Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

The papers are published under a CC-BY license:
http://creativecommons.org/licenses/by/4.0/

Contents

Editor's note **4**

I Contributions to the Main Conference **5**

Emily M. Bender: Radical non-configurationality without shuffle operators: An analysis of Wambaya **6**

Gabriela Bîlbîie: A syntactic account of Romanian correlative coordination from a Romance perspective **25**

Anne Bjerre, Tavs Bjerre: *There*-constructions with transitive verbs **46**

Scott Drellishak: Complex case phenomena in the Grammar Matrix **67**

Dan Flickinger: Transparent heads **87**

Chizuru Ito, Rui P. Chaves: Apparent non-constituent coordination in Japanese **95**

Tibor Kiss: Towards a grammar of preposition-noun combinations **116**

Kil Soo Ko: Korean postpositions as weak syntactic heads **131**

Frédéric Laurens: French predicative verbless utterances **152**

Yo Sato, Wai Lok Tam: Towards a unified account of adjuncts **173**

Karen Steinicke, Gerald Penn: Memory management for unification-based processing of typed feature structures **189**

Sanghoun Song, Jae-Woong Choe: Automatic construction of Korean verbal type hierarchy using Treebank **204**

Wai Lok Tam, Yo Sato: An analysis of pseudopartitives and measure phrases that say no to extra rules **222**

Jesse Tseng: The representation of syllable structure in HPSG **234**

Frank Van Eynde: Predicate complements **253**

Stephen Wechsler: Dualist syntax **274**

Eun-Jung Yoo: Transparent free relatives in English **294**

II Contributions to the Workshop 305

Anne Abeillé, Danièle Godard, Frédéric Sabio: Two types of NP preposing in French 306

Doug Arnold, Robert D Borsley: Non-restrictive relative clauses, ellipsis and anaphora 325

Felix Bildhauer: Clitic left dislocation and focus projection in Spanish 346

Olivier Bonami, Danièle Godard: On the syntax of direct quotation in French 358

Fabiola Henri, Anne Abeillé: Verb form alternations in Mauritian 378

Mutsumi Imai: Children's use of argument structure, meta-knowledge of the lexicon, and extra-linguistic contextual cues in inferring meanings of novel verbs 399

Yusuke Kubota, Jungmee Lee: Reconsidering the coordinate structure constraint in Japanese and Korean: Syntactic constraint or pragmatic principle? 417

Jean-Marie Marandin: The exclamative clause type in French 436

Editor's note

The 15th International Conference on Head-Driven Phrase Structure Grammar (2008) was held in Keihanna, Japan and organized by the National Institute of Information and Communications Technology and the Shoin Institute for Linguistic Sciences, Shoin Women's University.

The conference featured 2 invited talks and 17 papers selected by the program committee (Anne Abeillé, Olivier Bonami, Francis Bond, Bob Borsley, Gosse Bouma, Rui Chaves, Berthold Crysmann, Markus Egg, Elisabet Engdahl, Dan Flickinger, Jonathan Ginzburg, Danièle Godard, Takao Gunji, Chikara Hashimoto, Erhard Hinrichs, Anke Holler, Chiharu Uda Kikuta, Jong-Bok Kim, Tibor Kiss, Anna Kupsc, Shalom Lappin, Robert Levine, Rob Malouf, Nurit Melnik, Detmar Meurers, Stefan Müller, Tsuneko Nakazawa, Gerald Penn, Adam Przepiórkowski, Frank Richter, Louisa Sadler, Ivan Sag, Manfred Sailer, Jesse Tseng, Stephen Wechsler, Shûichi Yatabe (chair), Kei Yoshimoto).

A workshop about *Grammar at the Interfaces* was attached to the conference. It featured one invited talk and 7 papers, selected by the program committee.

In total there were 34 submissions to the main conference and to the workshop. We want to thank the respective program committee for putting this nice program together.

Thanks go to Francis Bond, Takao Gunji, Sanae Fujita, Kyoko Kanzaki, Takayuki Kuribayashi, and Eric Nichols, who were in charge of local arrangements.

As in the past years the contributions to the conference proceedings are based on the five page abstract that was reviewed by the respective program committees, but there is no additional reviewing of the longer contribution to the proceedings. To ensure easy access and fast publication we have chosen an electronic format.

The proceedings include all the papers except those by Stefan Müller and Tsuneko Nakazawa.

Part I
Contributions to the Main Conference

Radical non-configurationality without shuffle operators: An analysis of Wambaya

Emily M. Bender
University of Washington

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 6–24

Bender, Emily M. 2008. Radical non-configurationality without shuffle operators: An analysis of Wambaya. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 6–24. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.1. CC-BY 4.0

Abstract

The word order facts of radically non-configurational languages pose a challenge to HPSG approaches which assume both that the surface order of words is the yield of the (tectogrammatical) tree and standard HPSG-style cancellation of valence lists. These languages allow discontinuous noun phrases, in which modifiers appear separated from their head nouns by arbitrarily many other words from the same clause. In this paper, I explore an analysis which preserves tectogrammatical-phenogrammatical equivalence, and accounts for the word order facts of Wambaya with an analysis based on non-cancellation. This analysis is contrasted with other approaches to discontinuous constituents and analyses of other phenomena based on non-cancellation. Finally, I explore the implications for current models of semantic compositionality.

1 Introduction

The word order facts of radically non-configurational languages (including the Australian languages Wambaya [wmb] and Warlpiri [wbp]) pose a challenge to HPSG approaches which assume both that the surface order of words is the yield of the (tectogrammatical) tree and standard HPSG-style cancellation of valence lists. These languages allow discontinuous noun phrases, in which modifiers appear separated from their head nouns by arbitrarily many other words from the same clause. Donohue and Sag (1999) present an analysis based on linearization theory (Reape, 1994), which posits that the surface order of words need not be directly determined by the yield of the tree. In this paper, I explore the other alternative: preserving tectogrammatical-phenogrammatical equivalence, and instead accounting for the word order facts of Wambaya with an analysis based on non-cancellation. The analysis described here has been implemented in a medium-sized grammar fragment for Wambaya built on the basis of the LinGO Grammar Matrix (Bender et al., 2002; Bender and Flickinger, 2005).

2 Wambaya

Wambaya is a recently-extinct language of the West Barkly family from the Northern Territory in Australia (Nordlinger, 1998b, pc). Aside from the constraint that

[†]I would like to thank Rachel Nordlinger for providing access to the data used in this work in electronic form, as well as for answering questions about Wambaya; Russ Hugo for data entry of the lexicon; Stephan Oepen for assistance with parser efficiency; Ann Copestake, Scott Drellishak, Dan Flickinger, Tibor Kiss, Alex Lascarides, Stefan Müller, Stephan Oepen, Laurie Poulson, Ivan Sag, and the reviewers and audience of HPSG 2008 for general discussion. All remaining errors and infelicities are my own.

This material is based upon work supported by the National Science Foundation under Grant No. BCS-0644097.

verb-headed clauses require an auxiliary in second position,[1] clause-internally the word order is free, to the point that noun phrases can be non-contiguous, with head nouns and their modifiers separated by unrelated words. Furthermore, head nouns are generally not required: argument positions that are cross-referenced through agreement markers on the auxiliary can be instantiated by modifiers only, or (for some arguments), if the referent is clear from the context, by no nominal constituent of any kind. There is a rich system of case marking, and adnominal modifiers agree with the heads they modify in case, number, and four genders. An example is given in (1).[2] In (1), *ngaragana-nguja* ('grog-proprietive', or 'having grog') is a modifier of *ngabulu* milk. They agree in case (accusative) and gender (class IV), but they are not contiguous within the sentence.

(1) Ngaragana-nguja ngiy-a gujinganjanga-ni jiyawu ngabulu.
grog-PROP.IV.ACC 3.SG.NM.A-PST mother.II.ERG give milk.IV.ACC
'(His) mother gave (him) milk with grog in it.' [wmb]

At first glance, this might look like an extraction phenomenon targeting the left periphery of the sentence. However, as illustrated in (2) (Nordlinger, 1998b, 133) it is not the case discontinuous NPs must involve the clause initial position. Here, the clause initial position is filled with a vocative,[3] and the words *jundurra* ('dust') and *bajbaga* ('big') are separated by the benefactive dative pronoun.

(2) Babaga-yi nyi-n jundurra mirnda bajbaga
sister.II-LOC 2.SG.A.PRES-PROG dust.IV.ACC 1.DU.INC.OBL big.IV.ACC
yardi.
put
'Sister you're making lots of dust for us.' [wmb]

[1] As with Warlpiri, the pre-auxiliary position can contain more than one word just in case those words form an NP constituent.

[2] This is the first clause of a biclausal structure from example (8-62) on p. 223 of Nordlinger 1998b. Note that the recipient argument and not the theme is cross-referenced on the auxiliary and that the third person object marker is in fact a zero suffix, i.e., the absence of either of the overt marks for first or second person.

Glosses are slightly adapted from the source works. This paper uses the following abbreviations:

Case		Gender/number		Verbal inflection	
PROP	proprietive	II	noun class II	A	agent
NOM	nominative	III	noun class III	PST	past tense
ACC	accusative	IV	noun class IV	PRES	present tense
ERG	ergative	NM	non-masc. (class II-IV)	PROG	progressive
LOC	locative	MASC	masculine	CONT	contemporaneous
OBL	oblique case	NEUT	neuter	PASS-PART	passive participle
ABL	ablative	SG	singular		
GEN	genitive	DU	dual		
		INC	inclusive		

[3] Vocatives are marked with locative case.

Finally, note that clauses headed by non-verbal predicates are allowed, and do not use auxiliaries.[4] In such clauses, there is no second position constraint. An example is given in (3) (Nordlinger, 1998b, 72).

(3) Buguwama mamiyaga burnaringma.
big.III.NOM that.III.SG.NOM wild.orange.III.NOM
'That's a big orange.' [wmb]

3 Previous Analyses

3.1 LFG: Constructive Case

Nordlinger (1998a) presents an analysis of non-configurationality in terms of multiple strategies for the marking of grammatical functions: Configurational languages mark grammatical functions through specific phrase structure positions, while non-configurational languages mark grammatical functions through morphology. Morphological marking of grammatical functions can be through affixes on the verb (head-marking) or on the NPs (dependent-marking).

Nordlinger notes an asymmetry in previous accounts whereby verbal affixes are believed to directly satisfy valence requirements but case markers only match what is provided in the verb's lexical entry, and proposes that instead the case markers should be treated on a par with other kinds of grammatical-function marking morphology in non-configurational languages and directly fill grammatical roles. In particular, she proposes lexical specifications like (4) (for case markers on nominal heads) and (5) (for case markers on nominal modifiers):

(4) (SUBJ ↑)
(↑ CASE) = ERG

(5) (SUBJ (ADJ ↑))
((ADJ ↑) CASE) = ERG

The first statement in each specification is an inside out equation which asserts both the existence of an appropriate grammatical function in the clause and the association between that function and the nominal the case marker attaches to. The second equation gives the case value of the of the noun (4) or the nominal constituent to which the adjective belongs (5). Since each nominal thus associates itself to the appropriate grammatical function independently, modifiers and head nouns do not need to be contiguous in the c-structure for their information to be unified at f-structure.

As a result, the c-structure rules are very simple. Nordlinger proposes the following annotated c-structure rules:

[4] Though there is a copular verb, which, when present, requires the auxiliary.

(6)
$$\begin{array}{lcccc} \text{IP} & \rightarrow & \text{XP} & & \text{I}' \\ & & (\uparrow \text{DF}) = \downarrow & & \uparrow = \downarrow \\ \text{I}' & \rightarrow & \text{I} & & \text{S} \\ & & \uparrow = \downarrow & & \uparrow = \downarrow \\ \text{S} & \rightarrow & \text{C}^{+} & & \\ & & (\uparrow(\text{GF})) = \downarrow & & \end{array}$$

The I position is filled by the auxiliary. The single position to the left of the auxiliary is filled by a maximal projection assigned some discourse function. The complement of the auxiliary is an S, consisting of at least one constituent. The S and the auxiliary are f-structure co-heads. Each sub-constituent of S either bears a grammatical function with respect to the clause or is itself the head of the clause. Though this is not explicitly stated in Nordlinger 1998a, the main predicate must also provide a list of grammatical functions, either directly in its lexical entry or indirectly through its a-structure and the general linking theory. The general principles of coherence and completeness require the verb (if there is one) to fill the head role and the nouns to fill argument roles.[5]

3.2 HPSG: Linearization

Donohue and Sag (1999) present a linearization-based analysis of Warlpiri which is also applicable to Wambaya. Their analysis is based on the DOM feature introduced by Reape (1994). Here, the DOM value of a constituent is a list of *sign*s, which include the phonological representations of the words contained within the constituent. Constructions are then classified as either compacting or liberating. Compacting constructions fuse the DOM values of their daughters into a DOM list with a single element. Liberating constructions append the DOM values of their daughters to create multi-element lists. Both types of constructions allow the phonology to be "shuffled", but only liberating constructions allow their daughters' phonology to interleave with the phonology from other constituents higher up in the tree.

On Donohue and Sag's analysis, the NP construction (7) is liberating. That is, it combines two daughters with matching CASE values, but doesn't constrain them to appear contiguously in the final phonological representation.[6] In contrast, the clausal construction (8), which realizes all valence requirements of the head, is a compacting construction.

[5] When there is no verb, a noun can be a predicator, though it is not clear how this account captures the fact that nominal predicates don't co-occur with the auxiliary.

[6] $\bigcirc$ represents the operation of 'domain union', which shuffles two lists.

(7) *mod-nom-cx:*

$$\begin{bmatrix} \text{MOTHER} & \begin{bmatrix} \text{DOM } \delta_1 \bigcirc \delta_2 \\ \text{SYN NP} \end{bmatrix} \\ \text{DTRS} & \left\langle \begin{bmatrix} \text{DOM } \delta_1 \\ \text{SYN } \left[\text{NP, CASE } \boxed{1}\right] \end{bmatrix}, \begin{bmatrix} \text{DOM } \delta_2 \\ \text{SYN } \left[\text{NP, CASE } \boxed{1}\right] \end{bmatrix} \right\rangle \end{bmatrix}$$

(8) *cl-cx:*

$$\begin{bmatrix} \text{MOTHER} & \begin{bmatrix} \text{DOM} & \left\langle \begin{bmatrix} \text{SYN} & \boxed{0} \\ \text{DOM} & \delta_1 \bigcirc \ldots \bigcirc \delta_n \end{bmatrix} \right\rangle \\ \text{SYN} & \boxed{0}\left[\text{VAL } \langle\,\rangle\right] \end{bmatrix} \\ \text{DTRS} & \left\langle \begin{bmatrix} \text{DOM} & \delta_1 \\ \text{SYN} & \begin{bmatrix} \textit{finite} \\ \text{VAL} & \langle \boxed{1}, \ldots, \boxed{n} \rangle \end{bmatrix} \end{bmatrix}, \right\rangle \\ & \boxed{1}\left[\text{DOM} \quad \delta_2\right], \ldots, \boxed{n}\left[\text{DOM} \quad \delta_n\right] \end{bmatrix}$$

This construction is subject to two linear precedence constraints which force auxiliaries to appear before all non-focused elements and a single focused element to precede everything else. These constraints thus determine the auxiliary-second order.

3.3 Summary

This section has briefly reviewed to lexicalist analyses of non-configurationality in Australian languages. The first, in LFG, relies on inside-out designators to allow case markers to directly state which grammatical function the nominal they mark belongs to, as well as phrase structure rules which allow any constituent to fill any grammatical function. The second, in HPSG, posits tectogrammatical constituents of the usual kind, but creates the surface order through domain union, allowing subconstituents to shuffle together, subject to the constraints of the grammar.

4 Non-Cancellation Analysis

The alternative explored here is based on non-cancellation of valence features. The central intuition of this analysis is that the argument positions of a head can be the target of modification independently of being filled. This is similar in spirit to Nordlinger's approach in that it allows the head to combine with its arguments in

any order (subject to the auxiliary-second constraint), relying on the matching of case requirements and case marking to sort out which dependent goes with which argument position. This is achieved through altering the head-nexus rules to preserve the SUBJ and COMPS values, and positing new rules which allow modifiers to attach semantically to arguments of the syntactic constituents they combine with.

4.1 Head-arg and head-arg-mod rules

The core of the analysis is thus two series of rules, one for argument realization and one for argument modification. I illustrate here with the rule which targets the second complement position, though there are parallel rules for subjects and the other complement positions. Generalizations across these rules are captured in the type hierarchy. The head-2nd-complement rule is shown in (9). It identifies the SYNSEM value of the non-head daughter with the SYNSEM of the second complement of the head. In addition, it records the information that this argument has been instantiated by its head (rather than just a modifier; [INST +]), and that it has also been instantiated by something ([OPT +]).[7] At the same time, it checks that the argument has not previously been instantiated by its head, by checking for [INST −] on the head-daughter's COMPS list in this position.

(9) *head-2nd-comp-phrase:*

$$\left[\begin{array}{l} \text{SYNSEM} \mid \text{COMPS} \left\langle \boxed{1}, \left[\begin{array}{ll} \text{OPT} & + \\ \text{INST} & + \\ \text{LOCAL} & \boxed{3} \\ \text{NON-LOC} & \boxed{4} \end{array}\right] \right\rangle \oplus \boxed{A} \\ \\ \text{HD-DTR} \mid \text{COMPS} \left\langle \boxed{1}, \boxed{2} \left[\begin{array}{ll} \text{INST} & - \\ \text{LOCAL} & \boxed{3} \\ \text{NON-LOC} & \boxed{4} \end{array}\right] \right\rangle \oplus \boxed{A} \\ \\ \text{NON-HD-DTR} \mid \text{SYNSEM } \boxed{2} \end{array}\right]$$

The rule which attaches modifiers to the second complement of a head is shown in (10). Like the rule in (9) above, this rule targets the second item on the COMPS list, and provides the information on the mother that it has been overtly realized ([OPT +]).[8] However, since the non-head daughter is a modifier in this case, rather

[7] The feature OPT was initially adapted from the English Resource Grammar (ERG; Flickinger 2000) feature of the same name and used, as in the ERG, to track which arguments of heads can be left unfilled ([OPT *bool*]) and which must be discharged ([OPT −]). This is enforced by various selecting environments which check that the valence lists contain only [OPT +] elements. The present analysis takes advantage of this feature in tracking argument realization, using [OPT +] to indicate that the argument position has been filled, at least by a modifier.

[8] The actual implemented analysis is a bit more complicated than this, since these same rules are also used to attach adverbs which modify the verbal complement of the auxiliary and which can't stand in for the verb itself. To handle this, the OPT value of the argument position on the

than matching the non-head daughter's SYNSEM to the complement requirement, it uses the non-head daughter's MOD value instead. This has the effect of giving the modifier the information it needs about the argument's syntactic and semantic features, to allow agreement in case, number and gender on the one hand, and construction of appropriate semantic representations on the other.[9]

(10) *head-2nd-comp-mod-phrase:*

$$\left[\begin{array}{l} \text{SYNSEM} \mid \text{COMPS} \left\langle \boxed{1}, \left[\begin{array}{ll} \text{OPT} & + \\ \text{INST} & \boxed{4} \\ \text{LOCAL} & \boxed{2} \\ \text{NON-LOC} & \boxed{3} \end{array}\right] \right\rangle \oplus \boxed{A} \\ \\ \text{HD-DTR} \mid \text{COMPS} \left\langle \boxed{1}, \left[\begin{array}{ll} \text{INST} & \boxed{4} \\ \text{LOCAL} & \boxed{2} \\ \text{NON-LOC} & \boxed{3} \end{array}\right] \right\rangle \oplus \boxed{A} \\ \\ \text{NON-HD-DTR} \mid \text{MOD} \left\langle \left[\text{LOCAL} \quad \boxed{2}\right] \right\rangle \end{array}\right]$$

4.2 Auxiliaries and word order

Because of the auxiliary-second word order constraint, and because the auxiliaries show agreement with both subjects and objects as well as registering reflexivization, the grammar adopts an argument-composition (Hinrichs and Nakazawa, 1990) analysis of Wambaya auxiliaries. The auxiliaries all inherit from the following type:[10]

---

mother is identified with a head feature HDLESS on the modifier daughter, and the OPT value of the argument position on the head daughter is identified with the OPT value inside the modifier's MOD value. Adverbs preserve the OPT status of the argument they attach to by identifying HDLESS with MOD.OPT. Adnominal modifiers, on the other hand, are constrained to be [HDLESS +].

[9] Note that $\boxed{2}$ identifies only the LOCAL value and not the whole SYNSEM because the value for OPT (inside SYNSEM) potentially changes.

[10] The specification [FORM *fin*] distinguishes verbs with appropriate inflection for matrix clauses from those inflected to head subordinate modifying clauses. It also has the effect of disallowing auxiliaries as the complement of other auxiliaries, as the auxiliaries are only assigned other values of FORM.

(11) *arg-comp-aux:*

$$\begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{AUX} \quad + \end{bmatrix} \\ \text{VAL} \begin{bmatrix} \text{SUBJ} \quad \langle \boxed{1} \rangle \\ \text{COMPS} \quad \langle \begin{bmatrix} \text{OPT} \quad - \\ \text{HEAD} \quad \begin{bmatrix} \textit{verb} \\ \text{FROM} \quad \textit{fin} \end{bmatrix} \\ \text{SUBJ} \quad \langle \boxed{1} \rangle \\ \text{COMPS} \quad \boxed{A} \end{bmatrix} \rangle \oplus \boxed{A} \end{bmatrix} \end{bmatrix}$$

The head-argument and head-arg-modifier phrases illustrated above are all instantiated in both head-final and head-initial versions. The general head-final and head-initial types bear the constraints in (12), where the head and non-head daughters are linked to specific positions on the ARGS list, i.e., to specific positions within the phrase. These two types use the feature MC ('main clause') to force all constituents to the right of the auxiliary to attach before any to the left, and furthermore, to allow exactly one constituent to attach to the left. That is, an auxiliary plus any number of dependents to the right is [MC *na*],[11] and a suitable daughter for either another head-initial rule or the head-final rule. An auxiliary (or auxiliary-headed constituent) that has picked up one dependent to the left is now suitable as either a matrix or a subordinate clause ([MC *bool*]), but can no longer pick up any dependents, since it is now incompatible with the head-daughter position in either head-initial or head-final rules.

(12) *aux-head-init:*

$$\begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{AUX} \; + \end{bmatrix} \\ \text{MC} \quad \boxed{1}\textit{na} \end{bmatrix} \\ \text{HD-DTR} \; \boxed{2}\left[\text{CAT} \mid \text{MC} \; \boxed{1}\right] \\ \text{NON-HD-DTR} \; \boxed{3} \\ \text{ARGS} \; \langle \boxed{2}, \boxed{3} \rangle \end{bmatrix}$$

aux-head-final:

$$\begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{AUX} \; + \end{bmatrix} \\ \text{MC} \quad \textit{bool} \end{bmatrix} \\ \text{HD-DTR} \; \boxed{2}\left[\text{CAT} \mid \text{MC} \; \textit{na}\right] \\ \text{NON-HD-DTR} \; \boxed{3} \\ \text{ARGS} \; \langle \boxed{3}, \boxed{2} \rangle \end{bmatrix}$$

4.3 Representations

These aspects of the analysis are implemented together with analyses of a wide range of phenomena in Wambaya, including argument optionality; subject and object agreement on the auxiliary; various case frames; case, gender and number agreement between nouns and their modifiers; nouns functioning as adverbial modifiers; verbless clauses; coordination; and others. The grammar has been developed

[11] *na* stands for not-applicable. It contrasts with *bool*, which has subtypes + and −. This three-way contrast is used to similar effect in the ERG.

against a test suite comprising all of the example sentences in Nordlinger 1998b (804 examples), and presently produces appropriate semantic representations for 91% of these examples, while maintaining relatively low ambiguity.[12]

In combination with the other analyses in the grammar, the rules and lexical items sketched above assign the structure in Fig. 1 and the semantic representation in Fig. 2 to the example in (1). The nodes in the tree are labeled with their rule types to better indicate the workings of the analysis.[13] The most relevant point here is that even though *ngaraganananguja* ('with grog in it') and *ngabulu* ('milk') are at opposite ends of the sentence, they both contribute to the semantics of the theme argument (*x7* in this example).[14]

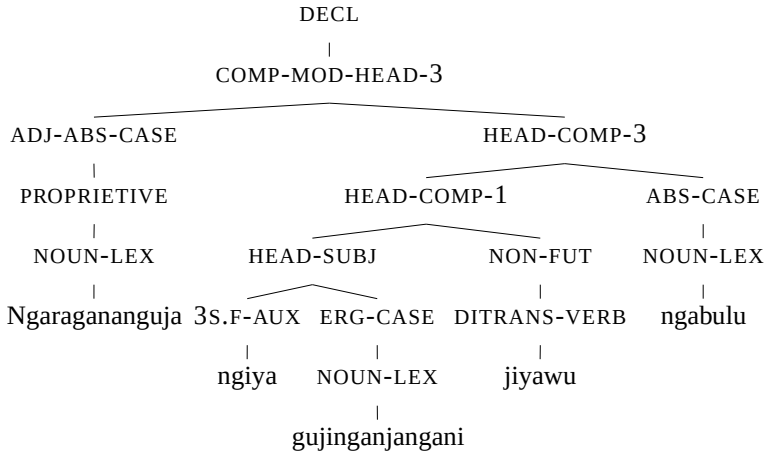


Figure 1: Derivation tree for example (1)

5 Comparison

The analysis presented here is, to my knowledge, the first to capture Australian-style discontinuous noun phrases in HPSG without resorting to shuffle or similar operators.[15] For the core data, it makes the same predictions as the existing accounts. There are interesting differences, however. The current analysis is com-

[12]There are on average 11.89 analyses per item. Some of the sources of structural ambiguity in Wambaya are not familiar from English. For example, because any noun or nominal modifier can head a clause, clausal coordination can be achieved through juxtaposition, and arguments can go unexpressed, any reasonably long sentence often has multiple parses involving coordination.

[13]Some nodes representing lexical rules have been suppressed to simplify the tree structure.

[14]Discontinuous noun phrases also raise the problem of where to introduce the quantifiers. The grammar currently has quantifiers introduced by selecting heads (e.g., verbs) and by constructions which create modifiers (e.g., the proprietive in (1)). In cases where an argument is not overtly realized, as in the ARG2 position of the **_give_v_rel** in Fig. 2, this gives rise to quantifiers with unbound RSTR values.

[15]But see Müller 2004 for an account of several related phenomena in German.

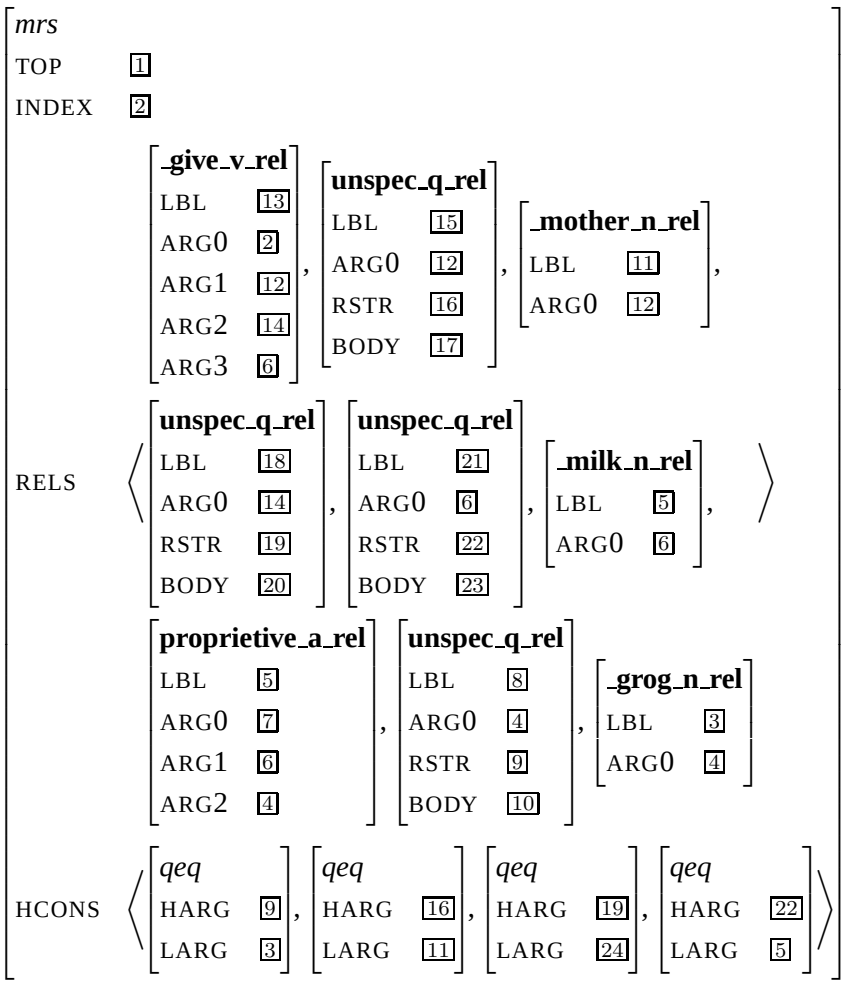


Figure 2: MRS for example (1)

pared to Nordlinger 1998a in §5.1 and to Donohue and Sag 1999 in §5.2. This analysis also bears similarities to previous non-cancellation analyses proposed in HPSG and to the treatment of relative clause extraposition in German in Kiss 2005. These are discussed in §5.3 and §5.4, respectively.

5.1 Comparison to Nordlinger 1998a

The proposed analysis, like the LFG analysis, allows for NPs to be base-generated as discontinuous. This means that the central problem is linking the pieces back together in the semantics/f-structure. On the present analysis, this is handled by matching constraints on CASE between the verb, the nominal heads, and the modifiers of nominal heads. On Nordlinger's analysis, the verbs have sets of grammatical functions that they require, and the case markers on the nouns/nominal modi-

fiers correlate case to grammatical function. The problem is that the mapping is not one-to-one. As Nordlinger shows, Wambaya has morphological ergativity. This means that both ergative and absolutive case[16] must be compatible with the grammatical function SUBJ. To avoid getting ergative subjects of intransitives, she has the ergative case marker stipulate the presence of an OBJ function as well. To avoid getting absolutive subjects of transitives, she appeals to 'morphological blocking' (Andrews, 1990). She doesn't address semitransitives (with an ⟨ erg, dat ⟩ case frame), but one possible analysis would be to have dative arguments correspond to an OBJ_θ function rather than plain OBJ. These stipulations are the side-effect of pinning the grammatical function assignment solely on case. It seems to me, however, that the grammatical function requirements of the verbs are a proxy for case, and it would be more straightforward to have the verbs give the case frames directly instead.[17]

5.2 Comparison to Donohue and Sag 1999

Like Nordlinger's analysis, as well as Pullum's (1982) metarule-based proposal and Ross's (1967) transformational account, the analysis proposed in this paper predicts that the word-order freedom of Wambaya-type languages should be clause-bounded. On the present analysis, this prediction is a result of the fact that the argument positions are all accessed through the valence lists of the head. Once a particular auxiliary's domain is complete, those arguments are no longer active. For Donohue and Sag, however, the clause-boundedness is stipulated by making the clausal construction a compacting construction. Thus Donohue and Sag predict that languages may vary on this point.

To my knowledge, the only language argued to have non-clause-bounded discontinuity of constituents is Ngarluma. Simpson (1980, 22) gives two examples of discontinuous verbal constituents:

(13) Kurna-yi thaka-lku kampa-rna-ku wantha-lku
charcoal-ACC take-PRES burn-CONT-ACC put-PRES
'(I) will pick up the charcoal still burning and put (it) (on the grass).' [nrl]

(14) Ngayi jimpayika-rnakurla-ku marrparnta-nha-pa yarnta-yi
I.NOM lose-PASS+PART-ACC find-PAST-CLITIC day/watch-ACC
nyintala-ku
you.LOC-ACC
'I found the watch you lost.' [nrl]

[16] Actually, as Nordlinger shows, Wambaya needs a tripartite distinction between ergative, nominative and accusative.

[17] Berman (2003) similarly keys grammatical function off of case in her analysis of German, and (Müller, To appear, Section 6.5) notes that this also runs afoul of the fact that case marking doesn't align perfectly with grammatical function, for example, in the case of accusative NPs serving as modifiers.

(13) is not a clear example of a discontinuous clause, even though *kurna-yi* ('charcoal') and *kampra-rna-ku* ('burn'), while non-contiguous, are interpreted together. This is because there is an alternative analysis where *kurna-yi* is simply the matrix object, and *kampra-rna-ku* its modifier.

The example in (14) appears to be a clearer case. Here, the candidate discontinuous clause is *jimpayika-rnakurla-ku* ('lose-PASS+PART-ACC') ... *nyintala-ku* ('you.LOC-ACC'). *nyintala-ku* is marked with locative case to show that it is a passive agent and accusative case to show that it is part of a modifier of an accusative argument of a higher clause.[18] However, there is at least one possible alternative analysis of (14), due to ambiguity in the functions of case in Ngarluma. Locative case, in addition to marking passive agents, is also used to mark instruments, location, and time. As in Wambaya, NPs marked with 'semantic' case (including locative) can function as modifiers of other NPs.[19] An example is in (15) (Simpson, 1980, 52), where Simpson argues that *ngathala-nguru-ku* ('I.LOC-ABL-ACC') and *mara-ngka-nguru-ku* ('hand.-LOC-ABL-ACC') don't fill the object role of *Marawanjarri-nha* ('drop'), but rather modify the unexpressed filler of that role.

(15) Marawanjarri-nha ngathala-nguru-ku mara-ngka-nguru-ku
drop-PAST I.LOC-ABL-ACC hand-LOC-ABL-ACC
'(I) dropped it from my hand.' [nrl]

Thus it is possible that *nyintala-ku* ('you.LOC-ACC') in (14) is actually an independent modifier of *yarnta-yi* ('watch-ACC'), and not a fragment of the clause headed by *jimpayika-rnakurla-ku* ('lose-PASS+PART-ACC'). In the absence of additional data on Ngarluma (or other languages with this property), it remains an open question whether there are any languages whose word-order freedom extends to the interleaving of words from different clauses.

A second difference between the present account and that of Donohue and Sag is in the treatment of coordination. Again, Donohue and Sag stipulate that the coordinating construction is compacting. On the present analysis, coordinated NPs are predicted to be continuous. This is because (per typical HPSG assumptions) coordination does not involve modification, there is no way for one coordinand to attach separately from the other. Again, I note the difference in predictions of the two analyses, but do not have definitive data to chose between them.

5.3 Comparison to other non-cancellation analyses

The standard HPSG strategy of argument cancellation is often presented as making strong predictions of locality (e.g., Sag, In Press), making, inter alia, arguments' arguments inaccessible to selecting heads. This predicts, for example, that no

[18] Simpson notes that this kind of discontinuity is not possible with clauses modifying nominative positions, and that this is functionally motivated by the fact that nominative has a null case marker.

[19] In Ngarluma, unlike in Wambaya, such modifiers can have additional case suffixes indicating which NP they are modifying.

verb selects for a clausal complement whose (embedded) object bears dative case. Whenever such non-local information is required, it has to be explicitly passed up the head path, typically through the addition of a new feature. However, there have been several proposals in the literature to use non-cancellation (either by not shortening valence lists or by making ARG-ST a head feature) to handle various phenomena. These are reviewed briefly here.

Meurers (1999) proposes non-cancellation of the SUBCAT list in order to account for nominative case on subjects fronted together with infinitival Vs, as in (16) (Meurers, 1999, 174).

(16) [Ein Außenseiter gewonnen] hat hier noch nie.
an.NOM outsider won has here still never
'An outsider has never won here yet.' [deu]

In these constructions, Meurers argues that the higher, finite verb (here, *hat* 'has') constrains the case of and agrees with the NP within the fronted VP (here, *ein Außenseiter*, 'an outsider'), even though that NP combines directly with the lower, non-finite verb (here, *gewonnen*, 'won') and fulfills its subject position. Meurers's account of the relevant facts leaves arguments on the SUBCAT list even after they are fulfilled, while changing their type information to indicate that they have been realized.

Przepiórkowski (1999) proposes ARG-ST as a head feature in order to account for so-called 'raising-across-preposition' verbs (17) (p. 213) and agreement of predicative AP/NP with complements of numerals (18) (p. 234). Regarding examples like (17), Przepiórkowski argues that the preposition *za* is not predicative and therefore has an empty SUBJ list. This means that for the matrix (raising) verb to have access to this argument, the subject of the prepositions complement must be exposed some other way. For (18), the issue is that the predicative phrase *wyrwane/wyrwanych z ziemi* can agree in case with either the numeral heading the subject (*kilka*, 'a.few.ACC') or its complement (*drzew*, 'trees.GEN'). In both cases, making ARG-ST a head feature exposes the relevant information at the right point in the tree.

(17) Uważałem go za szczerego.
considered.1.SG.MASC him.ACC for sincereACC
'I considered him to be sincere.' [pol]

(18) [Kilka drzew] było wyrwane/wyrwanych z ziemi
a.few.ACC trees.GEN be.3.SG.NEUT torn.ACC/GEN from earth
'A few trees were uprooted.' [pol]

More recently, Müller (2008) makes use of non-cancellation to provide a unified analysis of depictive secondary predicates in English and German:

(19) weil [er [die Äpfel [ungewaschen ißt]]].
because he the apples unwashed eats

'because he eats apples unwashed.' (unwashed=him or apples) [deu]

(20) weil [er [ungewaschen [die Äpfel ißt]]].
because he unwashed the apples eats
'because he eats the apples unwashed.' (unwashed=him) [deu]

(21) *weil [ungewaschen [er / der Mann [die Äpfel ißt]]].
because unwashed he / the man the apples eats
Intended: 'because he/the man eats the apples unwashed.' [deu]

(22) John$_i$ [[ate the apples$_j$] unwashed$_{i/j}$]

Müller's observation is that while German depictives can only target arguments that have not been realized at the point that the depictive attaches, English depictives do not have this restriction. He proposes an account where both English and German depictives target items on the SUBCAT list. In German, depictives are only allowed to target uncanceled arguments, while in English, they can refer to anything on the SUBCAT list (canceled or otherwise).

In summary, these previous approaches use non-cancellation to allow outside elements to:

1. constrain the case of an element inside an argument (German),
2. agree with the case of an element inside an argument (Polish), and
3. gain access to the INDEX of an element inside the constituent they attach to (English, Polish).

The analysis of Wambaya presented here is uses non-cancellation for (2) and (3). In light of the previous work discussed in this subsection, it appears what is special about Wambaya-type languages is not in fact the possibility of non-cancellation, but rather the *head-arg-mod* rules which leverage non-cancellation to license discontinuous NPs.

5.4 Comparison to Kiss 2005

Kiss (2005) makes three observations about extraposed relative clauses in German:

- Extraposed relative clauses apparently violate constraints on movement.
- Extraposed relative clauses may only form part of a partial verb phrase if their antecedents do, too.
- Extraposed relative clauses interact with variable binding.

He presents an analysis in terms of a new non-local feature ANCHORS which collects up the ⟨ index, handle ⟩ pairs[20] from all subconstituents of a constituent (discharged through a TO-BIND mechanism at clause boundaries). Relative clauses (and similar intersective modifiers) then attach semantically to an anchor within the anchors set of the head they attach to, rather than to that head itself. On this analysis, extraposed relative clauses are thus base-generated as sisters to constituents containing their antecedents. The semantic information they need access to is percolated up through the ANCHORS feature.

At a sufficient level of abstraction, the analysis presented here of Wambaya modifiers is quite similar to Kiss's proposal: Both analyses attach apparently discontinuous modifiers in their surface location, and make use of feature-passing to make the relevant information available. It follows that an ANCHORS-based analysis could be developed for the Wambaya data, though it would require some adaptation: Since Wambaya modifiers can also attach lower than the nouns the combine with and in fact in the absence of such nouns all together, the anchors for all arguments will have to be introduced by the selecting predicate. Once that modification is made, the two analyses are very similar indeed: the predicate (e.g., a verbal head) makes available a set of index-handle pairs corresponding to its arguments. The modifiers then attach syntactically to a projection of the predicate (e.g., a verbal projection) but semantically to the index-handle pair of one of its arguments.

The valence-features-based analysis presented here seems better adapted to Wambaya for two reasons: (1) The verb already records the index and handle information of its arguments through the valence features; adding this information to an anchors list seems redundant. (2) Unlike in German where the only agreement between the extraposed relative clauses and their antecedents is semantic (number and gender information) and thus can be handled through identification of indices, Wambaya modifiers also agree in case. This could be handled by making the anchors set a set of ⟨ index, handle, case ⟩ triples, but again, the case information is already available on the verb's valence lists, and it seems redundant to copy it.

Despite these similarities, there are differences in predictions between the two analyses, if one allows the anchors list to also accumulate anchors introduced by verbal modifiers (including subordinate clauses). The present analysis predicts that all NP discontinuity should be clause-bound, and furthermore that verbal modifiers (e.g., locative NPs) should be contiguous. Moving to an ANCHORS-based analysis would be one way to relax this constraint, by percolating up anchors from inside modifiers (clausal or otherwise). However, it still wouldn't allow complete freedom of realization of parts of modifiers. In particular, it would require that head daughters of modifiers (nouns or verbs) be realized lower than any discontinuous pieces of those modifiers. This is because only the head daughters would be assumed to introduce new anchors; non-heads would not be able to properly link any

[20] Kiss (2005), like the present analysis, uses Minimal Recursion Semantics (Copestake et al., 2005). For more on the semantic aspects of this analysis, see §6 below.

anchors they introduced to the rest of the semantics.

6 Discussion

The original motivation for approaching this problem was to answer the question of whether Wambaya-style radical non-configurationality could be countenanced within the formalism adopted by the Grammar Matrix (type description language, tdl, as interpreted by the LKB; Copestake 2002). Tdl does not allow for relational constraints; the value of a feature may be identified with the value of another, but not set to some function of the value of the other. Nonetheless, the formalism is Turing complete, and so it is to expected that some analysis is possible. The open question was whether a reasonably elegant analysis was available, and in particular, one which preserves most of the (other) features of HPSG and which could leverage the other analyses provided by the Grammar Matrix. The implementation work that this paper is based on has shown that such an analysis is available. As reported in Bender 2008, a majority of the types provided by the Grammar Matrix core grammar are used in the Wambaya grammar, and relatively few (4%) needed to be modified.

There is, however, one major side effect to the non-cancellation analysis: It is not compatible with the algebra for Minimal Recursion Semantics developed by Copestake et al. (2001). The purpose of the algebra is to support reasoning about the MRSs generated by a grammar. Provided that the lexical entries and grammar rules meet certain additional constraints, then a grammar that conforms to the algebra will produce only well-formed and satisfiable MRSs.

The algebra requires of the rules that they, among other things:

- Designate one or more 'holes' or positions to be filled in the semantic head daughter
- Identify these holes with the 'hook' information from non-head daughter(s)

The grammar presented here does not conform to these requirements. In particular, in order to allow modifiers (semantic heads) to attach to argument positions of the head they combine with, the grammar must make more than one hook accessible on certain kinds of constituents. The same is true of Kiss's (2005) account of German relative clause extraposition. Donohue and Sag (1999) do not present an explicit account of the semantics, but a linearization-based approach could in principle be done in a way that is consistent with the algebra of Copestake et al. (2001).

Thus one finding of the present work is that it appears that the word order facts of Wambaya and similar languages are not compatible with the combination of strict tectogrammatical-phenogrammatical equivalence and the only algebra presently available for MRS. However, that algebra was developed with reference to a grammar for a highly configurational language (namely the English Resource

Grammar) and is not necessarily the only possible way to ensure the construction of well-formed, satisfiable MRSs.

References

Andrews, A. 1990. Unification and Morphological Blocking. *Natural Language and Linguistic Theory* 8, 507–558.

Bender, E.M. and Flickinger, D. 2005. Rapid Prototyping of Scalable Grammars: Towards Modularity in Extensions to a Language-Independent Core. In *IJCNLP-05 (Posters/Demos)*.

Bender, E.M., Flickinger, D. and Oepen, S. 2002. The Grammar Matrix: An Open-Source Starter-Kit for the Rapid Development of Cross-Linguistically Consistent Broad-Coverage Precision Grammars. In *Workshop on Grammar Engineering and Evaluation at COLING19*, pages 8–14.

Bender, Emily M. 2008. Evaluating a Crosslinguistic Grammar Resource: A Case Study of Wambaya. In *Proceedings of ACL08:HLT*.

Berman, Judith. 2003. *Clausal Syntax of German*. Stanford: CSLI.

Copestake, A. 2002. *Implementing Typed Feature Structure Grammars*. Stanford, CA: CSLI Publications.

Copestake, A., Flickinger, D., Pollard, C. and Sag, I.A. 2005. Minimal Recursion Semantics: An Introduction. *Research on Language & Computation* 3(2–3), 281–332.

Copestake, Ann, Lascarides, Alex and Flickinger, Dan. 2001. An Algebra for Semantic Construction in Constraint-based Grammars. In *Proceedings of the 39th Meeting of the Association for Computational Linguistics*, Toulouse, France.

Donohue, C. and Sag, I.A. 1999. Domains in Warlpiri, paper presented at HPSG'99, Edinburgh.

Flickinger, D. 2000. On Building a More Efficient Grammar by Exploiting Types. *Natural Language Engineering* 6 (1), 15 – 28.

Hinrichs, Erhard and Nakazawa, Tsuneko. 1990. Subcategorization and VP Structure in German. In Shaun Hughes and Joe Salmons (eds.), *Proceedings of the Third Symposium on Germanic Linguistics*, Amsterdam: Benjamins.

Kiss, Tibor. 2005. Semantic Constraints on Relative Clause Extraposition. *Natural Language and Linguistic Theory* 23, 281–334.

Meurers, Walt Detmar. 1999. Raising Spirits (and Assigning Them Case). In Werner Abraham (ed.), *Groninger Arbeiten zur Germanistischen Linguistik 43*, pages 173–226.

