main reasons:

1. The vocative is supposed to be present on two levels: syntax and pragmatics. Therefore it needs more elaborate interpretation on the interface side, which, in HPSG, is more developed for morphology/syntax and syntax/semantics than syntax/pragmatics. Note that a challenge for the theory is the semantic weight of the vocatives with respect to the head sentence.
2. It will be useful for HPSG-oriented implementations, especially treebanks and dialogue systems.
3. On prosodic grounds the vocatives are often viewed as being 'side or extended parts' of the sentence and therefore - very close to the parenthetical constructions. From our point of view, both phenomena are pragmatic and hence, the treatment of vocative, presented here, could be generalized to cover other phenomena of pragmatic nature.

In our work the vocatives are viewed through the possibility of the integration/separation of their pragmatic, syntactic and semantic properties.

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Jong-Bok Kim and Stephen Wechsler.

The paper is structured as follows: in the next section the status of the vocative in Bulgarian is discussed. In section 12.3 we propose our ideas on a unified treatment of vocatives. In section 12.4 the HPSG model is given. Section 12.5 outlines the conclusions and future work.

12.2 The Status of the Vocative in Bulgarian

Vocatives are assumed to be restricted to the second person usage only. Generally they subsume the following two subtypes: calls (*hey you*) and addresses (*Madam*) (Levinson, 1987, p. 71). Bulgarian vocative role is usually treated within the opposition: vocative form (a remnant of the case paradigm) vs. base nominative form, i.e. with respect to the presence or loss of the special vocative inflections. Hence, functionally it includes not only the structural vocative case of the paradigm of some nominals (the singular masculine and feminine nouns and the long forms of some adjectives). As a matter of fact, it can be expressed by: vocative forms, nominal groups in nominative and different particles. The vocatives can be classified with respect to different properties. For example, the classification, presented in (Ivanova and Nitsolova, 1995, pp. 24-29) is based on the possibility of the vocatives to nominate the addressee or just to refer to him/her:

1. vocative particles, which do not nominate the addressee, but only refer to him/her (hej,be)
2. vocatives, which nominate the addressee
   (a) they function as contact establishers only
   (b) they qualify the addressee.

In the last case it is assumed (Nitsolova, 1984, p. 44) that there is a hidden proposition with the performative verb 'consider somebody to be of some property'.

Another classification, described in (Georgieva, 1987, pp. 75-83) discusses the word order typicalities of the vocative depending on its *standard* or *nonstandard* usage. In its standard usage the role of the vocative is to attract hearer's attention. In its nonstandard usage it is to express a certain attitude or subjective modality towards the hearer. The tendencies for the vocative position with respect to the mentioned usages can be summarized as follows:

1. standard usage
   (a) in introductory function - tends to be in the first position
   (b) in second and further usages - tends to change the first position

   (c) in interrogatives, imperatives or greetings - tends to be in the final position
2. nonstandard usage
   (a) in emphatic function and protocol - tends to be free
   (b) when accompanied by an interjection or a particle - the vocative follows them
   (c) when accompanied by vocative particles - tends to be free

Note that all the presented possibilities for the vocative orderings are relative, not absolute, because they are sensitive preferably to non-linguistic criteria. Hence, they can be considered tentative, with certain degree of reliability.

Traditionally vocatives are assigned three interpretations concerning their syntactic position in the sentence:

1. Non-arguments, such as parenthetical elements, which do not participate in syntactic relations (Popov, 1983, p. 130) and (Brezinski, 2000, p. 94).
   (1) Gospodine, dnes ste vali
   sir[sg,voc] today it-will-rain[fut,3p,sg]
   Sir, it will rain today
2. Subjects, when they are used in imperative, exclamative and optative sentences, agreeing with the verb and obeying the additional requirement not to be duplicated by a pronoun (Popov, 1983, p. 129) and (Brezinski, 2000, p. 94), (Acad.Gram., 1983, p. 120).
   (2) Gospodine, elate nasam
   sir[sg,voc] come[imper,pl] here[adv]
   Sir, come here
3. Appositions, when they appear together with a pronoun (Nitsolova, 1984, p. 43) and (Popov, 1983, p. 130).
   (3) Vie, gospodine, elate nasam
   You[pl,2p] sir[sg,voc] come[imper,pl] here
   You, Sir, come here

We argue that assigning the vocative three distinct syntactic and pragmatic roles is misleading and irrelevant on linguistic grounds. One reason for these contradictory interpretations could be the prosodic one. The intonational independency of the vocative combined with its optional syntactic connection with the intrasentential elements (Georgieva, 1987, p. 74) causes misinterpretations. Our contra arguments are as follows:

1. If vocatives are pure discourse markers and do not contribute to the sentence, how we could explain reasonably the structure-sharing between the vocative form and some parts of the sentence (subject, object, possessives etc).
2. If we assume that in Bulgarian only nominatives can be assigned a subject role, then it is strange to select a context, in which the vocative is assigned such a role. The agreement relations between the subject and the verb is not a pretty strong argument, because there are cases, where:
   (a) between the explicit subject and the verb there is no agreement relation
      (4) Vsichki izljazohme na razhodka
      All[3p,pl] went[1p,pl] for walk[sg,f]
      All of us went for a walk
   (b) the verb can agree with either of the parts of the subject
      (5) Chast ot studentite vleze/vljazoha
      Part[sg,f] of students-the[pl] came[3p,sg]/[3p,pl]
      Part of the students came
   (c) the agreement relation depends on the lexical semantics of the conjuncts in a coordination
      (6) Radost i taga ima v ochite mu
      Joy[sg,f] and sadness[sg,f] there-is[3p,sg] in eyes his
      There is joy and sadness in his eyes

   For HPSG-oriented discussion of the first two types of subject-verb agreement in Bulgarian see Osenova (2001).
3. Vocatives can combine in the same way with all types of illocutionary force, including declaratives and interrogatives:
   (7) Gospodine, kakvo tarsite?
   sir[sg,voc] what[interrogative] search[pres,2p,pl]
   Sir, what are you searching for?
4. Bulgarian is a pro-drop language, in which the subject is always realized on the verb and has the characteristics of the nominative personal pronouns. In the cases, where *hey you* vocative type is triggered, we can assume that the second person pronoun has two syncretic forms: one for nominative and one for vocative.
5. Vocative is outside the scope of the Left Dislocation or Left Periphery phenomena, which in Bulgarian are usually connected with object doubling (Penchev, 1993, p. 120), subject doubling (Boyadjiev et al., 1999, p. 565) or with complementizers Krapova and Karastaneva (1999). These phenomena usually treat the redundant expressing of one and the same category, while the voca-

tive cannot be interpreted as a doubling category because of its different structural case (see 2 above).

Needless to say, vocative's contribution to the Information structure of the utterance needs more elaborate research.

12.3 Towards a Unified View of the Vocative in Bulgarian

Vocatives play a pragmatic role with respect to the addressee of an utterance. But it is still not explained what the interaction between the syntactic and pragmatic behavior of the vocative is. Here we are not concerned with encoding of the speaker's intentions in BACKGROUND feature Green (2000) or with metapragmatic phenomena like honorifics. Rather, we concentrate on C-INDICES and their contribution to the adequate formalization of the vocative-sentence relation.

It is interesting to compare how this problem has been dealt with for more practical purposes. We suggest as an example the Verbmobil treebank. In the English HPSG-oriented part the NP, vocatives are treated as adjuncts and therefore attached to the highest sentential level, and the particles are treated as discourse markers (Kordoni, 2000, p. 21 and p. 40). In the German part all of them are treated as discourse markers and therefore they stay unattached (Stegmann et al., 2000, p. 40). We propose to combine the two views in one, i.e. to interpret the vocatives as adjuncts and discourse markers at the same time. We need the first, because vocatives very often share syntactic properties with the elements within the sentence and we need the second, because the interaction is done on the super-sentential level.

Another fact that supports our idea is the free word order of the NP vocatives. One could argue that the ostensive particles, the pronouns or complex vocative groups are more restricted in their vocative distribution, but it does not make a contradiction. All of them perfectly fit into the adjunct interpretation, because adjuncts can be recursive and of different nature as well. As a result of our modular view on this phenomenon, we propose the following types of interrelation between syntactic and pragmatic specificity of the vocatives:

1. the vocative and the expressed/unexpressed subject or object in the sentence refer to the same entity in the world.

   (8) Gospodine, vie ste pokanen
   sir[sg,voc] you[2p,pl] are[2p,pl] invited[m,sg]
   Sir, you have been invited

(9) Gospodine, izpusnahte vlaka
sir[sg,voc] missed[2p,pl] train-the[m,sg]
Sir, you missed the train

(10) Gospodine, tarsiat Vi
sir[sg,voc] look for[2p,pl] you[acc,pl]
Sir, they are looking for you

(11) Shte Vi kazhe, gospodine!
will[3p,sg] you[dat,pl] tell[3p,sg] sir[sg,voc]
She/he/it will tell you, Sir!

2. the vocative can bind some possessive, possessive-reflexive or personal reflexive pronoun in the sentence

(12) Zena Vi, gospodine, se obazhda
wife[f,sg] your[poss] sir[sg,voc] call[3p,sg]
Sir, your wife is calling

(13) Gospodine, sprete zena si
sir[sg,voc] stop[imper] wife your[refl]
Sir, stop your wife

(14) Gospodine, poglednete se
sir[sg,voc] look[imper] yourself[pers,refl]
Sir, look at yourself

3. the vocative is simultaneously coreferent with the subject or the object of the sentence and binds a possessive:

(15) Gospodine, zena Vi Vi chaka
sir[sg,voc] wife your[poss,pl] you[acc,pl] wait[sg]
Sir, your wife is waiting for you.

(16) Gospodine, Vie izpuskate vlaka si
sir[sg,voc] you[pl] miss train yours[ref]
Sir, you are missing your train

4. the vocative just serves as an ostensive stimulus for the hearer regarding some fact

(17) Gospodine, navan vali
sir[sg,voc] ouside[adverb] rain[3p,sg]
Sir, it is raining outside

(18) Gospodine, kolko e chasa?
sir[sg,voc] what[adverb] is[3p,sg] time-the[m,sg]
Sir, what is the time?

Note that all the presented types, except the last one, express both functions: the syntactic and the pragmatic one. In the last type, however, the syntactic one is suppressed and only the pragmatic one is active.

12.4 Modelling Bulgarian Vocatives in HPSG

In this section we present a formal model of Bulgarian vocative along the lines of Pollard and Sag (1994) with the necessary modifications and refinements to it. In the latest developments in HPSG some of our proposals have already been accepted - like the status of the semantic head with respect to the semantic impact of the adjuncts as reported in Kiss (2001) and assumed in Minimal Recursive Semantics (see Copestake et al. (1997)). We will point to these papers at the relevant places in the text below. On the syntactic level we treat vocatives as a special kind of adjuncts that contribute to the highest sentence node via their MOD feature. The main reason for choosing such an approach is that the proposition becomes visible for the vocative expression. This is needed, when the vocative shares some properties with inner-sentence elements. The information, specified for the vocative, is added to the value of the ADDRESSEE feature within CONTEXT value of the proposition, ensuring that the vocative coincides with the hearer of the proposition. Hence, in sentences, which explicitly refer to the hearer, the vocative expression is co-indexed with the appropriate syntactic elements within the proposition.

One problem when treating the vocative as an adjunct is the Semantics principle in HPSG. It requires the CONTENT of the mother to be structure-shared with the CONTENT of the semantic head. In head-adjunct phrases the adjuncts are assumed to be semantic heads. In our account of the vocative we change this by stating that vocative cannot be a semantic head.

In order to have our idea working, we need principles. HPSG94 does not introduce any principles, which operate on the c-indices of the daughters of a phrase (Pollard and Sag, 1994, p. 337). At the same time, we are aware of the relevant exploitation of the CONTEXT feature for resolving dialogue fragments within HPSG Ginzburg et al. (2001a). Two new attributes within the context feature structure are introduced: Maximal Question Under Discussion (max-qud), whose value is of sort question; and Salient Utterance (sal utt), whose value is a set of elements of type sign. For our present purpose, we do not use such a detailed hierarchy of features. To model the vocative-sentence relation first, we propose the following principle:

> Vocative Principle:
>
> In a head-adjunct structure, in which the adjunct is of case vocative, the ADDRESSEE value of the adjunct is token-identical with the ADDRESSEE value of the mother.

Additionally, we change the definition of the semantic head. This

change can be regarded as a consequence of the pragmatic nature of the vocative and as shifting its information contribution to CONTEXT:

Vocative Semantic Head:

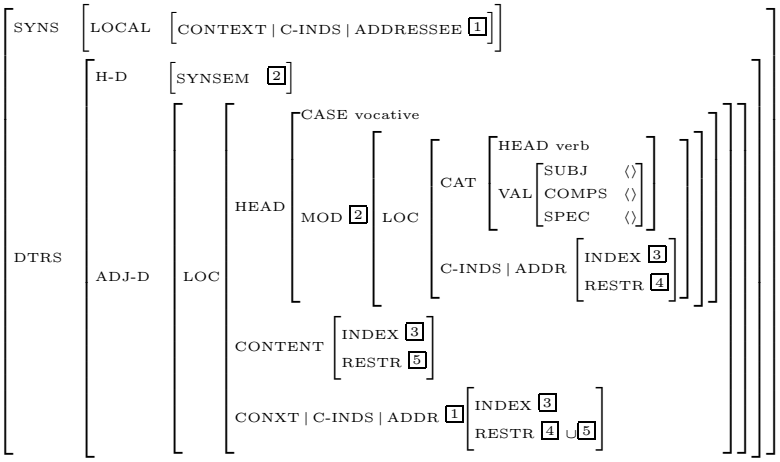
In a head-adjunct structure, in which the adjunct is of case vocative, the head daughter is the semantic head.

The change of the semantic head has already been proposed by Copestake et al. (1997) and Kiss (2001) in accordance with the reclassification of the semantic modifications. This step was enforced by the nonhomogeneous semantic nature of adjuncts. In the case of intersective modification the syntactic head remains a semantic head, as it was proposed above. In the case when the semantic contribution of the adjunct is a modifying functor which takes as an argument the semantic contribution of the head, the semantic head is the adjunct. The semantic contribution of the vocative could be considered as intersective and thus our proposal is in accordance with the proposal of Copestake et al. (1997) and Kiss (2001).

¿From the pragmatic point of view, the Vocative principle, given above, becomes a necessity, because sometimes the vocative phrase does not have any contribution to the semantics of the sentence but its pragmatic one is permanent.

The mechanism, which interprets the vocative, is structured as follows (see the schematic feature structure given on page 241):

1. The whole sentence has a DTRS value of sort headed-adjunct-structure, where the head daughter is a saturated verb phrase and the adjunct daughter is the vocative phrase.
2. The appropriate selection mechanism is encoded within the vocative phrase. Thus, the MOD value of the adjunct (the vocative phrase) requires as a head daughter a saturated verb phrase (equal to a sentence).
3. The MOD value of the adjunct is token identical with the SYNSEM value of the head daughter and thus the ADDRESSEE value of the head daughter is available within the structure of the adjunct.
   We define that the INDEX value of the ADDRESSEE (ADDR) feature of the adjunct is co-indexed with the INDEX value of the CONTENT feature of the vocative phrase and also with the INDEX within the ADDRESSEE value of the head daughter (see co-reference 3 in the feature structure given on page 241). The restriction (RESTR) of the ADDRESSEE of the vocative phrase is union of the restriction of the CONTENT of the vocative phrase



and the restriction of the ADDRESSEE of the head daughter (see co-references 4 and 5 in the feature structure.

4. Via the Vocative Principle, defined above, the ADDRESSEE value of the adjunct is token-identical with the ADDRESSEE value of the mother (see co-reference 1 in the picture).

Below we present the formal mechanisms, which ensure the interrelation between syntactic and pragmatic specificity within the vocative types, discussed at the end of the previous section.

1. The vocative and the expressed/unexpressed subject or object in the sentence refer to the same entity in the world. Within the head daughter the subject's CONTENT (or the object's CONTENT) value is structure-shared in appropriate way with the ADDRESSEE in the CONTEXT value.
2. The vocative binds some possessive or reflexive pronoun in the sentence. This binding first takes place within the head sentence where the possessive or reflexive pronoun is bound by the subject of the sentence and the subject's CONTENT is co-indexed in appropriate way to the ADDRESSEE value of the sentence. From there it gets co-indexed with the vocative.
3. When the vocative is simultaneously coreferent with the subject or the object of the sentence and binds a possessive, then the mechanisms presented in points 1 and 2 are combined.
4. The vocative just serves as an ostensive stimulus for the hearer regarding some fact. In this case again we have an appropriate co-indexed value of the ADDRESSEE and vocative CONTENT,

but the INDEX of the ADDRESSEE is not structure-shared with any other INDEX in the CONTENT of the sentence.

However, one technical problem remains: how to encode entries of the nominative nominals, which could serve as vocatives as well. In our view this can be stated in two ways: (1) as a disjunct with the MOD feature for all appropriate lexical signs, or (2) via a lexical rule. In our opinion the second mechanism is more appropriate, because practically all nominals can be used in a vocative role, but the first can ensure better treatment of the exceptions.

12.5 Conclusion

In this paper we presented an HPSG-based unified analysis of Bulgarian vocative phrases. At the same time, in our view, the general interaction between the adjunct vocative phrase and the selected sentence tends to be universal. Note the vocative role in other languages like Spanish, Czech, Russian, English, German, Polish etc. Language specific remains the typology of vocatives and the domains of their structure-sharing with different sentential elements.

As a natural future direction of this work we consider extending our idea with respect to the illocutionary force of the selected by the vocative sentence. It is to be done within the more recent two-dimensional reclassification of phrases Sag (1997) and the proposed structuring of the conversational move types (Ginzburg et al., 2001b, p. 6).

References

Acad.Gram. 1983. *Gramatika na bylgarskiia knizhoven ezik. Sintaksis.*. Sofia, Bulgaria.

Boyadjiev, Todor, Ivan Kutsarov, and Iordan Penchev. 1999. *Savremenen balgarski ezik*. Sofia, Bulgaria: Publishing house "Petar Beron".

Brezinski, Stefan. 2000. *Balgarski sintaksis*. Sofia, Bulgaria.

Copestake, Ann, Dan Flickinger, and Ivan A. Sag. 1997. Minimal recursion semantics: an introduction.

Georgieva, Elena. 1987. *Slovored na uslozhnenoto prosto izrechenie*. Sofia, Bulgaria: Publishing House of Bulgarian Academy of Sciences.

Ginzburg, Jonathan, Howard Gregory, and Shalom Lappin. 2001a. Shards: Fragment resolution in dialogue. In T. Bunt H., van der Slius, ed., *Proceedings of the 4th International Conference on Computational Semantics*, pages 156–172. Tilburg.

Ginzburg, Jonathan, Ivan A. Sag, and Matthew Purver. 2001b. Integrating conversational move types in the grammar of conversation. In H. R. Kühlein P. and H. Zeevat, eds., *Proceedings of Bidialog, the 5th Workshop on the Semantics and Pragmatics of Dialogue*. Bielefeld.

Green, Georgia. 2000. The nature of pragmatic information. In R. Cann, C. Grover, and P. Miller, eds., *Grammatical Interfaces in HPSG*, Studies in Constraint-Based Lexicalism 8, page 292. Stanford: CSLI.

Ivanova, K. and R. Nitsolova. 1995. *Nie, govoreshtite hora*. Sofia, Bulgaria.

Kiss, Tibor. 2001. Configurational and relational scope determination in German. In W. D. Meurers and T. Kiss, eds., *Constraint-based Approaches to Germanic Syntax*, pages 141–175. Stanford: CSLI Publications.

Kordoni, Valia. 2000. Stylebook for the English Treebank in Verbmobil. Tech. Rep. 241, SfS, Universität Tübingen, Tübingen.

Krapova, I. and T. Karastaneva. 1999. *On the structure of the CP field in Bulgarian*. Plovdiv, Bulgaria.

Levinson, S. 1987. *Pragmatics*. Cambridge Textbooks in Linguistics. Cambridge University Press.

Nitsolova, R. 1984. *Pragmatichen aspect na izrechenieto v balgarskiia ezik*. Sofia, Bulgaria: Narodna prosveta.

Osenova, Petya. 2001. On subject-verb agreement in Bulgarian (an hpsg-based account). In *Proceedings of the Fourth Formal Description of Slavic Languages Conference*. Potsdam.

Penchev, Iordan. 1993. *Balgarski sintaksis*. Plovdiv, Bulgaria.

Pollard, Carl J. and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: University of Chicago Press.

Popov, Konstantin. 1983. *Sintaksis*. Veliko Tarnovo, Bulgaria.

Sag, Ivan A. 1997. English relative clause constructions. *Journal of Linguistics* 33(2):431–484.

Stegmann, R., H. Telljohann, and E. Hinrichs. 2000. Stylebook for the German Treebank in Verbmobil. Tech. Rep. 239, SfS, Universität Tübingen, Tübingen.

13

Out of Control: A Unified Analysis of Japanese Passive Constructions

David Y. Oshima

13.1 Introduction

In this paper I develop a unified analysis of the Japanese passive, which provides a uniform syntactic/semantic representation of the alleged varieties of passives (direct, indirect, possessive) as a complex predicate that encodes the triadic relation of "lack of control" among an agent, undergoer and event. Various differences among the direct, possessive, and indirect passives (the adversative effect implicature, the possibility of reflexive binding, the animacy constraint on the subject, etc.) are explained as cooperative effects of the core syntactic/sematic properties of the passive morpheme -(*r*)*are* and functional/pragmatic factors like conversational implicature and empathy constraints.

13.2 Syntactic/Semantic Representation of the Japanese Passive

In past studies of the Japanese passive (Kuno 1973; Gunji 1987; Kubo 1992; Washio 1993; Uda 1994, *inter alia*), it has been commonly assumed (i) that two or more types of passives (direct/indirect/possessive etc.) must be postulated to explain various facts related to the construction, and (ii) that the "indirect" passive lexically implies an adversative effect caused by the described event on the referent of the (matrix) subject. In this section, I refute both of these two claims, and propose that all instances of passive verbs should be analyzed as single words with nested ARG-ST lists and whose CONTENT values are triadic relations among ACTOR, UNDERGOER and EFFECT, parallel to Manning et al.'s (1999) analysis of the Japanese causative. To defend this claim, I show

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that the differences among the argument realization patterns of the direct/possessive/indirect passives are illusory, and that the "adversative effect" observed in the indirect passive construction can be explained as a conversational implicature based on our knowledge-based inference.

13.2.1 Facts

The argument patterns of alleged varieties of Japanese passives are sketched out below, with corresponding active sentences (if any).

(1) direct passive

a. Max-ga Pat-ni nagu-rare-ta.
Max-Nom Pat-Dat hit-Pass-Past
'Max was hit by Pat.'

b. Pat-ga Max-o nagut-ta.
Pat-Nom Max-Acc hit-Past

(2) possessive passive

a. Max$_i$-ga Pat-ni (zibun$_i$-no) musuko-o nagu-rare-ta.
Max-Nom Pat-Dat self-Gen son-Acc hit-Pass-Past
'Max had his son hit by Pat.'

b. Pat-ga Max-no musuko-o nagut-ta.
Pat-Nom Max-Gen son-Acc hit-Past

(3) indirect passive

Max-ga Pat-ni John-o nagu-rare-ta.
Max-Nom Pat-Dat John-Acc hit-Pass-Past
'Pat hit John on Max.'

Among these three types, only the direct passive has the basic characteristics of a crosslinguistically canonical passive, involving "promotion" of an object of the stem verb to subject and "demotion" of the subject of the stem verb into a peripheral function marked by an oblique case, *-ni* (cf. Shibatani 1985; Dixon and Aikhenvald 1997). The subject of a possessive passive is not an object of the stem but an individual that stands in some relation (including, but not limited to, the possession relation) with a participant of the core (subordinate) event, and in most cases might be recovered as a genitive NP in the corresponding active sentence (as Uda 1994 observes, there are instances of the possessive passive that do not have a corresponding active sentence with a genitive NP). Indirect passives do not have corresponding active sentences at all, and they usually implicate an adversative effect caused by the core event on the referent of the subject.[1] It is noteworthy that

[1] This implicature is cancelable, as shown by the following example:

the Japanese passive has argument patterns that are nearly parallel to those of the causative:

(4) a. Max$_i$-ga Pat-ni {zibun$_i$-o/?ϕ_i} nagur-ase-ta.
Max-Nom Pat-Dat self-acc hit-Caus-Past
'Max$_i$ made Pat hit him$_i$.'

b. Max$_i$-ga Pat-ni (zibun$_i$-no) musuko-o nagur-ase-ta.
Max-Nom Pat-Dat self-Gen son-Acc hit-Caus-Past
'Max$_i$ made Pat hit his$_i$ son.'

c. Max-ga Pat-ni John-o nagur-ase-ta.
Max-Nom Pat-Dat John-Acc hit-Caus-Past
'Max made Pat hit John.'

As is pointed out by Washio (1993), the parallelism of passives and causatives in Japanese is not limited to the surface argument patterns; they both represent a relation between the referent of the matrix subject and the event described by the stem verb. To see their commonalities and differences more clearly, let us consider the syntactic/semantic representations of these constructions.

As a representation of the Japanese causative, I adopt Manning et al.'s (1999) lexical analysis, with a minor modification. To capture the "wordhood" of Japanese causative verbs (e.g. *kawaseru* 'cause to buy') which is supported by a number of phonological and morphosyntactic observations, Manning et al. (1999) propose an analysis of the Japanese causative verb as a single word, adopting the type-based morphology developed by Riehemann (1993, 1998). They posit the following as the constraints on the type *comp*(*lex*)-*pred*(*icates*) (in Japanese).

(5) *comp-pred*:

$$\begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle \boxed{2} \mid \boxed{3} \rangle \\ \text{ARG-ST} & \langle \boxed{1}, \boxed{2}, \boxed{4} \langle \text{PRO} \mid \boxed{3} \rangle \rangle \\ \text{STEM} & \left[\text{ARG-ST} \quad \boxed{4}\right] \end{bmatrix}$$

PRO designates a placeholder element to be associated with the subject of the base stem and to be co-indexed with some member of the (outer) ARG-ST list (for Japanese causatives, the causee argument), which is motivated by the possible binding patterns illustrated below:

(i) Taro-wa totuzen oogon-ni hutte-ko-rare-te kyookiranbu-si-ta.
Taro-Top suddenly gold-Dat fall-come-Pass-Gerund extreme joy-do-past
"Taro was wild with joy as gold suddenly fell down."

(6) a.*Max-wa Pat$_i$-ni kare$_i$-o bengo-s-ase-ta.
Max-Top Pat$_i$-Dat he$_i$-Acc defend-Caus-Past.
'Max made Pat defend him.'

b. Max-wa Pat$_i$-ni zibun$_i$-o bengo-s-ase-ta.
Max-Top Pat$_i$-Dat self$_i$-Acc defend-Caus-Past.
'Max made Pat defend himself.'

The presence of PRO blocks the coindexation between the causee and a pronoun (e.g. *kare*) in an argument position of the inner predicate, which causes violation of Principle B; it also guarantees that the coindexation between the causee and an anaphor in an argument position of the inner predicate is allowed, maintaining the generalization that Japanese anaphors obey the A-subject principle i.e. must be bound by an entity that is first on some ARG-ST list (Manning 1994; see also Oshima 2002).[2]

Manning et al. further propose that the following constraints as particular to the type *caus-stem*, which are associated with its supertype *comp-pred*; *cause-rel* is a subtype of *act-und-rel* (which in turn is a subtype of *act-rel* and *und-rel*) and this determines, by the general relation between stem types and semantic relation types, the argument projection of causative sentences (a subsumption-preserving homomorphism), along with the type of semantic relation of the base stem verb (cf. Davis 2001).

(7) *caus-stem*:

$$\begin{bmatrix} \text{PHON} & \text{F}_{sase}(\boxed{1}) \\ \text{ARG-ST} & \langle \text{NP, NP, ...} \rangle \\ \text{CONT} & \begin{bmatrix} \textit{cause-rel} \\ \text{EFFECT} & \boxed{3} \end{bmatrix} \\ \text{STEM} & \begin{bmatrix} \textit{v-stem} \\ \text{PHON} & \boxed{1} \\ \text{CONT} & \boxed{3} \end{bmatrix} \end{bmatrix}$$

The function F_{sase}(X) yields X+*sase* if X is vowel-final, and X+*ase* otherwise. The causative formed from the stem *kaw-* 'buy', with the constraints presented above, has the representation illustrated in (8).

[2]The use of PRO is obviously not the sole solution. Asudeh (1998: Ch.4) argues against the use of PRO and proposes to have a CONTENT object as a member of ARG-ST, which is structure-shared with the CONTENT value of a member of the non-embedded ARG-ST. Yet another possible solution is, following the line of Uda (1994) (and many others), to adopt a "thematic hierarchy"-based (rather than obliqueness-based) account of Japanese binding facts. Although I adopt Manning et al.'s solution here, I believe that the question is still open which option is most favorable.

(8) *kaw-ase-* 'cause-to-buy'

$$\begin{bmatrix} \textit{caus-stem} & \\ \text{HEAD} & \textit{verb} \\ \text{SUBJ} & \langle \boxed{1}\text{NP}[\text{NOM}]_i \rangle \\ \text{COMPS} & \langle \boxed{2}\text{NP}[\text{DAT}]_j, \boxed{3}\text{NP}[\text{ACC}]_k \rangle \\ \text{CONT} & \begin{bmatrix} \textit{cause-rel} & \\ \text{ACTOR} & i \\ \text{UNDERGOER} & j \\ \text{EFFECT} & \begin{bmatrix} \textit{buy-rel} & \\ \text{ACTOR} & j \\ \text{UNDERGOER} & k \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \langle \boxed{1}, \boxed{2}_j, \langle \text{PRO}_j, \boxed{3} \rangle \rangle \end{bmatrix}$$

One modification is needed, however, to capture the meaning of the Japanese causative more precisely; the Japanese causative semantically differs from English causative (factitive/inductive causative) verbs (*cause*, *make* etc.) in that it covers the meaning of the permissive (permissive causative; *let* etc.) as well:

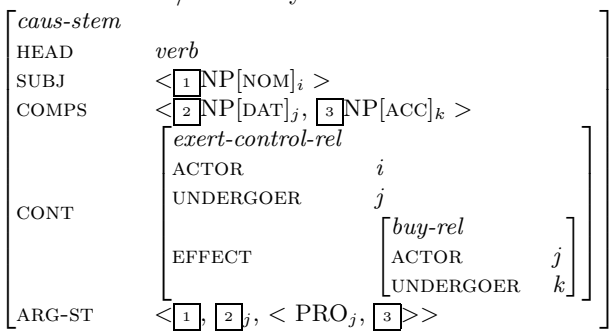
(9) Max-wa musume-o nihon-ni ik-ase-ta.
Max-Top daughter-Acc Japan-Dat go-Caus-Past
'Max made/let her daughter go to Japan.'

The sentence in (9) can be interpreted either as the causative (or factitive causative; i.e. Max forced his daughter to go to Japan) or as the permissive (or permissive causative; i.e. Max allowed his daughter to go to Japan). Thus, the relation between the referent of the subject and the controller (semantic subject) of the core event should be treated as the relation "exert control on (somebody as to do something)", which subsumes both factitive and permissive causation: one who "caused" an individual to do something might as well not have let him do so, and one who "let" someone do something might have hampered him from doing so; in either case, whether an event happens or not is under the control of the referent of the subject. The representation of the Japanese causative verb is given as the following, where the type of the value of CONTENT is *exert-control-rel* rather than *cause-rel*:

(10) *caus-stem:*

$$\begin{bmatrix} \text{PHON} & \text{F}_{sase}(\boxed{1}) \\ \text{ARG-ST} & \langle \text{NP}, \text{NP}, \ldots \rangle \\ \text{CONT} & \begin{bmatrix} \textit{exert-control-rel} & \\ \text{EFFECT} & \boxed{3} \end{bmatrix} \\ \text{STEM} & \begin{bmatrix} \textit{v-stem} & \\ \text{PHON} & \boxed{1} \\ \text{CONT} & \boxed{3} \end{bmatrix} \end{bmatrix}$$

(11) *kaw-ase-* 'cause/let to buy'



Now, let us turn to the analysis of the passive, which is the central interest of the present work. From the crosslinguistic point of view, the canonical passive construction involves "promotion" of the underlying object to subject (function) and "demotion" (or omission) of the underlying subject into a peripheral function which is marked by an oblique case, adposition, etc. (cf. Dixon and Aikhenvald 1997). Also, a passivizing operation usually does not affect the truth conditional meaning of the sentence. However, among the three types of passives, which are exemplified in (1)-(3), only the direct passive satisfies all of these conditions. The subject of a possessive passive is not an underlying object but a "possessor", which in most cases might be recovered as a genitive NP modifying one of the object NPs. Indirect passives do not have corresponding active sentences at all, and they usually imply an adversative effect on the referent of their subject.

Given that possessive/indirect passives are so deviant from the "prototypical" passive, it may seem (and it is commonly believed to be) impracticable to give a uniform and consistent account of Japanese passives. However, once we stop adhering to the canonical properties of the passive mentioned above, and consider the Japanese passive to be analogous to the causative, rather than to passives in other languages like English, a rather different picture emerges.

In this regard, Washio's (1993) analysis is suggestive. It is developed within the theory of thematic roles and argument structure advocated by Jackendoff (1990), where "Action Tier" and "Thematic Tier" are separated: Washio proposes that the Japanese passive shares a basic conceptual structure with the causative, both representing an event of affecting between the referent of the matrix subject and "core" (subordinate) event described by the stem verb. The difference between the passive and the causative, he claims, consists in the directionality of the effect and the suppression of the Instigator (causer) of the core

event; that is, while causatives represent an event where the referent of the subject affects (and causes) the core event, passives represent an event where the core event affects the referent of the subject. The core event may affect the referent of the subject in either of the following three ways, i.e., the referent of the subject (i) is a participant in the event (which corresponds to the direct passive), (ii) is affected by a participant in the event (which roughly corresponds to the possessive passive), or (iii) simply receives some effect from the event (which corresponds to the indirect passive). This analysis, treating the passive and the causative symmetrically, gives a straightforward account of the fact that Japanese passive verbs allow diverse argument patterns (cf. (1)-(3)), and may not have corresponding active sentences.

However, Washio's claim is not tenable as it stands, given counterexamples like the following.

(12) Max-wa kaseijin-ni hahaoya-o saraw-are-ta. Sikasi,
Max-Top Martian-Dat mother-Acc kidnap-Pass-Past But
kare-wa sono koto-o sir-anakat-ta.
he-Top that fact-Acc know-Neg-Past
'Max had his mother kidnapped by Martians. But he didn't know that.'

In the example above, where the first sentence is an instance of the possessive passive, the effect of the core event on the referent of the subject is not implied: i.e. the first sentence can be a true statement even in a situation where Max's mother left him when he was a baby, and is kidnapped by Martians some years later, and Max does not know this fact until the end of his life. This poses a serious problem for Washio's analysis, where the core meaning of the passive consists of a physical or mental effect on the referent of the subject.

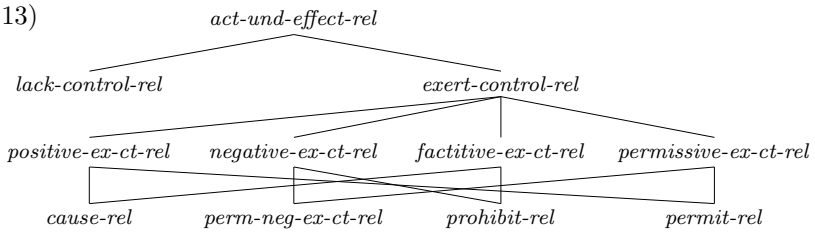
Another drawback of Washio's analysis is that, like many other approaches, it provides no explanation as to why only the indirect passive, where the core event itself affects the referent of the subject, implicates an "adversative" effect.

13.2.2 Proposal

To explain cases like (12) and to provide an account of adversative effects implicated by the indirect passive, I propose that the Japanese passive is antonymous to the causative in terms of the presence/absence of the controlling force, rather than the directionality of the effect. That is, whereas the Japanese causative represents the triadic *positive-exert-control-rel*, which is an immediate supertype of *cause-rel* and *permit-rel*, the passive represents *lack-control-rel*, which is a sister type of *exert-*

control-rel (the immediate supertype of *positive-exert-control-rel*).

(13)



Below, I show the format of passive stems.

(14) *passive-stem:*

$$\begin{bmatrix} \text{PHON} & \text{F}_{rare}(\boxed{1}) \\ \text{ARG-ST} & \text{<NP, NP, ...>} \\ \text{CONT} & \begin{bmatrix} \textit{lack-control-rel} \\ \text{EFFECT} \quad \boxed{3} \end{bmatrix} \\ \text{STEM} & \begin{bmatrix} \textit{v-stem} \\ \text{PHON} \quad \boxed{1} \\ \text{CONT} \quad \boxed{3} \end{bmatrix} \end{bmatrix}$$

The function F_{rare}(X) yields X+*rare*, if X is vowel-final, and X+*are* otherwise. The lexical representations of passivized verbs, where the stem verb is intransitive and transitive, are exemplified below.

(15) a. *abarerare-*

$$\begin{bmatrix} \textit{passive-stem} & \\ \text{HEAD} & \textit{verb} \\ \text{SUBJ} & \text{<}\boxed{1}\text{NP[NOM]}_i\text{ >} \\ \text{COMPS} & \text{<}\boxed{2}\text{NP[DAT]}_j\text{ >} \\ \text{CONT} & \begin{bmatrix} \textit{lack-control-rel} & \\ \text{ACTOR} & i \\ \text{UNDERGOER} & j \\ \text{EFFECT} & \begin{bmatrix} \textit{rage-rel} & \\ \text{ACTOR} & j \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \text{<}\boxed{1}\text{, }\boxed{2}_j\text{, < PRO}_j\text{ >>} \end{bmatrix}$$

b. *nagurare-*

$$\begin{bmatrix} \textit{passive-stem} & \\ \text{HEAD} & \textit{verb} \\ \text{SUBJ} & \text{<}\boxed{1}\text{NP[NOM]}_i\text{ >} \\ \text{COMPS} & \text{<}\boxed{2}\text{NP[DAT]}_j\text{, }\boxed{3}\text{NP[ACC]}_k\text{ >} \\ \text{CONT} & \begin{bmatrix} \textit{lack-control-rel} & \\ \text{ACTOR} & i \\ \text{UNDERGOER} & j \\ \text{EFFECT} & \begin{bmatrix} \textit{hit-rel} & \\ \text{ACTOR} & j \\ \text{UNDERGOER} & k \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \text{<}\boxed{1}\text{, }\boxed{2}_j\text{, < PRO}_j\text{, }\boxed{3}\text{>>} \end{bmatrix}$$

This characterization ("lack of control") of the meaning of the passive may sound odd, as it is so loose a relation that it holds for almost any triple of two individuals and an event in the world. However, this very generality is the key factor in explaining how the adversative effect implicature of the indirect passive arises. Observe the following English example:

(16) That dinosaurs became extinct was out of Tiger Woods' control.

The sentence (16) sounds pragmatically odd, though it is doubtlessly a true statement. Intuitively the source of this oddness is clear: Tiger Woods has nothing to do with the extinction of dinosaurs, and there could not be any "control" relation between them. This observation suggests that, for a sentence of the form "the event P is out of x's control" to be a pragmatically felicitous statement, there must be a significant relation between the event and the individual. But what exactly counts as such a relation? For an individual to be related to an event, it seems that either of the following conditions must be satisfied: (i) direct involvement, i.e., x is a participant in P, (ii) indirect involvement, i.e., some individual that stands in a pragmatically salient relation (ownership, kinship etc.) with x is involved in P, and (iii) affectedness, i.e., P physically or mentally affects x. Each of these cases is exemplified below.

(17) a. That Patricia nominated him$_i$ as her heir was out of Max's$_i$ control.
b. That Patricia nominated his$_i$ son as her heir was out of Max's$_i$ control.
c. That Patricia nominated John as her heir was out of Max's control.

In case (iii) (e.g. (17c); suppose John does not stand in a pragmatically significant relation, e.g. parenthood, with Max), the implicated effect is usually construed as an adversative one, due to the knowledge-based inference: "when an uncontrolled event has some effect on an individual, that effect tends to be a bad one". Crucially, such an adversative effect implicature is absent in (17a) and (17b), where the direct/indirect involvement guarantees the felicity of a statement about the "out of control" relation between the event and the individual.

Now, under the assumption that Japanese passive verbs have the lexical content shown in (14), a passive sentence has a semantic schema comparable to that of the sentences in (17), (17a), (17b) and (17c) corresponding to the direct, possessive and indirect passives respectively. The only substantial difference is the number of arguments involved; while the sentences in (17) encode a two-place relation between an

individual and an event, passive sentences, like causative sentences, represent a three-place relation among two individuals and an event.

One question remains to be answered: why is the argument coreferential with the subject suppressed in the direct passive, unlike in the corresponding causative (compare (1a) and (4a))? My analysis predicts that such an argument can be realized (with an anaphor *zibun*, for instance) just like it can be with the causative. I assume that this indeed is a correct prediction, based on the following two facts. First, the argument coreferrential with the subject of the direct passive must be present (i.e. cannot be suppressed) in certain contexts, as in the following example where the relevant argument is contrasted:

(18) Sono tetugakusha$_i$-wa desi-o hihan-s-are-ta
that philosophor-Top apprentice-Acc criticize-Pass-Past
node-wa-naku, {zibun$_i$-o/*ϕ_i} hihan-s-are-ta noda.
it is not the case self-Acc criticize-Pass-Past it is the case
'It is that philosopher himself, but not his apprentice, who was criticized.'

Second, in Japanese, the ellipsis of an argument that is coreferential with the pivot argument (subject) of a superordinate event is quite common and often preferred, if not required. See the examples below.

(19) a. Max$_i$-wa Pat-ga {ϕ_i/?zibun$_i$-o/?kare$_i$-o} mihatte-i-ru
Max$_i$-Top Pat-Nom self$_i$-Acc he$_i$-Acc watch-Asp-Pres
aida, zutto benkyoo-suru huri-o-site-i-ta.
while constantly study pretend-Asp-Past
'Max pretended to do his lessons while Pat kept a watch on him.'

b. Max$_i$-wa Pat-ga {ϕ_i/??zibun$_i$-o/??kare$_i$-o} yusutte-mo,
Max$_i$-Top Pat-Nom self$_i$-Acc he$_i$-Acc shake-though
me-o-samas-anakat-ta.
wake up-Neg-Past
'Max did not wake up though Pat gave him a shake.'

The degree of preference for ellipsis varies depending on the type of relevant connective/complementizer. It seems reasonable to assume that the same effect obtains in the case of the passive construction too, which involves two events, one superordinate and one subordinate.

The facts mentioned above suggest that argument suppression in the direct passive is an outcome of quite a broad phenomenon attested in other constructions as well, rather than of a peculiar syntactic or lexical operation. But why doesn't the same thing happen to causative verbs with *-sase*? The answer to this question is again a pragmatic

one. As we saw above, the Japanese passive can be used felicitously only if the referent of the subject is directly or indirectly involved in the subordinate event (direct/possessive), or is affected by that event (indirect). Among these three cases, the "direct" one can be shown to be canonical in terms of its frequency of use (Heo 1999), which makes it highly predictable that the subordinate event of the Japanese passive involves an argument that is coreferential with the subject. To conclude, nothing syntactic or semantic forces suppression of the argument of the core event bound to the subject, but its phonetic realization (with an anaphor *zibun*, for instance) is pragmatically anomalous and strongly disfavored, except within marked (e.g. contrastive) contexts.

13.2.3 Coercion

Examples like the following may appear to pose a problem for the proposal that the core meaning of the Japanese passive is "lack of control":

(20) Alice-wa Pat-ni wazato/umaku yuuwaku-s-are-ta.
Alice-Top Pat-Dat intentionally/aptly seduce-Pass-Past
'Alice was intentionally/aptly seduced by Max.'

(21) Otonasiku ore-ni nagur-are-ro.
obediently I-Dat hit-Pass-Imp
'Be hit by me obediently.' (lit.)

In (20), a passive verb co-occurs with adverbs entailing volitionality; this is predicted to cause a semantic inconsistency, as "lack of control" denotes a state (where the control force is absent). For instance, the sentences below where adjectives and adverbs entailing volitionality co-occur are unacceptable:

(22) a. *Max-wa wazato kanemoti-da.
Max-Top intentionally rich-be:Pres
'Max is intentionally rich.' (lit.)
b. ?Max-wa wazato Pat-ni reitan-da.
Max-Top intentionally Pat-Dat cold-be:Pres
'Max intentionally treats Pat coldly.' (intended)

This prediction does not conform to the data shown in (20). In (21), *-rare* is followed by the imperative morpheme *-ro*, which again ought to make the sentence unacceptable.[3] However, in Japanese, some state-denoting predicates can be construed as an agentive action roughly

[3]Incidentally, Japanese adjectives (verbal adjectives) do not have an imperative inflection, corresponding to the verbal imperative ending *-ro*.

characterizable as "keep oneself ϕ", when they co-occur with expressions like imperative markers and adverbs entailing volitionality. See the examples below:

(23) a. Otonasiku hon-o yonde-i-ro.
obediently book-Acc read-Asp-Imp
'Keep reading the book obediently.'

b. Alice-ga soozi-site-i-ru aida, Max-wa wazato terebi-o
Alice-Nom clean-Asp-Pres while Max-Top intentionally TV-Acc
mite-i-ta.
watch-Asp-Past
'While Alice was cleaning the room, Max did not stop watching TV.'

(24) a. Koko-ni i-ro.
here-Dat be-Imp
'Stay here.'

b. Kare-wa wazato soko-ni i-ta.
he-Top intentionally there-Dat be-Past
'He stayed there on purpose.'

Given the data above, it seems reasonable to assume (20) and (21) are also instances of this type of semantic coercion, where a passive verb is interpreted as "keep oneself lacking control on".[4]

13.3 Alleged Differences among the Direct, Possessive and Indirect Passives

In this section, I examine several phenomena which are commonly regarded as evidence for syntactic/semantic differences among the direct, possessive and indirect passives, and I provide functional/pragmatic accounts of all of them.[5]

13.3.1 Restriction on the Matrix Subject

Kuno (1973) and Uda (1994) claim that the matrix subject of the indirect passive is restricted to animate NPs, showing examples like the

[4]Similar phenomena are observed in other languages too: for example, some English adjectives allow such coercion; interestingly, however, the appropriate paraphrase is "make oneself ϕ", rather than "keep oneself ϕ" (cf. Pollard and Sag 1994: 308-14).

(i) a. Be optimistic! / Be careful! / ?Be allowed to go! / *?Be tall!
b. He is intentionally nice right now.
c. He is trying to be nice.

[5]An extensive list of such phenomena is given by Uda (1994: 67-80), to which the present work owes much data.

following.

(25) *Sono hon-wa syuppansha-ni betu-no hon-o
that book-Top publisher-Dat other book-Acc
syuppan-s-are-ta.
publish-Pass-Past
(cf. Sono hon-ga yatto syuppan-s-are-ta.)
that book-Nom finally publish-Pass-Past
'That book was finally published.'

This claim is incorrect. An indirect passive with a non-animate subject is possible, if information is supplied which explains how the referent of the subject is affected:

(26) a. Kono sinseihin-wa kaigaibumon-ni akazi-o
this new product-Top overseas dept.-Dat deficit-Acc
das-are-te kaihatu-ga
make-Pass-Gerund development-Nom
chuusi-ni-nat-ta.
suspension-become-Past
'The development of this new product was suspended because the overseas department ran into the red.'

b. Kono eiga-ga kookaichuusi-ni-nat-ta-no-wa, kantoku-ni
this movie-Nom recall-become-Past-Comp-Top director-Dat
husyoozi-o okos-are-ta-kara-da.
scandalous affair-Acc cause-Pass-Past-because-be:Pres
'The release of this movie was cancelled because the director caused a scandalous affair.'

Indirect passives with an animate subject do not require such supplementary information; importantly, however, the effect on the referent of the subject is construed as a mental one unless specified otherwise by the context:

(27) Max-wa Pat-ni oogoe-o das-are-ta.
Max-Top Pat-Dat loud voice-Acc make-Passive-Past
'Pat gave a loud cry (on Max).'

The default interpretation of (27) is that Max was annoyed or surprised by Pat's yelling, but not that Max was physically affected (e.g. his eardrums were broken). When the referent of the subject is inanimate, this option (mental effect) is not available, hence the acceptability of the sentence degrades unless the specification of the effect is supplied.

13.3.2 Possibility of the *Ni/Niyotte*-alternation

It has been often claimed that the case particle of a "*by*-phrase" can alternate with an agentive postposition -*niyotte* only in cases of the direct passive (Terada 1990; Kubo 1992; Uda 1994):

(28) Kyoko-ga Syota-ni/niyotte izime-rare-ta.
Kyoko-Nom Syota bully-Pass-Past
'Kyoko was bullied by Syota.'

(29) a. Syota-ga ame-ni/*niyotte hur-are-ta.
Syota-Nom rain fall-Pass-Past
'It rained on Syota.'

b. Syota-ga musuko-ni/*niyotte gakkoo-o yame-rare-ta.
Syota-Nom son school-Acc quit-Pass-Past
'Shota's son quit school on him.'

c. Syota-ga Kyoko-ni/*niyotte oogoe-de uta-o
Syota-Nom Kyoko loudly song-Acc
utaw-are-ta.
sing-Pass-Past
'Kyoko sang a song loudly on Syota.'

However, the *ni/niyotte*-alternation is possible for indirect passives if the stem verb is with a high degree of transitivity (cf. Hopper and Thompson 1980). Observe the following sentences:

(30) a. Batman-ga Joker-ni/niyotte mati-o hakai-s-are-ta.
Batman-Nom Joker city-Acc destroy-Pass-Past
'Joker destroyed the city on Batman.'

b. (Context: Max and Pat are rival investors.)
Max-wa Pat-ni/niyotte orenzi-o kaisime-rare-ta.
Max-Top Pat orange buy up-Pass-Past
'Pat bought up oranges on Max.'

On the other hand, the *niyotte*-marking of the UNDERGOER argument of a direct passive is not allowed when the stem verb is one with low transitivity, like verbs that denote mental states or contact:

(31) a. Max-wa Pat-ni/*niyotte sonkei-s-are-teiru /ais-are-te-iru.
Max-Top Pat respect-Pass-Past love-Pass-Past
'Max is respected/loved by Pat.'

b. Alice-wa Pat-ni/??niyotte kami-o sawar-are-ta.
Alice-Top Pat hair-Acc touch-Pass-Past
'Pat touched Alice's hair on her.'
(cf. Alice-wa Pat-ni/niyotte kami-o hikkonuk-are-ta.)
pull off-Pass-Past

From the data above, it is clear that the possibility of the *ni*/*niyotte* alternation (at least partially) hinges on the degree of transitivity of the stem verb, rather than the distinction between the direct and indirect passives.

13.3.3 Optionality of the Agent Phrase

Another common claim about *ni*-marked agent NPs is that they can be omitted only in direct passives (Miyagawa 1989; Kubo 1992; Terada 1990):

(32) a. Kyoko-ga izime-rare-ta.
Kyoko-Nom bully-Pass-Past
'Kyoko was bullied (by somebody).'
b. Sensei-ga hihan-s-are-ta.
teacher criticize-Pass-Past
'The teacher was criticized (by somebody).'

(33) a.*Syota-ga sin-are-ta.
Syota-Nom die-Pass-Past
'Syota had someone die on him.'
b.*Syota-ga gakkoo-o yame-rare-ta.
Syota-Nom school-Acc quit-Pass-Past
'Shota had someone quit school on him.'

This generalization, however, does not hold for sentences like the following, which implies that the optionality of *ni*-marked (matrix) UNDERGOER arguments cannot be attributed to the distinction between the direct and indirect passives.[6]

(34) Max-wa (kare-ga kirai-na) tetugaku-no giron-o
Max-Top he-Nom dislike philosophy-Gen discussion
s-are-ta.
do-Pass-Past
'(They) discussed philosophy (which Max hates) on Max.'

(35) Max-wa (tanosimi-ni-site-i-ta) konsaato-o
Max-Top look forward to-Asp-Past concert-Acc
chuusi-ni-s-are-ta.
cancel-Pass-Past
'(They) canceled the concert (that Max was looking forward to) on Max.'

I assume that the omission of the matrix UNDERGOER argument of the sentences in (33) is blocked by the pragmatic condition on the

[6] A similar remark is made by Kuroda; see Uda (1994:158).

indirect passive, i.e., the (implied) effect on the referent of the matrix UNDERGOER argument: the core events described in (33) are, being underspecified as to their participants, too vague to be construed as affecting a particular individual.

Another factor that favors the omission of the *ni*-marked agent NP of a direct passive is the presence of a corresponding active sentence. Although the Japanese direct passive has syntactic and semantic properties dissimilar to 'canonical' passives, its primary discourse function is similar to that of passives in other languages, i.e. it involves defocusing of the subject subcategorized by the stem verb and focusing of the promoted argument. The choice of the direct passive rather than the active indicates that the agent of the base verb is not prominent in the discourse context, which makes its omission natural. On the other hand, indirect passives, lacking corresponding active sentences, do not have such a defocusing effect, so that suppression of the agent of the base verb is less motivated.

13.3.4 *Zibun* Binding

The possibility of *zibun* binding is often counted as a piece of evidence for syntactic differences between the direct and indirect passives (Kuno 1973 *inter alia*):

(36) a. Max_i-ga Alice_j-ni $\text{zibun}_{i/j}$-no heya-kara
Max_i-Nom Alice_j-Dat $\text{self}_{i/j}$-Gen room-from
dete-ik-are-ta.
go out-Pass-Past
'Alice went out of Max's room on him./Alice went out of her room on Max.'

b. Max_i-ga Alice_j-ni $\text{zibun}_{i/j}$-no heya-de
Max_i-Nom Alice_j-Dat $\text{self}_{i/j}$-Gen room-Loc
benkyoo-s-are-ta.
study-Pass-Past
'Alice worked in Max's room on him./Alice worked in her room on Max.'

(37) a. Max_i-ga Alice_j-ni $\text{zibun}_{i/?*j}$-no ie-de
Max_i-Nom Alice_j-Dat $\text{self}_{i/?*j}$-Gen home-Loc
home-rare-ta.
praise-Pass-Past
'Max was praised by Alice in his/?*her house.'

b. Max$_i$-ga Alice$_j$-ni zibun$_{i/?*j}$-no syasin-o
Max$_i$-Nom Alice$_j$-Dat self$_{i/?*j}$-Gen picture
mise-rare-ta.
show-Pass-Past
'Max had his/?*her picture shown (to him) by Alice.'

In the sentences in (36), which are instances of the indirect passive, either the matrix subject or the *ni*-marked agent NP can be the antecedent of *zibun*, while for the direct passive sentences in (37), the coreference of the *ni*-marked agent NP and *zibun* is awkward. However, this fact can be explained in terms of the interaction between two independently attested factors, namely, (i) the presence/absence of a corresponding active sentence, and (ii) the empathy-loaded character of *zibun* (in its perspective use). As observed by Kuno and Kaburaki (1977), the direct passive indicates that the referent of the surface subject is more empathized with than that of the *ni*-marked agent NP by the speaker. On the other hand, as Kuno (1978) and Oshima (2002) observe, the genitive *zibun* also indicates that its referent is empathized with by the speaker. In the sentences in (37), the use of the direct passive implicates that the speaker empathizes with Max, rather than Alice; this makes the latter inappropriate as the referent of *zibun*. On the other hand, indirect passives have no bearing on empathy relations, because they lack corresponding unmarked actives.

13.3.5 Subject Honorification

Kuno (1973) observes that the *ni*-marked agent NP of an indirect passive qualifies (though marginally) as the trigger of subject honorification, while that of a direct passive does not:

(38) a. Sensei-ga Hanako-o o-tasuke-ni-nat-ta.
teacher-Nom Hanako-Acc help-Hon-Past
'The teacher helped Hanako.'

b.*Hanako-ga sensei-ni o-tasuke-rare-ni-natta.
Hanako-Nom teacher-Acc help-Pass-Hon-Past
'The teacher was helped by Hanako.'

(39) a. Sensei-ga hon-o o-kaki-ni-nat-ta.
teacher book-Acc write-Hon-Past
'The teacher wrote the book.'

b. Hanako-ga sensei-ni hon-o o-kak-are-ni-nat-ta.
Hanako-Nom teacher-Dat book-Acc write-Pass-Hon-Past
'The teacher wrote the book on Hanako.'

This disparity can be again explained in terms of empathy constraints. Observe the following examples:

(40) a. Max$_i$-wa, [Pat-ga kare$_i$/zibun$_i$-o sikat-ta node],
Max$_i$-Top Pat-Nom he$_i$/self$_i$-Acc scold-Past because
hara-o-tate-ta.
get angry-Past
'Max got angry because Pat scolded him.'

b. Max$_i$-wa, [sensei-ga kare$_i$/??zibun$_i$-o o-sikari-ni-nat-ta
Max$_i$-Top teacher-Nom he$_i$/self$_i$-Acc scold-Hon-Past
node], hara-o-tate-ta.
because get angry-Past
'Max got angry because the teacher scolded him.'