Müller, Stefan. 2004. Continuous or Discontinuous Constituents? A Comparison between Syntactic Analyses for Constituent Order and Their Processing Systems. *Research on Language and Computation, Special Issue on Linguistic Theory and Grammar Implementation* 2(2), 209–257.

Müller, Stefan. 2008. Depictive Secondary Predicates in German and English. In Christoph Schroeder, Gerd Hentschel and Winfried Boeder (eds.), *Secondary Predicates in Eastern European Languages and Beyond*, Studia Slavica Oldenburgensia, No. 16, pages 255–273, Oldenburg: BIS-Verlag.

Müller, Stefan. To appear. *Grammatiktheorie: Von der Transformationsgrammatik zur beschränkungsbasierten Grammatik*. Tübingen: Stauffenburg Verlag.

Nordlinger, R. 1998a. *Constructive Case*. Stanford, CA: CSLI.

Nordlinger, R. 1998b. *A Grammar of Wambaya, Northern Australia*. Canberra: Research School of Pacific and Asian Studies, The Australian National University.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph. D.thesis, Universität Tübingen, Germany.

Pullum, Geoffrey K. 1982. Free Word Order and Phrase Structure Rules. In James Pustejovsky and Peter Sells (eds.), *Proceedings of NELS 12*.

Reape, M. 1994. Domain Union and Word Order Variation in German. In John Nerbonne, Klaus Netter and Carl Pollard (eds.), *German in Head-Driven Phrase Structure Grammar*, pages 151 – 197, Stanford: CSLI.

Ross, John R. 1967. *Constraints on Variables in Syntax*. Ph. D.thesis, MIT, (Published as *Infinite Syntax!*, Norwood, NJ: Ablex, 1986).

Sag, Ivan A. In Press. Feature Geometry and Predictions of Locality. In Greville Corbett and Anna Kibort (eds.), *Proceedings of the Workshop on Features*, Oxford: Oxford University Press.

Simpson, Jane. 1980. Ngarluma as a W* Language, MIT, Cambridge, MA.

A syntactic account of Romanian correlative coordination from a Romance perspective

Gabriela Bîlbîie
University Paris 7

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 25–45

Bîlbîie, Gabriela. 2008. A syntactic account of Romanian correlative coordination from a Romance perspective. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 25–45. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.2. CC-BY 4.0

Abstract

This paper[†] examines the syntactic behaviour of two omnisyndetic coordinations (also called *correlative coordinations*), i.e. the disjunctive and the conjunctive types in Romanian, by explaining its data in a Romance perspective. Major issue has been whether these structures have symmetric or asymmetric structures. If all these Romance languages share a symmetric analysis for the disjunctive type Conj…Conj, it is not the case for the conjunctive type. Our aim is to show that the postulation of a conjunctional status for the Romanian structure *şi…şi* ('both…and'), which is the most widespread view in Romanian grammars, is inadequate for the Romanian data.

1 Introduction

In the literature on coordination phenomenon (see Haspelmath 2000, Huddleston and Pullum 2002, among others), one may find three main types of coordinate structures, with regard to the presence / the lack of the coordinator: i) *simple coordination*, when the coordinator appears with the last (or first[1]) conjunct, and optionally with the other conjuncts (except the first one), cf. (1a-b); ii) *omnisyndetic* or *correlative coordination*, in which the coordinator seems to appear on each conjunct, cf. (2a-b), and, finally, iii) *asyndetic coordination*, when it is not overtly marked by a coordinator, but it is achieved by means of juxtaposition, cf. (3a-b).

(1) a. Paul a appris [l'espagnol **et** le français]. (French)
b. Paul has learnt [Spanish **and** French]. (English)

(2) a. Paul a appris [**et** l'espagnol **et** le français]. (French)
b. Paul has learnt [**both** Spanish **and** French]. (English)

(3) a. Paul parle [l'espagnol, le français, l'anglais]. (French)
Paul speaks Spanish, French, English
b. John invited [all his colleagues, all his students]. (English)

In this paper, we focus on the second type, the omnisyndetic structures, which a priori are more constrained than simple coordinations (cf. Mouret 2007, Mouret *et al.* 2008). The restrictions operating on the correlative

[†]Many thanks to Anne Abeillé, François Mouret, the audience of the HPSG08 conference and three anonymous reviewers for comments, as well as my informants for Romance data. All errors or misconceptions remain mine.

[1]For head-final languages, like Korean or Japanese, for example.

coordinations include almost all levels of linguistic analysis: they concern syntactic, semantic, discursive and prosodic aspects. At the syntactic level, they are restricted with respect to the categories they conjoin, i.e. they conjoin maximal projections, but not words. From a semantic point of view, they accept only a Boolean reading. Let's take two examples in French (a priori available for other languages, too). If there is a conjunction of propositions, the conjunction *et* ('and') is ambiguous between a collective or distributive reading in simple coordination (4a), while it has only distributive reading in omnisyndetic structures (4b). We observe the same difference in the case of the disjunction of propositions: the conjunction *ou* 'or' has an inclusive or exclusive reading in simple coordination (5a), whereas in correlative structures, only the exclusive interpretation is available (5b).

(4) a. Paul **et** Marie se sont mariés.
Paul and Mary married (together or not)
b. **Et** Paul **et** Marie se sont mariés.
Both Paul and Mary married (not together)

(5) a. Paul **ou** Marie viendront / viendra à la fête.
Paul or Mary come.3pl/sg.FUT to the party
b. **Ou** Paul **ou** Marie viendra à la fête.
Either Paul or Mary come.3sg.FUT to the party

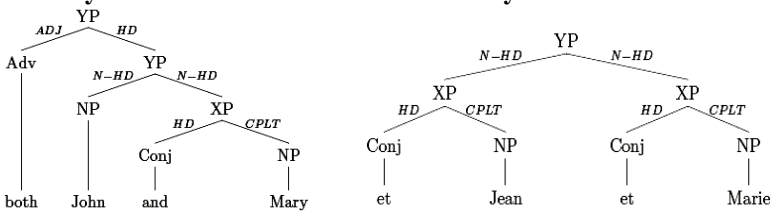
Finally, omnisyndetic coordination obeys a prosodic and discourse-related constraint, each conjunct being emphasized and forming an intonational phrase. These structures are compatible with focus and topic, but the relation involved by the doubled constituent obligatorily receives a contrastive interpretation.

Representative pairs we are concerned with in this study are the disjunction *either…or* and the conjunctive type *both…and*[2]. Cross-linguistically, there are two main structures proposed in the literature:
a) an asymmetric structure A (cf. (6a)), available for Germanic languages (such as English, German or Norwegian) (cf. Johannessen 2005, Hendriks 2004, Hofmeister 2008), where the initial element of the structure is a Focus Particle (with relatively free distribution, restrictions by focus and intonation, scopal effects), modifying the whole coordination, thus the term *initial coordination*.
b) a symmetric structure B (cf. (6b)), available for French (cf. Piot 2000, Mouret 2005 and 2007) and for Romance languages more generally (and a priori for Japanese and Korean), where all coordinators represent the same

[2]We leave aside the negative pair *neither…nor* which generally behaves as the conjunctive type *both…and* (at least, in Romanian). We use these terms (disjunction type, conjunctive type) for the sake of simplicity.

conjunctions combining with each conjunct, hence the term *conjunction doubling*.

(6) **a. Asymmetric Structure A** **b. Symmetric Structure B**

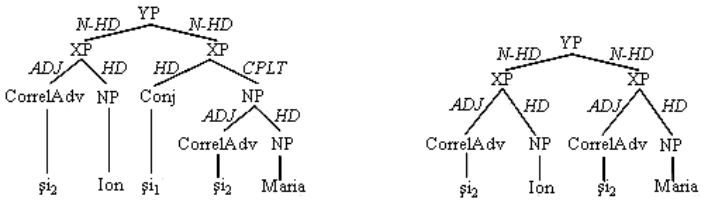


Some languages use both structure A and structure B; for example, French has two different structures for the additive coordination: an asymmetric structure *à la fois…et* (7a) and a symmetric construction *et…et* (7b).

(7) a. Jean lit [**à la fois** [en français **et** an anglais]].
John reads both in French and in English
b. Jean lit [[**et** en français] [**et** en anglais]].
John reads both in French and in English

A superficial Romance overview may suggest a common analysis for all Romance languages, i.e. a symmetric structure. Romanian data show that we have to handle a hybrid case: a symmetric structure B for the disjunction type (cf. table 1), whereas for the 'additive coordination' we have two possibilities: an asymmetric structure with conjunction (C_1, cf. (8a)) or a symmetric one without conjunction (C_2, cf. (8b)), in both cases the correlative elements behaving like adverbials.

(8) **a. Correlative Structure C_1** **b. Correlative Structure C_2**



The paper is structured as follows: In Section 2, we briefly mention the main distributional properties in Romance languages, and contrast French and Italian *vs.* Spanish and Romanian. In Section 3, we argue that, contrary to most Romanian grammars, Romanian elements *şi…şi* ('both…and') are (correlative) adverbs, rather than conjunctions. Finally, in Section 4, we give a syntactic analysis of the Romanian data within a construction-based HPSG framework.

2 Main properties of the correlative coordination in Romance

2.1 Forms of the coordinators

Table 1. Correlative coordinators of four Romance languages

	French	Italian	Spanish	Romanian
Disjunction Type	*ou...ou* *ou bien…ou bien* *soit...soit*$_c$ *soit que…soit que*$_c$	*o...o*	*o...o*	*sau...sau* *ori...ori* *fie...fie*$_c$
Conjunctive Type	*et...et* *à la fois…et*	*sia...sia*$_c$ *sia...che*$_c$	**y…y* *a la vez…y*	*şi...şi*

The index c in the left indicates that the form is always used in correlative structures.

A quick look at the table 1 shows that Spanish seems special, since it lacks the correlative pair **y…y* (9d).[3] A superficial examination of (9) would conclude that Romanian resembles French and Italian, but not Spanish.

(9) a. **Et** Jean **et** Marie sont venus à la fête. (French)
b. **Sia** Gianni **sia** Maria sono venuti alla festa. (Italian)
c. **Şi** Ion, **şi** Maria au venit la petrecere. (Romanian)
d. ***Y** Juan **y** Marìa han venido a la fiesta. (Spanish)
'Both John and Mary came to the party.'

Nevertheless, the structure *şi…şi* significantly differs from its counterparts, as shown by the empirical arguments mentioned in the section 3.

2.2 Properties of the coordinators[4]

If we look at the distribution of correlative items in these four languages, we observe at least three common properties. First of all, correlative items join phrasal categories such as NP (10-11-12-13a), PP (10-11-12-13b) or AP (10-11-12-13c) in all these languages.

[3]Its equivalent would be *tanto…como*, rarely used (in political discourse), or the adverbial *a la vez*, corresponding to the French *à la fois…et* (which follows the structure A, given in (6)):
(i) a. Voy (***y**) a Corea **y** a Japón.
b. Voy **a la vez** a Corea **y** a Japón.
go.1sg.IND both to Korea and to Japan

[4]For Spanish examples, we retain only the pair *o…o* (see the footnote number 3).

(10) F a. J'ai vu {**soit / et**} Jean {**soit / et**} Marie.
I saw {either / both} John {or / and} Mary
b. Je vais {**soit / et**} en Corée {**soit / et**} au Japon.
I go {either / both} to Korea {or / and} to Japan
c. Il est {**soit / et**} beau {**soit / et**} intelligent.
he is {either / both} beautiful {or / and} smart

(11) I a. Ho visto {**o / sia**} Gianni {**o / che**} Maria.
see.1sg.IND {either / both} John {or / and} Mary
b. Vado {**o / sia**} in Corea {**o / sia**} in Giappone.
go.1sg.IND {either / both} to Korea {or / and} to Japan
c. E {**o / sia**} bello {**o / che**} intelligente.
be.3sg.IND {either / both} beautiful {or / and} smart

(12) S a. He visto **o** a Juan **o** a Marìa.
see.1sg.IND {either / both} John {or / and} Mary
b. Voy **o** a Corea **o** a Japón.
go.1sg.IND {either / both} to Korea {or / and} to Japan
c. Es **o** guapo **o** inteligente.
be.3sg.IND {either / both} beautiful {or / and} smart

(13) R a. Maria adoră {**fie / şi**} proza, {**fie / şi**} poezia.
Maria adores {either / both} prose.DEF {or / and} poetry.DEF
b. Merg {**fie / şi**} în Coreea, {**fie / şi**} în Japonia.
go.1sg.IND {either / both} to Korea {or / and} to Japan
c. Este {**fie / şi**} frumos, {**fie / şi**} inteligent.
be.3sg.IND {either / both} beautiful {or / and} smart

As an additional remark, one may say that, inside the VP, the correlative coordination is more complicated, since the distribution of correlative items and speakers' acceptability vary cross-linguistically.[5]

Secondly, examples (14-15-16-17) show that such correlative items can also join embedded clauses:

[5]A priori, one can obtain a similarity between French and Italian on the one side, and Spanish and Romanian on the other side, according to at least two facts: first, the coordinator can freely combine with non-finite verbal categories in French or Italian, but this possibility is limited in Spanish and unavailable in Romanian; secondly, disjunctive coordinators combine with finite verbal categories (even if our data study shows some speakers' variation), while conjunctive ones are more constrained in French and Italian. We need further work in order to check these hypotheses.

(14) F a. Paul s'imagine **soit** que Jean n'est pas là **soit** que Marie le cache.
Paul thinks either that John is not here or that Mary hides him
b. Raconte-moi **soit** ce que tu as lu à la maison, **soit** ce que tu as appris à l'école.
Tell-me either what you read at home or what you learnt at school
c. Je propose **et** que Jean vienne **et** que Marie le cache.
I propose both that John come and that Mary hide him

(15) I a. Paolo pensa **o** che Gianni non c'è **o** che Maria lo nasconde.
Paul thinks either that John is not here or that Mary hides him
b. Raccontami **o** quello che hai letto a casa **o** quello che hai imparato a scuola.
Tell-me either what read.2sg.PAST at home or what learnt.2sg.PAST at school
c. Propongo **sia** che Gianni venga **sia** che Maria lo nasconda.
suggest.1sg.IND both that John come and that Mary hide him

(16) S a. Pablo se imaginaba **o** [que Juan no estaba allì] **o** [que Marìa lo escondìa].
Pablo thought either that John was not there or that Mary hid him
b. Cuéntame **o** lo que has leido en casa **o** lo que has aprendido en el colegio.
Tell-me either what read.2sg.PAST at home or what learnt.2sg.PAST at school

(17) R a. Paula îşi imaginează **fie** [că Ion nu e aici], **fie** [că Maria îl ascunde].
Paul thinks either that John is not here or that Mary hides him
b. Povesteşte-mi **fie** ce ai citit acasă, **fie** ce ai învăţat la şcoală.
Tell-me either what read.2sg.PAST at-home, or what learnt.2sg.PAST at school
c. Propun **şi** [ca Ion să vină] **şi** [ca Maria să-l ascundă].
suggest.1sg.IND both that John come and that Mary hide him

However, these coordinators are more constrained with root clauses. On the one hand, the disjunction type seems less constrained than the conjunctive one (in French or Italian), as examples in (18[6]-19) show; on the other hand, declarative sentences are less constrained than imperative or interrogative clauses, as we observe in (22-23-24-25).

(18) F a. **Soit** il fera beau **soit** il fera mauvais.
Either it be.FUT fine or it be.FUT bad

[6] % notes speakers' variation.

'Either the weather will be fine or the weather will be bad.'
b. %En ce moment, **et** ses élèves le fatiguent **et** ses collègues l'agacent.
At the moment, both his students are-wearing him out, and his colleagues are-annoying him
'At the moment, it is both the case that his students are-wearing him out, and that his colleagues are annoying him.'

(19) I a. **O** il presidente guarisce entro domani, **o** la riunione verrà annullata.
Either the president gets better until tomorrow, or the meeting will-be cancelled
b. *In questo momento, **sia** i suoi studenti lo stancano **sia\che** i suoi colleghi lo innervosiscono.
At the moment, both his students are-wearing him out, and his colleagues are-annoying him

(20) S **O** el presidente se pone bueno antes de mañana, **o** la reunión tendrá que ser suspendida.
Either the president gets better until tomorrow, or the meeting will-be cancelled

(21) R a. **Fie** preşedintele se va însănătoşi până mâine, **fie** reuniunea va fi anulată.
Either the president will get better until tomorrow, or the meeting will be cancelled
b. **Şi** gazul se scumpeşte, **şi** vremea se răceşte.
Both the gas is-getting-expensive, and the weather is-getting-bad
'It is both the case that the gas is getting expensive, and that the weather is getting bad.'

(22) F a. **Soit** tu manges, **soit** tu prépares tes devoirs.
Either you eat.IND, or you do.IND your homework.pl
b. ***Soit** mange, **soit** prépare tes devoirs!
Either eat.2sg.IMPERAT, or do.2sg.IMPERAT your homework.pl
c. ***Soit** qui viendra **soit** où on ira?
Either who come.3sg.FUT or where we go.1pl.FUT

(23) I a. **O** mangi, **o** fai i compiti.
Either eat.2sg.IND, or do.2sg.IND the homework.pl
b. ***O** mangia, **o** fa i compiti!
Either eat.2sg.IMPERAT, or do.2sg.IMPERAT the homework.pl
c. ***O** chi verrà **o** dove andremo?
Either who come.3sg.FUT or where go.1pl.FUT

(24) S a. **O** comes, **o** haces los deberes.
Either eat.2sg.IND, or do.2sg.IND the homework.pl
b. ***O** come, **o** haz los deberes, ¡decídete!
Either eat.2sg.IMPERAT, or do.2sg.IMPERAT the homework.pl
c. ***O** quien vendrá **o** dónde iremos?
Either who come.3sg.FUT or where go.1pl.FUT

(25) R a. **Fie** mănânci, **fie** citeşti.
Either eat.2sg.IND, or read.2sg.IND
b. ***Fie** mănâncă, **fie** citeşte, decide-te!
Either eat.2sg.IMPERAT, or read.2sg.IMPERAT, decide yourself
c. ***Fie** cine a venit **fie** unde mergem?
Either who come.3sg.FUT or where go.1pl.FUT

This restriction on main (declarative) clauses can be explained by the Boolean interpretation of omnisyndetic coordination (interpreted as conjoining propositions), assuming Ginzburg and Sag 2000's hypothesis that only declarative clauses have a propositional content. If interrogatives and imperatives do not have a propositional content, when embedded clauses are coordinated, one can interpret the coordination as scoping over the matrix clauses as well.

3 More on Romanian data

We give arguments for assigning structure B (given in (6b)) to Romanian disjunctive *sau / ori / fie…sau / ori / fie* ('either…or') and for assigning structures C (given in (8a-b)) to Romanian *şi…şi* ('both…and').

3.1 Correlative disjunction

Unlike English focus particles (e.g. *either*, cf. (26a)), 'initial' elements such as *sau / ori / fie* cannot float outside the cordination (26b-c).

(26) a. John **either** ate [rice **or** beans].
b. Ion a mâncat [**fie**[7] orez **fie** fasole].
'John ate [**either** rice **or** beans].'
c. *Ion **fie** a mâncat [orez **fie** fasole].
'John **either** ate [rice **or** beans].'

[7] For the sake of simplicity, we give examples only with *fie…fie* (only correlative use in coordination).

Unlike English *either* or *both* occurring only before the first term, Romanian correlative items can be iterated:

(27) a. Maria ar vrea să învețe **fie** engleza, **fie** franceza, **fie** german, **fie** japoneza.
Mary would wish to learn either English, or French, or German, or Japanese
b. Ion vrea **şi** o casă mare, **şi** o nevastă bună, **şi** copii deştepți.
John wants both a big house, and a good wife, and smart kids

Therefore, we consider that the symmetric structure B (proposed for French doubled conjunctions, cf. Mouret 2005 and 2007) is appropriate for Romanian disjunctive structure *sau / ori / fie…sau / ori / fie* ('either…or').

3.2 Arguments against the conjunctional status of *şi…şi*[8]

Romanian grammars (e.g. GALR 2005) distinguish between the conjunction *şi* ('and') and the homonymous form behaving like an adverb:

(28) a. Ion **şi**$_1$ Maria vorbesc franceza.
'John and Mary speak French.'
b. **Şi**$_2$ Ion vorbeşte franceza.
also John speaks French
c. Ion vorbeşte **şi**$_2$ franceza.
John speaks also French
'John speaks French, too.'

As for the correlative occurrences of the element *şi* (e.g. *şi…şi* 'both…and'), the widespread view is that this distribution is restricted to adverbial items, which by 'repetition' lose their meaning, inheriting conjunctional properties (GALR I: 644). Furthermore, the *şi* occurrences in correlative pairs (*şi…şi*) are analysed as conjunctions, without any empirical evidence.

In this sub-section, we give some arguments against the conjunctional status of *şi…şi*, arguing for an adverbial interpretation of *şi* in correlative environments.

First, *şi* can be preceded by a coordinating conjunction which exclusively realizes the coordination relation: it can combine with conjunctions like *şi* 'and' or *dar* 'but' (29a). Even if the first correlative item is absent[9], a conjunction can occur before the second conjunct (29b).

[8]The same observations hold for the pair *nici…nici* 'neither…nor' (cf. Bîlbîie 2006).

[9]In these cases, we interpret the 'end-attachment' coordination as a 'split' conjunct (cf. Abeillé 2005), functioning as an adjunct.

(29) a. Manolescu scrie **şi** poezie {***şi / dar***} **şi** proză.
Manolescu writes ***şi*** poetry {and / but} ***şi*** prose
'Manolescu writes both poetry and prose.'
b. La petrecere va veni Paul, {***şi / dar***} **şi** Mircea.
to the party will come Paul, {and / but} **also** Mircea
'Paul will come to the party, and Mircea too'.

As we have already mentioned, this item can occur outside coordinated phrases, in independent sentences, having a commonly accepted adverbial status: *şi* ('too' / 'also') (see table 5):

(30) a. La petrecere, vor veni **şi** prietenii, **şi** colegii lui Ion.
to the party, will come ***şi*** friends, ***şi*** colleagues of John
'Both John's friends and his colleagues will come to the party.'
b. La petrecere, vor veni **şi** {prietenii / colegii} lui Ion.
to the party, will come **also** {friends / colleagues} of Ion
'Ion's friends / colleagues will come to the party, too.'

Generally, the phrase composed by modifiers like *cam* 'rather', *chiar* 'even', *doar, numai* 'only', ***şi*** 'also', *nici* 'neither', etc. (called semiadverbs[10] in traditional grammars) and their host always bears 'emphatic' or contrastive stress, and that is exactly what we observe with the modifier *şi*: prosodically, the constituent modified by *şi* becomes stressed (receiving a special intonation).

(31) a. [**Chiar** Ion] a venit.
Even John came
b. Am [**doar** trei copii].
have.1sg.IND only three children
c. [**Şi** Ion] a picat examenul.
also John failed the exam
d. [[**Şi** Ion] [**şi** Maria]] au venit.
both John and Mary came

An additional argument concerns the fact that the correlative conjunction (*fie…fie* 'either…or') always precedes each conjunct, whereas the adverbial *şi* can occur inside the conjunct**,** following the subjunctive marker *să* 'that' (32a) or modifying a NP inside a coordinated VP (33a).

[10]*Semiadverbs* (cf. Ciompec 1985) behave differently from circumstantial adverbs, since they have modal or aspectual meaning (=intensifiers, so that they always need a head to modify), they can modify almost everything, they have relatively rigid order, in the immediate neighbourhood of the selected element. Barbu 2004 makes a distinction inside this class between lexical adverbs and affixal adverbs (the latter mentioned only occurring inside the verbal complex, next to the lexical verb).

(32) a. Paul adoră [să **şi** cânte la pian], [să **şi** danseze].
Paul adores [Subj *şi* play piano], [Subj *şi* dance]
'Paul adores both playing piano and dancing.'
b. *Paul adoră [să **fie** cânte la pian], [să **fie** danseze].
Paul adores [Subj *fie* play piano], [Subj *fie* dance]
'Paul adores either playing piano, or dancing.'

(33) a. Maria [şi-a făcut **şi** patul], [a scris **şi** tema la matematică].
Maria [made *şi* her bed], [wrote *şi* the-homework for maths]
'Maria both made her bed, and wrote the homework for the maths class.'
b. *Maria [şi-a făcut **fie** patul], [a scris **fie** tema la matematică].
Maria [made *fie* her bed], [wrote *fie* the-homework for maths]
'Maria either made her bed, or wrote the homework for the maths class.'

Another piece of evidence distinguishing between correlative conjunctions and the correlative *şi* is related to the insertion of an incidental phrase. A significant difference between correlative conjunctions and adverbs is that one can insert an incidental element (like *poate* 'perhaps'*, pare-se* 'it seems') after the conjunction *fie*, but not after the correlative *şi*:

(34) a. Ion vine **fie** azi **fie** {poate / pare-se}mâine.
'John comes **either** today **or** {perhaps / it-seems} tomorrow.'
b. *Ion vine **şi** azi, **şi** poate mâine.
John comes ***şi*** today, ***şi*** perhaps tomorrow
'John comes both today and perhaps tomorrow.'
b'. Ion vine **şi** azi, (dar) {poate / pare-se} **şi** mâine.
John comes ***şi*** today, (but) {perhaps / it-seems} ***şi*** tomorrow
'John comes both today and perhaps tomorrow.'

Additionally, there are some adverbs (like *chiar* 'even') that can modify the adverbial *şi*:

(35) a. La petrecere, va veni (**chiar**)[11] **şi** primarul satului.
to party, will come even ***şi*** the-major of-the-village
'Even the major of the village will come to the party.'
b. La petrecere, va veni Băsescu **şi chiar şi** fostul preşedinte.
to party, will-come John and even ***şi*** the ex-president
'Băsescu and even the ex-president will come to the party.'

[11]This element marks the idea of surprise, an unexpected event ("Ioana was the one least likely or least expected to resign").

The distributional behaviour of the adverbial *şi* is not singular in Romanian. There is a class of adverbs (the so-called 'intensifiers') that has the same distribution as *şi (*and *nici,* cf. Ciompec 1985). Inside this special adverbial class, Barbu 1999 and 2004 distinguishes between lexical intensifiers (= adverbs$_1$) and affixes (= adverbs$_2$). Elements of the first sub-set (adverbs$_1$) would be items like: *nici* ('neither', 'nor'), *abia* ('hardly'), *aproape* ('almost'), *chiar* ('even'), *doar, măcar, numai* ('only'), *încă* ('still'), ***şi*** ('also', 'already'), while the second sub-class (adverbs$_2$) contain: ***şi*** ('also', 'already'), *cam* ('rather'), *mai* ('nearly', 'still', 'again'), *prea* ('too'), *tot* ('still', 'repeatedly'). In table 2, one may see the general precedence order rule for both adverbial classes.

Table 2. General precedence order rule

(PO)	**adv$_1$** *să nu* pron aux **adv$_2$** vb
	să = subjunctive marker (see *que* in French)
	nu = negation
	pron = weak pronouns
	aux = auxiliaries
	adv = monosyllabic adverbs (*cam, prea, mai, şi, tot*)
	vb = lexical verb

Table 3. Precedence order rule for the adverbial *şi*

(PO)	(***şi***) *să nu* pron aux (***şi***) vb

As the table 3 shows, the adverbial *şi* can have both distributions[12], either at the edge of the verb cluster (= adverb$_1$), or inside, between the auxiliary and the lexical verb (= adverb$_2$). We observe some variations related to the verbal mood or tense: with the subjunctive, both distributions are available (36); with the past tense, for example, it can occur only between the auxiliary and the past participle (37).

(36) a. Maria vrea [**şi** să citească], [**şi** să deseneze].
Maria wants [*şi* Subj read], [*şi* Subj draw]
b. Maria vrea [să **şi** citească], [să **şi** deseneze].
Maria wants [Subj *şi* read], [Subj *şi* draw]
'Maria wants both to read and to draw.'

[12]The different distributions of the element *şi* correspond to a different syntactic (and semantic) status, i.e. the occurrence of *şi* as adverb$_2$ could be interpreted as an affix.

(37) a. Astăzi, [am **şi** băut], [am **şi** mîncat].
today [Aux *şi* Vb] [Aux *şi* Vb]
b. *Astăzi, [**şi** am băut], [**şi** am mîncat].
today [*şi* Aux Vb] [*şi* Aux Vb]
'Today I have both drunk and eaten.'

To sum up this section, we can say that the Conj…Conj… structure is available only for the disjunction type in Romanian (like in Spanish). With correlative adverbs (*şi…şi*), what we have is in fact simple coordination, or asyndetic coordination[13]: **Adv...**{ **Conj / Ø**} **Adv**.

As for the Romance perspective, the four Romance languages have one common correlative structure, i.e. the Conj…Conj… structure, as the new analysis of Romance shows in table 4.

Table 4. Analysis of Correlative coordination of 4 Romance languages

	French	**Italian**	**Spanish**	**Romanian**
Disjunction Type	*Conj…Conj…*	*Conj…Conj…*	*Conj…Conj…*	*Conj…Conj...*
Conjunctive Type	*Conj…Conj…* *Adv…Conj…*	*Conj…Conj...*	– *Adv…Conj…*	– *Adv…Adv…*

Table 5. Categorial status of the different correlative items

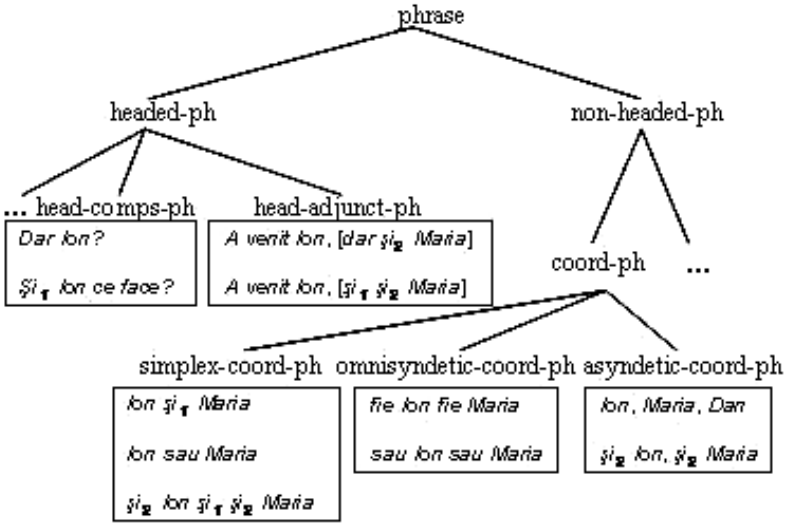
		French	**Italian**	**Spanish**	**Romanian**
Conj / Adv	simple conjunction	*et*	*e*	*y*	*şi*$_1$
	correlative conjunction	*et...et*	*sia...sia*$_c$	–	–
	simple adverb	*'aussi'*	*'anche'*	*'tambien'*	*şi*$_2$
	correlative adverb	*à la fois*		*a la vez*	*şi*$_2$*...şi*$_2$

4 An HPSG analysis

Let us first sketch the hierarchy of coordination types in Romanian:

[13]Represented here by the empty set symbol.

(38) Hierarchy of coordination types in Romanian

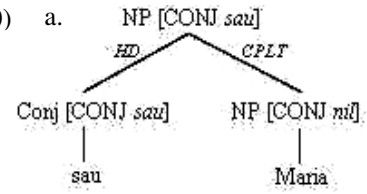


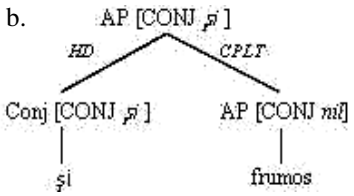
Turning to the syntax of coordination, we follow Abeillé 2003 and 2005 by treating them as 'weak' syntactic heads (rather than markers) making a subconstituent with the following phrase and inheriting from it most of their syntactic features, except the CONJ feature they introduce; consequently, they inherit the variable [1] and valence requirements (SUBJ, MARKING, SPR and COMPS features), represented by the sharing of variables like [2], [3], [4] and [5] respectively, which can correspond to empty lists (cf. the lexical type in (39)).

(39) *conj-word* ⇒

$$\begin{bmatrix} \text{CONJ} \neg \textit{nil} \\ \text{HEAD}[1] \\ \text{MARKING}[2] \\ \text{SUBJ}[3] \\ \text{SPR}[4] \\ \text{COMPS} \left\langle \begin{bmatrix} \text{CONJ} \textit{nil} \\ \text{HEAD}[1] \\ \text{MARKING}[2] \\ \text{SUBJ}[3] \\ \text{SPR}[4] \\ \text{COMPS}[5] \end{bmatrix} \right\rangle \oplus [5] \end{bmatrix}$$

Assuming a lexical type such as (39), one can allow head-complements structures, such as a NP structure (*sau Maria* 'or Maria') in (40a), or an AP structure (*şi frumos* 'and beautiful') in (40b):

(40) a. 

b. 

As for the analysis of coordinate structures as a whole, we follow Pollard and Sag 1994, Abeillé 2005 and 2006, by treating coordination as a subtype of non-headed phrase, rather than a binary conjunction phrase or some multi-headed construction.

(41) *coordinate-phrase* ⇒

$$\begin{bmatrix} \text{SYNSEM} \begin{bmatrix} \text{CONJ}\ nil \\ \text{HEAD}[1] \\ \text{VALENCE}[2] \\ \text{SLASH}[3] \end{bmatrix} \\ \text{NON}-\text{HEAD}-\text{DTRS}\ \text{list}(\text{SYNSEM}\begin{bmatrix} \text{CONJ}\ nil \\ \text{HEAD}[1] \\ \text{VALENCE}[2] \\ \text{SLASH}[3] \end{bmatrix}) \oplus \text{list}(\text{SYNSEM}\begin{bmatrix} \text{CONJ}\ \neg nil \\ \text{HEAD}[1] \\ \text{VALENCE}[2] \\ \text{SLASH}[3] \end{bmatrix}) \end{bmatrix}$$

In order to give an unitary account for the Romance data, we further posit three subtypes of coordinated phrases (see Mouret 2005 and 2007), differing on whether all the conjuncts (42), some conjuncts (43) or none of them (44) is headed by a conjunction. The first subtype is the omnisyndetic-coordinated-phrase, accounting for symmetric structures in Romance and, particularly, for the disjunction type in Romanian. Furthermore, the simplex-coordinated-phrase accounts for the simple coordination in general (mono- or polysyndetic), including also Romanian structures with correlative adverbs. And, finally, the asyndetic-coordinated phrase allows us to have Romanian coordinations with correlative adverbs (e.g. *şi*$_2$*…şi*$_2$), where there is no conjunction as coordinator at all.

(42) *omnisyndetic-coordinated-phrase* ⇒
$[\text{NON}-\text{HEAD}-\text{DTRS}\ \text{ne}-\text{list}([\text{CONJ}[1]\ fie \vee ori \vee sau])]$

(43) *simplex-coordinated-phrase* ⇒
$[\text{NON}-\text{HEAD}-\text{DTRS}\ \text{ne}-\text{list}([\text{CONJ}\ nil]) \oplus \text{ne}-\text{list}([\text{CONJ}[1] ori \vee sau \vee dar \vee şi_1])]$

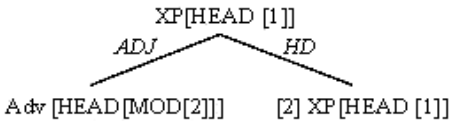
(44) *asyndetic-coordinated-phrase* ⇒

$$\left[\text{NON} - \text{HEAD} - \text{DTRS ne} - \text{list}\left(\left[\begin{array}{l}\text{CONJ } \textit{nil}\\ \text{LEFT CORREL } [1]\end{array}\right]\right)\right]$$

(45) **şi**$_2$ Ion ***şi***$_1$ **şi**$_2$ Maria
ADV Ion CONJ ADV Maria
'both Ion and Maria'

The adverbial *şi*$_2$ (as in (45)) selects the expression it modifies on a purely semantic basis; like other adverbs of the same type (see the two adverbial classes mentioned in Barbu 1999, 2004), it occurs to the left of the head it modifies. Following previous work (Noord and Bouma 1994, Abeillé and Godard 2003), we interpret it as an adjunct.

(46)



As for the representation of correlative adverbs, we follow Miller 1992 and Tseng 2003 in assuming an EDGE Feature Principle which allows feature propagation along the right and left edges of phrases. We then build from Abeillé and Borsley 2006, using a LEFT feature [CORREL] to identify the adverbial correlative forms in the lexicon and to percolate the information on the left edge of the phrase.

(47) <u>EDGE feature Principle</u>

phrase ⇒

$$\left[\begin{array}{l}\text{SYNSEM} \mid \text{EDGE}[\text{LEFT}[1], \text{RIGHT}[2]]\\ \text{DAUGHTERS}\langle[\text{SYNSEM} \mid \text{EDGE LEFT}[1]], \ldots, [\text{SYNSEM} \mid \text{EDGE RIGHT}[2]]\rangle\end{array}\right]$$

A linear precedence rule requires that there be no intervening material between the adverb and the modified constituent (*immediate precedence*):

(48) *head-adjunct-phrase* ⇒
ADJ_DTR [*adv*] << HEAD_DTR

(49) <u>Lexical entry for the conjunction *şi*$_1$</u>

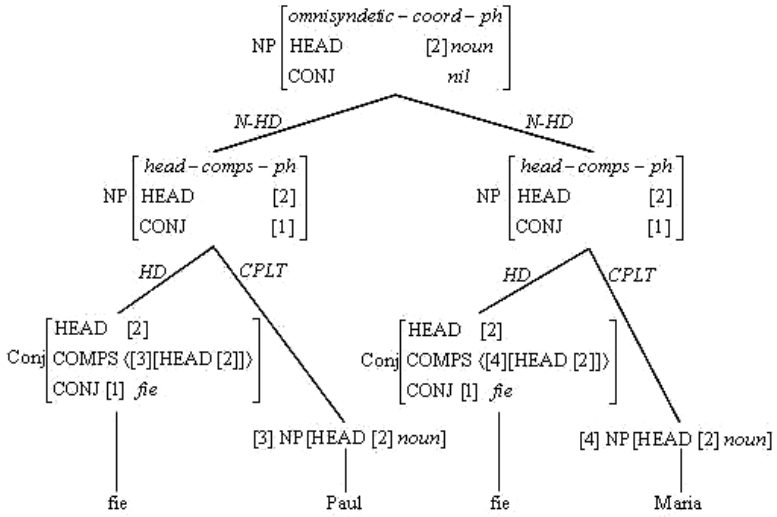
$$\left[\begin{array}{l}\text{CONJ} \quad \textit{şi}\\ \text{HEAD } [1]\\ \text{COMPS} < [\text{HEAD}[1], \text{LEFT}[\text{CORREL}[2]], \text{CONJ } \textit{nil}] >\\ \text{LEFT}[\text{CORREL}[2]]\end{array}\right]$$

(50) Lexical entry for the adverb *şi*$_2$

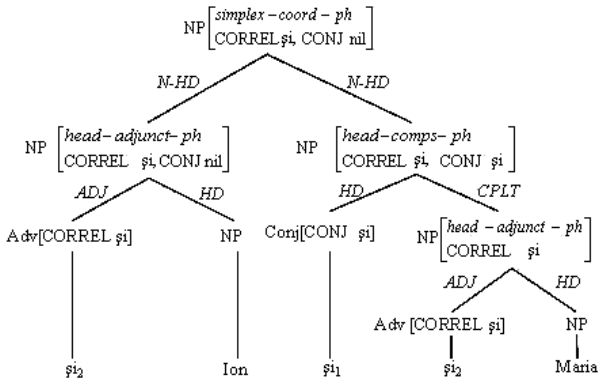
$$\begin{bmatrix} \text{HEAD} & adv \\ \text{MOD} & [\text{CONT}\ [1]] \\ \text{LEFT} & \text{CORREL}\ \ \textit{şi} \\ \text{CONT} & \begin{bmatrix} \text{RELS} & \begin{bmatrix} additive_rel \\ \text{ARG} \quad [1] \\ set \quad [2] \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Some simplified licensed structures:

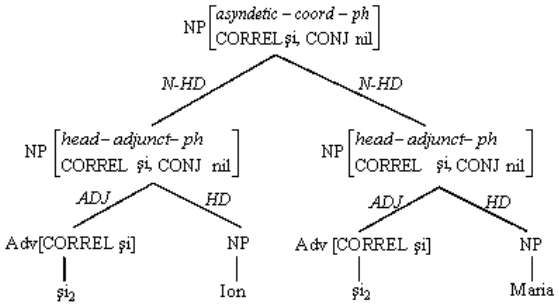
(51) Omnisyndetic coordination with *fie…fie* ('either…or')



(52) Correlative adverbs in simplex coordination



(53) Correlative adverbs in asyndetic coordination



5 Conclusion

Assuming three main types of coordinate structures (simplex, omnisyndetic and asyndetic), in this paper we have focussed on omnisyndetic constructions, the disjunctive *either…or* and the conjunctive *both…and* in four Romance languages (French, Italian, Spanish and Romanian). First, we have mentioned some of their common distributional properties in Romance and, then, we showed the hybrid case of Romanian, by a detailed analysis of the correlative *şi…şi*. We have provided some empirical evidence for analysing the *şi…şi* ('both…and') structure as asyndetic with the element *şi* as an adverbial, by showing the double status of the element *şi* (conjunction or adverbial). A more precise analysis of the distribution of correlative coordinations (e.g. Why is the omnisyndetic structure allowed for disjunction and not for conjunction in French and Italian? Why are declarative sentences less constrained than imperative or interrogative clauses), as well as an extension to other omnisyndetic coordinations (e.g. the negative type *nici…nici* 'neither…nor', which a priori has the same syntactic analysis as *şi…şi* 'both…and') still need to be provided.

References

Abeillé, A. 2003. A Lexicalist and Construction-based Approach to Coordinations. In S. Müller (ed.), *The Proceedings of the 10th International Conference on HPSG.* Stanford: CSLI Publications.

Abeillé, A. 2005. Les syntagmes conjoints et leurs fonctions syntaxiques. *Langages* 160, 42-66.

Abeillé, A. 2006. Stripping constructions in French. Paper presented at the international workshop *Coordination and Ellipsis* (June 2006). University Paris 7.

Abeillé, A. and Borsley, R. 2006. La syntaxe des corrélatives comparatives en anglais et en français. *Faits de langue* 38.

Abeillé, A. and Godard, D. 2003. The Syntactic Flexibility of French Degree Adverbs. In S. Müller (ed.), *The Proceedings of the 10th International Conference on HPSG*. Stanford: CSLI Publications.

Barbu, A.-M. 1999. Complexul verbal. *Studii şi cercetări lingvsitice* (SCL), nr. 1, 39-84. Bucarest.

Barbu, A.-M. 2004. Statutul semiadverbelor din cadrul complexului verbal. In G. Pană Dindelegan (coord.), *Tradiţie şi inovaţie în studiul limbii române*, 625-634. Editura Universităţii din Bucureşti.

Beavers, J. and Sag, I.A. 2004. Coordinate ellipsis and apparent non-constituent coordination. In S. Müller (ed.), *The Proceedings of the 11th International Conference on HPSG*. Stanford: CSLI Publications.

Bîlbîie, G. 2006. Les coordinations corrélatives du roumain. Master dissertation. Université Paris 7.

Ciompec, G. 1985. *Morfosintaxa adverbului românesc. Sincronie şi diacronie*. Editura Ştiinţifică şi enciclopedică Bucureşti.

Ginzburg, J. and Sag, I.A. 2000. *Interrogative Investigations: the form, meaning and use of questions*. Stanford: CSLI Publications.

*** *Gramatica academică a limbii române* (GALR) 2005. 2 vol. Bucarest: Editura Academiei Române.

Haspelmath, M. 2000. *Coordination. Language typology and linguistic description*. 2nd edition, ed. by Timothy Shopen. Cambridge: Cambridge University Press.

Hendriks, P. 2004. *Either, both* and *neither* in coordinate structure. In A. Meulen et W. Abraham, *The Composition of Meaning*, 115-138. Amsterdam: John Benjamins.

Hofmeister, Ph. 2008. A linearization account of *either…or* constructions. Ms.

Huddleston, R. and Pullum, G. 2002. *The Cambridge Grammar of the English Language*. Cambridge University Press.

Ionescu, E. 2004. *Understanding Romanian negation: syntactic and semantic approaches in a declarative perspective*. Editura Universităţii din Bucureşti.

Johannessen, J.B. 2005. The syntax of the corelative adverbs. *Lingua* 115-4, 419-433.

Miller, Ph. 1992. Clitics and Constituents in Phrase Structure Grammar. PhD dissertation. Published by Garland Publishing, Inc. (New York, London, 1992) in the series of Outstanding Dissertations in Linguistics.

Mouret, F. 2005. La syntaxe des coordinations corrélatives du français. *Langages* 160, 67-92.

Mouret, F. 2006. A Phrase Structure Approach to Argument Cluster Coordination. In S. Müler (ed.), *The Proceedings of the 13th International Conference on HPSG*. Stanford: CSLI Publications.

Mouret, F. 2007. *Grammaire des constructions coordonnées. Coordinations simples et coordinations à redoublement en français contemporain*. PhD dissertation. University Paris 7.

Mouret, F., Abeillé, A., Delais-Roussarie, E., Marandin, J.-M. and Hiyon, Y. 2008. Aspects prosodiques des constructions coordonnées. JEP 27 (Journée d'Etude sur la Parole).

Piot, M. 2000. Les conjonctions doubles: Coordination-subordination. *Linguisticae Investigationes* XXIII-1, 45-76.

Pollard, C. and SAG, I.A. 1994. *Head-driven Phrase Structure Grammar*. Chicago: University of Chicago Press. Stanford: CSLI Publ.

Tseng, J. 2002. Remarks on Marking. In F. van Eynde & L. Hellan (eds.), *The Proceedings of the 8th International Conference on HPSG*. Stanford: CSLI Publications.

Tseng, J. 2003. EDGE Features and French Liaison. In J.-B. Kim & S. Wechsler (eds), *The Proceedings of the 9th International Conference on HPSG*. Stanford: CSLI Publications.

van Noord, G. and Bouma, G. 1994. Adjuncts and the processing of lexical rules. Proceedings of COLING 15, 250-256. Tokyo.

Yatabe, S. 2001. Linearization-based syntax and semantics: an overview. *Conference Handbook 19: The Nineteenth National Conference of the English Linguistic Society in Japan*. 192-197.

There-constructions with transitive verbs

Anne Bjerre
University of Southern Denmark

Tavs Bjerre
Aarhus University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 46–66

Bjerre, Anne & Tavs Bjerre. 2008. *There*-constructions with transitive verbs. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 46–66. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.3.
CC-BY 4.0

Abstract

In this paper we address the question of which transitive verbs allow there-insertion in Danish. We propose that two constraints have to be met in order for verbs to appear in Danish there-constructions. Firstly, as have been noted by others, an empty direct object position must be available. This constraint is not sufficient for restricting the set of verbs in there-constructions. We further propose a "locative" constraint. The transitive verbs allowing there-insertion will be shown to coincide with verbs that allow a locative analysis.

1 Introduction

The there-construction has traditionally been discussed within the context of unaccusativity, claiming that the verbs that allow there-insertion are unaccusative verbs, cf. Burzio (1986). However, due to the observation that in certain languages, e.g. Scandinavian languages, unergative verbs do allow there-insertion, it has been suggested that there-insertion is not an unaccusativity diagnostic and that verbs allowing there-insertion form a more heterogeneous group, cf. e.g. Sveen (1996) and Lødrup (2000).

In this paper we wil focus on a group of transitive verbs that allow there-insertion in Danish. This group also constitutes an exception to the unaccusativity constraint on there-insertion. We want to argue that the distribution of verbs in Danish there-constructions is determined by a "locative" constraint. An important function of the there-construction is to "locate" the logical subject referent in a state. See also Bresnan (1993) who proposes a similar constraint for the English locative inversion construction. Our constraint accounts for both transitive and intransitive (unergative and unaccusatives) verbs appearing in the Danish there-construction, cf. Bjerre and Bjerre (2008) for an account of intransitive verbs in there-constructions. We will, in other words, show that both lexical semantics and grammatical functions together predict the set of verbs entering the there-construction.

In section 2 we will present some previous views on transitive verbs in there-constructions. In section 3 we will present Danish there-constructions with transitive verbs, showing how they express possession and experience. In 4 we will take a second look at the transitive verbs in there-constructions expressing experience. Finally, in section 5 we will formalize our account of transitive verbs in there-constructions.

2 Background

Certain languages allow transitive verbs in there-constructions, others do not. Maling (1988) gives the examples in (1) showing the distinction.

(1) a. *Det åt en man en pudding. (Swedish)

b. *There ate a man a pudding. (English)

c. það borðaði maður búðing. (Icelandic)

Platzack (1983) suggests that the difference between languages allowing transitive verbs in there-constructions and languages not allowing transitive verbs in there-constructions is determined by the grammatical function of the expletive pronoun. As shown in (2) the expletive pronouns has the same position as ordinary subjects in questions in English and Swedish, but not in German and Icelandic.

(2) a. Was there a man in the drainpipe?

b. Satt det en fågel på taket?
'Was-sitting there on the roof'

c. Sind (*es) in diesem Zimmer zwei Stühle?
'Are there in this room two chairs'

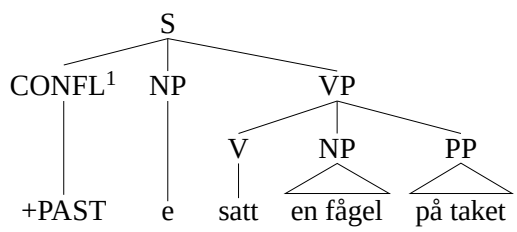
d. Eru (*það) mýs ín baðkerinu?
'Are there mice in the bathtub'

The positioning of the expletive in English and Swedish suggests that it functions as the subject and appears in subject position, whereas in German and Icelandic, the expletive pronoun appears in topic position and does not function as the subject. Platzack (1983) suggests that this distinction determines whether transitive verbs are allowed in there-constructions.

Languages in which the expletive functions as subject do not allow transitives. The explanation for the non-occurrence of transitives in English and Swedish is based on the assumption that the "logical subject" in these languages occupies the NP position inside the VP, i.e. [NP, VP], and there is only one NP position in VP. (Platzack, 1983, p. 89) assumes the D-structure in (4) for the Swedish there-construction with an intransitive in (3).

(3) Det satt en fågel på taket.
'There was-sitting a bird on the roof'

(4)

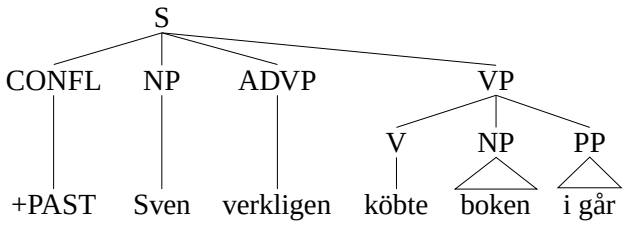


Transitive verbs are then excluded as the [NP, VP] position is occupied by the direct object of the transitive verbs, as shown in (5) and (6), Platzack (1983).

[1]CONFL is a position where both complementizers and and tense markers are generated, (Platzack, 1983, p. 82).

(5) Sven köbte verkligen boken igår.
'Sven bought really the book yesterday'

(6)



Nevertheless, we do find there-constructions with transitive verbs, both in English, Swedish and Danish. This is also noted by the above authors.

Platzack (1983, p. 92) gives the examples in (7) as exc eptions to his generalization, but offers no explanation.

(7) a. Det hände honom något konstigt igår.
'There happened him something strange yesterday'

b. Det väntade mig en verklig överraskning när jag kom hem.
'There waited me a real surprise when I came home'

Askedal (1986) and Lødrup (2000) also attribute the non-occurence of transitive verbs in there-constructions to the functional status of the logical subject as that of direct object. They assume that in Norwegian counterparts of (7), the objects are indirect objects, and consequently the direct object position is still vacant for the logical subject to fill. They point out that the logical subject in there-constructions appears in a VP construction which is structurally identical to a regular VP construction with an indirect object preceding a direct object. To illustrate this, Askedal (1986) gives the Norwegian examples in (8) and Lødrup (2000) gives the examples in (9) which are also Norwegian.

(8) a. Da hadde det tilstøtt ham noe alvorlig.
Then had there happened him something serious

b. Da hadde hun gitt ham en ny bok.
Then had she given him a new book

(9) a. Det blev overrakt barna en liten gevinst.
There was awarded the-kids a small prize

b. Hun har overrakt barna en liten gevinst.
She has awarded the-kids a small prize

An objection to the explanation regarding the direct object position is put forward by e.g. Maling (1988) and Börjars and Vincent (2005). They refer to verbs that are optionally transitive. Börjars and Vincent (2005, p. 60) refers to the example in (10), originally from Lødrup (2000).

(10) *Det spiste en mann en kake.
EXPL eat.PST a man a cake
There was a man eating a cake

The intransitive variant of such verbs are not allowed in there-constructions, even though the direct object position is not filled by a direct object preventing the logical subject to fill the position, as the example in (11) from Börjars and Vincent (2005) shows.

(11) *Det åt ett litet barn i köket.
EXPL eat.PST a.NT small.NT.SG child(NT) in kitchen.DEF
A small child was eating in the kitchen

These examples show that the constraint that a vacant direct object position is required is not sufficient. A further development of this "logical subject-is-direct object" approach is based on semantics referring to semantic roles. Maling (1988, p. 175) suggests that verbs associated with an agent role cannot occur in there-constructions, as agents must be assigned to subject position and not direct object position. This explains the exceptions noted by Platzack (1983), as the verbs in (7) have no agent role, and also the examples from Maling (1988) in (12).

(12) a. Det nådde Tomas ett brev hemifrå.
There reached Tomas a letter from-home

b. Det slog mig något interessant igår.
There struck me something interesting yesterday

c. *Det slog mig en kollega.
There struck me a colleague

Maling adds the further restriction that the verbs associated with an exeriencer role cannot occur either. This addition is motivated by the observation that psych-verbs do not occur in there-constructions, neither the subject experiencer nor the object experiencer variants. The examples in (13) are from Maling (1988, p. 176).

(13) a. *Det skrämmer mig sådana tanker.
there scares me such thoughts

b. *Det behagede honom lite musik.
there pleased him a little music

An alternative explanation to the phenomenon is to maintain that the logical subject is in effect a subject. Its position is then attributed to information-structural constraints. This course of explanation is taken by Börjars and Vincent (2005). They argue against the direct object analysis of the logical subject, claiming that the logical subject is a post verbal subject. This violates a topological rule saying that the subject precedes the indirect object. In sentences with inversion, the subject appears immediately after the finite verb, before the indirect object.

They argue, though, that the indirect object in there-constructions precedes the subject because of information-structural constraints, referring to a constraint by Börjars et al. (2003) that known information tends to precede new information.

The constraint is formulated to account for object shift in Swedish, and so an important restriction to the constraint is that it only applies to weak pronoun indirect objects. According to Börjars and Vincent (2005) this accounts for the Swedish data, as they claim that such there-constructions with transitive verbs only occur with weak pronoun indirect objects. The examples in (14) and (15), the latter from Börjars et al. (2003), show how the there-construction with an weak indirect object resembles the construction with long object shift in Swedish.

(14) Det väntade mig en verklig överraskning när jag kom hem.
'There waited me a real surprise when I came home'

(15) Då gav honom Eva förmodligen inte några pengar.
then give.PST he.ACC Eva probably not any money

Maling (1988, p. 171), however, claims that Platzak's exception examples are grammatical in Swedish with full NPs instead of pronouns. The Danish examples in (16) show that transitives in there-constructions are not restricted to cases with weak pronoun indirect objects in Danish.

(16) a. Der tilfaldt visse medlemsstater urimelige fordele.
There fell to certain member states unreasonable advantages

b. Der påhvilede bestyrelsen et ansvar.
There rested on board-the a responsibility

Börjars and Vincent (2005) put forward a list of arguments supporting the analysis of the logical subject as a subject rather than direct object. One concerns agreement properties, another case marking properties, cf. Börjars and Vincent (2005, p. 62-64).

(17) a. Det blev fyra trafikoffer inlagda igår.
EXPL become.PST four casualty.PL admit.PRT.PL yesterday
'Four traffic casualties were admitted yesterday.'

b. Det var bara hon / *henne hemma.
EXPL be.PST only she.NOM / she.ACC at home
' Only she was at home.'

(17a) shows that in Swedish a participle following the logical subject may agree with it, and (17b) shows that the logical subject is in the nominative form. An example like the Swedish in (17a) is not possible in Danish, but another example with the participle following the logical subject shows that a participle does not agree with the logical subject, and as for the example in (17b), we find that in Danish the accusative case is required. The Danish examples are shown in (18).

(18) a. Der var kun hende / *hun i lokalet.
There was only her / she in room-the

b. Hvor mange mennesker blev der dræbt og såret
How many people were there kill.PRT.SG and wound.PRT.SG
ved færdselsuheld i Italien i det seneste år?
by traffic accidents in Italy in the recent year

One argument they put forward, however, does apply to Danish and it concerns binding properties. In Swedish, and Danish, the reflexive determiner *sin* (his/hers) can only be bound by a subject, and we find that it is bound to the logical subject in there-constructions. A Danish example is given in (19).

(19) Der sidder en officer$_i$ ved bordet med sin mad$_i$.
There sits an officer at table-the with his food

However, it does seem, at least in Danish, that the reflexive determiner may be bound by non-subjects in constructions involving elements with "double" grammatical function, as in the there-construction where the logical subject is also the direct object. Another example is given in (20).

(20) Mulighederne hos Fujitsu overtalte Erik Redsø til at vende tilbage
Opportunities-the at Fujitsu persuaded Erik Redsø to to return
til sin tidligere arbejdsplads.
to his former work place

In this example we see a reflexive determiner is bound by a direct object which is also in some sense a subject. So, in spite of the binding argument, the evidence is in favour of the direct object analysis of the logical subject in there-constructions for Danish, and it is also the analysis we will pursue in this paper. However, like Maling (1988) we want to propose an additional a semantic explanation of why certain transitive verbs may appear in there-constructions in Danish even though Danish groups with Swedish and English wrt. status of the expletive as subject. Maling (1988) focuses on the exclusion of agent and experiencer roles in there-constructions, and as the Danish data will show, her constraint will be required to also include possessor. In contrast, we will focus on the presence of a theme subject being located in a state. Cf. also Ekberg (1990) who insists on the presence of a theme in her analysis of intransitive verbs in there-constructions.

3 Transitive there-insertion verbs

In Danish most transitive verbs do not appear in there-constructions, as shown in (21).

(21) a. *Der spiste æblet en mand.
There ate apple-the a man

b. *Der købte bogen en mand.
There bought book-the a man

c. *Der hørte lyden en mand.
There heard sound-the a man

d. *Der har bilen en mand.
There has car-the a man

As explained earlier, this can be seen as a consequence of the status of the Danish expletive as that of a subject which means that the logical subject must fill the direct object position instead. This, however, is not possible with transitive verbs which already have a direct object.

As we know now, we also find a group of Danish transitive verbs allowing there-insertion, cf. (22) and (23).

(22) a. Der påhviler dem et ansvar.
There rests on them a responsibility

b. Nu tilhørte der ham endnu et stykke af Addy.
Now belonged to there him another piece of Addy

c. Der tilfaldt ham et klækkeligt honorar.
There fell to him a substantial fee

d. Der tilkommer hende en godtgørelse.
There comes to her a compensation

(23) a. Der mødte os et dejligt syn af røde, violette, gule og orange
There met us a lovely sight of red, violet, yellow and orange
lamper.
lamps

b. Der greb hende et vanvittigt ønske om at flyve af sted
There grabbed her a crazy wish about to fly away
gennem luften.
through air-the

c. Der venter publikum en hockey-oplevelse af de helt store.
There waits audience a hockey experience of the very big

d. Der ramte ham en klam lugt af råddent kød.
There hit him a disgusting smell of rotten meat

3.1 Possessors as locations

We will begin by looking at the examples in (22). On the face of it, the examples contain theme + location/goal structures. Note that some of the verbs, e.g. *påhvile*, consist of a verb with a preposition prefix. However, it may be argued that what is really expressed is a possessor + theme structure, cf. e.g. Halliday (1994, p.

134) who notes that many languages express possession by location (circumstantial clauses in Halliday's terms). The examples may be paraphrased as in (24).

(24) a. They have a responsibility.
b. Now he had another piece of Addy.
c. He received a substantial fee.
d. She receives a compensation.

So what we have are possessor + theme structures expressed as theme + location structures. We assume that examples like (22c), (22d), (24c) and (24d) are complex events with a resulting state with a theme + location, (22c), (22d), or possessor + theme, (24c), argument structure.

Halliday (1994) terms this phenomenon "grammatical metaphors". The content of an expression is presented in terms of an event and argument structure which is not the "typical" event and argument structure. However, a theme + location argument structure used to express possession is not terribly marked compared to the possessor + theme structure.

Importantly, the argument structure used to express possession here involves a theme subject located in a state, explaining why they appear in there-constructions.

3.2 Experiencers as themes

The second group of examples, (23), involve a group of verbs with a different event and argument structure.

We will begin by looking at the verb *møde*, 'meet'. In (25) we show non-there examples of sentences with *møde*.

(25) a. En opdagelsesrejsende møder en sovende bjørn.
An explorer meets a sleeping bear
b. En ung Marie Fredriksson mødte den populære frontfigur i popgruppen Gyllene Tider.
A young Marie Frederiksson met the popular front figure in pop group-the Gyllene Tider
c. Et dejligt syn af røde, violette, gule og orange lamper mødte os.
A lovely sight of red, violet, yellow and orange lamps met us

In (25a) and (25b) we have processes with an actor + theme structure[2]. In (25c), we also have a process with an actor + theme structure on the surface. However, what is really expressed is an experience with an experiencer + theme structure. This is illustrated in (26).

(26) A lovely sight of red, violet, yellow and orange lamps met us
(≈ We saw lovely red, violet, yellow and orange lamps)

[2]We use "actor" in a broad sense.

Only the last example has a there-contruction variant as shown in (27).

(27) a. *Der møder en sovende bjørn en opdagelsesrejsende.
There meets a sleeping bear an explorer

b. *Der mødte den populære frontfigur i popgruppen Gyllene
There met the popular front figure in pop group-the Gyllene
Tider en ung Marie Fredriksson.
Tider a young Marie Fredriksson

c. Der mødte os et dejligt syn af røde, violette, gule og orange
There met us a lovely sight of red, violet, yellow and orange
lamper.
lamps

The verb *gribe*, 'grab', also appears in Danish there-constructions. In (28) we again find non-there examples.

(28) a. En kvinde griber drengens arm.
A woman grabs boys-the's arm

b. En mand griber mikrofonen og råber og skriger fra afgang
A man grabs microphone-the and yells and screams from take-off
til landing.
to landing

c. Et vanvittigt ønske om at flyve af sted gennem luften greb
A crazy wish about to fly away through air-the grabbed
hende.
her

In (28a) and (28b) we again find processes with an actor + theme structure. And again in the (28c) example we have a process with an actor + theme structure on the surface, but the content expressed is that of an experience with an experiencer + theme structure. This is again illustrated in (29).

(29) A crazy wish about to fly away through air-the grabbed her
(≈ She crazily wished to fly away through the air)

And as was the case for *møde*, 'meet', only the last example has a there-contruction variant, as shown in (30).

(30) a. *Der griber drengens arm en kvinde.
There grabs boy's-the arm a woman

b. *Der griber mikrofonen en mand og råber og skriger fra
There grabs microphone-the a man and yells and screams from
afgang til landing.
take-off to landing

c. Der greb hende et vanvittigt ønske om at flyve af sted
There grabbed her a crazy wish about to fly away
gennem luften.
through air-the

The verbs *vente*, 'wait', and *ramme*, 'hit', exhibit the same behaviour, as the examples in (31) through (34) show.

(31) a. En bus venter os.
A bus waits us

b. En guide venter jer i Osaka Kansai Lufthavn.
A guide waits you in Osaka Kansai Airport

c. En hockey-oplevelse af de helt store venter publikum.
A hockey experience of the very big waits audience

(32) a. *Der venter os en bus.
There waits us a bus

b. *Der venter jer en guide i Osaka Kansai Lufthavn.
There waits you a guide in Osaka Kansai Airport

c. Der venter publikum en hockey-oplevelse af de helt store.
There waits audience a hockey experience of the very big

(33) a. Endnu en storm ramte New Zealand.
Another storm hit New Zealand

b. Et skud ramte Møller i brystet.
A shot hit Møller in chest-the

c. En klam lugt af råddent kød ramte ham.
A disgusting smell of rotten meat hit him

(34) a. *Der ramte New Zealand endnu en storm.
There hit New Zealand another storm

b. *Der ramte Møller et skud i brystet.
There hit Møller a shot in chest-the

c. Der ramte ham en klam lugt af råddent kød.
There hit him a disgusting smell of rotten meat

The verbs discussed in this section basically have an actor + theme argument structure. However they can be used to express experience as the c. examples have shown. Again we have an example of a grammatical metaphor.

More examples of there-constructions with such verbs are given in (35).

(35) a. Der mødte mig et syn, jeg aldrig glemmer.
There met me a sight, I never forget
(≈ I saw something, I will never forget)

b. Der ventede hende en grim overraskelse.
There waited her an ugly surprise
(≈ She would be nastily surprised)

c. Når vi var ude sammen, greb der hende en heftigere og
When we were out together, grabbed there her an intenser and
heftigere uro.
intenser uneasiness
(≈ When we were out together, she got more and more intensely uneasy)

The examples in (35) differ from the experience examples in (23). In both (35) and (23) the mental state is nominalized and appears as an argument of the verb. However, in (35) the stimulus of the mental experience is not explicitly expressed. The NP representing the experience argument has a noun representing the experience as the head. e.g. *a sight* or *an intenser and intenser uneasiness*. In (23) this noun is further modified, expressing the stimulus of the experience, e.g. *a lovely sight of red, violet, yellow and orange lamps* or *smell of rotten meat*.

Expressing experiences as actor + theme structures does not give us an event and argument structure which meets our there-insertion constraint. There is no theme subject located in a state.

4 Experiencers as locations

In this section we suggest that the effect of representing experiencers as themes of actor + theme structures really has the effect that the experiences are understood locatively.

We follow e.g. Bouchard (1995) and Landau (2005) in suggesting that experiencers are "mental locations". In (23) and (35), as mentioned earlier, the mental state is nominalized and appears as the subject argument of the verb. The objects may be understood as mental location objects. The conceptualization is that a mental state is located in a mental location, cf. Landau (2005). Similarly, Bouchard (1995) proposes that experiences are conceptualized as a "contact" relation, the mental state is put in contact with the affected or mental location argument.

On our analysis, the theme subject which represents the experience or mental state is located at the ground object, the mental location, which represents the experiencer. On this locative analysis, the examples meet our there-insertion contraint in that we now have a theme subject located in a state.

The analysis puts focus on the affectedness of the experiencer, rather than the experiencer as a sentient being. There is little or no volition or control on the part of the experiencer.

We do not want to extend the mental location analysis to experiencer verbs. We restrict this analysis to verbs where the mental experience has been extracted and appears as an argument of a verb which is used metaphorically of an experience.

In (36) we give Danish examples of the often discussed fear/frighten verbs.

(36) a. Superligaklub frygtede hackerangreb.
Super league club feared hacker attack

b. Stød skræmte min hund.
Electric shock frightened my dog

To solve the linking problem that the same argument roles cannot be assigned to the same grammatical functions in the two examples, different argument structures have been proposed for the subject experiencer and object experiencer class of experiencer verbs. Pesetsky (1987) proposes that the subject of the object experiencer class has role "cause of emotion" , whereas the object of subject experiencer class has the role "target of emotion", explaining why the experiencer is linked to the object in object experiencer verbs, as the "cause of emotion" outranks the experiencer role. Dowty (1991) assumes an approach where the experiencer role has both a proto-agent property (sentience) and a proto-patient property (change of state). This duality of the experiencer role explains why it may be linked to either subject or object with subject and object experiencer verbs respectively. Finally, Grimshaw (1990) introduces an aspectual dimension in addition to a thematic dimension. Object experiencer verbs are analyzed as psychological causatives. The argument linked to the subject has a cause role (aspectual dimension) as well as a theme role (thematic dimension). As aspectual prominence determines subject choice, the presence of the cause role which outranks the experiencer role, is responsible for the linking of the theme to the subject with object experiencer verbs.

Although we do not extend our analysis to these examples, they do not constitute a linking problem on our analysis. To explain the linking properties of this pair of verbs we analyze the *fear* example as describing a state with an experiencer subject and a theme object. The *frighten* example, on the other hand, is analyzed as being causative, cf. also Pesetsky (1987) and Grimshaw (1990). It is a complex event with an unspecified process involving the argument linked to the subject. The resulting state locates a theme argument, linked to the object, in a state, i.e. the property of being afraid. None of the examples involve the location of a theme subject in a state and so we do not find these verbs in there-constructions, as shown in (37).

(37) a. *Der frygtede hackerangreb superligaklub.
There feared hacker attack super league club

b. *Der skræmte min hund stød.
There frightened my dog electric shock

5 Formalization

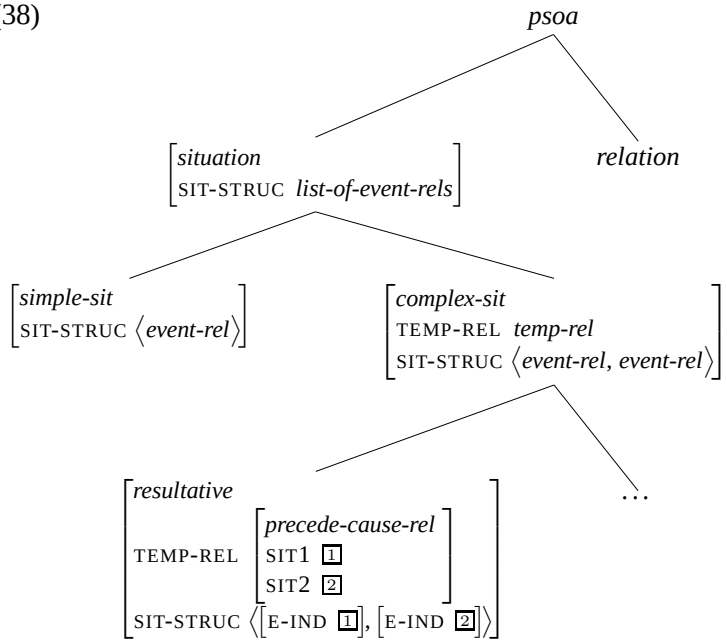
In this section we will formalize the analysis of there-constructions proposed in the previous sections. We will introduce types to represent event and argument

structure in section 5.1. We will then show lexical representations of the verbs we have shown to appear in there-constructions in section 5.2. In section 5.3 we will show the constraint on there-insertion in the form of a lexical rule.

5.1 Event and argument structure

The formal analyses provided in this section are modifications of analyses presented in Bjerre (2003) and Bjerre and Bjerre (2007). The analyses in the previous sections are based on the assumption that verbs split into a number of semantic classes reflected in their event and argument structure. Verbs (or predicates) denote situations. Situations may be divided into simple situations, a process or a state, and complex situations, situations where a process results in another situation, in most cases a state. The idea of decomposing event structure goes back at least to Lakoff (1965) and McCawley (1968) and is employed in combination with the Vendlerian classification (Vendler, 1957) in Dowty (1979) and Levin and Hovav (1995) among many others. This is reflected in the type hierarchy in (38).

(38)

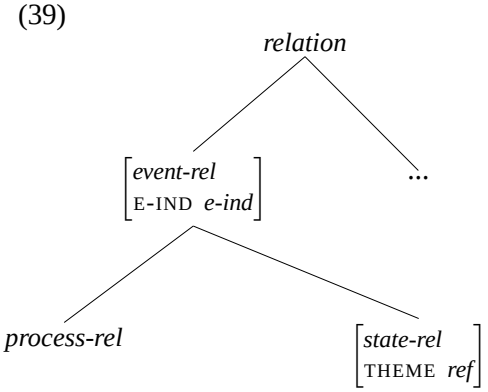


The situation structure of a *simple* situation is represented as a singleton list of event relations, cf. below. In a *resultative* situation the event structure is represented by a list of two event relations. The event relations are temporally ordered so that subsituation1 precedes and causes subsituation2.

We assume that semantic relations come with a fixed number of arguments. We are inspired by Davis (2001), though many details differ. Semantic roles are introduced as features on relations as shown in the hierarchies in (39), (40) and (41).

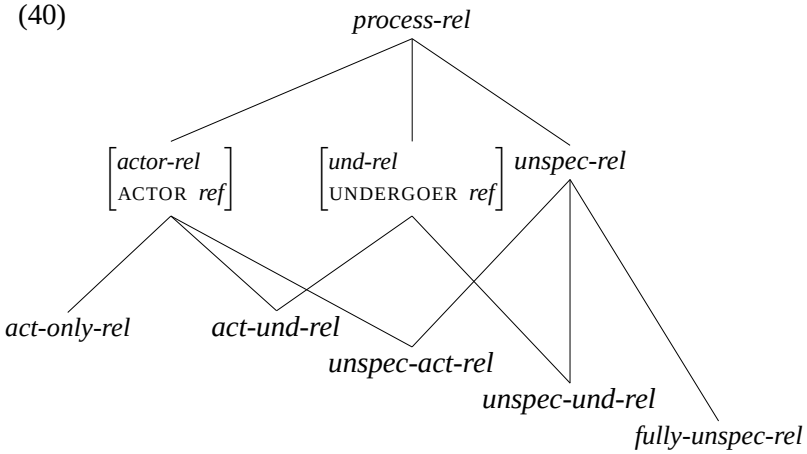
In (39) we can see that the type *event-rel* splits into a *process-rel* relation and a *state-rel* relation. The *state-rel* type introduces a THEME argument.

(39)



In (40) we can see how the *process-rel* type is subtyped and how an actor and an undergoer[3] argument are introduced on subtypes of *process-rel*.

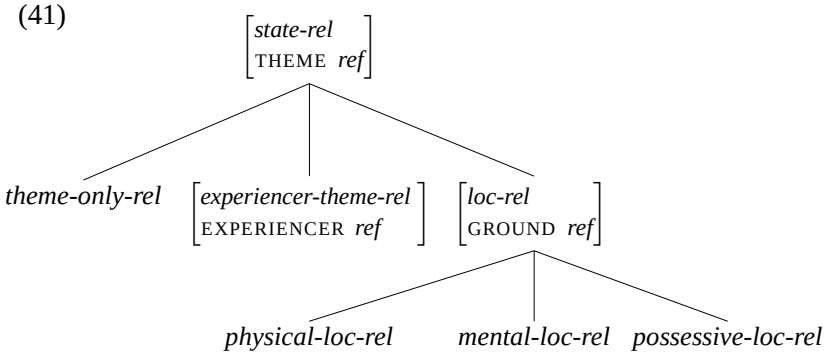
(40)



And finally, in (41) we can see how the *state-rel* type is subtyped and how a ground and an experiencer argument are introduced on subtypes of *state-rel*. Importantly, the *loc-rel* is subtyped into a *mental-loc-rel* relation and a *phys-loc-rel* relation accounting for the difference between physical locations and the mental locations we use to descibe our metaphorical object experiencer verbs.

[3]We use the undergoer role in processes and the theme argument in states.

(41)



5.2 Lexical representation of transitive verbs allowing there-insertion

Based on the types for event and argument structure in (38) and in (39) through (41), lexical semantic represention for the verbs we have have discussed earlier can be formulated. We will only formalize some of the verbs, as their entries will be similar.

As explained earlier we analyze the verb *tilfalde*, 'fall to', as a complex event. An unspecified process results in a state where a theme entity is located at a ground entity. This is formalized in (42).

(42) *tilfalde*, 'fall to'

$$\left[\begin{array}{l}\textit{word}\\ \text{S} \mid \text{L}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \textit{verb}\\ \text{ARG-ST}\left\langle \text{NP}_i, \text{NP}_j \right\rangle\end{array}\right]\\ \text{CONT}\left[\begin{array}{l}\textit{resultative}\\ \text{TEMP-REL}\left[\begin{array}{l}\textit{precede-cause-rel}\\ \text{SIT1}\ \boxed{1}\\ \text{SIT2}\ \boxed{2}\end{array}\right]\\ \text{SIT-STRUC}\left\langle\left[\begin{array}{l}\textit{fully-unspec-rel}\\ \text{E-IND}\ \boxed{1}\end{array}\right], \left[\begin{array}{ll}\textit{fallen-to-rel}\\ \text{E-IND}\ \boxed{2}\\ \text{THEME} & i\\ \text{GRND} & j\end{array}\right]\right\rangle\end{array}\right]\end{array}\right]\end{array}\right]$$

The resulting state is a *fallen-to-rel* relation which is a subtype of the *possessive-loc-rel* relation in the hierarchy in (41).

The verb *påhvile*, 'rest on', is analyzes as a simple situation, a state where a theme entity is located at a ground entity, as shown in (43).

(43) *påhviler*, ‘rest on’

$$\begin{bmatrix} \textit{word} \\ \text{S} \mid \text{L} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD } \textit{verb} \\ \text{ARG-ST} \langle \text{NP}_i, \text{NP}_j \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{simple} \\ \text{SIT-STRUC} \left\langle \begin{bmatrix} \textit{rest-on-rel} \\ \text{THEME } i \\ \text{GRND } j \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The state is a *rest-on-rel* relation which is also a subtype of *possessive-loc-rel* relation in the hierarchy in (41).

In (44) we show the formalization of the verb *møde*, ‘meet’. The meaning of the verb is that resulting from an unspecified process, a mental state, the theme, is located in a mental location, the ground role.

(44) *møde*, ‘meet’

$$\begin{bmatrix} \textit{word} \\ \text{S} \mid \text{L} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD } \textit{verb} \\ \text{ARG-ST} \langle \text{NP}_i, \text{NP}_j \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{resultative} \\ \text{TEMP-REL} \begin{bmatrix} \textit{precede-cause-rel} \\ \text{SIT1 } \boxed{1} \\ \text{SIT2 } \boxed{2} \end{bmatrix} \\ \text{SIT-STRUC} \left\langle \begin{bmatrix} \textit{fully-unspec-rel} \\ \text{E-IND } \boxed{1} \end{bmatrix}, \begin{bmatrix} \textit{met-rel} \\ \text{E-IND } \boxed{2} \\ \text{THEME } i \\ \text{GRND } j \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The *met-rel* relation is a subtype of the *mental-loc-rel* relation in the relation hierarchy.

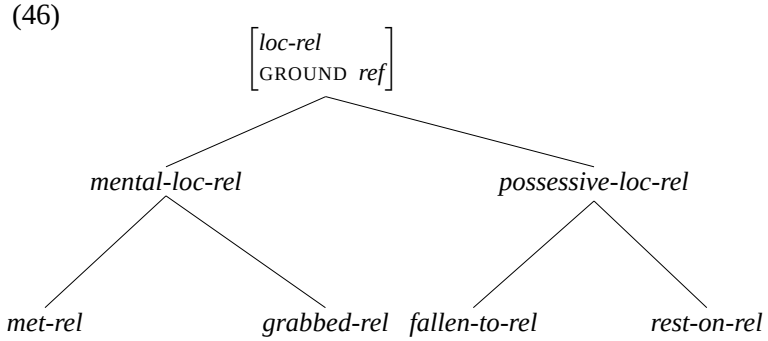
The meaning of the verbs *gribe*, ‘grab’, is similar, as the formalization in (45) shows. The resulting state is again a *mental-loc-rel* relation.

(45) *gribe*, ‘grab’

$$\begin{bmatrix} \textit{word} \\ \text{S} \mid \text{L} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD } \textit{verb} \\ \text{ARG-ST} \langle \text{NP}_i, \text{NP}_j \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{resultative} \\ \text{TEMP-REL} \begin{bmatrix} \textit{precede-cause-rel} \\ \text{SIT1 } \boxed{1} \\ \text{SIT2 } \boxed{2} \end{bmatrix} \\ \text{SIT-STRUC} \left\langle \begin{bmatrix} \textit{fully-unspec-rel} \\ \text{E-IND } \boxed{1} \end{bmatrix}, \begin{bmatrix} \textit{grabbed-rel} \\ \text{E-IND } \boxed{2} \\ \text{THEME } i \\ \text{GRND } j \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The hierarchy with the lexical relations as subtypes of the hierarchy in (41) is shown in (46).

(46)



We will also show the formalization of the object experiencer verb *skræmme*, 'frighten'. As mentioned earlier, we do not extend the mental location analysis to this class of verbs. (47) shows the representaion of the non-agentive variant of *skræmme*.

(47) *skræmme*, 'frighten'

$$\begin{bmatrix} \textit{word} \\ \text{S} \mid \text{L} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD } \textit{verb} \\ \text{ARG-ST} \langle \text{NP}_i, \text{NP}_j \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{resultative} \\ \text{TEMP-REL} \begin{bmatrix} \textit{precede-cause-rel} \\ \text{SIT1 } \boxed{1} \\ \text{SIT2 } \boxed{2} \end{bmatrix} \\ \text{SIT-STRUC} \left\langle \begin{bmatrix} \textit{unspec-und-rel} \\ \text{E-IND } \boxed{1} \\ \text{UNDERGOER } i \end{bmatrix}, \begin{bmatrix} \textit{afraid-rel} \\ \text{E-IND } \boxed{2} \\ \text{THEME } j \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The meaning of this verbs is that an unspecified process involving a an undergoer, results in an *afraid-rel* relation. The *afraid-rel* relation is a subtype of the *theme-only-rel* relation in the hierarchy. The argument which is placed in the *afraid-rel* state is not linked to the first elemement of the ARG-ST list which will be mapped to the SUBJ valence list. This means that the entry does not meet our locative constraint which requires a subject theme located in a state.

5.3 The there-insertion lexical rule

Canonically, the elements on the ARG-ST list are distributed to the valence lists so that the first element appears on the SUBJ list and the remaining elements appear on the COMPS list of verbs. A lexical entry with the ARG-ST elements distributed to the valence lists may be the input to a there insertion lexical rule, as shown in (48)[4].

[4]Lacking space, a number of more general constraints are represented together in (48).

(48)
$$\left[\begin{array}{l}\textit{there-insertion-lexical-rule}\\ \text{IN}\left[\begin{array}{l}\textit{word}\\ \text{SYNSEM}\mid\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{ll}\text{HEAD} & \textit{verb}\\ \text{SUBJ} & \left\langle \boxed{1}\text{NP}\left[\text{INDEF}\right]_i\right\rangle\\ \text{COMPS} & \boxed{2}\end{array}\right]\\ \text{CONT}\left[\begin{array}{l}\textit{situation}\\ \text{SIT-STRUC}\ \ \textit{list}\oplus\left\langle\left[\begin{array}{ll}\textit{state-rel}\\ \text{THEME} & i\end{array}\right]\right\rangle\oplus\textit{list}\end{array}\right]\end{array}\right]\end{array}\right]\\ \text{OUT}\left[\begin{array}{l}\textit{word}\\ \text{SYNSEM}\mid\text{LOCAL}\mid\text{CATEGORY}\left[\begin{array}{l}\text{SUBJ}\left\langle \textit{der}\right\rangle\\ \text{COMPS}\ \boxed{2}\oplus\left\langle\boxed{1}\right\rangle\end{array}\right]\\ \text{INFO-STRUC}\mid\text{TOPIC}\left\langle\ \right\rangle\end{array}\right]\end{array}\right]$$

(48) says that for any verb where an indefinite subject is linked to a theme argument in a state, there is a similar verb with *der*, 'there', inserted on the SUBJ list, and the logical subject appended to the COMPS list. Everything not explicitly mentioned in the rule is carried over unaltered from input to output. Note that it is assumed that the verb will end up in a topic-less clause.

6 Conclusion

In this paper we have addressed the question of which transitive verbs allow there-insertion in Danish. We have proposed that two constraints are involved in Danish there-constructions. Firstly, as have been noted by others, we need an empty direct object position constraint. To account for the transitive verbs allowing there-insertion, we have further proposed a "locative" constraint. The transitive verbs allowing there-insertion are verbs that allow a locative analysis. In this paper we have shown how verbs expressing possession and experience can be given a locative analysis, in this way they are shown to meet our locative constraint. We have provided a formalization of the proposal.

References

Askedal, John Ole. 1986. On ergativity in modern Norwegian. *Nordic Journal of Linguistics* 9, 25–45.

Bjerre, Anne and Bjerre, Tavs. 2007. Perfect and periphrastic passive constructions in Danish. *Nordic Journal of Linguistics* 30(1), 5–53.

Bjerre, Anne and Bjerre, Tavs. 2008. Danish there-constructions with intransitive verbs. In *Proceedings of the 13th conference on Formal Grammar*, pages 7–22, CSLI Publications.

Bjerre, Tavs. 2003. *Syntactically and Semantically Complex Predicates*. Ph. D. thesis, University of Southern Denmark.

Börjars, Kersti, Engdahl, Elisabeth and Andreasson, Maia. 2003. Subject and object positions in Swedish. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG03 Conference*, pages 43–58, CSLI Publications.

Börjars, Kersti and Vincent, Nigel. 2005. Position vs. Function in Scandinavian Presentational Constructions. In Miriam Butt and Tracy Holloway (eds.), *Proceedings of the LFG05 Conference*.

Bouchard, Denis. 1995. *The Semantics of Syntax: a Minimalist Approach to Grammar*. The University of Chicago Press.

Bresnan, Joan. 1993. *Locative Inversion and the Architecture of UG*. Masters Thesis, University of Stanford.

Burzio, Luigi. 1986. *Italian Syntax: A Government-Binding Approach*. D. Reidel Publishing Company.

Davis, Anthony. 2001. *Linking by Types in the Hierarchical Lexicon*. Stanford: CSLI Publications.

Dowty, David. 1979. *Word Meaning and Montague Grammar*. Dordrecht: Reidel.

Dowty, David. 1991. Thematic Proto-Roles and Argument Selection. *Language* 67(3), pp. 547–619.

Ekberg, Lena. 1990. Theta role tiers and the locative PP in existential constructions. *Working Papers in Scandinavian Syntax* 46, 37–45.

Grimshaw, Jane. 1990. *Argument Structure*. Cambridge, Massachusetts: MIT Press.

Halliday, Mak. 1994. *An Introduction to Functional Grammar*. Arnold, second edition.

Lakoff, George. 1965. *On the Nature of Syntactic Irregularity*. Ph. D. thesis, Indiana University.

Landau, Idan. 2005. *The Locative Syntax of Experiencers*. Department of Foreign Literature & Linguistics.

Levin, Beth and Hovav, Malka Rappaport. 1995. *Unaccusativity. At the Syntax–Lexical Semantics Interface*. Cambridge, Massachusetts: MIT Press.

Lødrup, Helge. 2000. Linking and Optimality in the Norwegian Presentational Focus Construction. *Nordic Journal of Linguistics* 22(2), 205–230.

Maling, Joan. 1988. Variation on a theme: Existential sentences in Swedish and Icelandic. *McGill Working Papers in Linguistics* .

McCawley, James D. 1968. Lexical Insertion in a Transformational Grammar without Deep Structure. *CLS* 4, 71–80.

Pesetsky, D. 1987. Binding Problems with Experiencer Verbs. *Linguistic Inquiry* 18, 126–140.

Platzack, Christer. 1983. Existential sentences in English, Swedish, German and Icelandic. In *Papers from the Seventh Scandinavian Conference on Linguistics*.

Sveen, Andreas. 1996. *Norwegian Personal Actives and the Unaccusative Hypothesis*. Ph. D. thesis, University of Oslo.

Vendler, Zeno. 1957. Verbs and Times. In Zeno Vendler (ed.), *Linguistics in Philosophy*, pages 97–121, New York: Cornell University Press. 1967.

Complex case phenomena in the Grammar Matrix

Scott Drellishak
University of Washington

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 67–86

Drellishak, Scott. 2008. Complex case phenomena in the Grammar Matrix. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 67–86. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.4. CC-BY 4.0

Abstract

This paper describes a number of verbal argument marking patterns found in the world's languages and provides HPSG analyses for them. In addition to commonly-occurring variations of morphosyntactic alignment (e.g. nominative-accusative, ergative-absolutive), this paper also presents analyses of more complex phenomena, including ergativity splits, Austronesian-style focus-case systems, and direct-inverse systems and their interaction with case.

1 Introduction

The Grammar Matrix (Bender et al., 2002) is an attempt to provide a typologically-informed foundation for building grammars of natural languages in software. It includes a set of pre-defined types for lexical and syntactic rules, and a hierarchy of lexical types. It also provides a detailed syntax-semantics interface consistent with HPSG and Minimal Recursion Semantics (Copestake et al., 2005) and expressed in TDL (type description language) as interpreted by the LKB (Copestake, 2002). The primary purpose of the Matrix is to allow the rapid creation of new grammars based on insights gained in the implementation of previous grammars.

The core of the Matrix is a set of types that are intended to be universal. Since there are linguistic phenomena that are widespread but not universal, the Matrix also includes "libraries" that consist of additional types covering non-universal phenomena (Bender and Flickinger 2005, Drellishak and Bender 2005). The Matrix also includes a customization system that prompts a linguist through a web-based questionnaire about a language, then creates a starter grammar based on the Matrix and the appropriate libraries and tailored to the language. The current version of the questionnaire[1] includes, among others, mandatory sections on basic word order and basic lexical entries, and optional sections on sentential negation, coordination, and matrix yes/no questions. The lexicon section has recently been greatly enhanced, now allowing the description of complex inflectional morphology (O'Hara, 2008) and of an arbitary number of noun and verb classes.

This paper describes the implementation of a library that supports the marking of verbal arguments, principally via case. Development of such a library involves three steps. First, the typological range to be covered must be determined. Second, HPSG analyses must be developed for each of the possible marking systems. Finally, these analyses must be "factored" into a set of sub-analyses that the customization system can "snap together" in response to a linguist's answers to the

[†]The author would like to thank Emily Bender for her guidance, Dan Flickinger for help refining this paper's focus, Laurie Poulson for tense and aspect, Kelly O'Hara for morphology, Stefan Müller for calling my attention to TRALE, and Renée for proofreading. This work was supported by NSF grant BCS-0644097, a gift to the Turing Center by the Utilika Foundation, and the Max Planck Institute for Evolutionary Anthropology.

[1]http://www.delph-in.net/matrix/customize/matrix.cgi

questionnaire and produce a consistent grammar. This paper will focus on the second step, the development of analyses, for several complex argument marking patterns, including split ergativity, focus-case marking, and direct-inverse languages, in which argument marking is sensitive to grammatical scales.

2 Case

Blake (2001) defines CASE as "a system of marking dependent nouns for the type of relationship they bear to their heads." This definition includes an extremely broad range of phenomena; in order to narrow this range, the Grammar Matrix case library covers only case-marking of mandatory arguments of verbs. Even within this narrowed typological range, there exists considerable variation cross-linguistically.

Most notably, languages vary as to how intransitive and transitive clauses mark their arguments. Following Dixon (1994), I refer to the central grammatical roles of arguments as S (intransitive subject), A (transitive agent), and O (transitive patient or object). Some languages mark S and A with the same case, and O with another case; this is called the NOMINATIVE-ACCUSATIVE pattern.[2] Other languages mark S and O the same, with A different; this is the ERGATIVE-ABSOLUTIVE pattern. Finally, some few languages mark all three roles differently; these are called TRIPARTITE languages.

Some languages have mandatory verbal arguments marked by additional cases beyond those marking intransitive subjects, agents, and patients. The Matrix customization questionnaire supports the description of an arbitrary number of additional case labels, which can then be used when describing the case of lexical items. In this paper, however, I will generally confine my attention only to cases marking the S, A, and O roles.