(41) a. Max$_i$-wa, Pat-ga [kare$_i$/zibun$_i$-o home-ta toki],
Max$_i$-Top Pat-Nom he$_i$/self$_i$-Acc praise-Past when
uresiku-omot-ta.
feel happy-Past
'Max felt happy when Pat praised him.'

b. Max$_i$-wa, sensei-ga [kare$_i$/??zibun$_i$-o o-home-ni-nat-ta
Max$_i$-Top teacher-Nom he$_i$/self$_i$-Acc praise-Hon-Past
toki], uresiku-omot-ta.
when feel happy-Past
'Max felt happy when the teacher praised him.'

Occurrences of *zibun* that are long distance-bound within adverbial clauses are, like the genitive *zibun*, empahthy-loaded (see Oshima 2002 for more detailed discussion). The badness of (40b) and (41b) with *zibun* suggests that the honorific auxiliary (*g*)*o*-V-*ni-naru* too is empathy-loaded and indicates that the speaker's empathy is with the referent of the honorified subject. As mentioned above, the *ni*-marked agent NP of a direct passive is "empathically demoted" and thus is not eligible as the honorified subject of (*g*)*o*-V-*ni-naru*.

13.4 Summary

In this paper, I proposed a uniform analysis of the Japanese passive as a triadic "lack control over (someone as to doing something)" relation, and argued (i) that the apparent discrepancy of argument realization patterns among the three types (direct, possessive and indirect) of passives is illusory, and (ii) that the adversative effect implicated by the indirect passive is given a natural account in terms of conversational implicature. I also argued that phenomena which have been commonly

regarded as evidence for syntactic/semantic differences among the three types of passives can be given independently motivated pragmatic accounts, maintaining the proposed uniform analysis.

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References

Asudeh, Ash. 1998. Anaphora and Argument Structure: Topics in the Syntax and Semantics of Reflexives and Reciprocals. M.Phil. Thesis, Center for Cognitive Science, University of Edinburgh.

Davis, Anthony R. 2001. *Linking by Types in the Hierarchical Lexicon*. CSLI.

Dixon, Robert M. and Alexandra Y. Aikhenvald. 1997. A typology of argument-determined constructions. In J. Bybee, J. Haiman, and S. A. Thompson, eds., *Essays on Language Function and Language Type*. John Benjamins.

Gunji, Takao. 1987. *Japanese Phrase Structure Grammar: a Unification-based Approach*. Kluwer.

Heo, Myeongja. 1999. Nihon go to kankoku go no ukemibun no jisshooteki taishoo kenkyuu (an empirical comparative study of the passive construction in japanese and korean). *Japanese-language Education around the Globe* 9:115–131.

Hopper, Paul and Sandra Thompson. 1980. Transitivity in grammar and discourse. *Language* 56(2):251–299.

Jackendoff, Ray. 1990. *Semantic Structures*. MIT Press.

Kubo, Miori. 1992. *Japanese Passives*, vol. 23 of *Working Papers of the Department of Languages and Cultures*. University of Hokkaido.

Kuno, Susumu. 1973. *The Structure of Japanese Language*. MIT Press.

Kuno, Susumu. 1978. *Danwa no bunpô (Grammar of discourse)*. Tokyo: Taishukan.

Kuno, Susumu and Etsuko Kaburaki. 1977. Empathy and syntax. *Linguistic Inquiry* 8:625–672.

Manning, Christopher. 1994. *Ergativity: Argument Structure and Grammatical Relations*. Ph.D. thesis, Stanford University.

Manning, Christopher, Ivan A. Sag, and Masayo Iida. 1999. The lexical integrity of japanese causatives. In R. Levine and G. Green, eds., *Studies in Modern Phrase Structure Grammar*. Cambridge University Press.

Miyagawa, Shigeru. 1989. *Structure and Case Marking in Japanese*, vol. 22 of *Syntax and Semantics*. Cambridge University Press.

Oshima, David Y. 2002. Logophoricity, empathy and quasi-indicators. Revised version of MA thesis, University of Tokyo. available from `http://www.stanford.edu/~davidyo/publications`.

Pollard, Carl and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. CSLI.

Riehemann, Suzanne. 1993. Word Formation in Lexical Type Hierarchies: A Case Study of Bar-Adjectives in German. Master's thesis, University of Tübingen.

Riehemann, Suzanne. 1998. Type-based derivational morphology. *Journal of Comparative Germanic Linguistics* 2:49–77.

Shibatani, Masayoshi. 1985. Passives and related constructions: A prototype analysis. *Language* 61(4):821–848.

Terada, Michiko. 1990. *Incorporation and Argument Structure in Japanese*. Ph.D. thesis, University of Massachusetts.

Uda, Chiharu. 1994. *Complex Predicates in Japanese*. Garland Publishing.

Washio, Ryuichi. 1993. When causatives mean passives. *Journal of East Asian Linguistics* 2:45–90.

14

Coordination and Underspecification

Ivan A. Sag

14.1 Introduction

Coordinate structures have posed a serious problem for HPSG ever since the idea that models of linguistic objects are 'complete' (i.e. totally well-typed and sort-resolved) became a standard assumption more than a decade ago. The problem, *tout court*, is the question of what feature structure to associate with the mother of the bracketed coordinate structure in examples like the following, where the categories of the conjuncts differ as indicated:

(1) Pat is [wealthy and a Republican]. [AP & NP] (Sag et al. 1985)

(2) Kim [likes bagels and is happy]. [[AUX −] & [AUX +]]

(3) Er [findet und hilft] Frauen.
OBJ.ACC OBJ.DAT
He finds and helps women
"He finds and helps women."
[[COMPS ⟨[*acc*]⟩] & [COMPS ⟨[*dat*]⟩]] (Ingria 1990)

(4) I certainly will, and you already have, {*clarify/*clarified the situation}
{set the record straight} with respect to the budget.
[[SLASH? {VP[*bse*]}] & [SLASH? {VP[*psp*]}]] (Pullum and Zwicky 1986)

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(5) Kogo/*Co [Janek lubi a Jerzy
(ACC/GEN)/(NOM/ACC) OBJ.ACC
who John likes and George
nienawidzi]?
OBJ.GEN
hates
"Who/*What does John like and George hate?"
[[SLASH {NP[*acc*]}] & [SLASH {NP[*gen*]}]] (Polish: Dyła 1984)

(6) Dajcie [wina i całą świnię]!
give wine.GEN and whole.ACC pig.ACC
"Serve some wine and a whole pig!"
[[CASE *gen*] & [CASE *acc*]] (Polish: Przepiórkowski 1999)

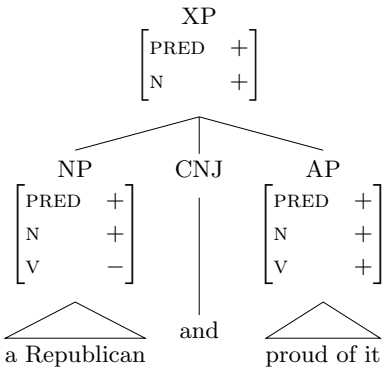
Various empirical problems that bear on this issue have been noted by Zaenen and Karttunen (1984), Pullum and Zwicky (1986), Jacobson (1987), and Ingria (1990), among others. In this paper I explore the idea that most (if not all) of these problems can be dealt with in HPSG by a simple change to the framework's foundational assumptions. I will consider an approach to these problems that involves suspending the requirement that feature structures be 'sort-resolved'.

14.2 Background

Work in Generalized Phrase Structure Grammar (GPSG),[1] included the proposal that a coordinate mother's feature structure is determined from the feature structures of its conjuncts via a set-theoretic relation (intersection of sets of feature-value specifications), an idea later adapted (in terms of union of atomic values) by Dalrymple and Kaplan (2000). The GPSG analysis treated (1) in terms of partially specified feature structures like the one labelling the mother node in (7):

[1] Sag et al. 1985; Gazdar et al. 1985.

(7)



Obviously, this proposal relied crucially on the assumption that well-formed feature structures need not be fully resolved.

As observed by Jacobson (1987), however, the GPSG analysis encounters difficulty in dealing with contrasts like the following:

(8) a. Kim grew wealthy.
b. *Kim grew a Republican.
c. Kim grew and remained wealthy.
d. *Kim grew and remained a Republican.
e. *Kim grew and remained [wealthy and a Republican].

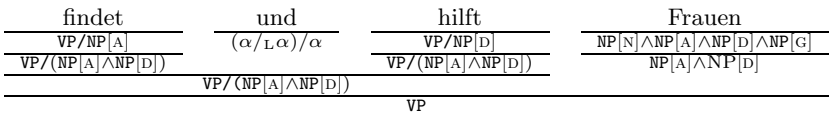
That is, assuming that *grow* selects for an [N +, V +] (AP) complement and that *remain* is freer, requiring only that its complement be [V +] (AP or NP), the GPSG treatment predicts that the coordinate verb [*grew and remained*] should, like *remain*, impose only the weaker requirement on the complement. But this cannot be right, Jacobson argues, because [V +] is the category that would be associated with phrases like *wealthy and a Republican* (cf. (1)) and such phrases cannot serve as the complement of *grew and remained*, as (8e) shows.

Bayer and Johnson (1995) and Bayer (1996) propose a solution to this and related problems in terms of Type Logical Grammar, a species of Categorial Grammar where functional categories correspond to implication. On such an approach, an expression of type `VP/NP` is one that can give rise to a `VP` if it is 'given' an `NP`. Implicational categories and conjunctive/disjunctive categories (categories which are built up with $\wedge$ and $\vee$ and which can be simplified according to familiar logical principles, e.g. '$\wedge$-Elimination') interact in such a way as to solve Jacobson's puzzle. That is, if *remained* is of type `VP/(NP∨AP)`, then the logic of categories allows us to infer that *remained* may also be of type `VP/AP`, which allows it to coordinate with *grew*, which is of that type

(and only of that type). The resulting coordinate verb, assuming that coordination requires category identity, is also VP/AP. This correctly accounts for (8a-d). In order for expressions of unlike category to coordinate, they must each be weakened to a 'lowest common denominator'. Thus, we may infer that an expression of type NP or one of type AP also leads a life as an NP∨AP expression and this is the only type that can be assigned to a coordinate expression like *wealthy and a Republican*. But this cannot combine with [*grew and remained*], whose type is VP/AP, as we just saw. Thus (8e) is correctly ruled out – for the same reason that r cannot be derived from the premises $p \vee q$ and $p \rightarrow r$.

Similarly, Bayer (and Johnson) provide a solution for some of the other examples noted in section 1. For example, by analyzing a case-syncretic noun as an expression of a case-conjunctive type (that in many circumstances gives rise to expressions of a simpler type via ∧-Elimination), one arrives at an analysis of the coordination of verbs selecting objects with distinct case, as in the following derivation of (3) above (after Bayer 1996):

(9)



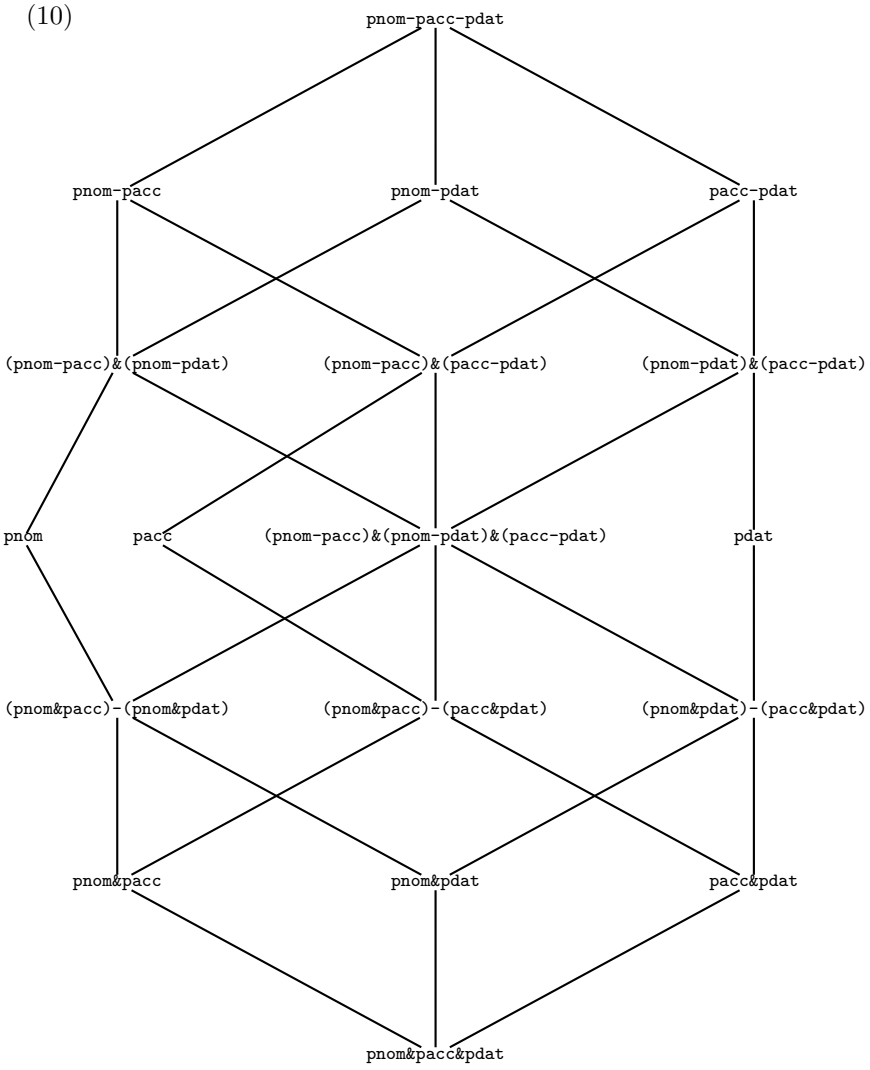
Several researchers have recently attempted to incorporate Bayer and Johnson's insights into HPSG. Levy (2001) augments the space of resolved feature structures in terms of objects he calls 'double-sets'.[2] These are organized into a lattice that is orthogonal to the familiar hierarchy of types assumed in HPSG work. Levy and Pollard (2001) adapt this idea in terms of boolean types (types built up via meet (&) and join (−) operations). On their proposal, three 'pure' case types such as *pnom*, *pacc*, and *pdat* give rise to 18 maximal types organized as follows:[3]

[2]The double-set lattice over the set $\{A,B\}$ is constructed from the following elements:

$\emptyset, \{\emptyset\}, \{\{A\}\}, \{\{B\}\}, \{\{A\},\{B\}\}, \{\{A,B\}\}$

[3]This is the Smyth powerlattice of the powerset (ordered by the subset relation) of a 3-element set, minus the top and bottom elements.

(10)

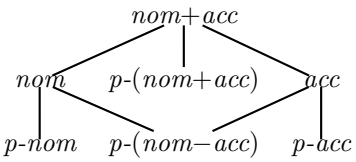


Levy and Pollard use this lattice to provide a space of maximal values that a coordinate NP's CASE value can be resolved to when the case of its conjuncts is not uniform. Join represents syncretization, and meet is coordination.[4]

[4]The hierarchies of Levy and Pollard are inverted (with respect to others discussed below, where (&) corresponds to syncretization and join (∨) corresponds to coordination).

In a related proposal, Daniels (2001) independently proposes a (semi-) lattice-based solution to some of the problems of feature neutrality and the coordination of unlikes. Daniels' solution, however, does not include a lattice structure independent of the familiar type hierarchy. Rather, he adapts ideas developed by Levine et al. (2001) for the analysis of apparent case discrepancies among parasitic gaps. Daniels posits hierarchies of CASE values that include the simplified example shown in (11):

(11)



This is a type hierarchy of the familiar kind, where only the leaf objects are maximal. What is perhaps unfamiliar here is the distinction between pure types (those begining with *p-*) and non-pure types. A linguistic object must be assigned a pure type. A syncretic expression is assigned a type constructed with −; a coordination of unlikes is assigned a type constructed with +. The case of a coordinate structure whose conjuncts are, for example, *p-nom* and *p-acc* is the pure type whose corresponding non-pure type is identical to, or a supertype of, the non-pure types *nom* and *acc*. Given the hierarchy in (11) then, the case of the coordinate structure is *p-*(*nom*+*acc*), a pure type that 'c-commands', as it were, the types of the conjuncts' cases in the type hierarchy.

Daniels' analysis posits hierarchies as rich as those offered by Levy and Pollard, but Daniels suggests that pieces of the hierarchy should be absent if the relevant syncretic forms are unattested in a given language. Otherwise, Daniels' proposal is in fact reducible to the one made by Levy and Pollard, as the latter authors note. To give the reader a feel for the complexity introduced into HPSG by these interrelated proposals, I will simply quote Levy and Pollard (2001: 225):

> So in a three-case system, this version of the Levine et al. hierarchy [upon which all of these proposals are based – IAS] would be isomorphic to the semilattice obtained by taking the powerset of a 7-element set and tossing out the empty set, giving a total of 127 nodes. In a four-case system, the Levine et al. hierarchy would have 32,767 nodes.

14.3 A Proposal

Reflecting on these recent attempts to incorporate into HPSG the insights of Bayer and Johnson, I am struck by two things: (1) the importance of Bayer's and Johnson's insights about how category resolution

and coordination interact and (2) the complexity that is apparently required to reconcile that insight with the modeling assumptions of HPSG. In the remainder of this paper, I want to consider what may be a simpler way of incorporating into HPSG the insights of all the researchers whose work I have just reviewed. This involves making one small but significant modification to HPSG's modeling assumptions.

Let's begin with a simple observation. Though much has been made of the HPSG assumption that feature structures are 'totally well-typed' (bear a specification for all features that could be specified for that type of feature structure) and 'sort-resolved' (assigned a maximal type – one that has no subtypes),[5] the fact of the matter is that the sentence descriptions produced by HPSG grammars typically have only one intended feature structure that satisfy them. For example, the grammar rules, general principles, and lexical entries in Pollard and Sag 1994 are such that for any well-formed word string, there is one feature structure model satisfying each grammar-induced description of that string. That is, a given sentence may be ambiguous in virtue of lexical or structural ambiguity, but in that case the grammar will provide a distinct description for each alternative reading. Sentence models and sentence descriptions are in general isomorphic.

The one exception to this that comes to mind is Pollard and Sag's (1994) treatment of quantifier scope in terms of constraints on quantifier 'retrieval'. There the constraint defining the relation between the head daughter's STORE value, the mother's STORE value and the QUANTS values of mother and head daughter may be satisfied in more than one way if more than one quantifier is in the head daughter's STORE value. The result is a one-to-many relation between the grammar-induced sentence description and the feature structure models that satisfy that description.

But this is a treatment of quantification that has been called into question. In particular, the framework of Minimal Recursion Semantics (MRS)[6] eliminates the entire notion of 'storage' in favor of a system where the grammar characterizes signs with scope-neutral semantic structures. These unscoped CONTENT values are then related to fully resolved MRS structures by general principles that lie outside the system of constraints on well-formed feature structures provided by the grammar. If we adopt MRS, or some other approach to semantics that allows scope underspecification, then HPSG models and sentence descriptions will indeed be isomorphic.

[5] See Pollard and Sag (1994, chapter 1), King (1989, 1994), and Carpenter 1992.
[6] See Copestake et al. 1995, Copestake et al. 1999, and Copestake et al. 2001.

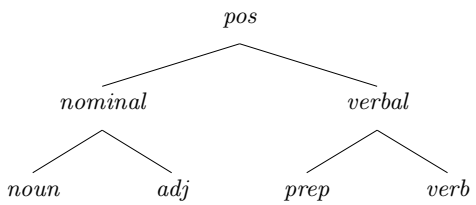
Given this observation, i.e. given the fact that the HPSG grammars we actually write provide fully determinate sentence descriptions, perhaps it is unnecessary to impose the additional requirement that structures be 'fully determinate', as reflected in the stipulation that feature structure models must be totally well-typed and sort-resolved. Here I will explore a simple modification of the standard HPSG modeling assumptions: abandoning the requirement that feature structures be sort-resolved. That is, feature structures will be specified for all features declared appropriate for their type but the values of those features need not be assigned leaf (maximal) types in the type hierarchy.

Following Levy, I will assume that verbs and other selectors impose a lower bound on the type of their arguments[7] and that the arguments themselves fix the relevant value (or else provide an upper bound). In the simplest cases, the specifications of a selector and those of the selected item coincide and the relevant value is uniquely determined. In other instances, those involving selectional underspecification, syncretic forms and the coordination of unlikes, the specifications of selector and the selected may diverge, as I will illustrate.

14.3.1 The Coordination of Unlikes

To get started, let us reconsider the coordination of expressions of unlike category and Jacobson's puzzle. I will assume, as have Levy, Pollard and Daniels, that the relevant part-of-speech distinctions are organized into a hierarchy like the one shown in (12):

(12)



The leaf types in (12) are maximal and the nonmaximal types *pos*, *nominal* and *verbal* correspond to the disjunctive types of the Categorial Grammar analyses. However, instead of allowing a fully expanded Boolean category space, as Bayer and Johnson do, I will follow Daniels in assuming that the only conjunctive and disjunctive types we have are those that are linguistically motivated. Conjunctive types are motivated by syncretism; disjunctive types by neutralization in coordinate

[7] More precisely: a greatest lower bound on the type of the value of some feature of each argument. The terminology may seem confusing, because the 'lower' types are displayed above the 'higher' types in the diagrams that appear below.

structures. I also follow Daniels (but not Levy and Pollard) in imposing only one hierarchy on types. That is, (12) is a type hierarchy of a familiar kind, where only the leaf types are maximal.

For the moment, let us assume that a verb like *elect* pins down its object's part-of-speech precisely, while verbs like *become* and *remain* specify a nonmaximal type that serves as a bound on their complement's part-of-speech:

(13) elect: [COMPS = ⟨[HEAD = *noun*]⟩]

(14) become, remain: [COMPS = ⟨[HEAD = $\boxed{1}$, *nominal* ≤ $\boxed{1}$]⟩]

Note that I use 'less-than-or-equal-to' (≤) to formulate bounding constraints, i.e. constraints that permit multiple resolutions. Since feature structures with nonmaximal values are now permitted, [HEAD = *nominal*] should be interpreted as fixing the HEAD value as (the nonmaximal type) *nominal*. In this type hierarchy, 'is less than' means 'is a supertype of'.

Lexical entries specify the appropriate maximal part-of-speech type in English, assuming English has no category-syncretic words. Hence the lexical entries in (13) and (14) are sufficient to account for standard simple data sets like the following:[8]

(15) a. They elected a Republican/*wealthy/*given a book...

b. Kim became/remained a Republican/wealthy/*given a book...

To deal with constituent coordination (other than NP coordination), consider the following simplified rule, which blends the approach of Shieber (1992) with that of Daniels (2001):

(16) General Coordination Rule (≤-based)

$$\begin{bmatrix}\text{HEAD} = \boxed{0}\\ \text{VAL} = \boxed{V}\end{bmatrix} \rightarrow \begin{bmatrix}\text{HEAD} = \boxed{1}\\ \text{VAL} = \boxed{V}\end{bmatrix} \ldots \begin{bmatrix}\text{HEAD} = \boxed{n-1}\\ \text{VAL} = \boxed{V}\end{bmatrix} \text{CNJ} \begin{bmatrix}\text{HEAD} = \boxed{n}\\ \text{VAL} = \boxed{V}\end{bmatrix}$$

where $\boxed{0} \leq \boxed{1}$, ... , $\boxed{0} \leq \boxed{n-1}$, and $\boxed{0} \leq \boxed{n}$.

Here the HEAD value of the mother is constrained to be less-than-or-equal-to the HEAD value of each conjunct. However, again following Daniels, the VAL(ENCE) values of the conjuncts are identified with each other and with the mother's VAL value. Thus a stronger condition is placed on the features used for argument selection.

[8] For convenience, I'm ignoring the fact that *remain*, but not *become*, is compatible with a PP complement.

We may now illustrate how the coordination of unlikes is analyzed. The constraints included in the lexical entries given above interact with the $\leq$-based formulation of the Coordination Rule given in (16) to allow examples like (17). The HEAD value of each relevant element is uniquely determined, as illustrated:

(17) a. become: [COMPS $\langle$[HEAD = $\boxed{1}$, *nominal* $\leq \boxed{1}$]$\rangle$]
b. wealthy: [HEAD = *adj*]
c. (a) Republican: [HEAD = *noun*]
d. wealthy and a Republican: [HEAD = *nominal*]

This analysis relies crucially on the assumption that the HEAD value of the coordinate phrase is a feature structure assigned to the nonmaximal type *nominal*, i.e. it relies on the assumption that feature structures need not be sort-resolved.

And because VAL values are identified in coordination, the COMPS value of a verbal coordination like *grew and remained* will be subject to all the constraints imposed by the conjuncts. Since the constraints of *grew* are more specific than those of *remain*, it follows that *grew and remained* must obey the more specific constraints, as shown in (18):

(18) a. grew: [COMPS = $\langle$[HEAD = *adj*]$\rangle$]
b. remained: [COMPS = $\langle$[HEAD = $\boxed{1}$, *nominal* $\leq \boxed{1}$]$\rangle$]
c. grew and remained: [COMPS = $\langle$[HEAD = *adj*]$\rangle$]
d. grew and remained wealthy
e. *grew and remained a Republican
f. *grew and remained wealthy and a Republican

This provides an HPSG solution to Jacobson's puzzle with a less complicated hierarchy than those assumed by Levy, Pollard, or Daniels. Moreover, the relevant constraints are all stated simply in terms of the notion of '$\leq$'.[9] Finally, it should be noted that there is no spurious ambiguity in this analysis: the constraints imposed by the grammar are such that each example we have considered has at most one feature structure model.

There is a slightly different approach that we should also consider. Suppose that the lexical entries for nouns and arguments did not fix

[9] We haven't really considered all the relevant data yet. For example, each different kind of unlike category coordination would motivate positing a new supertype in my analysis, since there must be some nonmaximal type for the HEAD value of the coordinate structure to resolve to. Even if the hierarchy in (12) must be further complicated, however, it will still have significantly fewer types than the alternative analyses just mentioned, and will use simpler constraints.

the type of the HEAD value, but rather put an upper bound on it, as shown in (19):

(19) a. wealthy: [HEAD = 1 , 1 ≤ *adj*]
b. (a) Republican: [HEAD = 1 , 1 ≤ *noun*]

Leaving all other aspects of our analysis unchanged, this would still provide a solution to the problem of unlike category coordination. The grammar would allow exactly one analysis for *became wealthy and a Republican*: the type of the HEAD value of the coordinate complement would be *nominal*. Note that this alternative proposal would allow us to modify our Coordination Rule so that it imposes the stronger condition that the HEAD value of the conjuncts and their mother be identical:

(20) General Coordination Rule (=-based)

$$\begin{bmatrix}\text{HEAD} = \boxed{0}\\ \text{VAL} = \boxed{1}\end{bmatrix} \rightarrow \begin{bmatrix}\text{HEAD} = \boxed{0}\\ \text{VAL} = \boxed{1}\end{bmatrix} \ldots \begin{bmatrix}\text{HEAD} = \boxed{0}\\ \text{VAL} = \boxed{1}\end{bmatrix} \text{CNJ} \begin{bmatrix}\text{HEAD} = \boxed{0}\\ \text{VAL} = \boxed{1}\end{bmatrix}$$

I believe there is no English evidence to distinguish among the three proposals just outlined: (1) lexical entries (17b,c) with the ≤ version of the Coordination Rule, (2) lexical entries (19a,b) with the ≤ version of the Coordination Rule, and (3) lexical entries (19a,b) with the = version of the Coordination Rule. All three analyses provide an account of unlike category coordination that solves Jacobson's puzzle without creating spurious ambiguity, and hence appear to be empirically indistinguishable.[10]

[10] As Roger Levy and Adam Przepiórkowski both remind me, there is a further potential problem illustrated by Polish examples like the following (Przepiórkowski 1998, ex. (5.265)):

(i) Jana dziwi, [[że Maria wybiera Piotra], i [jej brak
John-ACC suprise Comp Mary-NOM chooses Peter-ACC and her lack-NOM
gustu]].
good taste-GEN
'John is surprised that Mary chooses Peter and by her lack of good taste.'

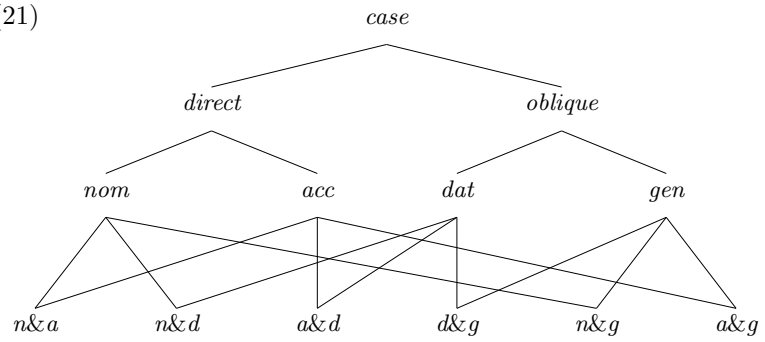
If we assume that assignment of case (nominative in the case of (i)) must be preserved in cross-categorial coordination, then it appears that case distinctions must somehow be reflected in the hiearchy of categories. Under this assumption, (i) presents the same dilemma for Levy's, Levy and Pollard's and Daniels' analyses.

I am not at all sure that case has to be transmitted across unlike category coordination, but let us suppose it does. A simple solution to this problem involves letting CPs (and thus, complementizers) bear CASE specifications, as, for example, in Sag et al. (to appear). This treatment of CPs is independently motivated by the fact that case-assigning verbs often allow CPs in argument positions (e.g. *He bothers me*/ *That Sandy left bothers me*). An alternative approach might treat *nom* as a default CASE value, leaving the mother of the coordinate structure in (i) unpecified for the feature CASE.

14.3.2 Case Neutralization in German

Now let us reconsider German case neutralization. Here, following Levy, Pollard, and Daniels (and Bayer and Johnson), we may posit conjunctive types to allow for the possibility of syncretic forms. The case system of German can then be based on the following hierarchy of types, where *direct* and *oblique* are familiar disjunctive types:

(21)



Note that conjunctive case types are posited only if German contains some syncretic word that actually is neutral over the relevant cases in coordination.

Because it allows for a simpler formulation of relevant constraints,[11] I will assume here that German makes use of the =-based general coordination rule given in (20) above, rather than its $\leq$ counterpart in (16). The analysis proceeds as follows. First, the verbs *findet* and *hilft* constrain the case of their object NP in the following ways:

(22) findet: [COMPS = ⟨[CASE = 1 , *acc* ≤ 1]⟩]

(23) hilft: [COMPS = ⟨[CASE = 1 , *dat* ≤ 1]⟩]

Then, since we adopt the =-based formulation of general coordination, we posit a lexical entry for *Männer* that contains the constraint shown in (24a):

(24) a. Männer: [HEAD = [CASE = 1 , ¬(*dat* ≤ 1)]]

b. Kindern: [HEAD = [CASE = 1 , 1 ≤ *dat*]]

Similarly, the dative noun *Kindern* has a lexical entry that includes the specification shown in (24b), which makes this word incompatible with

[11] The identity-based coordination rule might be simplified further, say, by identifying the entire CATEGORY, LOCAL, or SYNTAX value of each conjunct with that of the mother. This simplification appears unavailable within the ≤-based alternative.

all nondative contexts. These assumptions suffice to account for simple case restrictions, as shown in (25):

(25) a. findet Männer: [CASE = *acc*]
b. *findet Kindern: [CASE = ??]
c. hilft Kindern: [CASE = *dat*]
d. *hilft Männer: [CASE = ??]

Note that on this analysis, if a given word's case is unambiguous, then its lexical entry provides an upper bound on the relevant CASE value, as illustrated in (26):

(26) a. ich: [HEAD = [CASE = 1 , 1 ≤ *nom*]]
b. dich: [HEAD = [CASE = 1 , 1 ≤ *acc*]]
c. des: [HEAD = [CASE = 1 , 1 ≤ *gen*]]

This will play a key role in the treatment of NP coordination sketched below, which must ensure, for example, that nouns like (26a) cannot be coordinated with nouns like (26b).

A syncretic noun like *Frauen* can be resolved to any case. Thus its lexical entry needn't mention case (assuming that the grammar signature ensures that any CASE value is greater-than-or-equal-to *case*). This means that *Frauen* will be allowed as an object in contexts that require conjunctive CASE values. For example, if we coordinate *findet* and *hilft*, the resulting verb must satisfy the valence requirements of both verbs. This is impossible with nouns whose CASE value is incompatible with *a*&*d* (e.g. those in (24)), but it is possible with *Frauen*, as illustrated in (27):

(27) a. findet und hilft: [COMPS = ⟨[CASE = *a*&*d*]⟩]
b. findet und hilft Frauen: [CASE = *a*&*d*]
c. *findet und hilft Männer: [CASE = ??]
d. *findet und hilft Kindern: [CASE = ??]

I'll turn to nominal coordination in a moment. But first, let's consider the issue of 'spurious' ambiguity. The analysis I have just sketched in fact allows four values for the case of *Frauen* when it occurs as the object of *findet* or *hilft*:

(28) a. findet Frauen: [CASE = 1 , 1 ∈ {*acc*, *n*&*a*, *a*&*d*, *a*&*g*}]
b. hilft Frauen: [CASE = 1 , 1 ∈ {*dat*, *n*&*d*, *a*&*d*, *d*&*g*}]

It also allows three values for the case of *Männer* occurring as the object of *findet*:

(29) findet Männer: [HEAD = [CASE = 1 , 1 ∈ { *acc*, *n*&*a*, *a*&*g* }]]

My analysis thus seems to introduce multiple analyses that correspond to no linguistic ambiguity, a fact that might be construed as an argument against it.

However, there are at least two responses that could be made to this objection. First, as Ken Shan has suggested to me (personal communication), one might simply revise the way that linguistic ambiguity is defined so that families like those in (28) and (29) (feature structures that differ merely with respect to contiguous types) constitute an equivalence class. This proposal could also be thought of as letting a 'region' of the type hierarchy count as a single linguistic object. I'm not sure what undesirable consequences (if any) Shan's proposal might have; but it has a certain resemblance to proposals within Categorial Grammar to let semantically equivalent analyses count as linguistically nondistinctive.

An alternative solution involves altering the way 'root' signs are defined along the following lines:

(30) A feature structure F corresponds to a 'stand-alone' utterance with respect to a grammar $\mathcal{G}$ just in case F satisfies:

1. all constraints of $\mathcal{G}$, and
2. $$\begin{bmatrix} \textit{sign} \\ \text{LOC} = \begin{bmatrix} \text{CAT} = \begin{bmatrix} \text{HEAD} = \begin{bmatrix} \text{VFORM} = \textit{fin} \end{bmatrix} \\ \text{SUBJ} = \langle\,\rangle \\ \text{COMPS} = \langle\,\rangle \end{bmatrix} \end{bmatrix} \\ \text{SLASH} = \{\,\} \end{bmatrix},$$

and there is no F' more general than F that also satisfies 1 and 2.

Nothing here hinges on the specifics of the root condition given in (30)2.[12] The effect of the definition in (30) is to restrict the root-level signs defined by a grammar to the most general satisfiers of the grammar's constraints. As a result, all but the first feature structure schematized in (28a), (28b), or (29) would be eliminated from consideration. And with these feature structures out of the picture, the spurious ambiguity problem would be eliminated.

This approach to the spurious ambiguity problem will seem more satisfying to most linguists, I suspect. However, since it involves consider-

[12] But for a defense of the idea that S[*fin*] should be the category of utterances consisting of only elliptical XP fragments, see Ginzburg and Sag 2000.

ing multiple feature structures in order to ascertain well-formedness of any single feature structure, it might be objected that we have pushed HPSG outside the realm of 'model-theoretic grammar' (in the sense of Pullum and Scholz 2001). I don't think this objection cuts very deep, however. Because we have abandoned only the condition that feature structures must be totally well-typed, the determination of 'most general' is entirely local. That is, for any given feature structure, we need only consider a small space of alternative types in order to determine whether the assigned type is the most general one compatible with the relevant constraints. And this is all that needs to be considered in order to determine well-formedness. Thus the notion of 'most general satisfier' of a set of constraints that I am appealing to here seems unproblematic.[13]

Finally, let us consider NP coordination in German and English, which I will assume can be analyzed via a rule like the following:

(31) NP Coordination Rule:

$$\begin{bmatrix}\text{NP}\\ \text{NUM} = pl\\ \text{PER} = \boxed{0}\\ \text{CAT} = \boxed{C}\end{bmatrix} \rightarrow \begin{bmatrix}\text{NP}\\ \text{PER} = \boxed{1}\\ \text{CAT} = \boxed{C}\end{bmatrix} \ldots \begin{bmatrix}\text{NP}\\ \text{PER} = \boxed{n-1}\\ \text{CAT} = \boxed{C}\end{bmatrix} \text{CNJ} \begin{bmatrix}\text{NP}\\ \text{PER} = \boxed{n}\\ \text{CAT} = \boxed{C}\end{bmatrix}$$

where $\boxed{1} \leq \boxed{0}$, ... , $\boxed{n-1} \leq \boxed{0}$, and $\boxed{n} \leq \boxed{0}$.

This rule stipulates that all coordinate NPs are plural.[14] It also requires that NP conjuncts share their CAT value and that a coordinate NP's PER(SON) value be determined by the following hierarchy:

(32)
3rd
|
2nd
|
1st

This proposal builds into the analysis of NP coordination a version of the treatment of person/coordination interactions that is originally

[13] Note also that there need not be a unique most general satisfier of any particular set of constraints. If we assume that any two compatible types have a unique $\leq$ bound, however, then uniqueness can be guaranteed. There are further issues here having to do with set-valued features, but these are beyond the scope of the present paper.

[14] This is a simplification in that there is unclarity about the NUMBER value of NPs coordinated with *or*. For some discussion, see Morgan (1972, 1984).

cast in set-theoretic terms by Sag et al. (1985). However, my analysis is in one respect more like that of Dalrymple and Kaplan (2000), in that it is based on the values of the feature PER (rather than on sets of feature-value pairs, as in GPSG). Set-theoretic relations are here replaced by the ordering of the type hierarchy,[15] which makes it possible to capture Sag et al's generalization that 'the PERSON value of a coordinate NP is the minimum of the persons of the conjuncts'. 'Minimum' is here interpreted as 'most specific'.

The CAT identities specified in (31) ensure that the CASE values of all NP conjuncts must be identical. This generalization rings true, even though the particular case one finds in pronominal conjuncts is often not the expected one:

(33) a. He and I left.
b.%Him and me left.
c.%They invited Kim and I.

(34) a. *Him and I left
b. *I and him left.
c. *They invited him and I.
d. *They invited I and him.

These judgments reflect only a cursory exploration of dialects where (33b) or (33c) are grammatical. Clearly, a more thorough investigation of these data is called for.

In German, we find NP structures like the following, where the CASE value of the coordinate structure is just as resolved as that of the most specific conjunct:

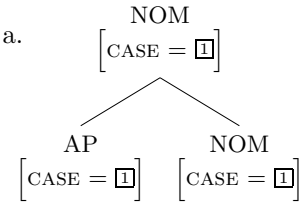
(35) Kindern und Frauen: [CASE = $\boxed{1}$, $\boxed{1} \leq$ *dat*]

In addition, identity of CASE value will be imposed in other NP-internal configurations, e.g. the following:

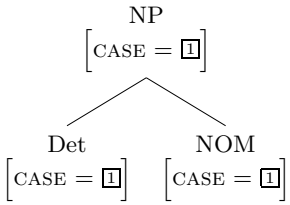
[15] Given the following correspondence, it is clear that the $<$ relation in my analysis corresponds to the subset relation, as used in Dalrymple and Kaplan's (D & K's) analysis of English (as pointed out in passing by Levy and Pollard (2001)):

TRADITIONAL CATEGORY	D & K's PER VALUE	MY PER VALUE
3rd person	$\emptyset$	*3rd*
2nd person	{**H**}	*2nd*
1st person	{**S**, **H**}	*1st*

(36) a.



b.



This will provide a correct account of the following contrasts (among others), which are discussed by Levy (2001):

(37) a. Er findet (die/*den) Frauen.
He finds (the-ACC/*the-DAT) women.

b. Er hilft (*die/den) Frauen.
He helps (*the-ACC/the-DAT) women.

c. Er findet und hilft (*die/*den) Frauen.
OBJ.ACC OBJ.DAT *ACC/*DAT
He finds and helps *the women

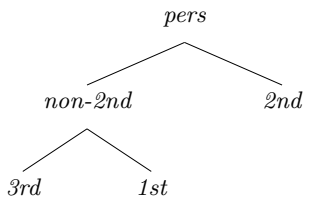
In (37a), the case of *den*, which is identified with that of the entire direct object NP, must be less than or equal to *dat*, but no such case is greater than or equal to *acc*, as required by *findet*. In (37b), the case of *die* must be less than or equal to *acc*, which is incompatible with being greater than or equal to *dat*, as required by the constraint introduced by the verb *hilft* as a bound on the object's case. Finally, in (37c), the case of the object of *findet und hilft* can only be *a&d*, which is incompatible with the case of either *die* or *den*. Since the determiner's case must be the object's case, neither of these options is well-formed. The contrasts in (37) are thus predicted to the letter.

That said, I have to confess that the person analysis just offered seems to be at odds with one of the standard examples in the coordination/syncretism literature, namely the following:

(38) ...weil wir das Haus und die Müllers den Garten
because we the house and the Müllers the garden
kaufen.
buy-1pl/3pl
...because we buy the house and the Müllers, the garden

I'm really not sure how to analyze right node raising examples like this, but if the subject requirements of the verb *kaufen* must somehow be satisfied by both *wir* (1st person) and *die Müllers* (3rd person), then it would appear that there must be a person type that is neutral to (a supertype of) these two possibilities, as sketched in (39):

(39)

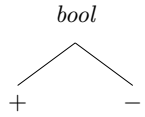


Needless to say, this person hierarchy is inconsistent with the one in (32) above. At present, I can only flag this as an unresolved issue.

14.3.3 English Auxiliaries

The feature AUX has long been problematic for HPSG analyses of English. VP conjuncts need not agree on AUX values (though they must agree on values of other HEAD features, e.g. VFORM), as illustrated in (40)–(41):

(40)



(41) a. likes bagels: [AUX = −]
b. is happy: [AUX = +]
c. Kim [likes bagels and is happy]: [AUX = ??]

The present framework provides an immediate solution to this dilemma. The AUX values are now lexically constrained as in (42a,b):

(42) a. likes (bagels): [AUX = $\boxed{1}$, $\boxed{1} \leq -$]
b. is (happy): [AUX = $\boxed{1}$, $\boxed{1} \leq +$]
c. Kim [likes bagels and is happy]: [AUX = *bool*]

And hence, as long as no more specific constraint is imposed, *bool* may serve as the AUX value of the coordinate VP, as shown in (42c). This provides an account of why such discrepancies do not give rise to ungrammaticality.

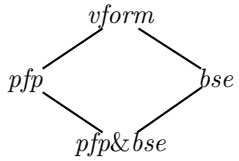
14.3.4 English Right Node Raising

Data like the following, noted in section 1, are discussed by Pullum and Zwicky (1986):

(43) I certainly will, and you already have, {*clarify/*clarified the situation}
{set the record straight} with respect to the budget.

Contrasts like these should lend themselves to a solution similar to those already presented. Again, there is uncertainty about how to analyze the right node raising construction, but if the correct analysis involved a feature whose value would have to satisfy the constraints imposed by the verbs governing the VP gaps as well as those specified in the lexical entry of the head of the right-raised VP, then the solution should be exactly like the others we have seen. The hierarchy of VFORM values, whatever it turns out to be, must include the subhierarchy shown in (44):

(44)



The lexical entry for *set* includes the constraint shown in (45a):

(45) a. set: [HEAD = [VFORM = 1 , 1 ≤ *pfp&bse*]]
b. clarify: [HEAD = [VFORM = 1 , 1 ≤ *bse*]]
c. clarified: [HEAD = [VFORM = 1 , 1 ≤ *pfp*]]

Hence the VFORM value of *set* can be resolved to the conjunctive type *pfp&bse*, *set* can appear in right-raised contexts like (43). However, because both *clarify* and *clarified* have lexical entries that fix the VFORM value as indicated in (45b-c), neither can satisfy the constraints imposed by both *will* and *have* simultaneously:

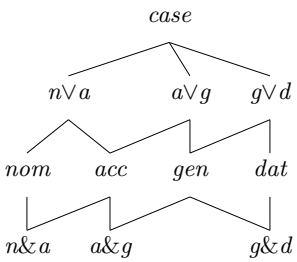
(46) a. will: [COMPS = ⟨ [VFORM = 1 , *bse* ≤ 1] ⟩]
b. have: [COMPS = ⟨ [VFORM = 1 , *psp* ≤ 1] ⟩]

This is what would be required in order for them to appear in these contexts.

14.3.5 Polish Case

The syncretic nouns of Polish would seem to motivate a hierarchy of case like the following:

(47)



The data relevant to establishing the conjunctive types in this hierarchy include constrasts like the following, noted in section 1:

(48) Kogo/*Co (ACC/GEN)/*(NOM/ACC) who nienawidzi? OBJ.GEN hates Janek lubi OBJ.ACC John likes a and Jerzy George

"Who/*What does John like and George hate?"
(Polish: Dyła 1984)

That is, the syncretic nouns make reference to the conjunctive types in lexical entries like the following:

(49) a. kogo: [HEAD = [CASE = 1 , 1 ≤ *a&g*]]
b. co: [HEAD = [CASE = 1 , 1 ≤ *n&a*]]

Polish verbs, like those considered above, place a bound on the CASE value of their object – *acc* and *gen* in the case of the verbs in (48). Thus the clauses that are coordinated in (48) are specified as shown in (50a,b):

(50) a. Janek lubi: [SLASH = {[CASE = 1, *acc* ≤ 1]}]
b. Jerzy nienawidzi: [SLASH = {[CASE = 1, *gen* ≤ 1]}]
c. [[Janek lubi] a [Jerzy nienawidzi]]:
[SLASH = {[CASE = *a&g*]}]

Hence the coordinate clause bears the SLASH specification shown in (50c). As a result, the fronted element in such examples must be consistent with [CASE = *a&g*], i.e. it must be (or be headed by) a noun like *kogo*, not by *co*, and not by any nonsyncretic noun.

Finally, let us reconsider Przepiórkowski's (1999) example that was cited in section 1:

(51) Dajcie [wina i całą świnię]!
give wine.GEN and whole.ACC pig.ACC
"Serve some wine and a whole pig!"

My take on this example may be overly simplistic, but it seems that one can use the disjunctive type $a \vee g$ to let the verb *dajcie* place the appropriate lower bound on its object, as shown in (52a):

(52) a. dajcie: [COMPS = ⟨[CASE = 1, $a \vee g \leq$ 1]⟩]
b. wina: [CASE = *gen*]
c. świnię: [CASE = *acc*]
d. dajcie [wina i całą świnię]: [CASE = $a \vee g$]

Assuming that the relevant nouns are specified as in (52b,c), then the NP coordination in (52d) is correctly analyzed, as long as Polish also uses the NP coordination rule proposed earlier.

Finally, there is further data, discussed by Levy (2001), that is also properly accounted for by this analysis:

(53) a. *? [Maria kocha a Ewa nienawidzi]
Maria loves.OBJ-ACC but Ewa hates.OBJ-GEN
tego mężczyzny.
this.ACC/GEN man.ACC

b. [Maria kocha a Ewa nienawidzi] tego
Maria loves but Ewa hates this.ACC/GEN
faceta.
guy.ACC/GEN
(Przepiórkowski, personal communication to Levy)

(54) *Včera vec' den' on prožd̆al [svoej podrugu
yesterday all day he awaited self's-GEN girlfriend-ACC
Irinu] i [zvonka [ot svoego brata Grigorija]].
Irina.ACC and call-GEN [from self's brother Gregory]

If we assume that the coordinate clauses in (53a,b) work in essentially the same way as leftward extraction examples like (48), i.e. via inheritance of SLASH specifications, then the CASE value of the right-raised NP must be $a \& g$. The determiner *tego* can resolve to this value, as can *faceta*, but the nonsyncretic noun *mężczyzny* cannot (it is upper-bounded by *acc*). Therefore, because the CASE value of the right-shifted NP must be the same as that of its head noun and that of its determiner (see (36) above), the contrast between (53a,b) is correctly predicted. Similarly, the Russian example (54) is ruled out, because the left conjunct's modifier must have the same case as its head, which it cannot.

Though the coordinate NP can be neutral with respect to *acc* and *gen*, each NP conjunct must be internally case-consistent.

14.4 Conclusion

Following foundational work by King (1989, 1994), Pollard and Sag (1994) and others working in HPSG have made the assumption that feature structures must be 'fully specified'. This notion has been interpreted as meaning 'totally well-typed' (bear a specification for all features that could be specified for that type of feature structure) and 'sort-resolved' (assigned to a maximal type). Ingria's (1990) much-cited paper (and Zaenen and Karttunen's (1984) important precursor) discussed data from various languages that pose a serious challenge for these assumptions. These problems and others were addressed in work by Bayer and Johnson (1995) and Bayer (1996), who propose an analysis in terms of Type Logical (Categorial) Grammar.

A number of recent attempts have been made (Levy 2001, Levy and Pollard 2001, and Daniels 2001) to integrate Bayer and Johnson's insights into HPSG accounts of the troublesome data involving coordination of unlikes, feature neutralization, case syncretism, and related issues. These proposals, however, have imposed new hierarchies on maximal types or else have introduced considerable complexity into existing type hierarchies, a complexity that I have tried to eliminate in this paper.

Eliminating the requirement that feature structures be assigned maximal types, I have suggested that it is possible to simplify these analyses, eliminating the need for new hierarchies, while nonetheless incorporating the insights of the Type Logical analyses and the solutions they provide to problems noted by Zaenen and Karttunen, Pullum and Zwicky, Ingria, and Jacobson. Of course, it may prove to be desirable to make a more radical departure from King's foundational assumptions, by introducing partiality more generally. And this may well be possible (eliminating the totally well-typed requirement as well, for example), for, as I have noted, the constraints induced by an HPSG grammar arguably uniquely determine a feature structure model for each desired sentence type without additional foundational assumptions. I leave open the possibility of further modifications along these lines.[16] My goal here has been to explore a minimal modification of familiar theoretical foundations, which seems to make available straightforward

[16] It is also possible that some of the examples discussed here should be analyzed as discontinuous dependencies, as Jim Blevins has suggested to me on many occasions. On such an approach, examples like (1) would involve VP coordination, where only the first conjunct's lexical head is phonologically realized.

accounts of the diverse phenomena I have surveyed.

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References

Bayer, Samuel. 1996. The coordination of unlike categories. *Language* 72: 579–616.

Bayer, Samuel and Mark Johnson. 1995. Features and agreement. *Proceedings of the 33rd Annual Meeting of the Association for Computational Linguistics* Pp. 70–76.

Carpenter, Bob. 1992. *The Logic of Typed Feature Structures*. Cambridge Tracts in Theoretical Computer Science 32. Cambridge University Press.

Copestake, Ann, Daniel Flickinger, Ivan A. Sag, and Carl Pollard. 1999. Minimal Recursion Semantics: an introduction. Manuscript, Stanford University: CSLI. (to be available in revised form in January, 2003).

Copestake, Ann, Daniel Flickinger, Robert Malouf, Susanne Riehemann, and Ivan A. Sag. 1995. Translation using Minimal Recursion Semantics. In *Proceedings of The Sixth International Conference on Theoretical and Methodological Issues in Machine Translation*. Leuven. Pp 15–32.

Copestake, Ann, Alex Lascarides, and Dan Flickinger. 2001. An algebra for semantic construction in constraint-based grammars. In

Proceedings of the 39th Annual Meeting of the Association for Computational Linguistics (ACL 2001). Toulouse, France.

Dalrymple, Mary, and Ronald M. Kaplan. 2000. Feature indeterminacy and feature resolution. *Language* 76(4): 759-798.

Daniels, Michael. 2001. On a type-based analysis of feature neutrality and the coordination of unlikes. Paper presented at the HPSG-2001 Conference – Trondheim, Norway. Available at: http://cslipublications.stanford.edu/HPSG/2/hpsg01-toc.html

Dyła, Stephan. 1984. Across-the-board dependencies and case in Polish. *Linguistic Inquiry* 15: 701-705.

Gazdar, Gerald, Ewan Klein, Geoffrey K. Pullum, and Ivan A. Sag. 1985. *Generalized Phrase Structure Grammar*. Oxford: Basil Blackwell's and Cambridge, MA: Harvard University Press.

Ginzburg, Jonathan and Ivan A. Sag. 2000. *Interrogative Investigations: the form, meaning, and use of English Interrogatives*. Stanford: CSLI Publications. [Distributed by University of Chicago Press]

Ingria, Robert. 1990. The limits of unification. *Proceedings of the 28th ACL*. Pp. 194-204.

Jacobson, Pauline. 1987. Review of Gerald Gazdar, Ewan Klein, Geoffrey K. Pullum, and Ivan A. Sag, 1985: *Generalized Phrase Structure Grammar*. *Language*.

King, Paul John. 1989. *A Logical Formalism for Head-Driven Phrase Structure Grammar*. Ph.D. dissertation, University of Manchester.

King, Paul John. 1994. An expanded logical formalism for Head-driven Phrase Structure Grammar. *Arbeitspapiere des SFB 340* Nr. 59. Universität Tübingen.

Levine, Robert, Thomas Hukari, and Michael Calcagno. 2001. Parasitic gaps in English: some overlooked cases and their theoretical implications. In Peter Culicover and Paul Postal (eds.), *Parasitic Gaps*. Cambridge, MA: MIT Press. Pp. 181–222.

Levy, Roger. 2001. Feature indeterminacy and the coordination of unlikes in a totally well-typed HPSG. Draft of March 19, 2001. Available at: http://www.stanford.edu/~rog/papers/feature-indet.ps

Levy, Roger, and Carl Pollard. 2001. Coordination and neutralization in HPSG. Paper presented at the HPSG-2001 Conference – Trondheim, Norway. Available at: http://cslipublications.stanford.edu/HPSG/2/hpsg01-toc.html

Morgan, Jerry L. 1972. Verb agreement as a rule of English. *Proceedings of the 8th Regional Meeting of the Chicago Linguistic Society.* Chicago: CLS. Pp. 278-86.

Jerry L. Morgan. 1984. Some problems of determination in English number agreement. *ESCOL 84.* Somerville, MA: Cascadilla Press.

Pollard, Carl, and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar.* Chicago: University of Chicago Press and Stanford: CSLI Publications.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A non-Configurational Constraint-Based Approach.* Ph.D. Dissertation, University of Tübingen.

Pullum, Geoffrey K., and Barbara C. Scholz. 2001. On the distinction between model-theoretic and generative-enumerative syntactic frameworks. In *Logical Aspects of Computational Linguistics: 4th International Conference* (Lecture Notes in Artificial Intelligence, 2099), ed. by Philippe de Groote, Glyn Morrill, and Christian Retoré, 17-43. Berlin: Springer Verlag.

Pullum, Geoffrey, and Arnold Zwicky. 1986. Phonological resolution of syntactic feature conflict. *Language* 62: 751-773.

Sag, Ivan A., Gerald Gazdar, Thomas Wasow and Steven Weisler. 1985. Coordination and how to distinguish categories. *Natural Language and Linguistic Theory* 3: 117–171. [Originally appeared as a CSLI Technical Report – March, 1984]

Sag, Ivan A., Thomas Wasow and Emily Bender. to appear. *Syntactic Theory – A formal introduction*, 2nd edition. Stanford: CSLI Publications. [To be distributed by University of Chicago Press].

Shieber, Stuart. 1992. *Constraint-Based Grammar Formalisms.* Cambridge, MA: MIT Press.

Zaenen, Annie and Lauri Karttunen. 1984. Morphological non-distinct-iveness and coordination. *Eastern States Conference on Linguistics* 1: 309–320.

15

Impersonal and Personal Passivization Of Latin Infinitive Constructions: A Scrutiny Of The Structures Called AcI

Susanne Schoof

15.1 The Data

The structure **Accusativus cum Infinitivo (AcI)** has been observed in a number of languages, amongst them Latin. Morphologically it consists of an NP_{acc} and a VP_{inf}. In Latin however, a finer distinction has to be drawn, as was already noticed by Bolkestein (1976) who differentiates "between actual accusative cum infinitive clauses and constructions existing of an object-noun in the accusative caseform and a complementary infinitive"(1976:263).
This syntactical distinction was not drawn by the classical grammarians (cf. Woodcock (1959), Ernout and Thomas (1951), Meillet and Vendryès (1924), Leumann, Hoffmann, and Szantyr (1965)). Even relatively recent authors such as Cann (1983) – although aware of the difference – sometimes confuse the structures.
(1) illustrates the A+I-variety and (2) the AcI:

(1) cogo te abire.
I-force you(acc) to-leave.
'I force you to leave.'

(2) dico te abire.
I-say you(acc) to-leave.
'I say that you leave.'

The Proceedings of the 9th International Conference on HPSG.
Jong-Bok Kim and Stephen Wechsler.