Nominative-accusative, ergative-absolutive, and tripartite NP case marking can be specified on verb lexical types using the ARG-ST feature (Manning and Sag, 1998) to constrain the argument structure, with the Argument Realization Principle providing the identities with the SUBJ and COMPS lists:[3]

(1) Nominative-Accusative

[2]There are nominative-accusative languages, including English and German, in which the nominative case only marks the S or A argument of finite verbs. Modeling the interaction of case-marking and verb form in the customization system is an area for future work.

[3]The current version of the system treats S and A as the subject and O as an object by placing them on the SUBJ and COMPS lists, respectively. In fact, this is not an adequate analysis cross-linguistically. Some languages show inter-clausal or syntactic ergativity, in which S and O pattern together in constructions including coordination and relative clauses (Dixon, 1979, 127). Manning (1996) describes an analysis of the variation between morphological and syntactic ergativity; however, the current version of the Matrix questionnaire includes almost no multi-clausal phenomena (the exception being coordination), so support for syntactic ergativity has been left for future work.

$$\begin{bmatrix} \textit{intransitive-verb-lex} \\ \textsc{synsem..head.val.subj}\left\langle \boxed{1} \right\rangle \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad \textit{nom} \right] \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{transitive-verb-lex} \\ \textsc{synsem..head.val} \begin{bmatrix} \textsc{subj} & \left\langle \boxed{1} \right\rangle \\ \textsc{comps} & \left\langle \boxed{2} \right\rangle \end{bmatrix} \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad \textit{nom} \right], \boxed{2}\left[\textsc{..head.case} \quad \textit{acc} \right] \right\rangle \end{bmatrix}$$

(2) Ergative-Absolutive

$$\begin{bmatrix} \textit{intransitive-verb-lex} \\ \textsc{synsem..head.val.subj}\left\langle \boxed{1} \right\rangle \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad \textit{abs} \right] \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{transitive-verb-lex} \\ \textsc{synsem..head.val} \begin{bmatrix} \textsc{subj} & \left\langle \boxed{1} \right\rangle \\ \textsc{comps} & \left\langle \boxed{2} \right\rangle \end{bmatrix} \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad \textit{erg} \right], \boxed{2}\left[\textsc{..head.case} \quad \textit{abs} \right] \right\rangle \end{bmatrix}$$

(3) Tripartite

$$\begin{bmatrix} \textit{intransitive-verb-lex} \\ \textsc{synsem..head.val.subj}\left\langle \boxed{1} \right\rangle \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad s \right] \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{transitive-verb-lex} \\ \textsc{synsem..head.val} \begin{bmatrix} \textsc{subj} & \left\langle \boxed{1} \right\rangle \\ \textsc{comps} & \left\langle \boxed{2} \right\rangle \end{bmatrix} \\ \textsc{arg-st}\left\langle \boxed{1}\left[\textsc{..head.case} \quad a \right], \boxed{2}\left[\textsc{..head.case} \quad o \right] \right\rangle \end{bmatrix}$$

The analysis of case in the Grammar Matrix case library also provides, in the

lexicon section of the questionnaire, two strategies for actually marking the case on the NP arguments: marking of whole NPs via case-marking adpositions, or morphological marking on nouns, determiners, or both.

2.1 Split Ergativity

Many languages are neither consistently ergative nor consistently accusative. Such languages are said to display SPLIT ERGATIVITY. In order to support this case pattern, the Matrix customization system must be able to create grammars in which more than one kind of marking, commonly the ergative and accusative patterns, coexist.

Dixon (1994, 70) divides split ergative languages into four categories based on how the split is conditioned:

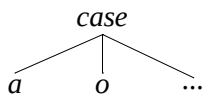
1. Semantic nature of the main verb
2. Semantic nature of the core NPs
3. Tense, aspect, or mood of the clause
4. Grammatical status of the clause

2.1.1 Semantic Nature of Main Verb

The first type of split occurs in two subtypes. In the first, called SPLIT-S, the intransitive verbs are divided into two classes: those that take A-like marking on their single arguments and those that take O-like marking.

I analyze Split-S languages as having the following simple case hierarchy (the location of any additional cases in the hierarchy is represented by ...):

(4)



Based on this case type, Split-S grammars have a single transitive verb class with A- and O-marked arguments, but two intransitive verb classes:

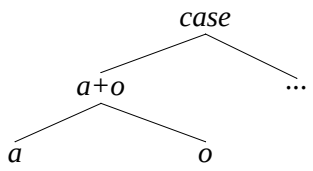
(5)
$$\begin{bmatrix} \textit{a-intrans-verb-lex} \\ \text{ARG-ST} \left\langle \begin{bmatrix} \text{..HEAD.CASE} & a \end{bmatrix} \right\rangle \end{bmatrix}$$
$$\begin{bmatrix} \textit{o-intrans-verb-lex} \\ \text{ARG-ST} \left\langle \begin{bmatrix} \text{..HEAD.CASE} & o \end{bmatrix} \right\rangle \end{bmatrix}$$

The questionniare allows the user/linguist to define verb lexical entries by defining any number of verb classes, each of which contains any number of stems. For each user-defined verb class, the user/linguist can choose which of the three lexical types above it derives from.

The other subtype is called FLUID-S. Fluid-S languages have, in addition to the two classes of verbs described above for Split-S languages, an additional intransitive verb class in which the single argument can be marked like A or like O, depending on whether the subject controls the action or not: when a speaker marks an intransitive subject like A, this emphasizes the agency of the subject; when the subject is marked like O, this implies a lack of volition on the part of the subject. The semantic representation in grammars produced by the Matrix customization system do not presently have any way to show such a distinction; however, it is possible to model the three intransitive verb classes.

I analyze Fluid-S languages with a slightly more articulated case hierarchy:

(6)



Fluid-S grammars include, in addition to the two lexical types above in 5, a lexical type for the fluid-marking verb class. This type simply specifies that the case of intransitive subjects is a supertype of both A and O:

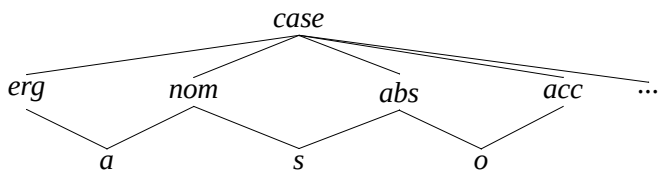
(7) $$\begin{bmatrix} a{+}o\text{-}intrans\text{-}verb\text{-}lex \\ \text{ARG-ST}\left\langle \left[\text{..HEAD.CASE} \quad a{+}o \right] \right\rangle \end{bmatrix}$$

2.1.2 Semantic Nature of NPs

The second type of ergativity split is conditioned on the semantic nature of the nominal arguments. In such languages, certain kinds of NPs (e.g. pronouns) are marked in a nominative-accusative pattern while others (e.g. common nouns) are marked in an ergative-absolutive pattern.

I analyze such a split with a rather more articulated case hierarchy:

(8)



For this type of language, the customization system will produce the same verb lexical types, shown in (3), that it would for a tripartite language. That is, an intransitive verb's sole argument is specified to take S case, while a transitive verb's agent and patient arguments take A and O, respectively. Then, when creating noun classes in the lexicon section of the questionnaire, the user/linguist will be prompted to specify for each class whether it is marked for *nom* (which unifies

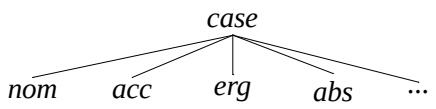
with *s* and *a*) and *acc* (which unifies just with *o*, or for *erg* (which unifies just with *a*) and *abs* (which unifies with *s* and *o*). This analysis puts the complexity in the right place in the lexicon for languages where the split is conditioned on the noun: verbs are not split, instead deriving from either the single intransitive or the single transitive type, while nouns are divided into classes based on whether they take the nominative-accusative or the ergative-absolutive pattern.

2.1.3 Clausal Splits

The third and fourth types of splits are both conditioned on clausal features. The third type is conditioned on the tense, aspect, or mood of the clause. In many Iranian languages, for example, clauses in the past tense are marked in an ergative-absolutive pattern, while clauses in other tenses take nominative-accusative marking (Dixon, 1994, 100). The fourth type of split is conditioned on the grammatical status of the clause; that is, whether it is a main or subordinate clause.

The third and fourth types can be analyzed in the same way. The case hierarchy is flat, and has at least four values:

(9)



Verb lexical items have no case specified on their arguments; instead, a set of mandatory lexical rules is used to constrain the CASE values on their ARG-ST lists. For languages with the third type of split, the lexical rule that marks the conditioning feature (e.g. the past-tense morpheme) will constrain the CASE value of the arguments. For languages with the fourth type of split, two non-spelling-changing lexical rules can be used, along with the Matrix's MC (main clause) feature, to achieve the proper analysis: one rule marks the clause as [MC +] and constrains the cases on ARG-ST to one pattern, while the second rule marks the clause as [MC −] and constrains the cases on ARG-ST to the other pattern. However, at the time the case library was implemented, the Matrix customization system had no support for tense, aspect, or mood, nor for any phenomenon involving a subordinate clause, so there was no way to describe languages of the third or fourth type via the questionnaire.[4]

2.2 Focus-case Systems

Some Austronesian languages display an interesting variant of verbal argument marking (Comrie, 1989, 120). In Tagalog (Austronesian, Philippines), a language of this type, noun phrase arguments must be marked by one of several case-marking prepositions, one of which marks an NP as the FOCUS (Comrie, 1989, 121). The

[4]But see Poulson (forthcoming) for the details of a library for tense and aspect currently under development.

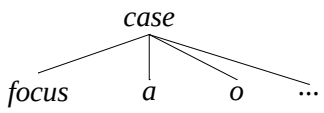
focus is marked by *ang*, while agent and patient are marked by *ng*. Every clause must have at least one argument marked as the focus. In intransitive clauses, this will be the sole argument. In transitive clauses, the verb is marked by one of a set of affixes that tell how the focus-marked NP should be interpreted, including among others agent-focus and patient-focus affixes. This pattern can be seen in the following examples (Comrie, 1989, 121):

(10) *Bumili* *ang* *babae* *ng* *baro*
bought-AGENT.FOCUS FOCUS woman PATIENT dress
'The woman bought a dress' [tgl]

(11) *Bimili* *ng* *babae* *ang* *baro*
bought-PATIENT.FOCUS AGENT woman FOCUS dress
'A/the woman bought the dress' [tgl][5]

This manner of argument marking is neither accusative nor ergative, instead constituting a distinct pattern. I analyze it as follows, using a slight modification of the analysis in §2. The case hierarchy is:

(12)



NPs are marked for agent, patient, or focus case, either directly in the lexicon or via case-marking adpositions. The sole argument on the ARG-ST of the intransitive verb lexical type is specified to have focus case. The lexical type of transitive verbs has an ARG-ST that is unspecified for case. In the lexicon section of the questionnaire, each type of focus-marking that can appear on a verb (including agent and patient focus) is implemented via a lexical rule that both applies the appropriate spelling change and constrains the cases of the arguments on ARG-ST. The rules for agent- and patient-focus marking are:

(13)
$$\left[\begin{array}{ll} \textit{agent-focus-verb-lex-rule} & \\ \text{INPUT} & \left\langle \boxed{1}, \textit{transitive-verb-lex} \right\rangle \\ \text{OUTPUT} & \begin{array}{l} F_{af}(\boxed{1}), \\ \left\langle \left[\text{ARG-ST} \left\langle \left[\ldots\text{CASE} \quad \textit{focus} \right], \left[\ldots\text{CASE} \quad \textit{patient} \right] \right\rangle \right] \right\rangle \end{array} \end{array}\right]$$

[5]Comrie actually uses the terms *actor* and *undergoer*, but I use *agent* and *patient* here for consistency. Note that, although a single case-marker *ng* is used to mark both agents and patients in Tagalog, my analysis distinguishes between agent and patient, allowing it to model languages where they are marked differently.

$$\left[\begin{array}{ll} \textit{patient-focus-verb-lex-rule} & \\ \text{INPUT} & \left\langle \boxed{1}, \textit{transitive-verb-lex} \right\rangle \\ & F_{pf}(\boxed{1}), \\ \text{OUTPUT} & \left\langle \left[\text{ARG-ST} \left\langle \left[\ldots\text{CASE} \quad \textit{agent}\right], \left[\ldots\text{CASE} \quad \textit{focus}\right] \right\rangle \right] \right\rangle \end{array}\right]$$

2.3 Direct-inverse Languages

In languages with DIRECT-INVERSE marking, the marking of verbal arguments is sensitive to a grammatical hierarchy. If the agent is ranked more highly on the hierarchy than the patient, then the clause is said to be DIRECT; if the patient is higher, the clause is said to be INVERSE. For a concrete example, let us consider the Algonquian languages, where the hierarchy is primarily sensitive to person:

(14) 2nd $>$ 1st $>$ 3rd proximate $>$ 3rd obviative

When a transitive clause contains two non-coreferential third-person arguments, one of them will be marked as proximate and the other as obviative to prevent ambiguity. The Algonquian proximate NP, according to (Dahlstrom, 1991, 91), is usually "the topic of the discourse" or "the focus of the speaker's empathy". The proximate NP is generally unmarked, while the obviative noun is marked by a suffix.

(14) is often referred to in the literature as a *hierarchy*, but it differs markedly from the sort of multiply-inheriting type hierarchies used in HPSG. The hierarchy in (14) only implies one-dimensional precedence relationships among the positions on the hierarchy; in contrast, HPSG-style type hierarchies involve arbitrary pairwise inheritance relationships among the items they contain. To avoid confusion, I will hereafter refer to grammatical hierarchies like (14) as SCALES.[6]

The following examples from Fox (Algonquian, North America) illustrate how argument marking works in a direct-inverse language (Comrie, 1989, 129):

(15) *ne -waapam-aa -wa*
1SG see-DIRECT 3
'I see him.' [sac]

(16) *ne -waapam-ek -wa*
1SG see-INVERSE 3
'He sees me.' [sac]

[6]The usage of *hierarchy* to refer to such scales, it should be noted, has quite a long history in linguistics, and includes such well-known examples as the Noun Phrase Accessibility Hierarchy of Keenan and Comrie (1977).

Analyzing the direct-inverse pattern is challenging in the version of HPSG used in the Matrix (which, recall, is expressed in TDL and interpreted by the LKB system). For transitive verbs, it is necessary to constrain the verb's arguments differently for direct and inverse clauses. It would be convenient when modeling this aspect of direct-inverse languages (via lexical rules, say) if there were a formal mechanism for stating scale constraints compactly, perhaps something like:

(17)
$$\left[\begin{array}{ll} \textit{direct-verb-lex-rule} & \\ \text{INPUT} & \left\langle \boxed{1}, \ldots \right\rangle \\ \text{OUTPUT} & \left\langle F_{dv}(\boxed{1}, \left[\text{ARG-ST} \left\langle \boxed{2}, \boxed{3} \right\rangle\right]) \right\rangle \end{array}\right] \& \boxed{2} >> \boxed{3}$$

$$\left[\begin{array}{ll} \textit{inverse-verb-lex-rule} & \\ \text{INPUT} & \left\langle \boxed{1}, \ldots \right\rangle \\ \text{OUTPUT} & \left\langle F_{iv}(\boxed{1}, \left[\text{ARG-ST} \left\langle \boxed{2}, \boxed{3} \right\rangle\right]) \right\rangle \end{array}\right] \& \boxed{2} << \boxed{3}$$

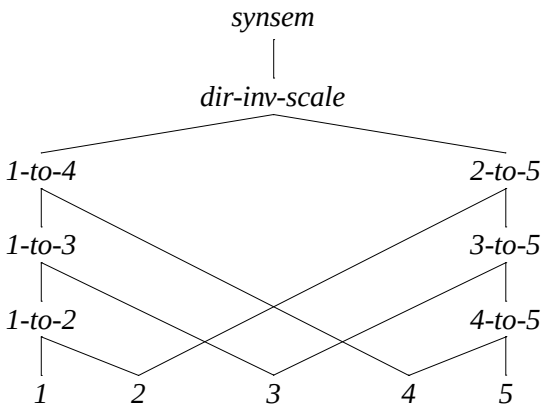
However, no such mechanism is available to us, so another method of analyzing scales is required.[7] It would be possible, of course, to simply create a lexical rule for each possible pair of positions on the scale, but this would mean having on the order of n^2 lexical rules for an n-position scale. It would be better to somehow model the scale with a type hierarchy.

Perhaps, noticing that it is necessary to address ranges of the scale that start at the left or the right end, we might try to model the scale using a type hierarchy like (18) (labeling the positions on the scale from 1 through 5), which is then used to constrain the series of lexical rules in (19) (which all derive from a single rule that applies the direct morphology to the verb):[8]

[7]Note, however, that other systems for implementing HPSG grammars are more powerful. In particular, the TRALE system (Meurers et al., 2002) can state constraints like those in (17) using its complex antecedent feature (Stefan Müller, personal communication, October 2008).

[8]This analysis models scales using subtypes of *synsem*, anticipating that the features involved may be syntactic or semantic. It is possible that a more specific feature structure would do (e.g. *local* or something within *cat* or *cont*), in some or all languages. This is left for future work.

(18)



(19)

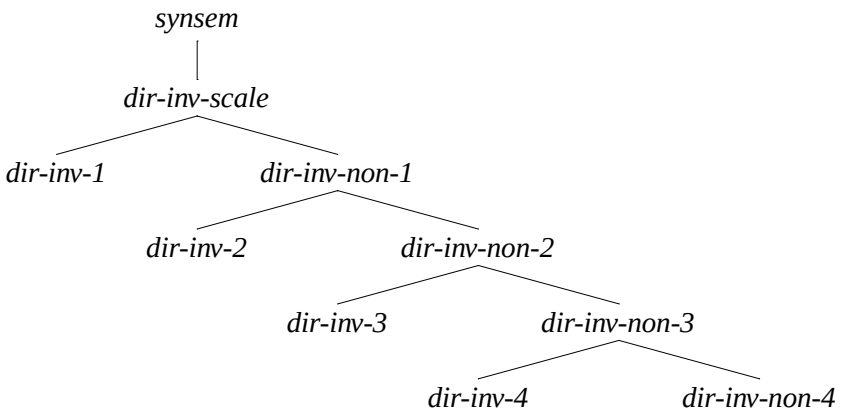
$$\begin{bmatrix} \textit{direct-verb-lex-rule-1} \\ \text{ARG-ST} \left\langle \textit{1}, \textit{2-to-5} \right\rangle \end{bmatrix} \qquad \begin{bmatrix} \textit{direct-verb-lex-rule-2} \\ \text{ARG-ST} \left\langle \textit{1-to-2}, \textit{3-to-5} \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{direct-verb-lex-rule-3} \\ \text{ARG-ST} \left\langle \textit{1-to-3}, \textit{4-to-5} \right\rangle \end{bmatrix} \qquad \begin{bmatrix} \textit{direct-verb-lex-rule-4} \\ \text{ARG-ST} \left\langle \textit{1-to-4}, \textit{5} \right\rangle \end{bmatrix}$$

Unfortunately, this set of rules would produce spurious ambiguity when applied to some sentences. While a sentence with, say, a subject from class 1 and an object from class 2 would parse just once with *direct-verb-lex-rule-1* having applied to the verb, a sentence with a subject from class 1 and an object from class 5 would parse four times, once for each of the above rules.

This problem can be addressed by revising the *dir-inv-scale* hierarchy. Rather than having ranges that extend from both ends, the revised hierarchy consists of pairs of types, one covering a single class in the scale and the other the rest of the scale to the right, arranged into a right-branching tree:

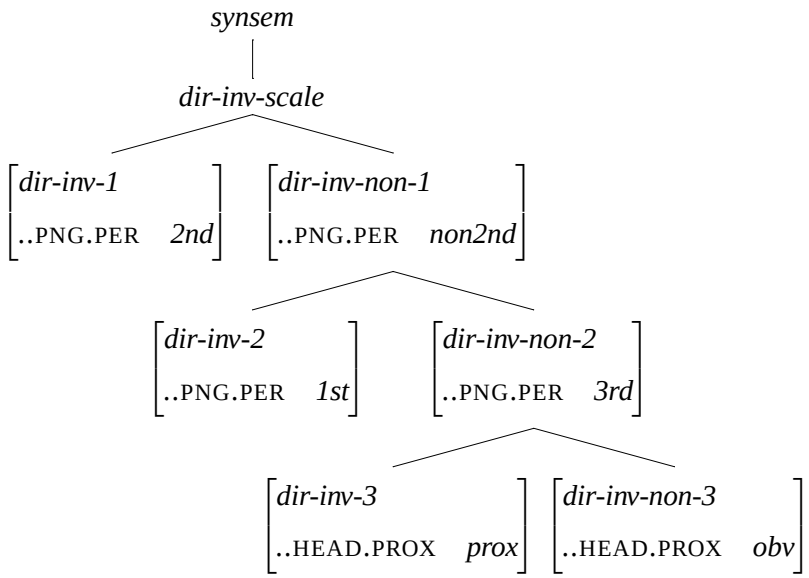
(20)



To prevent spurious parses, the type hierarchy must constrain the appropriate syntactic features on both the leaves and the non-terminal nodes of the tree. For a

concrete example, below are the type hierarchy (21) and lexical rules (22) for an Algonquian language with the scale in (14):

(21)



(22)

$$\begin{bmatrix} \textit{direct-verb-lex-rule-1} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-1, dir-inv-non-1} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-1} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-1, dir-inv} \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{direct-verb-lex-rule-2} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-2, dir-inv-non-2} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-2} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-2, dir-inv-2} \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{direct-verb-lex-rule-3} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-3, dir-inv-non-3} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-3} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-3, dir-inv-3} \right\rangle \end{bmatrix}$$

A further set of lexical rules that are sensitive to the value of the DIRECTION feature are defined by the user/linguist in the lexicon section of the questionnaire. These rules actually apply whatever spelling changes are associated with the direct and inverse forms of the verb; for example, handling the Fox examples in (15) and (16) would require a direct-marking rule for the suffix *-aa* and an inverse-marking rule for the suffix *-ek*. It would be possible in principle to merge the scale-constraining rules like those in (22) and the rules marking direct or inverse on the verb into a single paradigm of lexical rules; however, the questionnaire allows any number of morphological "slots" to be created that are sensitive to the

DIRECTION feature, raising the question of which slot's rules should also specify the constraints in (22). To avoid this issue, the customization system always separates the scale-constraining rules from any lexical rules that implement user-defined verb morphology.

Under this analysis, sentences will parse only once, solving the problem of spurious ambiguities. For example, a sentence with a verb in the direct form and a second-person agent will parse just once, regardless of the person and case of the patient, with *direct-verb-lex-rule-1* having applied to the verb.

Note that this analysis does not allow the parsing of transitive sentences where both NP arguments occupy the same position on the scale. This is correct for at least some Algonquian languages including Nishnaabemwin, where coreferential NP arguments require a reflexive form and two third person arguments can be distinguished using the obviative (Valentine, 2001, 273). Another possibility, languages where both NP arguments may occupy the same position on the scale, is analyzed below in §2.4.

It is worth noting some drawbacks to this analysis. First, it requires, for a scale with n positions, $2(n-1)$ lexical rules. Furthermore, the type hierarchy in (21) is only arbitrarily right-branching. An analysis could just as easily have been built around a left-branching hierarchy. Having two equally-valid analyses with nothing to choose between them may seem like luxury, but it could also be argued that it results from the inability of the formalism being used to compactly and efficiently express the linguistic generalization being analyzed.

Finally, it should be noted that the leaf types in the *dir-inv-scale* hierarchy, which are certainly necessary because they encode the positions on the grammatical scale, need not be arranged in a single hierarchy in order to model the language. The leaves could all be independent subtypes of *synsem*, and the verb lexical rules could be stated in exactly the same way without a *dir-inv-scale* supertype. However, there is a good reason to prefer a hierarchy to independent types. In (21), the features of the types *dir-inv-2* and *dir-inv-non-2* had better be compatible with those of *dir-inv-non-1*—otherwise, the latter type cannot be opposed with *dir-inv-1* in verb argument structures to distinguish NPs at the left of the scale from NPs at any position further down the scale. Since software systems can contain bugs, it is therefore valuable, as a "sanity check" on grammars produced by the customization system, to arrange the leaf types into a hierarchy. If the types are not compatible, loading the grammar with the LKB will produce an error rather than apparently succeeding but parsing and generating incorrectly. In other words, it ought to be possible to arrange the types encoding the grammatical scale into a hierarchy, and in fact, the grammar is seriously inconsistent if they cannot be so arranged, so to be safe, the customization system does so.

2.4 Fore

Scales can also control the verbal argument marking patterns in languages that lack direct or inverse marking on the verb. One such language is Fore (Trans-New

Guinea, Papua New Guinea), where the relative position of agent and patient on a scale correlates with the presence or absence of a marker on the agent NP. The scale governing argument marking in Fore is:

(23) pronoun, name, kin term > human > animate > inanimate

The operation of this hierarchy can be seen in the following examples (Scott 1978, 116, Blake 2001, 122):

(24) *yaga: wá aegúye*
pig man 3SG.hit.3SG
'The man kills the pig' [for]

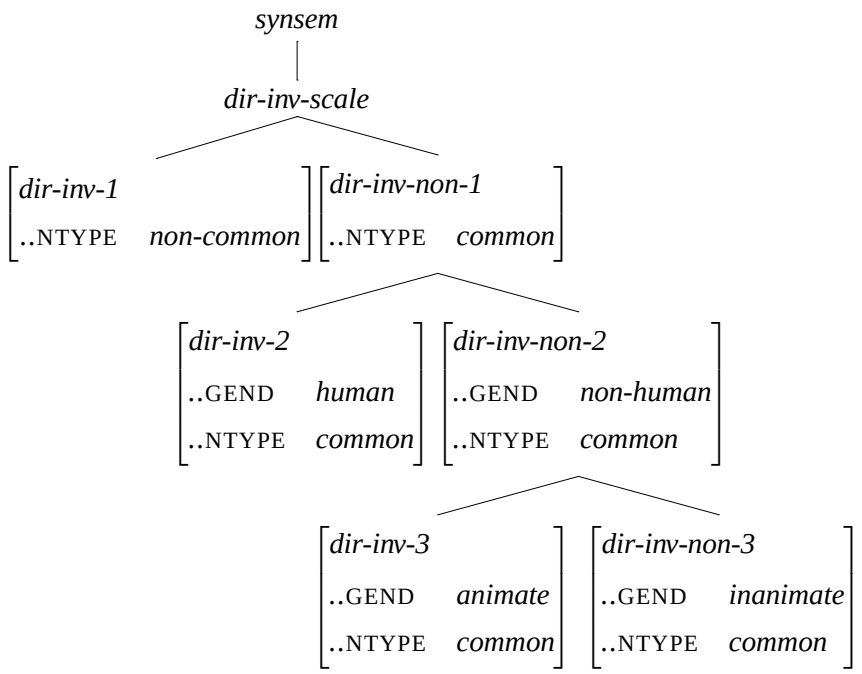
(25) *yaga:-wama wá aegúye*
pig-DLN man 3SG.hit.3SG
'The pig kills the man' [for]

(26) *wa yága:-wama aegúye*
man pig-DLN 3SG.hit.3SG
'The pig kills the man' [for]

An extra suffix *-wama* (which Scott (1978) describes as a "delineator") appears on the agent when it is lower on the hierarchy than the patient. Scott describes these facts of Fore without referring to it as a direct-inverse language; however, I will show that this marking pattern can be analyzed by treating Fore as direct-inverse language where, instead of marking on the verb, it is the marking of case on NPs that is sensitive to direct or inverse clauses.

I analyze Fore as an ergative-absolutive language, where ergative is marked by the delineator suffix *-wama*. To capture the distinction between types and genders of nouns, nominal heads have an additional NTYPE feature with the values *common* and *non-common*, and the GEND feature on PNG under INDEX has the values *human*, *non-human*, *animate*, and *inanimate* (where the latter two are subtypes of *non-human*). The *dir-inv-scale* hierarchy in the grammar is:

(27)



The grammar also contains a set of constant verb lexical rules, one of which will apply to the verb in each transitive clause, constraining the items on its ARG-ST list:

(28)

$$\begin{bmatrix} \textit{direct-verb-lex-rule-1} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-1}, \textit{dir-inv-scale} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-1} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-1}, \textit{dir-inv} \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{direct-verb-lex-rule-2} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-2}, \textit{dir-inv-non-1} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-2} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-2}, \textit{dir-inv-2} \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \textit{direct-verb-lex-rule-3} \\ \text{..HEAD.DIRECTION } \textit{dir} \\ \text{ARG-ST} \left\langle \textit{dir-inv-3}, \textit{dir-inv-non-2} \right\rangle \end{bmatrix} \begin{bmatrix} \textit{inverse-verb-lex-rule-3} \\ \text{..HEAD.DIRECTION } \textit{inv} \\ \text{ARG-ST} \left\langle \textit{dir-inv-non-3}, \textit{dir-inv-3} \right\rangle \end{bmatrix}$$

Compare the ARG-ST constraints in the rules in (28) with those in (22). The inverse rules are similar, but notice that the direct rules for Fore, rather than constraining agents and patients using types from the same level in the hierarchy, instead constrain patients to types that are the supertypes of their corresponding agents. For example, in *direct-verb-lex-rule-1*, *dir-inv-1* is opposed with *dir-inv-scale* rather than with *dir-inv-non-1*. This is necessary because Fore, unlike the

Algonquian languages described in §2.3, allows clauses where both arguments occupy the same position on the scale (Scott, 1978, 115).[9] The customization system allows the description of both types of languages in its questionnaire.

After one of the above rules has applied to a verb stem, another constant verb lexical rule from the set below applies. These rules are sensitive to the value of the DIRECTION feature and constrain the case of the verb's arguments appropriately.

(29)
$$\left[\begin{array}{ll} \textit{direct-lex-rule} & \\ \text{..HEAD.DIRECTION} & \textit{dir} \\ \text{..VAL.SUBJ} & \left\langle \left[\text{..HEAD.CASE } \textit{abs} \right] \right\rangle \\ \text{..VAL.COMPS} & \left\langle \left[\text{..HEAD.CASE } \textit{abs} \right] \right\rangle \end{array}\right]$$

$$\left[\begin{array}{ll} \textit{inverse-lex-rule} & \\ \text{..HEAD.DIRECTION} & \textit{inv} \\ \text{..VAL.SUBJ} & \left\langle \left[\text{..HEAD.CASE } \textit{erg} \right] \right\rangle \\ \text{..VAL.COMPS} & \left\langle \left[\text{..HEAD.CASE } \textit{abs} \right] \right\rangle \end{array}\right]$$

Note that constraints on the rules in (28) and (29) could have been folded into a single paradigm of rules by having the direct rules derive from *direct-lex-rule* and the inverse rules from *inverse-lex-rule*. However, because this analysis of Fore treats it as a direct-inverse language, the structure of the lexical rule system produced by the customization system parallels that in §2.3 above, with separate two sets of rules, one implementing scale constraints and the other marking clauses as direct or inverse (via verb morphology in Algonquian and via case-marking in Fore).

3 Results

In order to test the direct-inverse section of the customization system, I have filled out the questionnaire and created two small grammars, one for a language fragment resembling an Algonquian language and the other for a fragment resembling Fore. Below, I show the coverage of each grammar on a suite of sentences designed to test correct parsing.

[9] The delineator in Fore can also be used to make available dispreferred word orders with scale-equivalent arguments, but the current version of the customization system is not powerful enough to capture such an interaction between word order and argument marking. This grammatical fact must therefore be left for future work.

3.1 Pseudo-Algonquian

The Algonquian languages have direct and inverse marking of the verb, controlled by the scale in (14), repeated here for convenience:

(30) 2nd > 1st > 3rd proximate > 3rd obviative

To demonstrate the Matrix customization system's ability to handle such languages, a simple pseudo-Algonquian grammar was created via the questionnaire. It has no case marking; an additional head feature called PROXIMITY, used to mark proximate and obviative forms of third-person nouns; SVO word order[10]; and the scale in (30).

The pseudo-Algonquian lexicon contains a transitive verb *tv* and the nominal forms *1P*, *2P*, and *3P*, which have lexically-specified values of PERSON. Verbs take one of two suffixes: *-DIR*, which marks direct form, and *-INV*, which marks the inverse. Third person nouns take one of two suffixes: *-PROX* for the proximate or *-OBV* for obviative.

The grammar produces the judgments marked on the sentences below:

(31)		
	2P tv-DIR 1P	*2P tv-INV 1P
	2P tv-DIR 3P-PROX	*2P tv-INV 3P-PROX
	2P tv-DIR 3P-OBV	*2P tv-INV 3P-OBV
	1P tv-DIR 3P-PROX	*1P tv-INV 3P-PROX
	1P tv-DIR 3P-OBV	*1P tv-INV 3P-OBV
	3P-PROX tv-DIR 3P-OBV	*3P-PROX tv-INV 3P-OBV
	3P-OBV tv-INV 3P-PROX	*3P-OBV tv-DIR 3P-PROX
	3P-OBV tv-INV 1P	*3P-OBV tv-DIR 1P
	3P-OBV tv-INV 2P	*3P-OBV tv-DIR 2P
	3P-PROX tv-INV 1P	*3P-PROX tv-DIR 1P
	3P-PROX tv-INV 2P	*3P-PROX tv-DIR 2P
	1P tv-INV 2P	*1P tv-DIR 2P

These sentences are divided into four groups. Those in the upper-left quadrant are grammatical because the agent (first argument) outranks the patient and the verb is in direct form. Those in the lower-left quadrant are grammatical because the patient outranks the agent and the verb is in the inverse form. The sentences in the right column have the same arguments as those on the left, but *-DIR* and *-INV* have been reversed, so they are all ungrammatical.

3.2 Pseudo-Fore

The pseudo-Fore grammar has ergative-absolutive case marking; human, animate, and inanimate genders; an additional head feature called NTYPE that distinguishes

[10] Algonquian languages typically have free word order, but to make it easier to create both grammatical and ungrammatical test sentences, this pseudo-Algonquian is constrained to be SVO.

pronouns, names, kin terms, and common nouns; verb-final word order; and the scale in (23), repeated here for convenience:

(32) pronoun, name, kin term > human > animate > inanimate

The pseudo-Fore lexicon contains a transitive verb *tv* and the nouns *pro* (a pronoun), *human*, *anim*, and *inanim*, the latter three being common nouns of the obvious gender. The only inflection is the *-ERG* suffix on nouns.

The grammar produces the judgments marked on the sentences below:

(33)			
	pro pro tv	*pro pro-ERG tv	*pro-ERG pro tv
	pro human tv	pro human-ERG tv	*pro-ERG human tv
	pro anim tv	pro anim-ERG tv	*pro-ERG anim tv
	pro inanim tv	pro inanim-ERG tv	*pro-ERG inanim tv
	human human tv	*human human-ERG tv	*human-ERG human tv
	human anim tv	human anim-ERG tv	*human-ERG anim tv
	human inanim tv	human inanim-ERG tv	*human-ERG inanim tv
	anim anim tv	*anim anim-ERG tv	*anim-ERG anim tv
	anim inanim tv	anim inanim-ERG tv	*anim-ERG inanim tv
	inanim inanim tv	*inanim inanim-ERG tv	*inanim-ERG inanim tv

Sentences in the left column are all grammatical because no case is marked—in fact, the sentences with both arguments from the same scale position (e.g. *pro pro tv*, *human human tv*) are ambiguous and parse twice due to Fore's verb-final word order. The sentences in the center column have the second argument, which is always of lower or equal scale rank, marked with the ergative suffix. They are grammatical except where the two arguments are of equal rank, in which case Fore does not allow the ergative. The sentences in the third column have the first argument, which is always of higher or equal scale rank, marked with the ergative suffix. They are all ungrammatical because ergative may only be marked on the lower-ranked argument.

4 Conclusion

In this paper I have described analyses of a number of verbal argument marking patterns. These included several case patterns: nominative-accusative, ergative-absolutive, tripartite, split ergative, and focus-case. I also described an analysis of direct-inverse languages, whose marking pattern was challenging to describe compactly in HPSG.

The development and implementation of such sets of analyses, where each analysis must be designed so that it can be plugged into an automatically-created Matrix-based grammar, represents an instance of what could be called computational linguistic typology. Rather than analyzing linguistic phenomena deeply but separately, as syntacticians often do, or collecting shallow descriptions of the range

a phenomenon in the world's languages, as typologists do, I instead analyze in detail the whole typological range of a phenomenon (here, verbal argument marking) within a single consistent framework. The resulting analyses are made available via the Matrix customization system, which emits grammars whose correctness can be verified against suites of test sentences.

The aim of this style of analysis is to bring to light unrecognized commonalities among human languages. This effort has already born some fruit. I have shown here that an analysis of direct-inverse languages based on a complex of lexical rules can be extended to other languages whose argument marking is conditioned on grammatical scales. I expect that the implementation of libraries for other linguistic phenomena for the Grammar Matrix will reveal further generalizations.

A more detailed presentation of the work described here, along with additional Matrix libraries for person, number, gender, and agreement, will form the core of my dissertation (Drellishak, forthcoming).

References

Bender, Emily M. and Flickinger, Dan. 2005. Rapid Prototyping of Scalable Grammars: Towards Modularity in Extensions to a Language-Independent Core. In *Proceedings of the 2nd International Joint Conference on Natural Language Processing IJCNLP-05*, Jeju Island, Korea.

Bender, Emily M., Flickinger, Dan and Oepen, Stephan. 2002. The Grammar Matrix. In *Proceedings of COLING 2002 Workshop on Grammar Engineering and Evaluation*, Taipei, Taiwan.

Blake, Barry J. 2001. *Case, Second Edition*. Cambridge: Cambridge University Press.

Comrie, Bernard. 1989. *Language Universals & Linguistic Typology, Second Edition*. Chicago: University of Chicago.

Copestake, Ann. 2002. *Implementing Typed Feature Structure Grammars*. Stanford: CSLI.

Copestake, Ann, Flickinger, Dan, Pollard, Carl and Sag, Ivan A. 2005. Minimal Recursion Semantics: An Introduction. *Research on Language & Computation* 3(2–3), 281–332.

Dahlstrom, Amy. 1991. *Plains Cree Morphosyntax*. New York: Garland.

Dixon, R. M. W. 1979. Ergativity. *Language* 55, 59–138.

Dixon, R. M. W. 1994. *Ergativity*. Cambridge: Cambridge University Press.

Drellishak, Scott. forthcoming. *Widespread, but Not Universal: Improving the Typological Coverage of the Grammar Matrix*. Ph. D.thesis, University of Washington.

Drellishak, Scott and Bender, Emily M. 2005. A Coordination Module for a Crosslinguistic Grammar Resource. In *Proceedings of the 12th International Conference on Head-Driven Phrase Structure Grammar*, Lisbon, Portugal.

Keenan, Edward L. and Comrie, Bernard. 1977. Noun Phrase Accessibility and Universal Grammar. *Linguistic Inquiry* 8, 63–99.

Manning, Christopher D. 1996. *Ergativity*. Stanford: CSLI.

Manning, Christopher D. and Sag, Ivan A. 1998. Argument Structure Valence and Binding. *Nordic Journal of Linguistics* 21, 107–144.

Meurers, W. Detmar, Penn, Gerald and Richter, Frank. 2002. A Web-based Instructional Platform for Constraint-Based Grammar Formalisms and Parsing. In Dragomir Radev and Chris Brew (eds.), *Effective Tools and Methodologies for Teaching NLP and CL*, pages 18–25, New Brunswick, NJ: The Association for Computational Linguistics.

O'Hara, Kelly. 2008. *A Morphotactic Infrastructure for a Grammar Customization System*. Masters Thesis, University of Washington.

Poulson, Laurie. forthcoming. *Grammatical Tense and Aspect: A Cross-Linguistic Implementation*. Ph. D.thesis, University of Washington.

Scott, Graham. 1978. *The Fore Language of Papua New Guinea*. Canberra, Australia: Pacific Linguistics.

Valentine, J. Randolph. 2001. *Nishnaabemwin Reference Grammar*. Toronto: University of Toronto Press.

Transparent heads

Dan Flickinger
CSLI, Stanford University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 87–94

Flickinger, Dan. 2008. Transparent heads. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 87–94. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.5. CC-BY 4.0

Abstract

Head-complement structures in HPSG identify most properties of the phrase with those of the head daughter, except for that valence property (e.g. SUBCAT or COMPS) whose constraints are met by the non-head daughter(s) in the phrase. In this paper I present several phenomena in English syntax where idiosyncratic properties of a non-head daughter in a phrase must remain visible on the phrasal node, in order to preserve the strong version of the principle of locality in subcategorization. I propose a general formal mechanism to effect this occasional transparency of heads with respect to certain properties of their complements.

1 Introduction

Typical head-complement structures in HPSG identify most properties of the phrase with those of the head daughter, except for that valence property (e.g. SUBCAT or COMPS) whose constraints are met by the non-head daughter(s) in the phrase. It is usually assumed that most properties of the non-head daughter in such structures are not visible on the mother, except for those which are propagated by general feature principles such as the Slash Inheritance Principle or the Semantics Principle. In this paper I present several phenomena in English syntax where idiosyncratic properties of a non-head daughter in a phrase must remain visible on the phrasal node, in order to preserve the strong version of the principle of locality in subcategorization, and I propose a general formal mechanism to effect this occasional transparency of heads with respect to certain properties of their complements.

2 Passive verb phrase complements of *as*

One of the most unusual productive syntactic constructions in English involves the word "as" combining with a highly restricted class of verb phrases to form a phrase which can modify sentences, as illustrated in 1.

(1) As has been argued previously, this compound is unstable.
As will be proven in the next section, this compound is unstable.
As argued previously, this compound is unstable.
As shown in the next section, this compound is unstable.
As is being argued here, this compound is unstable.

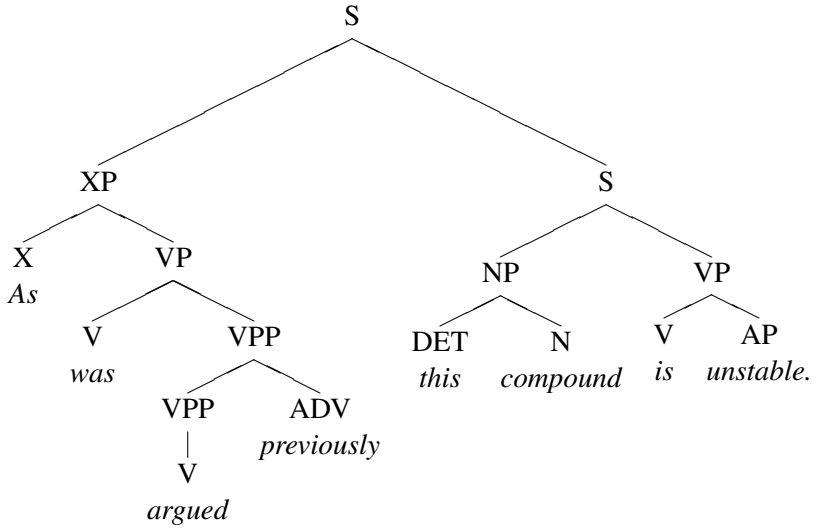
What is interesting about the VP complement of this word "as" is the requirement that it must be either a passive verb phrase of a particular kind, or a VP headed by a finite auxiliary verb which takes such a passive verb phrase as its complement (possibly mediated by the auxiliary "have" in addition to the obligatory auxiliary "be"). The passive verb phrase must be headed by a verb which ordinarily takes just a sentential complement and an expletive "it" subject, as illustrated in 2 The constraints on the permissible complements of "as" are illustrated in 3.

(2) It has been argued previously that this compound is unstable.
It will be proven in the next section that this compound is unstable.
It can be shown that this compound is unstable.

(3) *As been argued previously, this compound is unstable.
*As will prove in the next section, this compound is unstable.
*As has tried to be argued previously, this compound is unstable.
*As was amazed previously, this compound is unstable.
*as argues in the next section, this compound is unstable.

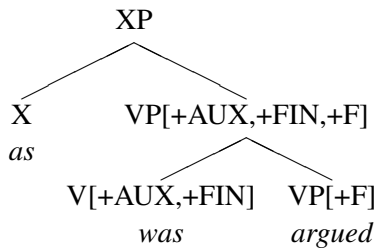
The syntactic structure given in 4 shows the particle "as" combining with its complement VP "was argued previously", thus forming a modifier phrase which combines with the main clause with an instance of the Modifier-Head schema.

(4) *As was argued previously this compound is unstable.*



In the lexical entry for this subordinating particle "as", its sole complement must be constrained to include finite VPs headed by an auxiliary verb just as long as the complement phrase in that VP has the necessary property F. Informally, this constraint seems to have the following structure, where the Head-Complement rule is invoked twice in succession, but where in addition the property `[+F]` propagates from the non-head to the mother.

(5) *as was argued*



Given the desirable highly schematic nature of the Head-Complement rule, it is clear that the auxiliary head should ensure that this property of its complement VP be preserved on the phrase it heads. Before examining the proposed formal mechanism enabling this feature propagation, it will be useful to consider some additional phenomena which exhibit this same transparency of certain properties of non-heads in head-complement structures.

3 Partitive noun phrases

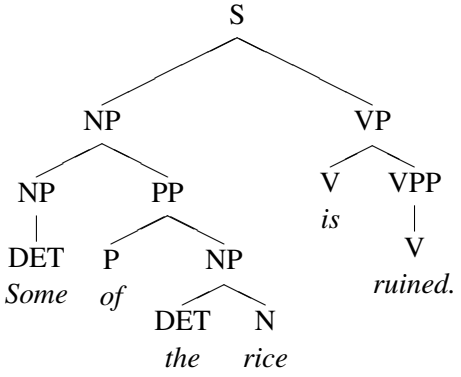
It is well known that in certain partitive phrases like those illustrated in 6, the grammatical number of the full noun phrase is determined by the number of the NP which is the complement of the preposition "of", even though under normal assumptions, that NP cannot be the head of the whole subject noun phrase. This transparency of grammatical number holds for those partitives which can appear equally cheerfully with singular or plural NPs following the preposition "of", as in 7.

(6) Some of the rice is ruined.
Some of the books are ruined.
*Some of the rice are ruined.
*Some of the books is ruined.

(7) All of the rice is ruined.
Most of the books are ruined.
*None of the rice are ruined.

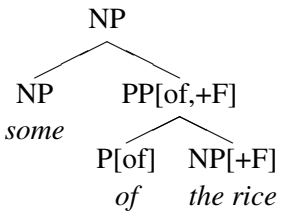
Assuming the syntactic analysis for these partitives shown in 8, the partitive head "some" (here derived from a determiner lexical entry) takes as its complement a prepositional phrase headed by "of", and that "of" preserves the number of its complement NP "the rice" on the phrasal PP node. That number property is thus visible to the partitive head, which unifies that number with its own to determine the number of the full NP, so it can be unified with the constraints imposed by the verb phrase on its subject.

(8) *Some of the rice is ruined.*



Again we have a configuration like the one seen in 5 above: one head-complement phrase serving as the complement in another head-complement phrase, with a property F of the lower non-head phrase preserved on its mother, as sketched in 9.

(9) *some of the rice*



A more careful look at these partitive phrases reveals that more than just number is preserved from the complement noun phrase. In English, certain temporal noun phrases can appear as VP modifiers, a phenomenon which can be analyzed by a unary construction whose daughter is typically an NP headed by a temporal noun (subject to some additional constraints which we ignore here), as in 10.

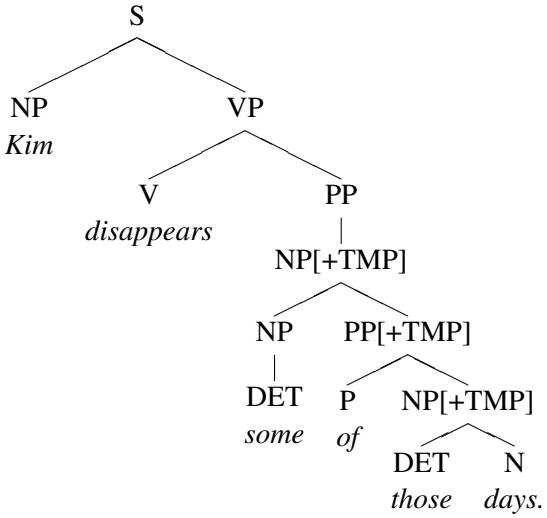
(10) Kim disappears those days.
Kim disappears the days when you're here.
* Kim disappears those appointments.

Interestingly, this same grammaticality pattern holds when the VP modifier consists of a partitive phrase which contains such a temporal noun phrase.

(11) Kim disappears some of those days.
Kim disappears some of the days when you're here.
* Kim disappears some of those appointments.

This property of being a temporal noun phrase, like the number of the NP, must be propagated up through the PP headed by "of", and then still be visible on the full partitive NP, so that this phrase can serve as the daughter of the unary construction which licenses the VP modifier phrase, as sketched in 12 using [+TMP] to signify the presence of this property.

(12) *Kim disappears some of those days.*



4 Additional phenomena

This transparency of one or more properties whose source is the non-head daughter in a head-complement phrase can be observed in several additional phenomena in English, including (1) PPs headed by semantically empty prepositions, a generalization of the partitive "of" discussed above, as illustrated in 13 where the verb "see" selects for a PP complement headed by "to" which contains an expletive "it"; and (2) sentences with tag questions involving verbs like "suppose", as discussed by Bender & Flickinger (1997), and illustrated briefly in 14, where the tag phrase's verb here surprisingly matches that of the complement clause, a property idiosyncratically preserved by "suppose" on the VP it heads.

(13) They saw *to it* that the evidence disappeared.
*They saw to them that the evidence disappeared.

(14) I suppose they can sing, can't they?
*Kim denied that they can sing, can't they?

5 Analysis

For each of these phenomena, a head H selecting for a complement C must preserve some property or properties F of that complement on the phrase it heads, and for at least some of these constructions, that property F must be preserved through multiple headed constructions up to the maximal projection of the head H. We can capture this propagation of F directly by introducing the relevant attribute as a HEAD feature, called MINOR to indicate its secondary effect on the distribution of the phrase it decorates. The heads H which appear in the constructions discussed

above will then include a general constraint identifying their own MINOR value with the MINOR value of their complement. This is illustrated in 15 for the lexical type for auxiliaries, whose VP complement may be a passive VP with the MINOR value *it-psv*, meaning the finite VP the auxiliary verb projects will preserve this value, so the entry for our particle "as" can be as given in 16.

(15)
$$\begin{bmatrix} \textit{fin_aux_verb} & \\ \text{SYNSEM} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} & \\ \text{AUX} & + \\ \text{MINOR} & \boxed{1} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{verb} & \\ \text{VFORM} & \textit{nonfin} \\ \text{MINOR} & \boxed{1} \end{bmatrix} \end{bmatrix} \rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(16)
$$\begin{bmatrix} \textit{p_vp_psv_le} & \\ \text{SYNSEM} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{particle} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{verb} & \\ \text{VFORM} & \textit{fin-or-psv} \\ \text{AUX} & + \\ \text{MINOR} & \textit{it-psv} \end{bmatrix} \end{bmatrix} \rangle \end{bmatrix} \end{bmatrix} \\ \text{ORTH} & \langle \textit{as} \rangle \end{bmatrix}$$

The lexically controlled propagation of this HEAD feature MINOR from complement phrases enables the precise control required to capture the necessary grammaticality distributions for phenomena employing transparent heads. Note that this approach bears some similarity to the use of MARKING/MARKED features proposed by Van Eynde (2007) and propagating from non-head daughters, though that analysis did not focus on phenomena involving complementation.

References

Bender, E. M., & Flickinger, D. (1997). No one's forgotten the periphery, have they. In *Proceedings of the 4th International Conference on HPSG.* Cornell: CSLI Publications.

Pollard, C., & Sag, I. A. (1994). *Head-Driven Phrase Structure Grammar*. Chicago, IL and Stanford, CA: The Univeristy of Chicago Press and CSLI Publications.

Potts, C.(2002). The syntax and semantics of *as*-parentheticals. *Natural Language and Linguistic Theory*, *20*, 623 – 689.

Tseng, J. (2002). Remarks on marking. In *Proceedings of the 9th International Conference on HPSG* (pp. 267 – 283). Stanford: CSLI Publications.

Van Eynde, F.(1998). Current topics in constraint-based theories of german syntax. In T. Kiss & D. Meurers (Eds.), (pp. 149 – 164). Saarbruecken, Germany.

Van Eynde, F. (2007). The big mess construction. In *Proceedings of the 14th International Conference on HPSG* (pp. 415 – 433). Stanford: CSLI Publications.

Apparent non-constituent coordination in Japanese

Chizuru Ito
Osaka University

Rui P. Chaves
Lisbon University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 95–115

Ito, Chizuru & Rui P. Chaves. 2008. Apparent non-constituent coordination in Japanese. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 95–115. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.6.
CC-BY 4.0

Abstract

Coordination in Japanese poses various puzzles which defy the standard notion of syntactic category. On the one hand, one can conjoin structures which one usually would not expect to form any constituent, and on the other hand, there are various conjunction particles that are sensitive to the kind of conjuncts that they combine with. In this paper we argue against abandoning the usual notion of constituency, and redefining the entire grammar of Japanese. We provide a novel construction-based account of the data in which the phenomena result from the interaction of the coordination construction, ellipsis, and allomorphy of the conjunction particle.

1 Introduction

In Japanese, one of the ways by which conjunction can be expressed it by the usage of two suffixes, *to* and *te*. The common assumption is that these have complementary distributions. While *to* is a nominal coordinator as seen in (1a) and (2b), *te* is a predicate coordinator as (1b) and (2a) show. If *te* is employed to conjoin non-predicates, or if *to* is used to conjoin non-nominals, then ungrammaticality ensues.

(1) a. Mary-ga [[ringo] -to [banana]]-o tabe-ta.
mary-NOM apple and banana-ACC eat-PAST
'Mary ate [[the apple] and [the banana]].'

b. Mary-ga [[eiga-o mi] -te [keeki-o tabe]]-ta.
Mary-NOM film-ACC watch and cake-ACC eat-PAST
'Mary [[watched the movie] and [ate the cake]].'

(2) a.*Mary-ga [[ringo] -te [banana]]-o tabe-ta.
Mary-NOM apple and banana-ACC eat-PAST
'Mary ate [[the apple] and [the banana]].'

b.*Mary-ga [[eiga-o mi] -to [keeki-o tabe]]-ta.
Mary-NOM film-ACC watch and cake-ACC eat-PAST
'Mary [[watched the movie] and [ate the cake]].'

In this paper, we refer to the suffix *to* as a nominal conjunction particle, and *te* as a predicate conjunction particle. As we will show later, *to* conjoins either nouns or numeral classifiers, while *te* conjoins either verbs or adjectives. The *pos* hierarchy we assume here is illustrated in Figure 1.

[†]We are grateful to Emily Bender, Ken Hiraiwa, Peter Sells, and Shûichi Yatabe for their comments and criticism. We also thank the the anonymous reviewers and the participants of HPSG 2008 for all their feedback and/or discussion. None of the above necessarily endorse or reject the current proposal, nor share responsibility for any errors or omissions.

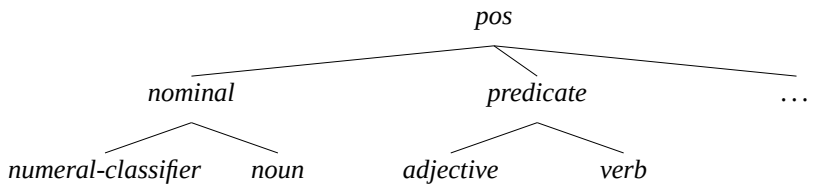


Figure 1: Part of speech type-hierarchy

There are other differences between *te* and *to* that are worth mentioning. Although *to*-coordination allows for either asyndeton or polysyndeton coordinations, there is one restriction specific to *te*-coordination, which is that the conjunction suffix *te* cannot attach to the final conjunct.

(3) a. [ringo-(to) banana-(to) orenzi-(to)] -o
apple-and banana-and orenge-and ACC

b. [arui-(te), hasi-(te), odot-(*te)] -ta
walk-and run-and dance-and PAST

Secondly, the predicate conjunction *te* attaches only to non-finite predicates, and establishes an asymmetric semantic relation between conjuncts. Thus, while the order of conjuncts in *to*-conjunction can typically be altered without semantic contrast, altering the conjunct order in *te*-conjunction yields semantic contrast.

(4) a. Mary-ga ringo-o kat -te sore-o tabe-ta.
Mary-NOM apple-ACC buy and it-ACC eat-PAST
'Mary bought the apple and ate it.'

b.*Mary-ga ringo-o kat-ta -te sore-o tabe-ta.
Mary-NOM apple-ACC buy-PAST and it-ACC eat-PAST
'Mary bought the apple and ate it.'

So far it seems that there is a clear line between *to* and *te* coordination, both with regard to the syntactic and semantic nature of the conjuncts. However, there are other cases where *to* is employed, rather than *te*. These cases are instances of so-called 'non-constituent coordination'. In the data below, *to* can also coordinate *sequences* of co-argument phrases (Koizumi 1995; 2000; Takano 2002; Fukui and Sakai 2003; Fukushima 2003; 2007). As shown in (5a) and (5b), not only [I-Obj D-Obj] coordination but also [Subj I-Obj D-Obj] coordination are allowed.

(5) a. Mary-ga [[John-ni ringo-o 2-tu] -to [Bob-ni banana-o]
Mary-NOM John-DAT apple-ACC 2-CL and Bob-DAT banana-ACC
age-ta.
give-PAST
'Mary gave two apples to John and the bananas to Bob.'

b. [[Mary-ga John-ni ringo-o 2-tu] -to [Sue-ga Bob-ni
Mary-NOM John-DAT apple-ACC 2-CL and Sue-NOM Bob-DAT
banana-o]] age-ta.
banana-ACC give-PAST

'Mary (gave) two apples to John and Sue gave the bananas to Bob.'

This is puzzling for two reasons. First, it is not clear what syntactic category should be assigned to a constituent like [Subj I-Obj D-Obj]. Second, although such a structure is closer to a clause rather than to a NP, it is the *to* conjunction particle that is used, not *te*. The goal of this paper is to provide a simple account of the distribution of *to* and *te* conjunctions, and to capture the various kinds of coordinate structure in a general way. In Section 2 we discuss previous accounts that have been proposed in the literature, and point out their shortcomings. In Section 3 we show that there is good evidence for an ellipsis account, in spite of the fact that the conjunction particle is not the expected one. Finally, section 4 provide an HPSG analysis of the phenomena.

2 Previous Approaches

There are two main lines of analysis that have been discussed in the literature. One assumes that such non-constituents do form a constituent, and that such structures can be coordinated just like a regular NP. Other accounts argue that standard constituents can be coordinated, and that the phenomena result from some form of ellipsis or movement operation. Let us consider these in turn.

2.1 Non-constituent-based accounts

Takano (2002) and Fukushima (2003; 2007) propose a direct coordination analysis. Takano argues that the apparent non-constituent are derived from one NP adjoining to another NP, which eventually forms a *surprising constituent* (αP in Figure 2). In the unlike coordination, he assumes such a surprising constituent is base-generated (βP) and the whole coordinate structure (&P) would then merge (adjoin) to the parallel co-argument strings.

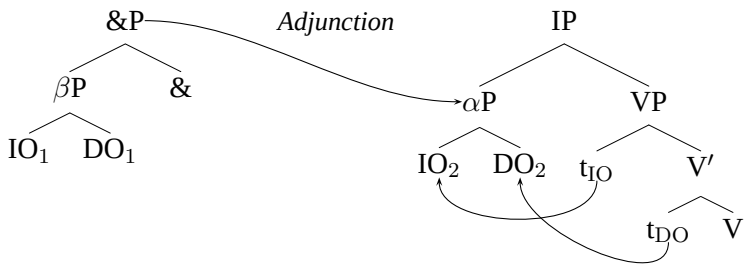


Figure 2: Adjunction and Base-Generation

This proposal has several problems. First, it is unclear how such co-arguments can be base-generated and be properly case-assigned without the presence of a verb predicate. The verb-less *surprising constituents* will not link to their right thematic roles, neither. Secondly, allowing such co-argument sequence to form a constituent gives rise to spurious ambiguity. This is (informally) depicted in Figure 3 below.

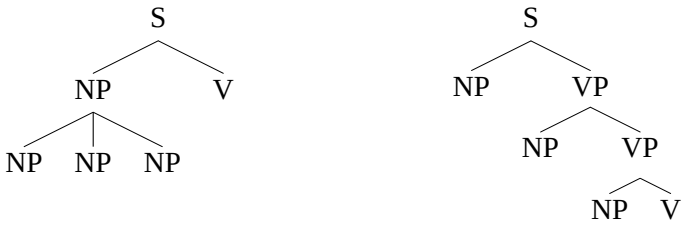


Figure 3: Spurious ambiguity (simplified)

Fukushima (2003; 2007) also argues for base-generation analyses. In his account, sequences like [NP *Mary John apple* CL] correspond to a nominal constituent headed by a numeral classifier, with optional full-fledged case-marked NP. Since these sequences form constituents, they can of course be conjoined. But since this analysis crucially hinges on the existence of a numeral classifier in each conjunct, it predicts that unlike coordinations without a classifier are ungrammatical. This prediction is not born out however, as shown in (6).

(6) Sanoku.en atatta ra, okaasan-ni (futa-tu-no) daiano yubiwa -to
300million.yen won if, mother-DAT two-CL-GEN diamond rings and
otousan-ni bentu-o katteage-tai.
father-DAT Mercedes-ACC buy-want

'If I won 300 million yen, I would buy my Mom (two) diamond ring(s) and my Dad a Mercedes.'

One must of course also consider the possibility that there is a phonologically null numeral classifier rescuing the structure from ungrammaticality. However, in (6) the first conjunct can have its own classifier *futa-tu-no*. It is then dubious that a null classifier is obligatory in such a NP (*futatu-no ringo*). Indeed, with a overt classifier, the null classifier head position, if any, cannot be filled by another classifier. Thus, one must stipulate not only the existence of phonologically null classifiers, but also extra grammar constraints on its distribution different from that of overt classifiers. In sum, the classifier-based account suffers from various shortcomings.

(7) a. [[futa-tu-no daiano yubiwa] [ϕ]]
two-CL-GEN diamond rings

b.*[[futa-tu-no daiano yubiwa] [futa-tu]]
two-CL-GEN diamond rings two-CL

Like Takano's adjunction analysis, Fukushima (2003; 2007) cannot avoid the problem of spurious ambiguity. Even if one stipulates homophonous classifiers just for non-coordinate structures – in order to rule out one of the possible parses – additional grammar constraints must be added in order to exclude the occurrence of coordination-related classifiers in non-coordinate structures.

He also makes some other non-standard assumptions about adjunction. It is claimed that the subject (thematically) proper noun *John-ga* and the NP *ringo-o* ('apple') attaches to the classifier as adjuncts. However, we can see no independent semantic motivation for *John* adjoining to another NP like *apples*. Another related problem lies in full-fledged case markings within the strings. He argues that the case markings for the adjoining NPs within the sequences are not licensed by some verb, but function just as pragmatic cues. Assuming that the sequences are a NP in syntax and a VP in semantics, Fukushima (2007: 981) claims that 'the case-markers are included base on the need for pragmatic recovery of a missing predicate meaning'. Such an assumption predicts that case-less NPs adjoining to a head classifier may cause pragmatically unnatural parse, but never syntactically unacceptable parse. However, (8b) is crucially different from (8a) in grammaticality.

(8) a. Okurimono-wa [Taroo-ga bara-o Hanako-ni ni-hon] -da.
gift-TOP Taroo-NOM rose-NOM Hanako-DAT 2-CL cop
'As for the gift, Taro (will/give/send/etc.) two roses to Hanako.'
(Fukushima 2007:975)

b.*Okurimono-wa [Taroo-ϕ bara-ϕ Hanako-ϕ ni-hon] -da.
gift-TOP Taroo-ϕ rose-ϕ Hanako-ϕ 2-CL cop

Many researchers have claimed that the presence/absence of case particles in cleft constructions gives rise to syntactic and semantic differences (See Hoji 1987, Hiraiwa and Ishihara 2002, among many others). Fukushima's argument that the case-markings within a complex NP are optional is thus not convincing. The account that we will pursue is free from all of these problems, and does not require redefinition of the notion of adjunction, nor of the process of semantic composition, nor of the entire grammar at large.

2.2 Constituent-based accounts

Koizumi (1995; 2000) and Fukui and Sakai (2003) propose to maintain the strict existence of constituent coordination. Koizumi argues that the non-constituent coordination of subjects and objects is in fact an instance of a VP(vP) coordination, coupled with rightward movement. The VP conjuncts are headed by the trace of a verb, which has been raised by Across-The-Board movement as illustrated below in Figure 4.

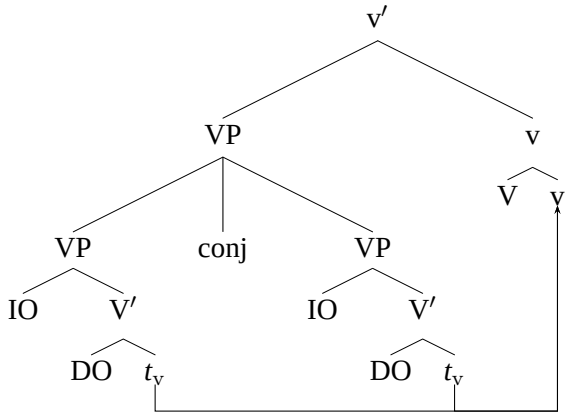


Figure 4: ATB rightwards verb movement

In this analysis, the particle *to* is allowed to conjoin verbal conjuncts, and the structure that is subject to rightwards ATB movement is ungrammatical to begin with, as shown in (9). It is thus unclear why the ATB counterpart becomes grammatical (cf. (5a)).

(9)*Mary-ga [John-ni ringo-o 2-tu age]-to [Bob-ni banana-o
Mary-NOM John-DAT apple-ACC 2-CL give-and Bob-DAT banana-ACC
age]-ta.
give-PAST
'Mary gave John two apples and gave Bob the banana.'

One can perhaps assume that verb raising is obligatory in such a coordinate structure, but the coordination with a disjunctive particle *ka* in (10) – which also allows for the non-constituent coordination phenomena presently under discussion – crucially shows that the verb raising would have to be obligatory only in conjunction, and optional in disjunction. Clearly, a more uniform account is desirable where all kinds of coordinate phenomena fall out from the same unique constraints.

(10) Mary-ga [musuko-ni baiku-o 1-dai (katta)] ka [musume-ni
Mary-NOM son-DAT motorbike-ACC 1-CL bought or daughter-DAT
TV-o katta] rasii.
TV-ACC bought seem
'It seems that Mary (bought) her son a motorbike or bought her daughter a TV set.'

Fukui and Sakai (2003) argue that the conjuncts in these *to* conjunctions are in fact nominals derived from VPs via PF deletion. The conjuncts are VPs only in narrow syntax, and the verb in the first conjunct is deleted at PF. The conjuncts without a verb can be then reanalyzed as NPs.

(11) <Narrow Syntax>

[[$_{VP}$John-ni ringo-o 2-tu age]-to [$_{VP}$Bob-ni banana-o
John-DAT apple-ACC 2-CL give-and Bob-DAT banana-ACC
age]]-ta.
give-PAST

<PF>

[[$_{NP}$John-ni ringo-o 2-tu ~~age~~]-to [$_{NP}$Bob-ni banana-o]]
John-DAT apple-ACC 2-CL give-and Bob-DAT banana-ACC
age-ta.
give-PAST

Again, this deletion account must resort to extra conditions in order to rule out (9), where the conjunction *to* coordinates verbal conjuncts. This is a fundamental issue which is not addressed by the theory. Furthermore, there is no empirical evidence for a categorical reanalysis at PF given that PF is supposed to contain only phonological information. Also, it is not clear how a conjunct having a verb in syntax, becomes an NP at PF.

3 Evidence for Ellipsis

We have argued that neither the base-generation coordination nor the deletion account is without major problems. There is however good reason to believe that the *to*-coordination is elliptical: a verb is missing. First, it is evident from the occurrence of two different locative adjuncts or temporal adverbials that the coordination structure is semantically an instance of verbal coordination (cf. Koizumi 2000).

(12) a. Mary-ga kinou John-ni ringo-o 2-tu-to kyou Bob-ni
Mary-NOM yesterday John-DAT apple-ACC 2-CL-and today Bob-DAT
banana-o ageta.
banana-ACC gave

'Mary gave John two apples yesterday and Bob the bananas today.'

b. Mary-ga konbini-de ringo-o 2-tu-to
Mary-NOM convenience.store-LOC apple-ACC 2-CL-and
suupaa-de banana-o katta.
supermarket-LOC banana-ACC bought

'Mary bought two apples at the convenience store and the banana at the supermarket.'

Second, sentential negation can have the distributive reading in the unlike coordination. Consider first an NP coordination in a single clause. The negation can scope over the conjuncts ¬ (A & B), and (13) is true if Mary didn't buy the apple or didn't buy the banana.

(13) Mary-ga ringo-to banana-o kawa-naka-tta.
Mary-NOM apple-and banana-ACC buy-NEG-PAST
'Mary didn't buy the apple and the banana.'

In the 'non-constituent' coordination, the negation has the narrow scope reading with respect to the conjuncts: (¬ A) & (¬ B). The reading in (14a) is indeed parallel to the non-elliptical full clause in (14b).

(14) a. Mary-ga rakusatusya-A-ni sinamno-o 2-ko-to John-ga
Mary-NOM winning.bidder-A-DAT item-ACC 2-CL-and John-NOM
rakusatusya-B-ni sinamono-o okura-naka-tta node...
winning.bidder-B-DAT item-ACC send-NEG-PAST because
'Because Mary (didn't send) two items to winning bidder A and John didn't send one item to winning bidder B, ...'

b. Mary-ga rakusatusya-A-ni sinamno-o 2-ko okura-nai-de
Mary-NOM winning.bidder-A-DAT item-ACC 2-CL send-NEG-and
John-ga rakusatusya-B-ni sinamono-o okura-naka-tta node...
John-NOM winning.bidder-B-DAT item-ACC send-NEG-PAST because
'Because Mary didn't send two items to winning bidder A and John didn't send one item to winning bidder B,...

Further evidence for ellipsis comes from the interpretation of anaphora. In (15), only a sloppy reading of a reflexive *zibunzisin* 'self' is possible. If the structure was not elliptical, one would expect that such a reading would not be available.

(15) John$_i$-ga ringo-o 2-tu [e] [e] to Bill$_j$-ga banana-o
John-NOM apple-ACC 2-CL and Bill-NOM banana-ACC
zibunzisin$_{i/j}$-ni kat-ta.
self-to buy-PAST
'John (bought) three apples for himself and Bill bought the bananas for himself.'

If these *to* conjunctions are elliptical, then the next question is what kind of ellipsis. There are some striking parallels with medial Gapping in English and many other languages. For example, one can also observe that the second conjunct in (16) looks like [Subj D-Obj I-Obj]:

(16) I charged a total of 5000 Yen to a student, and my colleague, a total of 10000 Yen to a professor.

We believe that *to*-coordination actually involves a form of *inverted* gapping, since it does not target the final conjunct. Gapping does not require phonological identity,

but rather, tense identity as shown in (17).[1] As one can see, in (17a) the verbs in each conjunct (the overt one and the covert one) are in the future tense, whereas in (17b) they are in different tenses.

(17) a. Kim arrives today, and her friends, tomorrow. ([e]=*arrive*)

b.*Kim arrived yesterday, and her friends, tomorrow. ([e]=*arrive*)

A similar fact is observed in the Japanese data. We begin with the tense-identity requirement. When the elided verb in the first conjunct is construed as past tense, which is identical to that of the second conjunct, the sentence (18a) patterns with the English gapping counterpart (17a).[2] Likewise, when violating tense-identity, (18b) becomes ungrammatical.

(18) a. Mary-ga kinou John-ni ringo-o 2-tu [e] -to kyou
Mary-NOM yesterday John-DAT apple-ACC 2-CL and today
Bob-ni banana-o *age-ta*. ([e]=*age-ta* 'give-PAST')
Bob-DAT banana-ACC give-PRES
'Mary (gave) John two apples yesterday and gave Bob the bananas today.'

b.*Mary-ga kinou John-ni ringo-o 2-tu [e] -to asita
Mary-NOM yesterday John-DAT apple-ACC 2-CL and tomorrow
Bob-ni banana-o *age-rudesyou*. ([e]=*age-ta* 'give-PAST')
Bob-DAT banana-ACC give-will
'Mary (gave) John two apples yesterday and will give Bob the bananas tomorrow.'

Next consider agreement feature mismatches. Most of the verbs in Japanese do not have agreement morphology with respect to person, number and gender. Here we use existential verbs, *iru* and *aru*, which are distinguished according to their subject animacy — *iru* is used for an animate subject, whereas *aru* is used for an inanimate subject.

(19) a. Heya-ni kodomo-ga {*iru/*aru*}.
room-LOC child-NOM exist$_{anim/inan}$
'There is a child in the room.'

b. Heya-ni sofaa-ga {**iru/aru*}.
room-LOC sofa-NOM exist$_{anim/inan}$
'There is a sofa in the room.'

[1] Although there are some controversial exceptions, it is usually assumed that typical Right-Node Raising construction requires phonological identity. See for example *Fred claimed that THE DOG, and Kim argued that THE CAT, was/*were sick.*

[2] Note that the gapped site cannot be filled by a past-tensed verb *age-ta*, because the conjunction *to* is a non-verbal coordinator. We will come back and explain this issue later.

Look at the coordination example (20), where the inanimate and the animate subject appear in each conjunct. We expect that the inanimate existential verb *aru* may be missing in the initial conjunct since the subject is 'latest five tractors'. On the other hand, the verb form in the final conjunct is animate verb *iru*, which agrees with its animate subject '100 domestic cows'. This supports the claim that inverted gapping in Japanese *to*-coordination does not need phonological identity, but imposes some kind of semantic identity, much like English gapping in (17b).

(20) Kono-nouzyou-ni-wa saisingata-no trakutaa-ga 5-dai [e] -to kokusan
this-farm-LOC-TOP latest.model-GEN tractor-NOM 5-CL and domestic
usi-ga 100-tou iru. ([e]=*aru* 'exist$_{\text{inani}}$')
cow-NOM 10-CL exist$_{\text{anim}}$
'There are latest five tractors and 100 domestic cows on this farm'.

4 A Morphophonological Account

We have addressed the elliptical properties of Japanese non-consistent coordinations. There are various ellipsis-based accounts of non-constituent coordination in HPSG (Yatabe 2001; Crysmann 2003; Beavers and Sag 2004), and these allow us to avoid the problem of redefining the notion of constituency and of having to make the grammar more complex with special semantic composition machinery introduced just for non-consituent coordination.

We will couple an ellipsis account in Japanese with an allomorphy analysis for *to* and *te* coordinations. Basically, we propose that there is a unique coordinator lexeme 't-', which has two possible realizations, depending on the category of the host. This kind of sensitivity is found elsewhere in other languages. There are cases in which the distribution of a word is determined not only by syntax, but also by the morphological, categorial, and phonological properties of the adjacent elements (see for instance Zwicky 1985; Asudeh and Klein 2001). One well-known example of this concerns the English indefinite determiners '*a*' and '*an*'. These are semantically identical but have a complementary distribution. For example, the former combines only with nominal phrases that begin with consonants (as in '*a large animal*', with consonantal vowels (as in '*a unique animal*', or '*a European individual*'), and with h- words with an unstressed syllable (e.g. '*a HIStory book*', as opposed to '*an hisTORical moment*'). Given that the phenomenon only occurs with the indefinite determiner, it is not a purely phonological effect. Thus, a word like *Sofia* does not become *Sofian* when followed by a vowel-initial word.

Rather than assuming that there are two lexical entries for the singular indefinite (one has the phonology *a* and attaches only to nominal hosts that have certain phonological properties, and another lexical entry with the phonology *an*, attaching only to nominal hosts with the opposite set of phonological properties), it is more reasonable to capture the allomorphy by resorting to a single lexical entry. The various realizations arise at the syntax-phonology interface. This can be done

via a language-specific function F_{Ing} that computes phonological processes, as illustrated in (21).

(21) $$F_{Ing}\left(\left\langle\begin{bmatrix}\text{PHON } \langle \text{ə}\rangle \\ \text{FORM } \langle a_{det}\rangle\end{bmatrix}\right\rangle, \left\langle\begin{bmatrix}\text{PHON } \boxed{1}\langle \textit{vowel}\rangle \oplus \textit{list} \\ \text{FORM } \boxed{2}\end{bmatrix}\right\rangle\right) = \left(\left\langle\begin{bmatrix}\text{PHON } \langle \text{ən}\rangle \oplus \boxed{1} \\ \text{FORM } \langle a_{det}\rangle \oplus \boxed{2}\end{bmatrix}\right\rangle\right)$$

If we adopt this single lexeme view for the affixes *te* and *to*, then it leads us to the notion that both a nominal conjunction *to* and a predicate conjunction *te* have the same basic semantics. This is independently motivated by Lasersohn (1995) and Chaves (2007), who show that one and the same meaning for conjunction *and* is observed cross-categorically, and that the Boolean/Non-Boolean dichotomy is empirically flawed. With this in mind, the same conjunction meaning can be attributed for the Japanese suffixes. We will discuss matters of conjunction symmetry later in the paper.

We start by establishing the feature geometry that we use to encode the relevant constraints at syntax-phonology interface. In this paper we adopt a feature M(ORPHO)P(HONOLOGY) which contains the more standard features PHON and FORM. The former contains phonological representations and the latter contains morphological forms.[3] Crucially, the elements in FORM have some information about part-of-speech. For example, in English it is assumed that there are at least two lexical entries for the verb *lie*. One contains a verb form lie_1 that inflects as *lay*, *lain*, *laid*, while the other lexical entry contains lie_2, which inflects as *lied* and derives the nouns *lie* and *liar*. The boolean CRD feature is used to identify which structures are marked by a coordination particle.

(22) $$\begin{bmatrix}\textit{sign} \\ \text{MP} \quad \textit{list}\left(\begin{bmatrix}\text{PHON } \textit{list(phon)} \\ \text{FORM } \textit{list(form)}\end{bmatrix}\right) \\ \text{SYN } \textit{syn} \\ \text{SEM } \textit{sem} \\ \text{DOM } \textit{list(sign)} \\ \text{CRD } \textit{bool}\end{bmatrix}$$

The phonological mapping functions compute the morphophonological interactions between the MP values of the daughters of any constructions of a given language (this includes phonological phenomena such as coarticulation, liaison, main stress assignment, phonological phrasing, etc.). The application of this language-specific function F is formalized below, inspired in the principle proposed in Reape (1994):

[3]The feature FORM and CORD are taken from Beavers and Sag (2004).

(23) $$\textit{sign} \Rightarrow \left[\text{MTR}\left[\begin{array}{l}\text{MP } F(\boxed{1}\oplus\ldots\oplus\boxed{n})\\ \text{DOM}\left\langle\left[\text{MP }\boxed{1}\right],\ldots,\left[\text{MP }\boxed{n}\right]\right\rangle\end{array}\right]\right]$$

Since both conjunctions *to* and *te* are taken to be allomorphic suffixal markers, we assume that there is a basic conjunction morpheme *t-* which is attached to a word by the following *conjunction suffixation lexical rule* in (24). The rule takes a non-coordinate stem (CRD-) and yields a word that is specified as [CRD +]. This indicates that the word is now marked as a conjunct, and that the lexical rule cannot apply recursively. In the process, a suffix is introduced into the linearization domain of the stem (and consequently, appended in the end of the phonological representation).

(24) LEXICAL RULE FOR CONJUNCTION SUFFIXATION

$$\textit{lex-coord-suffix} \Rightarrow \left[\begin{array}{l}\text{MOTHER}\left[\begin{array}{l}\text{SYN }\boxed{1}\\ \text{DOM }\boxed{2}\oplus\left\langle\left[\begin{array}{l}\textit{suffix}\\ \text{MP}\left\langle\left[\begin{array}{l}\text{PHON }\langle t\rangle\\ \text{FORM }\langle t_{cnj}\rangle\end{array}\right]\right\rangle\\ \text{SYN}\,|\,\text{HEAD }\textit{conj}\end{array}\right]\right\rangle\\ \text{CRD }+\end{array}\right]\\ \text{DTRS}\left\langle\left[\begin{array}{l}\text{SYN }\boxed{1}\\ \text{DOM }\boxed{2}\\ \text{CRD }-\end{array}\right]\right\rangle\end{array}\right]$$

We now turn to how the function F in (23) constrains the distribution of the allomorphs *to* and *te*, from the base *t-* suffix. When the rightmost element in the host's DOM is nominal, then *t-* is resolved as *to* by (25a). On the other hand, when the rightmost element is predicative, *t-* is resolved as *te*, by (25b).

(25) a. $$F\left(\left\langle\left[\begin{array}{l}\text{PHON }\boxed{1}\\ \text{FORM }\boxed{2}\oplus\boxed{3}\langle\textit{nominal}\rangle\end{array}\right]\right\rangle,\left\langle\left[\begin{array}{l}\text{PHON }\langle t\rangle\\ \text{FORM }\langle t_{cnj}\rangle\end{array}\right]\right\rangle\right)=\left(\left\langle\left[\begin{array}{l}\text{PHON }\boxed{1}\oplus\langle\text{ to}\rangle\\ \text{FORM }\boxed{2}\oplus\boxed{3}\oplus\langle t_{cnj}\rangle\end{array}\right]\right\rangle\right)$$

b. $$F\left(\left\langle\left[\begin{array}{l}\text{PHON }\boxed{1}\\ \text{FORM }\boxed{2}\oplus\boxed{3}\langle\textit{pred}\rangle\end{array}\right]\right\rangle,\left\langle\left[\begin{array}{l}\text{PHON }\langle t\rangle\\ \text{FORM }\langle t_{cnj}\rangle\end{array}\right]\right\rangle\right)=\left(\left\langle\left[\begin{array}{l}\text{PHON }\boxed{1}\oplus\langle\text{ tɛ}\rangle\\ \text{FORM }\boxed{2}\oplus\boxed{3}\oplus\langle t_{cnj}\rangle\end{array}\right]\right\rangle\right)$$

We can now proceed to the coordination structure *per se*. It has been cross-linguistically observed that there are at least two kinds of coordinate structure: symmetric and asymmetric. In symmetric coordination, conjuncts are reversible without semantic contrast and extraction must be ATB, while in asymmetric coordination, conjuncts are not reversible without contrast and extraction can violate

Ross's Coordinate Structure Constraint. In both cases, any number of conjuncts greater than two is allowed. We make this distinction explicitly, by positing two kinds of coordinate constructions as seen in Figure 5.

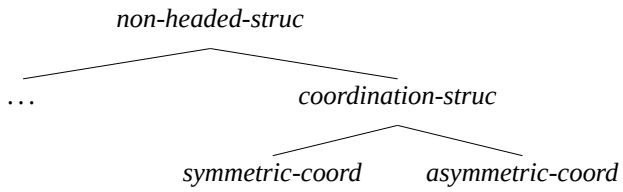


Figure 5: Type-hierarchy of coordinate structures

In Japanese, all coordination markings are conjunct-initial. We can neatly capture this in (26) by simply stating that the initial conjunct is specified as [CORD +], assuming a binary branching analysis.

(26) $\textit{coordination-struc} \Rightarrow \left[\text{DTRS} \left\langle \left[\text{CRD} + \right], \left[\ldots\right] \right\rangle\right]$

The Japanese symmetric coordinations include not only *to*-coordination but also *ka*-('or')-coordination. In (27), the conjuncts and the disjuncts are permutable without changing its original meaning. One difference between *to* and *ka* coordinations is that the disjunction *ka* is not category-sensitive, so that both nominal and predicative coordinations with *ka* are also possible.

(27) a. Mary-ga musuko-ni baiku-o 1-dai -to musume-ni TV-o
Mary-NOM son-DAT motorbike-ACC 1-CL and daughter-DAT TV-ACC
katta rasii.
bought seem

'It seems that Mary (bought) her son a motorbike and bought her daughter a TV set.'

b. Mary-ga musuko-ni baiku-o 1-dai (katta) ka musume-ni
Mary-NOM son-DAT motorbike-ACC 1-CL bought or daughter-DAT
TV-o katta rasii.
TV-ACC bought seem

'It seems that Mary (bought) her son a motorbike or bought her daughter a TV set.'

Another fact about *ka* is that the verb forms in both disjuncts are identical. We thus assume without prejudice for conjunction, that symmetric Japanese coordination in general requires syntactic identity, and allows ellipsis.

Japanese asymmetric coordinations on the other hand, include *te* conjunction and exclude *to* and *ka*. In asymmetric coordination a finite phrase is conjoined with non-finite phrases, as in (28). This type of coordination does not allow ellipsis, and

we assume that extra semantic content – which creates the asymmetric reading – is introduced by the construction.

(28) Mary-ga John-ni prezento-o {kat/*kat-ta} -te sore-o okut-ta.
Mary-NOM John-DAT present-ACC buy/buy-PAST and it-ACC send-PAST
'Mary bought the present to John and sent it (to him).'

Let us begin the syntactic stage of our analysis with symmetric coordination. Basically, we will allow ellipsis of the verbal DOM element in non-final conjuncts. As in many other languages, symmetric coordination in Japanese requires SYN identity (1). Only conjuncts with compatible valence and compatible head features can be conjoined.

With regard to the optional ellipsis operation, the DOM list of the first conjunct is non-deterministically split into three sublists: A, B and C. The B list optionally contains a predicate, and will not be not present in the mother node. The DOM list of the second conjunct is split into two lists, D and E, which are always present in the mother node. In order to ensure the semantic-based identity in ellipsis discussed above, we introduce an ancillary relation Id, which says that the B and E lists are either empty or they both contain a predicate under HEAD and RELN identity.

(29) *symmetric-coord* ⇒

$$\left[\begin{array}{l}\text{MTR}\left[\begin{array}{l}\text{SYN } \boxed{1}\\ \text{DOM } \boxed{A}\oplus\boxed{C}\oplus\boxed{D}\oplus\boxed{E}\end{array}\right]\\ \\ \text{DTRS}\left\langle\left[\begin{array}{l}\text{SYN } \boxed{1}\\ \text{DOM } \boxed{A}_{ne-list}\oplus\boxed{B}\oplus\boxed{C}\left\langle[\textit{conj}]\right\rangle\end{array}\right],\left[\begin{array}{l}\text{SYN } \boxed{1}\\ \text{DOM } \boxed{D}_{ne-list}\oplus\boxed{E}\end{array}\right]\right\rangle\end{array}\right]$$

$\wedge\ Id(\boxed{C},\boxed{B},\boxed{E})$

Where Id is an identity relation defined via the two clauses below.

$$Id\left(\left\langle[\neg te]\right\rangle,\langle\,\rangle,\langle\,\rangle\right)$$

$$Id\left(\left\langle[te]\left\langle\left[\begin{array}{l}\text{SYN}\mid\text{HEAD }\boxed{1}\textit{pred}\\ \text{SEM}\mid\text{RELS}\left\langle\left[\text{RELN }\boxed{2}\right]\right\rangle\end{array}\right]\right\rangle,\left\langle\left[\begin{array}{l}\text{SYN}\mid\text{HEAD }\boxed{1}\\ \text{SEM}\mid\text{RELS}\left\langle\left[\text{RELN }\boxed{2}\right]\right\rangle\end{array}\right]\right\rangle\right)$$

Note that Id only imposes HEAD and RELN identity, *not* identity of the predicate's arguments. The latter reside in not in RELN but in ARG_0, ARG_1 and so on.

Various coordination types can now be accounted for. If no predicate exists in B and E, no ellipsis occurs. The coordination must in this case be an instance of nominal coordination. However, if predicates appear in the linearization domains A and D, then this is symmetric S coordination, as for example the *ka* disjunction in (27b)).[4] In either case the same constraint $Id(\neg te,\langle\,\rangle,\langle\,\rangle)$ is applied, and no ellipsis occurs.

[4]The disjunction marker *ka* is a word. We can adopt a marking rule like the one for *and* in Beavers and Sag, specifying that the conjunct that *ka* attaches to is [CRD +].

$$\begin{bmatrix} \text{RELN } \boxed{2}\textit{give_rel} \\ \text{ARG}_o\ s_1 \\ \text{ARG}_1\ i \\ \text{ARG}_2\ j \\ \text{ARG}_3\ k \end{bmatrix} \qquad \begin{bmatrix} \text{RELN } \boxed{2} \\ \text{ARG}_o\ s_2 \\ \text{ARG}_1\ w \\ \text{ARG}_2\ z \\ \text{ARG}_3\ y \end{bmatrix}$$

Figure 6: Id and an example of RELN identity

On the other hand, if both predicates are in $\boxed{B}$ and $\boxed{E}$, and if they have the same semantic relation, then we obtain an elliptical coordination since the $\boxed{B}$ list is not present in the mother node. This can therefore be either a conjunction with *t* or a disjunction with *ka*. The above constraints can in principle be extended to also deal with other coordination particles.

This account, coupled with an ellipsis-based allomorphy account, yields the intended result. Suppose that the initial finite verb *ageta* is assumed to reside in $\boxed{B}$. The symmetric coordination then elides this verb in $\boxed{B}$ in the domain of the mother. In the mother node, the morpheme *t-* is realized as *to* through the function F. This ensures that the semantics is clausal, and computed as usual. An important consequence of our analysis is that – unlike in the accounts by Koizumi, or Fukui and Sakai – the nominal coordinator *to* never coordinates verbal conjuncts anytime.

(30) Mary-ga John-ni ringo-o 2tu to Bob-ni banana-o
Mary-NOM John-DAT apple-ACC 2-CL and Bob-DAT banana-ACC
age-ta.
give-PAST
'Mary gave two apples to John and the bananas to Bob.'

$$\begin{bmatrix} \text{MP } F(\textit{John-ni ringo-o 2tu t- Bob-ni banana-o age-ta}) = \\ \quad \textit{John-ni ringo-o 2tu-to Bob-ni banana-o ageta} \\ \text{SYN S} \\ \text{DOM} \left\langle \left[\text{MP } \textit{John-ni}\right], \left[\text{MP } \textit{ringo-o 2tu}\right], \left[\text{MP } \textit{t-}\right], \left[\text{MP } \textit{Bob-ni}\right], \left[\text{MP } \textit{banana-o}\right], \left[\text{MP } \textit{ageta}\right] \right\rangle \end{bmatrix}$$

$$\begin{bmatrix} \text{MP } F(\textit{John-ni ringo-o 2tu ageta t-}) = \\ \quad \textit{John-ni ringo-o 2tu ageta-te} \\ \text{SYN S} \\ \text{DOM} \left\langle \begin{matrix} \left[\text{MP } \textit{John-ni}\right], \left[\text{MP } \textit{ringo-o 2tu}\right], \\ \left[\text{MP } \textit{ageta}\right], \left[\text{MP } \textit{t-}\right] \end{matrix} \right\rangle \end{bmatrix} \qquad \begin{bmatrix} \text{MP } F(\textit{Bob-ni banana-o ageta}) = \\ \quad \textit{Bob-ni banana-o ageta} \\ \text{SYN S} \\ \text{DOM} \left\langle \begin{matrix} \left[\text{MP } \textit{Bob-ni}\right], \left[\text{MP } \textit{banana-o}\right], \\ \left[\text{MP } \textit{ageta}\right] \end{matrix} \right\rangle \end{bmatrix}$$

We can now turn to asymmetric coordination. We assume that this kind of

conjunction has an extra semantic import not because of the affix *te*, but because of a more general aspect of verbal conjunction. In many languages, VP and S conjunction can have a variety of asymmetric interpretations. Consider for example the following examples with *and*:

(31) a. I got on the horse and rode into the sunset. (time precedence)
b. We called an ambulance and it arrived within 5 minutes. (causality)
c. She can drink vodka and not get drunk. (while-interpretation)

Thus, this seems to be a phenomenon that is particular to how event-denoting conjuncts are integrated in the overall structure. If so, this can be seen as a constructional phenomenon, and the hierarchy in Figure 5 has cross-linguistic motivation. It is therefore not surprising that verbal conjunction in Japanese also has various asymmetrical readings. Moreover, in the case of Japanese there are also specific syntactic constraints at work, besides the extra semantic import. This construction requires that non-final conjuncts are non-finite, and that the final conjunct is finite. Also, the whole structure functions as if it were finite. For our account, this means that the rightmost daughter and the mother node of the coordination have the same HEAD value.