If we have a closer look at the superficially analogous sentences (1) and (2) we realize syntactical as well as semantical differences. *Cogo* is a transitive verb whilst *dico* is intransitive:

(3) cogo te.
I-force you(acc).
'I force you.'

(4) *dico te.
I-say you(acc).

This fundamental distinction has profound consequences in structure:

- Transitive verbs such as *cogo* taking an accusative object and an infinitive verb phrase as their complements exercise a semantic restriction. The action or activity which is forced must not be perfective. It must still be possible with respect to the action of forcing. This restriction is missing in case of the intransitive verbs:

  (5) *cogo te abitum esse.
  I-force you(acc) to-have-left.

  (6) dico te abitum esse.
  I-say you(acc) to-have-left.
  'I say that you have left.'

- The most striking syntactical difference however is found with regard to passivization. The object control verb *cogo* offers only one form of passive, the personal passive in which the accusative NP becomes the subject:

  (7) tu abire cogeris.
  you(nom) to-leave are-forced(2ndsg).
  'You are forced to leave.'

  Note that the verb agrees with the nominative subject 'tu'. There is no impersonal passive in which the accusative NP would keep its case:

  (8) *te abire cogitur.
  you(acc) to-leave is-forced(3rdsg).

  This latter structure is found with AcI-verbs. Sentence (2) can be passivized in two ways: The impersonal and the personal passive coexist (9, 10):

(9) te abire dicitur.
you(acc) to-leave is-said(3rdsg).
'It is said that you leave.'

(10) tu abire diceris.
you(nom) to-leave are-said(2ndsg).
'You are said to leave.'

Note that the impersonal passive is subjectless and shows third person singular inflection, while the personal passive is second singular, agreeing with the nominative 'tu'.

- The *verba sentiendi* (verbs of perception) participate in both structures. Thus they govern both A+I and AcI. This distinction was already drawn by Bolkestein (1976) who notices: [1]

> "Apparently, if the OBJECT-function with *audire* is filled by a single noun, there are certain semantic restrictions upon the kind of noun which is allowed as a filler. These restrictions may be expressed in the following way: the noun possible as a filler must denote either a sound (..), or some object or being which is able to produce some kind of sound (..). This means that *audire* when it governs a noun always refers to direct perception of sound" (1976:284).

The AcI-construction lacks these semantic restrictions. (11 a, b) illustrate Bolkestein's points. We suggest that the accusative NP is not a direct object of the matrix clause and this is supported by the ungrammaticality of (12a). In constructions such as (12b) "neither the referent of the accusative noun within the aci-clause, nor of the entire aci-clause, ..., need necessarily refer to a thing, respectively event or state which is itself audible at the time referred to by the verb audire" (Bolkestein, 1976)(285).

(11a) audio puellam.
I-hear girl(acc).
'I hear the girl.'

(11b) audio puellam venire.
I-hear girl(acc) to-come.
'I hear that the girl comes.'

(12a) *audivit hereditatem.
he-heard legacy(acc).

(12b) audivit venisse hereditatem.
he-heard to-have-come legacy(acc).

[1] cf. 1976:283-286

'He heard that a legacy had come.'

Cic., Verr., 2,21
examples (12a + b) taken from Bolkestein (1976)(284:(15)a)and b)

Audire as an AcI-construction also allows for impersonal passive:

(13) auditum est pantheras, .. remedium quoddam habere
heard it-is panthers(acc), .. remedy(acc) some(acc) to-have
..
..
'It is heard that panthers have some remedy ..'

Cic., N.D., 2, 126, 101

Impersonal AcI-constructions furthermore exist in the active:

(14) constat Caesarem dictatorem esse.
it-is-certain Cesar(acc) dictator(acc) to-be.
'It is certain that Cesar is a dictator.'

We have to note that constructions like (14) are always found with intransitive verbs that do not passivize - as, for example, *oportet* - '(it) must', *notum est* - 'it is known'. Raising-to-Subject variants of these sentences are extremely scarce. Nonetheless, the existence of these structures in combinations with intransitive verbs demonstrates further the plausibility of a syntactic category AcI. I have been able to find examples only with *oportet*:

(15) fieri haec libertates oportuerant
to-happen these(acc,pl) liberties(acc,pl) must(3sg).
'These liberties had had to be realized.'

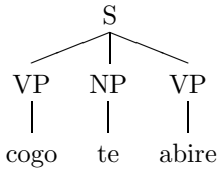
GregM.,epist., 1, 53p.78,25

The data offer enough evidence to show that there are two different structures. I suggest to call them **A+I** (1) and **AcI** (2).
In the next section I will offer an analysis of the data presented here. The analysis will be formulated within the framework of HPSG.

15.2 Analysis Of The A+I

The A+I, found with object-control-verbs, should be analysed as consisting of two constituents, the accusative object (NP_{acc}) and an infinitival complement (VP_{inf}). The structure looks as follows:

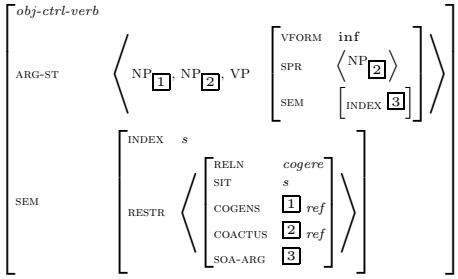
A+I



The lexical entry for *cogo* is thus:

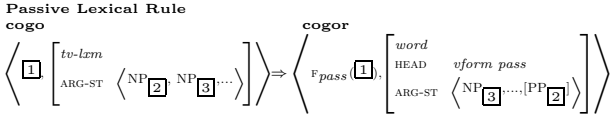
prefinal version:

(16) **cogo**



Following Pollard and Sag (1994) and Sag and Wasow (1999) I treat passivization in terms of a lexical rule. A morphological function maps a trans-verb-lexeme into the corresponding passive verb. It generates a passive lexeme to which the appropriate endings for number and person [2] are added.

(17) **Passive Lexical Rule**



The results of rule (17) are specified in (18).
The order of the elements on the argument-structure-list is rearranged. The first element, the agent - corresponding to the subject in an active sentence - is removed and turned into an optionally adjoined PP. The second element, the accusative object, becomes the subject of the passive sentence. Due to this rule the main verb of (1) is mappped into that of (7).

[2] and gender in verb forms specifying for gender

(18) **cogor** [*obj-ctrl-verb-pass*
ARG-ST ⟨ NP[2], VP [VFORM inf, SPR ⟨NP[2]⟩, SEM [INDEX 3]], [PP[1]] ⟩
SEM [INDEX *s*, RESTR ⟨ [RELN *cogere*, SIT *s*, COGENS [1] *ref*, COACTUS [2] *ref*, SOA-ARG [3]] ⟩]

The verba sentiendi partly belong to the group of object-control-verbs. One of the readings of (11b) would be analogously analysed:

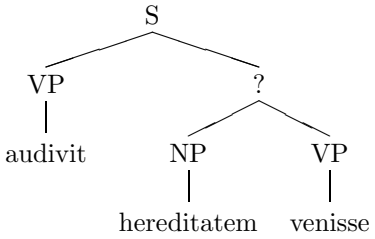
(19) **audio** [*obj-ctrl-verb*
ARG-ST ⟨ NP[1], NP[2], VP [VFORM inf, SPR ⟨NP[2]⟩, SEM [INDEX 3]] ⟩
SEM [INDEX s, RESTR ⟨ [RELN *audire*, SIT *s*, AUDIENS [1] *ref*, AUDITUS [2] *ref*, SOA-ARG [3]] ⟩]

The hearer as well as the object heard are referred to. The semantic restriction exercised on the embedded infinitive is structure-shared by the matrix verb.

15.3 Analysis of the AcI

The AcI-variant (12b) behaves differently. Given the ungrammaticality of (12a) the accusative NP cannot be analysed as an object of the matrix verb. No immediate perception of the object referred to takes place. It seems that NP_{acc} and VP_{inf} form one single constituent. What kind of structure is it?

AcI, preliminary version



At the end of the seventies the rise of Transformational Grammar caused a controversial debate amongst Latinists concerning this question. The distinction between deep and surface structure more or less

forced the authors to operate within terms of categorial shift: The AcI was taken to be a sentence in deep structure which was transformed into an accusative NP in surface structure. The transformation was formulated in a way similar to Raising to Object (Pepicello, 1977). This suggestion was criticized heavily (Pillinger, 1980; Bolkestein, 1979). Only Bolkestein made the suggestion to analyse the AcI as a nonfinite clause. This work follows her analysis, and goes further in suggesting a formalization.

We now address the question of the syntactic category of the AcI constituent. [3] If the AcI were assumed to be an NP the analysis would run into difficulties with regard to the following items:
The AcI

- can be negated

(20) et dum pro se quisque deos tandem esse et
and while for self each gods(acc) after-all to-be and
non neglegere humana fremunt
not to-neglect human-affairs(acc) mutter(3 pl)
'and while the people muttered, each man to himself, that there were gods after all, who did not neglect the affairs of man ...

Liv., 3, 56, 7

- is modified by adverbs.

(21) dicitur Offilius Calavius, .., longe aliter se
was-said Offilius Calavius, .., by-far different(adv) self(acc)
habere rem dixisse
to-keep thing(acc) to-have-said
'Offilius Calavius was said to have said that the case was very different.

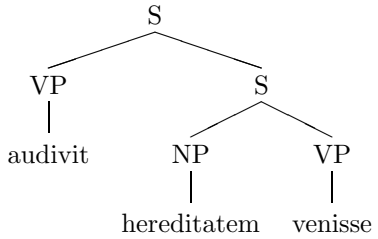
Liv., 9,7,1

These are certainly clausal properties. Moreover, one would have to explain the transitivization of otherwise intransitive verbs (like *dico* (2) and *constat* (13)) if one assumed that AcI were a subcategory within NP. These problems speak against an NP-analysis as does, of course,

[3] Another problem concerns the status of the matrix clause the AcI is dependent on. Since in Latin the realization of subjects of finite clauses is optional, the question arises whether the subjectless finite VP itself should be analysed as a clause or not, i.e. whether the AcI depends on the VP-node of the matrix clause or on the S-node. I decided in favour of the second option in this place. It is a question of the status of Latin subjects of finite clauses which I will not discuss here.

the NP-VP internal syntax of the AcI. An analysis in terms of two separate constituents (NP_{acc} and VP_{inf}) would not differentiate between the two structures described in section 1. Especially the AcI's behaviour concerning passivization differentiates it clearly from the A+I. Therefore I suggest to analyse the AcI in clausal terms:

AcI



Within the matrix clause it serves as a kind of adjunct. Sometimes it can also serve as a complement clause, thus modifying a single NP-constituent of the higher clause. Both structures indeed coexist:

(22) exemplum, quod testimonio sit non ex verbis
example that testimony(dat.finalis) is not from words
aptum pendere ius
appropriate(acc) to-depend Right(acc)
'example that serves as testimony that appropriate right does not depend on words'

Cic., Caecin., 52, 75b

(23) docebant rem esse testimonio, quod
they-learned thing(acc) to-be testimony(dat.finalis) that
primum hostium impetum sustinuerint.
first(acc) enemy's strike(acc) withstood(3 pl).
'they learned that there was proof of it in the fact that they had withstood the enemy's first strike'.

Caes., B.G., 5,28,3

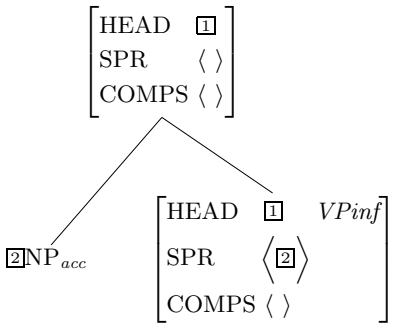
The dative NP *testimonio* stands in apposition with an AcI-construction in (22), whilst in (23) modification takes place via a finite complement-clause. [4]

We propose therefore that the AcI is an **infinitival clause**. A grammatical rule assigns accusative case to subjects of infinitival clauses.

[4] As *quod* is the adverbial neuter of the relative pronoun this construction can be classified as a relative clause in Latin.

These are generally expressed, [5] unlike subjects of finite clauses which are often left unexpressed.

(24)



With regard to passivization the same lexical rule that was already used in the analysis of the A+I is applied:

(25) **Passive Lexical Rule**

dico **dicitur**

$$\left\langle \boxed{1}, \begin{bmatrix} \textit{itv-lxm} & \\ \text{ARG-ST} & \left\langle \text{NP}_{\boxed{2}}, \text{S}, \ldots \right\rangle \end{bmatrix} \right\rangle \Rightarrow \left\langle \text{F}_{pass}(\boxed{1}), \begin{bmatrix} \textit{itv-pass} & \\ \text{HEAD} & \textit{vform pass} \\ \text{ARG-ST} & \left\langle \text{S}, .. \ [\text{PP}] \right\rangle \end{bmatrix} \right\rangle$$

As there is no direct object which can be promoted into subject position it follows that the matrix clause of impersonal passive constructions is necessarily subjectless. [6] The verb form is always the third person singular.

The impersonal active (13) is analysed in analogous terms:

(26) **constat**

$$\begin{bmatrix} \textit{itv-lxm} & \\ \text{HEAD} & \textbf{VFORM}\ \textit{act} \\ \text{ARG-ST} & \left\langle \text{S}, .. \right\rangle \end{bmatrix}$$

As an impersonal construction it is subjectless and always takes the third person singular.

[5] In colloquial language the subject pronoun is sometimes omitted, when it is obvious from the context cf. (Leumann, Hofmann, and Szantyr, 1963): 362, par. 198. An example of an AcI with the subject left unexpressed is also given in (20).

[6] Latin disposes of no expletiva.

15.4 Analysis Of The NcI

The AcI offers a further kind of passivization, the personal passive, **nominativus cum infinitivo (NcI)**. At first sight (10) resembles (7). Both sentences are repeated here as (27) and (28) for the convenience of the reader:

(27) tu abire cogeris.
you(nom) to-leave are-forced.
'You are forced to leave.'

(28) tu abire diceris.
you(nom) to-leave are-said.
'You are said to leave.'

However, a closer look reveals differences: Both structures consist of a passive matrix verb, its subject and an extra complement, VP_{inf}. (27) is the direct passivization of (1), repeated here as (29):

(29) cogo te abire.
I-force you(acc) to-leave.
'I force you to leave.'

Impersonal passive is never found with A+I-verbs, only with AcI-verbs:

(30) *te abire cogitur.
you(acc) to-leave is-forced.

(31) te abire dicitur.
you(acc) to-leave is-said.
'You are said to leave.'

Moreover, with respect to the AcI-verbs there is another important issue to be noticed: Those licensing personal passive (NcI) form a perfect subset of the group of AcI-verbs licensing impersonal passive. There is no example of a Latin AcI-verb allowing for only NcI-passivization, although examples can be found that allow only for impersonal passivization, as in (32):

(32a) constitui eos proficisci.
I-have-decided them(acc) to-leave.
'I have decided that they should leave.'

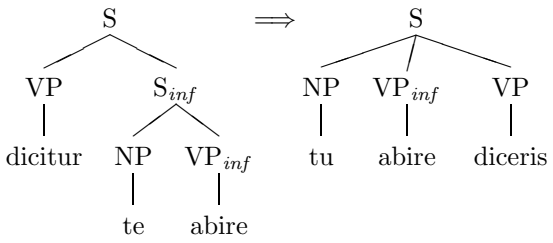
(32b) eos proficisci constitutum est.
the(acc) to-leave is-decided(nom, sg, neutr).
'It is decided that they would leave.'

(32c) *Ii constituti sunt proficisci.
they(nom) are-decided(nom, pl, masc) to-leave.
'They have been decided to leave.'

(examples taken from (Bolkestein, 1979): (26: 14 a-c)

So the NcI-verbs form a subgroup of the AcI-verbs. A closer look reveals that they all belong to a semantical group. This is traditionally called the group of *verba sentiendi et dicendi*. With these verbs we find two possible passive constructions, impersonal and personal. We propose that personal passives are generated via Raising to Subject.[7] NcI should best be interpreted as derived from the impersonal passive or as personalization of the impersonal passive. [8] The existence of two parallel passive forms with this set of verbs definitely has semantic reasons, as raising verbs do not assign a semantical rule on their own. If we compare (9) to (10) we see that the AcI-internal accusative subject ("te") becomes raised to subject position within the mat! rix clause ("tu"). There is agreement of person, number (and gender in forms specifying for gender) between the matrix verb and its (raised) subject, and no agreement in the unraised case.

Raising to Subject, passive



[7]Raising to Subject explains why the second passive (28) superficially resembles the single passive of A+I-verbs (27). No Raising-to-Object is presupposed in the analysis of the active sentence (2) *dico te abire.* If the AcI in (2) were interpreted in terms of Raising-to-Object it would be hard to explain why some structures consisting of a matrix verb, an NP_{acc} and an AcI only allow personal passivization with the (single) NP_{acc} turned into the nominative subject, leaving the AcI-construction unaffected. Since the AcI may not be split, it is ungrammatical to promote the second NP_{acc} (i.e. the accusative subjec! t of the VP_{inf}) into subject position (nominative case) within the matrix clause. It would additionally be hard to explain the grammaticality of (32 a, b) and the ungrammaticality of (32 c).

[8]This was already the traditional interpretation, cf. Woodcock (1959)(22). There is historical evidence that the impersonal passive construction is older than the personal one which gradually evolved so that two passive forms were coexisting. An analysis of the NcI in terms of Raising to Subject as derived from the impersonal passive is also found in Pillinger (1980)(Theoretical Implications II:78 - 82). Bolkestein (1979) only discusses active NcI-constructions (30f.) which she interprets in terms of Raising to Subject, leaving the passive variant undiscussed.

Another lexical rule provides for the personalization of the impersonal passive:

(33) dicitur te abire. ⟹ tu abire diceris.
it-is-said you(acc) to-leave. ⟹ you(nom) to-leave are-said.
'You are said to leave.'

(34a) **dicitur**

$$\left[\begin{array}{ll} \text{ARG-STR} & \left\langle \text{S}_{inf}, \boxed{1} \right\rangle \\ \text{SEM} & \text{RESTR} \quad \left\langle \left[\begin{array}{ll} \text{REL} & dicere \\ \text{SOA-ARG} & \boxed{1} \end{array}\right] \right\rangle \end{array}\right] \Longrightarrow$$

(34b) **diceris**

$$\left[\begin{array}{ll} \text{ARG-STR} & \left\langle \text{NP}\boxed{1}, \text{VP} \left[\begin{array}{ll} \text{VFORM} & \text{inf} \\ \text{SPR} & \left\langle \boxed{1} \right\rangle \end{array}\right] \right\rangle \\ \text{SEM} & \left[\begin{array}{ll} \text{RESTR} & \left\langle \left[\begin{array}{ll} \text{RELN} & dicere \\ \text{SOA-ARG} & \boxed{2} \end{array}\right] \right\rangle \end{array}\right] \end{array}\right]$$

As has been mentioned previously (see (14)), NcI-constructions also exist in the active, although they are extremely rare. The same mechanism of Raising to Subject is effective here as in the passive case:

(35) quos praetextatos
those(acc,pl) wearing-a-purple-garnished-toga(acc,pl)
curru vehi cum patre oportuerat
in-chariot to-ride with father should-have(sg)
'those - wearing a purple-garnished toga - should have ridden with their father in the chariot'

Liv.,45,40,7

(36) fieri haec libertates oportuerant.
to-happen these(nom,pl) liberties(nom,pl) must(3pl)
'These liberties had had to be realized.'

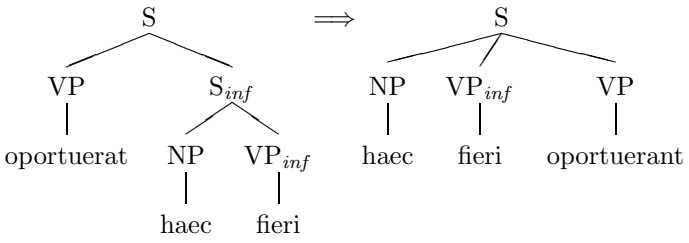
GregM.,epist.,1,53p.78,25

(35) is an impersonal active construction with the matrix verb in the singular. This matrix verb (*oportuerat*) subcategorizes for an infinitival clause (AcI). (36) is a personal active construction. The matrix verb (*oportuerant*) is in the plural, there is a (nominative) subject and an infinitive. [9] In (36) the same mechanism of Raising to Subject takes place as has already been noted in (33). Whilst (33) is passive, we find

[9] For discussion of *oportere* see also (Bolkestein, 1979) (30f.).

here its active counterpart. The matrix verb in (36) subcategorizes for a nominative specifier and an infinitival complement. [10]

Raising to Subject,active



(37) **oportuerat**

$$\left[\begin{array}{ll} \text{ARG-STR} & \left\langle \text{S}_{inf}, \boxed{1} \right\rangle \\ \text{SEM} & \text{RESTR} \quad \left\langle \left[\begin{array}{ll} \text{REL} & \textit{oportuerat} \\ \text{SOA-ARG} & \boxed{1} \end{array}\right] \right\rangle \end{array}\right] \Longrightarrow$$

(38) **oportuerant**

$$\left[\begin{array}{ll} \text{ARG-STR} & \left\langle \text{NP}\boxed{1}, \text{VP} \left[\begin{array}{ll} \text{VFORM} & \text{inf} \\ \text{SPR} & \left\langle \boxed{1} \right\rangle \end{array}\right] \right\rangle \\ \text{SEM} & \left[\text{RESTR} \left\langle \left[\begin{array}{ll} \text{RELN} & \textit{oportere} \\ \text{SOA-ARG} & \boxed{2} \end{array}\right] \right\rangle\right] \end{array}\right]$$

Let us repeat: Why is a differentiation between A+I- and AcI-verbs necessary?

- **A+I**-verbs are **transitive**.
- They participate in **object-equi-constructions**.
- They exercise a **semantic restriction** on their **two complements**, accusative object and infinitival verb phrase.
- In **passivization** the **accusative object becomes the subject**.
- They do not form impersonal passives.

- **AcI**-verbs are **intransitive**.
- They take an **infinitival clause** as their **oblique complement**.

[10] Bolkestein (1979)(30f.) notices, the Raising variant appears "only under specific conditions: the nominal to be raised must be a neuter pronoun and the infinitive of the clause must be passive voice." However, this is only true for anteclassical Latin (cf. the entry for *oportet* in Lewis and Short (1879/1966)). In the postclassical era of Gregory I (fifth century AD) Raising affects an NP consisting of a com! mon noun specified by a demonstrative pronoun (see (36)).

- **No semantic restriction** is exercised on this complement which consists of an accusative subject and an infinitival verb phrase.
- **Passivization** is **impersonal**: the matrix verb is passivized (third person sing.), leaving the AcI-clause unaffected.
- A **semantically circumscribed subset** of these AcI-verbs (group of *verba sentiendi et dicendi*) allows an **additional kind of passivization**. With these verbs **impersonal and personal passive coexist**. **Personal passive** (NcI) is derived via the process of **Raising to Subject**.

- The **verba sentiendi** are **structurally ambiguous**. If the accusative NP designates an object of **immediate perception** the matrix verb behaves as an **A+I**-verb. In case there is **no immediate perception** we have an **AcI**-structure allowing for **two different ways of passivization**.

15.5 A Note On The Copula

The auxiliary, when used as the copula, behaves differently from the other verbs as it subcategorizes for two NPs agreeing with each other in case. Predicative case-agreement occurs generally in either nominative (42 a) or accusative (42 b, c). It also appears in other cases, such as dative (42 d), although at a quite low frequency.

(42a) Caesar dictator esse dicitur.
Cesar(nom) dictator(nom) to-be is-said.
'Cesar is said to be a dictator.'

(42b) dico Caesarem dictatorem esse.
I-say Cesar(acc) dictator(acc) to-be.
'I say that Cesar is a dictator.'

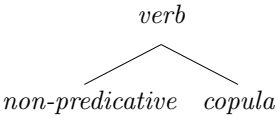
(42c) cogo Caesarem dictatorem esse.
I-force Cesar(acc) dictator(acc) to-be.
'I force Cesar to be a dictator.'

(42d) licuit esse otioso Themistocli
it-was-allowed to-be otiose(dat) Themistocles(dat)
'Themistocles was allowed to be idle.'

Cic., Tusc., 1,15,33

We thus have to conclude that the copula serves as a kind of "case identifier". It subcategorizes for an NP (its specifier) and either another

NP or an AP as a predicative (complement). This rather surprising verbal behaviour has not been described yet within the framework of HPSG. Therefore I suggest that for Latin verbs at least the following specification must be made within the type hierarchy:



For the copula we have to introduce a lexical specification which instantiates the case of the specifier (i.e. the subject) on the complement. [11]

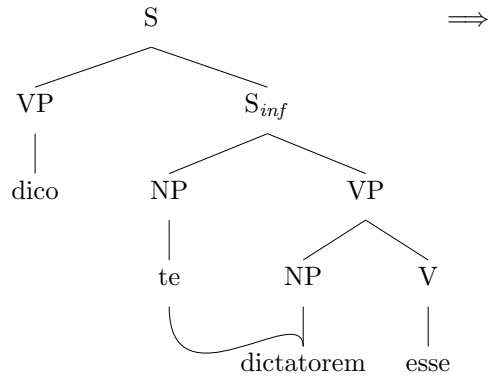
(43) **esse: lexical specification**

$$\begin{bmatrix} \text{HEAD} & \textit{verb aux} \\ \text{SPR} & \langle [] \rangle \\ \text{COMPS} & \langle [] \rangle \end{bmatrix} \Longrightarrow \begin{bmatrix} \text{HEAD} & \textit{verb aux} \\ \text{SPR} & \left\langle \text{NP}\left[\text{CASE} \ \boxed{1}\right] \right\rangle \\ \text{COMPS} & \left\langle \text{NP}\left[\text{CASE} \ \boxed{1}\right] \vee \text{AP}\left[\text{CASE} \ \boxed{1}\right] \right\rangle \end{bmatrix}$$

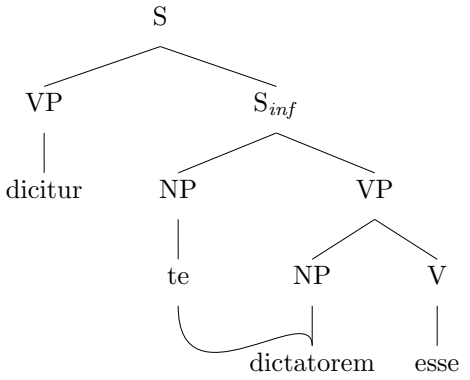
Let us now examine examples (42 a-d). (42a) is a Raising-to-Subject-construction, (b) an infinitival clause (AcI), (c) and (d) are object-control-constructions with the object bearing accusative (c) or dative (d) case. In (b) we have a one-constituent-construction, in (a), (c) and (d) two constituents depend on the matrix verb.
We discuss (42 b) first: Both “Caesarem” and “ dictatorem” bear accusative case. The grammatical rule (24) assigns accusative case to the subject of the infinitival sentence (“Caesarem”). The copula *esse* ensures agreement of case between the subject and the predicative NP (”dictatorem”). Impersonal passivization leaves the internal structure of the AcI unaffected, as predicted by rule (24).

[11] I leave the question open here how to change the HPSG-feature-architecture in order to cope with these data. Two interpretations are possible: either a purely semantic feature coindexation should be introduced, or we should argue that case is not purely syntactic but also semantic. Personally, I prefer the latter interpretation for Latin, a language which is rich in cases. The semantical identification would then be expressed syntactically.

(44)



(45)

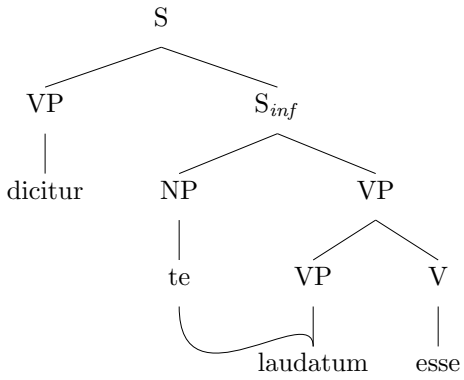


The entry for the argument-structure of *dicitur* in the passivized sentence (45) is given below. The impersonal passive subcategorizes for an infinitival sentence:

(46) **dicitur** $\left[\text{ARG-ST} \quad \left\langle \text{S}[\text{INF}] \right\rangle\right]$

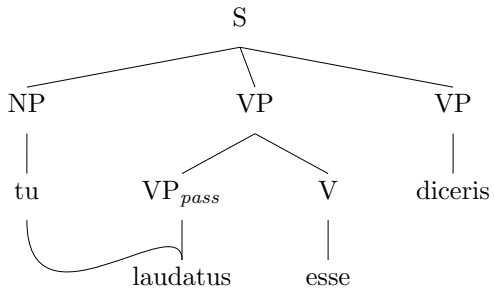
(42 a) is yielded via the process of Raising-to-Subject. In the NcI construction we have case agreement between the subject of the matrix clause (*Caesar*) and the predicative subcategorized for by the VP$_{inf}$ *esse*.

(47) **dicitur te laudatum esse**



$\Longrightarrow$

(47a) **tu laudatus esse diceris**



Here is the entry for the matrix verb in case of the NcI, i.e. the personalized passive construction that has undergone the Raising process:

(48) **diceris**

$$\left[\begin{array}{ll}
\textsc{syn} & \left[\begin{array}{ll}
\textsc{head} & \textit{verb} \\
\textsc{spr} & \langle \text{NP}\boxed{1} \rangle \\
\textsc{comps} & \langle \text{VP}_{inf} \rangle
\end{array}\right] \\
\textsc{arg-st} & \left\langle \text{NP,VP} \left[\begin{array}{ll}
\textsc{vform} & \textbf{inf} \\
\textsc{spr} & \langle \boxed{1} \rangle \\
\textsc{sem} & [\textsc{index}\ \boxed{2}]
\end{array}\right] \right\rangle \\
\textsc{sem} & \left[\textsc{restr} \left\langle \left[\begin{array}{ll}
\textsc{reln} & \textit{dicere} \\
\textsc{soa-arg} & \boxed{2}
\end{array}\right] \right\rangle\right]
\end{array}\right]$$

In (42 c), contrary to (42 b), the subject of the VP$_{inf}$ is subcategorized for as a complement of the matrix verb, thus found "on a higher level". It is straightforward to verify that the specification for object control (16) predicts the case of the matrix controller but not that of the (unrealized) embedded subject, with which it is semantically coindexed. Note however the syntactically very similar examples of 'quirky-case' assignment in Icelandic discussed in Pollard and Sag (1994)(138f.). The authors come to the conclusion "that raising controllers share CASE

values with the unexpressed subjects of unsaturated complements". Entry (16) thus has to be revised as it fails to predict the case of the predicative complement of *esse*, even though the latter is coindexed in case with the subject of *esse*. We therefore add a case stipulation to the control specification, changing (16) into (49):

final version:

(49) **cogo** [*obj-ctrl-verb*
ARG-ST ⟨ NP [1], NP [HEAD *case* [5]] [2], VP [VFORM inf, SPR ⟨ NP [HEAD *case* [5]] [2] ⟩, SEM [INDEX [3]]] ⟩
SEM [INDEX *s*, RESTR ⟨ [RELN *cogere*, SIT *s*, COGENS [1] *ref*, COACTUS [2] *ref*, SOA-ARG [3]] ⟩]

Alternatively, we could hypothesize that case was part of semantics. As Latin is a language extremely rich in case and in this respect similar to Icelandic this might not be too surprising.[12] The data clearly show that there is close interaction between case and semantics.

The predicative participle (50), (51) could be analysed in the same way as the predicative NP. This would imply that Latin verbs bear case, a conclusion easily drawn from comparison of (50) and (51):

(50) Tu laudatus es.
you(nom) praised(nom) are.
'You are praised.'

(51) dico te laudatum esse.
I-say you(acc) praised(acc,masc∨neutr,sg) to-be.
' I say that you were praised.'

[12]Notice however that Latin is not even consistent in quirky-case assignment. The verb *licet* 'it is allowed' allows for a second construction, found at a lower frequency, with the object NP in dative case and the predicative in accusative. Compare (42d) to (42e);

(42e) quibus licet iam esse fortunatos
these(dat,pl) it-is-allowed(3sg) already to-be very-fortunate(acc,pl)
these are allowed to be already very fortunate *Caes., Gall., 6,35,8*

We leave this problem open here.

The Lexical Specification (43) then has to be slightly revised, as coindexation between the NP and the VP_{part} subcategorized for concerns case, number and gender. This is assured in (52).[13]

(52) **esse: lexical specification for participles**

$$\begin{bmatrix} \text{HEAD} & verb\ aux \\ \text{SPR} & \langle [] \rangle \\ \text{COMPS} & \langle [] \rangle \end{bmatrix} \Longrightarrow$$

(52a)

$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{VERB AUX} & \\ \text{AGR} & \boxed{1} \begin{bmatrix} \text{CASE} \\ \text{NUMB} \\ \text{GEND} \end{bmatrix} \end{bmatrix} \\ \text{SPR} & \left\langle \text{NP} \quad \left[\text{AGR} \quad \boxed{1}\right] \right\rangle \\ \text{COMPS} & \left\langle \text{VP}_{past.part.} \quad \left[\text{AGR} \quad \boxed{1}\right] \right\rangle \end{bmatrix}$$

15.6 Conclusion

We have given sufficient evidence that two syntactically different structures formerly subsumed under the name of AcI have to be kept apart. The most crucial criterion which motivates the distinction is the behaviour of these structures with regard to passivization. Object-control verbs always display personal passive: The accusative object becomes the nominative subject. Intransitive verbs take an infinitival sentence as their complement. A grammatical rule assigns accusative case to subjects of infinitival sentences. Passivization takes place in two steps: Impersonal passivization yields in a subjectless matrix clause, leaving the AcI-clause unaffected. A perfect subset of verbs allowing for impersonal passivization displays additionally personal passivization which is explained via Raising to Subject.

We have shown furthermore that predicative infinitive constructions display 'quirky case assignment': CASE values are shared between the predicative NP and its unexpressed complement. In order to explain this we have to refine the lexical entries for control verbs, adding a case stipulation to the control specification. We leave open the question in what respect there is interaction between case and semantics.

References

Bolkestein, A.M. 1976. AcI- and ut-clauses with verba dicendi in Latin. *Glotta* 54: 263 – 291.

[13] I leave the question open here how to deal with the auxiliary in compound tenses semantically.

Bolkestein, A.M. 1979. Subject-to-Object Raising in Latin? *Lingua* 48: 15 – 34.

Cann, R. 1983. An approach to the Latin accusative and infinitive. In G. Gazdar, E.H. Klein, G.K. Pullum (eds.), *Order, Concord and Constituency*. Dordrecht Pp. 113 – 137.

Ernout, A. and F. Thomas. 1951. *Syntaxe latine*. Paris.

Leumann, J., B. Hofmann, and A. Szantyr. 1965. *Lateinische Grammatik*, volume II: Lateinische Syntax und Stilistik. München.

Lewis, C.T. and C. Short. 1879/1966. *A Latin Dictionary*. Oxford.

Meillet, A. and J. Vendryès. 1924. *Traité de grammaire comparée des langues classiques*. Paris.

Pepicello, W.J. 1977. Raising in Latin. *Lingua* 42: 209 – 218.

Pillinger, O.S. 1980. The accusative and infinitive in Latin: a refractory complement clause. *Journal of Linguistics* 16: 55 – 83.

Pollard, Carl and Ivan A. Sag. 1994. *Head-driven Phrase Structure Grammar*. Chicago.

Sag, I.A. and Th. Wasow. 1999. *Syntactic Theory, A Formal Introduction*. Stanford.

Woodcock, E.C. 1959. *A new Latin syntax*. London.

For abbreviations of classical authors and their works see Lewis and Short (1879/1966).

16

Edge Features and French Liaison

Jesse L. Tseng

16.1 Introduction

The sandhi phenomenon of consonant liaison in French has received a great deal of attention in pedagogical grammars as well as in more theoretical linguistic work. For the most part, theoretical studies have addressed the phonological aspects of liaison, focusing on the issue of syllabification at word boundaries or various mechanisms of deletion, insertion, or suppletion. See Klausenburger (1984) and Encrevé (1988) (ch. 3) for a chronological overview of this research.

Liaison is not a purely phonological phenomenon, however. The elements that trigger liaison cannot always be identified based on their phonology, and the elements targeted by liaison do not always have phonologically predictable forms. Furthermore, liaison is not necessarily realized at every word boundary where it is phonologically possible. It is subject to a wide range of lexical, syntactic, and stylistic conditions, as well as to the influence of speakers' conscious metalinguistic knowledge about the phenomenon. This combination of factors gives rise to a very diverse and variable set of facts, a situation not fully acknowledged in most (normative) descriptions of French.

This paper presents a descriptive overview of liaison, giving an idea of the scope of the phenomenon and possible approaches to its analysis. As for the contextual conditions on liaison, in many cases, the traditional notions of obligatory and prohibited liaison do not reflect speakers' actual behavior. It turns out that general syntactic constraints cannot determine the systematic presence or absence of liaison at a given word boundary (contrary to the proposals of Selkirk (1974), for example). At best, specific constraints can be formulated to target particular classes of constructions. To express such constraints, I propose a system of

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Jong-Bok Kim and Stephen Wechsler.

		short form	long form
citation:	très	[tʀɛ]	*[tʀɛz]
before C:	trè(s) chic	[tʀɛʃik]	*[tʀɛzʃik]
before V:	très élégant	??[tʀɛelegɑ̃]	[tʀɛzelegɑ̃]

TABLE 1 Basic liaison alternation

representation in the framework of HPSG. The use of EDGE features (introduced by Miller (1992) for a GPSG treatment of French) provides the necessary link between phrasal descriptions and the properties of phrase-peripheral elements.

16.2 Description of the phenomenon

16.2.1 Overview

Liaison results from the fact that certain word-final consonants in French have a special status. Ordinarily, consonants are fixed: the [k] at the end of "chi**c**" [ʃik] is always pronounced, whatever the following context (if any). Without the final [k], the sequence [ʃi] is not recognized as a realization of the same word.

Contrast this to the pronunciation of the word "très" in isolation and before the adjectives "élégant" and "chic," shown in Table 1.[1] Broadly (and as we will see, somewhat inaccurately) speaking, when the following word begins with a vowel, the "long" form including the consonant of liaison (henceforth CL) [z] is chosen. Elsewhere (before a C-initial word or before a pause) the non-liaison short form "trè(s)" appears, demonstrating that speakers do not rely on CL for lexical recognition, a point emphasized by Encrevé (1988). In fact, as indicated in the table, the presence of CL in a non-liaison context is more strongly marked than its absence in a liaison context.

Only a subset of the consonantal segments appearing word-finally in French participate in the CL/∅ liaison alternation. All potential CLs are listed in Table 2, with their corresponding graphemes and examples:[2] These consonants do not always alternate, as shown by the following words with fixed final consonants: "ga**z**," "ne**t**," "che**r**," "splee**n**,"

[1] I add a number of annotations to standard French orthography to indicate pronunciation at word boundaries. Unpronounced final consonants appear in parentheses, and liaison with enchaînement (see below, § 16.2.2) is signaled by a tie between words, or by more explicit means if necessary (e.g., "pa(s)-t-à moi" for *[pɑtɑmwa]).

[2] In constructing this table I have discarded final consonants that alternate only in fixed expressions (e.g., "che**f**" [ʃɛf] vs. "che(f)-d'œuvre" [ʃɛdœvʀ]) or word-internally as a result of derivation or inflection (e.g., "no(m)" [nɔ̃] vs. "nommer" [nɔme]). These do not represent productive, systematically conditioned word-boundary effects of the type in Table 1.

CL	Orthography	Examples
[z]	s z x	"sommes" "assez" "heureux"
[t]	t d	"tout" "grand"
[ʀ]	r	"premier"
[n]	n	"bon"
[l]	l	"bel" "nouvel"
[j]	il	"vieil" "gentil"
[p]	p	"beaucoup" "trop"
[g], [k]	g	"long"

TABLE 2 Possible liaison consonants

"se**l**," "a**il**," "ca**p**," "le**g**(s)," "la**c**." The first two rows account for the vast majority of liaisons, since they include the plural marker [z] and practically all finite verb endings.

Liaison can also have an effect on the quality of the vowel preceding CL. This is most commonly observed in the next two rows of Table 2 with [ʀ] and [n]: "premie(r) ministre" [pʀəmjeministʀ] vs. "premier‿étage" [pʀəmjɛretaʒ], "bo(n) sang" [bɔ̃sɑ̃] vs. "bon‿anniversaire" [bɔnanivɛrsɛʀ]. See Tranel (1990) for a discussion, particularly concerning denasalization.

In the last four rows of Table 2, the examples provided are in fact an exhaustive list of all instances of these CLs, just seven words in all.[3] For the last example, Morin (1987) notes that most speakers prefer [g] to [k], or they may produce an [n]-liaison as in "lon(g)-n-hiver" or avoid liaison altogether ("lon(g) hiver" with hiatus, [lɔ̃ivɛʀ]). Nevertheless, the bottom half of the table includes some very high-frequency items, for which the effects of productive liaison can be readily observed.

16.2.2 Related issues

H aspiré

The basic phonological condition given for liaison above—that the following word must be V-initial—is only a first approximation, because there is a class of V-initial words in French that do not trigger liaison

[3] I have intentionally excluded "mol" and "fol," which are hardly productive nowadays (Bonami and Boyé, 2003). Furthermore, examples like "sang‿impur," "respec(t)-k-humain," and "joug‿odieux" appear in many grammars (e.g., Fouché, 1959, Grevisse, 1980), but none of these nouns shows a systematic [k]/∅ alternation outside of these (extinct) fixed expressions. And as mentioned in fn. 2, the appearance of a consonant in derived forms is not directly relevant for liaison: "cou(p)" vs. "couper," "siro(p)" vs. "sirupeux" (or "siroter").

to the left. These include words beginning with *aspirated h* ("mo(n) héros," "gran(d) hasard," "vieu(x) hibou") as opposed to *mute h*, which allows liaison ("mon͡ héroïne," "grand͡ honneur," "vieux͡ homme").

¿From a historical point of view, most aspirated *h* words are derived from [h]-initial Germanic roots, and in modern French they retain the behavior of C-initial words. To explain this, many linguists have assumed an underlying initial /h/, glottal stop /ʔ/, or some empty consonantal element or syllable onset (Dell, 1970, Selkirk and Vergnaud, 1974, Encrevé, 1988). On the surface, however, for most speakers, aspirated *h* words are simply realized as V-initial words with irregular behavior.[4] Like other irregularities, aspirated *h* is subject to significant variation, and hesitations and 'errors' are common for lower-frequency items.

To account for these observations, Gaatone (1978) rejects abstract manipulations of the phonological representation and assumes that the words in question, in contrast to the vast majority of V-initial words, bear a feature [−SANDHI] that blocks word-boundary phenomena like liaison. The same feature is useful for the treatment of glide-initial words. In some words, glides pattern with consonants in blocking sandhi ("u(n) yaourt," "deu(x) week-ends") but a number of glide-initial words trigger liaison ("des͡ oiseaux," "belles͡ huîtres"). Again, one could propose an abstract phonological distinction. According to Milner (1973), for example, "oiseau" has the underlying V-initial representation /uazo/, which would trigger liaison to the left before undergoing glide formation to surface as [wazo]. "Week-end," on the other hand, would have an underlying glide from the start: /wikɛnd/. But as with aspirated vs. mute *h*, there is no concrete motivation for such an analysis, and Gaatone's feature [±SANDHI] captures the same facts more directly: "oiseau" is [+SANDHI] while "week-end" is [−SANDHI].

To the set of V-initial words marked exceptionally as [−SANDHI] must be added: the names of numerals and letters, unassimilated foreign words (especially proper nouns), and in general any metalinguistically mentioned material. In fact, usage can vary considerably in these cases, and I will not attempt to address the problem. Furthermore, I restrict my attention to liaison, without claiming that all French sandhi phenomena pattern together. I assume therefore that (the left edge of) a word is lexically specified as [+LIAISON] if it can trigger liaison in the preceding context, and [−LIAISON] otherwise.

[4] Aspirated *h* words can be pronounced with a phonetic [ʔ] (e.g., "vieu(x) hibou" [vjøʔibu]), but this is the result of a general process of [ʔ] epenthesis in empty onset positions (Encrevé, 1988) and does not motivate distinct phonological representations for aspirated *h* words and other V-initial words.

Elision and enchaînement

Two other word-boundary effects are often mentioned in connection with liaison, because they are triggered in similar (but not identical) environments. The first is the elision of the final vowel in a small number of monosyllabic function words (e.g., "la," "le," "de," "que"). For example, we have "la table" [latabl] but "l'église" [legliz] (not *"la église" *[laegliz]). Elision only occurs when the following word is V-initial, but not with aspirated *h* words or glide-initial words like "week-end" ("le hasard" not *"l'hasard," "de yaourt" not *"d'yaourt"). Given the overlap of elision-triggering words with [+LIAISON] words, some authors (e.g., Schane, 1965) have treated consonant liaison and vowel elision as instances of a single phenomenon.

In fact, the sets of triggers for liaison and elision may not coincide exactly. It is clear, for instance, that "arbre" triggers both and "table" triggers neither, but speakers may have distinct tendancies for liaison and elision with more exceptional and unstable cases like "ouate," "hiatus," or "handicap."[5] The two phenomena also differ with respect to their alternating target forms. Liaison applies to a much larger and more diverse set of forms (although not an open class), while elision is restricted to just a handful of items, mostly of the form Cə, whose syntactic status is debatable—they could be analyzed effectively as affixal elements (Miller, 1992, Miller and Sag, 1997). Furthermore, in an appropriate triggering context, elision is generally obligatory, whereas liaison is often optional.

The other sandhi effect often associated with liaison is *enchaînement*, the realization of a word-final consonant as the onset of the following syllable ([nwa.ʀe.blɑ̃] for "noi**r** e(t) blanc," for instance). Liaison is normally produced with enchaînement (and I assume this unmarked realization throughout this discussion): "sont‿importants" [sɔ̃.tɛ̃.pɔʀ.tɑ̃]. As Encrevé (1988) demonstrates, however, liaison without enchaînement ([sɔ̃t.(ʔ)ɛ̃.pɔʀ.tɑ̃]) is also found (e.g., in the speech of political figures), too frequently to be dismissed as a simple performance error, or in any case, an error that shows that the two phenomena can be dissociated.

In general, the domain of enchaînement is much wider than that of liaison, since it applies to all final consonants, not only CL. For example, the [ʀ] of "noir" in the example above is always pronounced; its

[5]There is also the (unique?) example of "et," which clearly triggers liaison ("mesdames‿e(t) messieurs") but it is impossible to test whether it triggers elision, because in ordinary usage it cannot follow any of the forms that show a final-V/∅ alternation.

presence is not triggered by the [+LIAISON] word "e(t)." Moreover, the set of triggers for enchaînement is much larger. For example, aspirated *h* words allow enchaînement: "pur hasard" [py.ʀa.zaʀ], "quel héros" [kɛ.le.ʀo] (see Encrevé, 1988, p. 196ff). In fact, enchaînement even applies at C-C word boundaries: "il part pour Paris" [i.lpa.ʀpu.ʀpa.ʀi] (Delattre, 1951, cited in Encrevé, 1988, p. 24).

We can conclude that there are good reasons for treating liaison as a separate phenomenon from elision and enchaînement. Most striking, however, is the fact that liaison is subject to additional syntactic and stylistic constraints, while the other two phenomena are of a more purely phonological nature (modulo the extremely limited inventory of alternating elements targeted by elision). I discuss the non-phonological conditions on liaison in § 16.4. As a simple example, liaison is disallowed between an NP subject and the VP, but enchaînement is perfectly natural: "Le(s) gen(s) arrivent" vs. "Le publi**c** arrive" (where "c" is a non-alternating C, not CL).

16.3 Lexical forms

In the previous section I talked about the words that trigger liaison (specified as [+LIAISON]), and now I turn to the target words that exhibit the CL/∅ alternation. As indicated in Table 1, these words are traditionally described as having a short form and a long form. In most cases the two forms differ only with respect to CL, but as discussed in § 16.2.1, the preceding vowel sometimes alternates, and as we will see, suppletive and defective cases exist as well.

16.3.1 Relating short and long forms

¿From a derivational point of view, the most straightforward way to relate the two forms is to treat the long form, appearing in liaison contexts, as basic and derive the short form by deletion of CL. This is the idea behind, for example, the Truncation Rule of Schane (1965), which deletes final C before another C or before a pause. This approach reproduces the historical development of French, since this is precisely the kind of phonologically-conditioned deletion that gave rise to the liaison alternation in the 16th and 17th centuries. In modern French, however, the alternation is less regular. There are fixed final consonants that can never be deleted ("ave**c**," "ne**t**"), but without further stipulations the Truncation Rule would produce *"ave(c) Jean." Moreover, there are many contexts where liaison is left unrealized pre-vocalically ("pa(s) encore," "le(s) héros," "le(s) chef(s) arrivent"), but the Truncation Rule would not delete CL in these environments, giving rise only to "pas encore" and the ungrammatical *"les héros" and *"le(s)

gens‿arrivent."

The opposite approach, represented for example by Klausenburger (1974), is to take the short form as basic and derive the liaison form by CL insertion or Epenthesis. This kind of analysis accounts for the intuition that the short form is not incomplete or truncated in terms of its lexical identity. For instance, the citation form of a word is always the short form.[6] The CL epenthesis approach can also provide an explanation for the appearance of inappropriate consonants in liaision "errors": "chemin(s) de fer z-américains," "devra-t-y aller" (Morin and Kaye, 1982). Ordinarily, however, the lexical entry of a word must include some indication of which CL can be inserted, if any. Epenthesis cannot be formulated as a systematic phonologically-conditioned rule—i.e., insert CL before V—given the many cases of non-realization of liaison before V. Like the Truncation Rule, Epenthesis would force the realization of CL in "pas‿encore," *"les‿héros," and *"le(s) gens‿arrivent."

A third possibility is the treatment of liaison as suppletion. In other words, a given lexical item has one form for the realization of liaison and one non-liaison form. A priori, the forms are not directly related by any productive rule. And in fact, there are some clearly suppletive short/long form pairs: the masculine prenominal adjectives "nouveau/nouvel," "beau/bel," and "vieux/vieil," and the determiners "ce/cet" (masculine) and "ma/mon," etc. (feminine). These pairs cannot be accounted for with simple CL deletion or insertion. It has been observed (e.g., Perlmutter, 1998) that the suppletive form involves a gender switch; in other words, masculine "bel" is in fact identical to the feminine form "belle," and feminine "mon" is identical to the masculine form. This correspondence does not hold for all short/long pairs, however: we have masculine "grand" [gʀɑ̃]/[gʀɑ̃t] vs. feminine "grande" [gʀɑ̃d], and for some speakers "long" [lɔ̃]/[lɔ̃k] vs. "longue" [lɔ̃g]. Masculine singular adjectives ending in [ʀ] ("cour(t)," "for(t)") show no liaison alternation, although an additional consonant appears in the feminine ("forte," "courte"). And finally, certain adjectives simply have no prenominal liaison form in the masculine singular (Morin, 1998, cited in Bonami and Boyé, 2003). For example, "un franc entretien" has no acceptable pronunciation: *"fran(c) entretien," *"franc‿entretien," *"franche entretien," *"fran(c) n-entretien," *"fran(c) t-entretien." Aside from these exceptional cases, however, most short/long form pairs are predictably related, given the identity of CL, and it would be unattractive simply to list the two forms for

[6] This constitutes another argument against a unified treatment of liaison and elision: the non-elided long form shows up in isolation ([la], not *[l]).

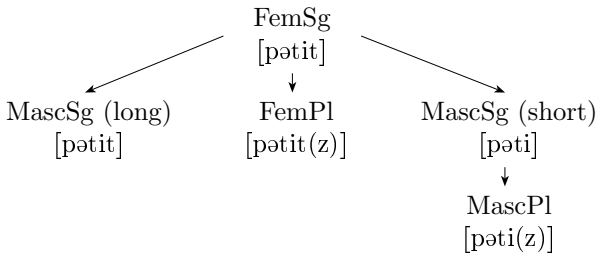


FIGURE 1 "petit" (adapted from Bonami and Boyé, 2003)

each word.

16.3.2 Paradigm functions

I assume a paradigm-based analysis along the lines of Bonami and Boyé (2003), a model that allows the statement of morphophonological regularities and subregularities, while at the same time accommodating irregular (suppletive or defective) forms. Bonami and Boyé focus on the problem of French prenominal adjectives. They propose a paradigm of 5 forms for each lexeme, resulting from the combination $(masc \vee fem) \times (sg \vee pl)$, plus the fact that the masculine singular has short and long forms. The root of the paradigm is the feminine singular, and the other forms are generated by various functions. The paradigm for the completely regular adjective "petit" provided by Bonami and Boyé is shown in Figure 1. The forms of "petit" illustrate the regular output of the morphophonological functions, but other adjectives have irregular or defective forms. For example, the MascSg long (liaison) form is normally identical to the FemSg, but we have already seen some exceptions: "grande"/"grand" ([d] → [t]), "courte"/"cour(t)" (loss of final C after [ʁ]), "franche"/∅ (gap in paradigm). The MascSg short form is typically generated by dropping the final consonant (if any) of the FemSg, but there are also non-alternating adjectives ("nette"/"ne**t**") and suppletive pairs ("vielle"/"vieu(x)"). Pluralization is always regular in the feminine (add [(z)]), while some masculine plurals are exceptional ("éga**l**"/"égaux").

The advantage of Bonami and Boyé's model is not only that it accounts for both regular and irregular alternations, but also the fact that it generates an organized paradigm of forms, without reference to the eventual phonological context. Thus it avoids the pitfalls of the rules of truncation and epenthesis discussed above, which apply or fail to apply at the actual word boundaries that result from syntactic combination. In the paradigm-based approach, all the necessary forms are

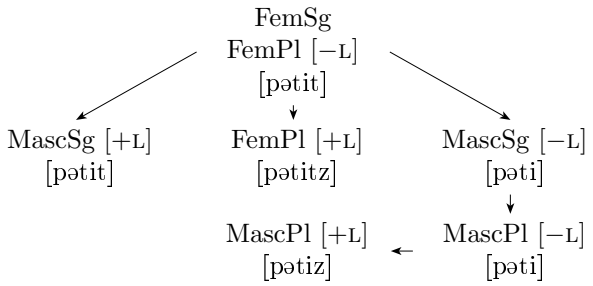


FIGURE 2 "petit" revised

made available in the lexicon, and it is left up to other principles and constraints to license or block their appearance in particular contexts. For this to work, each form has to carry some indication of whether it is a long or short form for liaison. I will (temporarily) use the feature [±L] for this purpose: [+L] for long forms, [−L] for short forms. Recall that in § 16.2.2, I introduced the feature [±LIAISON] to indicate liaison trigger status; here [±L] encodes liaison target status. In § 16.5, I will explain the interaction of these two features.

In Figure 2, I update Bonami and Boyé's paradigm for "petit" using the [±L] feature. I also expand the distinction represented by [(z)] in the plural forms in Figure 1. French plural nouns and adjectives systematically have a [+L] long form with [z] and a [−L] short form, which is usually identical to the corresponding singular [−L] form (except for "égau(x)" type plurals). So in fact, prenominal adjectives like "petit" have a paradigm of 6 (potentially) distinct forms, resulting from the combination $(masc \vee fem) \times (sg \vee pl) \times ([+L] \vee [-L])$, with some leveling of feminine forms at the root of the paradigm.

16.3.3 Inventory of forms

Masculine singular (prenominal) adjectives represent the largest class of mono-morphemic elements that show a liaison alternation, and the most complex realization of this alternation, with suppletion and other irregularities. As we have seen, feminine singular forms do not alternate, and in the plural, the alternation always and only involves [z], the plural marker. In the end, there are relatively few masculine singular adjectives with distinct [+L] and [−L] forms, if we discount derived words ending in "-ant," "-eux," and so on, whose liaison forms are determined predictably and uniquely by the suffix. There are perhaps several dozen high-frequency items like "grand" and "petit," but less common monomorphemic adjectives are rarely produced in prenominal position, and

give rise to the problem of 'ineffability' seen above with "franc entretien." The question deserves further attention; for now I only suggest the hypothesis that alternating adjectives form a closed (and diminishing) class. Similar considerations apply to other prenominal elements (articles, numerals, quantifiers): high frequency items participating in liaison, restricted to a closed class.

Liaison effects involving adjectives in postnominal or predicative position are rarer and less well documented. They seem to be limited to a few specific items ("prêt," "sujet"), and never in the plural (Morin and Kaye, 1982), but further investigation is called for. Nouns themselves are a simpler case. Singular nouns never alternate productively with respect to liaison: "solda(t) anglais," *"soldat͡anglais." As mentioned above (fn. 2), for morphological purposes one might postulate a 'latent' final consonant in the representation of these words (to derive "soldate" or "soldatesque" for example). Or final consonants may be preserved in frozen expressions ("accent͡aigu," "porc-épic").[7] But singular nouns never contain CL; they always have a single lexical form unspecified for [±L]. For plural nouns, we find the same systematic [z]/∅ alternation as for adjectives.