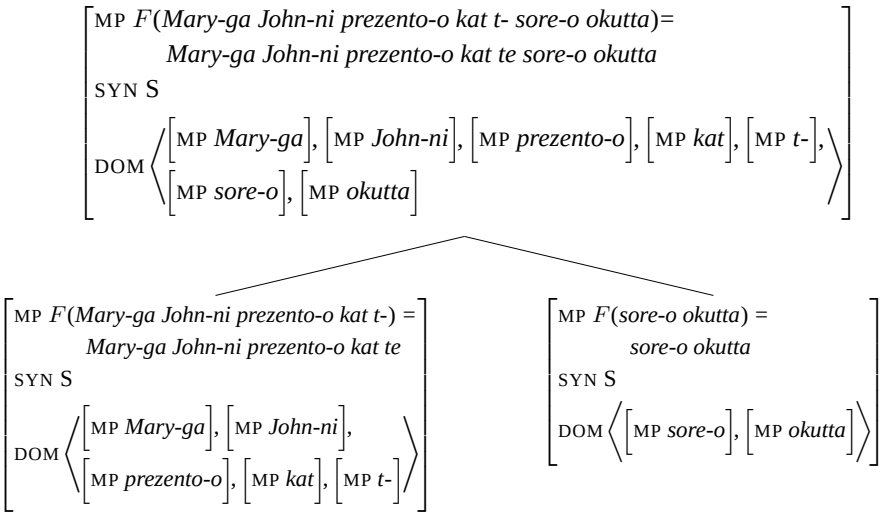
Since the conjuncts are semantically asymmetric, the construction also adds extra causal pragmatic content. This extra content will be introduced via BACKGROUND, and introduces a relation that holds between the two situational indices of the two conjuncts. For simplification, we will assume that there is only one kind of possible asymmetric meaning for *te* conjunction: causality. A more elaborate collection of pragmatic relations can be used, and be incorporated into our analysis.

(32) *asymmetric-coord* ⇒

$$\left[\begin{array}{l}\text{MTR}\left[\begin{array}{l}\text{SYN}\mid\text{HEAD}\ \boxed{0}\\ \text{DOM}\ \boxed{A}\oplus\boxed{B}\\ \text{BACKGROUND}\left\{\text{CAUSES}(\boxed{s1},\boxed{s2})\right\}\end{array}\right]\\ \text{DTRS}\left\langle\left[\begin{array}{l}\text{SYN}\mid\text{HEAD}\mid\text{VFORM}\ \textit{nfin}\\ \text{SEM}\mid\text{INDEX}\ \boxed{s1}\\ \text{DOM}\ \boxed{A}\end{array}\right],\left[\begin{array}{l}\text{SYN}\left[\text{HEAD}\ \boxed{0}[\text{VFORM}\ \textit{fin}]\right]\\ \text{SEM}\mid\text{INDEX}\ \boxed{s2}\\ \text{DOM}\ \boxed{B}\end{array}\right]\right\rangle\end{array}\right]$$

Consider the *te*-coordination in (33). While the verb form in the initial conjunct is non-finite (*kat* 'buy'), it is finite (*okut-ta* 'send-PAST') in the final conjunct. Since the asymmetric coordination establishes the causal relation, the conjuncts are not permutable. Below we can see the coordinator *t-* being resolved as *te* in the mother node, because it is adjacent to a verb predicate.

(33) Mary-ga John-ni prezento-o kat -te sore-o okut-ta.
Mary-NOM John-DAT present-ACC buy and it-NOM send-PAST
'Mary bought the present for John and sent it (to him).'



A word about verbal adjunctions in the *to*-coordination is in order here. Recall here that the 'non-constituent coordination' cases do allow for the presence of verbal adjuncts, as in (12). With temporal adverbials in (34a), our ellipsis account correctly predicts the verb-only ellipsis. If we assume that adverbs do not compact with the verb domain, in linearization terms – and because Japanese is a verb-final language – then the elements eligible for $\boxed{B}$ are always verbal domain elements.

(34) a. Mary-ga kinou John-ni ringo-o 2-tu to Bob-ni
Mary-NOM yesterday John-DAT apple-ACC 2-CL and Bob-DAT
banana-o kyou ageta.
banana-ACC today gave
'Mary gave John two apples yesterday and Bob the bananas today.'

b. $$\left[\begin{array}{l}\textsc{mtr}\left[\textsc{dom}\left\langle[\textsc{np}_{\textsc{subj}}],[\textsc{adv}],[\textsc{np}_{io}],[\textsc{np}_{\textsc{do}}],[\textit{conj}],[\textsc{np}_{io}],[\textsc{np}_{\textsc{do}}],[\textsc{adv}],[\textsc{v}]\right\rangle\right]\\ \textsc{dtrs}\left\langle\left[\textsc{dom}\left\langle[\textsc{np}_{\textsc{subj}}],[\textsc{adv}],[\textsc{np}_{io}],[\textsc{np}_{\textsc{do}}],[\textsc{v}],[\textit{conj}]\right\rangle\right],\right.\\ \left.\left[\textsc{dom}\left\langle[\textsc{np}_{io}],[\textsc{np}_{\textsc{do}}],[\textsc{adv}],[\textsc{v}]\right\rangle\right]\right\rangle\end{array}\right]$$

5 Double Coordinators

Polysyndeton conjunction presents some other puzzles. Note that the accusative case marker *o* can appear after the conjunction *to* as shown in (35). In fact, the doubled coordination affixes cannot be conjunct-final if the structure is elliptical. In other words, the second *to* must always occur somewhere before the overt verb.

(35) Mary-ga John-ni ringo 2-ko *-to* Bob-ni banana 3-bon *-to* -o
Mary-NOM John-DAT apple 2-CL and Bob-DAT banana 3-CL and ACC
ageta.
gave
'Mary gave John two apples and Bob three bananas'.

Why does the final conjunction end up with residing between a nominal 'banana' and the accusative case? In this paper we will assume that only the leftmost *to* is a true conjunction particle, and that the other optional *to*s are semantically vacuous, and are used simply to emphasize each of the non-initial conjuncts. A similar phenomenon may be observed in English. For example, (36a) can be understood as simply a listing of the people who hate each other. In this case, there is only one conjunction that forms a collection of individuals {Fred, Mary, Tom, Sue}. This sentence is equivalent to the monosyndeton counterpart *Fred, Mary, Tom, and Sue hate each other*. On the other hand, (36b) can be interpreted as establishing a relation between pluralities {{Fred, Mary}, {Tom, Sue}}. Here, each of the three conjunctions *and* is semantically potent and forms a plurality.

(36) a. Fred, and Mary, and Tom, and Sue (all) hate each other.
b. Fred and Mary, and Tom and Sue love each other.

Assuming that there are two kinds of *to*, we will account for the Japanese data via linearization. One type of *to* is a true conjunction with semantic content, and it occurs in the initial conjunct and must be conjunct-final: X $\prec$ *t(rue)-coord*.

(37) a. ... [ringo-o 2-ko -to] banana-o katta.
apple-ACC 2-CL and banana-ACC bought
'(Someone) bought two apples and the banana.'

b.*... [ringo-(o) -to 2-ko] banana-o katta.
apple-ACC and 2-CL banana-ACC bought

The constraints in (25a) further ensure that it cannot attach to a case-marker, and must attach to a nominal host.

The other *to* affix is a vacuous conjunction which can optionally occur in non-initial conjuncts, and which floats leftward. Let us see a simple NP coordination with double coordinators first. The non-initial *to* is followed by accusative in (38a), whereas it is stranded in (38b). We will assume that the ungrammaticality in (38b) is due to the absence of the accusative marker.

(38) a. John-ga ringo-to banana-to-o katta.
John-NOM apple-and banana-and-ACC bought.
'John bought the apple and the banana.'

b.*John-ga ringo-to banana-to katta.
John-NOM apple-and banana-and bought.

The generalization is then that the vacuous *to* must precede a case marker: *v(acuous)-coord* $\prec$ case. This is further motivated by (39) (cf. with (35)).

(39) a.*... John-ni ringo 2-ko -to Bob-ni banana 3-bon-to ageta.
John-DAT apple 2-CL and Bob-DAT banana 3-CL-and gave
'(They) gave John two apples and Bob theree bananas'.

b. ... John-ni ringo 2-ko -to Bob-ni banana-to-o ageta.
John-DAT apple 2-CL and Bob-DAT banana-and-ACC gave
'(They) gave John two apples and Bob the bananas'.

c.*... John-ni ringo 2-ko -to Bob-ni banana-to ageta.
John-DAT apple 2-CL and Bob-DAT banana-and gave

6 Conclusion

In this paper we argued that the apparently paradoxical coordination phenomena in Japanese result from the interaction of two different kinds of phenomena. On the one hand, of V ellipsis – which explains the semantic interpretations that are obtained – and on the other, of a lexically-specific allomorphy phenomenon that operate at the syntax-phonology interface. This line of analysis allows us to avoid making the assumption that phrasal sequences like [Subj D-Obj I-Obj] form a constituent, as well as making stipulations about complex semantic composition machinery just for these structures.

References

Asudeh, Ash and Klein, Ewan. 2002. Shape Conditions and Phonological Context. In Frank Van Eynde, Lars Hellan and Dorothee Beermann (eds.), *Proceedings of the 2002 HPSG conference*, pages 20–30, Stanford: CSLI Publications.

Beavers, John and Sag, Ivan A. 2004. Coordinate Ellipsis and Apparent Non-Constituent Coordination. In Stefan Müller (ed.), *Proceedings of the 2004 HPSG Conference*, pages 48–69, Stanford: CSLI Publications.

Chaves, Rui Pedro. 2007. *Coordinate Structures - Constraint-based Syntax-Semantics Processing*. Ph. D.thesis, University of Lisbon, Portugal.

Crysmann, Berthold. 2003. An Asymmetric Theory of Peripheral Sharing in HPSG: Conjunction Reduction and Coordination of Unlikes. In Gerhard Jäger, Paola Monachesi, Gerald Penn and Shuly Wintner (eds.), *Proceedings of Formal Grammar 2003*, pages 47–62.

Fukui, Naoki and Sakai, Hiromu. 2003. The Visibility Guideline for Functional Categories: Verb Raising in Japanese and Related Issues. *Lingua* 113, 321–375.

Fukushima, Kazuhiko. 1991. Phrase Structure Grammar, Montague Semantics and Floating Quantifiers in Japanese. *Linguistics and Philosophy* 14, 581–628.

Fukushima, Kazuhiko. 2003. Verb-raising and Numeral Classifiers in Japanese: Incompatible Bedfellows. *Journal of East Asian Linguistics* 12, 313–347.

Fukushima, Kazuhiko. 2007. Conspiracy of Form and Contex for Proper Semantic Interpretation: the Implications of Lonesome Numeral Classifier in Japanese. *Journal of Pragmatics* 39, 960–989.

Gunji, Takao and Hasida, Kôiti. 1998. Measurement and Quantification. In Takao Gunji and Hasida Kôiti (eds.), *Topics in Constraint-Based Grammar of Japanese*, pages 39–79, Dordrecht: Kluwer.

Hiraiwa, Ken and Ishihara, Shinichiro. 2002. Missing Links: Cleft, Sluicing, and 'No da' Construction in Japanese. *MIT Working Papers in Linguistics* 43, 35–54.

Koizumi, Masatoshi. 1995. *Phrase Structure in Minimalist Syntax*. Ph. D.thesis, MIT.

Koizumi, Masatoshi. 2000. String Vacuous Overt Verb Movement. *Journal of East Asian Linguistics* 9, 227–285.

Lasersohn, Peter. 1995. *Plurality, Conjunction and Events*. Dordrecht: Kluwer Academic Publishers.

Miyagawa, Shigeru. 1989. *Structure and Case Marking in Japanese*. New York: Academic Press.

Reape, Mike. 1994. Domain Union and Word Order Variation in German. In John Nerbonne, Klaus Netter and Carl J. Pollard (eds.), *German in Head-Driven Phrase Structure Grammar*, CSLI Lecture Notes, No. 46, pages 151–197, Stanford University: CSLI Publications.

Takano, Yuji. 2002. Surprising Constituents. *Journal of East Asian Linguistics* 11, 243–301.

Watanabe, Akira. 2006. Functional Projections of Nominals in Japanese: Syntax of Classifiers. *Natural Language and Linguistic Theory* 24, 241–306.

Yatabe, Shûichi. 2001. The Syntax and Semantics of Left-Node Raising in Japanese. In Dan Flickinger and Andreas Kathol (eds.), *Proceedings of the 2000 HPSG Conference*, pages 325–344, Stanford: CSLI Publications.

Zwicky, Arnold. 1985. Rules of Allomorphy and Phonology-Syntax Interactions. *Journal of Linguistics* 21, 431–436.

Towards a grammar of preposition-noun combinations

Tibor Kiss
Ruhr-Universität Bochum

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 116–130

Kiss, Tibor. 2008. Towards a grammar of preposition-noun combinations. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 116–130. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.7.
CC-BY 4.0

Abstract

Preposition-noun combinations (PNCs) are compositional and productive, but not fully regular. In school grammars and many theoretical approaches, PNCs are neglected, but they have recently been addressed in an HPSG analysis by Baldwin et al. (2006). After discussing some basic properties of PNCs, we show that statistical methods can be employed to prove that PNCs are indeed productive and compositional, which again implies that PNCs should receive a syntactic analysis. Such an analysis, however, is impeded by the limited regularity of the construction. We will point out why adding semantic conditions to syntactic schemata might be necessary but not sufficient and turn then to a framework which allows the derivation of syntactic (and semantic) generalizations from linguistic data without taking recourse to introspective judgments.[1]

1 Introduction

Combinations of a preposition with determinerless nominal projections have been neglected in theories of grammar for some time. But with increasingly blurring boundaries between core and periphery in grammar, a growing interest in preposition-noun combinations can be observed. Minimally, a preposition-noun combination consists of a preposition and an unadorned count noun in the singular, as illustrated in (1). Minimal combinations can be extended in various ways: the noun can be modified, as illustrated in (2); it may – and in some cases even must – realize a complement, as illustrated in (3).

(1) *auf Anfrage* (after being asked), *auf Aufforderung* (on request), *durch Beobachtung* (through observation), *in Anspielung* (alluding to), *mit Vorbehalt* (with reservations), *ohne Vorwarnung* (without warnings), *unter Androhung* (under threat)

(2) *auf parlamentarische Anfrage* (after being asked in parliament), *auf diskrete Aufforderung* (on discreet request), *durch kritische Beobachtung* (through critical observation), *in untertreibender Anspielung* (in an allusion to understate ...), *mit leisem Vorbehalt* (with quiet reservations), *ohne mündliche Vorwarnung* (without verbal warnings), *unter sanfter Androhung* (under gentle threat)

[1] I would like to thank Francis Bond, Takao Gunji and Shuichi Yatabe for kindly inviting me to HPSG 2008 in Japan, and thus making it possible to discuss the work reported here. The present results would not have been possible without the assistance of Katja Keßelmeier, Antje Müller, Claudia Roch, Tobias Stadtfeld, and Jan Strunk. Special thanks to Stefan Müller for his help and patience.

(3) Experten, die von Anreizen reden, sollten diese unter Annahme
experts who of incentives talk should these under assumption
realistischer Bedingungen durchrechnen.
realistic conditions calculate
'Experts who talk of incentives should calculate on the basis of realistic conditions.'

The characteristic difference between a preposition-noun combination on the one hand and an ordinary PP on the other hand is the missing determiner in the nominal projection. This property has led some linguists to call such constructions somewhat erroneously *determinerless PPs* (cf. Quirk et al. 1985). Since determiners combine with nominal projections, and not with prepositions, we will refrain from using this terminology and call the combination in (1) to (3) *preposition-noun combinations* (henceforth: PNCs). The missing determiner might also be one of the main reasons for neglecting the construction: it makes the construction look like an irregular sequence in languages that require the realization of a determiner together with a count noun in the singular. By the same line of reasoning, constructions like the ones presented in (4) and (5) do not form exceptions. The nouns in question are not classified as count nouns or not realized in the singular.[2]

(4) Sie befanden sich unter Druck.
They found themselves under pressure

(5) Die wechselnden Ursachen verbieten es, bei Annahmen über
the changing causes prohibit EXPL at assumptions about
künftige Bewegungen eine einfache Fortschreibung der
future movements a simple continuation the
Vergangenheit zugrunde zu legen.
past base to place.
'The ever-changing causes put a ban on a simple continuation of past activities as a basis to determine future movements.'

The German Duden grammar (Duden 2005) offers an exception-based treatment of PNCs. According to Duden rule 442 (Duden 2005:337), the realization of a determiner is mandatory for count nouns realizing the feature singular. In order to deal with constructions like (1), (2) and (3), the Duden introduces rule 395 (Duden 2005:306). It provides a list of exceptions to rule 442, thus suggesting that PNCs are restricted to sublanguages and registers and that they do not form a productive subclass of prepositional phrases. Such a treatment is not an oddity of the Duden grammar or of German. Himmelmann (1998) reports the universal tendency that singular count nouns have to be accompanied by determiners; but also that determinerless count nouns are often combined with prepositions. More recently, Baldwin et al.

[2] Bare plurals and mass terms form NPs without determiners. Hence the relevant phrases in (4) and (5) have to be analyzed as ordinary PPs.

(2006) have claimed that a subclass of English PNCs must be analyzed as productive.
As a second reason for neglecting PNCs, we may consider the observation that at least certain combinations of a preposition and a noun are idiomatic. An illustration is given in (6).

(6) Alles ist unter Kontrolle.
Everything is under control

Combinations like the one in (6) are often identified with PNCs as defined above although they do not strictly belong to this set. Typically, nouns found in constructions like (6) have to be analyzed as mass terms. This is obscured by the fact that the property of being a count noun cannot be attributed to words, but must be attributed to word senses. So while *Kontrolle* in one of its senses can be a count noun (as in *Eingangskontrolle,* i.e. *reception inspection)*, this is not the pertinent sense in (6).
A third reason for the neglect might stem from the observation that PNCs are known to be less regular than ordinary PPs. The frequency of PNCs when compared with prepositional occurrences in general is indicative. Table (7) lists the proportion of PNCs for 20 high frequency prepositions in a newspaper corpus of 310 million words (Neue Zürcher Zeitung, 1993-1999).

(7) Proportion of PNCs for 20 high-frequency Ps

Preposition	Frequency	P-N Proportion
in	2.127.029	0,76 %
mit	1.233.962	2,46 %
auf	1.094.267	1,45 %
für	940.824	2,02 %
an	547.787	1,93 %
nach	460.080	2,79 %
bei	383.172	2,32 %
über	379.538	1,93 %
um	268.384	2,22 %
vor	264.178	2,15 %
durch	249.353	4,27 %
unter	199.232	2,08 %
gegen	179.375	3,33 %
seit	120.517	1,26 %
ohne	93.219	11,56 %
wegen	66.973	5,25 %
während	45.170	0,38 %
neben	38.804	3,71 %
gemäß	36.878	4,82 %
dank	26.217	8,58 %

With the exception of *ohne (without), dank (thanks to)* and *wegen (because)* PNCs make up less than 5 % of the respective occurrences of prepositional phrases, and in many cases, the proportion falls below a value of 3 %.
What is more, speakers show great reluctance and cannot easily decide whether a PNC should be considered acceptable. Baldwin et al. (2006) point out that combinations might be constrained by further semantic conditions, but it seems that the pertinent conditions are not available to speakers in judgement and production tasks. Since speakers are not able to judge newly coined PNCs, taking recourse to introspective judgments or judgment tasks cannot substantiate the productivity of the construction.
The following sections will address these issues in turn. In the second section, we will report results from Kiss (2007) and Dömges et al. (2007) showing that PNCs can neither be classified as non-compositional, nor as non-productive. From an empirical perspective, PNCs in German are no more idiomatic than other regular phrasal combinations, and from the same perspective, they can be classified as productive, supporting the claim made in Baldwin et al. (2006) for English. In the third section, we will review the proposal made in Baldwin et al. (2006) that PNCs are in fact completely regular but the rules have to be amended by semantic conditions. In the final section, we will suggest that in the absence of clear judgments, annotation mining (Chiarcos et al. 2008) will be useful to arrive at results concerning the latent properties, which determine the combination of prepositions and determinerless count nouns in the singular.

2 Compositionality and Productivity

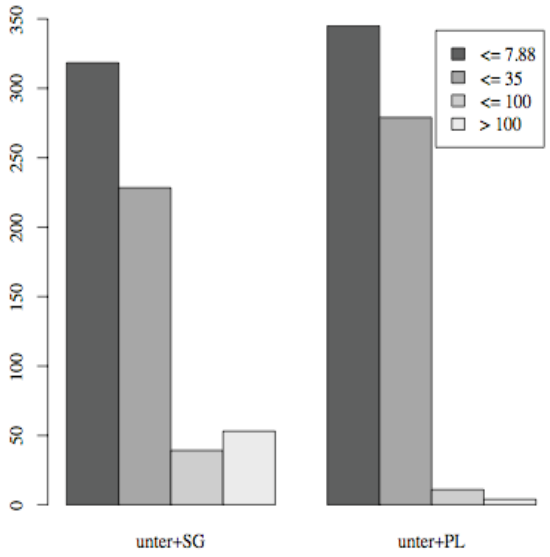
2.1 Compositionality

In a corpus-based study, Kiss (2007) has investigated whether PNCs of the type *unter+noun* should be classified as mainly compositional or not.
To assess the compositionality of PNCs, Kiss (2007) makes use of a structural analogy between PNCs and ordinary collocations. Methods to detect collocations can be used to determine whether PNCs behave like collocations.[3] A high degree of non-compositional combinations among PNCs would entail a high degree of fixed expressions and hence a high degree of collocations, which would be found my statistical methods for the identification of collocations. Kiss (2007) employs Dunning's *log likelihood ratio* (Dunning 1993) and compares the distributions of log likelihood ratios for combinations of *unter* with a noun in the singular and PPs headed by *unter* where the NP-complement is a bare plural. Since combinations with bare plurals are phrases that do not show a particularly high degree of idiomatic combinations, deviations between this class and combinations of

[3] For a discussion of the relation between collocations and idioms, cf. Burger (2007), Deuter (2005), and Smadja (1993).

prepositions and a singular noun would allow the conclusion that the latter class does indeed show a higher degree of idiomatic members.

(8) Collocation Detection for *unter+noun*$_{sg}$ *vs.* [$_{PP}$ *unter noun*$_{pl}$]



Following the analysis suggested in Dunning (1993), we may assume a basic threshold value of 7.88, which means that structural dependency between two adjancent words makes their occurrence in the corpus $e^{7.88/2}$ times more likely than assuming that the words are structurally independent. However, as has already been pointed out by Dunning (1993), the absolute values are of much lesser relevance than either an ordering reached among the candidate pairs or a comparison of values between one set of candidates and another set, whose properties are known. In addition, the basic value of 7.88 does not take into account the influence of morphosyntax and grammar, so that a more plausible threshold could be placed at a level of 35.
Given these assumptions, the figures summarized in (8) are even more indicative: 40 % of candidate pairs of type *unter+noun*$_{sg}$ show a log likelihood value *below* the basic threshold of 7.88. 75 % show a value below the more plausible threshold. What is more, the distribution between the singular and the plural types shows a similarity in the first two columns, mostly deviating if values larger than 35 are considered. This deviation indicates that there is a larger number of collocations among combinations of type *unter+noun*$_{sg}$ than among combinations of the plural type. But the total number of presumed collocations is small in both classes. The results show that most instances of *unter+noun*$_{sg}$ cannot plausibly be analyzed as non-compositional combinations. While there are more candidates with high log likelihood values among *unter+noun*$_{sg}$, their number is still small and does not justify the claim that the combination is idiomatic in general.

2.2 Productivity

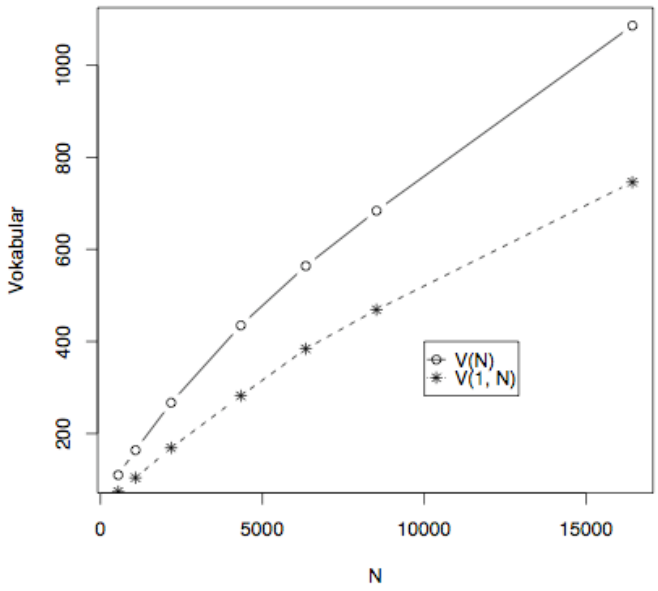
The empirical productivity of PNCs has been investigated in Dömges et al. (2007), following and extending the calculations for morphological productivity in Baayen (2001) and Evert (2004). Baayen (2001) has proposed that a process can be considered productive if the number of *hapax legomena* produced by the process will not drop below a threshold, as the corpus gets larger. The basic insight is that a process is still productive if more and more new instances are coined. If an instance is truly new, it will be encountered only once (it is already known when encountered a second time), making it a *hapax legomenon*. If a process cannot produce new instances, there will be no further *hapax legomena*. True productivity is thus indicated by three measures: to be productive, the vocabulary V(N) must not decrease as the corpus size N grows, i.e. $V(N) \leq V(M)$ if $N < M$; the number of hapax legomena V(1, N) must not decrease as the corpus increases, i.e. $V(1, N) \leq V(1, M)$ if $N < M$; and finally, the productivity as measured on the basis of the *hapax legomena* and the corpus size must not fall below a threshold. The measure for productivity is calculated as illustrated in (9).

(9) Baayen's (2001) measure for productivity: $\mathbf{P(N)} = \mathbf{E}[V(1, N)]/N$

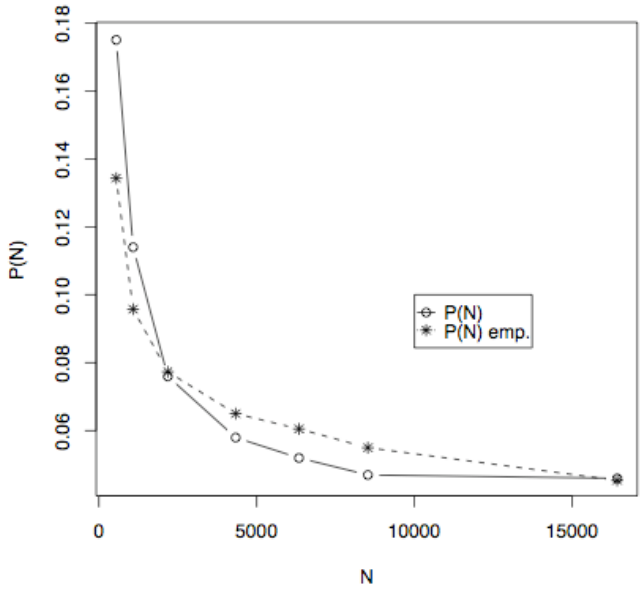
The measure in (9) also has a probabilistic interpretation: it provides the likelihood that a new instance can be observed after a corpus of N token instances has already been considered. With regard to the values for V(N) and V(1, N), the following illustration shows that both values increase as the corpus of candidates gets larger, already suggesting that the process is productive.

Yet, **P(N)** has to be determined. In its calculation we require the true expectation of the *hapax legomena* $\mathbf{E}[V(1, N)]$, which is not known for the sample corpus. Dömges et al. (2007) suggest the following approximation: They calculated the empirical productivity of the pertinent construction, i.e. $\mathbf{P(N)} = V(1, N)/N$ for fixed values of N. Dömges et al. (2007) employ two different regression models and use the empirical productivity over a large sample to determine which of the two models offers a better fit. The two models are a finite Zipf-Mandelbrot model (fZM) and a generalized Zipf-Mandelbrot (ZM) model (for a detailed discussion of the models, cf. Evert 2004). The crucial difference between the finite and the generalized model concerns the cardinality of categories employed by the two models.

(10) Development of V(N) and V(1, N)



(11) Fitting to empirical **P(N)** from Dömges et al. (2007)



While an fZM assumes a finite number of categories, a ZM allows for infinitely many categories. If a better fit is reached by an fZM, this would indicate an upper limit of different instances of the basic process. But if a

better fit is reached by the ZM, infinitely many instances of the basic process are predicted, which yields true productivity. Dömges et al. (2007) show that ZM provides the better approximation, as is illustrated in (11). According to this result, PNCs are not properly analyzed by a finite set of instances, i.e. the combination is productive.
Summing up, the investigations in Kiss (2007) and Dömges et al. (2007) have shown that PNCs in German are compositional and productive, thus supporting the proposal by Baldwin et al. (2006) that subclasses of English PNCs have to be analyzed as productive.

3 Semantic Conditions and Syntactic Combinations

Baldwin et al. (2006:175f.) presuppose the results stated in section 2. They conclude that an exception-based proposal *"will not extend to the productive constructions ... in which a particular preposition ... selects for an exclusively countable noun that cannot project a determinerless NP in other syntactic contexts."* They assume that at least certain prepositions can be described by a lexical entry as the one given in (12).

(12) Lexical entry of P (Baldwin et al. 2006)

$$\left[\text{SYN|CAT}\left[\begin{array}{l}\text{HEAD prep}\\ \text{VAL|COMPS}\left\langle\left[\text{SPR}\left\langle\text{Det}\right\rangle\right]\right\rangle\end{array}\right]\right]$$

But a lexical entry like the one given in (12) would justify the conclusion that PNCs are fully regular. Thus, it leaves open why speakers cannot form clear judgments and are uneasy to coin new combinations. Baldwin et al. (2006:176) note that *"[t]hese productive [determinerless PPs] seem further restricted to particular semantic domains, e.g.* on+MEDIUM *or* by+MEANS/INSTRUMENT. *These restrictions could be the result of selection for specific semantic classes of nouns by the preposition or they could alternatively be interpretations entirely contributed by the preposition on top of the nominal semantics."*
This amendment does not seem to be sufficient, both from a conceptual and an empirical perspective. Conceptually, adding semantic conditions to a rule, schema, or general lexical entry may affect the generality of a rule; it does not affect its regularity (and a lexical entry is already quite specific. Constraining it further does not actually change its status in the architecture of the grammar). If rule conditions are met, a rule can and has to be applied.
An HPSG of PNCs should not only offer a grammatical description but should also account for speakers' judgments of the pertinent construction. Speakers cannot easily discern acceptable from unacceptable PNCs, and this does not seem to be a question of generality, but of regularity.

We will leave this issue open and turn to the empirical perspectives of the proposal presented in Baldwin et al. (2006), reminding us of the polysemy of prepositions. In addition to the two alternatives suggested by Baldwin et al. (2006), a third possibility is conceivable: it might be that the noun imposes constraints on the interpretation of the preposition. Such a treatment would in fact require changes of the rule schema responsible for complementation, and imply further ramifications for the principles of semantic combination. But we will ignore these issues presently, especially since the second amendment suggested by Baldwin et al. (2006) would require similar changes.
An illustration of the application of the third alternative can be given by considering interpretation options of a preposition if either realized with an NP complement or with a determinerless nominal complement (DNC). With regard to the possible interpretation of the preposition *unter,* the dictionary *Duden Deutsch als Fremdsprache (Duden German for Foreign Learners;* Duden 2002) offers eleven top level definitions, many of which show fine-grained subdivisions and further qualifications. The top-level definitions are listed in (13).

(13) *spatial, temporal, circumstantial, comtemporaneity, subordination, association, presence among other things, picking an individual from a set, mutual dependency, state, causality*

In a further corpus study, we have investigated interpretation options of *unter* in combination with NPs and determinerless nouns. The corpus contains 29 million words and 650 different types of *unter* combined with an unadorned noun. It turns out that in relation to combinations of *unter+NP,* spatial and temporal interpretations are underrepresented in combinations of the type *unter+noun.* PNCs that require a spatial interpretation are highly restricted and can only be found in headlines – which generally seem to offer a natural habitat for otherwise problematic PNCs. An illustration is given in (14).

(14) Fußweg unter Brücke gesperrt.
footpath under bridge barred-for-traffic
'The footpath under the bridge is barred for traffic.'

This small study illustrates that certain interpretations of a highly polysemous preposition seem to be shadowed if the preposition is used in a PNCs. The results, however, are not accidental. Müller (2008:330) reports that uses of the preposition *unter* in support verb constructions involve a suppression of the spatial interpretation of the preposition, thus mirroring the present results. An analysis of PNCs should thus not only constrain the semantics of the preposition's complement but also account for a suppression of one of the preposition's senses when used in a PNC.
The cross-linguistic perspective offers a further empirical challenge. If the occurrence of PNCs is largely restricted by semantic conditions, we would expect that PNCs occurring in one language are mirrored in other, closely

related languages. But this does not seem to be the case, as can be illustrated with the examples in (15).[4]

(15) a. Mijn auto is proper. Ik smijt alles op straat.
b. Mein Auto ist sauber. Ich schmeiße alles auf *(die) Straße.
c. My car is clean. I throw everything on *(the) street.

While (15a) shows that the determiner can be dropped in the combination *on straat,* leaving out the determiner in similar constructions is neither possible in German, nor in English (15b, c). If semantic conditions govern the omission in Dutch and Flemish, why does the same condition not apply to German or English? Interestingly, a Dutch grammar offers an explanation for the grammaticality which is in direct opposition to the analysis suggested for PNCs in the Duden, in that the grammar turns PNCs into regular citizens, once a semantic condition is fulfilled: *"We gebruiken ook geen lidwoord als het zelfstandig naamwoord een meer algemene betekenis heeft." (We do not use a determiner if the noun receives a generic interpretation.* Grammatica in gebruik: Nederlands for anderstaligen, p. 42).
It should be noted, however, that the implicational relationship between a generic interpretation of the noun and a determiner omission cannot always be established. A generic interpretation is not sufficient to drop the determiner in German and English, as has been illustrated in (15b, c). Moreover, many examples with non-generic interpretations of the noun can be found, illustrated with *auf Initiative (on initiative)* and *unter Voraussetzung (presuming that)* for German in (16) and (17)

(16) Im Januar 1996 hat sich dort auf (die) Initiative der ehemaligen
in January 1996 has REFL there at (the) initiative the former
Bob-Vizeweltmeisterin Erica Fischbach eine Bob- und
bobsled-vice-world-champion EF a bob and
Rodelabteilung formiert.
toboggan-department constituted
'On initiative of former vice-world champion Erica Fischbach, a new department for bobsled and toboggan has been constituted there in January 1996.'

(17) Auch Philipp Egli besteht auf einer eigenen Handschrift – unter
also Philipp Egli insists on a own signature under
Voraussetzung des Einverständnisses des Ensembles.
prerequisite the acceptance the ensemble
'Philipp Egli insists on his own style as well, provided that the ensemble accepts.'

[4] Example (15a) is used as an ironic slogan against waste prevention on Belgian highways.

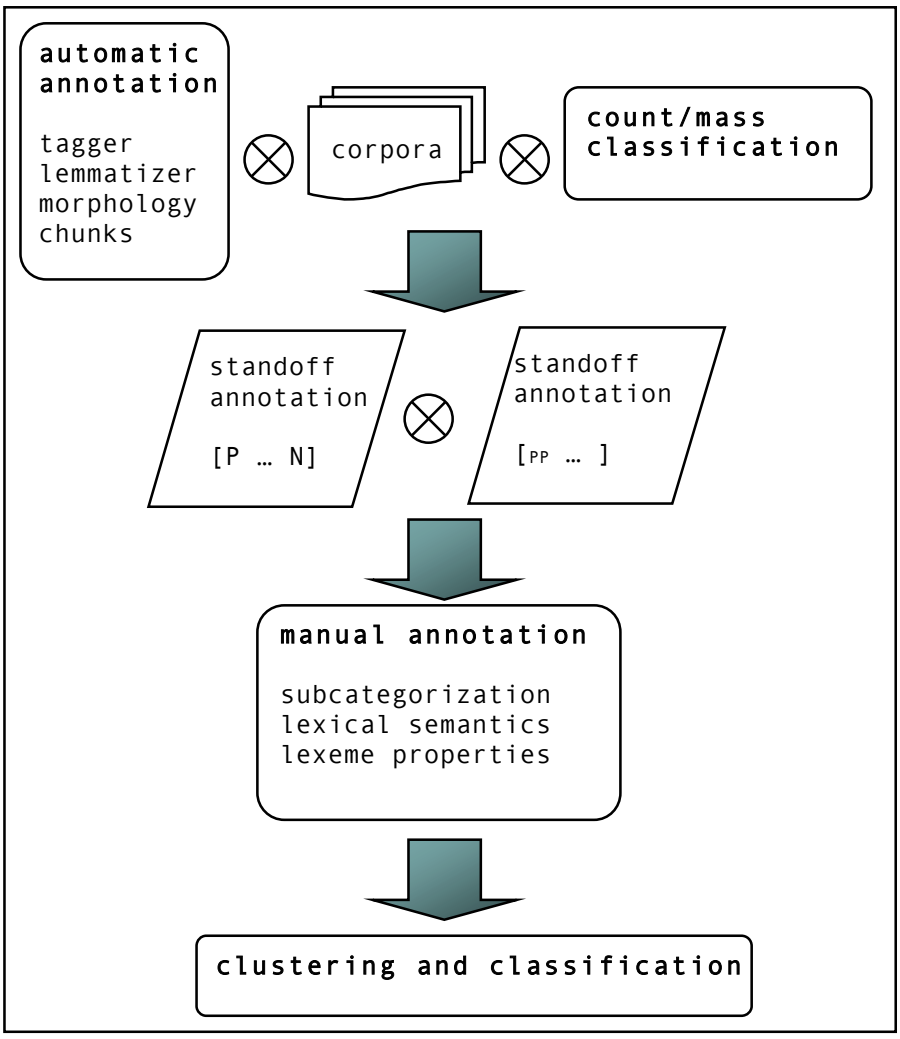
It is interesting that the use of an article is in fact optional in example (16), while its omission leads to strong unacceptability in (15b). The example (17) further illustrates with the preposition *unter* that PNCs cannot be tied to genericity in German.
It is indicative that for both the prepositions *auf* and *unter* a spatial interpretation is blocked if the prepositions are used in PNCs. A similar condition may apply in English but it obviously not active in Dutch and Flemish. Possibly, the semantic conditions active in the determination of acceptable PNCs must be described as language-specific.

4 Where is the method in this madness?

While the regularity of PNCs was neglected for a long time (and sometimes is still today), current analyses assume that the construction should in fact be described as regular, and that PNCs are compositional. Support for both assumptions come from corpus-based studies as presented in section 2. Despite a growing consensus that the constructions are regular, it is accepted that the constructions are just not as regular as other combinations – such as an ordinary preposition and an NP. Yet, grammar theory has not been able to pin down the factors that distinguish grammatical from not so grammatical combinations of a preposition and a determinerless nominal projection. Standard methods for the determination of grammaticality and the identification of features and factors, which make a construction acceptable cannot be applied to PNCs. In particular, speakers are extremely uneasy to produce acceptability judgments in isolation and normally cannot coin new combinations. A variety of factors may account for this lack on the speaker's side. To begin with, prepositions are highly polysemous, and only certain senses seem to be available in PNCs. Choosing a sense, however, largely depends on the local and non-local context in which a PP or preposition-noun combination can be embedded. Secondly, the distinction between mass nouns and count nouns interferes. Only combinations with the latter should lead to imperfect combinations, but this conclusion already assumes that speaker's have knowledge of the count/mass-distinction that is independent of contextual clues (cf. the recent discussion in Borer 2004, where this assumption is explicitly denied). Additional factors may depend on different senses of the nouns involved. Taken together, it does not come as a surprise that speakers become reluctant. For the linguist, the question remains how to tackle these constructions and how to identify the discerning factors.
A solution to this problem comes from the area of *annotation mining* (Chiarcos et al. 2008). Annotation mining combines large corpora with classification tools and annotations to produce large annotated corpora, ideally in a stand-off format allowing further extension of the annotation without affecting the other layers. After automatically and manually annotating the corpora, they can be used as input for clustering and categorization tools, such as Weka (Witten and Frank 2005). Since raw data have been annotated on various strata from morphology to semantics, and

since many instances have been annotated, classifier and clustering tools receive a robust multidimensional representation of the data. In the present setting, raw corpora are combined with lemmatizers, morphological analyzers, taggers and chunkers, and in particular, with a classification system to determine the count/mass-distinction, an annotation of realized syntactic arguments, as well as annotations on the sense level for nouns and prepositions. From the initial corpora, we extract all cases of PNCs (appropriately chunked), all cases of ordinary PPs, in which the same preposition and noun appears, and also all NPs outside of PPs, in which the noun appears. By extracting not only PNCs, but also PPs, and NPs, we hope to find characteristic properties that are present with the former but are possibly missing with the latter. The identification of characteristic yet latent traits is not carried out by manual inspection, but by feeding the different subgroups into a classification algorithm and extract the rules for classification from the classifier – particularly well-suited to this task are decision tree classifiers, such as Weka's J4.8, which is a re-implementation of the standard decision tree algorithm C4.5 (cf, Quinlan 1993). Decision tree classifiers, possibly amended with a Principal Components Analysis (Baayen 2001), are useful in that they allow the derivation of a probabilistic rule system from the classification. The following schema (18) gives an illustration of the annotation task.

(18) Annotation Mining



In an on-going project, we are working on the identification characteristic properties of PNCs in the aforementioned manner. The results will form the basis for further analysis in terms of controlled experiments. The result of this process will most likely be a probabilistic analysis of PNCs. Yet the results can be turned into a categorical analysis by using a threshold value to turn continuous probabilities into clear-cut categories, thus offering a broader empirical coverage of PNCs in terms of a refined HPSG analysis. As not only syntactic properties, but also semantic and other influences play a role in determining whether or not a preposition may combine with a determinerless nominal projection, a model like HPSG is clearly more appropriate for a representation of the latent generalizations than a framework that relies on purely syntactic means only.

References

Baayen, Harald. 2001. *Word Frequency Distributions*. Dordrecht: Kluwer.

Baldwin, Timothy, John Beavers, Leonoor van der Beek, Francis Bond, Dan Flickinger and Ivan A. Sag. 2006. In Search of a Systematic Treatment of Determinerless PPs. In Patrick Saint-Dizier (Ed.): *Syntax and Semantics of Prepositions*. Dordrecht: Springer, pages 163-179.

Borer, Hagit. 2004. *In Name Only. Structuring Sense, Vol. I.* Oxford: Oxford University Press.

Burger, Harald. 2007. *Phraseologie. Eine Einführung am Beispiel des Deutschen.* Berlin: Erich Schmidt Verlag.

Chiarcos, Christian, Stefanie Dipper, Michael Götze, Ulf Leser, Anke Lüdeling, Julia Ritz and Manfred Stede. 2008. A Flexible Framework for Integrating Annotations from Different Tools and Tagsets. *Traitement Automatique des Langues*. *Special Issue Platforms for Natural Language Processing*. *ATALA* 49 (2).

Deuter, Margaret (Ed.). 2005. *Oxford Collocations Dictionary for Students of English.* Oxford: Oxford University Press.

Dömges, Florian, Tibor Kiss, Antje Müller and Claudia Roch. 2007. *Measuring the Productivity of Determinerless PPs.* In: Fintan Costello, John Kelleher and Martin Volk (Eds.): Proceedings of the ACL 2007 Workshop on Prepositions, Prag, pages 31-37.

Duden. 2002. *Duden. Deutsch als Fremdsprache*. Mannheim: Bibliographisches Institut & F.A. Brockhaus AG.

Duden. 2005. *Duden. Die Grammatik*. Duden Band 4. Mannheim: Bibliographisches Institut & F.A. Brockhaus AG.

Dunning, Ted. 1993. Accurate methods for the statistics of surprise and coincidence. *Computational Linguistics* 19, 61-74.

Evert, Stefan. 2004. A Simple LNRE Model for Random Character Sequences. In *Proceedings of the 7mes Journees Internationales d'Analyse Statistique des Donnees Textuelles,* pages 411-422.

Himmelmann, Nikolaus. 1998. Regularity in Irregularity: Article Use in Adpositional Phrases. *Linguistic Typology* 2, 315-353.

Kamber, Alain. 2008. *Funktionsverbgefüge – empirisch. Eine korpusbasierte Untersuchung zu den nominalen Prädikaten des Deutschen.* Tübingen: Max Niemeyer Verlag.

Kiss, Tibor. 2007. Produktivität und Idiomatizität von Präposition-Substantiv-Sequenzen. *Zeitschrift für Sprachwissenschaft* 26, 317-345.

Quinlan, J. Ross. 1993. *C4.5: Programs for Machine Learning.* San Francisco: Morgan Kaufman.

Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech and Jan Svartvik. 1985. *A comprehensive grammar of the English language*. London: Longman.

Smadja, Frank. 1993. Retrieving collocations from text: Xtract. *Computational Linguistics* 19, 143-177

Witten, Ian H. and Eibe Frank. 2005. *Data Mining. Practical Machine Learning Tools and Techniques.* San Francisco: Morgan Kaufman.

Korean postpositions as weak syntactic heads

Kil Soo Ko
University Paris 7

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 131–151

Ko, Kil Soo. 2008. Korean postpositions as weak syntactic heads. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 131–151. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.8. CC-BY 4.0

Abstract

This paper deals with Korean postpositions. They are treated as suffixes in recent lexicalist works. But they differ syntactically from suffixes and we will propose to treat them as clitics, i.e. words combining with a phrase in the syntax and attaching to its last lexical item in the phonology. We treat them as weak syntactic heads, taking into account their head properties and the syntactic similarity between the mother phrase and the host phrase. They take the latter as complement and share most of its syntactic properties. Revising the traditional classification, we divide postpositions into three subtypes: marking, oblique and semantic postpositions, based on their distributional properties, such as optionality, non-nominal marking and stacking, *etc*. Finally we show how our analysis can be described in the HPSG model.

1 Introduction

This paper deals with Korean postpositions (henceforth P). They are usually subdivided in (at least) 7 subclasses[1 2]:

(1)

examples	in the traditional grammar
-i/ga 'nom', *-(l)eul* 'acc', *-ui* 'gen'	grammatical case-marking P
-e 'loc', *-ege* 'dat', *-(eu)lo* 'to, by', *etc*.	semantic case-marking P
-jocha 'even', *-kkaji* 'up to', *etc*.	spectific P
-(n)eun 'top'	topic marker
-do 'too', *-man* 'only'	additive/restrictive P
-(g)wa 'and', *-(i)na* 'or', *etc*.	conjunctive P
-(y)a 'voc'	vocative P

They attach to lexical items but determine the function of phrases: *-eul* in the following example is attached to the N *dongsaeng* but marks the whole NP *Mary-ui dongsaeng* as direct object.

(2) Paul-i Mary-ui dongsaeng-eul manna-ss-da.
Paul-*nom* Mary-*gen* brother-*acc* meet-*past-decl*.
Paul met Mary's brother.

† We wish to thank Anne Abeillé, Jean-Marie Marandin and Jesse Tseng for comments and suggestions. We are also grateful to the HPSG2008 reviewers and audience for questions and comments. All remaining errors and unclarities are of course our own.

[1] The transcription follows "the Romanization of Korean" issued by the Korean Ministry of Culture and Tourism and does not take into account the phonetic variations.

[2] Cf. P are divided into 2 or 3 subclasses in syntactic works. See the following section.

P are analyzed as suffixes in recent lexicalist works, based on their suffix-like behaviours: morpho-phonological variations, idiosyncratic host forms and strict ordering restrictions, *etc*. (Sells 1995, Kim & Choi 2005, Yoo 2002, *etc*.).

We propose to analyze P as words and show that they differ syntactically from suffixes. We treat them as clitics, in order to account for their morpho-phonological dependency. We propose also to analyze P as weak syntactic heads. They take the host phrase as complement but share its HEAD feature values. Consequently the mother phrase and the host phrase show similar syntactic behaviours. We propose to divide postpositions into 3 subtypes: marking, oblique and semantic P. They have different restrictions for stacking and contribute differently to the mother phrase's syntax. We will adopt previous analyses of weak syntactic heads and use features like CL, MARKING and CASE to describe P's grammar within HPSG.

2 Previous analyses

P are analyzed as words or suffixes in previous works. The first analysis is motivated by the phrasal scope (Yoon 1995, Chae & No 1998, *etc*.): for example, *-eul* in (2) combines with the NP *Mary-ui dongsaeng* affected by it. Some P are syntactic heads determining the mother phrase's function while others are not:

(3) Paul-gwa Mary-neun jib-eseo-do il-eul ha-n-da.
Paul-and Mary-*top* home-*loc*-also work-*acc* do-*prog*-*decl*.
Paul and Mary works at home too.

-eseo is a head forming an NP adjunct (Choi 1997, O'Grady 1991, *etc*.), while *-(n)eun* and *-do* is not, because they don't change the phrase's function. *-eul* is considered as a functional head (Im 1999, *etc*.) or a case marker (Han 2003, *etc*.): it marks the object but can be omitted.

The second analysis is supported by suffix-like behaviours (Kim & Choi 2005, *etc*.). Certain P show morpho-phonological variation (4); Certain pronouns appear in an idiosyncratic form before *-i/ga* '*nom*' (5) (Bratt 1996); P are stacked in a strictly restricted order (6).

(4)

after consonants	*-i*, *-eul*, *-eun*, *-eulo*, *-gwa*, *-ina*, …
after vowels	*-ga*, *-leul*, *-neun*, *-lo*, *-wa*, *-na*, …

(5) a. *na/nae-ga vs. na/*nae-{leul,neun,ege} 'I-{*acc*,*top*,*dat*}'
b. ??jeo/je-ga vs. jeo/*je-{leul,neun,ege} 'I-{*acc*,*top*,*dat*}'
c. ??neo/ne-ga vs. neo/*ne-{leul,neun,ege} 'you-{*acc*,*top*,*dat*}'
d. *nugu/nu-ga vs. nugu/*nu-{leul,neun,ege} 'who-{*acc*,*top*,*dat*}'

(6) a. Paul-{man,kkaji,jocha}-{i,eul,ui,eun,do}
Paul-{only,up to,even}-{*nom*,*acc*,*gen*,*top*,also}
a'. *Paul-{i,eul,ui,eun,do}-{man,kkaji,jocha}
b. haggyo-{e,lo,eseo}-{man,kkaji,jocha}
school-{*loc*,to,at}-{only,up to,even}
b'. *haggyo-{man,kkaji,jocha}-{e,lo,eseo}

P attach to lexical roots or bases in the morphology. So they neither appear alone (7) nor can be separated from their lexical host (8):

(7) - Paul-i Mary-do manna-ss-ni?
Paul-*nom* Mary-also met?
Did Paul met Mary too?
- ani, *(Mary)-man manna-ss-da.
No, *(Mary)-only met.

(8) a. Paul(*amado)-i Mary(*amado)-ege chaeg(*amado)-man
Paul(*perhaps)-*nom* Mary(*perhaps)-*dat* book(*perhaps)-*only*
bonae-gess-ji.
send-may-decl.
Paul may send to Mary only a/the book.
b. Paul(*#)-i Mary(*#)-ege chaeg(*#)-man bonae-ss-da.
Paul(*#)-*nom* Mary(*#)-*dat* book(*#)-*only* sent.
Paul sent to Mary only a/the book.

The phrasal scope is achieved by incorporating P's properties into lexical hosts, which percolate them up to the mother phrase (Kim & Choi 2005). This analysis does not take into account the fact that most P combine with various categories: nominal, adverbial and verbal. This is unexpected for suffixes.

3 Our proposals

This section presents 3 proposals with justifications: to treat P as clitics in 3.1 and as weak syntactic heads in 3.2 and to divide them into 3 subtypes in 3.3.

3.1 P are clitics

In spite of morpho-phonological similarity, P contrast with suffixes in two syntactic facts. 1) Syntactic rules move suffixes with their host but not P (Nam 1996, Zwicky & Pullum 1983). In fact, the latter disappear:

(9) a. chingu-deul-eul manna-ass-da.
friend-*plur-acc* met.
(I) met friends.

b. [__ manna-n] chingu-*(deul)-(*eul)-i manh-da.
[__ meet-*rel*] friend-*(*plur*)-(*acc*)-*nom* be many.
lit. friends I met are numerous.

-*deul* in (9b) is not obligatory and can be omitted. But if it is omitted, the host is interpreted as singular or plural, whereas it is always plural N with it.

2) P and suffixes have different distribution in the coordination. P have restricted distribution: some can't appear at the first conjunct (10a) while others can't be omitted at the last conjunct (10b).

(10) a. Paul-(*eul)-gwa Mary(-leul) manna-ss-da.
Paul-(**acc*)-and Mary-(*acc*) met.
I met Paul and Mary.
b. gabang-eul bang-(e)-na geosil-*(e) du-geola!
sack-*acc* school-(loc)-or library-*(loc) put!
Put your sack in the room or in the living room!

But suffixes don't show such restrictions and appear freely at each conjunct.

(11) a. namu-(kkun)-gwa sanyang-(kkun)-eul gugyeongha-da.
tree-(person)-and hunting-(person)-*acc* watch.
watch a woodcutter/tree and a hunter/hunting.
b. ai-(deul)-gwa seonsaeng-(deul)-eul manna-da.
child-(*plur*)-and teacher-(*plur*)-*acc* meet.
meet a child/children and a teacher/teachers.

The interpretation reveals another difference. P at the last conjunct take the whole coordination in their scope, as shown in (10a). But suffixes affect only the conjunct to which they are attached. The first conjunct, if we delete the suffix, denotes a tree or trees in (11a) and can be singular NP modified by a quantifier conveying singularity in (11b):

(12) a. namu-wa sanyang-kkun-eul gugyeongha-da.
tree-and hunting-person-*acc* watch.
watch a tree/trees and a hunter.
b. han ai-wa yeoleo seonsaeng-deul-eul manna-da.
one child-and several teacher-*plur-acc* meet.
meet a child and several teachers.

Note also that P differ from both derivational and inflectional suffixes. In contrast to derivational ones, they attach to lexical hosts in a regular way and

they don't change their category[3]. They can't be inflectional suffixes, in that they are compatible with non flectional categories, such as adverb.

We then treat P as words. But they are dependant to their hosts, as illustrated in (7) and (8):

(7) - Paul-i Mary-do manna-ss-ni?
Paul-*nom* Mary-also met?
Did Paul met Mary too?
- ani, *(Mary)-man manna-ss-da.
No, *(Mary)-only met.

(8) a. Paul(*amado)-i Mary(*amado)-ege chaeg(*amado)-man
Paul(*perhaps)-*nom* Mary(*perhaps)-*dat* book(*perhaps)-*only*
bonae-gess-ji.
send-may-decl.
Paul may send to Mary only a/the book.

b. Paul(*#)-i Mary(*#)-ege chaeg(*#)-man bonae-ss-da.
Paul(*#)-*nom* Mary(*#)-*dat* book(*#)-*only* sent.
Paul sent to Mary only a/the book.

The fact can be accounted for, if we treat P as clitics, i.e. phonologically dependant words attaching to a lexical host in the phonology. The host can't be omitted in (7), because *-man* needs a non-empty host. The adverb *amado* in (8a) is a verbal adjunct and its embedding between a P and its host is ruled out in the syntax. And to insert a pause between them in (8b) will be rejected by the attachment in the phonology.

It is also possible to account for the allomorphy in (4) and (5). As for P's variation, we can introduce in the phonology a rule (or function) determining their form according to the host's final phoneme or register all variants in the lexicon with a restriction on it[4]. For example, the variation between *-i* and *ga* '*nom*' in (13) can be described by a rule (14) or two lexical entries (15):

---

[3] Cf. semantic case-marking P are often treated as forming a PP or KP and grammatical case-marking P as forming a KP in the literature.

[4] There are also non phonological variations. The dative complement is marked by *-ege* '*dat*' if it is an animate NP or by *-e* '*loc*'. *-i/ga* '*nom*' is replaced by *-kkeseo*, if the subject refers to a person socially superior to the speaker:

i. a. chaeg-eul chingu-{ege,*e} bonae-ss-da.
book-*acc* friend-*dat* sent.
(I) sent a/the book to a/the friend.

b. chaeg-eul haggyo-{*ege,e} bonae-ss-da.
book-*acc* school-*dat* sent.
(I) sent a/the book to a/the school.

ii. a. ai-{ga,*kkeseo} o-ass-da.
child-*nom* came.
A child came.

(13) a. {Paul,*Mary}-i
b. {*Paul,Mary}-ga
(14) '*nom*' → *-i* after a consonant, but *-ga* after a vowel
(15) a. *-i*: the host terminates with a consonant[5]
b. *-ga*: the host terminates with a vowel

Idiosyncratic host forms can be explained in the same way: change their form in the phonology by a rule or register in the lexicon all host forms with a constraint on P, as follows.

(16) a. nae/*na-ga 'I-*nom*'
b. *nae/na-{leul,ui,neun,do,ege,*etc.*} 'I-{*acc*,*gen*,*top*,also,*dat*,*etc.*}'
(17) 'I' → *nae* before *-i/ga*, but *na* before other P
(18) a. *nae*: it combines only with *-i/ga*.
b. *na*: it combines with all P except *-i/ga*.

It seems also possible to treat idiosyncratic forms and *-i/ga* as complexes words, in that they are not numerous and appear only before *-i/ga* as illustrated in (5). Then, *nae* in (18a) will be replaced by *nae-ga* 'I-*nom*' with a constraint that it doesn't combine with any P.

Ordering restrictions in (6) can be summarized into two constraints, if we revise P's classification: oblique case P come first and marking P come last (see 3.3 for the detail).

We then treat P as clitics combining with a phrase in the syntax and attaching to a non-empty lexical item in the phonology.

3.2 P are weak syntactic heads

The next issue is to decide P's syntactic status. They are given different status in previous works, as mentioned in 2. But they have head properties:
1) Korean is a head-final language and P always follow their host phrase:

(19) a. [yeoleo salam]-{i,ege,eun} '[several man]-{*nom*,*dat*,*top*}'
b. *yeoleo-{i,ege,eun} salam
c. *{i,ege,eun}-yeoleo salam

---

b. abeonim-{*i,kkeseo} o-si-eoss-da.
father-*nom* come-*hon-past-decl*.
(My) father came.

[5] This restriction can be described by the edge feature (Tseng 2002, *etc.*): *-i*[COMPS <[EDGE|RIGHT *C*]>] vs. *-ga*[COMPS <[EDGE|RIGHT *V*]>]

2) *-i/ga*, *-(l)eul*, and *-ui* restrict the function and the distribution of the phrase (20), though they can be omitted. And certain contexts forbid their omission (21).

(20) Paul-{i,*eul,*ui} Mary-{*ga,*leul,ui} sagwa-{*ga,leul,*ui}
Paul-{*nom*,*acc*,*gen*} Mary-{*nom*,*acc*,*gen*} apple-{*nom*,*acc*,*gen*}
meog-eoss-da.
ate.
Paul ate Mary's apple(s).

(21) a. gongbuha-gi-neun doseogwan-eseo-*(ga) joh-da.
study-nominalizer-*top* library-*loc*-*(*nom*) is good.
the library is a good place to study in.
b. [oegug-eseo-*(ui) saenghwal]-edaehae mud-da.
[foreign country-*loc*-*(*gen*) life]-about ask.

3) Other P are semantic heads taking the host phrase as argument, though they don't change its syntactic function:

(22) seonmul-eul Paul-ege-{neun,do,man,kkaji,jocha} bonae-ss-da.
gift-*acc* Paul-*dat*-{*top*,also,only,till,even} sent
(I) sent a gift only/also/up/even to Paul.

4) *-(n)eun* and *-do* can replace *-i/ga* in (21a) and they can't be omitted:

(23) gongbuha-gi-neun doseogwan-eseo-{<u>neun,do</u>} joh-da.
study-nominalizer-*top* library-loc-{*top*,also} is good.
the library is a good place for study.

5) Some P restrict the host's semantic property:

(24) a. *NP-dat*: [+animate]-{*e,ege} vs. [-animate]-{e,*ege}
b. *NP-nom*: [-hon]-{i/ga,*kkeseo} vs. [+hon]-{*i/ga,kkeseo}

We then treat P as heads and their host phrase as complement. But it is also true that some P can be omitted (25a) and that others are compatible with all syntactic functions (25b), unlike ordinary heads:

(25) a. Paul-(<u>i</u>) Mary-(<u>ui</u>) dongsaeng-(<u>eul</u>) manna-ss-da.
Paul-*nom* Mary-*gen* brother-*acc* met.
Paul met Mary's brother.
b. Paul-{eun,do,man,jocha} sul-{eun,do,man,jocha}
Paul-{*top*,also,only,even} wine-{*top*,also,only,even}
ppalli-{neun,do,man,jocha} masi-eoss-da.
fast-{*top*,also,only,even} drank.
Paul drank wine fast.

The data can be accounted for, if we treat these P as weak syntactic heads having underspecified syntactic properties and sharing those of the complement (Tseng 2002, Abeillé *et al*. 2005). They share syntactic properties of the host phrase and percolate them to the mother phrase. Then the latter inherits the properties of the host phrase. This means that these P have no effect on the syntax of the phrase and that they can appear or be omitted freely.

In our analysis, *sul-man* and *ppalli-man* in (25b) are a direct NP and an AdvP respectively. *-man* shares the category and case values in the first case, and the category value in the second case. If the complement is a VP, it shares and percolates the VFORM value, which may be checked by another verb:

(26) a. Paul-i ja-{ji,*go}-man anh-ass-da.
Paul-*nom* sleep-*Comp*-only didn't.
Paul didn't sleep only.
b. Paul-i ja-{*ji,go}-man sipeoha-yeoss-da.
Paul-*nom* sleep-*Comp*-only wanted.
Paul wanted only to sleep.

P in (25a) share also the complement's syntactic properties. They form an NP after an NP and an AdvP after an AdvP, *etc*. But the mother phrase has a more restricted distribution than the host phrase. For example, *Paul-i* and *Paul-eul* appear in different positions: one can't be direct object and the other can't appear as subject, as illustrated in (20), whereas *Paul* is compatible with both functions. We will treat them as marking elements and as being checked by the verb (see 3.3 for the detail).

We treat P of oblique complements and NP adjuncts as sharing syntactic properties of the complement too. But, unlike other P, they can't be omitted (27a) and forbid a phrase to appear in direct positions (27b-c):

(27) a. Paul-i doseogwan-*(eseo) jam-eul ja-n-da.
Paul-*nom* library-(*loc*) sleep-*acc* sleep-*prog-decl*.
Paul sleeps at the library.
b. dali-*{e,eseo,lo}-ga muneoji-eoss-da.
bridge-{*loc*,*loc*,by}-*nom* broke
the bridge broke.
c. Paul-eun uija-*{e,eseo,lo}-leul mandeul-eoss-da.
Paul-*top* chair-{*loc*,*loc*,by}-*acc* made.
Paul made a chair.

-eseo in (27a) forms an NP adjunct and oblique P in (27b-c) restricts the phrase's function. We treat them as having a specified case value, oblique in our analysis. They share the host phrase's syntactic properties, except the

case value. They select only an NP complement, which is the only category compatible with a case value, and constitute an oblique NP.

3.3 P's subtypes and syntactic features

Previous works use only one syntactic feature: CASE. They divide P into 2 subtypes: case P and non case P, or into 3, if they differentiate case assigning P and case marking P. But we propose to use 2 syntactic features: MARKING and CASE, and to divide P into 3 subtypes: marking P, oblique P and semantic P, based on the following properties:

(28) a. marking P are optional and attach to various categories.
b. oblique P are not optional and attach only to NP.
c. semantic P are not optional and attach to various categories.

We treat grammatical case-marking P (*-i/ga*, *-(l)eul*, *-ui*) and two non case P (*-(n)eun*, *-do*) as marking P. They belong to different subtypes in previous works, but they have similar behaviours:

(6) a. Paul-{man,kkaji,jocha}-{i,eul,ui,eun,do}
Paul-{only,up to,even}-{*nom*,*acc*,*gen*,*top*,also}
a'. *Paul-{i,eul,ui,eun,do}-{man,kkaji,jocha}
b. haggyo-{e,lo,eseo}-{man,kkaji,jocha}
school-{*loc*,to,at}-{only,up to,even}
b'. *haggyo-{man,kkaji,jocha}-{e,lo,eseo}

(29) *Paul-{i,eul,ui,eun,do}-{i,eul,ui,eun,do}
Paul-{*nom*,*acc*,*gen*,*top*,also}-{*nom*,*acc*,*gen*,*top*,also}

(21) a. gongbuha-gi-neun doseogwan-eseo-*(ga) joh-da.
study-nominalizer-*top* library-*loc*-*(*nom*) is good.
the library is a good place to study in.
b. [oegug-eseo-*(ui) saenghwal]-edaehae mud-da.
[foreign country-*loc*-*(*gen*) life]-about ask.

(23) gongbuha-gi-neun doseogwan-eseo-{neun,do} joh-da.
study-nominalizer-*top* library-loc-{*top*,also} is good.
the library is a good place for study.

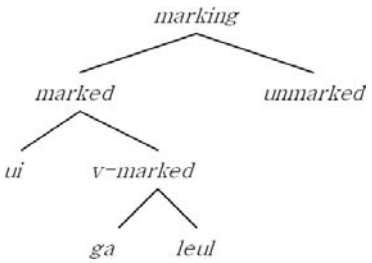
They can't precede other P (6); they can't appear together (29); they have in common the capacity to allow a phrase to appear in inaccessible positions (21 and 23).

It is necessary then to define this group as a subtype and to find out a syntactic property or more characterizing its members. The CASE feature is not available, because *-(n)eun* and *-do* are non case P compatible with an AdvP or a VP, as illustrated in (25b) and (26). Recall that *-i/ga* and *-(l)eul* also can be omitted (25a) and appear after non case categories:

(30) a. bi-ga manhi-{ga,leul} naeli-eoss-da.
rain-*nom* much-{*nom*,*acc*} fell.
It rained much.
b. Paul-i bab-eul ppalli-eul meog-eoss-da.
Paul-*nom* meal-*acc* much-*acc* ate.
Paul ate much.

So we introduce the MARKING feature to P and attribute a *marked* value to marking P. The feature doesn't control the syntactic function of the phrase and marking P can be omitted. But MARKING is a syntactic feature and its value works in the syntax: it may restrict P's distribution inside the phrase and modify the mother phrase's distribution in the sentence. As for its value, we introduce more specified values to account for *-ui*, *-i/ga* and *-(l)eul*:

(31)



v-marked is for *-(n)eun* and *-do* and indicates that the mother phrase can't appear inside an NP, for example as a genitive complement. *-ui* 'gen' has the *ui* value forbidding its attachment to a verbal constituent. *unmarked* is attributed to non marking P.

Oblique P in our analysis correspond with semantic case-marking P in previous works. They have CASE feature and percolate an oblique value to the mother phrase. They select an NP complement and form an oblique NP. The latter appears as oblique complement or as NP adjunct. They can't be omitted because the phrase loses the oblique case value offered by them. As for the case value, we assume only 2 specified values: direct and oblique.

(32)

The first value is for the NP appearing in one of the direct argument positions. We don't use more specified values like *nom*, *acc*, *etc.*, because our analysis has no grammatical case-marking P and consequently no P assigning these values. We assume that the direct case value is introduced directly by nominal items, because an NP without a P can appear in direct positions. The oblique case value is attributed to all oblique P. It is percolated to the mother phrase and the latter can't appear in direct argument positions.

All remaining P are treated as semantic P. They add usually a contextual meaning to the phrase and contribute to its semantics. Hence they can't be omitted. They don't have the CASE feature but convey the MARKING feature with an *unmarked* value. Their appearance has no effect on the syntax of the phrase.

The following table shows the subtypes in our analysis and in the traditional grammar of P illustrated in (1):

(33)

examples	marking P	oblique P	semantic P	in the traditional grammar
-i/ga 'nom', *-(l)eul* 'acc', *-ui* 'gen'	X			grammatical case-marking P
-e 'loc', *-ege* 'dat', *-(eu)lo* 'to, by', *etc*.		X		semantic case-marking P
-jocha 'even', *-kkaji* 'up to', *etc*.			X	spectific P
-(n)eun 'top'	X			topic marker
-do 'too'	X			additive P
-man 'only'[6]			X	restrictive P
-(g)wa 'and', *-(i)na* 'or', *etc*.		X		conjunctive P
-(y)a 'voc'	X			vocative P

4 Descriptions within HPSG

We use the CL feature (Monachesi 1998) and the notion of weak head introduced by Tseng 2002 and applied to French prepositions *à* and *de* by

[6] Lim, Donghoon pointed out to me that there are 2 *-man*: one attaches directly to the lexical item and the other attaches after oblique P:

i. ileum-man-eulo salam-eul chaj-da.
name-only-by person-*acc* find.
find a person by only his name.
ii. ileum-eulo-man salam-eul chaj-da.
Name-by-only person-*acc* find.
find a person only by the name (we don't .

(i) means that we look for a person about whom we know only his name whereas, in (ii), we look for a person by his name but not by his age, address, *etc*. *-man* in (ii) is a semantic P that comes between an oblique P and a marking P. But its type is not clear in (i), because it comes before oblique P but it is not an oblique P.

Abeillé *et al.* 2005, in order to describe our analysis within HPSG (Pollard & Sag 1994, Sag *et al.* 2003, *etc.*).

4.1 P's description

Let's start by summarizing our proposals. P are clitics attaching to non-empty lexical hosts in the phonology and weak heads sharing syntactic properties of their complement, i.e. the phrase constituted by the lexical host. And there are 3 types of P: marking P, oblique P and non marking non oblique (or semantic) P.

If we introduce the feature CL to note phonological dependency, P have a following feature structure in the lexicon:

(34) P → $\begin{bmatrix} \text{HEAD} / [1] \\ \text{CL} + \\ \text{MARKING } \textit{marking} \\ \text{COMPS} < \begin{bmatrix} \textit{canonical} \\ \text{HEAD} [1] \\ \text{MARKING } \textit{unmarked} \\ \text{COMPS} < > \end{bmatrix} > \end{bmatrix}$

P are clitics and have a + value for CL. They have an underspecified value for MARKING (see the value set in (31)). COMPS is a list indicating their complement with restrictions: it is a canonical, i.e. non-empty, sign and an unmarked phrase. The same notation between two HEAD features indicates that P and the complement have in common the HEAD feature values. / means sharing by default: P share the value but they override it by their own value, if there is one.

P's subtypes inherit the feature structure in (34) and add to it feature-values appropriate to each type, as follows:

(35) a. marking P→ P & [MARKING *marked*]
b. oblique P→P & $\begin{bmatrix} \text{HEAD} \mid \text{CASE } \textit{oblique} \\ \text{MARKING } \textit{unmarked} \end{bmatrix}$
c. semantic P→ P & [MARKING *unmarked*]

A final description of P items can be formed by completing those in (35) with values defined by each of them, as follows:

(36) a. *-i/ga* → marking P & [MARKING *ga*]
b. *-(l)eul* → marking P & [MARKING *leul*]
c. *-ege* → oblique P
d. *-(n)eun* → marking P& [MARKING *v-marked*]

e. *-kkaji* → semantic P

4.2 Combination of P and their host

P are heads and the host phrase is their complement in our analysis. Their combination is described following the syntactic rule HEAD-COMPLEMENT[7]:

(37) $\begin{bmatrix}\text{HEAD}[2]\\ \text{COMPS}<\ >\end{bmatrix} \rightarrow [\text{SYNSEM}[1]]\ ,\ \begin{bmatrix}\text{HEAD}[2]\\ \text{COMPS}<[\text{SYNSEM}[1]]>\end{bmatrix}$

The mother phrase inherits the HEAD value from P according to the Head Feature Principle. So, all 3 parts are given the same HEAD value:

(38) $\begin{bmatrix}\text{HEAD}/[2]\\ \text{COMPS}<\ >\end{bmatrix} \rightarrow [\text{HEAD}[2]]\ ,\ \begin{bmatrix}\text{HEAD}/[2]\\ \text{COMPS}<[\text{SYNSEM}[1][\text{HEAD}[2]]]>\end{bmatrix}$

Now let's see some examples. With an NP complement, P constitute a direct or oblique NP with a specified MARKING value, as follows:

(39) a. Paul-i 'Paul-*nom*' $\begin{bmatrix}\text{HEAD}[2]\\ \text{MARKING } ga\end{bmatrix} \rightarrow$

Paul [1] $\begin{bmatrix}\text{HEAD}[2]\begin{bmatrix}noun\\ \text{CAS } direct\end{bmatrix}\end{bmatrix}$, -i $\begin{bmatrix}\text{HEAD}[2]\\ \text{MARKING } ga\\ \text{COMPS}<[1]>\end{bmatrix}$

b. doseogwan-eseo 'library-*loc*' $\begin{bmatrix}\text{HEAD}\begin{bmatrix}noun\\ \text{CASE } oblique\end{bmatrix}\\ \text{MARKING } unmarked\end{bmatrix} \rightarrow$

doseogwan [1] $\begin{bmatrix}\text{HEAD}[2]\begin{bmatrix}noun\\ \text{CAS } direct\end{bmatrix}\end{bmatrix}$, -eseo $\begin{bmatrix}\text{HEAD}[\text{CASE } oblique]/[2]\\ \text{MARKING } unmarked\\ \text{COMPS}<[1]>\end{bmatrix}$

-i in (39a) share the HEAD value and constitute a direct NP. It percolates also its MARKING value to the mother phrase. *-eseo* in (39b) doesn't share the CASE value and gives an oblique NP.

P gives an AdvP or a VP in the same way, if the complement is an AdvP or a VP:

(40) a. ppalli-man 'fast-only' $\begin{bmatrix}\text{HEAD}[2]\\ \text{MARKING } unmarked\end{bmatrix} \rightarrow$

ppalli [1] $[\text{HEAD}[2][adverb]]$, -man $\begin{bmatrix}\text{HEAD}[2]\\ \text{MARKING } unmarked\\ \text{COMPS}<[1]>\end{bmatrix}$

[7] The rule places the complement before the head, reflecting the order in Korean.

b. ga-ji-neun ‘go-*Comp-top*’ $\begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{VFORM } \textit{ji} \end{bmatrix} \\ \text{MARKING } \textit{v – marked} \end{bmatrix}$ →

ga-ji [1] $\begin{bmatrix} \text{HEAD} [2] \begin{bmatrix} \textit{verb} \\ \text{VFORM } \textit{ji} \end{bmatrix} \end{bmatrix}$, -neun $\begin{bmatrix} \text{HEAD} [2] \\ \text{MARKING } \textit{v – marked} \\ \text{COMPS} < [1] > \end{bmatrix}$

-man in (40a) select an AdvP complement and forms an unmarked AdvP while a v-marked VP is composed by *-neun* in (40b).

When a phrase has 2 or more P, it is constructed by successive combinations activated by the HEAD-COMPLEMENT rule, as follows:

(41) a. doseogwan-eseo [1] $\begin{bmatrix} \text{HEAD} [2] \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{oblique} \end{bmatrix} \\ \text{MARKING } \textit{unmarked} \end{bmatrix}$, -man $\begin{bmatrix} \text{HEAD} [2] \\ \text{MARKING } \textit{unmarked} \\ \text{COMPS} < [1] > \end{bmatrix}$

→ doseogwan-eseo-man $\begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{oblique} \end{bmatrix} \\ \text{MARKING } \textit{unmarked} \end{bmatrix}$

b. doseogwan-eseo-man [3] $\begin{bmatrix} \text{HEAD} [4] \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{oblique} \end{bmatrix} \\ \text{MARKING } \textit{unmarked} \end{bmatrix}$, -i $\begin{bmatrix} \text{HEAD} [4] \\ \text{MARKING } \textit{ga} \\ \text{COMPS} < [3] > \end{bmatrix}$

→ doseogwan-eseo-man-i $\begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{oblique} \end{bmatrix} \\ \text{MARKING } \textit{ga} \end{bmatrix}$

The NP *doseogwan-eseo-man-i* is constructed by 3 combinations: the second and the third ones are given in (41) and the first one in (39b).

When several P appear together, there are 2 ordering restrictions, as mentioned in 3.2: oblique P come first and marking P come last (see also the example (6)).

(42) a. doseogwan-eseo-man-i ‘library-*loc*-only-*nom*’
b. *doseogwan-man-eseo-i ‘library-only-*loc-nom*’
c. *doseogwan-eseo-i-man ‘library-*loc-nom*-only’
d. *doseogwan-i-eseo-man ‘library-*nom-loc*-only’

(42b-d) are ruled out, because P are arranged in a bad order. For example, (42d) has 2 violations: an oblique P *-eseo* doesn’t come first and a marking P *-i* doesn’t come last. These restrictions can be represented as follows:

(43) a. $\begin{bmatrix} \text{HEAD} [\text{CASE } \textit{oblique}] / [1] \\ \text{COMPS} < [\text{HEAD} [1]] > \end{bmatrix} < \begin{bmatrix} \text{HEAD} / [1] \\ \text{COMPS} < [\text{HEAD} [1]] > \end{bmatrix}$

b. $[\text{MARKING } \textit{unmarked}] \quad < \quad [\text{MARKING } \textit{marked}]$

And the second restriction may be redefined as "P select an unmarked complement", because only the combination of marking P is strictly ruled out, if we look at the data:

(44) a. 2 unmarked P:
Paul-ege-{lo,man,kkaji} 'Paul-*dat*-{to,only,even}', *etc*.
b. unmarked P + marked P:
Paul-man-{ga,leul,ui,neun,do} 'Paul-only-{*nom*,*acc*,*gen*,*top*,also}',
jib-e-{ga,leul,ui,neun,do} 'house-*loc*-{*nom*,*acc*,*gen*,*top*,also}', *etc*.
c. 2 marked P:
*Paul-{ga,leul,ui,neun,do}-{ga,leul,ui,neun,do}

The redefined restriction is integrated to the description of P by adding the feature [MARKING *unmarked*] in their COMPS value (see the feature structure in (34)).

4.3 Descriptions of the verb

Finally, we show how phrases headed by P are described in the verb, when they appear in a larger context. Let's start by the basic case that they appear as an argument of a verb:

(45) Paul-i sagwa-leul Mary-ege bonae-ss-da.
Paul-*nom* apple-*acc* Mary-*dat* sent.
Paul sent apples to Mary.

The verb selects 3 arguments. 2 are direct NP appearing as subject and direct object respectively and the third argument is an oblique NP. And the subject and the direct object are followed by different marking P: *-i* and *-eul*.

(46) bonae-ss-da 'sent'

$$\begin{bmatrix} \text{SUBJ} < \text{NP}\begin{bmatrix} \text{HEAD}\vert\text{CASE}\ \textit{direct} \\ \text{MARKING}\ \textit{ga} \end{bmatrix} > \\ \text{COMPS} < \text{NP}\begin{bmatrix} \text{HEAD}\vert\text{CASE}\ \textit{direct} \\ \text{MARKING}\ \textit{leul} \end{bmatrix}, \text{NP}[\text{CASE}\ \textit{oblique}] > \end{bmatrix}$$

These marking P can be omitted and be replaced by *-(n)eun* or *-do*. But they can't replace each other. The oblique object accepts also some marking P:

(47) a. Paul-(i) sagwa-(leul) Mary-ege bonae-ss-da.
b. Paul-{i,*eul,neun,do} sagwa-{*i,leul,neun,do}
Paul-{*nom*,**acc*,*top*,also} apple-{**nom*,*acc*,*top*,also}
Mary-ege-{*ga,leul,neun,do} bonae-ss-da.
Mary-*dat*-{**nom*,*acc*,*top*,also} sent.

The fact requires to correct the MARKING values in (46) and to add a new MARKING value to the oblique object:

(48)
$$\left[\begin{array}{l}\text{SUBJ} < \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{direct}\\ \text{MARKING}\,[1]:[1]\leq \textit{ga}\ \text{or}\ \textit{unmarked}\end{array}\right] > \\ \text{COMPS}\left\langle \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{direct}\\ \text{MARKING}\,[2]:[2]\leq \textit{leul}\ \text{or}\ \textit{unmarked}\end{array}\right], \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{oblique}\\ \text{MARKING}\,[3]:[3]\leq \textit{leul}\ \text{or}\ \textit{unmarked}\end{array}\right]\right\rangle\end{array}\right]$$

It is the description of the verb *bonae-ss-da* concerning its arguments and the syntactic restrictions imposed on them. The MARKING values described in a complex form show the range of possible values on the value set for the MARKING feature in (31). For example, "[1]:[1]≤*ga* or *unmarked*" in (48) means: [1] is the subject's MARKING value ; [1] is a value equal or superior to *ga*, (i.e. *ga* ou its supertype) or a value that is *unmarked*.

The restrictions on the arguments vary according to each verb. Let's put in (45) another verb *ju-eoss-da* selecting also 3 arguments:

(49) a. Paul-(i) sagwa-(leul) Mary-(ege) ju-eoss-da.
Paul-*nom* apple-*acc* Mary-*dat* gave.
Paul gave an/the apple to Mary.
b. Paul-{i,*eul,eun,do} sagwa-{*ga,leul,neun,do}
Mary-ege-{*ga,leul,neun,do} ju-eoss-da.
c. Paul-i sagwa-leul Mary-{*ga,leul,neun,do} ju-eoss-da.

The subject and the direct object have the same restrictions: their marking P can be omitted and replaced by *-(n)eun* and *-do*. But the restrictions on the oblique object are different: the verb accepts now the omission of the oblique P. So the verb has a different description for the oblique complement[8]:

(50) ju-eoss-da
$$\left[\begin{array}{l}\text{SUBJ} < \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{direct}\\ \text{MARKING}\ [1]:[1]\leq \textit{ga}\ \text{or}\ \textit{unmarked}\end{array}\right] > \\ \text{COMPS}\left\langle \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{direct}\\ \text{MARKING}\ [2]:[2]\leq \textit{leul}\ \text{or}\ \textit{unmarked}\end{array}\right], \text{NP}\left[\begin{array}{l}\text{HEAD}\,|\,\text{CASE}\ \textit{direct}\ \text{or}\ \textit{oblique}\\ \text{MARKING}\ [3]:[3]\leq \textit{leul}\ \text{or}\ \textit{unmarked}\end{array}\right]\right\rangle\end{array}\right]$$

[8] It is of course possible to give 2 descriptions to the verb: one containing an oblique complement and the other containing 2 direct complements.

The second case is the AdvP followed by a P that appears as adjunct:

(51) Paul-i bab-eul manhi-{*ga,leul,neun,do} meog-eoss-da.
Paul-*nom* meal-*acc* much-{*nom*,*acc*,*top*,also} ate.
Paul ate the meal much.

The adjunct may be followed by several marking P but not by *-i/ga* in (51), whereas the adverb can appear with it in other contexts:

(52) bi-ga manhi-ga naeli-eoss-da.
rain-*nom* much-*nom* fell.
It rained much.

So it is the verb and not the adverb that rejects *-i/ga* in (51). In other words, the verb imposes restrictions on the adjunct's MARKING value. Then it must include the adjunct in its description, even though it is not argument. We put it in its COMPS and the adverb in (53) is noted as follows:

(53) meog-eoss-da

$$\left[\begin{array}{l}\text{SUBJ} < \text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{direct}\\ \text{MARKING}\,[1]:[1] \leq \textit{ga} \text{ or } \textit{unmarked}\end{array}\right] > \\ \text{COMPS}\left\langle \begin{array}{l}\text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{direct}\\ \text{MARKING}\,[2]:[2] \leq \textit{leul} \text{ or } \textit{unmarked}\end{array}\right], \\ \text{AdvP}[\text{MARKING}\,[3]:[3] \leq \textit{leul} \text{ or } \textit{unmarked}]\end{array}\right\rangle\end{array}\right]$$

The verb in (52) allows all marking P except *-ui* to the adverb, so it includes a description: COMPS < AdvP[MARKING [1]:[1]≥*v-marked* or *unmarked*] >.

The final case is the following example, repeated from (21a):

(54) gongbuha-gi-neun doseogwan-eseo-*(ga) joh-da.
study-nominalizer-*top* library-*loc*-*(*nom*) is good.
the library is a good place to study in.

-i/ga after the oblique NP is not optional. It may be replaced by *-(n)eun* and *-do*, as shown in (23), while the verb refuses *-(l)eul*. *-i/ga* become optional again, if the oblique NP is replaced by a direct NP:

(55) gongbuha-gi-neun doseogwan-(i) joh-da.
study-nominalizer-*top* library-(*nom*) is good.
the library is a good place to study.

From the observation can be drawn following 2 descriptions:

(56) joh-da

a. $\left[\begin{array}{l}\text{SUBJ} < \text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{oblique} \\ \text{MARKING}\,[1]:[1] \leq \textit{ga}\end{array}\right] > \\ \text{COMPS} < \text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{direct} \\ \text{MARKING}\,[2]:[2] \leq \textit{ga} \text{ or } \textit{unmarked}\end{array}\right] >\end{array}\right]$

b. $\left[\begin{array}{l}\text{SUBJ} < \text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{direct} \\ \text{MARKING}\,[1]:[1] \leq \textit{ga} \text{ or } \textit{unmarked}\end{array}\right] > \\ \text{COMPS} < \text{NP}\left[\begin{array}{l}\text{HEAD}\vert\text{CASE } \textit{direct} \\ \text{MARKING}\,[2]:[2] \leq \textit{ga} \text{ or } \textit{unmarked}\end{array}\right] >\end{array}\right]$

The verb in (56a) takes an oblique NP subject and doesn't accept an unmarked NP as subject. In contrast, it selects a direct NP subject and accepts an unmarked NP as subject in (56b).

Now it seems more comprehensible why marking P may not be omitted in (54). The verb selects a direct NP for subject but the subject in (54) is not a direct NP. In other words, *joh-da* requires that the subject have a *direct* value for the CASE feature. If this requirement is not satisfied, like in (54), the verb imposes on the subject a second condition that it should have a *marked* value for the MARKING feature. Therefore, an unmarked NP can't appear as its subject. A similar reasoning seems also possible to account for the following example:

(57) gongbuha-gi-neun honja-*(ga) joh-da.
study-nominalizer-*top* alone-*(*nom*) is good.
Being alone is good to study.

An AdvP appears as subject but doesn't satisfy the verb's first condition. Then it needs a *marked* value required by the verb as second condition and hence it must be an AdvP constituted by a marking P.

5 Conclusion

We proposed an analysis of Korean P and showed its description with HPSG.

Our analysis is based on two main ideas: Korean P are clitics attaching to the preceding lexical item in the phonology and weak syntactic heads sharing syntactic feature values of the complement phrase. To justify these ideas, we tried to show differences between P and suffixes, possible accounts for P's suffix-like behaviours, P's qualifications for syntactic heads and similarities between the mother phrase and P's host phrase.

Our analysis is described within HPSG via a feature [CL +] and feature structure sharing within P and their complement. Then P percolate not only shared feature values but also their own feature values, if there are any, up to

the mother phrase. So the latter has similar properties to the complement and shows different behaviours also.

During the discussion, we redefined also certain factors. We assumed only two values for CASE: *direct* and *oblique* and introduced MARKING feature to P. This helped us to revise P's classification into 3 subtypes: marking P, oblique P and semantic P. The first P has the MARKING feature with a marked or more specified value. The second P has the CASE feature with an oblique value. The third P don't have specified values for syntactic features. So they are heads but the mother phrase has the same syntactic properties as the complement, while the other two types give rise to syntactic differences between the mother phrase and the complement.

References

Abeillé, Anne, Godard, Danièle, Bonami, Olivier & Jesse Tseng. 2005. The syntax of French à and de: An HPSG analysis. In Patrick Saint-Dizier (ed.), *Dimensions of the syntax and the semantics of prepositions*, Dordrecht: Kluwer. pp. 147-162.

Bratt, Elizabeth. 1996. *Argument composition and the lexicon: Lexical and periphrastic causatives in Korean*. Ph.D. dissertation, Stanford University.

Chae, Hee-Rahk & No, Yongkyoon. 1998. A Survey of Morphological Issues in Korean. *Korean Linguistics* 9. pp. 65-109.

Choi, Dong Ju. 1997. A Syntactic Study on the 'Semantic Particles' in Modern Korean. *gugeohag* 30.1. pp. 201-224.

Han, Jeong-Han. 2003. *Case Markers are not Syntactic Heads*, *hangeul* 260. pp. 149-182.

Im, Hong Pin. 1999. gugeo myeongsaguwa josaguui tongsa gujoe daehayeo (on the syntactic structure of noun phrase and postposition phrase in Korean, en coréen), *gwanageomunyeongu* 24-1. pp. 1-62.

Kim, Jong-Bok & Choi, Incheol. 2005. The Korean Case System: A Unified, Constraint-based Approach. *Language Research* 40.4. pp. 885-921.

Ko, Kil Soo. 2007. Are There Really Grammatical Case Postpositions in Korean ?, *Linguistic Research* 24-1, Kyunghee University. pp. 25-42.

Ko, Kil Soo. in press. Les postpositions du coréen en HPSG, in J. Tseng (ed), *Prépositions et Postpositions*, Hermes Lavoisier.

Monachesi, Paola. 1998. Decomposing Italian clitics, In S. Balari & L. Dini (eds.) *Romance in HPSG*. CSLI Publications. Stanford. pp. 305-357.

Nam, Y.-J. 1996. gugeo josaui munbeobjeog wichi (grammatical status of Korean postpositions), *ulsaneomunjib* 11. pp. 193-215.

O'Grady, William. 1991. *Categories and case: The sentence structure of Korean*. Philadelphia: Benjamins.

POLLARD, C. and SAG, I. 1994. *Head-Driven Phrase Structure Grammar*. Chicago:University of Chicago.

SAG, I., T. WASOW & BENDER. E. 2003. *Syntactic theory: a formal introduction*, Stanford : CSLI Publications.

Sells, Peter. 1995. Korean and Japanese morphology from a lexical perspective. *Linguistic Inquiry* 26. pp. 277-325.

Tseng, Jesse. 2002. Remarks on Marking, in *Proceedings of the 8th International Conference on Head-Driven Phrase Structure Grammar*. CSLI Publications. pp. 267–283.

Tseng, Jesse. 2003. EDGE Features and French Liaison. In J.-B. Kim et S. Wechsler (eds), in *Proceedings of the 9th International Conference on Head-Driven Phrase Structure Grammar*, CSLI Publications. pp. 313-333.

Yoo, Eun-Jung. 2002. Auxiliary Verbs and Structural Case Assignment in Korean. *Language Research* 38.4. pp. 1069-1036.

Yoon, James Hye-Suk. 1995. Nominal, Verbal, and Cross-Categorial Affixation in Korean. *Journal of East Asian Linguistics* 4. pp. 325-356.

Zwicky, A. M. & Pullum, G. K. 1983. Cliticization vs. inflection: English N'T, *Language* 59.3. pp. 502-513.