Verbal liaison forms are completely determined by inflection. The account of French conjugation based on paradigm functions given in Bonami and Boyé (2002) can be enriched by the specification of [+L] and [−L] forms for each verb ending, when appropriate. CL for finite verbs and participles is always [z] or [t]. Some speakers also have alternating [ʁ] for "-er" infinitives ("laisser͡u(n) message"). Again, the set of verb endings that give rise to liaison-based alternation is a closed class.

Finally, a subset of prepositions (e.g., "dans," "devant," "après"), conjunctions ("mais," "quand," but not "e(t)"), adverbs ("bien," "trop," "plus," "très," "tout," "jamais"), and a few other items ("pas," "dont," "beaucoup," "rien") have distinct [+L] and [−L] forms. The adverbial suffix "-ment" also creates alternating forms.

The inventory provided here is not necessarily exhaustive. It serves, however, to give an idea of the scope of the liaison alternation. Since I adopt an approach in which all alternating forms are generated in the lexicon, it is important to establish that the set of elements (i.e., roots and suffixes) requiring the idiosyncratic specification of distinct [+L] and [−L] forms is of manageable size. Empirical work remains to be

[7] An interesting question is whether lost consonants can reappear in newly formed expressions. For example, Encrevé (1988) observes the pronunciation "Crédit͡agricole" by F. Mitterrand (p. 58), an instance of orthographically induced hypercorrection that could eventually gain acceptance.

done, but I estimate the number of alternating elements to be around one hundred, not hundreds or thousands.

16.4 Liaison contexts

Pedagogical grammars of French include lists of contexts where liaison is obligatory (when possible), and contexts where it is prohibited. In other environments, liaison is considered optional but recommended, given that the realization of optional liaison is an explicit indicator of 'cultivated' speech, and normative grammars aim to promote "le bon usage," which does not always correspond to speakers' natural behavior. In this section I try to present an unbiased classification of liaison contexts.

16.4.1 Invariable liaison

Empirically, we can pick out a small subset of the so-called obligatory liaison contexts where all speakers do in fact produce liaison all the time, and in all registers. These include:

(1) Invariable contexts
   a. between Det and $\overline{\text{N}}$: "les‿oiseaux," "mon‿ancie(n) collègue"
   b. between two pronominal clitics: "elles‿en‿on(t) parlé"
   c. between clitics and the verb: "nous‿acceptons," "allez‿y"
   d. in many fixed expressions: "États‿Unis", "le cas‿échéant"

Interestingly, all of these cases allow a fully lexical treatment. Fixed expressions, for example, presumably require multi-word lexical entries to account for their syntactic and semantic idiosyncrasies; the obligatory realization of the CL can be specified along with this information. Note that fixed expressions can also specify the obligatory non-realization of liaison: compare "de part‿e(t) d'autre" with "de par(t) en par(t)" and "à par(t) entière."

French pronominal clitics have been analyzed persuasively as verbal affixes (Miller and Sag, 1997), and Miller (1992) proposes a treatment of determiners as phrasal affixes, lexically prefixed to the left-most word of the $\overline{\text{N}}$. If we adopt these analyses, invariable liaison is no longer a word-boundary effect, but a question of morpho-phonological realization.

Other liaisons that are declared obligatory in a normative sense turn out not to be invariable. These include the following contexts: between a monosyllabic preposition and its complement ("en‿une journée"/"e(n) une journée"), after monosyllabic adverbs ("trop‿innocent"/"tro(p) innocent"), and after a prenominal adjective ("un grand‿appartement"/

"un gran(d) appartement"). It is true that speakers are very likely to produce liaison in these cases, and particular lexical items encourage liaison more than others, but overall these syntactic contexts must be considered to be variable liaison contexts (see § 16.4.3).

16.4.2 Erratic liaison

If we turn to prescriptively prohibited liaisons, certain cases are indeed erratically produced or non-existent in actual speech, while others are actually commonly observed 'mistakes.' As discussed above, liaison is not found after singular nouns, or before aspirated *h* words. The non-realization of liaison in these cases can be analyzed without reference to syntactic context: non-alternating words simply have a single lexical form for [+L] and [−L] (§ 16.3.2), and words that fail to trigger liaison to the left are specified as [−LIAISON] (§ 16.2.2).

Syntactically defined erratic liaison contexts include:

(2) Erratic contexts

a. between a non-pronominal subject and the verb:
*"les‿ovnis‿existent"

b. between a noun or an adjective and its complement:
*"verres‿à bière," *"bon‿en mathématiques"

c. between the complements of a ditransitive verb:
*"donne le(s) livres‿à Marie"

Other types of supposedly 'incorrect' liaison are in fact quite frequently realized. For example, Morin and Kaye (1982) discuss extensions of nominal and verbal marking, as in "quatre-z-enfants," "le(s) chemin(s) de fer-z-anglais," and "il devra-t-y aller." These occur in variable liaison contexts (discussed next), so in fact they respect the syntactic conditions on liaison. What needs to be explained is the appearance of a lexically unmotivated CL. For "quatre" and "devra" we may have overgeneralization by analogy with other numerals ("deux," "trois") and other third person verbs ("doit," "devrait"). The plural [z] after "chemins de fer" is more problematic; Morin and Kaye argue against a compound word analysis and take such examples as evidence that [z] may be a prefix inserted in plural contexts (and that [t] can be inserted in verbal contexts).

Finally, it is usually said that liaison is subject to prosodic conditions, blocked in particular by pauses or parenthetical intonation. While this is generally true, speakers often realize liaison around a pause (as in Encrevé's liaision without enchaînement, or hesitations like "au(x)... z-étudiants"). These examples are possible, in fact preferable,

with normal connected prosody, but Tranel (1990) identifies one dislocation construction where a pause is required, and liaison is nevertheless obligatory: "J'en ai un peti(t), t-éléphant."

16.4.3 Variable liaison

In all contexts where liaison is neither invariable nor erratic—that is, in the majority of contexts—liaison is possible and realized with varying frequency. Many factors interact to determine the realization of variable liaison. Across speakers, there is variation based on social class, age, and even sex (women make more liaisons than men), and a given speaker will show different behavior in different registers, with distinct tendencies for particular CLs, particular words, or particular constructions (Booij and de Jong, 1987). This is also an area where metalinguistic knowledge (e.g., of prescriptive rules and orthography) and the conscious desire to produce more or less 'cultivated' speech strongly influence linguistic performance.

Naturally I cannot take all of these factors into account here. From a purely syntactic point of view, every word boundary must somehow be marked as allowing liaison or not, and those that do can also enforce obligatory liaison. The contexts listed in (2) are not exhaustive, but it seems clear that relatively few broadly-defined syntactic combinations block liaison categorically. There is usually some instantiation of the structure in which speakers can produce and accept liaison.

There have been attempts to formulate syntactic generalizations for liaison; the proposals of Selkirk (1974, 1986) are the best known. She offers a general procedure for identifying domains for 'unmarked' (i.e., invariable) liaison based on syntactic structure (or in terms of a prosodic structure directly derived from the syntax). Then these domains are extended to account for 'stylistically elevated' (i.e., variable) liaison. Morin and Kaye (1982), however, call Selkirk's results into question, first of all because the sharp distinction she assumes between obligatory and optional liaison, based on normative grammars (Delattre, 1966, Fouché, 1959), is not empirically accurate. Second, Selkirk's rules both over- and undergenerate. Morin and Kaye conclude that liaison contexts cannot be specified syntactically by means of broad, cross-categorial rules, but have to be listed more or less exhaustively, as in traditional descriptions of French.

A partial inventory of variable liaison contexts (some of which have already been discussed above) is given below:

(3) Variable contexts

a. between a verb, preposition, or adverb and its complement

b. between a prenominal adjective and the modified noun
c. between a plural noun and an adjective: “enfants‿innocents”

The lists in (1)–(3) are a first approximation and do not provide a classification of all possible word boundaries. Much empirical work remains to be done, especially with respect to liaison in coordination and modification structures, and in extraction and dislocation constructions.

16.5 Edge features

Given the features introduced in § 16.2.2 and § 16.3.2, the realization of liaison can be described as the concatenation of a [+L] target word with a [+LIAISON] trigger word. But as we just saw in the previous section, liaison is also syntactically conditioned, and at the level of syntactic combination, the objects manipulated are generally phrases, not words. We will therefore need a mechanism for propagating [±L] and [±LIAISON].

16.5.1 Right and left liaison features

As an example, consider the prenominal MascSg adjective “grand,” with the two lexical forms, [gʀɑ̃] ([−L]) and [gʀɑ̃t] ([+L]). The former must be chosen if the following word is, for example,“studio” ([−LIAISON]), while the latter can be used if the next word is “appartement” ([+LIAISON]). But we see the same effect with the phrase “trè(s) grand”—i.e., the following word must be allowed to trigger the appropriate form of the embedded adjective, so its [±L] specifcation must be visible at the level of AdjP. In this example, “grand” happens to be the syntactic head of “très grand,” and so we could rely on head-driven feature propagation, but this is not always possible. For example, in the phrase “deux‿[autre(s) livres],” the choice of the [+L] form [døz] is triggered by the [+LIAISON] word “autres,” embedded inside the $\overline{\text{N}}$ and not its syntactic head. What is essential in each case is not the syntactic status of the liaison trigger or target word, but the fact that “grand” is the rightmost word in “très grand” and “autres” is the leftmost word in “autres livres.”

To account for this pattern of propagation, I use EDGE features to encode liaison information. My HPSG analysis is loosely based on the GPSG treatment of French function words in Miller (1992). Every sign carries a set of left edge attributes, and a set of right edge attributes, and specifications relevant for liaison are found on both edges. The value of LEFT | LIAIS indicates liaison trigger status, while RIGHT | LIAIS indicates liaison target status. Up to now I have referred to these features as [±LIAISON] and [±L], respectively, but now with the left and

right edge distinction I only need a single (boolean) attribute.

I summarize the results of previous sections using this new terminology. The lexical entries for most V-initial words have the specification [L | LIAIS: +], while C-initial words have [L | LIAIS: −]. Aspirated *h* words and certain other V- or glide-initial words that fail to trigger liaison are also marked [L | LIAIS: −]. Words that exhibit liaison-based alternation have distinct lexical forms for their [R | LIAIS: +] (long form) and [R | LIAIS: −] (short form) lexical entries. Most cases involve a straightforward CL/∅ alternation, but there are a small number of suppletive and defective paradigms. Words that do not alternate have a single lexical form with an underspecified value for R | LIAIS.

16.5.2 Edge Feature Principle

EDGE features require a special propagation mechanism, since they are sometimes contributed by the head daughter, and sometimes by a non-head daughter. The LEFT features of a phrase are shared with its left-most daughter, and its RIGHT features are shared with its rightmost daughter. The formalization of this principle has to refer to the surface word order, which does not necessarily correspond to syntactic constituency. Here I use the DOMAIN list of Reape (1994):

(4) EDGE Feature Principle
phrase ⇒

$$\left[\begin{array}{ll} \text{EDGE} & \left[\begin{array}{ll} \text{LEFT} & \boxed{1} \\ \text{RIGHT} & \boxed{2} \end{array}\right] \\ \text{DOMAIN} & \left\langle \left[\text{EDGE} \mid \text{LEFT} \quad \boxed{1}\right], \ldots, \left[\text{EDGE} \mid \text{RIGHT} \quad \boxed{2}\right] \right\rangle \end{array}\right]$$

Here I do not follow Miller's (1992) proposal, which relies on LP rules to ensure that EDGE feature carriers end up at the appropriate periphery of the phrase, because in the present analysis, every element carries EDGE features. In (4) the phrase takes its EDGE specifications from the peripheral daughters as determined by the (independent) LP component.

In Figure 3, I give an example structure for the adjunct-head phrase "ancien(s) collègues-z." The [+LITE] adjective precedes the noun according to liteness constraints (Abeillé and Godard, 2000). The left-peripheral daughter "anciens" contributes its LEFT features, and the right-peripheral daughter "collègues" contributes its RIGHT features, to the phrase. The resulting phrase is therefore specified as capable of triggering liaison to the left ([L | LIAIS: +]) and requiring a liaison context to the right ([R | LIAIS: +]). In other words, this phrase could be

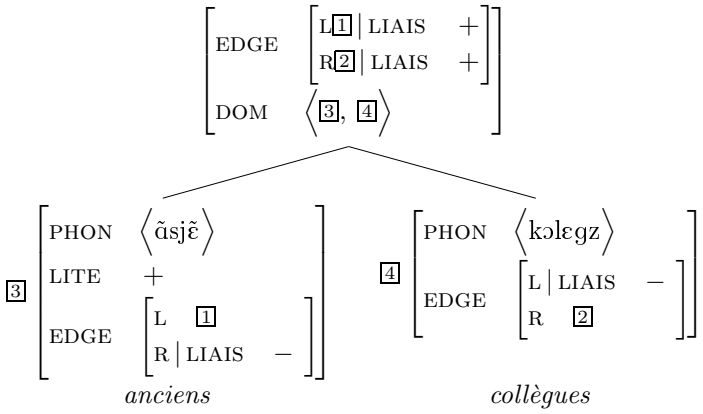


FIGURE 3 EDGE feature percolation

used to build the larger phrase "deux‿ancien(s) collègues‿américains"). Within the phrase, the R | LIAIS value of "anciens" and the L | LIAIS value of "collègues" interact to ensure the non-realization of liaison at their word boundary (see the following section), but this information is not encoded on the mother phrase.

16.6 Boundary constraints

Liaison is governed by constraints on the EDGE feature specifications of adjacent elements in a DOMAIN list. These constraints determine if a given boundary will give rise to liaison always, never, or variably.

16.6.1 Licensing of liaison

The following constraint applies to all phrases:[8]

(5) Realization of liaision

$$\left[\text{DOM} \left\langle \ldots \boxed{1}\left[\text{R} \mid \text{LIAIS} \quad +\right], [] \ldots \right\rangle\right] \Rightarrow$$
$$\left[\text{DOM} \left\langle \ldots \boxed{1}, \left[\text{L} \mid \text{LIAIS} \quad +\right] \ldots \right\rangle\right]$$

This constraint says that whenever an element with the feature [R | LIAIS: +] appears, it must be immediately followed by an element spec-

[8] A disjunctive formulation of this constraint is also possible, for those concerned about the complex antecedent in (5): For every pair of adjacent elements in a DOM list, either the first element has the feature [R | LIAIS: −], or the first element has [R | LIAIS: +] and the second has [L | LIAIS: +].

ified as [L | LIAIS: +]. In other words, a liaison form like "grand" [grɑ̃t] must be licensed by a triggering word like "amour," not like "mépris."

Constraint (5) does not apply to [R | LIAIS: +] elements at the end of a DOM list. In these cases, according to the EDGE Feature Principle (4), the phrase itself will also carry the feature [R | LIAIS: +], which will eventually have to be licensed by an appropriate trigger in a higher DOM list. A top-level constraint is needed to ensure that all complete utterances (i.e., sentences, or words or phrases pronounced in isolation) have the specification [R | LIAIS: −].

This analysis treats optional or variable liaison as the default, because the constraint in (5) says nothing about non-liaison forms ([R | LIAIS: −]). They are free to appear in all positions, no matter what liaison triggering properties the following element has. Liaison is also possible, but it must be properly licensed.

16.6.2 Further constraints

Syntactic combinations where liaison is not acceptable, for example in the constructions listed in (2), must match descriptions of the following form:

(6)
$$\left[\text{DOM} \quad \left\langle \left[\text{R} \mid \text{LIAIS} \quad \text{-}\right], [] \right\rangle\right]$$

This corresponds to a phrase with two daughters, and the left daughter is not allowed to be a liaison form, even if the right daughter happens to be a liaison trigger. For structures with more than two daughters, the description (6) will have to modified to apply to just a sub-list of DOM.

In an obligatory or invariable liaison context, adjacent EDGE specifications must match:

(7)
$$\left[\text{DOM} \quad \left\langle \left[\text{R} \mid \text{LIAIS} \quad \boxed{1}\right], \left[\text{L} \mid \text{LIAIS} \quad \boxed{1}\right] \right\rangle\right]$$

In this binary phrase, the left daughter *must* be a liaison form if the right daughter is a liaison trigger. Such a description applies, for example, if we adopt a syntactic analysis for the specifier-head structures in (1a).

The descriptions in (6)–(7) must be incorporated into the constraints associated with the corresponding phrases. Assuming a construction-based approach, there is a type that groups together all the grammatical properties of subject-head phrases, for example, and an additional constraint can be added here to block liaison. Similarly, the constructional

type for Det-$\overline{\text{N}}$ phrases can specify obligatory liaison. As established in § 16.4.3, very few cross-constructional generalizations can be stated for the realization of liaison; an adequate analysis should allow idiosyncratic constraints to be associated with specific constructions.

The data for variable liaison also indicate that speakers are more or less likely to produce liaison depending on the particular construction involved. This again suggests the need for a hierarchy of constructional types, although I make no proposals about the formalization of these preference constraints.

16.7 Discussion

16.7.1 Phonological context

In a recent paper, Asudeh and Klein (2002) propose an HPSG analysis of (among several other sandhi phenomena) prenominal liaison effects in French. With their extension of the PHON feature, every sign has access to the first phonological segment of the immediately following sign (and to this sign's SYNSEM value). This allows, for example, the 1st person feminine possessive pronoun to take the form "ma" before a consonant and "mon" before a vowel.

As I have shown in this paper, however, the triggers for liaison cannot be identified phonologically, given the exceptional behavior of words like "hasard," "onze," and "yaourt" (vs. "yeux"). Apart from this, the major difference of Asudeh and Klein's analysis is that all of the licensing conditions for the liaison and non-liaison allomorphs are specified in the lexical entry of the alternating word. Thus, in a way, the word itself decides which of its forms will appear in a given context. In my analysis, the lexicon simply provides two possible forms, and the eventual context allows one (or both) of them.

In many situations, the two approaches are indistinguishable, but the crucial cases are words that can appear in different syntactic contexts, with different results for liaison. For instance, a plural noun followed by a modifying adjective shows optional liaison (3c), but the same noun followed by a verb or a complement PP cannot (2a)–(2b). With my proposed analysis, I say nothing in particular in the lexicon, and nothing in particular for the N-Adj combination, and I specify that subject-head phrases and nominal head-complement structures disallow liaison (6). Asudeh and Klein can also account for this contrast, but at the cost of complicating the PHON value of every plural noun. They could allow the noun to access to the following word's syntactic category through its P-CTXT value. Then they would have to cross the phonological contexts with all possible syntactic contexts, determine the allowable combina-

tions, and assume the resulting (potentially very complex) disjunction to be the noun's PHON value.

In order to account for distinct liaison preferences for words of the same class (prepositions, for example), Asudeh and Klein's approach may be useful, since contextual constraints are built into lexical entries. But more general syntactic conditions on liaision should be stated at the constructional level, as I have proposed.

16.7.2 Conclusion

In this paper, I have described several aspects of French consonant liaison, and presented an analysis that assumes the lexical specification of alternating and triggering forms, and the phrasal or constructional formulation of constraints on the realization of liaison. The analysis relies on the introduction of EDGE features whose values are propagated along the right and left peripheries of phrases.

Several empirical issues call for further investigation, most importantly a more complete classification of word boundaries in French with respect to the possibility of liaison. Also, an extension of the analysis presented here that encodes the identity of CL as the value of LIAIS might provide a treatment of liaison 'errors' where the consonant [z] or [t] seems to be specified by the construction ("chemin(s) de fer-z-anglais"). The introduction of these consonants and their realization in the chain of speech present an interesting problem for models of the syntax-phonology interface.

References

Abeillé, Anne and Danièle Godard. 2000. French word order and lexical weight. In R. D. Borsley, ed., *The Nature and Function of Syntactic Categories*, vol. 32 of *Syntax and Semantics*, pages 325–360. San Diego: Academic Press.

Asudeh, Ash and Ewan Klein. 2002. Shape conditions and phonological context. In van Eynde et al. (2002), pages 20–30.

Bonami, Olivier and Gilles Boyé. 2003. La nature morphologique des allomorphies conditionnées. Les formes de liaison des adjectifs en français. In B. Fradin, ed., *Actes du Troisième Forum de Morphologie*. Lille: UMR SILEX, University Lille 3.

Bonami, Olivier and Gilles Boyé. 2002. Suppletion and dependency in inflectional morphology. In van Eynde et al. (2002), pages 51–70.

Booij, Geert and Daan de Jong. 1987. The domain of liaison: theories and data. *Linguistics* 25:1005–1025.

Delattre, Pierre. 1951. *Principes de phonétique française à l'usage des étudiants anglo-américains*. Middlebury, VT: Middlebury College.

Delattre, Pierre. 1966. *Studies in French and comparative phonetics*. The Hague: Mouton.

Dell, François. 1970. *Les Règles phonologiques tardives et la Phonologie dérivationnelle de français*. Ph.D. thesis, MIT.

Encrevé, Pierre. 1988. *La liaison avec et sans enchaînement*. Paris: Seuil.

Fouché, Pierre. 1959. *Traité de prononciation française*. Paris: Klincksieck.

Gaatone, David. 1978. Phonologie abstraite et phonologie concrète. *Linguisticae Investigationes* 2:3–22.

Grevisse, Maurice. 1980. *Le Bon usage: Grammaire française avec des Remarques sur la langue française d'aujourd'hui*. Paris: Duculot, 11th edn.

Klausenburger, Jürgen. 1974. Rule inversion, opacity, conspiracies: French liaison and elision. *Lingua* 34:167–179.

Klausenburger, Jürgen. 1984. *French Liaison and Linguistic Theory*. Stuttgart: Steiner.

Miller, Philip H. 1992. *Clitics and Constituents in Phrase Structure Grammar*. New York: Garland.

Miller, Philip H. and Ivan A. Sag. 1997. French clitic movement without clitics or movement. *Natural Language and Linguistic Theory* 15:573–639.

Milner, Jean-Claude. 1973. *Arguments linguistiques*. Paris: Mame.

Morin, Yves-Charles. 1987. French data and phonological theory. *Linguistics* 25(5):815–843.

Morin, Yves-Charles. 1998. Remarks on prenominal liaison consonants in French. Ms., Université de Montréal.

Morin, Yves-Charles and Jonathan D. Kaye. 1982. The syntactic bases for French liaison. *Journal of Linguistics* pages 291–330.

Perlmutter, David M. 1998. Interfaces: explanation of allomorphy and the achitecture of grammars. In S. G. Lapointe, D. K. Brentari, and P. M. Farrell, eds., *Morphology and its relation to phonology and syntax*, pages 307–338. Stanford, CA: CSLI Publications.

Reape, Mike. 1994. Domain union and word order variation in German. In J. Nerbonne, K. Netter, and C. Pollard, eds., *German in Head-Driven Phrase Structure Grammar*, vol. 46 of *CSLI Lecture Notes*, pages 151–197. Stanford, CA: CSLI Publications.

Schane, Sanford. 1965. *The Phonological and Morphological Structure of French*. Ph.D. thesis, MIT.

Selkirk, Elisabeth O. 1974. French liaison and the $\bar{\text{X}}$ convention. *Linguistic Inquiry* 5:573–590.

Selkirk, Elisabeth O. 1986. On derived domains in sentence phonology. *Phonology Yearbook* 3:371–405.

Selkirk, Elisabeth O. and J.-R. Vergnaud. 1974. How abstract is French phonology? *Foundations of Language* 10:249–254.

Tranel, Bernard. 1990. On suppletion and French liaison. *Probus* 2(2):169–208.

van Eynde, Frank, Lars Hellan, and Dorothee Beermann, eds. 2002. *Proceedings of the 8th International HPSG Conference*, Stanford, CA. CSLI Publications.

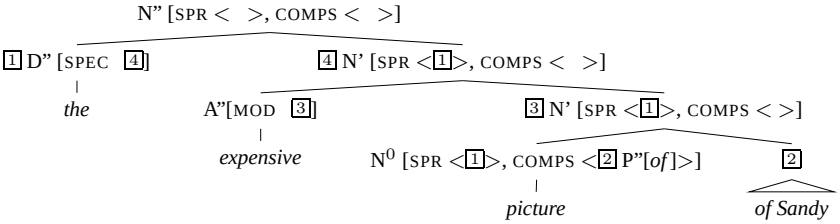
17

Prenominals in Dutch

FRANK VAN EYNDE

17.1 Introduction

For modeling the internal structure of noun phrases (Pollard and Sag, 1994, 385) treats the noun as the head and classi£es its dependents in terms of a three-fold distinction, £rst proposed in Chomsky (1970), between complements, adjuncts and speci£ers. For a phrase like *the expensive picture of Sandy* the structure looks as follows.



The noun *picture* selects a DetP (D") as its speci£er and a PP (P") as its complement. The adjectival modi£er is not selected by the noun; instead, it is the noun which is selected by the adjective. This is modeled in terms of the latter's MOD value. In a similar way, the determiner also selects the nominal which it speci£es. This is modeled in terms of the feature SPEC; its value speci£es the syntactic and semantic constraints which the determiner imposes on its head. The inde£nite article, for instance, requires a singular count nominal. The difference between MOD and SPEC is a categorial one: while the members of the lexical categories (N,V,A,P) select their head in terms of MOD, the members of the functional categories (DET, MARKER, ...) select their head in terms of SPEC.

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Typical of this analysis is the emphasis on the differences between determiners and adjectives: they belong to different parts of speech, they are associated with different head features and their role within the NP is fundamentally different.[1] For an analysis of the Dutch NPs, none of these assumptions is particularly helpful; as a matter of fact, there are at least three problems with it, as I will demonstrate in section 2. As an alternative, I will propose a functor treatment for both the determiners and the adjectives. This treatment will £rst be sketched in general terms (section 3) and will then be elaborated in more detail (section 4).

17.2 Three problems for the speci£er treatment

Adopting a broad de£nition of the notion, I will identify the determiners as those prenominals which are in complementary distribution with the articles. By this criterion, the Dutch possessives are determiners, as illustrated by the ungrammaticality of *de mijn hond* 'the my dog' and *mijn de hond* 'my the dog'. Applying this criterion to the Dutch prenominals we arrive at the following—incomplete but representative—sample of determiners.

Possessive	*mijn, ons, uw, jouw, zijn, haar, hun*
Demonstrative	*deze, die, gene*
Quanti£er	*elk, ieder, alle, sommige, geen, enig*

In terms of (Quirk et al., 1985, 253) these are the central determiners: they are distinct from the predeterminers, such as *al* 'all' in *al de kinderen* 'all the children', and from the postdeterminers, such as *beide* 'both' in *zijn beide ouders* 'his both parents'. The purpose of this section is to demonstrate that the determiners had better be treated along the same lines as the adjectives.

17.2.1 The part of speech of the prenominals

When we apply the criteria which are standardly used for motivating part of speech distinctions, it turns out that there is little evidence for treating the Dutch determiners as members of another part of speech than the adjectives.

First, as shown in the table below, the prenominal determiners show the same in¤ectional variation as the prenominal adjectives. It can be captured in terms of two binary distinctions, i.e. [+/–DECL] and [+/–CASE]. The [–C] forms lack a case af£x and may have the declension af£x *-e*. The [+C] forms have a case af£x, i.e. *-n, -r* or *-s*.[2] The table contains various gaps, but since such gaps occur both among the adjectives and the determiners, they con£rm

[1] This remark also applies to Netter's DP analysis. Netter (1994) treats the determiners as heads, rather than as speci£ers, which makes the contrast with the modifying adjectives even more conspicuous.

[2] In prenominal positions, *goeds-* is invariably incorporated, as in *goedsmoeds* 'good-GEN-courage-GEN'.

the similarity.

Adnominal	[–D,–C]	[+D,–C]	[+C]		
Adjective	*goed*	*goede*	*goeden*	*goeder*	*goeds-*
	koel	*koele*	*koelen*		
	open				
Possessive	*zijn*		*zijnen*	*zijner*	*zijns*
	ons	*onze*	*onzen*	*onzer*	*onzes*
Demonstrative		*deze*	*dezen*	*dezer*	
Quanti£er	*elk*	*elke*			
	enig	*enige*		*eniger*	

Second, determiners can be conjoined with adjectives, as in *deze en soortgelijke problemen* 'these and similar problems' and *deze en andere steden* 'these and other cities'. That the second conjuncts in these examples are adjectives follows from their compatibility with a determiner, as in *een soortgelijke oplossing* 'a similar solution' and *zijn andere baan* 'his other job'. The fact that they can be conjoined with a demonstrative determiner is signi£cant, since it is normally not possible to conjoin words which belong to different parts of speech, such as a noun and a verb or an adjective and a preposition.

Both in terms of morphology and distribution the Dutch determiners are, hence, so similar to the prenominal adjectives that it is more reasonable to start from the assumption that they belong to the same part of speech than from the assumption that they must belong to different parts of speech. Further evidence for this conclusion is provided by the fact that many of the determiners are standardly treated as adjectives in other languages. The Italian possessives, for instance, are treated as adjectives, since they cooccur with the articles, as in *il mio cane* 'the my dog', and since they can follow the noun, as in *un amico suo* 'a friend his', see Renzi (1988). The same holds for the Greek demonstratives, which standardly cooccur with the de£nite article, see (Mackridge, 1985, 193).

17.2.2 The optionality of the prenominals

One of the main differences between adjuncts and speci£ers in Pollard and Sag (1994) is that the former are entirely optional, whereas the latter are not. Singular count nouns, for instance, require the presence of a determiner (in English). To capture this difference, the speci£er is lexically selected by the noun in terms of the SPR feature, whereas the adjuncts are not selected. The value of the SPR feature is a list containing one element (DetP). In the lexical entries of singular count nouns its presence is obligatory, but in the entries of mass and plural nouns, it is optional. The obligatoriness of the determiner is hence linked to lexical properties of the noun, such as its number and its being mass or count.

When applied to Dutch, this distinction between optional adjuncts and (sometimes) obligatory speci£ers turns out to be untenable, since all Dutch nouns, including the singular count ones, can be used without determiner. (Haeseryn et al., 1997, 195–210) discusses no less than nine different types of contexts in which this is possible. These include a.o. the predicative use in *is leraar* 'is teacher', the combination with certain prepositions, as in *zonder tapijt* 'without carpet' and *per trein* 'by train', the combination with *als* in *heeft een krokodil als huisdier* 'has a crocodile as pet', and the conjunction in *moeder en kind zijn verdwenen* 'mother and child have disappeared'. The claim that singular count nouns are incomplete without determiner is hence far too strong.[3]

Moreover, the question of whether the determiner is obligatory or optional is not related to lexical properties of the noun. The noun *trein* 'train', for instance, which is singular and count, needs a determiner in **(de) trein is net vertrokken* 'the train has just left', but in *trein 4325 is net vertrokken* 'train 4325 has just left' it sounds more natural without determiner, and in the PP *per trein* 'by train' it may not even take a determiner. Similarly, the singular count noun *viool* 'violin' needs a determiner in **(die) viool is niet gestemd* 'that violin is not tuned', but in *speelt viool* 'plays violin' and *zonder viool* 'without violin' it standardly occurs without determiner. This shows that the omissibility of a determiner is not determined by lexical properties of the noun, but rather by the function of the nominal as a whole. As a consequence, it does not make much sense to use a valence feature for modeling the selection of a determiner, since it is typical of valence features that they encode lexical properties of selectors.

17.2.3 The effect of the prenominals on the level of saturation

Another difference between speci£ers and adjuncts is that the former have an effect on the content of the valence features of their head, whereas the latter have not. More speci£cally, the addition of a determiner triggers the cancellation of the SPR requirement on the noun, whereas the addition of an adjunct does not have any effect on the valence features of its head. This follows from the Valence Principle, as spelled out in Sag (1997). For Dutch, however, there is some clear evidence that the addition of an adjunct CAN affect the degree of saturation of a nominal. To show this let us take the following contrasts.

(1) wit/*witte goud, geen wit/*witte goud
white/*white-DECL gold, no white/*white-DECL gold

[3] From a cross-linguistic perspective, this is hardly surprising, since there are languages which allow an even wider use of bare singulars, such as Latin and Norwegian. On the latter, see Borthen (2000).

(2) het witte/*wit goud
the white-DECL/*white gold

If a singular neuter noun, such as *goud* 'gold', combines with an adjective, then the adjective has to be nondeclensed, if there is either no determiner, as in *wit goud*, or an inde£nite determiner, as in *geen wit goud*. By contrast, if there is a de£nite determiner, such as the article *het*, then the adjective has to be declensed. As a consequence, since *goud* 'gold' is a mass noun, both *goud* and *wit goud* can be used without determiner, but *witte goud* 'white-DECL gold' cannot: it is only grammatical, when it is preceded by a de£nite determiner. In other words, the morphological form of the adjective has an effect on whether or not the nominal needs a determiner. Moreover, it also has an effect on what type of determiner the nominal needs.

A similar phenomenon concerns the fact that the *-er* forms of the adjectives pre-empt the addition of a determiner. Some relevant examples are the genitive and dative forms in *zaliger gedachtenis* 'holy-GEN remembrance' and *te goeder trouw* 'in good-DAT faith'. While the heads of these nominals are nouns, which can be combined with a determiner, the addition of the case marked adjective makes this impossible, cf. * *de zaliger gedachtenis* and * *de goeder trouw*. This is signi£cant, since the same forms without the *-r* af£x are grammatical, cf. *de zalige gedachtenis* and *de goede trouw*.

In sum, whether or not a Dutch nominal needs a determiner also depends on the morphological form of the prenominal adjectives. This con£rms the conclusion of the previous paragraph that the distinction between speci£ers and adjuncts lacks empirical motivation.

17.3 Outline of an alternative treatment

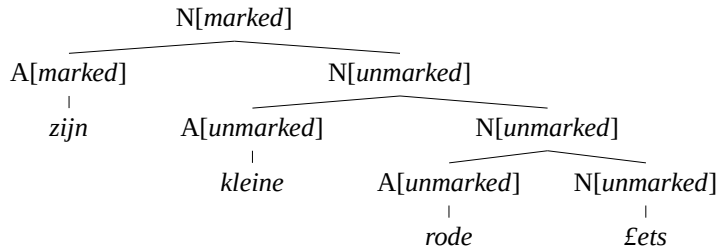
In keeping with the conclusions of the previous section I will assume that determiners and adjectives belong to the same part of speech (A) and that the dichotomy between adjuncts and speci£ers had better be dropped. Instead, I will treat them both as functors. To model their combination with the noun, I employ the type *head-functor*. Characteristic of this type is that it generalizes over all combinations in which the non-head daughter selects the head daughter. As such, it subsumes the *head-adjunct*, *head-speci£er* and *head-marker* types of Pollard and Sag (1994). For its de£nition I employ the version of Van Eynde (1998).[4]

[4]There is another version, employed in Allegranza (1998), which differs minimally from the one I use.

$$\textit{hd-func-phr}\left[\begin{array}{l}\text{SYNSEM}\,|\,\text{LOCAL}\,|\,\text{CAT}\,|\,\text{MARKING}\ \boxed{2}\ \textit{marking}\\ \text{HEAD-DTR}\,|\,\text{SYNSEM}\ \boxed{1}\ \textit{synsem}\\ \text{NONHEAD-DTRS}\ \left\langle \text{SYNSEM}\,|\,\text{LOCAL}\,|\,\text{CAT}\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\ \boxed{1}\\ \text{MARKING}\ \boxed{2}\end{array}\right]\right\rangle\end{array}\right]$$

The selection of the head daughter by the nonhead daughter is modeled by the SELECT feature of the functor. Just like the MOD and SPEC features, which it replaces, its value is an object of type *synsem*. It can be used to model various types of agreement, as well as semantic constraints, such as the fact that the inde£nite article requires a singular count noun.

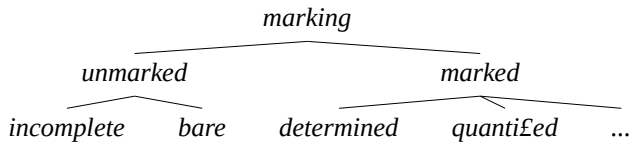
The MARKING feature models the syntactic properties which a mother shares with its functor daughter. In Pollard and Sag (1994) it is used to model the combination of a complementizer with a clause. The clause *that we leave*, for instance, is represented as S [MARKING *marked*], whereas *we leave* is represented as S [MARKING *unmarked*]. When applied to nouns and adjectives, it can be used to distinguish between marked and unmarked nominals, as in



The common nouns receive the value *unmarked* in the lexicon, and the prenominal functors select an unmarked nominal; their own MARKING value can be of type *unmarked*, in which case they can be stacked, or it can be *marked*, in which case stacking is not allowed. For instance, if we treat the adjectives as unmarked and the determiners as marked, then we correctly predict that *kleine rode £ets* 'small-DECL red-DECL bike' and *deze rode £ets* 'this-DECL red-DECL bike' are well-formed, whereas *deze onze £ets* 'this-DECL our-DECL bike' and *rode deze £ets* 'red-DECL this-DECL bike' are not. In other words, we predict that determiners cannot be stacked and that they must precede the adjectives.

At this point, the extension of the use of the MARKING feature may look like a thinly disguised effort to re-introduce the distinction between adjectives and determiners. In practice, though, it does much more than that. For a start, the distinctions which are captured by the MARKING values are log-

ically independent of the part of speech distinctions. As a consequence, we do not exclude the possibility that an adjective can be *marked* or that a determiner can be *unmarked*. As a matter of fact, we also leave open the option that nouns can be *marked*, which may be useful for the treatment of pronouns and proper nouns. Second, the distinction between *marked* and *unmarked* is only the tip of the iceberg. In order to model the rather intricate interactions between nominals and prenominals, I will employ a more complex hierarchy of MARKING values.



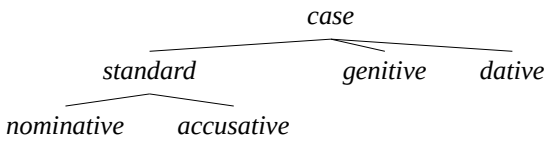
A special subtype of *unmarked* is the type *incomplete*; it is assigned to those nominals which are inherently incomplete, such as *witte goud* 'white-DECL gold'. As a consequence, we get a threefold distinction between nominals which must take a determiner (*incomplete*), nominals which may but need not take a determiner (*bare*), and nominals which may not take a determiner (*marked*). The subtypes of *marked* capture the distinction between the determiners in the strict sense, i.e. the possessives, the demonstratives and the de£nite article, and the quanti£ers, such as *elk* 'each' and *geen* 'no'. The relevance of this distinction will become clear in section 4.

17.4 A head-functor analysis of the Dutch NP

Starting from the assumption that the prenominals are head selecting functors, this section will provide a detailed account of the combination of a noun with its prenominal dependents. A major challenge is the prevention of overgeneration. The grammar should, for instance, accept *onze tafel* 'our-DECL table' and *een tafel* 'a table', while excluding *ons tafel* 'our table' and *alle tafel* 'all table'. To express the relevant constraints I will employ the following morpho-syntactic and semantic features.

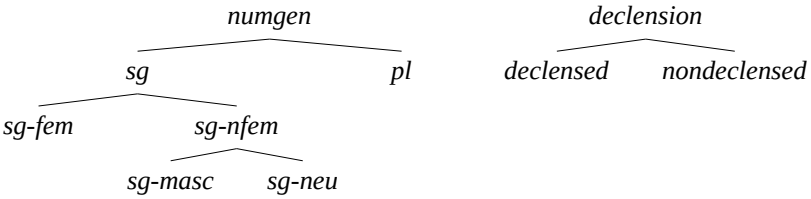
$$\left[\begin{array}{l}\textsc{category}\ \left[\begin{array}{l}\textsc{head}\ \left[\begin{array}{l}\textsc{case}\ \textit{case}\\ \textsc{numgen}\ \textit{numgen}\\ \textsc{decl}\ \textit{declension}\end{array}\right]_{\textit{noun}}\\ \textsc{marking}\ \textit{marking}\end{array}\right]\\ \textsc{content}\ \left[\begin{array}{l}\textsc{index}\ \boxed{1}\ \left[\begin{array}{l}\textsc{pergen}\ \textit{3}\\ \textsc{number}\ \textit{number}\\ \textsc{count}\ \textit{boolean}\end{array}\right]_{\textit{referential}}\\ \textsc{restr}\ \left\langle\left[\begin{array}{l}\textsc{relation}\ \textit{predicate}\\ \textsc{instance}\ \boxed{1}\end{array}\right],\ \ldots\right\rangle\end{array}\right]\end{array}\right]$$

The HEAD value contains a number of features which are traditionally assumed to play a central role in the description of Dutch nominals, i.e. case, number, gender and declension. The inventory of CASE values is the same as for German.



Since the distinction between nominative and accusative is systematically neutralized for the common nouns, I have added the underspeci£ed value *standard*. Its more speci£c subtypes can be assigned when the nominal's case value is uni£ed with the selection requirements of an external selector: £nite verbs, for instance, select a nominative subject and most of the prepositions require an accusative object.

The NUMGEN feature provides information about grammatical number and gender. Since the gender distinction is systematically neutralized in plural nominals, I only apply it to the singular ones. The intermediate type for nonfeminine singular nouns is added to simplify the treatment of NP-internal agreement.



The DECL(ENSION) feature signals whether the nominal contains a declensed form. This information is relevant since nominals with a declensed

adjective do not combine in the same way with a determiner as nominals with a nondeclensed adjective. The mass noun *goud* ‘gold’, for instance, and the combination *wit goud* ‘white gold’ can be used used without determiner or with an inde£nite determiner, but the combination *witte goud* ‘white-DECL gold’ must be preceded by a de£nite determiner. In the lexicon, the vast majority of nouns gets the underspeci£ed value *declension*; this value is then replaced with a more speci£c one, when the prenominals are added, since they will usually require the nominal to be either declensed or nondeclensed.

Given the Head Feature Principle, the values of the HEAD features are propagated throughout the nominal projection. This implies that they are not only available for checking various kinds of NP-internal agreement, but also for checking constraints on its external distribution.

The MARKING values are not shared between a phrase and its head daughter, but rather between a phrase and its functor daughter. As such, they are the natural locus for capturing the distinction between de£nite and inde£nite NPs. The relevance of this distinction can be illustrated with the following contrasts.

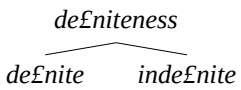
(3) Ik heb gisteren [geen/hun paarden] gezien.
I have yesterday [no/their horses] seen
‘I saw no/their horses yesterday.’

(4) Ik heb [er] gisteren [geen/*hun __] gezien.
I have [GEN] yesterday [no/*their __] seen
‘I saw none/*their (of them) yesterday.’

(5) Er zijn [geen/*hun paarden] in de stal.
There are [no/*their horses] in the stable
‘There are no/*our horses in the stable.’

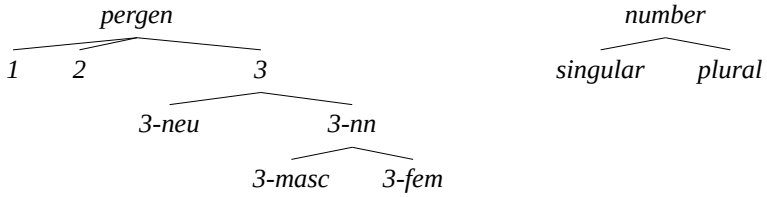
The quantifying *er* can be extracted from an NP which is introduced by the inde£nite *geen*, but not from an NP which is introduced by the de£nite *hun*. Similarly, the expletive *er* can anticipate an inde£nite subject, but not a de£nite one. Since the de£niteness value of the NP is determined by its determiner rather than by its nominal head, the simplest way of integrating this information is to include it in the MARKING value of the determiners.

$$\textit{marked}\left[\text{DEFINITENESS}\quad \textit{de£niteness}\right]$$



In terms of this feature, the possessives can be marked as de£nite and the quantifying *geen* ‘no’ as inde£nite.

Turning to the semantic distinctions, I assume, just like Pollard and Sag (1994), that the indices are marked for person, number and gender, but since the gender distinction is systematically neutralized in the £rst and second person, I merge it with the person distinction, employing one feature PERGEN with the following inventory of values.



These inventories bear an obvious resemblance to the one of the morpho-syntactic NUMGEN feature, but the distinctions which they capture are of another nature: they do not concern properties of the noun as such, but rather the mode of individuation of the noun's referent. To illustrate the difference, let us take the noun *meisje* 'girl-DIM'. Like all diminutive nouns, it is grammatically neuter, but for the purpose of pronominal reference it can be either neuter or feminine. Which of the two prevails, depends on the type of pronoun: for personal pronouns, both are possible, but for relative pronouns it must be neuter and for possessives it must be feminine.[5]

(6) [Dat meisje] heeft geen geluk; [het/ze/*hij] is alweer ontslagen.
[That girl] has no luck; [it/she/*he] is again £red
'That girl has no luck; she has been £red again.'

(7) Daar staat [het meisje] [dat/*die] mijn broer heeft verklikt.
There stands [the girl] [that/*who] my brother has betrayed
'There is the girl that betrayed my brother.'

(8) [Dat meisje] heeft [haar/*zijn] broer verklikt.
[That girl] has [her/*its] brother betrayed
'That girl has betrayed her brother.'

This demonstrates that the HEAD|NUMGEN value of *meisje* is unambiguously *sg-neu*, whereas its INDEX|PERGEN value is the disjunction of *3-neu* and *3-fem*.[6]

Since the indices concern the mode of individuation of NP referents, they are the natural locus for hosting the distinction between mass nouns and count

[5]The exclusion of the neuter possessive is probably due to its homonymy with the masculine *zijn* 'its/his'; using this form for reference to a female individual would be misleading.

[6]A detailed argumentation for the need to distinguish between morpho-syntactic agreement and index agreement is provided in Kathol (1999); it contains examples from a host of different languages, including German, Spanish, French and Italian.

nouns. Typical of the count nouns is that their referents are individuated as discrete, and hence as countable. A noun, such as *paard* 'horse', for instance, can be combined with the numeral *één* 'one' in the singular and with the numeral *twee* 'two' in the plural. By contrast, mass nouns cannot be used in this way: both the singular *één goud* 'one gold' and the plural *twee gouden* 'two gold-PLU' are ungrammatical. To capture this distinction I will extend the INDEX values with the boolean feature [+/–COUNT].

$$\textit{index}\begin{bmatrix}\text{PERGEN} & \textit{pergen}\\ \text{NUMBER} & \textit{number}\\ \text{COUNT} & \textit{boolean}\end{bmatrix}$$

For most nouns, the value is either positive or negative, but for some it is the underspeci£ed *boolean*; *glas* 'glass', for instance, is a mass noun, when it denotes a kind of material, as in *drie ton glas* 'three ton glass', but it is a count noun, when it denotes a recipient which is made of that material, as in *elk glas* 'each glass.

Summing up, the AVMs of the nominals have been enriched with a number of syntactic and semantic features, in terms of which we can express the constraints on their combination with prenominal dependents. Spelling out these constraints is the major objective of the rest of this section. I will £rst discuss the possessives and demonstratives (section 4.1), then the predicating adjectives (section 4.2) and £nally the quanti£ers (section 4.3).

17.4.1 The possessives and the demonstratives

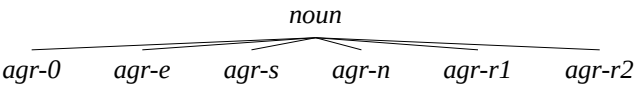
The possessives and the demonstratives have much in common. They both select an unmarked nominal with a referential index and turn it into a marked NP, more speci£cally one of the type *determined*. As a consequence, the resulting NP is de£nite and inadmissible in positions which are reserved for inde£nite NPs.

$$\begin{bmatrix}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOCAL}\begin{bmatrix}\text{CAT}\begin{bmatrix}\text{HEAD}\;\textit{noun}\begin{bmatrix}\text{DECL} & \textit{declensed}\end{bmatrix}\\ \text{MARKING} & \textit{unmarked}\end{bmatrix}\\ \text{CONTENT}\,|\,\text{INDEX} & \textit{referential}\end{bmatrix}\\ \text{MARKING}\;\textit{determined}\begin{bmatrix}\text{DEFINITENESS} & \textit{de£nite}\end{bmatrix}\end{bmatrix}$$

Another common property is that they require their nominal head to be declensed, also if they are not declensed themselves. Since their SELECT|…|DECL value is uni£ed with the DECL value of the nominal, they are compatible with nominals with the value *declensed*, as in *ons zwarte paard* 'our black-DECL horse', and with nominals with the underspeci£ed value *declension*, as in *ons*

paard ‘our horse’; they are not compatible, though, with nominals with the value *nondeclensed*, as in **ons zwart paard* ‘our black horse’.

Depending on their form, the determiners also impose constraints on the CASE and NUMGEN values of the nominals which they select. To model these I will assume the following partition for the objects of type *noun*.[7]



The subsorts are associated with more speci£c values for CASE and NUMGEN.

$$agr\text{-}0\begin{bmatrix}\text{CASE} & standard\\ \text{NUMGEN} & sg\text{-}neu\end{bmatrix} \qquad agr\text{-}e\begin{bmatrix}\text{CASE} & standard\\ \text{NUMGEN} & \neg\, sg\text{-}neu\end{bmatrix}$$

$$agr\text{-}s\begin{bmatrix}\text{CASE} & genitive\\ \text{NUMGEN} & sg\text{-}nfem\end{bmatrix} \qquad agr\text{-}n\begin{bmatrix}\text{CASE} & dative\\ \text{NUMGEN} & \neg\, sg\text{-}fem\end{bmatrix}$$

$$agr\text{-}r1\begin{bmatrix}\text{CASE} & \neg\, standard\\ \text{NUMGEN} & sg\text{-}fem\end{bmatrix} \qquad agr\text{-}r2\begin{bmatrix}\text{CASE} & genitive\\ \text{NUMGEN} & pl\end{bmatrix}$$

Given this partition we can now express the constraints which the different forms of the determiners impose on the nominal. The relevant forms are given below.

[–D,–C]	[+D,–C]	[+C]			
mijn		*mijnen*	*mijner*	*mijns*	my
ons	*onze*	*onzen*	*onzer*	*onzes*	our
zijn		*zijnen*	*zijner*	*zijns*	his
	deze		*dezer*		this
	die	*dien*	*dier*		that

The forms without case af£x select a nominal in standard case. If they show variation for declension, as in *ons/onze*, then the form without af£x ([–D,–C]) selects a singular neuter nominal (*agr-0*), whereas the one with the af£x ([+D,–C]) selects a singular nonneuter or plural nominal (*agr-e*). This accounts for the contrast between *ons paard/*ezel/*paarden* ‘our horse/*donkey/*horses’ and *onze ezel/paarden/*paard* ‘our-DECL donkey/horses/*horse’. If the determiner lacks a declensed form, then its [–D] form takes over the function of the [+D] one; forms like *mijn* ‘my’ and *zijn* ‘his’ are, hence, compatible with any nominal in standard case. By contrast, if the determiner lacks a nondeclensed form, its [+D] form does not take over

[7] These six types form a partition: they are mutually distinct and together they cover the range of logical possibilities.

its function: *deze paard* is ungrammatical.[8]

The forms with a case af£x select a genitive or dative nominal. The forms with the *-s* af£x require a genitive which is singular masculine or neuter (*agr-s*), as in *het huis mijns vaders* 'the house my-GEN father-GEN' and *onzes inziens* 'our-GEN opinion-GEN'. The forms with the *-n* af£x select a nonfeminine dative (*agr-n*), as in *te mijnen behoeve* 'at my-DAT need-DAT'. The forms with the *-r* af£x are complementary to the two other ones: they select a singular feminine genitive, as in *de vrienden mijner tante* 'the friends my-GEN aunt', a singular feminine dative, as in *te zijner ere* 'to his-DAT honour-DAT', or a genitive plural, as in *één dezer dagen* 'one this-GEN days'. The former two are covered by *agr-r1* and the latter by *agr-r2*. The reason for making this distinction is that some of the prenominals have only one of them. The predicating adjectives, for instance, have *agr-r1*, but lack *agr-r2*.

Because of the uni£cation of the SELECT|…|CASE value of the determiner with the CASE value of the selected nominal, the addition of a determiner may have the effect of resolving underspeci£cation. The noun *ouders* 'parents', for instance, has the underspeci£ed value *case*, but *mijn ouders* 'my parents' is unambiguously *standard* and *mijner ouders* 'my-GEN parents' is unambiguously *genitive*.

17.4.2 The predicating adjectives

The adjectives which are treated in this section are those which select a nominal with a referential index and which denote a property which is predicated of that same index. A relevant example is the combination *black horse*, in which the adjective further restricts the denotation of the noun: {x | <*horse*(x), *black*(x)>}.

$$\left[\begin{array}{l} \text{CAT}\,|\,\text{HEAD}\quad \underset{adj}{\left[\begin{array}{l}\text{SELECT}\,|\,\text{LOCAL}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \textit{noun}\\ \text{MARKING} & \textit{unmarked}\end{array}\right]\\ \text{CONTENT}\,|\,\text{INDEX}\quad \boxed{1}\ \textit{referential}\end{array}\right]\end{array}\right]}\\ \text{CONTENT}\left[\begin{array}{l}\text{INDEX}\quad \boxed{1}\\ \text{RESTR}\quad \left\langle\left[\begin{array}{ll}\text{REL} & \textit{predicate}\\ \text{INST} & \boxed{1}\end{array}\right]\right\rangle\end{array}\right]\end{array}\right]$$

The distinctive property of the predicating adjectives is that the predicate which they express is independent of the predicate which is expressed by the nominal. An easy way to identify them is the relative clause test: if the combination [Adj N] can be paraphrased as [N Rel Adj Copula], then the ad-

[8] In this combination, *deze* is replaced by the demonstrative pronoun *dit*. Its nondeclensed counterpart *dees* is only used in dialects.

jective is predicating. For instance, since *een klein kind* ‘a small child’ can be paraphrased as *een kind dat klein is* ‘a child that is small’, the adjective is predicating. By contrast, since *een industrieel ingenieur* ‘an industrial engineer’ cannot be paraphrased as *een ingenieur die industrieel is* ‘an engineer that is industrial’, this adjective is not predicating.

Depending on their form, the predicating adjectives impose different constraints on the nominals which they select. To model them, I start from the following survey of forms.

[–D,–C]	[+D,–C]	[+C]		
goed	*goede*	*goeden*	*goeder*	good
koel	*koele*	*koelen*		cool
open				open

In terms of distribution, there is an important difference with the possessives and demonstratives: while the latter invariably require the nominal to be declensed, the predicating adjectives only require this when they are declensed themselves. If they are not declensed, they select a nominal with the DECLENSION value *nondeclensed*. Since the SELECT|…|DECL value of the adjective is uni£ed with the DECL value of the selected nominal, the [–D] forms are compatible with nominals whose DECL value is *nondeclensed*, as in the combination of *groot* ‘tall’ with *zwart paard* ‘black horse’, as well as with nominals whose DECL value is the underspeci£ed *declension*, as in the combination of *groot* ‘tall’ with *paard* ‘horse’, but they are not compatible with nominals whose DECL value is *declensed*, as in * *groot zwarte paard* ‘tall black-DECL horse’. By contrast, the [+D] forms select a nominal with the value *declensed*, as in *grote zwarte ezel* ‘tall-DECL black-DECL donkey’.

The CASE and NUMGEN constraints are similar to the ones of the determiners: the [–D,–C] forms select a singular neuter nominal in standard case (*agr-0*), as in *zwart/*zwarte paard* ‘black horse’, and the [+D,–C] forms require a singular nonneuter or plural nominal in standard case (*agr-e*), as in *zwarte ezel(s)* ‘black-DECL donkey(s)’.[9]

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \overset{agr\text{-}0}{\left[\text{DECL}\quad \textit{nondeclensed}\right]}\\ \text{MARKING} & \boxed{1}\ \textit{bare}\end{array}\right]\\ \text{MARKING}\quad \boxed{1}\end{array}\right]$$

[9]For adjectives which lack the declensed form, such as *open* ‘open’, the [–D] form takes over the function of the [+D] form.

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \textit{agr-e}\left[\text{DECL}\quad \textit{declensed}\right]\\ \text{MARKING}\quad \boxed{1}\,\textit{bare}\end{array}\right]\\ \text{MARKING}\quad \boxed{1}\end{array}\right]$$

It may be worth adding that these constraints only hold for the predicating adjectives. If the adjective is not predicating, its nondeclensed form also combines with singular nonneuter nouns, even if there is a separate declensed form. For instance, in spite of the existence of the form *industriële*, it is the nondeclensed form which is used in *industrieel ingenieur* 'industrial engineer'. An interesting minimal pair is *een Vlaams volksvertegenwoordiger* 'a Flemish parlementarian' vs. *een Vlaamse volksvertegenwoordiger* 'a Flemish-DECL deputy'. Both are well-formed, but there is a difference in meaning: while the combination with the nondeclensed form denotes a member of the Flemish Parliament, the combination with the declensed form denotes a member of some Parliament (Flemish, Belgian, European, ...) who is Flemish. As a consequence, while the latter is a predicating adjective, the former is part of a single multi-word expression and hence non-predicating.

Another property of these AVMs which deserves special mention is the fact that they identify the MARKING value of the adjective with the one of the selected nominal. Stacking is hence allowed.

Turning to the forms with a case af£x, the ones with *-n* occur in singular nonfeminine datives, as in *van goeden huize* 'of good-DAT house-DAT', *in koelen bloede* 'in cool-DAT blood-DAT' and *ten eeuwigen dage* 'to-DAT eternal-DAT day-DAT'.

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \textit{agr-n}\left[\text{DECL}\quad \textit{declensed}\right]\\ \text{MARKING}\quad \boxed{1}\,\textit{bare}\end{array}\right]\\ \text{MARKING}\quad \boxed{1}\end{array}\right]$$

The ones with the *-r* af£x occur in singular feminine genitives, such as *zaliger gedachtenis* 'holy-GEN remembrance', and in singular feminine datives, such as *van ganser harte* 'of whole-DAT heart-DAT', but not in plural genitives. A typical property of these forms is that they cannot be preceded by a determiner, cf. * *de zaliger gedachtenis*. In terms of our notation, this implies that their MARKING value is of type *marked*.[10]

[10]Since they are marked, they also have a de£niteness value. I assume that this value is *inde£nite*. The fact that NPs with an *-r* adjective cannot occur in the subject position of an existential clause does not provide evidence against this assumption, since this is due to their CASE value: genitives and datives do not appear in subject position.

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \underset{agr\text{-}r1}{}\left[\text{DECL}\quad declensed\right]\\ \text{MARKING} & bare\end{array}\right]\\ \text{MARKING}\quad \underset{marked}{}\left[\text{DEF}\quad inde£nite\right]\end{array}\right]$$

The forms with the *-s* af£x are invariably incorporated, when they occur in prenominal positions, as in *goedsmoeds* 'good-GEN-courage-GEN' and *blootsvoets* 'bare-GEN-foot-GEN'. Their treatment is, hence, a matter of morphology rather than of syntax.

Together, the different forms cover four of the six combinations of CASE and NUMGEN, i.e. *agr-0, agr-e, agr-n* and *agr-r1*. To cover the remaining two, some of the declensed forms have acquired a secondary use. In singular nonfeminine genitives, for instance, it is the *-n* forms, which take over the function of the *-s* forms, as in *de geneugten des goeden levens* 'the pleasures the-GEN good-GEN life-GEN'.[11] A peculiar property of this form, though, is that it must be preceded by the *-s* form of a determiner. To model this, I assume that they mark the nominal as inherently incomplete.

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \underset{agr\text{-}s}{}\left[\text{DECL}\quad declensed\right]\\ \text{MARKING} & unmarked\end{array}\right]\\ \text{MARKING}\quad incomplete\end{array}\right]$$

In a similar fashion, it is the *-e* forms which take over the function of the *-r2* forms in plural genitives, as in *de problemen der rijke landen* 'the problems the-GEN rich-DECL countries'. Also here, the adjective has to be preceded by the *-r2* form of a determiner.

$$\left[\begin{array}{l}\text{HEAD}\,|\,\text{SELECT}\,|\,\text{LOC}\,|\,\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \underset{agr\text{-}r2}{}\left[\text{DECL}\quad declensed\right]\\ \text{MARKING} & unmarked\end{array}\right]\\ \text{MARKING}\quad incomplete\end{array}\right]$$

While these additions £ll the obvious gaps, there remain some less conspicuous ones. For a start, since the bare forms of the adjectives ([–D,–C]) are only compatible with *nondeclensed* nominals of type *agr0*, i.e. singular neuter nominals in standard case, we still lack a form which combines with *declensed* nominals of type *agr-0*. This form is apparently the declensed one, as exempli£ed by *ons zwarte paard* 'our black-DECL horse'. To cover this use we need a third AVM for the *-e* forms of the adjectives.

[11] Also this form is sometimes incorporated, as in *'s anderendaags* 'the-GEN other-GEN-day-GEN'.

$$\begin{bmatrix} \text{HEAD} \mid \text{SELECT} \mid \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{HEAD} \underset{\textit{agr-0} \vee \textit{agr-r1}}{} \begin{bmatrix} \text{DECL} & \textit{declensed} \end{bmatrix} \\ \text{MARKING} \quad \textit{unmarked} \end{bmatrix} \\ \text{MARKING} \quad \textit{incomplete} \end{bmatrix}$$

Also here, the MARKING value of the adjective accounts for the fact that *zwarte paard* is inherently incomplete. At the same time, since *incomplete* is a subsort of *unmarked*, stacking is allowed, as in *mijn kleine zwarte paard* 'my small-DECL black-DECL horse'.

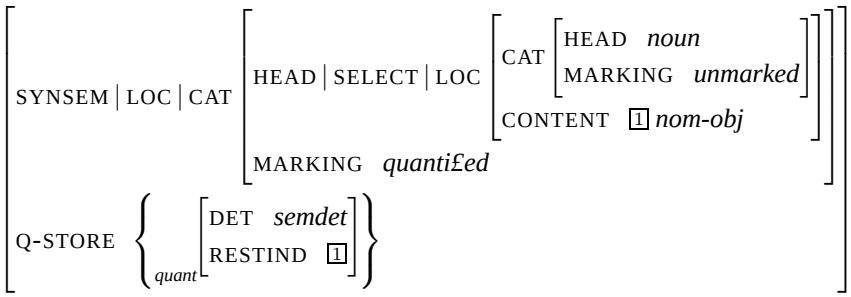
The last AVM also covers the gap which results from the fact that the *-r1* forms of the adjectives are *marked* and hence incompatible with a determiner. As a consequence, if there is a determiner, the adjective has to take another form. The relevant one is—once again—the *-e* form, both in the genitive, as in *woordenboek der Nederlandse taal* 'dictionary the-GEN Dutch-DECL language' and in the dative, as in *ter meerdere eer en glorie* 'to-the-DAT more-DECL honour and glory'.

Surveying the paradigm, it can be concluded that the *-e* forms and the *-n* forms jointly £ll the gaps which are left by the other forms. For this purpose, though, they need the simultaneous presence of a determiner which makes the distinctions which are neutralised in the adjective.

Summing up, the combination of a predicating adjective with a nominal can have three possible MARKING values. In the majority of cases, it will be *bare*, which means that it may but need not take a determiner, but it can also be *marked* or *incomplete*. In the latter case, the derivation of a wellformed NP requires the addition of a de£nite determiner.

17.4.3 The quanti£ers

The quanti£ers select an unmarked nominal with a referential index and turn it into a quanti£ed object. The addition of *every* to *horse*, for instance, turns the nominal object $\{x \mid <\textit{horse}(x)>\}$ into the quanti£ed object $\forall x \mid <\textit{horse}(x)>$. Making use of the Q-STORE attribute of Pollard and Sag (1994) I will adopt the following format for the analysis.



The quanti£ers form a large and heterogeneous class, but if we restrict attention to those which are in complementary distribution with the articles, we can limit them to the following ten.[12]

Type	Def	[–D,–C]	[+D,–C]	[+C]	
1	def	*elk*	*elke*		each
		ieder	*iedere*		every
		menig	*menige*		many a
2	def	AL	*alle*	*allen* *aller*	all
		sommig	*sommige*		certain
3	indef		*ettelijke*		several
			verscheidene		several
			verschillende		several
4	indef	*geen*		*genen* *gener*	no
		enig	*enige*	*eniger*	any

Semantically, there are four types of quanti£ers. The ones of the £rst type require a singular count nominal, as in *elk paard* ‘each horse’. Combinations with mass nouns, as in *elk bier* ‘each beer’, are not necessarily ungrammatical, but have a nonstandard interpretation: the addition of the quanti£er triggers a shift from the usual [–COUNT] interpretation to a ‘kind-of’ interpretation. To model this, I assume that these quanti£ers have two AVMs: one in which they combine with a singular count noun to yield an interpretation which is represented by the usual PC formula $\forall$ x | <P(x)>, and one in which they combine with a singular mass noun to yield an interpretation which can be represented as $\forall$ x | <*kind-of*-P(x)>.

The quanti£ers of the second type are complementary to the ones of the £rst: they require either a singular mass noun, as in *alle aandacht* ‘all attention’, or a plural noun, as in *alle paarden* ‘all horses’ and *alle ingewanden* ‘all intestines’. Their addition may have a disambiguating effect; in *alle glas*

[12]The form *al* is singled out by the use of small capitals, since it cooccurs with the de£nite article, as in *al de paarden* ‘all the horses’. It will be treated separately below.

'all glass', for instance, the noun unambiguously denotes the total amount of glassy material and not the total amount of recipients which are made of that material.

The quanti£ers of the third type require a plural count nominal. The combination with a singular noun or a plural mass noun is not possible: nominals like *verscheidene paard* 'several horse' and *ettelijke ingewanden* 'several intestines' are not just semantically anomalous, but simply ill-formed.

The quanti£ers of the fourth type do not impose any constraints on the index of the nominal. They are equally compatible with mass nouns and count nouns, both in the singular, as in *geen bier* 'no beer' and *geen paard* 'no horse', and in the plural, as in *geen paarden* 'no horses' and *geen ingewanden* 'no intestines.

Orthogonal to the semantic distinction, there is the syntactic one between de£nite and inde£nite quanti£ers. Compare, for instance, the de£nite *ieder* 'every' with the inde£nite *geen* 'no'.

(9) Ik heb er toen [geen/*iedere __] ontmoet.
I have GEN then [no/*every __] met.

(10) Er is geen/*iedere ezel in de stal.
There is no/*every donkey in the stable.

Of the quanti£ers which are listed in the table, the ones of the £rst two types are de£nite, whereas the ones of the last two types are inde£nite.

Turning to the morphological variation, the quanti£ers share the property of the predicating adjectives to require a declensed nominal if and only if they are declensed themselves. This accounts for the contrast between *elk zwart/*zwarte paard* 'each black horse' and *elke zwarte/*zwart ezel* 'each-DECL black-DECL donkey'. The CASE and NUMGEN constraints are the usual ones: the [–D,–C] forms select a singular neuter nominal in standard case (*agr-0*), as in *elk/*elke paard* 'each horse',[13] and the [+D,–C] forms require a singular nonneuter or plural nominal in standard case (*agr-e*), as in *elke ezel* 'each-DECL donkey' and *sommige ezels* 'certain-DECL donkeys'. Predictably, the quanti£ers of type 3, which only combine with plural nominals, lack the bare form, and the quanti£ers which lack the declensed form, such as *geen* 'no',[14] use the [–D] forms in their place, as in *geen zwarte ezel(s)* 'no black-DECL donkey(s)'.

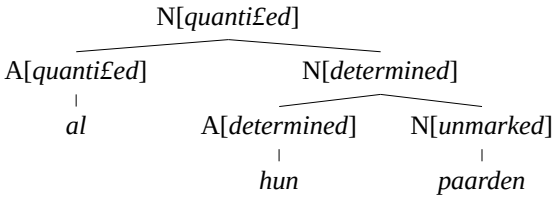
Also the forms with a case af£x show many similarities with the ones of the predicating adjectives. The *-s* forms are invariably incorporated, as

[13]The de£nite *menig* 'many-a' occasionally combines with a nonneuter noun, as in *menig politicus* 'many a politician'.

[14]The declensed form *gene* is a demonstrative, meaning 'yonder'.

in *enigszins* ‘any-GEN-way-GEN’. The *-n* forms select a nonfeminine dative (*agr-n*), as in *te allen tijde* ‘at all-DAT time-DAT’ and *in genen dele* ‘in no-DAT part-DAT’, and the *-r* forms select a singular feminine dative, as in *te eniger tijd* ‘at some-DAT time’. The only difference with the predicating adjectives concerns the use of the *-r* forms in plural genitives, as in *proletariërs aller landen* ‘proletarians all-GEN countries’.

A special case is *al* ‘all’. Morphologically, it is the nondeclensed counterpart of *alle*, but this contrast does not correlate with the usual constraints on the HEAD value of the selected nominal. Instead, the declensed form also combines with singular neuter nominals, as in *alle geduld* ‘all-DECL patience’, and what differentiates it from the nondeclensed form is its position in the NP: whereas the former is in complementary distribution with the determiners, the latter appears in the predeterminer position, as in *al hun paarden* ‘all their horses’. For its analysis, I assume a right branching structure, as in



One reason for preferring it to a left branching structure is that the predeterminer can scope over the second conjunct in coordinate NPs, such as *al hun paarden en hun ezels* ‘all their horses and their donkeys’. Typical of the predeterminer is that it selects an NP which is introduced by a de£nite determiner. Just like *alle*, it requires this NP to be either singular mass, as in *al die modder* ‘all that mud’, or plural, as in *al zijn inspanningen* ‘all his efforts’ respectively. The properties of the latter use can be spelled out as follows.

$$\left[\begin{array}{l}\textsc{synsem}\,|\,\textsc{loc}\,|\,\textsc{cat}\left[\begin{array}{l}\textsc{head}\,|\,\textsc{select}\,|\,\textsc{loc}\left[\begin{array}{l}\textsc{cat}\left[\begin{array}{ll}\textsc{head} & \textit{noun}\\ \textsc{marking} & \textit{determined}\end{array}\right]\\ \textsc{cont}\quad \boxed{1}\,\textit{nom-obj}\end{array}\right]\\ \textsc{marking}\quad \textit{quanti£ed}\end{array}\right]\\ \textsc{q-store}\left\{\underset{\textit{quant}}{\left[\begin{array}{ll}\textsc{det} & \forall\\ \textsc{restind} & \boxed{1}\end{array}\right]}\right\}\end{array}\right]$$

Stacking is correctly excluded because of the change of the MARKING value.

At this point, we can demonstrate why the inherently incomplete nominals can be combined with possessives or demonstratives, but not with quanti£ers. For a start, let us take the combination of a declensed adjective with a singular neuter noun, as in *zwarte paard* 'black-DECL horse'. This is compatible with the [–D,–C] forms of the determiners, since they select a declensed nominal, but not with the [–D,–C] forms of the quanti£ers, since they require a nondeclensed nominal; moreover, their [+D,–C] forms do not qualify either, since they require a singular nonneuter or plural nominal. A similar reasoning applies to the incomplete genitive *goeden levens* 'good-GEN life-GEN'. This nominal cannot be completed by a quanti£er, since none of their forms qualify: the [–C] forms do not qualify, since they require a nominal in standard case, and of the [+C] forms the only ones which could qualify are the *-s* forms, but precisely those are lacking from the paradigm. By contrast, the possessives have such forms, and are hence compatible with the inherently incomplete genitive, as in *onzes goeden levens* 'our-GEN good-GEN life-GEN'.

17.5 Conclusion

The speci£er treatment of the determiners in Pollard and Sag (1994) rests on a dichotomy between specifying determiners and modifying adjectives. For a language like Dutch this dichotomy causes more problems than it solves. As an alternative I have developed an analysis in which the prenominal speci£ers and adjuncts are uniformly treated as head selecting functors. The resulting analysis copes succesfully with the phenomena which are problematic for the speci£er treatment. In work in progress the present analysis is extended to the articles, the numerals, the nominally used determiners and the use of NPs in prenominal position.

References

Allegranza, V. (1998). Determiners as functors: NP structure in Italian, *in* S. Balari and L. Dini (eds), *Romance in HPSG*, CSLI Publications, Stanford, pp. 55–107.

Borthen, K. (2000). The distribution pattern of Norwegian bare singulars, *in* C. e. a. Czinglar (ed.), *Proceedings of the Eighth Conference of the Student Organisation of Linguistics in Europe*, SOLE, Leiden, pp. 29–44.

Chomsky, N. (1970). Remarks on nominalization, *in* R. Jacobs and P. Rosenbaum (eds), *Readings in English transformational grammar*, Ginn and Company, Waltham, Mass., pp. 184–221.

Haeseryn, W., Romijn, K., Geerts, G., de Rooij, J. and van den Toorn, M. (1997). *Algemene Nederlandse Spraakkunst*, Nijhoff and Wolters Plantyn.

Kathol, A. (1999). Agreement and the syntax-morphology interface in HPSG, *in* R. Levine and G. Greene (eds), *Studies in Contemporary Phrase Structure Grammar*, Cambridge University Press, Cambridge, pp. 223–274.

Mackridge, P. (1985). *The Modern Greek Language*, Clarendon Press, Oxford.

Netter, K. (1994). Towards a theory of functional heads: German nominal phrases, *in* J. Nerbonne, K. Netter and C. Pollard (eds), *German in HPSG*, CSLI Publications, Stanford, pp. 297–340.

Pollard, C. and Sag, I. (1994). *Head-driven Phrase Structure Grammar*, CSLI Publications and University of Chicago Press, Stanford/Chicago.

Quirk, R., Greenbaum, S., Leech, G. and Svartvik, J. (1985). *A comprehensive grammar of the English language*, Longman, London and New York.

Renzi, L. (1988). *Grande grammatica italiana di consultazione*, Il Mulino, Bologna.

Sag, I. (1997). English relative clause constructions, *Journal of Linguistics* **33**: 431–484.

Van Eynde, F. (1998). The immediate dominance schemata of HPSG, *in* P.-A. Coppen, H. van Halteren and L. Teunissen (eds), *Computational Linguistics in the Netherlands 1997*, Rodopi, Amsterdam/Atlanta, pp. 119–133.

18

Verb-particle constructions in a computational grammar of English

ALINE VILLAVICENCIO AND ANN COPESTAKE

Abstract

In this paper we investigate the phenomenon of verb-particle constructions, discussing their characteristics and the challenges that they present for a computational grammar. We concentrate our discussion on the treatment adopted in a wide-coverage HPSG grammar: the LinGO ERG. Given the constantly growing number of verb-particle combinations, possible ways of extending this treatment are investigated, taking into account the regular patterns found in some productive combinations of verbs and particles. We analyse possible ways of identifying regular patterns using different resources. One possible way to try to capture these is by means of lexical rules, and we discuss the dif£culties encountered when adopting such an approach. We also investigate how to restrict the productivity of lexical rules to deal with subregularities and exceptions to the patterns found.

18.1 Verb-Particle constructions in a nutshell

In this paper we investigate verb-particle constructions in English and discuss some of the challenges that they pose for a broad-coverage computational grammar. By verb-particle constructions, we mean both idiosyncratic or semi-idiosyncratic combinations, such as *make up*, in (1), where the meaning of the combination cannot be straightforwardly inferred from the meaning of the verb and the particle, and also more regular combinations, such as *tear up*, in (2).

(1) He knew what he wanted and quickly made up his mind.

(2) In a rage she tore up the letter Jack gave her.

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Jong-Bok Kim and Stephen Wechsler (eds.).

Such constructions are often highly polysemous: for instance, eight senses are listed for *make up* in the Collins Cobuild Dictionary of Phrasal Verbs and among them we have:

(3) to form something:
Half the congress is made up of lawyers.

(4) to invent:
He used to make up tales about dragons and fairies.

(5) to prepare something for someone to use it or have it:
They made a bed up for John in the guest room.

They also show syntactic variation, where each combination can take part in several different subcategorisation frames. For example, *add up* can occur as an intransitive verb-particle combination in (6) or as a transitive one in (7).

(6) It's a few calories here and another hundred calories there, and it all quickly adds up.

(7) We need to add these marks up.

Some particles have a £xed position in relation to the verb, such as *come up*, in sentence (8), where the particle is expected immediately after the verb. Thus (9) is ungrammatical.

(8) She came up with the idea.

(9) *She came with the idea up.

Other combinations have a more ¤exible order in relation to the verb, and can equally well occur immediately after the verb, or after another complement, as *eat up* in sentences (10) and (11) exemplify.

(10) John ate up his cereal.

(11) John ate his cereal up.

Besides complements, certain adverbs are also accepted between the verb and the particle, such as *right* in (12).

(12) He came *right* back.

In terms of usage, verb-particle constructions tend to be thought of as informal: they are sometimes said to be inappropriate in formal writing, and conversely slang is a rich source of these constructions. Presumably because of this, dialect variation in the use of verb-particle constructions is quite marked: the examples and judgements in this paper are British English, except where otherwise stated.

These constructions have been the subject of a considerable amount of interest, and recent work includes Jackendoff (1997), Bame (1999), Gries (2000), Zeller (1999). However, the degree of ¤exibility that they present still poses a challenge, especially when it comes to attempting to capture them in a computational grammar. In this paper we describe some of these challenges

and discuss potential solutions. It is organised as follows: in section 18.2 we analyse the treatment of verb-particle constructions adopted in the Lingo ERG, which is used as the basis for the treatment adopted in this investigation. In section 18.3 we discuss possible ways of extending this treatment, through the use of lexical rules. After that we investigate ways of identifying more regular patterns and how different resources can be used to provide this information, so that more speci£c lexical rules can be constructed. In section 18.5 we face the problem of semi-productivity present in the patterns captured by the lexical rules and discuss how the application of these rules can be restricted. We £nish with some conclusions and future work.

18.2 Verb-particle constructions in a computational grammar of English

The grammar we will take as our starting point is the LinGO English Resource Grammar (ERG) (Copestake and Flickinger, 2000) version of November 2001. This version of the LinGO ERG treats verb-particle constructions by means of verb entries which subcategorise for particles. There are 295 entries that belong to 11 types, which de£ne a wide range of verb-particle constructions, and these vary, for instance, in terms of the subcategorisation frame of the verb-particle combination, the position of the particle and the semantics of the particle. A lexical rule, NP_particle_lr, changes the order of the complements to deal with the NP-particle alternation: its application is controlled by the lexical type of the verb. In this way, this rule only applies to certain transitive verb-particle combinations, such as *check out*, allowing both "*check* NP *out*" and "*check out* NP" but not to others such as *take around*, only allowing the form "*take* NP *around*". A particular combination is speci£ed in an entry de£ning the relevant aspects of the verb, and where the selection for the speci£c particle is via the particle's semantic relation. For instance, the entry for *wander up* is as follows:

wander_up_v1 := v_particle_le &
[STEM < "wander" >,
SYNSEM.LOCAL.KEYS [KEY _wander_up_rel,
–COMPKEY _up_rel_s]].

where the attribute SYNSEM.LOCAL.KEYS.KEY speci£es the semantic relation of the combination and SYNSEM.LOCALS.KEYS.–COMPKEY implements the particle selection by specifying the semantic relation of the speci£c particle required.

In the ERG particles and prepositions share a lexical entry with an underspeci£ed relation. For example, *on* is de£ned as follows, where the semantic relation is the general type **on_rel**.

```
on := p_reg_le &
   [ STEM < "on" >,
   SYNSEM.LOCAL.KEYS.KEY _on_rel ].
```

In the structure for an utterance, the semantic relation for a particle is specialized differently from the independent preposition because of the selection de£ned by the relevant verbal entry. Then in the case of *on* as a particle, e.g. in *add on*, the semantic relation is further specialised to **on_rel_s** as speci£ed in the entry for the combination, as opposed to *on* as a preposition which is **on_rel_p**.[1]

In the entry for *wander up* the semantics of *up* is specialized to the semantically vacuous **up_rel_s**, and the scoped logical form for *the dog wandered up* is as follows (there and below we ignore some complications irrelevant for current purposes, such as optional arguments, and an extra event argument for prepositions):

(13) prpstn(def(x4,dog(x4),wander_up(e2,x4) ∧ up_rel_s(e15,v14)))

Note that there is no coindexation between the arguments of **up_rel_s** and **wander_up**. The idea is that selected-for relations, such as **up_rel_s**, are semantically vacuous and can therefore be ignored in the logical form (LF). Contrast this with the logical form for the sentence *The dog wandered along the street*:

(14) prpstn(def(x4,dog(x4),def(x12,street(x12),wander(e2,x4) ∧
along_rel_p(e2,x12))))

where one of the arguments of **along_rel_p** is coindexed with the event variable of *wander* (e2) and the other with the index of *street* (x12).

An earlier approach in the ERG followed Nerbonne (1995) in actually removing the semantic contribution of the selected-for particle within the process of composition. However, there is now a strong monotonicity assumption underlying semantic composition in the ERG which makes that analysis impossible. An analysis analogous to that of Wechsler (1997) in which the semantic structures for the verb and particle are merged is tempting, but this is also unavailable in the ERG because there is an assumption that the lexical entries contribute individual elementary predications.

There are some practical problems with the ERG's analysis. The £rst is that verb-particle entries are never treated as productively formed, which leads to omissions — for instance, while *walk* is in the lexicon, *walk up* is not, and the latter could be productively generated from the former. Instead, in the ERG each verb-particle combination needs to be explicitly de£ned in

[1] There are some cases in the LinGO ERG where this has not been carried through systematically. The discussion below ignores this, since these seem to be infelicities rather than deliberate distinctions.

the lexicon, and this is not only labour intensive and time consuming, but given the huge number of existing combinations and of new combinations that are constantly created, there are always going to be those combinations that are not listed in the lexicon. The second problem concerns semantics. Although the idea that the particle is idiosyncratic and contributes no semantics makes sense for some verb-particle combinations, such as *make up* (in at least some of its senses), it is not so reasonable for the productive cases. For instance, we will argue below that *wander up* can be regarded roughly as:

(15) prpstn(def(x4,dog(x4),wander(e2,x4) ∧ up_rel_s(e2)))

where **up_rel_s** has either a directional or locational/aspectual interpretation, which in both cases can be regarded as qualifying the event of wandering (the semantics is discussed further below) and could be compositionally added to the meaning of the verb to generate the meaning of the combination. Furthermore, the existing treatment means that the commonality in the directional interpretation between *wander up* and *walk up*, where the semantics of the particle is shared, is not captured in the LF, which means that generalizations will be missed in an inference component or in semantic transfer for Machine Translation. Similarly, even though the semantics of verb is shared, there is no semantic connection between *wander* and *wander up*. Ideally we would like to keep recorded the connection between a verb and a related verb particle combination that could be productively derived from it. Moreover, as there is no explicit link between these two forms, it is impossible to construct the latter productively from the former.

The semantic vacuity idea also causes some problems for generation, at least when using the chart generation following Carroll et al. (1999). It is unreasonable to assume that a grammar-independent component will be able to produce input LFs with the vacuous selected-for particles, and they thus have to be inserted into an input LF as a separate stage before normal generation with the ERG will work.

18.3 Regularities in verb-particle constructions: lexical rules

In order to extend the treatment for verb-particle constructions in the ERG one possibility is to investigate regularities in these constructions. It is often the case that some verb particle combinations form some productive pattern that can be captured, with the combinations sharing the semantic contribution of the particles. This is the case of the particle *up*, indicating movement or position, and the verb-particle combinations *jump up*, *get up* and *stand up*. These combinations involve the literal meanings of the verb and particle, and have a transparent semantics.

A simple way of allowing for productive verb-particle combinations is to produce an entry similar to the one for *wander up* from a base verb via a

rule that adds particles to the complements list. This is shown schematically below:

$$\left[\begin{array}{l}\textbf{main\_verb}\\ \text{SYNSEM.LOCAL.CAT.VAL.COMPS} : \boxed{1}\end{array}\right] \mapsto \left[\begin{array}{l}\textbf{main\_verb}\\ \text{SYNSEM.LOCAL.CAT.VAL.COMPS} : \left[\begin{array}{l}\text{FIRST} : [\ \text{HEAD} : \textbf{prt}\ ]\\ \text{REST} : \boxed{1}\end{array}\right]\end{array}\right]$$

This rule simply takes a verb lexeme and adds an extra complement, the particle, to its subcategorisation list. The semantic contribution of the particle is added compositionally to the meaning of the verb to form the semantics of the combination: we discuss the details of the semantics below. For instance, this rule could be used to generate the verb-particle entry for *wander up* from the entry for *wander*. This solution leaves the analysis in the ERG essentially unchanged as far as syntax is concerned.

In computational terms, the motivation for capturing productive cases is partly to add coverage, but also to improve reliability of the coding. This ensures, for instance, that the entries generated are consistently de£ned in terms of the information de£ned for verbs and particles already contained in the lexicon. However, it will of course overgenerate creating ungrammatical combinations. Thus, this rule needs to be specialized to account for various classes of verb-particle constructions that form grammatical combinations. In what follows we discuss some of the classes that form regular patterns.

Even though the particle *up* occurs with a wide range of verbs, it only combines productively with some classes. Bame (1999) discusses two such cases: the resultative and the aspectual *up*. For example:

(16) Kim carried the television up. (resultative up)

(17) Kim ate the sandwich up. (aspectual up)

With the resultative *up*, the argument is affected (i.e., at the end of the action the television is *up*). In contrast, the aspectual or completive *up* suggests that the action is intensi£ed and taken to some conclusion (i.e., the sandwich is totally consumed at the end of the action). Bame's analysis follows Wechsler (1997) in merging semantic structures in order to restrict the verb-particle combinations and also in order to give contrasting semantic structures for these two cases. Unfortunately, as mentioned above, this cannot be directly implemented in the ERG: it also does not lend itself to underspeci£cation, which is important to avoid proliferation of analyses.

One complication, however, is that *up* has a use with some motion verbs in which it simply denotes a contextually salient endpoint to the action:

(18) Kim was standing in the bottom of the valley. Sandy galloped up.

It is tempting to analyse this as an aspectual *up*, in which the end of the path is indicated. Assuming an approach to event semantics where an activity

verb such as *gallop* denotes an event which is underspeci£ed as to whether it includes an end point, the very simple analysis below can be defended:

(19) gallop(e,x) ∧ up-end-pt(e)

where **up-end-pt** is taken as a predicate which is true of terminated events (accomplishments), and compositionally added to the semantics of the verb by the presence of the particle.

An alternative to Bame's account would then be to extend this approach to transitive verbs, where although the *up* also generally has a directional component, the sense of completed path is still present:

(20) carry(e,x,y) ∧ up-end-pt-and-dir(e) ∧ television(y)

Under this approach, given that the end of the path is *up*, it necessarily follows from the semantic properties of *carry* that the television is also *up*, so it isn't necessary to make the compositional semantics express this directly. We can then utilize a very simple lexical rule, which inherits from the schema given above, but which only takes as input the class of motion verbs with the correct aspectual properties.[2]

In this case, this rule generates the desired combination and adds to the action described by the verb, the appropriate semantic predicate associated with *up*:

$$\begin{bmatrix} \textbf{motion\_verb} \\ \text{COMPS} : \boxed{1} \\ \text{SEM.RELS.LIST} : \boxed{2} \end{bmatrix} \mapsto$$

$$\begin{bmatrix} \textbf{motion\_prt\_verb} \\ \text{COMPS} : \begin{bmatrix} \text{FIRST} : \begin{bmatrix} \text{HEAD} : \textbf{prt} \\ \text{SEM.KEYS.KEY} : \boxed{3}\ \textbf{up-end-pt-and-dir} \end{bmatrix} \\ \text{REST} : \boxed{1} \end{bmatrix} \\ \text{SEM.RELS.LIST} : \begin{bmatrix} \text{FIRST:}\ \boxed{2} : \begin{bmatrix} \textbf{verb\_pred} \\ \text{ARG0} : \boxed{4} \end{bmatrix} \\ \text{REST} : \begin{bmatrix} \text{PRED} : \boxed{3} \\ \text{ARG0} : \boxed{4} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

the general relation associated with the entry for *up* is specialised to **up-end-pt-and-dir**, which has both the sense of completed path and the sense of direction. The added particle is also coindexed to the same event variable as the verb, generating the desired semantic effect, schematically:

carry(e,x,y) ↦ carry(e,x,y) ∧ up-end-pt-and-dir(e)

However, we should also note that there is a particle use of *up* which is very similar to the PP argument of a verb such as *put*:

(21) Kim put the picture up.

(22) The picture is up.

[2]The availability of the hierarchy of lexical rules is a strong counter-argument to Ackerman and Webelhuth's (1998) claims that they are unsuitable for capturing this type of phenomenon (see also Ackerman and Webelhuth (1998) page 162).

(23) Kim put the picture on the table.

(24) The picture is on the table.

Associating individual particles with subtypes of lexical rules is very similar to the treatment of productive derivational morphology available within the LKB system. This allows us to de£ne more £ne-grained details about the combinations such as the particular semantic contribution of a given particle. By capturing regularities using lexical rules, such as the one above, the idea is to obtain a family of lexical rules, organized in a hierarchy. The LKB system also allows the use of redundancy rules to encode subregularities, with the verb-particle lexical entry default inheriting from the result of applying a rule to a verb. Thus, it is possible to relate a base verb form with the verb-particle construction derived from it, which means that the latter inherits from the former all the common information, such as in¤ectional morphology, so that if the base verb is irregular, so is the verb-particle combination (Copestake et al., 2002). For example, from a verb with irregular morphology like *go* it is not only possible to derive *go up*, but also the third person singular present form *goes up* and the past form *went up*, since all the information about *go* can be used when generating these forms. Moreover, the same idea applies to register and dialect information, which is shared between the base verb and the verb-particle combination (e.g. both *piss* and *piss off* are generally perceived as informal and impolite). However, in other respects the treatment of productive verb particle formation is somewhat different, in that it is possible to join particles and verbs into groups, so that any one verb of a given verb group could occur with any one particle of a related particle group. For instance, the movement verbs (*come, go, jump, run, walk, . . .*) and the location or direction particles (*down, in, out, up, . . .*) can be productively combined by a lexical rule that will generate all the possible verb-particle combinations allowed by these groups (*come down, come in, come out, come up, go down, . . .*). This is done more stipulatively than in Bame's analysis, in the sense that the types for the classes of verbs and the classes of prepositions are separately de£ned, but the actual work involved in doing the encoding for the computational lexicon is much the same, with the groups of verbs and the groups of particles belonging to appropriate types and the lexical rules being applied exclusively to the relevant types. We consider how we can acquire these classes in the next sections.

18.4 Productivity among verb-particles

In this section we discuss possible ways of £nding productive patterns. For this task we use two different sources of information: dictionaries and Levin's verb classes (Levin, 1993).

Although it seems intuitively plausible that there is some degree of produc-

tive formation of some verb-particle combinations, it is not clear what proportion of verb-particles might be accounted for in this way. One source of information about verb-particles is dictionaries. Moreover, they may also help us uncover some productive patterns in these combinations. For these purposes we investigated the coverage of verb-particle combinations in several dictionaries and lexicons: the paper versions of the Collins Cobuild Dictionary of Phrasal Verbs (Collins-PV), and of the Cambridge International Dictionary of Phrasal Verbs (CIDE-PV), the electronic versions of the Alvey Natural Language Tools (ANLT) lexicon (Carroll and Grover, 1989) (which was derived from the Longman Dictionary of Contemporary English, LDOCE), the COMLEX lexicon (Macleod and Grishman, 1998), and the Cambridge International Dictionary of English (CIDE+) lexicon. Table 1 shows the number of phrasal verb entries for each of these dictionaries, including not only verb-particle constructions, but also prepositional verbs.

TABLE 1 Phrasal Verb Entries in Dictionaries

Dictionary	Entries
ANLT	6,439
CIDE-PV	over 4,500
CIDE+	1,433
Collins-PV	over 3,000
Comlex	10,478

As we can see from these numbers, each of these dictionaries has a considerable number of phrasal verb entries potentially providing us with a good starting point for £nding patterns. There are 13,555 phrasal verbs that are described in the ANLT and Comlex lexicons combined, and from this, 3,107 are entries for verb-particle combinations.[3] However, even though there is a common core of verb-particle combinations that is described in every dictionary, the coverage of each dictionary varies considerably. For example, given the large number of entries obtained by combining these dictionaries, it is surprising that a considerable proportion (16%) of the entries in the LinGO ERG lexicon are not listed in any of these two dictionaries (this proportion would increase if we took subcategorization etc into account).[4] Most of these are at least semi-compositional, e.g., *crisp up*, *come together*, *tie on*, and were

[3]These £gures do not take into account subcategorisation information, where a given verb-particle construction can occur with more than one subcategorisation frame.

[4]The LinGO ERG lexicon was manually constructed with most of the verb-particle entries being empirically motivated by the Verbmobil corpus. It is thus probably reasonably representative of a moderate-size domain-speci£c lexicon.

probably omitted from the dictionaries for that reason,[5] though some others, such as *hack up*, are probably recent coinages. Thus, even though there is a signi£cant number of entries that are common among the different dictionaries, it seems to correspond only to a subset of the total number of entries each dictionary has. For instance, from the total number of entries obtained by combining ANLT and Comlex, only 34% of the entries are listed in both dictionaries with the remaining 66% of the total number of entries being exclusive to one or the other of these dictionaries. There is much less agreement in this respect between dictionaries than for morphologically derived forms, for example.

Having this large amount of dictionary data available, we then investigated the possibility of £nding regular patterns in verb particle combinations, more speci£cally those where the particles use a speci£c meaning in the combinations. The idea is that some such patterns could be uncovered by the classi£cation of verbs into meaningful groups according to the particles they take, so that any one verb of a given group could occur with any one particle of a related group. For each such verb group and associated particle group there would be a lexical rule that would generate the possible combinations.

In order to create these groups we used the combined information from two of the electronic dictionaries: ANLT and Comlex. We analysed possible combinations listed in these dictionaries involving the location particles *down, in, out* and *up*, which are four of the most common particles according to Collins Cobuild Dictionary of Phrasal Verbs. We identi£ed a group of 42 verbs that occur with all of these particles, resulting in 168 verb-particle combinations out of the 3,107 listed in these dictionaries. Given that these particles are so common and account for 50.20% of the combinations listed in these two dictionaries, this group of 42 verbs is surprisingly small, even taking into account that these dictionaries do not list all literal combinations. However, most of them seem to form valid combinations with the verbs and particles having transparent meanings, and they imply some form of directional movement (e.g. *come, run, bring, drag, send, ...*) or need a location (e.g. *put, lay, ...*).

Even though dictionaries do highlight some tendencies, no large patterns could be found in this manner, mainly because dictionaries tend to list idiosyncratic combinations at the expense of omitting the more productive ones. Since most of the combinations which would be expected to be found with these particles would be more productive ones, the results were somewhat limited. So, we cannot use dictionaries either as a means of discovering productive classes or of £ltering unwanted combinations. Moreover, the number

[5]The Cobuild Dictionary explicitly states that literal meanings and combinations are not given for all verbs.

of verb-particle constructions is constantly growing. Thus, if we want to be able to construct wide-coverage grammars that can capture verb-particle constructions in naturally occurring texts, we cannot rely on dictionaries alone.

A second source of information was found in Levin's classes of verbs. We investigated the possibility of using Levin's classes themselves as the groups of verbs. To test this idea, we analysed the combinations generated by some of Levin's classes and the subset of four direction or location particles (*in, down, out, up*). For instance, one of the classes analysed was that of *Roll* verbs (class 51.3.1, *bounce, drift, drop, ¤oat, glide, move, roll, slide, swing*). In a manual analysis of the combinations involving this class most of the verb-particles generated were considered acceptable.[6] These results suggest that Levin's classes are a good starting point for obtaining productive patterns in verb-particle constructions. Moreover, to test the extra coverage obtained over the dictionaries, we investigated how many of these combinations derived from the *Roll* verbs are already listed in the combined ANLT and Comlex lexicons. We found that 64% of these combinations are not listed in the combined lexicons. Even for the most common of these particles, *up*, 6 out of 9 combinations generated from the *Roll* verbs are not listed in the lexicons. These results are encouraging and suggest that were the family of patterns to be implemented it would help us considerably to extend not only the coverage provided by the grammars, but also that provided by the dictionaries.

Levin's verb classes seem to give us, in some cases, a good indication of verb-particle acceptability, with the great majority of pairings of the verbs in the *Roll* class with the common locative particles being acceptable. However, these classes seem to be too £ne-grained and speci£c and it may be the case that the same pattern can be found in several unrelated classes. For example, the verbs of *Manner of Wiping* (class 10.4.1) and those of *Cutting* (class 21.1) seem to follow the same pattern with the aspectual *up*, but there are no links between these two classes in Levin's classi£cation.

These results obtained indicate the dif£culty of constructing meaningful groups of verbs that present regular patterns, using both dictionaries and Levin's classes. The use of corpora to extract verb-particle combinations may contribute to improving these results. An investigation of the automatic extraction of combinations from corpora is described by Baldwin and Villavicencio (2002).

18.5 Restrictions on productivity

Although there are some cases where it appears reasonable to treat verb-particle combination as fully productive (within fairly £nely speci£ed classes), there are also cases of semi-productivity. For instance, many verbs

[6] **drop up* is presumably disallowed because of contradictory directional properties.

denoting cooking processes can occur with aspectual *up*: e.g., *boil up*, *fry up*, *brew up*, *heat up* (although note *cool down* — there is perhaps some directionality involved as well). But some other combinations are implausible e.g., ?*sauté up*, ?*microwave up*. In terms of Levin's classi£cation, this cross-cuts the distinction within the class of *Cooking* verbs (class 45.3) between those which are also verbs of *Preparing* (class 26.3) and those which are not, since *fry* and *softboil* are both verbs of preparing, but while *fry up* is acceptable, ?*softboil up* is odd. Conversely, neither *microwave* or *stew* are verbs of preparing according to Levin, but *stew up* is acceptable while ?*microwave up* sounds odd.

Similar cases of semi-productivity are found in other classes. For instance, while *vomit*, *spew* and *puke* occur with *up*, ?*regurgitate up* seems unacceptable. It is also worth noting that there is a strong constraint against repeating the same particle: so while *throw up* or *chuck up* mean *vomit*, we do not get **throw up up* or **chuck up up*. To take a further example, Bame (1999) gives *Gene banged up the car* as an example of aspectual *up*, but *bang up* does not generally have the relevant meaning in British English (though the example is comprehensible). *smash up* and *bash up* are usual, but ?*crash up* and ?*damage up* are both at least odd. Some of the constraints that arise may be due to register, others to general blocking principles. The frequency with which a given combination occurs may also in¤uence acceptability judgements.

The sub-regularities and exceptions within verbal groups might be dealt with by having lexical rules that semi-productively apply to the members of each group, following Briscoe and Copestake (1999). The general idea is to have the basic entries in the lexicon augmented with a representation of the rules that can be applied to them. For both the basic and any attested lexical sign that is generated by applying a given rule to the basic entry, a probability could be assigned, based on corpus information. This approach allows the attested forms to be captured, but, while dispreferring the unattested ones, does not prohibit them, since they are assigned very low smoothed probabilities (Briscoe and Copestake, 1999). In this way we can capture regular patterns, while accounting for subregularities and exceptions, with the semi-productive application of lexical rules allowing e.g. *fry up* while avoiding e.g ?*softboil up*.

It is also worth noting that idiomatic uses of the combinations may have a connection with productive uses of particles. For instance, *cough up* has a productive meaning, but also the idiomatic one 'to produce (money or information) unwillingly' (using the de£nition from CIDE). This example should not involve the same relation as literal *cough*, but arguably at least, the contribution of *up* can be taken as involving the same relation as in *pay up*, *settle up*, *serve up*. By adopting this position, it is possible to use the usual entry for the particle *up*, which is compositionally added to these verbs to produce

these idiomatic combinations. This treatment of idioms is along the lines of Riehemann (2001), allowing for commonalities between the non-productive cases. ¿From a computational perspective, we want to underspecify meaning rather than proliferate particles in the grammar, but we need to do this in a manner which is compatible with expressing commonalities of meaning for inference or MT.

18.6 Conclusions

In this paper we analysed possible treatments for verb-particle constructions in a computational grammar of English. The discussion concentrated on the LinGO ERG, and proposed possible extensions to the treatment adopted. Lexical rules are a possible means of encoding regular patterns, and we investigated the identi£cation of regular patterns among verb-particle constructions using dictionaries and Levin's classes, not only to extend coverage but also to improve reliability of the coding. As there are potential exceptions to the generalisations in these patterns, we also discussed how to restrict the application of these lexical rules.

Further analysis need to be conducted, but the results obtained so far suggest that having a hierarchy of lexical rules to automatically generate verb-particle constructions with transparent meanings, based on groups of verbs and particles presents a reasonable initial solution to the productivity problem. A range of mechanisms is available within the LKB system to allow for different classes of semi-productivity, and although this does not lead to a smooth gradient between productive and non-productive verb-particle combinations, it at least begins to allow for the range of productivity observed by Bolinger (1971) and other authors.

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References

Ackerman, Farrell and Gert Webelhuth. 1998. *A Theory of Predicates - CSLI Lecture Notes Number 76*. CSLI Publications.

Baldwin, Timothy and Aline Villavicencio. 2002. Extracting the unextractable: A case study on verb-particles. In *Proc. of the 6th Conference on Natural Language Learning (CoNLL-2002)*. Taipei, Taiwan.

Bame, Ken. 1999. Aspectual and resultative verb-particle constructions with Up. Handout for talk presented at the Ohio State University Linguistics Graduate Student Colloquium.

Bolinger, Dwight. 1971. *The Phrasal Verb in English*. Harvard, USA: Harvard University Press.

Briscoe, Ted and Ann Copestake. 1999. Lexical rules in constraint-based grammars. *Computational Linguistics* 25(4):487–526.

Cambridge. 1994. *Cambridge International Dictionary of English*. Cambridge University Press.

Cambridge. 1997. *Cambridge International Dictionary of Phrasal Verbs*. Cambridge University Press.

Carroll, John, Ann Copestake, Dan Flickinger, and Victor Poznanski. 1999. An ef£-cient chart generator for (semi-)lexicalist grammars. In *Proc. of the 7th European Workshop on Natural Language Generation (EWNLG'99)*, pages 86–95.

Carroll, John and Claire Grover. 1989. The derivation of a large computational lexicon of English from LDOCE. In B. Boguraev and E. Briscoe, eds., *Computational Lexicography for Natural Language Processing*. Longman.

Collins. 1989. *Collins Cobuild Dictionary of Phrasal Verbs*. Harper Collins Publishers.

Copestake, Ann and Dan Flickinger. 2000. An open-source grammar development environment and broad-coverage English grammar using HPSG. In *Proc. of the 2nd International Conference on Language Resources and Evaluation (LREC 2000)*.

Copestake, Ann, Fabre Lambeau, Aline Villavicencio, Francis Bond, Timothy Baldwin, Ivan Sag, and Dan Flickinger. 2002. Multiword expressions: Linguistic precision and reusability. In *Proc. of the 3rd International Conference on Language Resources and Evaluation (LREC 2002)*. Las Palmas, Canary Islands.

Gries, Stefan T. 2000. *Towards multifactorial analyses of syntactic variation: The case of particle placement*. Ph.D. thesis, University of Hamburg.

Jackendoff, Ray. 1997. Twistin' the night away. *Language* 73:534–59.

Levin, Beth. 1993. *English Verb Classes and Alternations - A Preliminary Investigation*. The University of Chicago Press.

Macleod, Catherine and Ralph Grishman. 1998. Comlex syntax reference manual, Proteus Project. `http://nlp.cs.nyu.edu/comlex`.

Nerbonne, John. 1995. Computational semantics—linguistics and processing. In S. Lappin, ed., *Handbook of Contemporary Semantic Theory*. Blackwells.

Riehemann, Susanne. 2001. *A Constructional Approach to Idioms and Word Formation*. Ph.D. thesis, Stanford University.

Wechsler, Stephen. 1997. Resultative Predicates and Control. *In Texas Linguistic Forum 38: The Syntax and Semantics of Predication* .

Zeller, Jochen. 1999. *Particle verbs, local domains, and a theory of lexical licensing*. Ph.D. thesis, University of Frankfurt.

19

When a Head is not a Head: A Constructional Approach to Exocentricity in English

Abby Wright and Andreas Kathol

19.1 Introduction

As the name of the framework suggests, one of the driving forces behind traditional HPSG analyses is the notion of *head*. With the exception of a few non-headed constructions (i.e., mostly coordination), constructions are typically seen as being headed by a particular word or phrase with the nonhead constituting a complement, specifier or adjunct. The head determines the internal composition of a phrase and is responsible for its external distribution. Moreover, syntactic headedness, as determined by morphosyntactic criteria, is typically assumed to coincide with semantic headness. In the case of NPs, for instance, this means that the semantic contribution (including the index) of the entire phrase is provided by the element that is the head by morphosyntactic criteria (typically the noun).

In this paper, we intend to challenge this view of heads on the basis of two constructions from English. In both instances, we will argue that the constituents that are responsible for the internal combinatorial make-up of the phrase do not constitute heads because they fail both to determine the external distribution of the phrase and to contribute the semantic index of the projected phrase. At the same time, however, we will show that it is possible to view these cases not as random departures from more well-behaved headed constructions, but instead as particular instantiations of more general construction types which do not impose strict conditions on external headedness.

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19.2 English free relatives

As has been observed, for instance by Bresnan and Grimshaw (1978), free relative constructions (FRC) in English involve ordinary *wh*-filler-head structures which have the external distribution not of a clause but rather of the initial relative phrase. For instance, the examples in (1) show that, despite appearing clause-like, free relatives do not share other properties of clausal structures such as *it*-extraposition.

(1) a. It was unclear [what Bozo planted in his garden].
b.*It got Bozo into trouble [what he planted in his garden].

A number of solutions to the problem of accounting for the non-clausal external behavior of FRCs have been proposed, involving either phonologically unexpressed modified nouns or unary phrase structures (cf. Müller 1999 for German).

More recent proposals have attributed the external distribution directly to the filler phrase. In the analyses of Lee (2001) and Kim (2001), this is achieved by treating the clausal part as an (obligatory) adjunct to the relative phrase. However, such an approach leads to a dichotomy between the constructions that match an initial filler against a gap in a following clausal structure. In addition to ordinary filler–head structures, we need to assume that the same function can be performed by certain head–adjunct structures, even though they are structures that do not usually concern themselves with filler-gap dependencies. Furthermore, we need to posit the existence of adjunct clauses which do not seem to occur in any context outside free relative constructions.

Apart from these conceptual issues, a greater problem for analyses of this kind is that the relative phrase does not fully determine the external distribution of an FRC. For instance, Pollard and Sag (1994, 69) note that in examples like (2a), the whole FRC behaves like a singular NP despite the plural head *dogs*. Similarly, examples such as (2b) are understood in terms of the owner of the dogs being the addressee, not the dogs themselves.[1] [2]

(2) a. Whoever's dogs are running around in the garden is in big trouble.
b. You ought to talk to whoever's dogs they let run on the lawn.

[1] A somewhat milder instance of the same problem arises from mismatches in case, as observed by Lee (2001):

(i) Whomever he likes gives us a big headache later.

[2] Following Ginzburg and Sag (2000), we assume here that the relative phrase is always a filler even when it has subject status as in (2a). However, nothing we say here hinges on this assumption.

Thus, it seems that an analysis of FRCs that simply makes the initial phrase the head (for instance in the form of a head–adjunct structure) can neither make the relationship with ordinary filler–head structures explicit nor is it sufficient to properly predict the external distribution of the FRC.

19.3 English measure phrases

The second construction of English we will examines is characterized by the form *N of NP*, which serves to individuate mass or multiplex substances, indicate the amount of the substance and classify the substance along dimensions such as shape, dimensionality and extension. Some examples are *cup of coffee*, *bunch of flowers*, *square of cloth*, and *herd of elephants*. For ease of discussion we will refer to the first noun, say *cup*, as X and the second noun, say *coffee* as Y; thus giving us an *X of Y* phrase. The similarity in function between lexical items like *cup* or *square* and classifiers found in prototypical classifier systems has led researchers like Lehrer (1986) to propose that English possesses something akin to a classifier construction, which we will here refer to as a "measure phrase construction", or "EMP" (following Dodge and Wright 2002). Some examples of the construction follow in (3). Attested examples will be marked by "@"; all our attested examples come from the British National Corpus.

(3) a.@Place a **tablespoon of grape mixture** into the centre of each plate.
b.@The adult female lays **large clusters of eggs** (shown here magnified 15 times) sometimes wrapping them in bands around twigs.
c.@**Swarms of flies and mosquitoes** hover over the marshes.
d.@Thereafter he was allowed only six **boatloads of brushwood** a year, to be taken out under view of the bailiff.
e.@My catering was limited to brewing endless **mugs of insipid coffee** and opening packets of custard creams.
f.@Two women were trapped in the cabin, with only **inches of air space**, as the boat filled with icy water.
g.@The teacher, Beth, recites eleven **seconds of poetry** once they are quiet.

The problems posed by these measure phrase constructions fall into two categories. The first is the "transparency" of their head nouns with respect to external syntax; this includes both modifier placement and the selectional restrictions of verbs with EMPs as complements. The second is the strange agreement properties they exhibit, i.e., the ability

of the whole phrase to receive a plural index even when the head noun (X) is singular. For the first problem we encounter attested examples such as those found in (4):

(4) a.@A toddler was fighting for his life last night after he **swallowed** a bottle of **lethal acid** at a doctor's surgery.
b.@The adult female **lays** large clusters of **eggs** (shown here magnified 15 times) sometimes wrapping them in bands around twigs.
c.@The pair had been drinking all day and Jones downed more than 10 pints, while Miss Smith, 29, **drank** six or seven pints of **cider**, Nottingham Crown Court was told yesterday.
d.@Tammuz was watching TV alone, **eating** a bag of **Munchi-Chipz**.

The verb's selectional restrictions are satisfied by the EMP-internal noun or Y, (as discussed in Dodge and Wright 2002); in example (4a), it is unlikely that the toddler has swallowed the bottle itself; the bottle indicates the amount of lethal acid. In example (4b), the adult female is laying eggs, not clusters. In example (4d), Tammuz is eating Munchi-Chipz, not the bag itself.

Considered on its own, however, the phrase *bag of Munchi-Chipz* is not necessarily an EMP. There are phrases which are form-identical to EMPs, but are actually instantiations of a different construction, as becomes apparent when these phrases appear in a larger clause. In this more straightforwardly headed construction, the noun is followed by a prepositional phrase which modifies it, giving an indication of its contents. An example is given in (5):

(5) @The **bottle of champagne** took five attempts to **break** ...

Here the bottle itself is being broken, and *champagne* indicates what its contents are.

A near minimal pair is given in (6):

(6) a. The partygoers drank a bottle of champagne.
b. The partygoers smashed a bottle of champagne over the ship's prow.

In (6a) the verb *drank* selects for a liquid, which is satisfied by *champagne*. In (6b) the predicate *smashed* requires a solid physical object, which is supplied by *bottle*, the head noun. Even though the internal syntax of both phrases is identical, in one case *bottle* is transparent, allowing the non-head *champagne* to be the category determinant of the entire phrase and to satisfy *drink*'s selectional restrictions. In the other case there is a straightforward modificational relationship between the

N and the PP, with *of champagne* telling us more about the bottle-object. The external semantic distribution of *bottle of champagne* can either be predictable from the distribution of *bottle* or the distribution of *champagne*. In the case of the EMP in (6a), we know that the sentence is intuitively about champagne, the lower noun. Consider the example in (7):

(7) [@]No less than 53 extras portrayed the wartime travelling public, not forgetting a **crate of live chickens**, **one of which** actually **laid an egg** on set!

Here it is clear that *crate of live chickens* is picking out a particular group of chickens because it is followed by *one of which*, which can only refer to the chickens (especially since it laid an egg).

EMPs can also be embedded within each other as is illustrated in (8):

(8) a.[@]Dr. Robert Shore and Dr H Choudhury both dose with one granule in 110 ml water putting one tablespoon in a **glass of 110mls of water** ...

b.[@]He rummaged about in a chest of drawers, and then produced a **box of sheets of paper** with dried flowers that Leverrier had collected and mounted.

c.[@]A door opened, and Isay entered with a **tray of platters of food**.

d.[@]When I open it a **load of bits of paper** fall out and flutter to the ground.

Again we find that in these sentences, the phrase is intuitively about the most embedded noun, and the other elements of the clause are sensitive to this. Consider the example in (9) that illustrates a verb selecting through an embedded EMP.

(9) In a year, the average American **drinks** the equivalent of 5 24-count cases of 12-ounce cans of **soda**.

Intuitively, the patient of *drink* is *soda*, the most embedded noun, not *case* or *can*.

The second area of "transparency" in EMPs is that a modifier on the periphery of the EMP (next to the X) can modify qualities of the lower noun, Y. Examples are given in (10):

(10) a.[@]The only other colours are provided by a snaking **blue-black** ribbon of **tarmac** ...

b.[@]Soon Maggie held a **golden** BALL of **thread** and St Margaret had one end of it firmly attached to her finger.

c.[@]A long **white** strip of **cloth** linked them all from hand a hand

as they made their way down through the sleet and open snowy fields.

d.[@] A **bitter** cup of **coffee**, a rude salesgirl, a failed attempt to get the right ingredients for a vegetable lasagna, are the signposts of the day, and they are massive.

e.[@] Your husband needs to relax before he hits the sack. Make him a **delicious** cup of **99 tea**, Brenda, it licks other bedtime drinks—and it'll put an end to his night-time grinding!

f.[@] As our taxi made its way up the winding road to the north west of the island, we passed immaculate terraces filled with olive and citrus groves beneath which tethered goats grazed on the **dry** clumps of **grass**.

In all of these cases the adjective immediately adjacent to X is modifying properties of Y. Consider the pair in (11):

(11) a. I ate a can of mouth-watering beans.
b. I ate a mouth-watering can of beans.

Mouth-watering can appear in either position, next to the X or next to the Y, and still modify a property of the *beans*.[3] This possibility is striking because other classes of N-of-NP constructions do not allow this. For instance, consider (12):

(12) a. The mother of the injured boy refused to speak to the police.
b.*The injured mother of the boy refused to speak to the police.

In (12b) *injured* cannot precede *mother* and still be construed as modifying *boy*. Only the EMP licenses modifiers to appear adjacent to X (the first noun).

Whenever the larger clausal context requires a physical object reading, however, an alternation like that in (11a) and (11b) is disallowed, even though the phrase may be form-identical to an EMP. This is illustrated by the contrast in (13):

(13) a. In protest, I **smashed** a can of their mouth-watering beans against my head.
b.*In protest, I **smashed** a mouth-watering can of their beans against my head.

There is a second area in which EMPs prove interesting; measure phrases behave unusually with respect to agreement properties. Consider the attested corpus sentences in (14) and (15):

[3] However, as Tibor Kiss (p.c.) has pointed out to us, whenever quantity-denoting expressions such as *amount* are modified, the modifier seems to obligatorily construed with *amount*, not with *beans*:

(i) She prepared a mouth-watering amount of beans.

(14) a. @ A **herd of zebras**, hence, **produces** about a quarter to a third of **its** weight in prey carcasses each year.
b. @ Here, a **small clump of scarlet tulips brings** a disproportionate flash of brilliance to a spring dalliance of Daphne mezereum, muscari, erythronium and Magnolia stellata.

(15) a. @ To ease the pressure, a **truckload of Commandos were** taken to the rear, where **they** could relax for a couple of days.
b. @ A **herd of Asian elephant cows with calves drink** and **cool themselves** with mud.

The default agreement pattern is with X, the syntactic head, as expected, shown in (14). Note that the semantic head, the contributor of the semantic category of the entire phrase, is still *zebras* or *tulips*. It would appear that agreement is thus a property of syntactic heads. However, the sentences in (15) illustrate the possibility of agreement being determined by the measured multiplex (*Commandos* or *elephant cows*). When individuals are particularly salient in a collection they can, by means of semantic construal, coerce the entire phrase into being treated as a plural entity. This is further demonstrated by the use of the pronoun *they* in example (15a) which has the antecedent *a truckload of Commandos*.

With the embedded EMP, the agreement can be even trickier, as illustrated in (16):

(16) @ When I open it, a **load of bits of paper fall out** and **flutter** to the ground.

Here *fall out* and *flutter* agree with *bits*, which is the middle element and somehow the most salient.

At this point one may wonder if the agreement facts are a peculiarity of British English (which can make nouns like *government* plural). This doesn't appear to be the case since both agreement patterns were found in the BNC, as the preceding examples demonstrate. A second concern might be whether or not the agreement facts are the result of the proximity of the plural Y noun and the verb. However, this does not appear to be the case for several reasons: The first is that, as seen in (14a) and (15a), a plural or singular pronoun can be used later in the clause, suggesting that the EMP has really been conceptualized as either singular or plural. Secondly as seen in (16), the verb doesn't have to agree with the closest noun phrase, even when agreement doesn't take place with the syntactic head.

When the X is plural, agreement is necessarily plural, as illustrated in (17):

(17) a. @ Signalled by changes in the weather, great **herds of these**

deer follow ancestral migration routes to sheltered valleys and more ample food supplies.

b.*Great herds of these deer follows ancestral migration routes.

An additional agreement fact to note is that the determiner always agrees with the syntactic head, the X, as is demonstrated in (18) (cf. Casillas Martínez 2001).

(18) *These herd of Asian elephant cows with claves drink and cool themselves with mud.

In sum, a single notion of agreement cannot simply be linked directly with the semantic index because (1) the determiner always agrees with the "syntactic head" and (2) sentences exist where the semantic head is Y; but agreement still occurs with X. Consider the example in (19):

(19) The **herd of zebras is** finally eating its favorite plant again, after the plants' brush with extinction.

Here, the agreement is singular, but it is the zebras which are eating. This sentence is about *zebras* but the agreement doesn't have to be linked to *zebras*.

The one final complication that we will discuss is that the acceptance of plural agreement seems to depend on the lexical item in question as can be seen from the examples in (20).

(20) a. A school of remoras were silently attaching to an unsuspecting shark.

b. A circle of crows were hovering overhead.

c.?An entire boatload of bananas were eaten by the children.

d.*A bag of peas were lying on the floor.

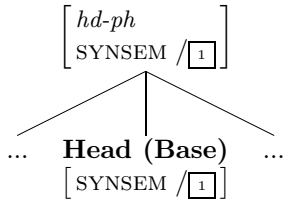
e.*A pile of logs were burning.

Clearly, the complexities of agreement in measure phrases combined with the category determinant facts point to the necessity of rethinking the notion of head. The base on which the internal syntax rests need not be identical to the elements of a construction that determine its external behavior.

19.4 Heads as bases

The solution we propose for analyzing the two construction types just discussed can be seen as an elaboration of the Generalized Head Feature Principle (GHFP) of Ginzburg and Sag (2000, 33), given in (21):

(21) **Generalized Head Feature Principle**

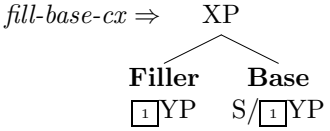


Since the identity of SYNSEM values is not a strict requirement but rather a default, we expect that a range of nonidentities between head daugher and mother are possible. In Ginzburg and Sag (2000), a primary concern is the nonidentity of valence information. Here we would like to explore the possibilities of even more extreme departures of the identity between head and mother.

19.4.1 Free relatives reconsidered

We first consider the case of FRCs. In the case of filler-initial constructions, we posit that there is a general phrase type in which a clausal expression is combined with a phrase that matches that clause's gap information, shown in (22). In order to avoid confusion with regular notions of headedness, we choose the more neutral labels "base" and "filler" to refer to the clausal and the filler parts, respectively (hence the label of **Head** in (21) now corresponds to our notion of **Base**).[4]

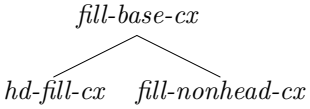
(22) **Filler-base construction**



Our notion of filler-base construction is a more abstract version of Sag and Ginzburg's (2002) notion of *hd-fill-cx*. The *hd-fill-cx* is now a subtype of our notion of filler-base construction, as part of the partial constructional hierarchy shown in (23):

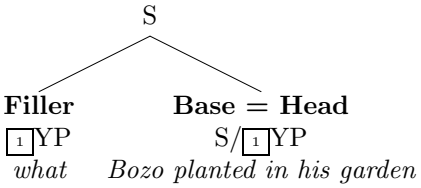
[4]Our notion of "base" is not unlike the one proposed by Zwicky (1993). However, there are important differences. First, Zwicky focuses his discussion only on nuclear constructions and does not address the status of "displacement". Thus, unless one wishes to subsume those under "specifier–specified" constructions, Zwicky's notion of "base" does not directly extend to those cases. Second, and more importantly, Zwicky's criteria for headedness unambiguously pick out the measure noun as the head and the base (cf. also Zwicky 1993:305), while our claim here is precisely that in such constructions there may be a mismatch between base and head properties.

(23) **Constructional hierarchy**



A regular *wh*-interrogative clause constitutes a subtype of the *fill-base-cx* construction in which the base contributes the category and content information for the entire construction, i.e., a clausal structure with some type of (open) propositional semantics, as outlined in (24):

(24) **Endocentric filler-base construction** (*hd-fill-cx*):
E.g., interrogative clause



We propose to analyze FRCs as another instance of filler–base constructions, but with different constraints on the syntactic and semantic properties of the mother node. Borrowing from Lee (2001) and Kim (2001), we utilize F-REL as a feature that characterizes phrases that are eligible to occur as fillers in FRCs.[5]

Furthermore, it is the value of the filler's F-REL feature—which we assume to be projected from the relevant *wh*-word—that determines the content of the entire FRC.[6] The **Base** part, i.e., the clausal structure, licenses the combination with the filler via (22) but does not itself contribute to the external properties of the entire construction. The details of this subconstruction are further spelled out in (25):[7]

[5]Thus, initial phrases in free relative constructions also need to be distinguished semantically. Extending the proposal made in Kim (2001), we can locate the difference between "specific" and "nonspecific" free relative clauses in the quantificational contributions made by the relative pronouns of either kind, as outlined in (i):

(i) a. *what*

$$\begin{bmatrix} \text{CAT } noun \\ \text{CONT } \boxed{2}(the\,\boxed{1}(thing(\boxed{1}))) \\ \text{F-REL } \{\boxed{1}\} \\ \text{Q-STORE } \{\boxed{2}\} \end{bmatrix}$$

b. *whatever*

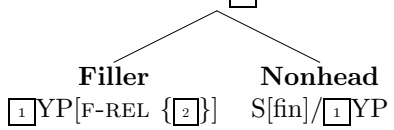
$$\begin{bmatrix} \text{CAT } noun \\ \text{CONT } \boxed{2}(forall\,\boxed{1}(thing(\boxed{1}))) \\ \text{F-REL } \{\boxed{1}\} \\ \text{Q-STORE } \{\boxed{2}\} \end{bmatrix}$$

[6]As Marianne Desmets (p.c.) has pointed out to us, this assumption requires further refinement. While it works well for FRCs that have argument status, in the case of FRC adjuncts, as in (i), the relative phrase (here: *whenever*) acts as a modifier of both the event described by the relative clause and the matrix clause:

(i) I'll leave whenever you want to leave.

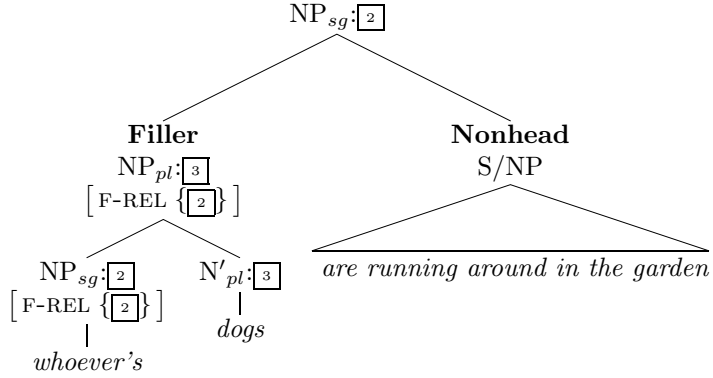
[7]One issue which we will not attempt to resolve here is whether a free relative

(25) **Filler-nonhead construction** (e.g., free relatives)
fill-nonhead-cx ⇒ YP′:[2]



A more elaborated example of a free relative clause, which is an example of an exocentric filler-base construction is presented in (26):

(26) **Example of free relative construction**



As a consequence of our analysis, the ordinary notion of syntactic head can be viewed as a special case of base. A head is a base which, in addition to determining the internal syntax of a phrase, also determines the external distribution. Typically bases are heads, but as the above example shows, they do not need to be. Under the view espoused here, such departures do not require a radically different analysis of the internal syntax.

19.4.2 English measure phrases reconsidered

The proposal made here can also be fruitfully applied to the problem of English measure phrases. This time, however, the constructions at issue are subinstances of base-complement structures. In addition to the regular combinations in which the noun contributes both the morphosyntactic and semantic head (cf. (6b)), we assume that there exists another way of licensing such combinations, giving rise to the partial constructional hierarchy in (27):

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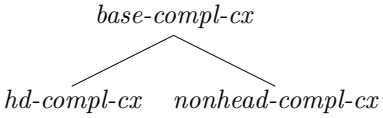
construction is always NP in category or whether there is flexibility in categorial status, depending on whether the phrase is an NP or PP. Kim (2001) argues for the first position, while traditionally the second view has been espoused (see, e.g., Bresnan and Grimshaw 1978, Baker 1995).

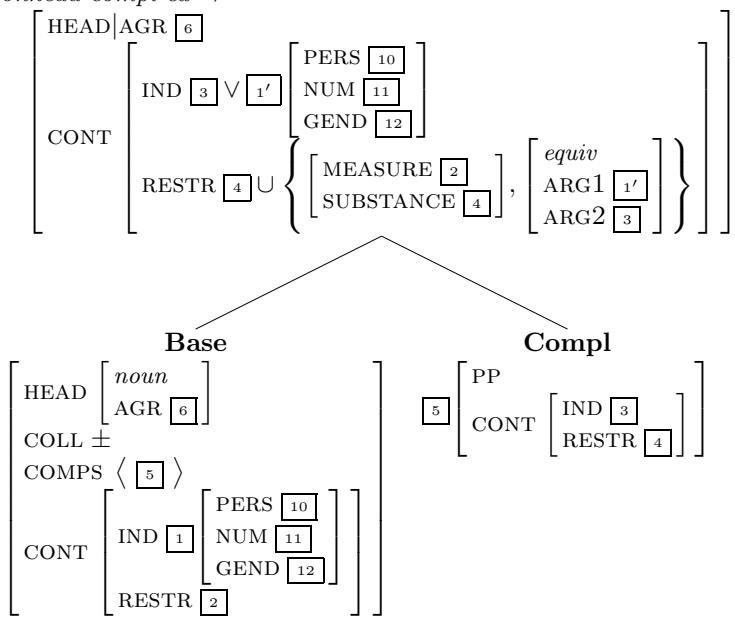
(27) **Constructional hierarchy**



English measure phrases are one instance of the *nonhead-compl-cx* type of construction, described in more detail in (28):

(28) **Nonhead-complement construction** (e.g., EMP)

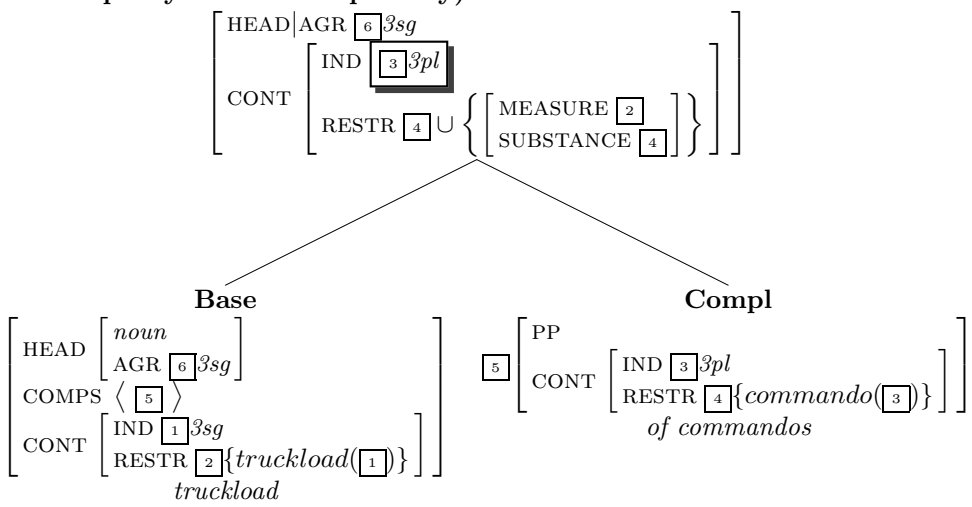
nonhead-compl-cx ⇒



As one can see from (28) the index of the resulting phrase is determined disjunctively. In the first case, Y is the semantic "head" of the construction and determines its external distribution by means of the index 3. This is the case where we find plural agreement. Everything about the index is shared, including its information about number, person and gender.

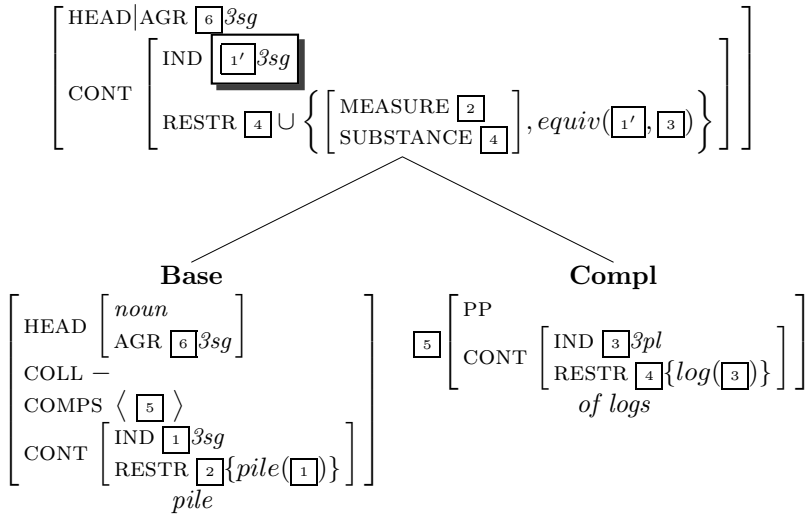
This situation corresponds to examples such as (15a) above and is illustrated more formally in (29):

(29) **EMP as instance of *nonhead-compl-cx* (full morphosyntactic transparency)**



The second possibility is that a new index, [1′], is created, which gets its person, gender and number information from the Base. Crucially, the index is still distinct from the Base's index. There is still an unresolved issue, however. In our current analysis the RESTR values are shared. However, the value of RESTR is a set of restrictions on [3], not [1′]. Thus something must ensure that the relations restricting [3] are also restrictions on [1′]. That is, [1′] and [3] are semantically equivalent, hence (28) contains a constraint of semantic equivalence. A verb or adjective is sensitive to the semantics of the Nonbase when it combines with the EMP. For examples such as (20e), this gives rise to the analysis outlined in (30):

(30) **EMP as instance of *nonhead-compl-cx*, (semantic transparency only)**



Furthermore we propose a feature, COLL, which determines whether or not a particular lexical item has enough collectivizing properties to allow for a "transparent" determination of the index of the measure phrase. This varies from speaker to speaker and is also affected by context, but for simplicity's sake, we will state this as a feature in each speaker's lexicon. Thus, the most common case will be that $\boxed{1'}$ is constructed as the index. This makes sense if we consider NP-internal concord. As (30) shows, the NP-internal concord is always with the base and its AGR information; this is also the element which is the morpho-syntactic locus. Speakers might, therefore, prefer concord and agreement to depend on the same element in a phrase, if possible. Many measure expressions also allow for the other possibility, that is, having the Nonbase determine the morphosyntactic properties of the entire phrase.

Others, such as *pile*, however, appear to be highly resistant to letting the Nonbase determine the external distribution of the phrase, as was seen in (20e) above. Such expressions require that the phrase's index always be determined from their own ($\boxed{1}$), as is illustrated in (30). This is captured by marking them as $\left[\text{COLL} -\right]$, which in turn limits the choice of index to $\boxed{1'}$.

One final complication is how to block singular agreement when the Base is plural, but the Nonbase is singular as in *two strips of cloth*. In our figure there is actually nothing preventing this, because the

index can always be directly taken from the Nonbase. We would like to propose that although the morphological marking is on the Base; semantically speaking, pluralization takes the entire phrase in its scope. As a result, this pluralization blocks any "transparency", which may otherwise allow for singular Y to affect the external behavior of the entire phrase. We will leave it for future research to make this idea more precise.[8]

19.5 Summary and conclusion

The approach argued here lets us have our cake and eat it too: we can account for the special properties of FRCs and measure phrases without having to treat them as unrelated deviations from more established patterns. Rather, in terms of their internal syntax (i.e., the factors that license the combination in the first place) they can be analyzed in a manner that is fully parallel to the case of more "well-behaved", better known, fully headed counterparts.[9] Thus our approach allows us to weave a tighter web of constructional relationships and to state the shared properties of internal syntax across related constructions at just the right level.

From this vantage point, a conventional headed construction is simply one in which the properties of the entire expression can be straightforwardly predicted from the properties of the base. If successful, the approach outlined here may replace the binary distinction of endocentric and exocentric with a more fine-grained typology of how properties of the phrase are determined from its constituent parts.

Acknowledgments

We would like to thank the audience of the Ninth International conference on HPSG for helpful comments and discussion, in particular Marianne Desmets, Tibor Kiss, Hansook Lee, Ivan Sag, and Eun Jung Yoo. All remaining errors are ours.

[8] Another issue which the proposal in (28) glosses over is the fact that in *X of Y*, *of+Y* forms a PP constituent whose semantic properties are largely determined by Y, rather than the syntactic head *of*. The issue of such semantically vacuous prepositions has received quite a bit of attention over the years, culminating in van Eynde's (2002) recent work on "minor prepositions" (in Dutch). Alternatively, one could imagine extending the present account of exocentricity to such cases as well and treating the preposition as as the Base, but not necessarily as the head of the phrase.

[9] In some ways this is similar to the mixed category cases discussed by Malouf (1999), except that in the cases considered here, the mixed category behavior is arguably not reducible to lexical properties.

References

Baker, C. L. 1995. *English Syntax*. Cambridge, MA: MIT Press.

Bresnan, Joan and Jane Grimshaw. 1978. The syntax of free relatives in English. *Linguistic Inquiry* 9:331–391.

Casillas Martínez, Luis. 2001. A surface-based account of agreement in Spanish and French $N_1/A\,de\,N_2$ affective constructions. unpubl. ms., Stanford University.

Dodge, Ellen and Abby Wright. 2002. Herds of wildebeests, flasks of vodka, heaps of trouble: An embodied constructional approach to English measure phrases. In *Proceedings of 28th Meeting of the Berkeley Linguistic Society*. Berkeley, CA: Berkeley Linguistic Society.

Ginzburg, Jonathan and Ivan A. Sag. 2000. *Interrogative Investigations: The Form, Meaning, and Use of English Interrogatives*. Stanford: CSLI Publications.

Kim, Jong-Bok. 2001. Constructional constraints in English free relative constructions. *Korean Society for Language and Information* 5(1):35–53.

Lee, Hansook. 2001. English free relative constructions: A constraint-based approach. unpubl. ms., Seoul National University.

Lehrer, Andrienne. 1986. English classifier constructions. *Lingua* 68:109–148.

Malouf, Robert. 1999.
Mixed Categories in the Hierarchical Lexicon. Stanford, CA: CSLI Publications.

Müller, Stefan. 1999. *Deutsche Syntax deklarativ. Head-Driven Phrase Structure Grammar für das Deutsche*. No. 394 in Linguistische Arbeiten. Tübingen: Niemeyer.

Pollard, Carl J. and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: University of Chicago Press and Stanford: CSLI Publications.

Sag, Ivan A. and Jonathan Ginzburg. 2002. Extraction by construction. Unpublished ms., Stanford University and King's College London.

van Eynde, Frank. 2002. Minor adpositions in Dutch. Unpublished ms., University of Leuen.

Zwicky, Arnold. 1993. Heads, bases and functors. In G. Corbett, N. Fraser, and S. McClashan, eds., *Heads in grammatical theory*, pages 292–315. Cambridge: Cambridge University Press.

20

A Linearization-Based Theory of Summative Agreement in Peripheral-Node Raising Constructions

Shûichi Yatabe

20.1 Introduction

Before I start, I would like to explain what the title of this paper is supposed to mean. The term *peripheral-node raising (PNR)* will be used as a cover term for both right-node raising (RNR) and left-node raising (LNR). RNR is a phenomenon exemplified by an English sentence such as (1), and LNR is a phenomenon that can be regarded as its mirror image (see Yatabe 2001).

(1) My mother likes, but my father dislikes, that movie.

What I call *summative agreement* is a peculiar agreement pattern observed in right-node raising and left-node raising constructions in languages such as Basque (McCawley 1988, p. 533), Dargwa (Kazenin 2002), English (Postal 1998, p. 173; Levine 2001), German (Schwabe 2001; Schwabe and von Heusinger 2001), and Russian (Kazenin 2002). In these languages, when a predicate has two or more subjects (or objects, in the case of Basque) as a result of having been PNRed out of two or more clauses, it does not have to agree with each of its subjects (or objects, respectively). For instance, in these languages, when a verb has two subject NPs that are both singular, the verb can unexpectedly appear in a form that agrees with a plural subject. (2) is an English example of this phenomenon.

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(2) The pilot claimed that the first nurse, and the sailor proved that the second nurse, were spies. <7, 12, 3, 1>[1]
(from Postal 1998, p. 173)

The VP *were spies* in this example has two subjects; in the first clause, it takes the NP *the first nurse* as its subject, and in the second clause, it takes the NP *the second nurse* as its subject. Both the subjects are singular but the verb appears in the plural form. The following German and Russian examples appear to show the same pattern.

(3) Bist du sicher, daß Hans den Saft und Fritz den Wein gestohlen
Are you sure that Hans the juice and Fritz the wine stolen
haben? Ich glaube eher, daß [Hans den Saft und Fritz den
have.PL I believe rather that [Hans the juice and Fritz the
Wein gekauft haben].
wine bought have.PL]
'Are you sure that Hans STOLE the juice and Fritz the wine? I rather believe that [Hans BOUGHT the juice and Fritz the wine].'
(from Schwabe 2001)[2]

(4) Včera kupili: Vasja žurnal, a Kolja slovar'.
yesterday bought.PL Vasja journal but Kolja dictionary
'Yesterday Vasja bought a journal, and Kolja a dictionary.'
(from Kazenin 2002)

The bracketed portion of the German example (3) has the form S-O-S-O-V and arguably involves RNR of a verb cluster out of two clauses, and the Russian example (4) has the form V-S-O-S-O and arguably

[1]The figures immediately following some of the examples show the result of a questionnaire survey that I conducted in 2002, in which I obtained grammaticality judgments from 23 native speakers of English (3 American speakers and 20 British speakers). The notation <m, n, o, p> means that m people said the example was perfect, n people said it was slightly unnatural, o people said it was considerably unnatural, and p people said it was impossible. Each sentence was given 3 points for each speaker who said it was perfect, 2 points for each speaker who said it was slightly unnatural, and 1 point for each speaker who said it was considerably unnatural, and is shown here with no diacritic if it got more than 2.0 points on average, with '?' if it got 2.0 or less but more than 1.5 points on average, with '??' if it got 1.5 or less but more than 1.0 points on average, with '?*' if it got 1.0 or less but more than 0.5 points on average, and with '*' if it got 0.5 or less points.

[2]It is noted in the literature (Schwabe 2001; Schwabe and von Heusinger 2001) that this example is acceptable only when the sentence-final verb clusters are focused. Of the four non-linguist German speakers I consulted, one speaker found the example perfect, two speakers found it slightly unnatural, and one speaker found it somehow comical.

involves LNR of a verb out of two clauses.[3] Notice that, in both of these examples, the predicate is in the plural form, although the subject noun phrase in each clause is singular.

The phenomenon of summative agreement is of considerable theoretical significance, because it contradicts all currently available theories of agreement, as well as all currently available theories of PNR as far as I am aware, although there have been some vague proposals as to how the phenomenon is to be understood.

The aim of this paper is to present a theory that explicitly characterizes patterns of summative agreement. The proposed theory builds on my own theory of PNR, presented in Yatabe 2001, and is based on the view that agreement results from a non-lexical constraint that regulates under what circumstances a domain object can be merged with other domain objects by the compaction operation.

20.2 Two Theories That Do Not Work

I would like to start by describing two conceivable theories of summative agreement and showing that neither of them actually works.

First, it might seem easy to capture the patterns of summative agreement by adding the following combinatory rule to Steedman's Combinatory Categorial Grammar (see Steedman 2000). (According to Steedman's notation, $S\backslash NP_{sg}$ is a verb phrase that is looking for a singular subject NP, and $S\backslash NP_{pl}$ is a verb phrase that is looking for a plural subject NP.)

(5) $$\frac{S/(S\backslash NP_{sg}) \quad \text{Conj} \quad S/(S\backslash NP_{sg})}{S/(S\backslash NP_{pl})}$$

What this rule means is that, if you have the three things written above the horizontal bar, those three things can be combined to produce a constituent belonging to the category shown below the horizontal bar. Given this rule, the English example that we saw earlier could be analyzed as follows.

(6)
The p. claimed that the f. n.	and	the s. proved that the s. n.	were spies
$S/(S\backslash NP_{sg})$	Conj	$S/(S\backslash NP_{sg})$	$S\backslash NP_{pl}$
$S/(S\backslash NP_{pl})$			
S			

We can even extend this analysis to capture the contrast between this example and the following example, where the two clauses are conjoined by the word *or*, instead of the word *and*.

[3] I am assuming that the conjunction word *a* 'but' is not part of the second conjunct.

(7) The pilot claimed that the first nurse, or the sailor proved that the second nurse, $\left\{\begin{array}{l}\text{??were spies. <0, 9, 8, 6>}\\ \text{was a spy. <9, 8, 2, 2>}^{4}\end{array}\right\}$

The grammar will not tolerate summative agreement in a case like this if we assign the conjunction word *or* to a syntactic category different from the category of the word *and*.

This line of analysis, however, cannot be on the right track, because this analysis is incapable of capturing the fact that the possibility of summative agreement is partly determined by the meaning of the subject NPs involved, as shown by (8) and (9).

(8) The pilot claimed that the nurse from the United States, and the sailor also claimed that the nurse from the United States, $\left\{\begin{array}{l}\text{?*were spies. <1, 2, 9, 11>}\\ \text{was a spy. <9, 9, 4, 1>}\end{array}\right\}$

(9) The pilot claimed that the nurse from the United States, and the sailor claimed that no one, $\left\{\begin{array}{l}\text{?*were spies. <0, 5, 10, 8>}\\ \text{was a spy. <6, 14, 1, 2>}\end{array}\right\}$

In (8) the two subject NPs refer to the same individual, and in (9) one of the two subject NPs is a quantifier that begins with *no*, and summative agreement is prohibited in both these cases. The restrictions on summative agreement that are exemplified by these sentences would seem difficult to capture within a theory based on Combinatory Categorial Grammar, since in this theory information regarding the meaning of the two subject NPs is not available at the point where two clauses (more precisely, two phrases belonging to the category $S/(S\backslash NP_{sg})$) are conjoined.

Next, it might seem that a purely semantic theory of subject-verb agreement would make it unnecessary to say anything special about summative agreement. More specifically, it might seem possible to capture the observed patterns of summative agreement as well as non-summative agreement by saying that the plural form of a verb phrase is used if and only if that verb phrase is predicated of two or more objects. For instance, the English example in (2) states that there are *two* people who were either claimed or proven to be spies, and this semantic fact could be taken to be the reason why the verb appears in the plural form. If such a semantic account turns out to be appropriate in all cases, then it will not even be necessary to distinguish summative agreement from non-summative agreement.

[4]These figures do not add up to 23 because two speakers did not rate this sentence.

This line of analysis is ultimately not tenable either, however, because subject-verb agreement cannot be regarded as an entirely semantic phenomenon even in a language like English, where the form of subject-verb agreement does seem to be largely determined by semantic factors. This can be seen from the following examples, taken from Morgan 1984.

(10) a. Every student has passed the exam.

b. More than one student has passed the exam.

c. No student $\left\{\begin{array}{c}\text{has}\\ \text{*have}\end{array}\right\}$ failed the exam.

d. No students $\left\{\begin{array}{c}\text{*has}\\ \text{have}\end{array}\right\}$ failed the exam.

In (10a) and (10b), the singular form of the verb is used despite the fact that the sentences claim that the number of students who have passed the exam is two or more (assuming that there are two or more students in the case of (10a)). (10c) and (10d) both claim that the number of students who have failed the exam is zero, but the singular form of the verb is used in (10c) and the plural form is used in (10d). These sentences demonstrate that the form of number agreement that materializes on a verb phrase is not necessarily determined by the number of things that the verb phrase is predicated of. The difference in acceptability between (11a) and (11b) below shows that the same can be said about verb phrases that have been PNRed. (Note that the VP *were spies* in (11b) takes a singular NP as its subject in the first clause, and hence cannot be said to agree with each of its subjects.)

(11) a. ?*The pilot claimed that the nurse from the United States, and the sailor claimed that no doctor, were spies.
<0, 0, 11, 4>[5]

b. ?The pilot claimed that the nurse from the United States, and the sailor claimed that no doctors, were spies.
<2, 4, 9, 0>

(11b) is less than perfectly acceptable for many speakers, but there is a clear contrast between (11a) and (11b). This contrast will be difficult to account for within a purely semantic theory of agreement, as the two sentences appear to have the same meaning.

[5]I consulted only 15 speakers (2 American speakers and 13 British speakers) concerning the sentences in (11).

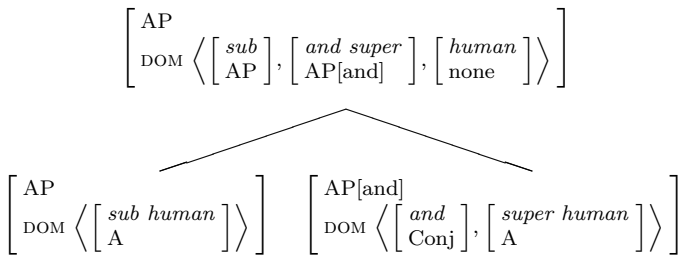

FIGURE 1 Right-node raising of a prosodic constituent

20.3 Peripheral-Node Raising of Predicates

Now I would like to present what I believe to be the correct theory of summative agreement. It is based on my own theory of peripheral-node raising (PNR), so let me briefly describe that theory first.

In the linearization-based theory of PNR presented in Yatabe 2001, it is claimed that PNR comes in two varieties: PNR that dislocates prosodic constituents and PNR that dislocates domain objects. The first type of PNR can be regarded as a species of phonological deletion; it has no semantic effect, and is allowed to fuse and dislocate two or more prosodic constituents even if they do not share identical syntactic or semantic internal structure. The second type of PNR, on the other hand, is an essentially syntactic operation; it does have a semantic effect, and it does not apply unless the things that are to be peripheral-node-raised share identical syntactic and semantic internal structure. Figure 1 shows a structure that is claimed to result from RNR of a prosodic constituent, and Figure 2 shows a structure that is claimed to result from RNR of a domain object. In Figure 1, it is assumed that the morphological words *subhuman* and *superhuman* each consist of two prosodic words, as indicated by use of spacing between the prefixes and the stems. Some people might be inclined to analyze the phrase *sub- and superhuman* as involving coordination of two prefixes, not as involving RNR out of two APs. The analysis depicted in Figure 1 is a reasonable one, however, in light of the existence of examples like *We must distinguish psycho- from sociolinguistic claims* and *the in- and the output of this machine* (Wilder 1997), which show clearly that part of a morphological word can be affected by RNR. (See also Booij 1984.)

Let us see what this theory predicts about examples that involve PNR of predicates. As it turns out, this theory predicts that when two or more predicates are peripheral-node-raised out of conjoined clauses, what is involved can only be PNR of the first type, which is assumed to be a process of phonological deletion. This prediction is obviously

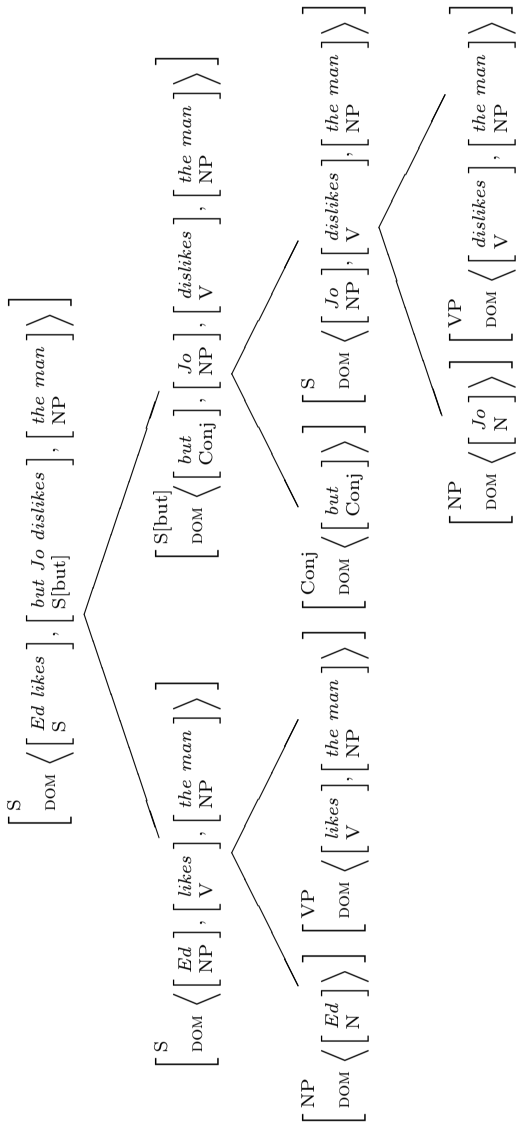

FIGURE 2 Right-node raising of a domain object

incorrect, in light of the existence of summative agreement; since a singular subject is not allowed to combine with a predicate in the plural form, sentences involving summative agreement just cannot be results of simple phonological deletion of a predicate (or predicates) contained in one (or more) of the conjuncts. To see that the theory under discussion indeed makes this incorrect prediction, let us examine the German example again, which is repeated in part in (12).

(12) (Ich glaube eher, daß) Hans den Saft und Fritz den Wein
(I believe rather that) Hans the juice and Fritz the wine
gekauft haben.
bought have.PL
'(I rather believe that) Hans BOUGHT the juice and Fritz the wine.'

Notice that the VALENCE value of the verb cluster which heads the first conjunct cannot be identical to the VALENCE value of the verb cluster which heads the second conjunct; for example, the SUBJ value of the former verb cluster is a list that consists of a *synsem* object whose index is anchored to Hans, whereas the SUBJ value of the latter verb cluster is a list consisting of a *synsem* object whose index is anchored to Fritz, and the two indices cannot be identical to each other. Hence the incorrect prediction that the domain objects corresponding to the two verb clusters cannot be RNRed together.

In order to make the theory work, it is necessary to allow two or more domain objects to be PNRed together even when their VALENCE values (and as a result their CONT values as well) are not identical. Now, what should happen when two or more domain objects with non-identical VALENCE values are PNRed together? Obviously those domain objects must be fused together to produce a single domain object, but what should the VALENCE value of that resultant domain object be? I suggest that the VALENCE value of the newly formed domain object be an amalgamation of the VALENCE values of the domain objects that are PNRed together. More specifically, I suggest that the German example, for instance, be analyzed as in Figure 3. In the proposed theory, when two or more domain objects representing predicates are PNRed together and thus fused together, information as to which *synsem* objects each predicate combines with is collected and stored in the newly created domain object, so to speak.

Let me describe in more detail what is going on in Figure 3. $\boxed{2}$ is the SYNSEM value of the domain object corresponding to the verb cluster in the first conjunct. It contains a SUBJ list and a COMPS list, which show which *synsem* objects this verb cluster combines with; in this case, the

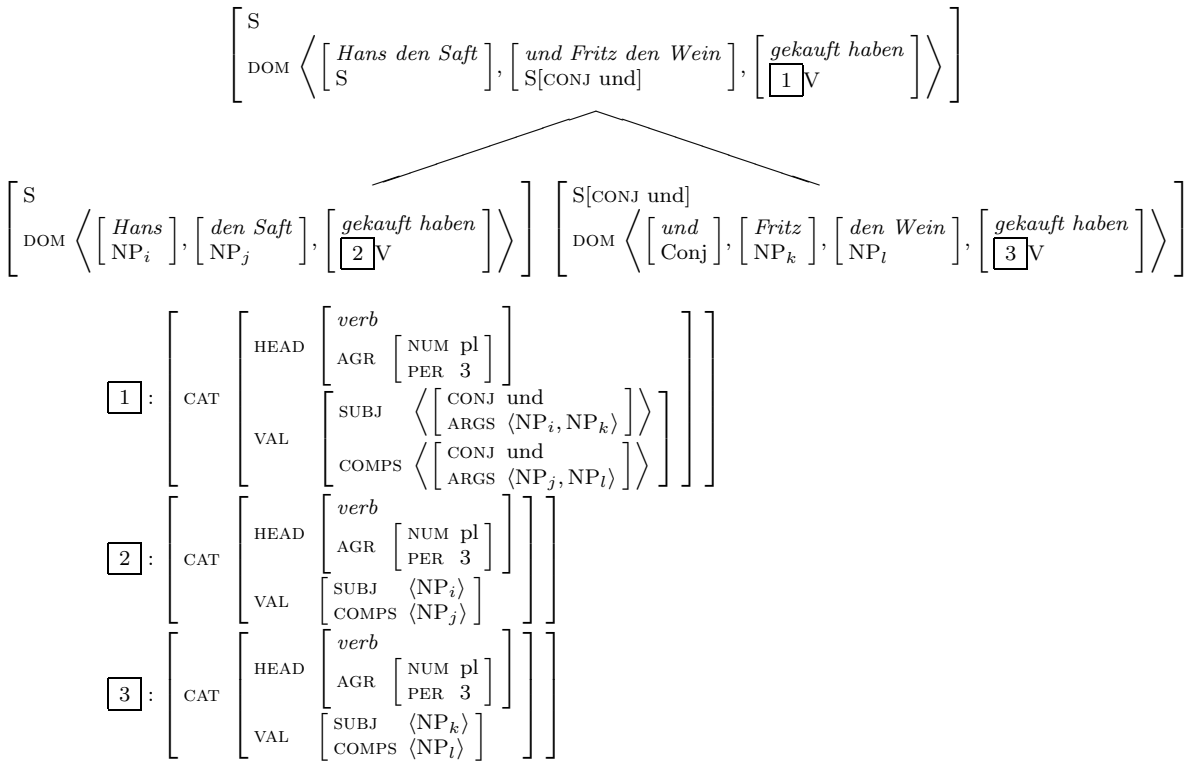

FIGURE 3 Right-node raising of a verb cluster in German

SUBJ list indicates that the verb cluster takes an NP whose index is i as its subject, and the COMPS list indicates that the verb cluster takes an NP whose index is j as its object. [3] is the SYNSEM value of the domain object corresponding to the verb cluster in the second conjunct. It also contains a SUBJ list and a COMPS list; the SUBJ list indicates that the verb cluster takes an NP whose index is k as its subject and the COMPS list indicates that the verb cluster takes an NP whose index is l as its object. [2] and [3] are fused and produce the SYNSEM object which is tagged as [1] in this figure. [1] contains all the information contained in [2] and [3]. Thus, the SUBJ list of [1] shows that this verb cluster takes as its subject an NP whose index is i in the first conjunct and an NP whose index is k in the second conjunct, and the COMPS list shows that this verb cluster takes as its object an NP whose index is j in the first conjunct and an NP whose index is l in the second conjunct. In addition, [1] contains information as to the conjunction word that was used to join the first clause and the second clause; in this case, the SUBJ list and the COMPS list of [1] both indicate that the two clauses were joined together by the conjunction word *und*.

Incidentally, here and in the rest of this paper, I assume, following Kathol 1999, that a verb has a HEAD feature called AGR. The way the AGR feature is put to use in the grammar will be explained shortly. As Kathol himself notes (see Kathol 1999, fn. 16), the assumption that AGR is a HEAD feature might lead to unwelcome consequences regarding the analysis of coordination of Ss. We may want to pursue the idea that AGR is not a HEAD feature but a VALENCE feature, and is somehow 'emptied' together with the SUBJ list when a predicate is combined with its grammatical subject. In this paper, however, I will continue to assume that AGR is a HEAD feature.

The way two domain objects with non-identical VALENCE values are fused together and produce what might be called phantom coordinate structures inside VALENCE lists is further illustrated in the following example.

(13)
$$\left[\begin{array}{l}\textit{dom-obj}\\ \textsc{ss|ct|vl}\ \left[\begin{array}{ll}\textsc{subj} & \langle \boxed{1}\,\mathrm{NP}_i\rangle\\ \textsc{comps} & \langle \boxed{2}\,\mathrm{NP}_j\rangle\end{array}\right]\end{array}\right] + \left[\begin{array}{l}\textit{dom-obj}\\ \textsc{ss|ct|vl}\ \left[\begin{array}{ll}\textsc{subj} & \langle \boxed{1}\,\mathrm{NP}_i\rangle\\ \textsc{comps} & \langle \boxed{3}\,\mathrm{NP}_k\rangle\end{array}\right]\end{array}\right]$$

$$\longrightarrow \left[\begin{array}{l}\textit{dom-obj}\\ \textsc{ss|ct|vl}\ \left[\begin{array}{ll}\textsc{subj} & \langle \boxed{1}\,\mathrm{NP}_i\rangle\\ \textsc{comps} & \left\langle \left[\begin{array}{ll}\textsc{conj} & \text{und}\\ \textsc{args} & \langle \boxed{2}\,\mathrm{NP}_j,\ \boxed{3}\,\mathrm{NP}_k\rangle\end{array}\right]\right\rangle\end{array}\right]\end{array}\right]$$

In this example, the two domain objects that are to be fused together

have identical SUBJ lists, although they have non-identical COMPS lists. In this case, the SUBJ list of the resultant domain object is identical to the SUBJ list of each of the two input domain objects, while the COMPS list of the resultant domain object is an amalgamation of the COMPS lists of the two input domain objects.[6]

The definitions of functions and relations that are needed to implement the proposed analysis are given in the Appendix. They are admittedly somewhat complicated, but the proposed analysis is in essence quite straightforward, and provides a basis for developing an adequate account of summative agreement.

20.4 A Non-Lexical Theory of Agreement

The theory of agreement that I propose takes Kathol's theory of agreement (see Kathol 1999) as a point of departure. In Kathol's theory, agreement is enforced by lexically encoded constraints that require identity between a portion of the AGR value of a predicate and a portion of the AGR or INDEX values of the elements in that predicate's VALENCE lists. For instance, in his theory, each personal verb in German is associated with a constraint that requires its own NUMBER and PERSON values to be identical to the AGR|NUMBER and the INDEX|PERSON value of the sole element in its SUBJ list. Now, Kathol's analysis as it stands now, like Pollard and Sag's analysis of agreement (see Pollard and Sag 1994) that it is intended to supersede, fails to capture the pattern of summative agreement, at least when combined with the theory of PNR that I presented above; neither the first conjunct nor the second conjunct in a sentence like (2) or (12) will be allowed to be generated, because the subject and the predicate do not agree in number in either of the conjuncts in such a sentence.

I submit that the lexical entry for each predicate does not impose any constraint on the AGR or INDEX values of the elements in its VALENCE lists. As an alternative means to enforce agreement, I propose the constraint in (14), a constraint that a sign is required to satisfy if it is to undergo compaction. (Here I disregard object-verb agreement.)

(14) A sign α cannot undergo compaction (i.e. it is not allowed to serve as the argument of the *totally_compact* function) unless the following constraint is satisfied:
For each domain object β in α's order domain such that β's SUBJ list contains an element that does not appear inside α's SUBJ list,

[6] Phantom coordinate structures inside COMPS lists do not have any function except in languages like Basque, which exhibits summative agreement with respect to object-verb agreement (see McCawley 1988, p. 533).

the SYNSEM|CAT|HEAD|AGR value of β is required to be in the *subj_verb_agreement* relation with the sole element in β's SUBJ list.

This can be informally paraphrased as in (15).

(15) Subject-verb agreement is enforced at the point (in a bottom-up tree construction) where either the SUBJ list of a domain object is emptied or the SUBJ list of a domain object disappears altogether.

The *subj_verb_agreement* relation, which is mentioned in (14), is defined as follows. This is a formulation intended for English. The *per_agr* relation, which is mentioned in (16), is defined in (17), and the functor symbol c, which also shows up in (16), is defined in (18). Roughly speaking, c(α) is an appropriate description of an object X if and only if either α is an appropriate description of X or X is a possibly nested phantom coordinate structure such that α is an appropriate description of each of its 'conjuncts'.[7]

(16) subj_verb_agreement $(\boxed{1}, \boxed{2}) \equiv$

$$\left(\boxed{1}:\begin{bmatrix}\text{PER} & \boxed{3}\\ \text{NUM} & \boxed{4}\end{bmatrix} \wedge \boxed{2}:\left[\text{CONT|INDEX} \begin{bmatrix}\text{PER} & \boxed{3}\\ \text{NUM} & \boxed{4}\end{bmatrix}\right]\right)$$

$$\vee \left(\boxed{2}:\left[\text{ARGS} \left\langle \boxed{a_1}, \ldots, \boxed{a_n}\right\rangle\right]\right.$$

$$\wedge \text{ subj\_verb\_agreement } \left(\boxed{1}, \boxed{a_1}\right)$$

$$\wedge \ \ldots$$

$$\wedge \text{ subj\_verb\_agreement } \left.\left(\boxed{1}, \boxed{a_n}\right)\right)$$

$$\vee \left(\boxed{1}:\begin{bmatrix}\text{PER} & \boxed{5}\\ \text{NUM} & \text{pl}\end{bmatrix}\right.$$

$$\wedge \text{ per\_agr } (\boxed{5}, \boxed{2})$$

$$\wedge \boxed{2}:[\text{CONJ} \ \boxed{6}]$$

$$\wedge \boxed{6} \neq \text{or}$$

$$\wedge \neg \exists \boxed{7} \exists \boxed{8} \left[\boxed{2}: \text{c}\left(\left[\text{CONT|INDEX} \ \boxed{7}[\text{NUM} \ \text{sg}]\right] \vee \left[\text{CONT}\begin{bmatrix}\text{LTOP} & \boxed{8}\\ \text{KEY|RELN} & \text{no}\\ \text{INDEX|NUM} & \text{sg}\end{bmatrix}\right]\right)\right]\Bigg)$$

[7]The formulation in (16) makes use of the features LTOP and KEY, which are standard ingredients of Minimal Recursion Semantics (MRS) (see Copestake et al. 1999). The theory described in the present paper (especially the material in the Appendix) presupposes the modified version of MRS proposed in Yatabe 2001, in which the SYNSEM|CONT values of signs are assumed to represent only constructional meaning. However, the way the LTOP feature and the KEY feature are assumed to behave in the proposed theory is much the same as the way they are assumed to behave in the original version of MRS.

(17) $\text{per\_agr}\left(\boxed{1},\boxed{2}\right) \equiv$

$$\begin{array}{lll}
 & \boxed{2} : \left[\text{CONT}|\text{INDEX}|\text{PER} \quad \boxed{1}\right] & \\
\vee & \Big(\quad \boxed{1} = 1 & \\
 & \quad \wedge \quad \boxed{2} : \left[\begin{array}{ll}\text{CONJ} & \boxed{3} \\ \text{ARGS} & \left\langle \boxed{a_1}, \ldots, \boxed{a_n} \right\rangle\end{array}\right] & \\
 & \quad \wedge \quad \boxed{3} \neq \text{or} & \\
 & \quad \wedge \quad \left(\text{per_agr}\left(1, \boxed{a_1}\right) \vee \cdots \vee \text{per_agr}\left(1, \boxed{a_n}\right)\right) \Big) & \\
\vee & \Big(\quad \boxed{1} = 2 & \\
 & \quad \wedge \quad \boxed{2} : \left[\begin{array}{ll}\text{CONJ} & \boxed{3} \\ \text{ARGS} & \left\langle \boxed{a_1}, \ldots, \boxed{a_n} \right\rangle\end{array}\right] & \\
 & \quad \wedge \quad \boxed{3} \neq \text{or} & \\
 & \quad \wedge \quad \left(\text{per_agr}\left(2, \boxed{a_1}\right) \vee \cdots \vee \text{per_agr}\left(2, \boxed{a_n}\right)\right) & \\
 & \quad \wedge \quad \neg\left(\text{per_agr}\left(1, \boxed{a_1}\right) \vee \cdots \vee \text{per_agr}\left(1, \boxed{a_n}\right)\right) \Big) & \\
\vee & \Big(\quad \boxed{2} : \left[\text{ARGS} \quad \left\langle \boxed{a_1}, \ldots, \boxed{a_n} \right\rangle\right] & \\
 & \quad \wedge \quad \left(\text{per_agr}\left(\boxed{1}, \boxed{a_1}\right) \wedge \cdots \wedge \text{per_agr}\left(\boxed{1}, \boxed{a_n}\right)\right) \Big) &
\end{array}$$

(18) $\boxed{1} : \text{c}\left(\alpha\right) \equiv$

$$\begin{array}{ll}
 & \boxed{1} : \alpha \\
\vee & \left(\boxed{1} : \left[\text{ARGS} \left\langle \boxed{a_1}, \ldots, \boxed{a_n} \right\rangle\right] \wedge \boxed{a_1} : \text{c}\left(\alpha\right) \wedge \cdots \wedge \boxed{a_n} : \text{c}\left(\alpha\right)\right)
\end{array}$$

As mentioned above, the *subj_verb_agreement* relation is a relation that is required to hold between the SS|CAT|HEAD|AGR value ($\boxed{1}$), and the SS|CAT|VAL|SUBJ|FIRST value ($\boxed{2}$) of a domain object. (The SS|CAT|VAL|SUBJ|FIRST value of a domain object is the sole element in its SUBJ list.) The first disjunct in the right-hand side of the definition of this relation (i.e. line 2 of (16)) deals with cases that do not involve phantom coordinate structures. The second disjunct (i.e. lines 3–6) deals with cases in which a predicate agrees with each 'conjunct' of a phantom coordinate structure.[8] And the third disjunct (i.e. lines 7–12) specifies constraints on summative agreement; lines 9–10 block

[8]This formulation is based on the assumption that a sentence like *The pilot claimed that the first nurse, and the sailor proved that the second nurse, was a spy* <9, 8, 5, 1>, which some authors take to be ungrammatical (Postal 1998, p. 173; Levine 2001), is in fact grammatical, as well as on the assumption that this sentence can be a result of RNR of a domain object, as opposed to RNR of a prosodic constituent.

summative agreement in cases like (7), and lines 11–12[9] block summative agreement in cases like (8), (9), and (11a), but not in cases like (11b) above or cases like (19) and (20) below.[10]

(19) The pilot claimed that every nurse, and the sailor proved that every doctor, $\left\{\begin{array}{l}\text{?were spies. <4, 10, 6, 3>}\\ \text{was a spy. <14, 7, 2, 0>}\end{array}\right\}$

(20) The pilot claimed that more than one nurse, and the sailor proved that more than one doctor, were spies. <9, 12, 1, 1> (Cf. (10b))

Let me step back a little and clarify the overall picture using the simple example in Figure 4. The VP node at the bottom of the figure has an order domain which contains a domain object corresponding to the verb *speaks*, and this domain object has a SUBJ list which is not empty. The NP node, which is also at the bottom of the figure, combines with this VP node to produce an S node. This NP serves as the subject of the VP, so the SUBJ list associated with the VP node itself is emptied at this point. However, the SUBJ list associated with the domain object corresponding to the verb, that is, the SUBJ list inside [4], is not emptied at this point; notice that the order domain associated with the S node still contains a domain object corresponding to the verb, a domain object which has a non-empty SUBJ list. I assume, as I do in Yatabe 2001, that the root node is required to undergo total compaction. In the case at hand, this means that the S node must undergo total compaction. The result of the compaction is the top node in the figure, tagged [1]; this top node is a domain object, whereas the other nodes in the figure are signs. Now, the SUBJ list in [3] *does* get emptied when the S node undergoes compaction; notice that the sole element in the SUBJ list of [3], i.e. NP_i, does not appear inside the SUBJ list of [5], which is empty. Therefore subject-verb agreement is enforced at this point, due to the constraint given in (15) (or (14)). The AGR value of [3] indicates that this verb should combine with a third-person singular subject under normal circumstances, and the sole element in the SUBJ list of [3], i.e. NP_i, indeed *is* a third-person singular NP; thus

[9]Here I am assuming that the KEY|RELN value of NPs like *no doctor* and *no one* is 'no'. This means that the theory proposed here presupposes the so-called DP hypothesis. I am also assuming that each elementary predication has a feature called RELN, whose value indicates the type of relation involved.

[10]Lines 11–12 of (16) predict that a phantom coordinate structure *does* sanction summative agreement if more than one of its 'conjuncts' is a quantifier whose KEY|RELN value is 'no'. This prediction is made because no two quantifiers ever share the identical LTOP value. This is a correct prediction to the extent that a sentence like *The sailor claimed that no nurse, and the pilot proved that no doctor, were spies* is acceptable.

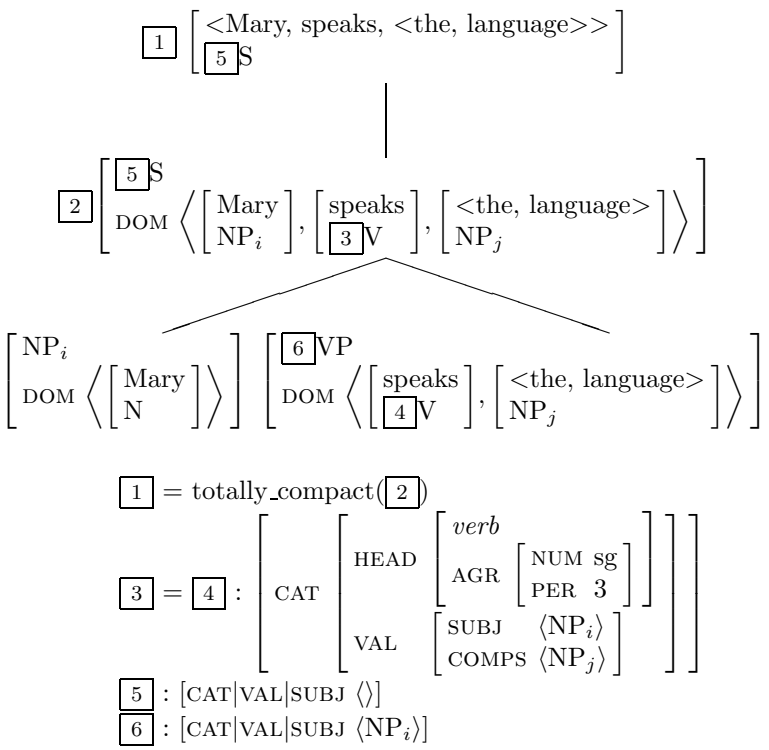

FIGURE 4 A simple example of subject-verb agreement

it is determined that the total compaction that applied to 2 to yield 1 was legitimate.

The precise location where subject-verb agreement is enforced makes no difference in a simple case like this, but it does make a difference in examples involving PNR. Let me describe in informal terms what this theory claims is taking place in the example illustrated in Figure 3. In this example, the verb cluster *gekauft haben* is not required to agree with the subject NP of the first conjunct or that of the second conjunct because the SUBJ list of the domain object representing this verb cluster stays intact while we are constructing each of these conjuncts. The verb cluster is required to agree with whatever fills its subject argument slot only at the location where the domain object representing the verb cluster (or some phrase containing the verb cluster) is merged with some other domain objects and its SUBJ list is emptied or disappears altogether. The location where this takes place is not shown in this figure; but at that location, the SUBJ list of the domain object rep-

resenting the verb cluster will be identical to the SUBJ list in [1], and the *subj_verb_agreement* relation (the German version of which has not been formulated here but is assumed to be similar in essential respects to the English version in (16)) *will* hold between the relevant elements in that domain object.

In order to have an analogous account of the summative agreement facts in English, we need to abandon or at least weaken the assumption (endorsed in Dowty 1996, Kathol and Pollard 1995, and Yatabe 2001) that tensed sentences are always required to undergo total compaction in English. This move is independently motivated by the existence of examples like (21).

(21) I had hoped that it was true for many years that Rosa Luxemburg had actually defected to Iceland. (from Gazdar 1981)

In this example, the phrase *that Rosa Luxemburg had actually defected to Iceland* appears to have been extraposed out of a tensed sentence. According to the linearization-based view of extraposition most explicitly developed in Kathol and Pollard 1995, this means that a tensed sentence is sometimes allowed to undergo strictly partial, as opposed to total, compaction.

What I have proposed in this section amounts to saying that agreement is a phenomenon that results from a non-lexical constraint that regulates under what circumstances a domain object can be merged with other domain objects by the compaction operation. This non-standard view of agreement is forced on us because any effort to lexicalize the patterns of summative agreement will force us to encode in the lexical entry for each predicate whether, how, and how many times it will have to undergo PNR, arguably a bizarre type of information to be encoded in the lexicon.

20.5 Conclusion

To conclude, I have presented a linearization-based theory that explicitly characterizes patterns of summative agreement in right-node raising and left-node raising constructions. In the process, I argued that subject-verb agreement results from a non-lexical constraint that regulates under what circumstances a sign is allowed to undergo compaction. I refer to the proposed theory as a linearization-based theory because it makes use of order domains, but I hope to have shown that a lot more than just linearization takes place inside order domains. In fact, I have argued in Yatabe 2001 that semantic composition mostly takes place inside order domains, and it has been my contention in this paper that agreement, one of the quintessential syntactic phenomena,

also takes place in order domains.

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Appendix

The analysis proposed in Section 20.3 can be formalized as in (22)–(29). Here, I concentrate on RNR of domain objects, ignoring RNR of prosodic constituents and LNR. Note that the formulation below presupposes the modified version of Minimal Recursion Semantics presented in Yatabe 2001, in which semantic composition is mostly carried out inside order domains. Note also that MOD is treated as a VALENCE feature in this formulation. This makes it possible to deal with examples in which a relative clause appears to have been PNRed, for example.

(22) Suppose $\boxed{1}\cdots\boxed{n}$ are the daughters of the phrase $\boxed{0}$, the DOM value of $\boxed{0}$ is $\boxed{d_0}$, and the SYNSEM|CONT|KEY|RELN value of $\boxed{0}$ is $\boxed{\text{Conj}}$. Then the relation between $\boxed{d_0}$, $\boxed{1}\cdots\boxed{n}$, and $\boxed{\text{Conj}}$ must conform either to 'constraints of the usual type' (which give rise to a structure not involving RNR or LNR) or to the the following constraints:

(i) $n \geq 2$, and

(ii) for some list $\left\langle \boxed{L_1}, \cdots, \boxed{L_n} \right\rangle$ that is obtained by arbitrarily reordering the elements of the list $\langle \boxed{1}, \cdots, \boxed{n} \rangle$, $\text{rnr}\left(\left\langle \boxed{L_1}, \cdots, \boxed{L_n} \right\rangle, \boxed{d_0}, \boxed{\text{Conj}} \right)$.

(23) $\text{rnr}\left(\left\langle \boxed{L_1}, \cdots, \boxed{L_n} \right\rangle, \boxed{d_0}, \boxed{\text{Conj}} \right) \equiv$

$\boxed{L_1} : \left[\text{DOM } \boxed{M_1} \oplus \boxed{N_1} \right] \wedge \cdots \wedge \boxed{L_n} : \left[\text{DOM } \boxed{M_n} \oplus \boxed{N_n} \right]$

$\wedge \boxed{N_1} \neq \langle\rangle \wedge \cdots \wedge \boxed{N_n} \neq \langle\rangle$

$\wedge \boxed{d_0} = \Big\langle \text{totally\_compact}\left(\text{cut\_right}\left(\boxed{N_1}, \boxed{L_1} \right) \right),$

$\cdots, \text{totally\_compact}\left(\text{cut\_right}\left(\boxed{N_n}, \boxed{L_n} \right) \right) \Big\rangle \oplus \boxed{N_0}$

$\wedge \text{fuse\_each}\left(\left\langle \boxed{N_1}, \cdots, \boxed{N_n} \right\rangle, \boxed{N_0}, \boxed{\text{Conj}} \right)$

(*totally_compact* and *cut_right* are functions, whereas *rnr* and *fuse_each* are relations. I assume that the *totally_compact* function is defined as in Yatabe 2001, (28).)

(24) $\mathrm{cut\_right}\left(\boxed{a}, \begin{bmatrix}\mathrm{SYNSEM} & \boxed{1}\\ \mathrm{DOM} & \boxed{b}\end{bmatrix}\right)$
$= \begin{bmatrix}\mathrm{SYNSEM} & \boxed{1}\\ \mathrm{DOM} & \mathrm{subtract\_right}(\boxed{a}, \boxed{b})\end{bmatrix}$

(25) $\mathrm{subtract\_right}\,(\boxed{a}, \boxed{b})$ is
(i) the non-empty list $\boxed{c}$ such that $\boxed{c} \oplus \boxed{a} = \boxed{b}$, if such $\boxed{c}$ exists, and
(ii) undefined, otherwise.

(26) $\mathrm{fuse\_each}\left(\left\langle \boxed{K_1}, \cdots, \boxed{K_n}\right\rangle, \boxed{K_0}, \boxed{\mathrm{Conj}}\right) \equiv$
$\left(\boxed{K_1} : \langle\rangle \wedge \cdots \wedge \boxed{K_n} : \langle\rangle \wedge \boxed{K_0} : \langle\rangle\right)$
$\vee \left(\boxed{K_1} : \left\langle \boxed{1} \mid \boxed{L_1}\right\rangle \wedge \cdots \wedge \boxed{K_n} : \left\langle \boxed{n} \mid \boxed{L_n}\right\rangle \wedge \boxed{K_0} : \left\langle \boxed{0} \mid \boxed{L_0}\right\rangle\right.$
$\wedge\, \mathrm{fuse}\left(\left\langle \boxed{1}, \cdots, \boxed{n}\right\rangle, \boxed{0}, \boxed{\mathrm{Conj}}\right)$
$\left.\wedge\, \mathrm{fuse\_each}\left(\left\langle \boxed{L_1}, \cdots, \boxed{L_n}\right\rangle, \boxed{L_0}, \boxed{\mathrm{Conj}}\right)\right)$

(27) $\mathrm{fuse}\left(\langle \boxed{1}, \cdots, \boxed{n}\rangle, \boxed{0}, \boxed{\mathrm{Conj}}\right) \equiv$
$\boxed{0} = \boxed{1} = \cdots = \boxed{n}$
$\vee \left(\neg\left(\boxed{1} = \cdots = \boxed{n}\right)\right.$
$\wedge\, \boxed{1} : \begin{bmatrix}\mathrm{SYNSEM} & \boxed{S_1}\\ \mathrm{PHON} & \boxed{P}\end{bmatrix} \wedge \cdots \wedge \boxed{n} : \begin{bmatrix}\mathrm{SYNSEM} & \boxed{S_n}\\ \mathrm{PHON} & \boxed{P}\end{bmatrix}$
$\wedge\, \boxed{0} : \begin{bmatrix}\mathrm{SYNSEM} & \boxed{S_0}\\ \mathrm{PHON} & \boxed{P}\end{bmatrix}$
$\left.\wedge\, \mathrm{fuse\_synsem}\left(\left\langle \boxed{S_1}, \cdots, \boxed{S_n}\right\rangle, \boxed{S_0}, \boxed{\mathrm{Conj}}\right)\right)$

(28) $\mathrm{fuse\_synsem}\left(\langle \boxed{1}, \cdots, \boxed{n}\rangle, \boxed{0}, \boxed{\mathrm{Conj}}\right) \equiv$

$$\boxed{1} : \begin{bmatrix}\mathrm{CAT} & \begin{bmatrix}\mathrm{HEAD} & \boxed{a}\\ \mathrm{VAL} & \begin{bmatrix}\mathrm{SUBJ} & \boxed{b_1}\\ \mathrm{COMPS} & \boxed{c_1}\\ \mathrm{MOD} & \boxed{d_1}\end{bmatrix}\end{bmatrix}\\ \mathrm{CONT} & \begin{bmatrix}\mathrm{LTOP} & \boxed{e_1}\\ \mathrm{INDEX} & \boxed{f_1}\\ \mathrm{SEMHEAD} & \boxed{g_1}\\ \mathrm{EP} & \boxed{h_1}\\ \mathrm{H\text{-}CONS} & \boxed{i_1}\\ \mathrm{H\text{-}STORE} & \boxed{j}\end{bmatrix}\end{bmatrix} \wedge$$

$$\cdots \wedge \boxed{n} : \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \boxed{a} \\ \text{VAL} & \left[\begin{array}{ll} \text{SUBJ} & \boxed{b_n} \\ \text{COMPS} & \boxed{c_n} \\ \text{MOD} & \boxed{d_n} \end{array}\right] \end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll} \text{LTOP} & \boxed{e_n} \\ \text{INDEX} & \boxed{f_n} \\ \text{SEMHEAD} & \boxed{g_n} \\ \text{EP} & \boxed{h_n} \\ \text{H-CONS} & \boxed{i_n} \\ \text{H-STORE} & \boxed{j} \end{array}\right] \end{array}\right]$$

$$\wedge \boxed{0} : \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \boxed{a} \\ \text{VAL} & \left[\begin{array}{ll} \text{SUBJ} & \boxed{b_0} \\ \text{COMPS} & \boxed{c_0} \\ \text{MOD} & \boxed{d_0} \end{array}\right] \end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll} \text{LTOP} & \text{none} \\ \text{INDEX} & \text{none} \\ \text{SEMHEAD} & \text{none} \\ \text{EP} & \boxed{h_1} \oplus \cdots \oplus \boxed{h_n} \\ \text{H-CONS} & \boxed{i_1} \cup \cdots \cup \boxed{i_n} \\ \text{H-STORE} & \boxed{j} \end{array}\right] \end{array}\right]$$

$$\wedge \text{fuse\_valence}\Big(\Big\langle \boxed{b_1}, \cdots, \boxed{b_n} \Big\rangle, \boxed{b_0}, \boxed{\text{Conj}}\Big)$$
$$\wedge \text{fuse\_valence}\Big(\Big\langle \boxed{c_1}, \cdots, \boxed{c_n} \Big\rangle, \boxed{c_0}, \boxed{\text{Conj}}\Big)$$
$$\wedge \text{fuse\_valence}\Big(\Big\langle \boxed{d_1}, \cdots, \boxed{d_n} \Big\rangle, \boxed{d_0}, \boxed{\text{Conj}}\Big)$$

(29) $$\text{fuse\_valence}\Big(\big\langle \boxed{1}, \cdots, \boxed{n} \big\rangle, \boxed{0}, \boxed{\text{Conj}}\Big) \equiv$$
$$\Big(\boxed{1} : \langle\rangle \wedge \cdots \wedge \boxed{n} : \langle\rangle \wedge \boxed{0} : \langle\rangle\Big)$$
$$\vee \Big(\boxed{1} : \Big\langle \boxed{a_1} \mid \boxed{L_1} \Big\rangle \wedge \cdots \wedge \boxed{n} : \Big\langle \boxed{a_n} \mid \boxed{L_n} \Big\rangle \wedge \boxed{0} : \Big\langle \boxed{a_0} \mid \boxed{L_0} \Big\rangle$$
$$\wedge \Bigg(\Big(\boxed{a_0} = \boxed{a_1} = \cdots = \boxed{a_n}\Big) \vee \Bigg(\neg\Big(\boxed{a_1} = \cdots = \boxed{a_n}\Big) \wedge \boxed{a_0} : \left[\begin{array}{ll} \text{CONJ} & \boxed{\text{Conj}} \\ \text{ARGS} & \Big\langle \boxed{a_1}, \cdots, \boxed{a_n} \Big\rangle \end{array}\right]\Bigg)\Bigg)$$
$$\wedge \text{fuse\_valence}\Big(\Big\langle \boxed{L_1}, \cdots, \boxed{L_n} \Big\rangle, \boxed{L_0}, \boxed{\text{Conj}}\Big)\Big)$$

References

Booij, Geert E. 1984. Coordination reduction in complex words: A case for prosodic phonology. In H. van der Hulst and N. Smith, eds., *Advances in Nonlinear Phonology*, pages 143–160. Dordrecht: Foris.

Copestake, Ann, Dan Flickinger, Ivan A. Sag, and Carl Pollard. 1999. Minimal recursion semantics: An introduction. Ms., Stanford University. Obtained at http://www-csli.stanford.edu/~aac/ in 2001.

Dowty, David R. 1996. Toward a minimalist theory of syntactic structure. In H. Bunt and A. van Horck, eds., *Discontinuous Constituency*, pages 11–62. Berlin: Mouton de Gruyter.

Gazdar, Gerald. 1981. Unbounded dependencies and coordinate structure. *Linguistic Inquiry* 12:155–184.

Kathol, Andreas. 1999. Agreement and the syntax-morphology interface in HPSG. In R. D. Levine and G. M. Green, eds., *Studies in Contemporary Phrase Structure Grammar*, pages 223–274. Cambridge: Cambridge University Press.

Kathol, Andreas and Carl Pollard. 1995. Extraposition via complex domain formation. In *33rd Annual Meeting of the Association for Computational Linguistics*, pages 174–180. San Francisco: Morgan Kaufmann.

Kazenin, Konstantin I. 2002. Gapping and some agreement puzzles. Ms., University of Tübingen. Obtained at http://www.sfb441.uni-tuebingen.de/b2/b2pubs.html on Feb. 7, 2002.

Levine, Robert D. 2001. The extraction riddle: Just what are we missing? *Journal of Linguistics* 37:145–174.

McCawley, James D. 1988. *The Syntactic Phenomena of English*. Chicago: University of Chicago Press.

Morgan, Jerry L. 1984. Some problems of determination in English number agreement. In G. Alvarez, B. Brodie, and T. McCoy, eds.,

Proceedings of the First Eastern States Conference on Linguistics, pages 69–78.

Pollard, Carl and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: University of Chicago Press.

Postal, Paul M. 1998. *Three Investigations of Extraction*. Cambridge, Massachusetts: MIT Press.

Schwabe, Kerstin. 2001. On shared indefinite expressions in coordinative structures. In O. Teuber and N. Fuhrhop, eds., *ZAS Papers in Linguistics 21*, pages 175–196. Berlin: ZAS.

Schwabe, Kerstin and Klaus von Heusinger. 2001. On shared indefinite NPs in coordinative structures. *Journal of Semantics* 18:243–269.

Steedman, Mark. 2000. *The Syntactic Process*. Cambridge, Massachusetts: MIT Press.

Wilder, Chris. 1997. Some properties of ellipsis in coordination. In A. Alexiadou and T. A. Hall, eds., *Studies on Universal Grammar and Typological Variation*, pages 59–107. Amsterdam: John Benjamins.

Yatabe, Shûichi. 2001. The syntax and semantics of left-node raising in Japanese. In D. Flickinger and A. Kathol, eds., *Proceedings of the 7th International Conference on Head-Driven Phrase Structure Grammar*, pages 325–344. Stanford: CSLI.

21

Case Marking in Korean Auxiliary Verb Constructions

Eun-Jung Yoo

21.1 Introduction

This paper deals with case marking in auxiliary verb constructions (AVCs) in Korean, and investigates how the case marking pattern in AVCs can be explained in terms of structural case resolution in the spirit of Pollard 1994, Heinz & Matiasek 1994, and Przepiórkowski 1999. There have been numerous studies on the theory of case marking in Korean, including Kang 1986, Kim, Y.J. 1990, Hong 1991, Lee 1992, Chung 1994, and Lee 1994. There also have been many works on the structure of Korean AVCs (Cho 1988, Kim, M.K. 1990, No 1991, Sells 1991, 1998, Chung 1993, Kang 1998). Yet it has not been attempted to examine diverse case marking patterns that arise from various combinations of auxiliary verbs. Previous analyses have been focused on simple case alternation phenomena with the auxiliary verb *siph-* 'want' (Gerdts & Youn 1989, Chang & Cho 1991, and Kim & Maling 1996) and many claim that such case alternation is caused by structural ambiguity that the *siph-* construction exhibits. Within the HPSG framework, Yoo 1993 and Bratt 1996 discuss the basic mechanism of case marking in AVCs under the assumption that auxiliary verbs combine with a main verb to form a complex predicate (Chung 1993,1998).

In this paper, a new set of data involving various combinations of auxiliary verbs is presented to point out problems for both transformational analyses based on head movement and previous HPSG analyses in which the final auxiliary verb solely determines the case of the complements of the whole complex predicate. This paper shows that while most auxiliary verbs "inherit" the case marking property of

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the preceding verb, the auxiliary verbs *siph-* 'want' and *ha-* 'act like' have an additional property of assigning nominative and accusative case, respectively, to their complements. The actual case assignment by these auxiliary verbs is made possible, however, depending on what other kind of auxiliary verbs they are combined with. Based on the complex predicate analysis of AVCs, this paper proposes that complicated case patterns in AVCs can be accounted for by classification of verbs/auxiliary verbs via distinct feature values and by the mechanism of structural case resolution.

21.2 Case in Auxiliary Verb Constructions

AVCs in Korean are formed with a main verb followed by one or more auxiliary verbs.

(1) a. Nay-ka sakwa-lul mek-nun-ta.
I-NOM apple-ACC eat-PRES-DECL
'I eat an apple.'

b. Nay-ka sakwa-lul mek-e po-ass-ta.
I-NOM apple-ACC eat do.as.a.try-PST-DECL
'I tried to eat an apple.'

c. Nay-ka sakwa-lul mek-e po-ci anh-key
I-NOM apple-ACC eat do.as.a.try not
toy-ess-ta.
come.to-PST-DECL
'(Lit.) I came to not try to eat an apple.'

When an auxiliary verb combines with a verb or another auxiliary verb, it requires a particular verbal ending on the preceding predicate. This is shown in (2), which lists auxiliary verbs that may combine with transitive verbs and are used in relatively high frequency. (Cf. Nam & Ko 1993, Seo 1994, Kim 1996, Sohn 1996, Kang 1998.)

(2) Auxiliary verbs in Korean

a. *-e/a* : *po-* 'try, do as a try', *cwu-* 'do as a favor', *noh-* 'do in advance', *twu-* 'do in advance', *chiwu-* 'do resolutely', *peli-* 'do completely', *tay-* 'do repeatedly', *nay-* 'do thoroughly', *ha-* 'act like' *ka-* 'be getting', *o-* 'gradually come to/get', *ci-* 'come to'

b. *-ko*: *siph-* 'want', *iss-* 'be in the process of', *na-* 'have finished doing', *mal-* 'end up doing'

c. *-ci*: *anh-* 'not'

d. *-key*: *toy-* 'come to'

Moreover, each auxiliary verb has selectional restrictions on preceding predicates in terms of a syntactic category or semantics. For example, *cwu-*, *tay-*, *nay-*, and *iss-* do not combine with adjectives, and *noh-* and *twu-* do not combine with adjectives or intransitive verbs without cognate objects. While both *chiwu-* and *peli-* have a meaning associated with removal, *chiwu-* cannot combine with stative verbs with abstract objects (e.g., **al-a chiwu-ta* 'know resolutely'). (Cf. Kang 1998)

In AVCs, the complement NP(s) usually bear the case that the main verb would assign. This is illustrated by (1) and (3).

(3) a. Nay-ka paym-i mwusep-ta.
I-NOM snake-NOM afraid-DECL
'I am afraid of a snake.'

b. Nay-ka paym-i mwusew-e ci-ess-ta.
I-NOM snake-NOM afraid come.to-DECL
'(Lit.) I have become afraid of a snake.'

c. Nay-ka paym-i mwusep-ci anh-key toy-ess-ta.
I-NOM snake-NOM afraid not come.to-DECL
'(Lit.) I have become not afraid of a snake.'

In (1b,c), accusative case assigned by the main verb *mek-* 'eat' is retained, while in (3b,c), nominative case assigned by the psych verb *mwusep-* 'afraid' is maintained.

On the other hand, when the auxiliary verb *siph-* 'want' is involved, case alternation between Acc and Nom is observed.

(4) a. Nay-ka sakwa-lul/sakwa-ka mek-ko siph-ta.
I-NOM apple-ACC/apple-NOM eat want-DECL
'I want to eat an apple.'

b. Nay-ka sakwa-lul/sakwa-ka mek-e po-ko siph-ta.
I-NOM apple-ACC/apple-NOM eat as.a.try want-DECL
'I want to try to eat an apple.'

Moreover, the auxiliary verb *ha-* 'act like', which is only attached to psych verbs, changes case marking of the preceding verb (No 1991).

(5) Nay-ka paym-ul mwusew-e ha-n-ta.
I-NOM snake-ACC afraid act.like-PRES-DECL
'I am afraid of snakes.'

The auxiliary verb *ha-* also combines with *siph-* predicates and may affect the case of the main verb.

(6) a. Nay-ka sakwa-lul/∗sakwa-ka mek-ko siph-e
I-NOM apple-ACC/apple-NOM eat want
ha-n-ta.
act.like-PRES-DECL
'(Lit.) I act like wanting to eat an apple.'

b. Nay-ka paym-ul/∗paym-i mwusew-e-ha-ko
I-NOM snake-ACC/snake-NOM afraid-act.like
siph-ta.
want-DECL
'(Lit.) I want to act like being afraid of snakes.'

The examples in (4-6) show that the case of an NP complement in AVCs is not solely determined by the main verb, and suggest that the role of *siph-* and *ha-* in case marking should be examined. In the following section, we will review some previous analyses on these phenomena.

21.3 Previous Analyses

21.3.1 Derivational approaches

Chang & Cho (1991) propose that case alternation in *siph-* constructions and *ha-* psych predicate constructions can be accounted for by positing head movement of a main verb into a higher auxiliary verb. For the structure of AVCs, they assume that auxiliary verbs *siph-* or *ha-* take VP complements. Then they claim that head movement of a main verb is obligatory when the hosting auxiliary verb has no lexical meaning (e.g. *ha-* in (5)), and it is optional, otherwise (e.g. *siph-* in (4)). According to them, when head movement occurs, the case of the complement is determined by the host auxiliary verb. Thus a *siph-* predicate assigns Nom and a *ha-* predicate assigns Acc. However, this analysis posits many serious problems. Most importantly, this analysis yields multiple structures for most AVC examples, because head movement is optional when an auxiliary verb has a lexical meaning. Since almost all auxiliary verbs have some semantic content (probably including *ha-*), when more than one auxiliary verb appears, each of them has an option for head movement. Consequently, many different structures are possible for one sentence, even if there is no case alternation involved. Furthermore, it would wrongly predict that examples such as (1c) have case alternation, because when head movement occurs, the auxiliary verb *toy-* will be able to assign Nom as well. In addition, they cannot account for (6b), because both *mwusep-* and *ha-* may move to *siph-*, and the resulting *siph-* predicate may assign Nom to the complement.

Kim & Maling (1996) adopt a head movement approach to the *siph-*

construction as well. In their analysis, the *siph-* construction is structurally ambiguous: *siph-* takes an Asp(ect)P headed by *-ko* as its complement, and has an additional structure as a result of head movement. Their analysis is based on the following structural schema:

(7) $[[[[[[\text{NP } V_2]_{VP2}$ *-ko*$]_{AspP2}$ *siph-*$]_{VP1}$ $\text{Asp}_1]_{AspP1}$ $\text{T}]_{TP}$ $\text{Mood}]_{MoodP}$

According to them, when *-ko*, the head of a AspP, is [-complete], denoting an incomplete event, the main verb remains inside a VP and assigns Acc to its complement. On the other hand, when *-ko* is [0complete], denoting an unrealized event, head movement of a verb (V2) occurs to form a verbal complex V-*ko*-*siph*. When a verbal complex with *siph-* is formed, V2 is not associated with its own Aspect, so Acc is not assigned. Instead, Nom is assigned to the complement NP by the matrix Infl, due to the Nom assigning property of the complex predicate headed by *siph-*.

Kim & Maling argue for syntactic ambiguity of the *siph-* construction on two grounds. First, they argue that the two structures (i.e., without and with head movement) exhibit different behaviors with respect to coordination and gapping. Consider the following coordination example:

(8) a. Cheli-nun pap-ul cis-ko ppallay-lul ha-ko
Cheli-TOP rice-ACC cook-CONJ laundry-ACC do
siph-ess-ta.
want-PST-DECL
'Cheli wanted to cook rice and do the laundry.'

b. *Cheli-nun pap-i cis-ko ppallay-ka ha-ko
Cheli-TOP rice-ACC cook-CONJ laundry-ACC do
siph-ess-ta.
want-PST-DECL
'Cheli wanted to cook rice and do the laundry.'

They explain that while (8a) is an instantiation of a VP (or AspP) coordination, (8b) cannot be generated by coordination, since a nominative complement appears only when a verbal complex is formed via head movement. However, this cannot be strong evidence for structural ambiguity, because, if we assume that an untensed *-ko* clause (or VP) is an adjunct, following Kim (2000), (8) can be analyzed as involving an adjunct VP, rather than a coordinated structure. (Cf. Manning et al. 1999.)

(9) a. Cheli-nun [pap-ul cis-ko] ppallay-lul ha-ko
Cheli-TOP rice-ACC cook-CONJ laundry-ACC do
siph-ess-ta.
want-PST-DECL
'Cheli wanted to cook rice and (then) do the laundry.'

b. Cheli-nun ppallay-lul [pap-ul cis-ko] ha-ko
Cheli-TOP laundry-ACC rice-ACC cook-CONJ do
siph-ess-ta.
want-PST-DECL
'Cheli wanted to cook rice and then do the laundry.'

Example (9b) shows that the bracketed phrase in (9a) can be analyzed as an adjunct. Therefore, the ungrammaticality of (8b) can be accounted for regardless of head movement, because the sequence *pap-i cis-ko* can never form an adjunct phrase.

Another argument for the dual structure analysis comes from difference in scope of aspect/time adverbials. According to them, scopal difference occurs in (10), because, in (10a), there are two possible VPs to be modified, while in (10b) the adverbial only modifies the whole complex predicate.

(10) a. Na-nun pamsay swul-ul masi-ko siph-ess-ta.
I-TOP all.night liquor-ACC drink want-PST-DECL
'To drink all night was my desire.'
or 'All night long, I had a desire to drink.'

b. Na-nun pamsay swul-i masi-ko siph-ess-ta.
I-TOP all.night liquor-NOM drink want-PST-DECL
'All night long, I had a desire to drink.'
Not available: 'To drink all night was my desire.'
(Kim & Maling 1996: 141)

However, scope ambiguity with aspect/time adverbials is not always correlated with structural ambiguity. For example, in (11), though it is not possible to posit two different constituent structures, the time adverbial still have two possible scope readings.

(11) Emeni-ka ai-ekey ppalkan os-ul olay-tongan
mother-NOM child-to red cloth-ACC long-during
ip-hi-ess-ta.
wear-CAUS-PST-DECL
'Mother dressed the child with red dress for a long time.'
or 'Mother made the child wear red dress for a long time.' (Bratt 1996:180)

More importantly, even in (10b), a slightly different word order allows narrow scope reading, as shown in (12).

(12) Na-nun swul-i pamsay masi-ko siph-ess-ta.
I-TOP liquor-NOM all.night drink want-PST-DECL
'To drink all night was my desire.' or 'All night long, I had a desire to drink.'

Therefore, there is no convincing evidence that case alternation in *siph*-constructions should be accounted for in terms of structural ambiguity.[1]

Kim & Maling's analysis posits empirical problems as well. First, if *-ko* [0complete] triggers head movement of V resulting in a complex predicate V-*ko*-*siph*, it is not explained why Nom is also available in (13).

(13) a. Nay-ka sakwa-lul/sakwa-ka mek-e po-ko
I-NOM apple-ACC/apple-NOM eat have.a.try
siph-ta.
want-DECL
'(Lit.) I want to have a try at eating an apple.'

b. Na-nun sakwa-lul/sakwa-ka mek-e chiwu-ko
I-NOM apple-ACC/apple-NOM eat do.resolutely
siph-ta.
want-DECL
'I want to get through with eating an apple.'

c. Na-nun Cheli-lul/Cheli-ka ttayli-e cwu-ko
I-NOM Cheli-ACC/Cheli-NOM hit do.as.a.favor
siph-ta.
want-DECL
'I want to hit Cheli.'

In (13a), for example, *po-ko* is incorporated with *siph*-, but cannot assign Nom to the complement of *mek*-, which is not part of the verbal complex.

Second, as Kim & Maling note, the sentences in (14) are left unexplained. (Kim & Mailing 1996:165)

[1]Sells (2002) independently argues that the Acc/Nom case on NP complement is not correlated to the different syntactic structures. He provides examples similar to (12), in which scope ambiguity is exhibited regardless the case marking on the complement, when the negation particle *an* 'not' or the event quantifier *cacwu* 'often' appears between the complement and the *siph*- complex predicate.

(14) a. Na-nun paym-ul/*paym-i mwusewe-ha-ko
I-TOP snake-ACC/snake-NOM afraid-act.like
siph-ta.
want-DECL
'I want to be afraid of a snake.'

b. Na-nun wuli cip-ul/*cip-i calangsulewe-ha-ko
I-TOP our house-ACC/house-NOM proud-act.like
siph-ta.
want-DECL
'I want to be proud of our house.'

Since they treat *ha-* as an affix, *mwusewe-ha-ko* and *calangsulewe-ha-ko* in (14) form a verbal complex with *siph-* respectively. Then it is unexplained why Nom cannot be assigned by the verbal complex. Furthermore, they cannot account for why case alternation does not occur in (15) in spite of formation of the verbal complex *mek-ko-siph-e-ha* via head movement of the main verb.

(15) Nay-ka sakwa-lul/*sakwa-ka mek-ko siph-e-
I-NOM apple-ACC/apple-NOM eat want
ha-n-ta.
act.like-PRES-DECL
'I want to eat an apple.'

21.3.2 Non-derivational approaches

Within the framework of HPSG, Yoo (1993) and Bratt (1996) discuss the basic mechanism of case marking in Korean AVCs under the assumption that a main verb followed by an auxiliary verb forms a complex predicate (Chung 1993). Yoo assumes that Nom and Acc can be either lexically or structurally assigned in Korean. (Cf. Heinz & Matiasek 1994.) In Yoo (1993), case alternation with *siph-* is explained by two different lexical entries, one of which specifies lexical nominative case [lnom] on the complement. Furthermore, examples with psych verbs (e.g., (3a)) and their non-psych counterparts containing *ha-* (e.g., (5)) are accounted for by assuming that psych verbs assign lexical nominative case to their complements, while the *ha-* form verbs, which are derived from psych verbs, assign lexical accusative case, [lacc].

However, Yoo (1993) has a problem in more complicated examples. When *ha-* is analyzed as a [lnom] assigner, the example in (16) cannot be accounted for, since all the examples involving *ha-* are predicted to have accusative complements.[2]

[2]The same kind of problem arises in Chung (1998) that also assumes lexical

(16) a. Ku-nun pam-i/*pam-ul twulyep-key toy-ko siph-e
he-TOP night-NOM/night-ACC afraid become want
ha-n-ta.
act.like-PRES-DECL
'(Lit.) He acts like wanting to become afraid of night.'

b. Ku-nun ton-i/*ton-ul philyoha-ci anh-key toy-ko
he-TOP money-NOM/-ACC need not come.to
siph-e ha-n-ta.
want act.like-PRES-DECL
'(Lit.) He wants to come to be not in need of money.'

The examples in (16) will raise problems for Bratt (1996) as well, who assumes that structural case is basically determined by the [AG(ENTIVE)-PR(EDICATE)-SIS(TER)] value of the predicate. Following Kim,Y.J. (1990), Bratt assumes that predicates with agent subjects assign Acc to its complement, and those with non-agent subjects, Nom case. Therefore, in (16), the [AG-PR-SIS +] of *ha-* will wrongly predict that the complement is assigned Acc. Furthermore, in order to explain the case alternation with *siph-* in (4), *siph-* will have to be specified as [AG-PR-SIS ±]; however, this does not explain (17) as well as (14), in which no alternation is observed.

(17) Ku-nun paym-i/*paym-ul muwsep-ci anh-key toy-ko
he-TOP snake-NOM/snake-ACC afraid not become
siph-ta.
want-DECL
'(Lit.) He wants to become not afraid of snakes.'

We take the case non-alternation in (16) to be crucial evidence that indicates that the complements of the complex predicates headed by *ha-* is neither always assigned structural accusative case by its [AG-PR-SIS +] property nor assigned lexical accusative case. Such unexpected case patterns cannot be simply accounted by the presence of *siph-* or *ha-*, and we will argue that they can receive a proper explanation when the preceding auxiliary verbs are taken into account.

21.4 More Facts on Case Marking with *Siph-*

In this section, we will consider more examples involving *siph-* to investigate what is responsible for unexpected non-alternation with *siph-*, and unexpected nominative case in *ha-* constructions. As shown in (4),

assignment of accusative case for *ha-*.

when *siph-* immediately follows a main verb that normally assigns Acc, case alternation occurs. However, when *siph-* is preceded by a main verb that normally assigns Nom, this does not happen. Although examples of this kind are not common, due to incompatibility of *siph-* with transitive psych verbs (e.g. *coh-* 'like'), the following example with *toy-* exemplifies it:

(18) a. Nay-ka tayphyo-ka toy-ess-ta.
I-NOM representative-NOM become-PST-DECL
'I became a representative.'

b. Nay-ka tayphyo-ka/*tayphyo-lul toy-ko siph-ta.
I-NOM representative-NOM/-ACC become want-DECL
'I want to become a representative.'

Thus we cannot say that *siph-* has an intrinsic property of assigning both Nom and Acc case. Instead, it can be said that while *siph-* allows the main verb to maintain its case marking property, it may also have an additional property as a psych predicate that enables the complement of the *siph-* complex predicate to bear nominative case, which would take a Acc form otherwise.

What is more interesting is that when *siph-* follows another auxiliary verb, case alternation is not always exhibited, even if the main verb is an Acc assigner. Compare the case alternation examples with *siph-* in (19-20) with non-alternation ones in (21- 23).[3]

[3]The examples in (21-23) become more acceptable when the nominative complements receive (contrastive) focus. When the *-i/-ka* marked NPs receive focus, they get focus interpretations. The difference in interpretation with and without focus is clearly shown in examples like (ii).

(i) a. ?Na-nun KU CIP-I (cengmallo) phal-ci anh-ko siph-ta.
'It is the house that I want not to sell.'

b. ?Na-nun (talun kakey mal-ko) SECEM-I wunyengha-key toy-ko siph-ta.
'It is a bookstore that I want to get to run.'

(ii) a. Na-nun sey haksayng-ul citoha-key toy-ko siph-ta.
I-TOP three student-ACC advise come.to want
'I want to get to advise three students./ What I want is to get to advise three students.'

b. Na-nun SEY HAKSAYNG-I citoha-key toy-ko siph-ta.
'It is three students that I want to get to advise.'

While it is an interesting issue to pursue how to explain the function of *-i/-ka* as a focus marker, it is outside the scope of this research. See Yoon (2001) for some current discussion on case markers and their focus function.

(19) a. Na-nun sakwa-lul/sakwa-ka mek-e po-ko
I-NOM apple-ACC/apple-NOM eat do.as.a.try
siph-ta.
want-DECL
'I want to try to eat an apple.'

b. Na-nun sakwa-lul/sakwa-ka mek-e po-ko siph-ci
I-NOM apple-ACC/apple-NOM eat do.as.a.try want
anh-ta.
not-DECL
'I don't want to try to eat an apple.'

(20) a. Na-nun Cheli-lul/Cheli-ka ttayli-e cwu-ko
I-TOP Cheli-ACC/Cheli-NOM hit do.as.a.favor
siph-ta.
want-DECL
'I want to hit Cheli.'

b. Na-nun swukcey-lul/?swukcey-ka mili ha-y
I-TOP homework-ACC/homework-NOM beforehand do
twu-ko siph-ta.
do.in.advance want-DECL
'I want to get homework done beforehand.'

c. Na-nun ipwul-ul/?ipwul-i phye-e noh-ko
I-TOP bedding-ACC/bedding-NOM unfold do.in.advance
siph-ta.
want-DECL
'I want to make the bed.'

(21) a. Na-nun cip-ul/?*cip-i phal-ci anh-ko siph-ta.
I-TOP house-ACC/house-NOM sell not want-DECL
'I want not to sell a house.'

b. Na-nun phyenci-lul/?*phyenci-ka ponay-ci anh-ko
I-TOP letter-ACC/letter-NOM send not
siph-ta.
want-DECL
'I want not to send a letter.'

(22) a. Na-nun secem-ul/?*secem-i wunyengha-key
I-TOP bookstore-ACC/bookstore-NOM run
toy-ko siph-ta.
come.to want-DECL
'(Lit.) I want to get to run a bookstore.'

b. Na-nun khemphyuthe-lul/?*khemphyuthe-ka sa-key
I-TOP computer-ACC/computer-NOM buy
toy-ko siph-ess-ta.
come.to want-PST-DECL
'(Lit.) I want to get to buy a computer.'

(23) a. Nay-ka (kuttay-nun) ccikay-lul/*ccikay-ka
I-NOM then pot.stew-ACC/pot.stew-NOM
kkuli-ko iss-ko siph-ta.
boil be want-DECL
'(Lit.) I want to be boiling a pot stew (at that time).'

b. Nay-ka (kuttay-nun) phiano-lul/*phiano-ka chi-ko iss-ko
I-NOM then piano-ACC/piano-NOM play be
siph-ta.
want-DECL
'(Lit.) I want to be playing the piano (at that time).'

In these examples, auxiliary verbs *anh-* 'not', *toy-* 'come to', and *iss-* 'be in the process of' show different patterns from other auxiliary verbs such as *po-* 'do as a try', *cwu-* 'do as a favor', *noh-* 'do in advance', *twu-* 'do in advance', *chiwu-* 'do resolutely', *peli-* 'do completely', *tay-* 'do repeatedly', and *nay-* 'do thoroughly' in case alternation with *siph-* .[4]Examining various combinations among auxiliary verbs, we observe that while the majority of auxiliary verbs such as *po-*, *cwu-*, *noh-*, *twu-*, *chiwu-*, *peli-*, *tay-*, and *nay-* do not affect case alternation when they are used before *siph-*, the auxiliary verbs *anh-*, *toy-*, and *iss-* prevent the complements of the main verbs from manifesting case alternation when they are followed by *siph-*.

The contrast between (19-20) and (21-23) has not been discussed in literature, and no previous analyses, whether derivational or non-derivational, can account for the difference. As will be discussed in section 5, we argue that there exist differences between the two groups of auxiliary verbs and it should be taken into account in case marking in AVCs.

Another environment in which case alternation does not occur is when *siph-* is followed by the auxiliary verb *ha-* 'act like' as in (24). Just as when *ha-* combines with simple psych verb (e.g., in (5)), if

[4]The informants that I consulted agreed with the contrast between (19-20) and (21-23), and my proposal is based on these judgments. However, it should be noted that minor revisions in my analysis can also account for the speakers who find no such contrast, if there are any.

siph- is followed by *ha-*, it loses the property as a psych predicate that licenses a nominative complement.

(24) a. Nay-ka sakwa-lul/*sakwa-ka mek-ko siph-e
I-NOM apple-ACC/apple-NOM eat want
ha-n-ta.
act.like-PRES-DECL
'I want to eat an apple.'

b. Nay-ka paym-ul/*paym-i mwusew-e ha-ko
I-NOM snake-ACC/snake-NOM afraid act.like
siph-ta.
want-DECL
'I want to be afraid of a snake.'

As shown in (24b), case alternation does not occur, even when a *ha-* predicate is followed by the psych verb *siph-*. Since it is an idiosyncratic property of *ha-* that it combines only with psych predicates and affect the case marking property of their complements, this kind of examples will have to be explained in terms of the lexical property of *ha-*.

21.5 The Proposed Analysis

21.5.1 Proposal

For the account of AVCs, we employ a complex predicate analysis of AVCs, following Hinrichs & Nakazawa (1989, 1994) and Chung (1993, 1998). Hinrichs & Nakazawa propose the notion of argument composition to explain German AVCs, by which an auxiliary verb "attracts" the arguments of the verb or the complex predicate it combines with. This idea is manifested in the description of the German auxiliary verb *wird* in (25).

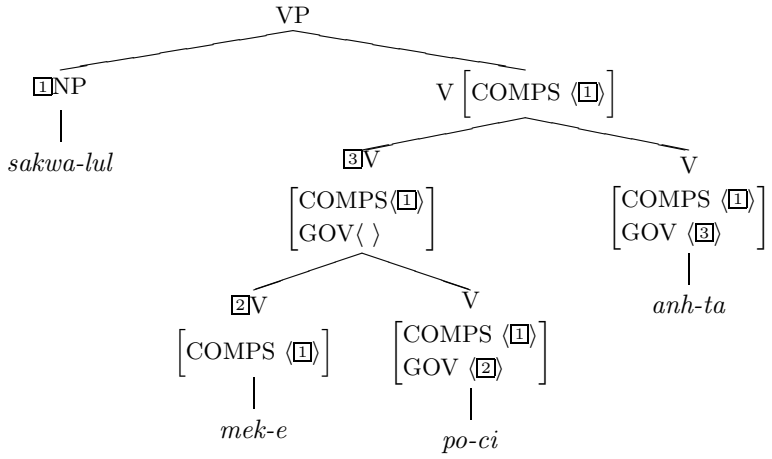
(25) wird 'will': $\left[\text{SUBCAT } \textit{append}(\boxed{1}, \langle \text{V}[\text{SUBCAT } \boxed{1}] \rangle)\right]$

Based on Hinrichs & Nakazawa's mechanism of argument composition, Chung proposes that an auxiliary verb selects its governee verb via the GOV(ERNEE) feature, and that the valence values of the governing verb and the governee verb are structure-shared. The following (26) exemplifies the lexical entry of an ordinary auxiliary verb *po-* 'do as a try':

(26) $\begin{bmatrix} \text{SUBJ } \boxed{1} \\ \text{COMPS } \boxed{2} \\ \text{GOV} < \text{V}[\text{VFORM } e, \text{SUBJ } \boxed{1}, \text{COMPS } \boxed{2}\ ] > \end{bmatrix}$

In Chung, when an auxiliary verb combines with a verb, a complex predicate of the sort *complex-word* is formed syntactically. Since an auxiliary verb, which is the head of the *complex-word-structure*, may combine with either a simplex verb or a complex verb, more than one auxiliary verb can follow a main verb. Accordingly, the whole sequence of a main verb and auxiliary verb(s) form a complex predicate, in which the final auxiliary verb is the head. This is illustrated in (27).

(27)



Before getting into the account of case marking in AVCs, discussion of theoretical assumptions on the general mechanism of case marking is in order. Following Pollard 1994, Heinz & Matiasek 1994, Yoo 1993, and Przepiórkowski 1999, who argue for the notion of structural case in HPSG, we explain case marking in Korean in terms of structural case assignment. Furthermore, we maximally utilize the mechanism of structural case marking, so that nominative and accusative case is only structurally assigned. Accordingly, the type hierarchy of case values can be simplified, eliminating the distinction between lexical vs. structural nominative case and between lexical vs. structural accusative case.

In this paper, psych predicates (including *siph-*) are analyzed as structural case assigners. In addition, in order to account for problematic examples like (16), we treat *ha-* 'act like' as an auxiliary verb assigning structural case, rather than a derivational affix assigning lexical case. The most important reason for such assumption is that delimiters such as *-man* 'only', *-to* 'also', or *-nun* 'Contrastive Topic' may occur between the main verb and *ha-*, just as in the cases of other auxiliary verbs. Therefore, the present analysis contrasts to Yoo (1993) and Chung (1998) that assign lexical nominative case to the complements

of psych predicates, and lexical accusative case to the complement of a complex predicate headed by *ha-*.

For determination of structural case values, we assume that predicates have [Agentive +/-] values ([AG±], henceforth), roughly depending on whether they have Agent subjects or not (Kim, Y.J. 1990, Bratt 1996). The distinction between [AG+] verbs and [AG-] ones also corresponds to Wechsler & Lee's (1996) division of verbs into two groups, i.e., verbs with an external argument and verbs without one. While it is arguable whether the [Agentive] is the most appropriate term for the distinction that has been recognized in literature, we assume that this line of classification is necessary for the account of Acc vs. Nom complements of verbs.

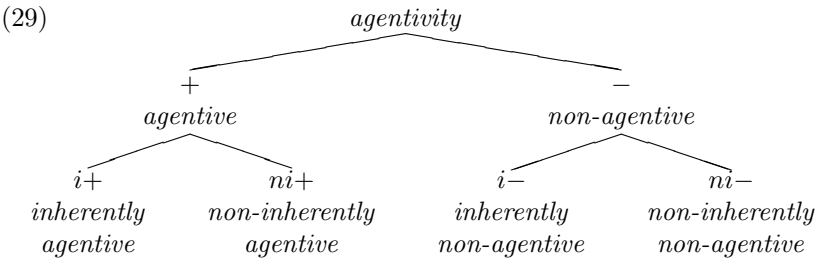
As a general principle of structural case resolution in Korean, we employ the Case Principle in (28), revising and incorporating the ideas in Yoo (1993), Bratt (1996), and Wechsler & Lee (1996):

(28) Case Principle (for Korean)
For an unresolved structural NP that is a daughter of a phrase α,
i) it is [acc], if it is a COMPS-DTR of α whose head is [AG+], and
ii) it is [nom], if it is a SUBJ-DTR of α, or a COMPS-DTR of α whose head is [AG-].

It should be noted that (28) can be easily restated in non-configurational terms along the lines of Przepiórkowski (1999) as well. For AVCs, nothing seems to hinge on the choice between a configuational or non-configurational approach to case assignment.

In order to account for the complicated pattern of case marking in AVCs, this paper proposes a fine-grained classification of the [AG] value in the type hierarchy. This is shown in (29).[5]

(29)



[5]In (29), the values such as +, *i*+, and *ni*+ are used respectively as shorthand for the full value names directly below, i.e., *agentive*, *inherently agentive*, and *non-inherently agentive*, etc.

As for non-auxiliary verbs, the AG value can be inherently (or lexically) determined considering their argument structure and CONT value. Thus verbs with agentive subjects (e.g., *mek-* 'eat', *phal-* 'sell', *kolu-* 'select', and *ttayli-* 'hit') will be specified as [AG i+], while verbs that are non-agentive (i.e., with no external argument) are [AG i-] (e.g., *coh-* 'like', *mwusep-* 'be afraid', *philyoha-*'need', and *toy-* 'become').

On the other hand, determination of [AG] values of auxiliary verbs is less straightforward. One possibility is to assume that auxiliary verbs, just like main verbs, are assigned their own [AG] values in the lexicon. In this case, auxiliary verbs like *anh-*, *toy-* and *iss-* would be [AG *i-*], since they do not have their own agentive external argument in their semantic interpretation. However, this approach immediately fails to predict the case marking patterns in AVCs, because, as shown in (30), complex predicates headed by these auxiliary verbs have accusative complements when the main verbs are agentive ones.

(30) a. Nay-ka sakwa-lul mek-ess-ta.
I-NOM apple-ACC eat-PST-DECL
'I ate an apple.'

b. Nay-ka sakwa-lul mek-ci anh-ass-ta.
I-NOM apple-ACC eat not-PST-DECL
'I did not eat an apple.'

c. Nay-ka sakwa-lul mek-key toy-ess-ta.
I-NOM apple-ACC eat come.to-PST-DECL
'I came to eat an apple.'

In order to avoid such problems, we propose that auxiliary verbs are basically "transparent" with respect to the [AG] value, so they "inherit" the [AG] value of their governee verbs. Futhermore, we argue that the [AG] value of auxiliary verbs, while being basically "inherited" from the preceding predicates, needs to reflect differences among auxiliary verbs. In our view, case alternation and non-alternation exhibited in (19-23) is related to the property of the auxiliary verbs involved, more specifically, to the way auxiliary verbs inherit [AG] values from the embedded predicates.

Considering the meaning and combinatorial properties of various auxiliary verbs, we can identify two different classes. One group of auxiliary verbs such as *po-* 'try, do as a try', *cwu-* 'do as a favor', *noh-* 'do in advance', *twu-* 'do in advance', *chiwu-* 'do resolutely', *peli-* 'do completely', *tay-* 'do repeatedly', and *nay-* 'do thoroughly' have agentive meaning. They combine with agentive verbs in most cases, and maintain their meaning as an agentive predicate in the combination

with agentive verbs. Sells (1993, 1998) argues verbs like *po-* and *cwu-* are control verbs that assign a role to their highest argument, and that this role is coindexed with the subject of the governed predicate. While the control verb relation detected in these predicates may be a very 'weak' one as Sells notes, we can still identify some verb relation that is associated with these predicates. Then, for this group of auxiliary verbs that retain their agentive property in the combination with agentive verbs, we can assume that they have the same [AG] values with the embedded verbs. Thus, the [AG] value of this group of auxiliary verbs can be specified as in (31).

(31) $\left[\text{AG } \boxed{1}, \text{GOV}<\text{V}[\text{AG } \boxed{1}]>\right]$

In contrast, another group of auxiliary verbs such as *anh-* 'not', *toy-* 'come to', and *iss-* 'be in the process of', *ci-* 'come to', *ka-* 'be getting', *o-* 'gradually come go/get' are non-agentive since they do not bear their own external argument. Semantically, these auxiliary verbs can be typically represented as a weak, supplementary verb relation that takes a proposition as their argument. Thus, for example, *mek-ci anh-ta* can be expressed as 'not′(eat′(x,y))', *mek-key toy-ta* as 'come-to′(eat′(x,y))' and *mek-ko iss-ta* as 'in-progress′(eat′(x,y))'.[6] For this second group of auxiliary verbs, whose meaning is non-agentive, their [AG] values cannot be determined by their non-agentive property. Most of these auxiliary verbs combine both agentive or non-agentive verbs and their case marking property is inherited from their governee verbs, as shown in (30) and (32).

(32) a. Nay-ka paym-i mwusep-ta.
I-NOM snake-NOM afraid-DECL
'I am afraid of a snake.'

b. Nay-ka paym-i mwusep-ci anh-ta.
I-NOM snake-NOM afraid not-DECL
'I am not afraid of a snake.'

c. Ku-nun paym-i mwusep-key toy-ess-ta.
He-TOP snake-NOM afraid come.to-DECL
'He became afraid of a snake.'

Since their non-agentive property does not directly determine their [AG] value, we assume that their [AG] values are only non-inherently agentive or non-agentive. Therefore, the [AG] value of the second group of auxiliary verbs can be specified as in (33).

[6] Alternatively, we can characterize these auxiliary verbs as event-modifiers, as Peter Sells points out to me (p.c.).

(33) [AG *ni*α, GOV<V[AG α]>]

In (33), α is used as a variable over the boolean type values, i.e., + or -. Therefore, when the governee verb is [AG +] (i.e., [AG *i*+], [AG *ni*+], or [AG +]), the auxiliary verb is [AG *ni*+], and when the governee verb is [AG -] (i.e., [AG *i*-], [AG *ni*-], or [AG -]), the auxiliary verb is [AG *ni*-].

On the other hand, the two auxiliary verbs *siph-* and *ha-* should be treated specially, since their semantic contribution is directly related to the agentive/non-agentive property. Unlike other auxiliary verbs that are just "transparent" with respect to the case marking property of governee verbs (cf. (1), (3), (30), and (32)), *siph-* and *ha-* may affect the case marking pattern of complex predicates containing them, as shown in (4-6). We assume that this is because *siph-* and *ha-* may have a lexically assigned, inherent [AG] value, in addition to the [AG] value that comes from the govenee verb.

The auxiliary verb *siph-* expresses a non-agentive relation, so when it inherits its [AG] value from the governee verb, it behaves like the second group of auxiliary verbs. (See (34a).) When it combines with an inherently agentive verb, however, it may exhibit its own non-agentive property as a psych predicate, thus having the [AG *i*-] value. Accordingly, the dual lexical entry of *siph-* can be represented as in (34).

(34) *siph-*

a. $\left[\text{AG } ni\alpha, \text{ GOV<V[AG } \alpha\text{]>}\right]$

b. $\left[\text{AG } i\text{-, GOV<V[AG } i\text{+]>}\right]$

Meanwhile, *ha-* 'act like, show signs of some emotion' is agentive in its meaning, so it can be taken to belong to the first group of auxiliary verbs. (See (35a).) However, when it combines with a lexically non-agentive psych verb, it exerts its inherent property as an agentive predicate, thus satisfying the entry in (35b).

(35) *ha-*

a. $\left[\text{AG } \boxed{1}, \text{ GOV<V[AG } \boxed{1}\ ni\alpha\text{]>}\right]$

b. $\left[\text{AG +, GOV<V[AG } i\text{-]>}\right]$

In (35), the governee verb of *ha-* is restricted to [AG *ni*±] and [AG *i*-], since *ha-* never combines with ordinary, non-psych verbs which are [AG *i*+]. In the following section, we will show how various AVC examples can be accounted for by the lexical entries and theoretical assumptions discussed so far.

21.5.2 How the analysis works

In a sentence with a simplex verb, the case value of the complement is determined by the [AG] value of the verb and the Case Principle in (28). For example, in (36), the two NPs, which are specified as NP[str] in the lexicon, are realized as NP[nom] and NP[acc] respectively in a sentence, by (28). This is because the first NP is a SUBJ-DTR of S and the second NP is a COMPS-DTR of VP whose head is [AG +].

(36) a. Nay-ka chayk-ul ilk-ess-ta.
I-NOM book-ACC read-PST-DECL

'I read a book.'

b. Nay-ka chayk-ul ilk-ess-ta.
NOM ACC [AG *i*+]

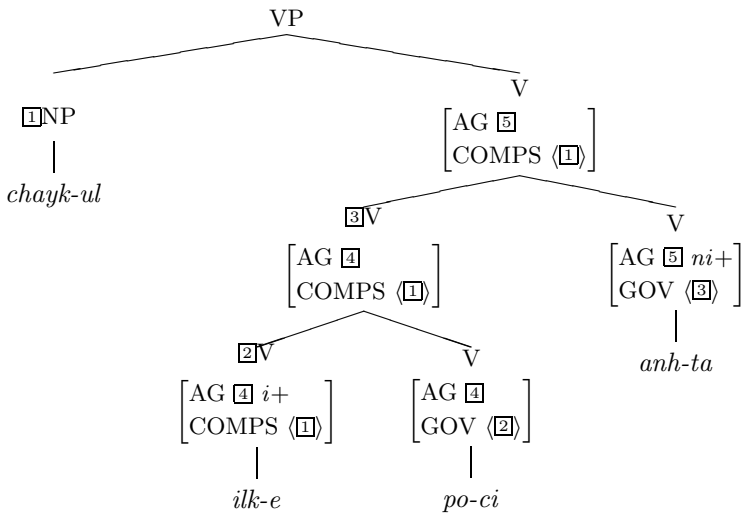
When a main verb is followed by an ordinary auxiliary verb, the case value of the complement is not changed, as shown in (37).

(37) a. Nay-ka chayk-ul/*-i ilk-e po-ass-ta.
ACC [AG *i*+] [AG *i*+]
(by 31)

b. Nay-ka chayk-ul/*-i ilk-e po-ci anh-ass-ta.
ACC [AG *i*+] [AG *i*+] [AG *ni*+]
(by 31) (by 33)

In (37a), the auxiliary verb *po-* has the [AG *i*+] value, since it should satisfy the constraint on the AG value in (31). On the other hand, since auxiliary verbs like *anh-* are subject to (33), *anh-* in (37b) gets [AG *ni*+]. As the (final) auxiliary verb is the head of a complex predicate, and the [AG] feature is assumed to be a HEAD feature, the [AG] values of the verbs in (37b) are specified as in (38).

(38)



In (37a), the complex predicate is [AG *i*+], and the one in (37b) is [AG *ni*+]. However, since both [AG *i*+] and [AG *ni*+] are subtypes of [AG +] in the type hierarchy (29), the Case Principle requires both complements in (37) to be [acc].

Next, when *siph-* combines with ordinary transitive verbs, it may have either [AG *ni*+] or [AG *i*-] value, due to the dual property described in (34). Accordingly, either Nom or Acc is allowed.

(39) Nay-ka sakwa-lul/-ka mek-e po-ko siph-ta. (= (19a))
ACC [AG *i*+] [AG *i*+] [AG *ni*+] (by 34a)
NOM [AG *i*+] [AG *i*+] [AG *i*-] (by 34b)

On the other hand, when *siph-* combines with a non-agentive verb as in (40), the whole complex predicate is just [AG *ni*-], since (34b) does not apply.

(40) Nay-ka tayphyo-ka/*-lul toy-ko siph-ta. (= (18b))
NOM [AG *i*-] [AG *ni*-] (by 34a)

Moreover, case alternation does not occur when *siph-* follows a complex predicate with *ha-*.

(41) Nay-ka paym-ul/*-i mwusew-e ha-ko siph-ta. (= (6b))
ACC [AG *i*-] [AG +] (by 35b) [AG *ni*+] (by 34a)

The problematic example (16a) can be also accounted for by adequate inheritance of AG values in the complex predicate structure.

(42) Ku-nun pam-i/*-ul twulyep-key toy-ko siph-e ha-n-ta.
NOM [AG *i*-] [AG *ni*-] [AG *ni*-] [AG *ni*-]
(by 33) (by 34a) (by 35a)

Likewise, a more complicated example where case alternation does not occur can be explained by the partial and total inheritance of [AG] values, as shown in (43).

(43) Nay-ka ccikay-lul/*-ka kkuli-ko iss-ko siph-ta. (= (23a))
ACC [AG *i*+] [AG *ni*+] [AG *ni*+]
(by 33) (by 34a)

21.6 Concluding Remarks

We have argued that complicated case marking patterns in AVCs can be accounted for by recognizing different classes of auxiliary verbs and proper specification of auxiliary verbs in terms of the [Agentive] feature values. This approach enables us to deal with idiosyncratic properties of *siph-* and *ha-* lexically, while maintaining the general mechanism of structural case assignment. Since the use of the [Agentive] feature and a case principle has been independently motivated for Korean case marking, this analysis does not employ any new device adopted only for the case marking in AVCs. Furthermore, the proposed analysis provides explanation for the examples that are problematic for existing derivational/non-derivational analyses, without positing ambiguous structures or stipulating the case principle.

In this paper, we have focused on case marking of complements of predicates. On the other hand, current works such as Wechsler & Lee (1996), Kim & Maling (1996), Przepiorkówski (1999), and Lee (1999) convincingly argue that the domain of direct case marking should be extended to certain adverbials. In particular, Wechsler & Lee show that adverbials interpreted as situation delimiters (i.e., adverbials of duration, frequency, and path length that temporarily quantifies a situation) should be treated in the same ways as ordinary complements with respect to case assignment. According to Wechsler & Lee, situation delimiters are extensive measures that must satisfy the condition of ADDITIVITY.[7] Within the HPSG framework, case marking of adverbials can be accounted for by assuming that adjuncts are added to the COMP(LEMENT)S list and that the NPs in the COMPS list are subject to the Case Principle (Bouma et al. 2001, Przepiorkówski 1999). Drawing upon Wechsler & Lee's proposal, we can say that among

[7] (i) Additivity ($\oplus$ is the concatenation operator)
$m(x \oplus y) = m(x) + m(y)$, if x and y do not overlap.

adjuncts that are added to the COMPS list, only the ones that are [ADDITIVITY +] are marked as structural NPs (i.e., NP[str]).[8] Then these adverbial NP[str]s would have case values by the Case Principle (28). This line of assumptions will account for simple examples as in (44), and the AVC examples in (45), which is from Kim & Maling (1996:148).

(44) Nay-ka cacenke-lul hansikan-ul tha-ss-ta.
I-NOM bicycle-ACC one.hour-ACC ride-PST-DECL
'I rode a bicycle for an hour.'

(45) a. Na-nun cacenke-lul hansikan-ul tha-ko siph-ess-ta.
I-TOP bicycle-ACC one.hour-ACC ride want-PST-DECL
'I wanted to ride a bicycle for an hour.'

b. Na-nun cacenke-ka hansikan-i tha-ko siph-ess-ta.

c. *Na-nun cacenke-ka hansikan-ul tha-ko siph-ess-ta.

d. *Na-nun cacenke-lul hansikan-i tha-ko siph-ess-ta.

While the case pattern of duration/frequency adverbials is parallel to that of complements in many examples, they do not always coincide with each other. As some current research suggests, a comprehensive discussion of adverbial case marking should take into account semantic factors as well. (Cf. Lee 1999) Furthermore, it should be noted that focus may well be another factor that affects adverbial case marking patterns, when we consider examples like (46).[9]

(46) a. Ku-ka chongli-ka twu pen-i/*pen-ul
he-NOM prime.minister-NOM two times-NOM/-ACC
toy-ess-ta.
become-PST-DECL
'He became Prime Minister twice.'

b. Ku-ka TWU PEN-UL chongli-ka toy-ess-ta.
'He became Prime Minister twice.'

Whatever explanation is given to such non-syntactic factors, we believe that it would be one that can interact with the syntactic domain of case marking such that it can be equally well applied to the AVCs.

[8] See Lee (1999) for the use of the [ADDITIVITY] feature.

[9] In this regard, it is interesting to note that Kim & Maling (K&M 1996:149) also mention that the example in (45c) is ameliorated when the adverbial is focused as in (i).

(i) ?Na-nun cacenke-ka HANSIKAN-UL tha-ko siph-ess-ta.

However, even a very sketchy answer to these questions requires concrete understanding of syntax-semantics interaction and focus assignment mechanism in the grammar, and we leave this issue for future research.

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References

[1] Bouma, G., R. Malouf, & I. A. Sag. 2001. Satisfying Constraints on Extraction and Adjunction. *Natural Language and Linguistic Theory* 19, 1-65.

[2] Bratt, E. 1996. *Argument composition and the Lexicon: Lexical and Periphrastic Causatives in Korean.* Ph.D. dissertation, Stanford University.

[3] Chang, J.W. & D.-I. Cho. 1991. Head Movement and Case Theory. In Kuno, S. et al (eds.), *Harvard Studies in Korean Linguistics* IV, 217-228.

[4] Cho, J. O. 1988. Suffixed Verb Forms and Compound Verb Constructions. In E. Baek (ed.), *Papers from the Sixth International Conference on Korean Linguistics*, 77- 106.

[5] Chung, C. 1993. Korean Auxiliary Verb Constructions without VP Nodes. In Kuno, S. et al (eds.), *Harvard Studies in Korean Linguistics* V, 274-286.

[6] Chung, C. 1998. Argument composition and Long-Distance Scrambling in Korean: An Extension of the Complex Predicate Analysis. In Hinrichs et al (eds.), *Syntax and Semantics* 30, 159- 220.

[7] Chung, G.-H. 1994. *Case and Its Acquisition in Korean.* Ph.D. dissertation, University at Texas at Austin.

[8] Gerdts, D. & C. Youn. 1989. Psych Constructions and Case in Korean. Unpibl. ms. SUNY at Buffalo.

[9] Han, H.-S. 1991. The Case of Korean Adjectives and Passive Verbs. *Studies in Generative Grammar* 2.1, 219-249.

[10] Heinz, W. & J. Matiasek. 1994. Argument Structure and Case Assignment in German. In Nerbonne, J. et al (eds.), *German in HPSG*, 199-236.

[11] Hinrics, E. & T. Nakazawa. 1989. Flipped out: AUX in German. *CLS* 25, 193-202.

[12] Hinrics, E. & T. Nakazawa. 1994. Linearizing AUX in German Verbal Complexes. In Nerbonne, J. et al (eds.), *German in HPSG*, 11-37.

[13] Hong, K.-S. 1991. *Argument Selection and Case Marking in Korean.* Ph.D. dissertation, Stanford University.

[14] Kang, H.-H. 1998. *Kwuke-uy Tongsa Yenkyel Kwuseng-ey Tayhan Yenkwu (A Study on Verb Linking in Korean)*. Seoul: Hankwuk Mwunhwasa.

[15] Kang, Y.-S. 1986. *Korean Syntax and Universal Grammar*. Ph.D. dissertation, Harvard University.

[16] Kim, J.-B. 2000. *The Grammar of Negation*. CSLI Publications.

[17] Kim, M.-H. 1996. The grammaticalization of auxiliary verbs in Korean. *Discourse and Cognition* 2, 129-146. (Written in Korean)

[18] Kim, M.-K. 1990. Korean Auxiliary Verb Constructions. *Linguistic Journal of Korea* 15, 31-48.

[19] Kim, S.-W. & J. Maling. 1996. Case Assignment in the Sipta Construction and its Implications for Case on Adverbials. In King, R. (ed.), *Description and Explanation in Korean Linguistics*.

[20] Kim, Y.J. 1990. *The Syntax and Semantics of Korean Case: The Interaction between Lexical and Syntactic Levels of Representation*. Ph.D. dissertation, Harvard University.

[21] Lee, H.-J. 1999. The Domain of Grammatical Case in Lexical-Functional Grammar. In Butt, M. et al (eds.), *Proceedings of the LFG 99 Conference*. CSLI Publications.

[22] Lee, J.-K. 1994. *The Syntax and Pragmatics of Korean Case*. Ph.D. dissertation, University of Texas at Austin.

[23] Lee, J.-S. 1992. *Case Alternation in Korean: Case Minimality*. Ph.D. dissertation, University of Connecticut.

[24] Manning, C.D., I.A. Sag, & M. Iida. 1999. The Lexical Integrity of Japanese Causatives. In Levine, R. et al (eds.), *Studies in Contemporary Phrase Structure Grammar*, 39-79.

[25] Nam, K.-S. & Y.-K. Ko. 1993. *Phyocwun Kwuke Mwunpeplon* [A Theory of Standard Korean Grammar], revised edition. Seoul: Thap Publishing Co.

[26] No, Y.-K. 1991. *Case Alternations on Verb-Phrase Internal Arguments*. Ph.D. dissertation, Ohio State University.

[27] Pollard, C. 1994. Toward a Unified Account of Passive in German. In Nerbonne, J. et al (eds.), *German in HPSG*, 273-296.

[28] Przepiórkowski, A. 1999. *Case Assignment and the Complement/Adjunct Dichotomy*. Ph.D. dissertation, University of Tuebingen.

[29] Sells, Peter. 1991. Complex Verbs and Argument Structures in Korean. In Kuno, S. et al (eds.), *Harvard Studies in Korean Linguistics* IV, 395-406.

[30] Sells, Peter. 1998. Structural Relationships Within Complex Predicates. Paper presented at the 1998 meeting of the International Circle of Korean Linguistics.

[31] Sells, Peter. 2002. Argument Structure Properties and Case Marking in Complex Predicates. Talk given at the LSK 2002 Workshop on Complex Predicates.

[32] Seo, J.-S. 1994. *Kwuke Mwunpep* [Korean Grammar]. Seoul: Ppwulikiphunnamwu.

[33] Sohn, S.-M.-T. 1996. *Kwuke Poco Yongen Yenkwu (A Study on Korean Auxiliary Verbs)*. Seoul: Hankwuk Mwunhwasa.

[34] Wechsler, S & Y.S. Lee. 1996. The Domain of Direct Case Assignment. *Natural Language and Linguistic Theory* 14, 629-664.

[35] Yoo, E.J. 1993. Subcategorization and Case Marking in Korean. In *Papers in Syntax, OSU Working Papers in Linguistics* 42, 178-198.

[36] Yoon, J. H. 2001. Non-nominative (Major) Subjects and Case-Stacking in Korean. Paper presented at the International Symposium on Non-nominative Subjects, Tokyo.

22

A Linear Approach to Multiple Clause Embedding

Kei Yoshimoto

22.1 Introduction

It is generally accepted among psycholinguists that real-time human sentence processing proceeds incrementally from left to right (see for example Mazuka & Itoh 1995). Recently proposals have been made in the domain of syntax to reduce phenomena which have hitherto been accounted for in terms of linguistic performance to linear structures given at the level of competence (for example Babyonyshev & Gibson 1999, Joshi 1990, Rambow & Joshi 1994, and Lewis & Nakayama 2001). Keeping in line with this tendency in research, this paper tries to reestablish the much discussed relationship between the two aspects of language, competence and performance: the issue of processing difficulty dependent on sorts of multiple clause embedding is addressed by incorporating into HPSG a mechanism reflecting *left-to-right* processing and *memory costs* calculated at each processing step.

The organization of this paper is as follows. After delineating processing difficulty caused by multiply embedded clauses in Section 22.2, a short introduction to the psycholinguistic theory we rely on, the Syntactic Prediction Locality Theory, is provided in Section 22.3. Section 22.4 proposes an extension of the linearization-based version of HPSG to equip it with an architecture which evaluates sentence complexity. Then Section 22.5 illustrates how the mechanism copes with the difference in processing complexity between differently embedded rela-

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tive clauses in Japanese. Section 22.6 proposes an application of our approach to a yet unknown relationship between memory load and prosody. The last section summarizes the discussion and mentions a possible use of the proposed theory as a uniform framework to process diverse understudied linguistic phenomena.

22.2 Types of Relative Clause Embedding and Processing Difficulty

It is well established that understanding of multiply embedded clauses is affected by how they are embedded. Sentence (1a)—an example from a right-branching language, English—in which embedded clauses each appear to the right of their heads is much easier to understand than (1b) in which center embedding or mixture of right-branching and left-branching doubly occurs (Chomsky & Miller 1963):

(1) a. Mary saw the friend [who recommended the real estate agent [who found the great apartment]].
b. *The rat [the cat [the dog chased] ate] died.

In Japanese, a typical left-branching and head-final language, a sentence with left-branching relative clauses, as in (2a), causes no difficulty, while a center-embedded sentence (2b) is harder to understand.[1]

(2) a. [$_S$ [$_S$ Rinjin ga kodomo ni kure-ta] ringo wo
neighbor SBJ child OBJ2 give-PAST apple OBJ
kajit-ta] nezumi wo neko ga oikake-ta.
gnaw-PAST rat OBJ cat SBJ chase-PAST
'The cat chased the rat which gnawed the apple the neighbor gave to the child.'

b. ??Kōchō ga [$_S$ sensei ga [$_S$ nezumi ga kajit-ta]
principal SBJ teacher SBJ rat SBJ gnaw-PAST
ringo wo kure-ta] kodomo wo shikat-ta.
apple OBJ give-PAST child OBJ scold-PAST
'The principal scolded the child to whom the teacher gave an apple a rat gnawed.'

Phrase Structure Grammar (PSG) and constraint-based grammars with representations reflecting PSG assign recursive structures to both types of embedding, disregarding the difference between them. For this reason, and also because of graded distinctions in comprehensibility, the

[1] See Mazuka & Itoh (1995) for the result of an experiment which shows an increase in reading time when subjects were given a sentence with this kind of syntactic structure.

prevailing view has been that the types of embedding must be captured in terms of performance rather than competence.

In recent years, accounts have been proposed on issues such as multiple clause embedding and word order based on left-to-right processing of sentences. Gibson and Babyonyshev, advocating the Syntactic Prediction Locality Theory, attempt to rate the on-line processing complexity of a variety of nested constructions in English and Japanese (see e.g. Gibson 1998 and Babyonyshev & Gibson 1999). (Bottom-up) Embedded Pushdown Automaton by Joshi (1990) and Rambow & Joshi (1994) copes with Dutch and German word orders from the point of view of limitations within a left-to-right processing model.[2] Lewis & Nakayama (2001) sets up a hypothesis that interference based on syntactic and positional similarity crucially affects human sentence processing, specifically that of center embedding. Furthermore, Kempson et al. (2001) establishes a basis of a logico-semantic approach to various syntactic difficulties by incrementally building up semantic representations as sentences are processed from left to right.

The proposed study copes with the processing difficulty involving multiple embedding, which exceeds the limitations of standard HPSG, by adopting Gibson and Babyonyshev's rating of left-to-right processing complexity.

22.3 Syntactic Prediction Locality Theory

Gibson and Babyonyshev (specifically, Gibson 1998) try to quantify the sentence complexity involving multiple embedding by the memory load of syntactically predicted categories. Their theory called 'the Syntactic Prediction Locality Theory (SPLT)' is based on two notions of processing cost. *Memory cost* is calculated in terms of how many syntactic categories are required to complete the input constituent as a grammatical sentence. *Integration cost* involves computational resources that are necessary to integrate the new input string to the currently existing syntactic structure. The resources are proportional to the distance between the two constituents.

In this paper, memory cost is adopted as the only criterion to measure sentence complexity, following Babyonyshev & Gibson (1999). This is because, first, memory cost alone covers all the phenomena discussed in this paper. Furthermore, this is 'effectively potential integration cost' (Gibson 1998) and the proposed constraints can be extended later to account for integration cost too.

[2]Hawkins (1994) puts forward a similar, but less formal theory on word-order universals from the point of view of processing efficiency.

The SPLT forms the basis on which the proposal of this paper develops, since it can account for the complexity of an abundant variety of sentences in a manner verifiable by psycholinguistic experiments. Another advantage of the theory is that it is neutral in terms of syntactic assumptions, and accordingly easily applicable to HPSG. Thus the proposed framework is essentially a syntactic one. In fact, it has been pointed out that the processing difficulty is a complex issue involving lexical, semantic, pragmatic, and discoursal conditions. I assume that constraints from the other components of grammar are imposed additionally on the syntax.

The proposed study has been constrained by the present state of psycholinguistic research. Although Lewis & Nakayama (2001) is important in that it explains data not accountable by Gibson and Babyonyshev, it is not adopted in this paper. This is because, first, given that data discussed by Lewis and Nakayama and those dealt with by Gibson and Babyonyshev cannot be accounted for by each other's theory, it is extremely difficult at this stage of research to decide which side is right.[3] Second, with many syntactic details remaining unclear, it is too early to apply the HPSG formalization to Lewis and Nakayama's hypothesis. If future studies may reveal that this line of research has essential importance, the advanced theory will be revised by giving additional constraints to the DOM list proposed in the next section.

22.4 HPSG Formalization

The grammar I propose is an extension of the linearization-based version of HPSG (Reape 1994 and Kathol 2000) in which the DOM feature is used as a record of memory costs to represent the processing complexity involving the prediction and satisfaction of syntactic categories. An additional feature S(YNTACTIC-)P(REDICTION-)L(OCALITY)-INF(ORMATION) within *spl*(-)*u*(*nit*), a type constituting the DOM list corresponding to Kathol's (2000) *dom-obj*, stands for this information. The feature's value is a feature structure specified for attributes LOC(AL)-VAL(UE), STACK, PREV(IOUS)-STACK, and BASE-STACK, all with values of type *list(mem-cost)*. STACK is the place where the information on the *splu*'s memory cost is stored. This is obtained based on the values of LOC-VAL and BASE-STACK. As a value of LOC-VAL a memory cost is first brought into existence and is then propagated to STACK. The BASE-STACK feature in turn is built up

[3] The only study I know which compares the two theories based on common data is Kruijff & Vasishth (2001). They discuss that both can account for subsets of their data.

from relevant principles and the value of PREV-STACK representing the STACK information of the immediately preceding *splu*.

(3) *sign* ⟶

$$\left[\begin{array}{ll} \text{PHON} & \textit{phon} \\ \text{SYNSEM} & \textit{synsem} \\ \text{DOM} & \textit{list}\left(\left[\begin{array}{ll} \textit{splu} & \\ \text{PHON} & \textit{phon} \\ \text{SYNSEM} & \textit{synsem} \\ \text{SPL-INF} & \left[\begin{array}{ll} \text{LOC-VAL} & \textit{list(mem-cost)} \\ \text{STACK} & \textit{list(mem-cost)} \\ \text{PREV-STACK} & \textit{list(mem-cost)} \\ \text{BASE-STACK} & \textit{list(mem-cost)} \end{array}\right] \end{array}\right)\right] \end{array}\right]$$

The type *mem-cost* has features PHON, HEAD, and a new feature DISTANCE with a value of type *number* representing the number of intervening sytactic categories processed until a predicted category is met.

(4) a.

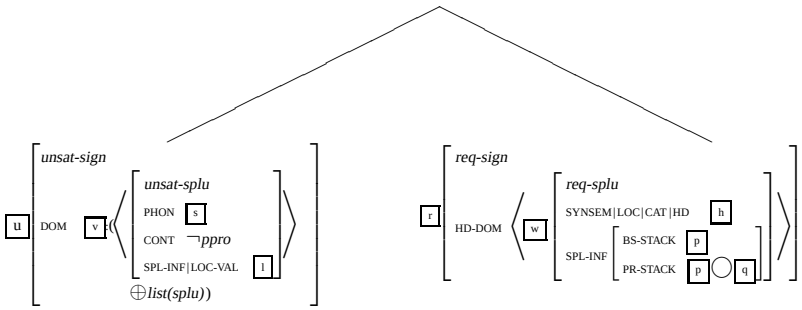
$$\textit{mem-cost} \longrightarrow \left[\begin{array}{ll} \text{PHON} & \textit{phon} \\ \text{HEAD} & \textit{head} \\ \text{DISTANCE} & \textit{num} \end{array}\right]$$

b. $\textit{head}(\textit{phon}, \textit{num})$

(4a) is abbreviated as (4b) hereafter.

A *mem-cost* is introduced as a member in the vaule of LOC-VAL, percolated to the value of STACK, and later eliminated from the latter value when the predicted syntactic category is processed. The introduction and elimination is specified by the Memory Cost Principle (MCP) common to Japanese and English. In the following, $\oplus$ and $\bigcirc$ stand for list appending and the 'shuffle' relation.

(5) Memory Cost Principle



Conditions:

(i) $\boxed{l}$ is the smallest list of *mem-cost*s such that

$$\boxed{l} = (\boxed{m}{:}\mathit{list(mem\text{-}cost)}) \bigcirc \langle \boxed{n} \begin{bmatrix} \mathit{mem\text{-}cost} & \\ \textsc{phon} & \boxed{s} \\ \textsc{hd} & \boxed{h} \\ \textsc{dist} & 0 \end{bmatrix} \rangle$$

(ii) $\boxed{q}$ is the smallest list of *mem-cost*s such that

$$\boxed{q} \ni \begin{bmatrix} \mathit{mem\text{-}cost} & \\ \textsc{phon} & \boxed{s} \\ \textsc{hd} & \boxed{h} \end{bmatrix}$$

(iii) $\forall \boxed{x} \in \boxed{v}(\boxed{x} \prec \boxed{w})$

(iv) $(\boxed{u} = \mathit{head\text{-}dtr} \wedge \boxed{r} = \mathit{comp\text{-}dtr}) \vee (\boxed{u} = \mathit{comp\text{-}dtr} \wedge \boxed{r} = \mathit{head\text{-}dtr}) \vee (\boxed{u} = \mathit{adj\text{-}dtr} \wedge \boxed{r} = \mathit{head\text{-}dtr})$

(v) $\boxed{n} \notin \boxed{m}$

(vi) $\neg(\boxed{w} = \mathit{matrix\text{-}pred\text{-}splu})$

Condition (i) says that $\boxed{l}$, the LOC-VAL value of the *splu* into which the memory cost $\boxed{n}$ predicting the corresponding head is introduced, must be the smallest list including this memory cost. This is because it may contain other list elements derived as a result of multiply applying the MCP or the principle for a relativized nominal formation defined in (14). Condition (ii) helps eliminate from BASE-STACK of the head's *splu* the prediction for the head, i.e. the memory cost originating from $\boxed{n}$. As with Condition (i), this *memory-cost* is not the only element to be popped off from BASE-STACK, since the same *splu* may udergo the MCP or (14) repeatedly.

Condition (iii) limits the application of this principle to cases in which the *unsat(isfied)-sign* precedes the *req(uired)-sign*. Condition (iv) prescribes what can be the *unsat-sign* and *req-sign*: the principle can apply to a complement and its head when the complement either precedes or follows the head. But an adjunct and its head are subject to the principle only when the former occurs before the latter, since a head does not necessarily call for a following adjunct. Condition (v) is needed to prohibit more than one complement from introducing a *mem-cost* to be popped out by one and the same head. Thus in a right-branching structure as in (6), the first complement C_1 may cause to exist a memory cost predicting for a head H, but the second complement C_2 is forbidden to repeatedly make the same prediction.

(6) $[C_1 \quad [C_2 \quad H]]$

The last condition (vi) constrains a new memory cost not to be introduced at an *splu* which is a constituent of the matrix sentence: the

principle does not apply to the constituent of the matrix sentence, since the prediction of the head of the matrix sentence, i.e. the matrix verb, is assumed to be costless (Gibson 1998 and Babyonyshev & Gibson 1999).

In (5), the new *mem-cost* $\boxed{\text{n}}$ appears within the leftmost element of the *unsat-sign*'s DOM list. Owing to this specification, the *mem-cost* is introduced at the first constituent of the *unsat-sign*. Its DISTANCE value, at first set to 0, is increased by one by the function *increase-by-1* defined as in (7) each time a new input is processed, and finally the *mem-cost* is popped out from the list when the head of the *req-sign* is met.[4] The H(EA)D-DOM feature is used to percolate the DOM feature of the head constituent to the whole *req-sign*.

(7) $\mathit{increase\text{-}by\text{-}1}(\langle \mathit{hd}(\boxed{1}, \boxed{n_1}), \mathit{hd}(\boxed{2}, \boxed{n_2}), \ldots, \mathit{hd}(\boxed{\text{i}}, \boxed{n_{\text{i}}})\rangle)$
$\stackrel{def}{=} \langle \mathit{hd}(\boxed{1}, \boxed{n_1} + 1), \mathit{hd}(\boxed{2}, \boxed{n_2} + 1), \ldots, \mathit{hd}(\boxed{\text{i}}, \boxed{n_{\text{i}}} + 1)\rangle$

By (5), the introduction of a new *mem-cost* is limited to a constituent which is not a personal pronoun. This is because, both in English and Japanese, an embedded clause with a personal pronoun case phrase is easier to process than a clause with a full NP (Babyonyshev & Gibson 1999):[5]

(8) The pictures which the photographer **I** met yesterday took were damaged by the child.

As in (5) and the other following specifications, the value of STACK in an *splu* is obtained on the basis of that of PREV(IOUS)-STACK representing the STACK value of the immediately preceding *splu*. The relationship between the two feature values is established by the following rule common to Japanese and English specifying the interdependency between two adjacent *splu*s.

(9) STACK Adjacency Rule
For any pair of adjoining elements of the DOM value list $\boxed{\text{i}}$ and $\boxed{\text{j}}$ such that $\boxed{\text{i}} \prec \boxed{\text{j}}$,

$$\boxed{\text{i}} = \left[\begin{array}{ll} \textit{splu} & \\ \text{SPL-INF|STACK} & \boxed{\text{s}} \end{array}\right] \wedge \boxed{\text{j}} = \left[\begin{array}{ll} \textit{splu} & \\ \text{SPL-INF|PREV-STACK} & \boxed{\text{s}} \end{array}\right].$$

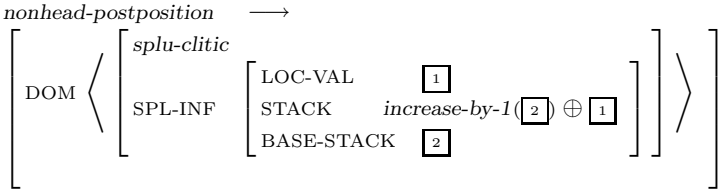
For Japanese, the SPL-related information of complements and adjuncts is formed together with (5) by the lexical information of the

[4] Throughout this paper, accounts are often given as if the processing were performed procedurally from left to right. But of course, they are just metaphors to enhance intelligibility.

[5] Babyonyshev and Gibson's statement that the difference in processing complexity derives from the newness/oldness distinction in the introduced discourse referents is incorrect.

postposition:

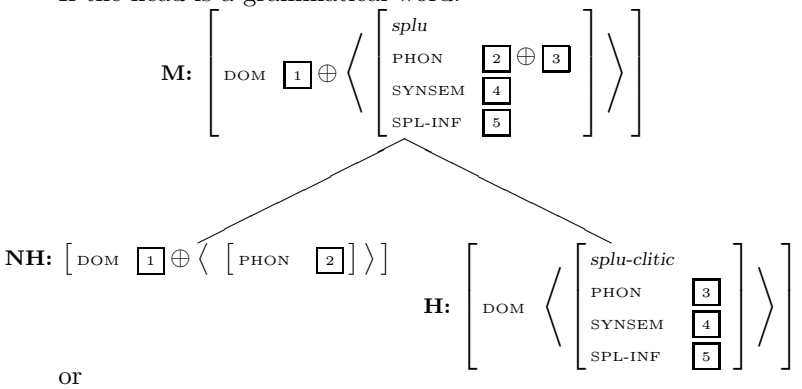
(10) *nonhead-postposition* ⟶



If the value of BASE-STACK is not specified explicitly by the principles defined in (5) or (14), it unifies with that of PREV-STACK by default. An *splu* is constructed in Japanese by the Order Domain Principle below. The principle is divided into two parts, *compaction* which is applied to cases in which the head is a function word with a clitic status and *liberation* which applies otherwise. The distinction has been made so that it can work in parallel with a principle to form an accentual phrase (AP), a tonal domain fundamental in Japanese phonology, since in Japanese APs are also basic units of scrambling (See Yoshimoto 2000. See also Gunji 1999 and Chung & Kim 2002.).

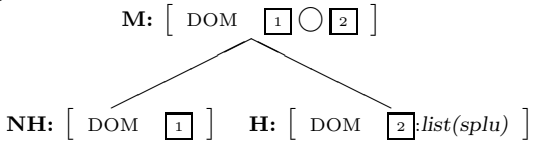
(11) Order Domain Principle
The mother's DOM feature is obtained either

(i) by compaction
If the head is a grammatical word:



or

(ii) by liberation
If the head consists of (a) lexical word(s) possibly followed by grammatical words:



(i) compacts the last element of the non-head daughter and the functional head into one *splu*. (ii) shuffles the DOM lists of both daughters: the relative order within each list is observed, but otherwise elements of both lists can be mixed up with the caveat that they obey the Japanese linear precedence rule.

For English, let us assume that every word carries SPL-reated information and thus is an *splu*, following Gibson (1998).

Figure 1 shows how the MCP is applied to process a simple example (12).

(12) Haha wa [sensei ga seito wo tazuneru to
mother TOP teacher SBJ pupil OBJ visit QUOT
it ta] to omot-te iru.
say PAST QUOT think-PROG
'Mother thinks that the teacher said that he would visit the pupil.'

Given that the matrix clause subject involves no memory cost predicting the main predicate, as mentioned above, only the analysis of the parenthesized part of the sentence is shown.

Observe that a *mem-cost* introduced into STACK in processing *sensei ga* ('teacher-SBJ'), $v(\boxed{2}, 0)$, has its DISTANCE value increased by one each as *seito wo* ('pupil-OBJ') and *tazuneru to* ('visit-QUOTATIVE') are read in, and is finally eliminated from the STACK value when its counterpart head (i.e., the *required-sign*) *it-ta* ('say-PAST') is processed. In a similar manner, a prediction for the innermost predicate, $v(\boxed{4}, 0)$, is introduced at *seito wo*, but immediately popped off when the predicate *tazuneru* is scanned.

A question might have come up to the reader by now: *Why on earth the* DOM *feature?* This feature was developed by Reape (1994) and Kathol (2000) to cope with word order, and as such it originally has nothing to do with the complexity problem discussed in this paper.

The answer is as follows. By separating idiosyncrasies in word order from other factors we can capture the commonalities and differences between Japanese and English, because the main distinction between the two languages in terms of this issue depends completely on word order (or linearity). And it is by extending the DOM feature already available that we can most easily cope with the problem intricately involved with word order without overlapping. Furthermore, as discussed in Section 22.6, metrical boost, a prosodic marking of a non-default branching, can be accounted for by resorting to memory costs. Given the close relationship of prosodic representation to the DOM feature (see Yoshi-

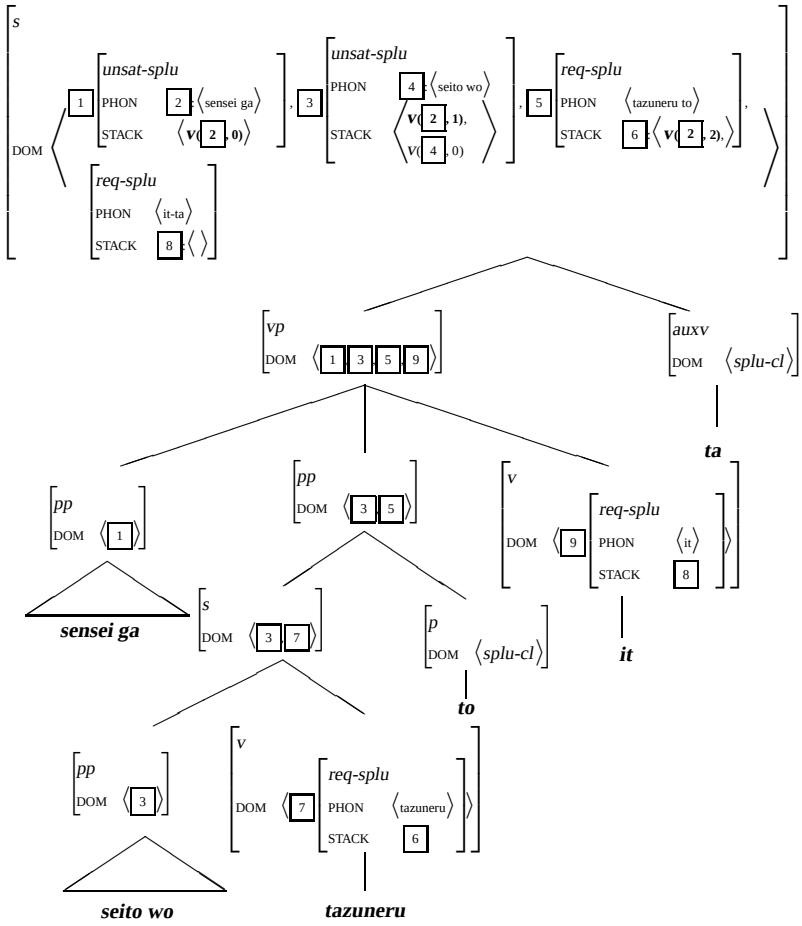


FIGURE 1 Analysis of a Part of Sentence (12)

moto 2000), it is reasonable to deal with the SPL-related information within this feature too.

The proposal offered in this paper is to add constraints to simulate processing load, relying on sentence processing performed within the framework of the standard HPSG syntax. For instance, according to the analysis of example (12) illustrated in Figure 1, the nominal phrase *sensei ga* ('teacher-SBJ') is interpreted as the subject of the predicate *it-ta* ('say-PAST') — and simultaneously as that of *tazuneru* ('visit') — following one possible analysis, while it may also be related only to *tazuneru* and the outer predicate *it-ta* may have a zero pronominal subject referring to another entity. In this manner, (partial) ambiguity of a constituent being processed is not dealt with in this framework, assuming that it is disambiguated by the HPSG syntax. By contrast Dynamic Syntax (Kempson et al. 2001) makes possible a representation underspecified in terms of its syntactic status. Whereas this approach may draw some important generalizations about head-final languages including Japanese, it will not be further discussed in this paper.

22.5 Types of Relative Clause Embedding and Processing Difficulty

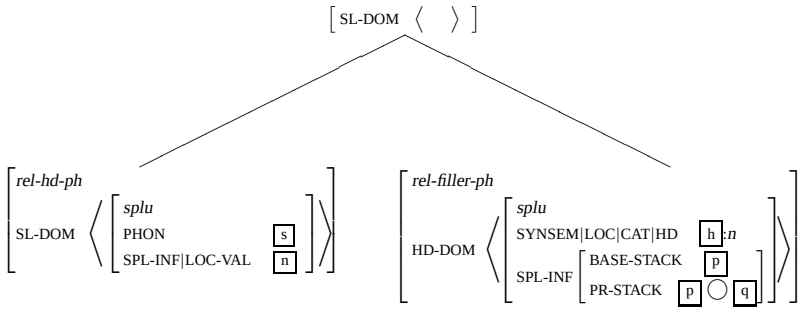
According to our analysis of Japanese relative clauses, the prediction of a counterpart head nominal is introduced into the STACK feature. This is supported by the results of Babyonyshev & Gibson's (1999) experiments which showed that the prediction affects comprehensibility. In the examples cited below, a construction (13b) with a sentential complement within a relative clause is much harder than a reverse embedding structure (13a). The difference can be accounted for by the longer distance in (13b) than in (13a) from the *pro* introduced by the doubly embedded relative clause predicate to the corresponding nominal head. During this procedure, it is assumed that the prediction for the nominal head is retained.

(13) a. Dōryō ga [kowai jōshi ga [[raikyaku ga ***pro***
coworker SBJ strict boss SBJ visitor SBJ (OBJ)
mushishi- ta] **hisho**] wo hihanshi- ta to]
ignore PAST secretary OBJ criticize PAST QUOT
it- ta.
say PAST
'The coworker said that the strict boss criticized the secretary whom the visitor ignored.'

b. ??Kōchō ga [[sensei ga [shōjo ga ***pro*** **tsunet-ta**]
principal SBJ teacher SBJ girl SBJ (OBJ) pinch-PAST
to it- ta] **otonashii shōnen**] wo seme- ta.
QUOT say PAST well-behaved boy OBJ blame PAST
'The principal blamed the well-behaved boy whom the teacher said that the girl pinched.'

A principle different from the MCP in (5), the Relative Clause Memory Cost Principle (RMCP) defined as (14), applies to a relative clause–nominal head construction. As shown below, the *mem-cost* or the prediction for a nominal head is introduced by means of the SL(ASHED)-DOM feature when the predicate which possesses a gapped case phrase is read in. The feature value is propagated from a gapped constituent to another each time the Nonlocal Feature Principle applies to pass the information on the gap (Pollard & Sag 1994), until the gap is discharged. The memory cost does not first come into existence at the leftmost constituent as defined in (5), since it would make a wrong prediction for the memory load. For example, in (13b), the prediction of the head nominal would be introduced when *sensei ga* ('teacher-SBJ') is processed, resulting in a memory load much heavier than in practice.

(14) Relative Clause Memory Cost Principle



Conditions:

(i) n is the smallest list of *mem-cost*s such that

$$\boxed{n} \ni \begin{bmatrix} \textit{mem-cost} & \\ \text{PHON} & \boxed{s} \\ \text{HD} & \boxed{h} \\ \text{DIST} & 0 \end{bmatrix}$$

(ii) q is the smallest list of *mem-cost*s such that

$$\boxed{q} \ni \begin{bmatrix} \textit{mem-cost} & \\ \text{PHON} & \boxed{s} \\ \text{HD} & \boxed{h} \end{bmatrix}$$

Figure 2 is a part of the result of processing example (13a).[6] The principle (14) applies when combining the relative clause *raikyaku ga mushishi-ta* ('the visitor ignored') and the nominal head *hisho* ('secretary'). Since *mushishi-ta* is the predicate which triggers the gapped case phrase and at which the prediction for the head nominal is introduced, its DOM value ⟨ 8 ⟩ unifies with that of the SLASHED-DOM feature of the relative clause. The memory cost in terms of the relative clause is represented by *n*(9 , 0).

Figure 3 partially summarizes how memory costs are obtained concerning sentence (13b). As shown in the figure, the head predicate of the gapped NP, *tsunet-ta* ('pinch-PAST'), is more deeply embedded than *mushishi-ta* in (13a); the memory cost predicting for a nominal head accordingly stays longer in the STACK value, resulting in *n*(6 , 2) in 10 (at *otonashii* 'well-behaved') with the maximum DISTANCE value, which is much higher than that of (13a). The difference accounts for the processing difficulty observed for (13b) but not for (13a).

Note that both of the elements in the STACK list of the *splu* corresponding to *otonashii* ('well-behaved'), *n*(6 , 2) and *n*(11 , 0), disappear within the subsequent *splu* for *shōnen wo* ('boy-OBJ'). This is the result of the applications of both the RMCP, triggered when *shōjo ga tsunet-ta to it-ta* is combined with *otonashii shōnen*, and the MCP, which comes to work when the adjective *otonashii* is paired with its head *shōnen*.

22.6 Metrical Boost

In this section a possibility is pointed out to extend the approach which has hitherto been proposed to cope with relationships between the syntactic information on memory load and phonology. Kubozono (1987) has shown in his statistical phonetic experiments that, in a phrase with multiple modifiers, a modifyng nonhead (corresponding to an *unsat-sign* in this paper) has different pitch levels, depending on whether the phrase structure is right-branching or left-branching. He calls this phenomenon *metrical boost*. In the examples in Figures 4 and 5 each with two modifiers, the peak of the second accentual phrase (AP) *óoki-na* ('big'), which occurs in the right-branching structure in Figure 4, is significantly higher than that of *rémon no* ('lemon-GENITIVE'), an adjunct on the left-branching structure in Figure 5.

Choi et al. (1995) observe a similar difference in peaks of adverbial

[6] In both Figures 2 and 3, the past tense marker *ta*, standardly given an independent auxiliary verb status, is analyzed as if it were a verbal suffix. This is just for the simplification of the tree and causes no essential difference.

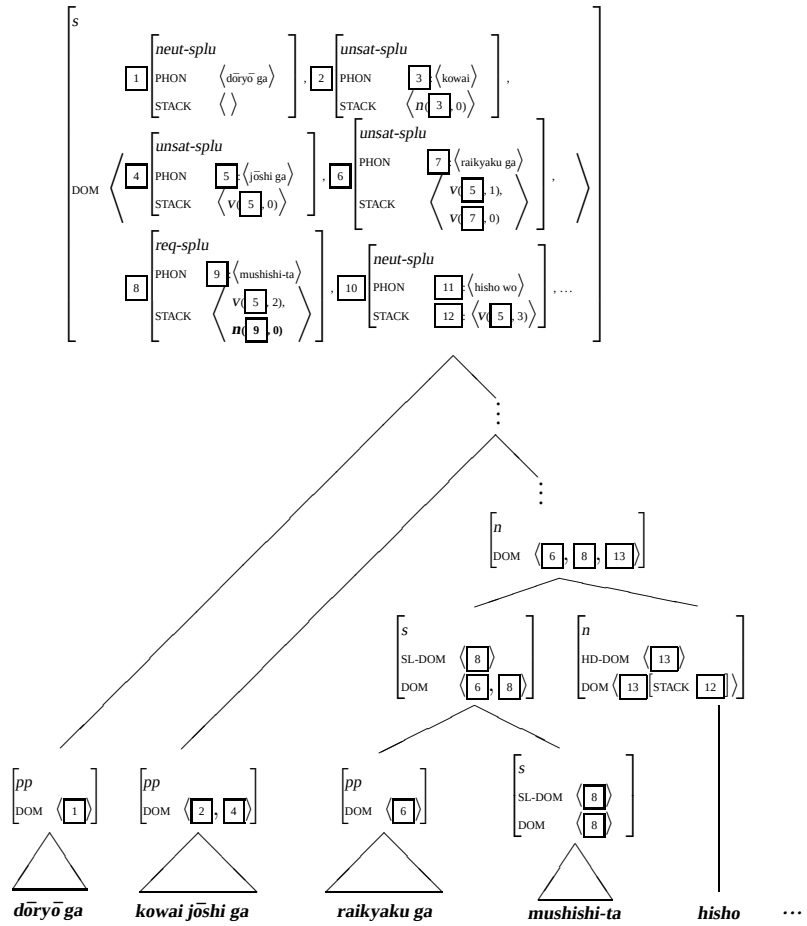


FIGURE 2 Analysis of Sentence (13a)

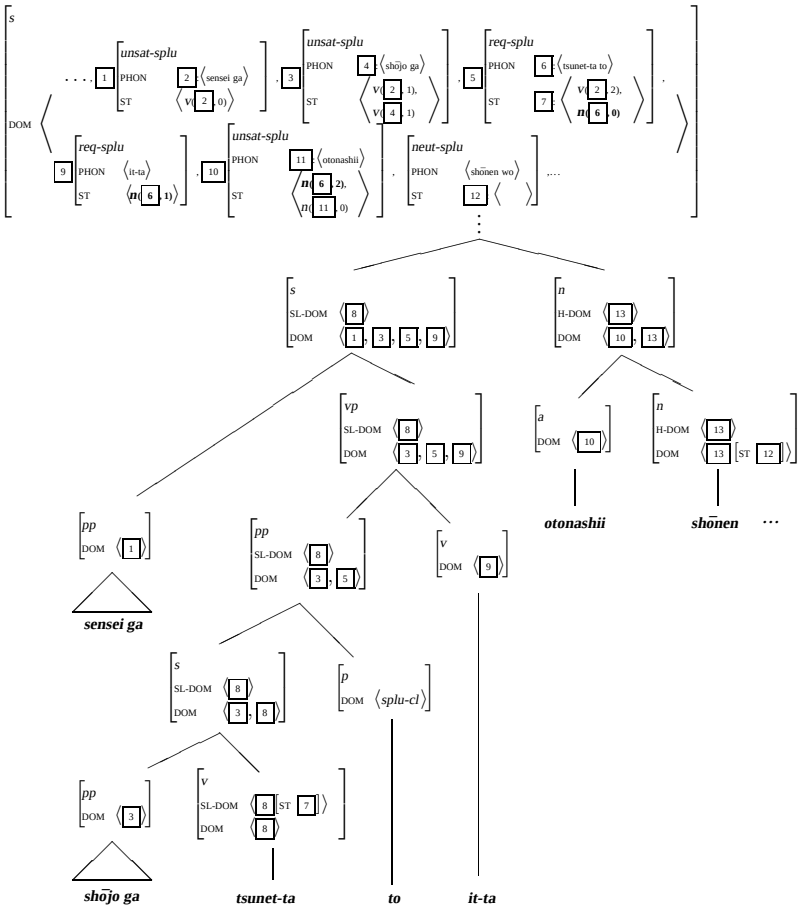
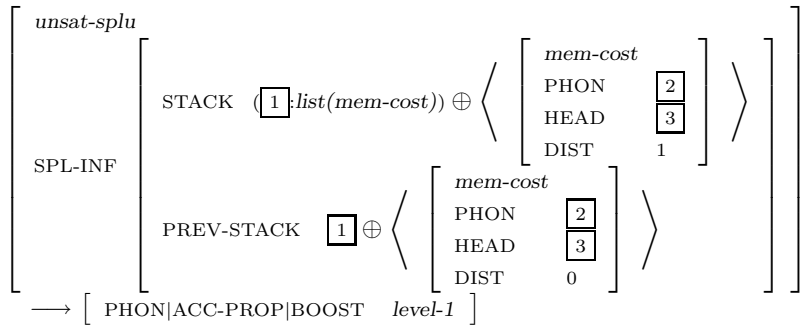


FIGURE 3 Analysis of Sentence (13b)

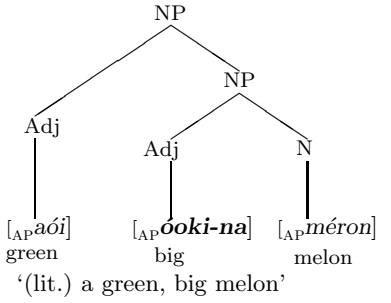
phrases in syntactically ambiguous sentences and demonstrate that the pitch difference is used to disambiguate the sentence. They also report that Korean, Mongolian, and Turkish employ prosodic means to resolve the ambiguity in sentences with structures parallel to their Japanese examples. Traditionally it has been assumed that the syntactic structure solely affects intonational phrasing, and accordingly has a strictly limited influence on prosody. In contradiction to this belief, the findings cited above show that the influence is much more direct and the formulation of an interface that transmits information on the syntactic hierarchy to phonology is called for.

A hypothesis is put forward in this paper that metrical boost is an influence on prosodic information exerted by the information on the meory load; it signals marked, more memory-burdening branching (i.e., right-branching for Japanese), in other words deviation from unmarked, less memory-burdening branching (i.e., left-branching for Japanese). The following is a constraint for differentiating phonological information based on the STACK values of *splu*s:

(15)

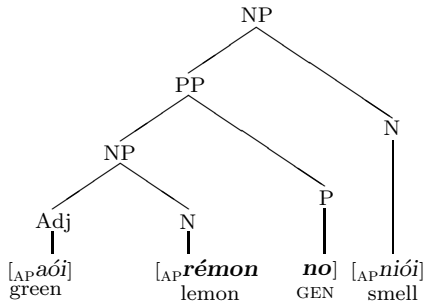


If the memory cost deriving from the immediately preceding *splu*



'(lit.) a green, big melon'

FIGURE 4 Right-Branching Structure



'the smell of a green lemon'

FIGURE 5 Left-Branching Structure

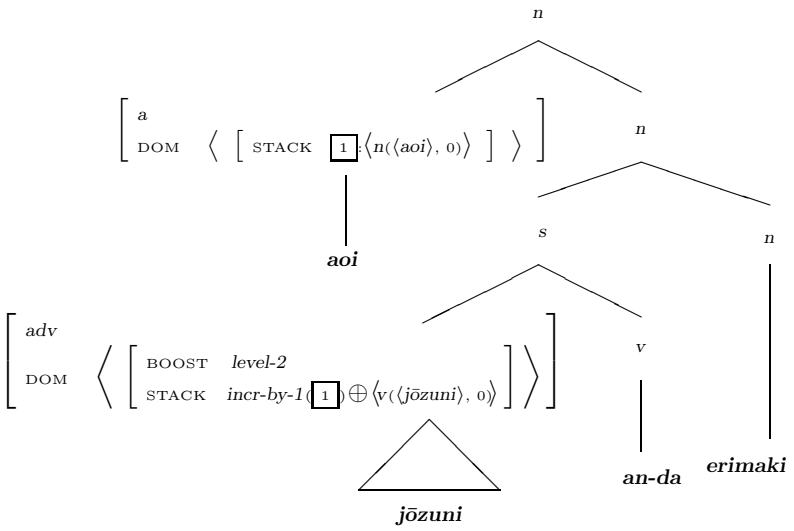


FIGURE 6 Memory Load in Phrase (16)

is not eliminated and remains within the current *splu*'s STACK, then its PHON|ACC(ENTUAL)-PROP(ERTY)|BOOST feature has a value *level-1*, which stands for a higher pitch than a default value *level-0*.

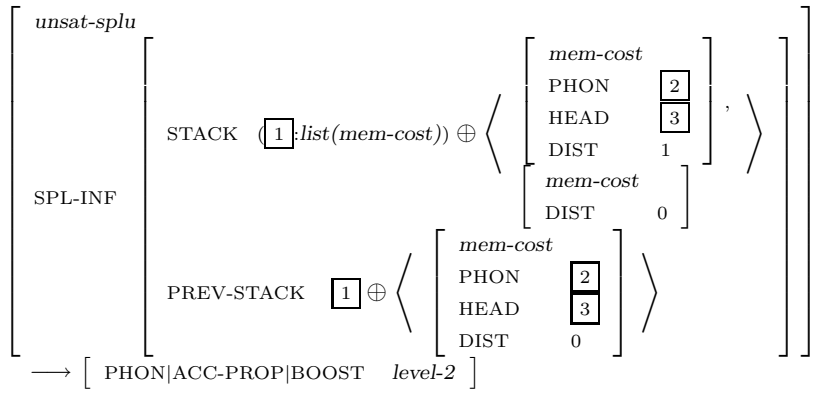
The hypothesis has the advantage of being able to account for metrical boosts within NPs with three modifying nonheads. Kubozono (1987) observed in his experiments that of the 4 possible syntactic structures with three modifiers, only the structure of the type below

(16) [$_{N}$ aoi [$_{N}$ [$_{S}$ **jōzuni** an- da] erimaki]]
blue skillfully knit PAST muffler
'(lit.) the blue, skillfully knit muffler'

has a boosted pitch, which is even higher than other boosted phrases, on *jōzuni* ('skillfully') occurring at the left edge of the two embedded subtrees. According to my formalization, both the MCP and RMCP are applied to process example (16), giving the analysis in Figure 6 (irrelevant memory costs are left out).

Owing to this doubly embedded syntactic structure, *jōzuni* has a heavier memory load than others, i.e. two memory costs, each with DISTANCE values 1 and 0, predicting the nominal head and the verbal head. The following specification infers a BOOST value *level-2*, representing a higher pitch than *level-1*, from the value of STACK when this condition is met:

(17)



Kubozono (1987) found that the highest metrical boost observed for (16) does not occur within other structures with three modifiers.

(18) a. [$_{N}$ [$_{GP}$ [$_{N}$ [$_{GP}$ Naoko no] ani] no] [$_{N}$ **aoi** erimaki]]
NAME GEN brother GEN blue muffler
'Naoko's big brother's blue muffler'

b. [$_{N}$ [$_{GP}$ Mariko no] [$_{N}$ **ōkina** [$_{N}$ **aoi** erimaki]]]
NAME GEN big blue muffler
'Mariko's big, blue muffler'

c. [$_{N}$ [$_{GP}$ [$_{N}$ [$_{GP}$ Ayako no] [$_{N}$ [$_{GP}$ **men** **no**] erimaki]] no]
NAME GEN cotton GEN muffler GEN
iromoyō]
design
'design of Ayako's cotton muffler'

Kuboznono's observation squares with the predictions by rules (15) and (17). *Aoi* in (18a), *ōkina* and *aoi* in (18b), and *men no* in (18c) are all given a BOOST value *level-1*, since *splu*s corresponding to them has a STACK value of the type in (15). Into these *unsat-splu*s no new memory cost is introduced: the prediction of the same head as the preceding constituent's is prohibited by Condition (v) of the MCP in (5).

Thus the DOM feature can serve as an interface which transmits the information on the syntactic hierarchy to the phonological component. The proposal is also motivated by the relationship of this feature to prosodic information (Yoshimoto 2000).

22.7 Conclusions

It has been demonstrated that a linear syntax with additional information on the memory costs of anticipated heads can account for the issue of sentence complexity caused by multiple clause embedding. It has also been suggested that the DOM feature can be expanded to an interface where the linear aspect of syntax and prosodic information meet. The proposal, still being at a seminal stage, paves the way for an integrated linguistic model which sheds light on diverse linguistic issues based on processing efficiency in human language processing: they include word order discussed by Joshi (1990) and Rambow & Joshi (1994) and garden path sentences with which sentence's complexity is known to be involved with.

Acknowledgements

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References

Babyonyshev, M. and E. Gibson. 1999. The Complexity of Nested Structures in Japanese. *Language* 75:423-450.

Choi, Y.-S. and S. Satō and G.-J. Min. 1995. Tōgo–teki ni Aimaina Bun no Seisei ni okeru Inritsu-teki Yōso no Bunseki. *Proceedings of the Phonetic Society of Japan 1995 Annual Convention*, 26-31.

Chomsky, N. and G. Miller. 1963. Introduction to the Formal Analysis of Natural Languages. *Handbook of Mathematical Psychology*, R. Luce et al., eds. New York: John Wiley, 269-321.

Chung, C. and J.-B. Kim. 2002. Mismatch in Korean Copula Constructions and Linearization Effects. *Proceedings of PACLIC 16*, I.-H. Lee et al., eds. The Korean Society for Language and Information, 36-49.

Gibson, E. 1998. Linguistic Complexity: Locality of Syntactic Dependencies. *Cognition* 68:1-76.

Gunji, T. 1999. On Lexicalist Treatments of Japanese Causatives. *Studies in Contemporary Phrase Structure Grammar*, R. Levine and G. Green, eds. Cambridge: Cambridge University Press, 119-160.

Hawkins, J. 1994. *A Performance Theory of Word Order and Constituency.* Cambridge: Cambridge University Press.

Joshi, A. 1990. Processing Crossed and Nested Dependencies: An Automation Perspective on the Psycholinguistic Results. *Language and Cognitive Processes* 5:1-27.

Kathol, A. 2000. *Linear Syntax.* Oxford: Oxford University Press.

Kempson, R. et al. (2001) *Dynamic Syntax: The Flow of Language Understanding.* Oxford: Blackwell.

Kruijff, G.-J., and S. Vasishth. 2001. *Competence and Performance Modelling of Free Word Order.* 13th European Summer School in Logic, Language and Information, lecture notes. Helsinki, August 13-24.

Kubozono, H. 1987. *The Organization of Japanese Prosody.* University of Edinburgh doctoral thesis; Published 1993 Tokyo: Kurosio.

Lewis, R. and M. Nakayama. 2001. Syntactic and Positional Similarity Effects in the Processing of Japanese Embeddings. *Sentence Processing in East Asian Languages*, M. Nakayama, ed. Stanford: CSLI Publications, 85-111.

Mazuka, R. and K. Itoh. 1995. Can Japanese Speakers Be Led Down the Garden Path? *Japanese Sentence Processing*, R. Mazuka and N. Nagai, eds. Hillsdale, N.J.: Lawrence Erlbaum, 295-329.

Pollard, C. and I. Sag. 1994. *Head-Driven Phrase Structure Grammar.* Stanford: CSLI.

Rambow, O. and A. Joshi. 1994. A Processing Model for Free Word-Order Languages. *Perspectives on Sentence Processing*, C. Clifton et al., eds. Hillsdale, N.J.: Lawrence Erlbaum, 267-301.

Reape, M. 1994. Domain Union and Word Order Variation in German. *German in Head-Driven Phrase Structure Grammar*, J. Nerbonne et al., eds. Stanford: CSLI Publications, 151-197.

Yoshimoto, K. 2000. A Bistratal Approach to the Prosody-Syntax Interface in Japanese. *Grammatical Interfaces in HPSG*, R. Cann et al., eds. Stanford: CSLI Publications, 267-282.