French predicative verbless utterances

Frédéric Laurens
Université Paris 7

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 152–172

Laurens, Frédéric. 2008. French predicative verbless utterances. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 152–172. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.9.
CC-BY 4.0

Abstract

This paper focuses on a specific type of verbless utterance, labeled PVU, which is defined by two properties:

- PVUs are not discourse fragments.
- PVUs can host a phrase in their right periphery which is coreferential with their external argument. This phrase is labeled α-phrase.

PVUs are analyzed as clausal predicative phrases. Although PVUs can have various illocutionary forces, their content type is constrained by their syntactic form. As for α-phrases, they are shown to be right-dislocated phrases. Right-dislocation is analyzed as a local anaphoric phenomenon. This approach is consistent with the anaphoric properties of PVUs' external arguments.

1 Introduction

French verbless utterances fall into at least three categories.[1] *Discourse fragments* form the first category. They convey a clausal meaning. However, this meaning is highly context-dependent. To resolve the meaning of a discourse fragment, it is necessary both to infer the exact type of the fragment and to recover the missing material, which is provided either by an explicit antecedent or by the situational context (Fernández et al. 2007). Short queries are a subtype of discourse fragment (1).

(1) A- Marie est venue. B- Quand?
A- Mary has come. B- When?

Existential verbless utterances make up the second category. They consist in a noun phrase and behave like autonomous presentative constructions. Examples with various illocutionary forces are given in (2).

(2) a. Plus d' argent. [context: after opening one's wallet]
no.more of money
No more money.

b. Quoi de plus formateur que ça?
what of more challenging than that
What is more challenging than that?

c. Que de gens ici!
how.much of people here
How many people there are here!

[†]I thank Jean-Marie Marandin, Anne Abeillé, Olivier Bonami, Danièle Godard, François Mouret and Grégoire Winterstein for their comments.

[1]This picture is somewhat simplified. Adverbs, interjections as well as some verbless idioms are intentionally left aside here (see Laurens 2007).

Predicative verbless utterances form the third category (3). PVUs differ from existential verbless utterances in that only the former have an unrealized external argument which can be made explicit by a phrase appearing in their right periphery (3b). I label such phrases α-phrases for now.

(3) a. Très jolie voiture!
very nice car

b. Très jolie voiture, [celle de Marie]$_\alpha$!
very nice car [that of Mary]

This paper proposes an analysis of PVUs. In the first section, PVUs are shown to be made up of one predicative phrase with clausal properties. The second section focuses on the properties of α-phrases. These are shown to be right-dislocated phrases. An analysis of right-dislocation is subsequently proposed. The analysis is then couched in a constructional version of HPSG.

2 Analysis of PVUs

PVUs are verbless utterances which are not discourse fragments and are compatible with α-phrases. They are constituted of a predicative phrase and display clausal properties.

2.1 A predicative construction

PVUs are made up of one predicative phrase. It can be either an AP (4a), a NP (4b) or a PP (4c).

(4) a. [Très sympathique]$_{AP}$, ton frère.
[very nice] your brother

b. [Bon danseur]$_{NP}$, ton frère.
[good dancer] your brother

c. [Encore en retard]$_{PP}$, ton frère.
[again PREP late] your brother

Adverbial phrases, which are not predicative, are excluded (5).

(5) * [Très rapidement]$_{AdvP}$ que l' affaire a été résolue
[very quickly] that the matter has been solved

Non-predicative APs do not constitute well-formed PVUs (6).

(6) a. * La place est assise
the ticket is seated

b. * Assise, cette place
seated this ticket

Quantifiers like ”tous” (all) ou ”chacun” (each) can appear at the beginning of PVUs (7).

(7) a. Tous très sympathiques, tes amis.
all very nice your friends

b. Chacun dans leur monde, tes amis.
each in their world your friends

Those quantifiers must be analyzed as floating quantifiers rather than subjects of a non-verbal predicate. This is shown by the fact that quantifiers which do not qualify as floating quantifiers do not appear in that position (8).

(8) * Beaucoup très sympathiques, tes amis
many very nice your friends

Moreover, light adverbs such as ”encore” (again) cannot be incidental adverbs in preverbal position (Abeillé and Godard 2001). They can however precede initial quantifiers in PVUs as they can precede floating quantifiers in verbal clauses (9).

(9) a. * Encore tous sont en retard, tes amis
again all are PREP late your friends

b. Encore tous en retard, tes amis.
again all PREP late your friends

Finally, those quantifiers can also be linearized elsewhere within PVUs (10).

(10) En retard, tous, tes amis.
PREP late all your friends.

Interestingly, nouns with an adnominal modifier preferably appear without an indefinite determiner in PVUs (11a) while the indefinite determiner is obligatory when the same predicative noun phrase function as the complement of a verb (11b). The indefinite determiner is also preferably missing in predicative adjuncts (11c).

(11) a. Très bonne idée, d’ avoir apporté du café.
Very good idea to have brought some coffee

b. C’ est *(une) très bonne idée, d’ avoir apporté du café.
This is *(a) very good idea to have brought some coffee

c. Très bonne idée, le projet a néanmois été refusé.
Very good idea the projet has however been rejected

Nevertheless, the indefinite determiner may appear in PVUs (12a) and in predicative adjuncts (12b).

(12) a. ? Une très bonne idée, d' avoir apporté du café.
A very good idea to have brought some coffee

b. ?? Une très bonne idée, le projet a néanmoins été refusé.
A very good idea the projet has however been rejected

Note that this phenomenon is not related to the constraints on bare predicative nominal complements in French which must belong to specific noun classes such as capacity nouns (De Swart et al. 2007).

It may be conjectured that the mandatory presence of the determiner when the predicative noun phrase is the complement of a verb is not triggered by a constraint on predicative noun phrases but rather by a constraint on nominal complements. Thus, the optionality of the determiner in both constructions may support an analysis of determiners as markers or functors rather than subcategorized dependents of the nominal head (see Van Eynde 2003). [2]

2.2 Clause type properties

It has been observed by Marandin (in prep) that declarative clauses are unmarked in French while verbal clauses of other types (exclamative, imperative and interrogative clauses) feature an item which crucially contributes to the construal of their type of content (a parameter for interrogatives, a degree quantifier for exclamatives). This can be observed in PVUs as well.

Selectional properties of verbs have been used to test the semantic content of clauses (Grimshaw 1979, Ginzburg and Sag 2001). However, this can be done only partially for PVUs because some of them never function as the complement of a verb. However, it has been noted by (Beyssade and Marandin 2006) that illocutionary tags show semantic selectional properties as well (14). This is also true of evaluative adverbs (not shown here).

[2] Note that when no adnominal modifier is present an indefinite modifier is required. This is also the case with some prenominal modifier such a "vrai" (true) (13).

(13) a. Une (vraie) catastrophe, qu' il soit malade.
a (true) disaster that he is sick

b. ?? Vraie catastrophe, qu' il soit malade
true disaster that he is sick

c. ?? Catastrophe, qu' il soit malade
disaster that he is sick

(14)

Tags	Felicitous with	Resulting type of call-on-addressee
sans indiscretion *just for information*	declarative clauses interrogative clauses	question
n'est-ce pas *isn't it so*	declarative clauses exclamative clauses	question
oui ou non *yes or no*	declarative clauses polar interrogative clauses	question
point barre *period*	declarative clauses imperative clauses	assertion outcome

Testing which PVUs can be combined with each of these items, three patterns can be observed. These patterns correlate, as expected, with the presence of specific items within the PVU. PVUs containing an interrogative wh-word behave like interrogative clauses (15).

(15) a. Sans indiscrétion, à quelle heure, le prochain train?
without indiscretion at what time the next train

b. # A quelle heure, le prochain train, n'-est-ce pas?
at what time the next train NE-is-this not

c. # A quelle heure, le prochain train, oui ou non?
at what time the next train yes or no

d. # A quelle heure, le prochain train, point barre!
at what time the next train dot bar

PVUs containing exclamative wh-words behave like exclamative clauses (16).

(16) a. # Sans indiscrétion, quel dommage, qu' il-ne-vienne pas?
without indiscretion what.a waste that he-NE-comes not

b. Quel dommage, qu' il-ne-vienne pas, n'-est-ce pas?
what.a waste that he-NE-comes not NE-is-this not

c. # Quel dommage, qu' il-ne-vienne pas, oui ou non?
what.a waste that he-NE-comes not yes or no

d. # Quel dommage, qu' il-ne-vienne pas, point barre!
what.a waste that he-NE-comes not dot bar

Other PVUs, which do not contain any of the items cited above, behave like declarative clauses (17).

(17) a. Sans indiscrétion, encore en retard, ton frère?
without indiscretion again PREP late your brother

b. Encore en retard, ton frère, n'-est-ce pas?
again PREP late your brother NE-is-this not

c. Encore en retard, ton frère, oui ou non?
again PREP late your brother yes or no

d. Toujours en retard, ton frère, point barre!
always PREP late your brother dot bar

There are no PVUs of the imperative type although there are declarative PVUs used with a directive value (as there are declarative clauses used with such a value).

(18) a. Sans indiscrétion, bleu le steak?
without indiscretion rare the steak

b. Bleu le steak, n'-est-ce pas?
rare the steak NE-is-this not

c. Bleu, le steak, oui ou non?
rare the steak yes or no

d. Bleu, le steak, point barre!
rare the steak dot bar

2.3 Clause properties

PVUs can be coordinated with verbal clauses (19). This is expected if they have a clausal content type themselves.

(19) a. Très joli tableau mais il est déjà vendu.
Very nice picture but it is already sold.

b. Une catastrophe, cette crise ou est-ce une chance pour l' économie?
A disaster this crisis or is.it a chance for the economy?

c. Un vrai génie, ce type ou y'a-t-il beaucoup de bruit pour rien.
A true genious this guy or is.there much of fuzz for nothing

The predicative construction underlying PVUs can be complement clauses when it is interrogative (20a) or exclamative (20b). This is however not the case when it is declarative (20c). This is expected since the complementizer "que" (that) requires a finite complement.

(20) a. Je me-demande à quelle heure, le prochain train
I wonder at what time the next train

b. Regarde quelle belle fleur, cette rose
Look what.a nice flower that rose

c. * Je pense (qu') encore en retard, son frère
I think that again in delay your brother

Crucially, the relational content of PVUs is contributed by the predicative phrase and need not be inferred from the context or from the content of a discourse antecedent.

3 Analysis of α-phrases

One of the two defining properties of PVUs is that they license α-phrases. α-phrases are in turn defined by the two following properties. First, they appear in the right periphery of verbless utterances. Then, they are coreferential with the external argument of the verbless utterance's head.

Lefeuvre 1999 analyses α-phrases as subject phrases. However, α-phrases do not exhibit the same properties as French pre- or postverbal subject phrases. In this section, α-phrases are shown to be right-dislocated phrases.

3.1 Properties setting α-phrases apart from subject phrases

α-phrases display at least four properties that set them apart from pre- or postverbal subject phrases (see Bonami et al. 1999).

3.1.1 Optionality of α-phrases

In French, a subject phrase must be realized (21a, 21c), unless the external argument of the finite verb is realized by a pronominal affix (21b).

(21) a. Où va [Marie]$_{SUBJ}$?
where goes Mary
Where does Mary go?

b. Où (Marie) va-t-elle?
where (Mary) goes-she
Where does she/Mary go?

c. * Où va
where goes
intended: Where does she go?

By contrast, the realization of an α-phrase within a PVU is always optional (22), just as right-dislocated phrases are (23).

(22) Très drôle, ([ton histoire]$_{\alpha}$).
very funny ([your story])

(23) Elle est très drôle, ([ton histoire]$_{RD}$).
it is very funny ([your story])

3.1.2 Agreement properties of subjects

The type of agreement observed between subject phrases and non-verbal predicative complements differs from that which is observed between α-phrases and non-verbal predicates.

α-phrases can display an index-type agreement of the kind in (24) with non-verbal predicates.

(24) Très beau, [toutes ces décorations]$_{\alpha}$.
very nice.MSG [all these ornaments].FSG

The same kind of agreement can be observed with right-dislocated phrases when the pronominal expression is ”ce” or ”ça” (this) (25).

(25) C’ est très beau, [toutes ces décorations]$_{RD}$.
this is very nice.MSG [all these ornaments].FSG

This kind of index-type agreement is ungrammatical between subject phrases and predicative complements (26).

(26) a. * [Toutes ces décorations]$_{SUBJ}$ est/sont très beau.
[all these ornaments].FPL is/are very nice.MSG.

b. [Toutes ces décorations]$_{SUBJ}$ sont très belles.
[all these ornaments].FPL is/are very nice.FPL.

3.1.3 Restrictions on subject phrases

French pre- or postverbal subject phrases are submitted to syntactic restrictions. These pertains to category or clause type and do not apply to α-phrases.

French pre- or postverbal subject phrases cannot be prepositional phrases (27).

(27) a. * [Sous ce lit]$_{SUBJ}$ est un vrai bordel.[3]
[under this bed] is a terrible mess

b. * Sais-tu comment est [sous ce lit]$_{SUBJ}$
know-you how is [under this bed]

Prepositional phrases can however be α-phrases (28) as well as right-dislocated phrases (29).

(28) Un vrai bordel, [sous ce lit]$_{\alpha}$.
a terrible mess [under this bed]

(29) C’ est un vrai bordel, [sous ce lit]$_{RD}$.
this is a terrible mess [under this bed]

Exclamative clauses cannot be pre- or postverbal subject phrases in French (30).

(30) * [Comme ce moteur tourne vite]$_{SUBJ}$ est vraiment étonnant
[how this engine turns fast] is really incredible

They can however be α-phrases (31) or right-dislocated phrases (32).

(31) Vraiment incroyable, [comme ce moteur tourne vite]$_{\alpha}$.
really incredible [how this engine turns fast]

(32) C' est vraiment incroyable, [comme ce moteur tourne vite]$_{RD}$.
this is really incredible [how this engine turns fast]

3.2 Properties shared by α-phrases and right-dislocated phrases

Not only do α-phrases display properties that are distinct from those of subject phrases, but they also share specific properties with right-dislocated phrases (see De Cat 2002, Villalba 2000).

3.2.1 Incompatibility with quantified noun phrases

Quantified noun phrases cannot be α-phrases (33).

(33) * Encore en retard, [chaque étudiant qui est venu]$_{\alpha}$
Again PREP late [every student that has come]

This is also true of right-dislocated phrases (34).

(34) *Jean le/les recevra, [chaque étudiant qui est venu]$_{RD}$
John him/them receive.FUT [every student that has come]

Pre- or postverbal subject phrases, on the other hand, do not show this property (35).

(35) C' est le film qu' a vu [chaque étudiant qui est venu]$_{SUBJ}$.
this is the movie that has seen [every student that has comed]

3.2.2 Incompatibility with restrictive adverbs like "seulement" (only)

An α-phrase cannot be a noun phrase containing a restrictive adverb like "seulement" (only) (36).

(36) * Encore en retard, [Marie seulement]$_{\alpha}$
Again late [Mary only]

This is also true of dislocated phrases (37).

(37) * Elle est encore en retard, [Marie seulement]$_{RD}$
She is again late [Mary only]

Pre- or postverbal subjects do not have this property (38).

(38) C' est le film qu' a vu [Marie seulement]$_{SUBJ}$.
This is the movie that has seen [Mary only]

3.2.3 Incompatibility with omnisyndetic coordinations

An α-phrase cannot be an omnisyndetic coordination (39) (see Mouret 2005).

(39) * Plutôt sympathiques, [et Marie et Jean]$_{\alpha}$
Quite nice [both Mary and John]

This is also true of right-dislocated phrases (40).

(40) * Ils sont plutôt sympathiques, [et Marie et Jean]$_{RD}$
They are quite nice [both Mary and John]

Pre- or postverbal subjects do not have this property (41).

(41) C' est le film qu' ont vu [et Marie et Jean]$_{SUBJ}$.
This is the movie that have seen [both Mary and John]

3.2.4 α-phrases and associative anaphora

Right-dislocation usually involves coreference. Less frequently, it may resort to associative anaphora (42a). This is also the case with left-dislocation (42b).

(42) a. J'adore la couleur du bois, [ta nouvelle chaise]$_{RD}$.
I love the color of the wood [your new chair].

b. [Ta nouvelle chaise]$_{LD}$, j'adore la couleur du bois.
[Your new chair], I love the color of the wood.

Associative anaphora is also found in PVUs (43). Since associative anaphora only holds between noun phrases, it only involves nominal PVUs. In this case, there is no anaphoric link between the right-dislocated phrase and the external argument of the head noun phrase.

(43) Très beau bois, [ta nouvelle chaise]$_{RD}$.
Very nice wood [your new chair].

Lefeuvre 1999 proposes to relate the asymmetry between the properties of α-phrases and subject phrases to the category of the head phrase (verb vs. non-verb). Such a proposal cannot account for the fact that α-phrases precisely have the properties of right-dislocated phrases.

3.3 Properties of right-dislocation in French

A key syntactic feature of PVUs is that they license a right-dislocated phrase which is coindexed with their external argument. Thus, an analysis of right-dislocation is needed to obtain a full characterization of PVUs.

3.3.1 General properties

Leaving aside associative anaphora, right-dislocated phrases are typically licensed by some anaphoric expression. French anaphoric expressions include pronominal affixes (44a), strong pronouns (44b), possessive determiners or adjectives (44c), nounless noun phrases (44d) and the unrealized argument of imperative verb forms (44e).

(44) a. Paul lui$_i$-a déjà parlé, [à Marie]$_{RDi}$.
Paul him[A]-has already talked [A Mary]

b. On-m'-a déjà présenté à [lui]$_i$, [Paul]$_{RDi}$.
One-me-has already presented A [him] [Paul]

c. [Son]$_i$ livre est intéressant, [à Marie]$_{RDi}$.
[His] book is interesting [A Mary]

d. [Le rouge]$_i$ est intéressant, [de livre]$_{RDi}$.
[The red] is interesting [DE book]

e. Entrons, [nous aussi]$_{RD}$.
Go.in [us too]

Each anaphoric expression can be associated with only one right-dislocated phrase at a time (45).

(45) * Quel bel animal, [le sien], [ce chien].
What nice animal [the hers] [this dog]

Right-dislocated phrases can be licensed by an anaphoric expression which is contained within a right-dislocated phrase (47a, 47b).[4]

(47) a. Très beau, [son chapeau]$_{RD}$, [à Jean]$_{RD}$.
very nice [his hat] [A John]

b. Très belle, [la sienne]$_{RD}$, [de voiture]$_{RD}$.
very nice, [the hers], [DE car]

[4] Associative anaphora is also observed between two right-dislocated phrases (46).

(46) Très beau, [le bois]$_{RD}$, [ta nouvelle chaise]$_{RD}$.
very nice, [the wood] [your new chair].

The form of the right-dislocated phrase is constrained by the licensing anaphoric expression (48, 49).

(48) a. Incroyable, [que Marie soit venue]$_{RD}$.
Unbelievable [that Mary is.SBJV come]

b. * Incroyable, [que Marie est venue]$_{RD}$
Unbelievable [that Mary is.IND come]

(49) a. Très vrai, [que Marie est venue]$_{RD}$.
Very true [that Mary is.IND come]

b. * Très vrai, [que Marie soit venue]$_{RD}$
Very true, [that Mary is.SBJV come]

Right-dislocated phrases are islands for certain types of extraction (50).

(50) a. Je-trouve ça$_i$ incroyable, [que Marie soit venue trois fois]$_i$
I-find that incredible that Mary is come three times

b. *Combien de fois trouves-tu ça$_i$ incroyable, [que Marie soit venue]$_i$
How.much of times find-you that incredible that Mary is come

3.3.2 Locality

Right-dislocation is more local than left-dislocation. A right-dislocated phrase must always appear within the clause that contains the licensing anaphoric expression (Right Roof Constraint). This is shown by the contrast between (51a) and (51b).

(51) a. L' homme [qui lui$_i$-a parlé, [à Marie]$_i$], est venu.
The man [who her[A]$_i$-has talked [A Mary]$_i$] is come

b. * L' homme [qui lui$_i$-a parlé] est venu, [à Marie]$_i$.
The man [who her[A]$_i$-has talked] is come [A Mary]$_i$

In fact, right-dislocated phrases bind the anaphoric expression that licenses them in their clausal domain.

3.3.3 Properties of the coindexation

No other phrase can be coindexed with an anaphoric expression bound by a right-dislocated phrase.[5] This can be shown in contexts where coreference between two expressions can only be established using a pronominal expression as in (52a).

[5]This is also true of left-dislocated phrases.

(52) a. Ils$_i$ voulaient que Paul leur$_i$ lise des histoires.
They$_i$ wanted Paul to read them$_i$ stories.

b. Ils$_i$ voulaient que Paul lise des histoires [aux enfants]$_{*i}$.
They$_i$ wanted Paul to read stories [to the children]$_{*i}$

When the pronoun "leur" is bound by a right-dislocated phrase as in (53), the coindexation between the two pronominal expressions which is grammatical in (52a) becomes ungrammatical.

(53) Ils$_i$ voulaient que Paul leur$_{\{*i,j\}}$ lise des histoires, [aux enfants]$_{RDj}$.
They$_i$ wanted Paul to read them$_{\{*i,j\}}$ stories, [the children]$_{RDj}$.

Contrastively, the coindexation of the two pronominal expressions is possible if the right-dislocated phrase binds the pronominal expression "ils" because "leur" is not bound by a right-dislocated phrase (54).

(54) Ils$_i$ voulaient que Paul leur$_i$ lise des histoires, les enfants$_i$.
They wanted that Paul them[A] read some stories the children

We observe the same coindexation constraints for binding as those we have just observed for coreference. It is known that a quantifier can bind a pronominal variable or a nounless noun phrase which is inside a right dislocated phrase (Cecchetto 1999) 55.

(55) [Chaque homme]$_i$ en$_j$ rêve, [des livres qu' il$_i$ lit]$_{RDj}$.
[Every man] them[DE] dreams, [the[DE] books that he reads]

In donkey sentences, the quantifier can bind a pronoun or a nounless NP inside a right-dislocated phrase. In such a configuration, it is observed that bindable right-dislocated phrases (such as nounless noun phrases) are grammatical while non-anaphoric noun phrases are not (56, 57).

(56) a. A- Les ânes rouges sont toujours malheureux.
A- Red donkeys are always unhappy.

b. B'- Tout homme qui a des ânes$_i$ colorés bat les rouges$_i$.
B'- Every man who has colored donkeys beats the red ones.

c. B"- Tout homme qui a des ânes$_i$ colorés les$_i$ bat, [les rouges]$_i$.
B"- Every man who has colored donkeys beats them, [the red ones].

(57) a. A- Les ânes sont toujours malheureux.
A- Donkeys are always unhappy.

b. B'- *Tout homme qui a des ânes$_i$ colorés bat les ânes$_i$.
B'- Every man who has colored donkeys beats the donkeys.

c. B”- *Tout homme qui a des ânes$_i$ colorés les$_i$ bat, [les ânes]$_i$.
B”- Every man who has colored donkeys beats them, [the donkeys].

Thus, (56c) is parallel to (55).

The same constraints on anaphoric relations apply in PVUs. This is hard to show because discourse constraints on coreference are weaker than coindexation constraints
within clauses. Consider however the discourse sequences in (58).

(58) a. Qui est le plus fort? Le nouveau? Très intelligent en effet.
Who is the best? The new guy? Very intelligent indeed.

b. Qui est le plus fort? [Le nouveau]$_i$? Très intelligent en effet, Jean$_i$.
Who is the best? [The new guy]? Very intelligent indeed, John.

c. #Qui est le plus fort? [Le nouveau]$_i$? Très intelligent en effet, Jean$_j$.
Who is the best? [The new guy]? Very intelligent indeed, John.

The short query ”the new guy?” makes explicit a biased answer to the preceding question. The following PVU is then interpreted as a comment on ”the new guy” which is the expected answer to the question (58a). If there is a right-dislocated phrase in the PVU, it must be interpreted as coreferent with ”the new guy” as in (58b). Else, the discourse sequence is not well-formed (58c).

4 HPSG analysis

The HPSG analysis presented here builds upon the constructional analysis of clause types proposed by Ginzburg and Sag 2001. PVUs are integrated in a modified hierarchy of French phrasal types. PVUs being predicative phrases, an HPSG analysis of predicative lexemes and words is also provided. Finally, an HPSG account of right-dislocation is introduced.

4.1 Predicative lexemes and words

Predicative lexemes, including verbs, are defined as lexemes with a distinguished element on their argument structure list. The recording of the special status of this element which corresponds to the external argument of the lexeme is achieved using a list-valued head feature (XARG) (59) (see Sag 2007). A definition of non-predicative lexemes is given in (60) for comparison.

(59) predicative-lexeme $\Rightarrow$ $\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{XARG} & \langle \boxed{1} \rangle \end{bmatrix} \\ \text{ST-ARG} & \langle \boxed{1} \rangle \oplus \boxed{A} \end{bmatrix}$

(60) non-predicative-lexeme ⇒ $\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{XARG} & \langle\rangle \end{bmatrix} \\ \text{ST-ARG} & \text{list(synsem)} \end{bmatrix}$

The external argument of a predicative lexeme can be realized in more than one fashion. Predicative words can, for example, subcategorize for a subject phrase (61). A null realization of the external argument (62) is also possible as it is the case in PVUs. PVUs are thus subject-saturated.

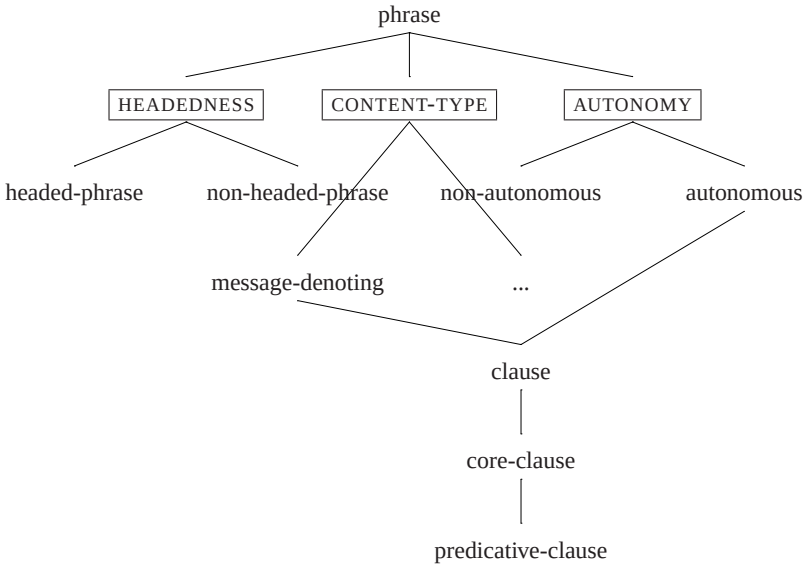
(61) predicative-word-with-subject ⇒ $\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{XARG} & \boxed{1} \end{bmatrix} \\ \text{SUBJ} & \left\langle \boxed{1} \right\rangle \\ \text{ST-ARG} & \left\langle \boxed{1}\ \textit{canonical-synsem} \right\rangle \oplus \boxed{A} \end{bmatrix}$

(62) predicative-word-without-subject ⇒ $\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{XARG} & \boxed{1} \end{bmatrix} \\ \text{SUBJ} & \langle\rangle \\ \text{ST-ARG} & \left\langle \boxed{1}\ \textit{pro-synsem} \right\rangle \oplus \boxed{A} \end{bmatrix}$

4.2 Predicative verbless utterances

Contructional properties of PVUs are introduced within a hierarchy of phrasal types. The hierarchy in (63) displays three dimensions of classification rather than two as in Ginzburg and Sag 2001. The first dimension, labeled HEADEDNESS, is used to distinguish headed phrases and their subtypes from non-headed phrases. The dimension CONTENT-TYPE is used to distinguish phrases with a clausal content type (message type) from phrases with other content types. Finally, the dimension AUTONOMY distinguishes phrases whose content is context-sensitive like discourse fragments from phrases whose content is not context-sensitive.

(63)



Clauses are defined as a subtype of *message-denoting-phrase* and *autonomous-phrase*. They have an empty SUBJ list (64).

(64) clause ⇒ message-denoting & autonomous & $\left[\text{SUBJ}\ \langle\rangle\right]$

As in Ginzburg and Sag 2001, the type *core-clause* stands for any clause which is not a modifier (65).

(65) core-cl ⇒ clause & $\left[\text{MOD}\ \textit{none}\right]$

A *predicative-clause* type corresponding to PVUs is introduced. It is a core-clause which cannot be embedded. Its head is non-verbal and predicative. No subject phrase is realized. The content of the clause is contributed by its head daughter (66).

(66) predicative-cl ⇒ core-cl & $\left[\begin{array}{ll}\text{IC} & + \\ \text{HEAD} & \left[\begin{array}{l}\textit{non-verbal} \\ \text{XARG}\left\langle \textit{pro-synsem} \right\rangle\end{array}\right] \\ \text{CONT} & \left[\text{SOA}\left[\text{NUCL}\left[\text{MSG-ARG}\ \boxed{2}\right]\right]\right] \\ \text{HD-DTR} & \left[\text{CONT}\ \boxed{2}\right]\end{array}\right]$

The predicative clause type has three subtypes which have each a distinctive content-type (67).

(67) a. declarative-clause ⇒ core-clause & $\left[\text{CONT}\ \textit{proposition}\right]$

b. exclamative-clause ⇒ core-clause & $\left[\text{CONT}\ \textit{exclamation}\right]$

c. interrogative-clause ⇒ core-clause & $\left[\text{CONT}\ \textit{question}\right]$

Table (68) displays the three subtypes of PVUs.

(68)

type	inherits from	example
declarative-predicative-cl	predicative-cl declarative-cl head-only-ph	Encore en retard. He's late again.
exclamative-predicative-cl	predicative-cl exclamative-cl head-only-ph	Quel dommage! What a pity!
interrogative-predicative-cl	predicative-cl interrogative-cl head-only-ph	A quelle heure? At what time is it?

4.3 Right-dislocation

Right-dislocation involves coindexation between an anaphoric expression and a right-dislocated phrase as well as opacity of the anaphoric expression for other binding relations. It also involves connectivity constraints between the anaphoric expression and the right-dislocated phrase (see examples 48 and 49 above).

There are a least two options for an accurate HPSG account of right-dislocation: either a lexical account which is based on the properties of anaphoric expressions or a constructional approach based on selectional constraints of right-dislocated phrases regarding the kind of anaphoric expressions contained within their host. The former option is chosen here because the binding properties of anaphoric expressions are affected by the presence of a right-dislocated phrase.

4.3.1 Anaphoric expressions

Anaphoric expressions are either free (having a source in the discourse) or bound by a right-dislocated phrases in the clausal domain. Thus, two types of anaphoric expressions reflecting these properties must be defined. Two set-valued context features are introduced: ANTEC which keeps track of the source required by anaphoric expressions and R-DISL which keeps track of right-dislocated phrases licensed by anaphoric expressions. No anaphoric expression can both require a source and license a right-dislocated phrase. This is reflected by the type definitions given in (69) and (70).

(69) $$\text{anaphoric-local-with-source} \Rightarrow \& \text{ local } \& \begin{bmatrix} \text{CTXT} & \begin{bmatrix} \text{ANTEC} \left\{ \textit{index} \right\} \\ \text{R-DISL} \{\} \end{bmatrix} \end{bmatrix}$$

(70) $$\text{anaphoric-local-with-right-dislocate} \Rightarrow \text{local } \& \begin{bmatrix} \text{CTXT} & \begin{bmatrix} \text{ANTEC} \{\} \\ \text{R-DISL} \left\{ \textit{local} \right\} \end{bmatrix} \end{bmatrix}$$

An example is given for possessive determiners. The lexical entry in (72) corresponds to the use of the possessive determiner in (71a) while the lexical entry in (72) corresponds to the use of the possessive determiner in (71b).

(71) a. Marie a lu son livre.
Mary has read her/his book

b. [Son]$_i$ livre est vraiment pas mal, [à Marie]$_i$.
[Her] book is really not bad, [A Mary]

(72) a. $$\begin{bmatrix} \text{CONT} & \begin{bmatrix} \text{RELS} \left\{ \begin{bmatrix} \textit{possess-rel} \\ \text{POSSESSOR } \boxed{1} \end{bmatrix} \right\} \end{bmatrix} \\ \text{CTXT} & \begin{bmatrix} \text{ANTEC} \left\{ \boxed{1} \right\} \\ \text{R-DISL} \{\} \end{bmatrix} \end{bmatrix}$$

b. $$\begin{bmatrix} \text{CONT} & \begin{bmatrix} \text{RELS} \left\{ \begin{bmatrix} \textit{possess-rel} \\ \text{POSSESSOR } \boxed{1} \end{bmatrix} \right\} \end{bmatrix} \\ \text{CTXT} & \begin{bmatrix} \text{ANTEC } \{\} \\ \text{R-DISL} \left\{ \begin{bmatrix} \text{MARKING } \grave{a} \\ \text{INDEX } \boxed{1} \textit{ individual} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

By default, the R-DISL set of a phrase is the union of the R-DISL sets of its daughters.

4.3.2 Head-right-dislocated-phrase

A subtype of headed-phrase (head-right-dislocated-phrase) is posited in order to account for the realization of right-dislocated-phrases. It is composed of a head (the host phrase) and a right-dislocated phrase on the right. While an anaphoric expression only licenses one right-dislocated phrase, the R-DISL set can contain more than one element at the level of a clause if it contains more than one licensing expression. When a right-dislocated phrase is realized, the corresponding element is discharged from the R-DISL set (73).

(73) head-right-dislocated-phrase $\Rightarrow$ headed-phrase &
$$\begin{bmatrix} \text{CTXT} \left[\text{R-DISL } \boxed{A} \right] \\ \text{HD-DTR } \boxed{1} \left[\text{CTXT} \left[\text{R-DISL} \left\{ \boxed{2} \right\} \cup \boxed{A} \right] \right] \\ \text{DTRS} \left\langle \boxed{1}, \left[\text{SYNSEM} \left[\text{LOCAL} \left[\boxed{2} \right] \right] \right] \right\rangle \end{bmatrix}$$

The locality constraint on right-dislocation is enforced by (74). Within a phrase, every clause which is not a head must have an empty R-DISL set. Root clauses must also have an empty R-DISL set (not shown here).

(74) $$\left[\text{NHD-DTRS contains} \left(\boxed{A} \textit{clause} \right) \right] \Rightarrow \left[\text{NHD-DTRS contains} \left(\boxed{A} \left[\text{R-DISL } \{\} \right] \right) \right]$$

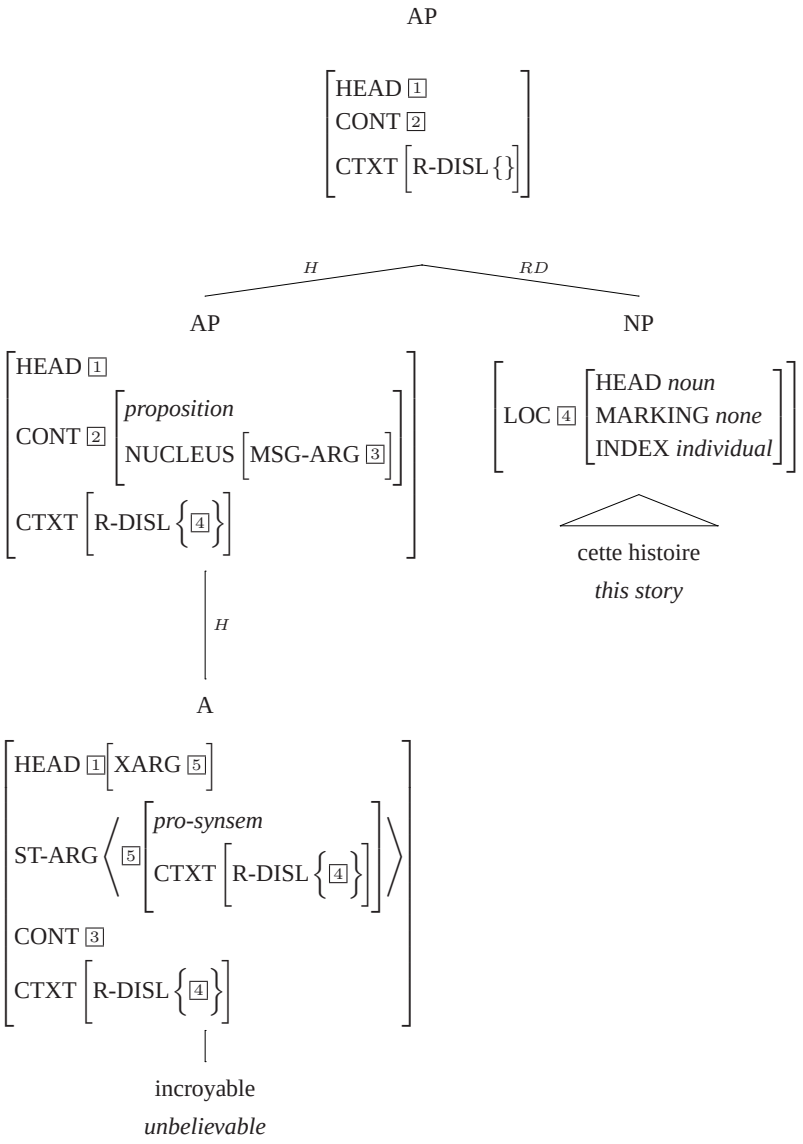
5 Conclusion

PVUs are root clauses whose head is a non-verbal predicative phrase. They never display a subject phrase but they are nevertheless saturated phrases, their external argument being an anaphoric expression.

It has been shown how to integrate PVUs in a hierarchy of French clause types. They are a subtype of headed-phrase and are autonomous in discourse in the sense

that their relational content need not be inferred from the discourse or situational context. Moreover, they show clause type properties. There are declarative, interrogative and exclamative PVUs.

PVUs are compatible with right-dislocated phrases just like verbal clauses are. A right-dislocated phrase can be licensed by the external argument of the PVU. In that case, the external argument of the PVU is opaque for anaphoric relations but the right-dislocated phrase is not. A head-right-dislocated-phrase has been defined to account for the properties of right-dislocation. It is compatible with verbal or non-verbal heads.



References

Abeillé, Anne and Godard, Danièle. 2001. *A class of lite adverbs in French*, pages 9–25. Amsterdam: J. Benjamins.

Beyssade, Claire and Marandin, Jean-Marie. 2006. From complex to simple speech acts: a bidimensional analysis of illocutionary forces. In *Brandial*, Postdam.

Bonami, Olivier, Godard, Danièle and Marandin, Jean-Marie. 1999. Constituency and word order in French subject inversion. In *Constraints and Resources in Natural Language Syntax and Semantics*, pages 21–40, Stanford : CSLI Publications.

Cecchetto, Carlo. 1999. A comparative analysis of left and right dislocation in romance. *Studia Linguistica* 53, 40–67.

De Cat, Cécile. 2002. *French Dislocation*. Ph. D.thesis, University of York, UK.

De Swart, Henriette, Winter, Yoad and Zwarts, Joost. 2007. Bare nominals and reference to capacities. *Natural Language and Linguistic Theory* 25.

Fernández, Raquel, Ginzburg, Jonathan and Lappin, Shalom. 2007. Classifying Non-Sentential Utterances in Dialogue: A Machine Learning Approach. *Comput. Linguist.* 33(3), 397–427.

Ginzburg, Jonathan and Sag, Ivan A. 2001. *Interrogative Investigations: the form, meaning, and use of English Interrogatives*. Stanford, California: CSLI Publications.

Grimshaw, Jane. 1979. Complement selection and the lexicon. *Linguistic inquiry* 10(2), 279–326.

Laurens, Frédéric. 2007. *Analyse et Formalisation des Types de Phrases Averbales du Français*. Masters Thesis, Université Paris Diderot - Paris 7, France.

Lefeuvre, Florence. 1999. *La phrase averbale en français*. Paris: L'Harmattan.

Marandin, Jean-Marie. in prep. les types phrastiques. In Anne Abeillé, Annie Delaveau and Danièle Godard (eds.), *Grande Grammaire du Français*, Bayard Presse.

Mouret, François. 2005. The Syntax of French Conjunction Doubling. In N. Adam, A. Cooper, F. Parrill and T. Wier (eds.), *Proceedings of the 40th Regional Meeting of the Chicago Linguistic Society*, volume 2.

Sag, Ivan A. 2007. Remarks on Locality. In Stefan Müller (ed.), *The Proceedings of the 14th International Conference on Head-Driven Phrase Structure Grammar*, pages 394–414, Stanford: CSLI Publications.

Van Eynde, Frank. 2003. On the Notion 'Determiner'. In Stefan Müller (ed.), *Proceedings of the HPSG-2003 Conference, Michigan State University, East Lansing*, pages 391–396, Stanford: CSLI Publications.

Villalba, Xavier. 2000. *The Syntax of Sentence Periphery*. Ph. D.thesis, Universitat Autonoma de Barcelona, Spain.

Towards a unified account of adjuncts

Yo Sato
King's College
Queen Mary University of London

Wai Lok Tam
Tokyo University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 173–188

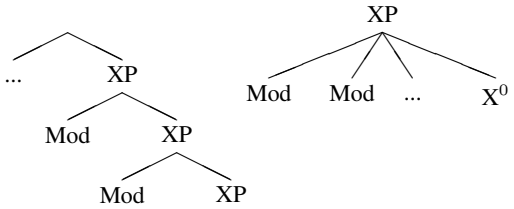
Sato, Yo & Wai Lok Tam. 2008. Towards a unified account of adjuncts. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 173–188. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.10.
CC-BY 4.0

Abstract

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

1 Introduction

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



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

This paper is an attempt towards reconciling the two approaches and find a unifying middle ground. We shall present an analysis that essentially reverts back

[†]We thank Shalom Lappin, Olivier Bonami, three anonymous reviewers and some members of the audience of the conference for their useful comments on the earlier versions of this paper, without which it would have been far less satisfactory.

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

1.1 A-as-C vs. Traditional Accounts

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

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

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

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

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

Here the adverbial *hansikan* ('for an hour') receives accusative case in (a) and nominative in (b). This difference is difficult to explain in the traditional account, but is straightforwardly accounted for if adjuncts are in the domain (such as COMPS) on which the lexical head exerts its case-assignment capacity, as the two lexical heads, verbs *ilkta* ('read') and *philyohata* ('need') respectively subcategorise for accusative and nominative NPs for their external argument.[1]

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

Compositional semantics: It is broadly accepted that a modifier/adjunct is semantically a functor, which takes its modifiee (syntactic head) as its argument, whereas these statuses are reversed for head/arguments. While this semantic difference is easy to accommodate if, as in the traditional analysis, the head-adjunct

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

and head-complement/specifier phrases constitute separate projections, it requires more complication if, as in the A-as-C account, adjuncts and arguments are placed in the same valence feature.

Scope and word order: Adjuncts can be sensitive to scope ambiguity, but their scope behaviour seems more 'linear' than quantified arguments.[2] That is, the most plausible scope reading with multiple adjuncts tends to be the one faithful to the surface word order, as below:

(2) a. Peter trains two hours daily.

b. ? Peter trains daily two hours.

c. * Peter trains daily every week two hours.

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

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

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

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

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

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

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

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

2 Proposal

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

The spirit of the proposal is to make the syntactic head/modifiee and the modifier/adjunct select for each other syntactically *in distinct manners*, by granting to the modifiee a new valence feature with underspecified values. The selectional property of modifier/adjunct over its modifiee is, as in the traditional analysis, encoded in the MOD feature. Additionally, in order to allow a modifiee head to select its modifier as well, the feature ADJS, separate from COMPS, is introduced into lexical heads.[3] It is then an interaction of these two features that enforces the selectional effects while ensuring that the head-complement and head-adjunct phrases form separate projections. The modified feature structure for a lexical head looks like Figure 1.[4]

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

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

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

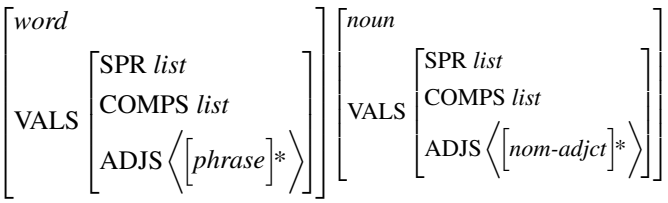


Figure 1: Feature structures of a lexical head with ADJS

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

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

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

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

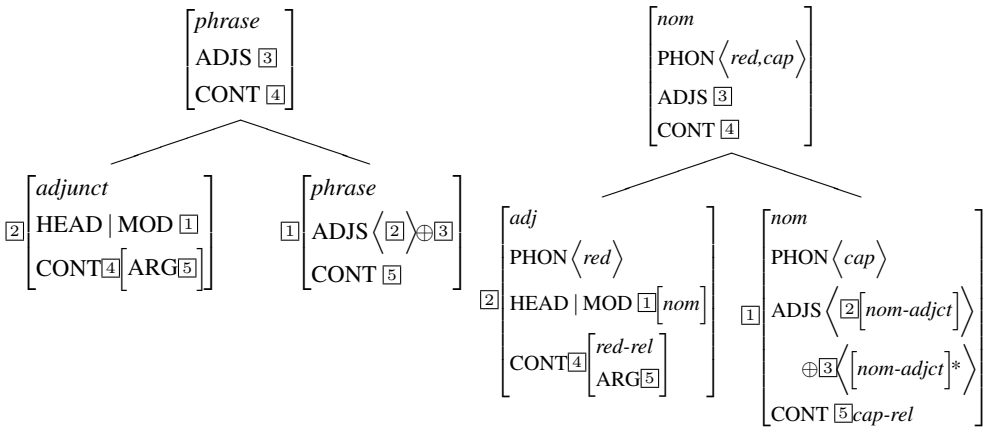


Figure 2: Revised Head-Adjunct Schema and a nominal instantiation

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

3 Examples

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

3.1 Cumulative scoping and extraction

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

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

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

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

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

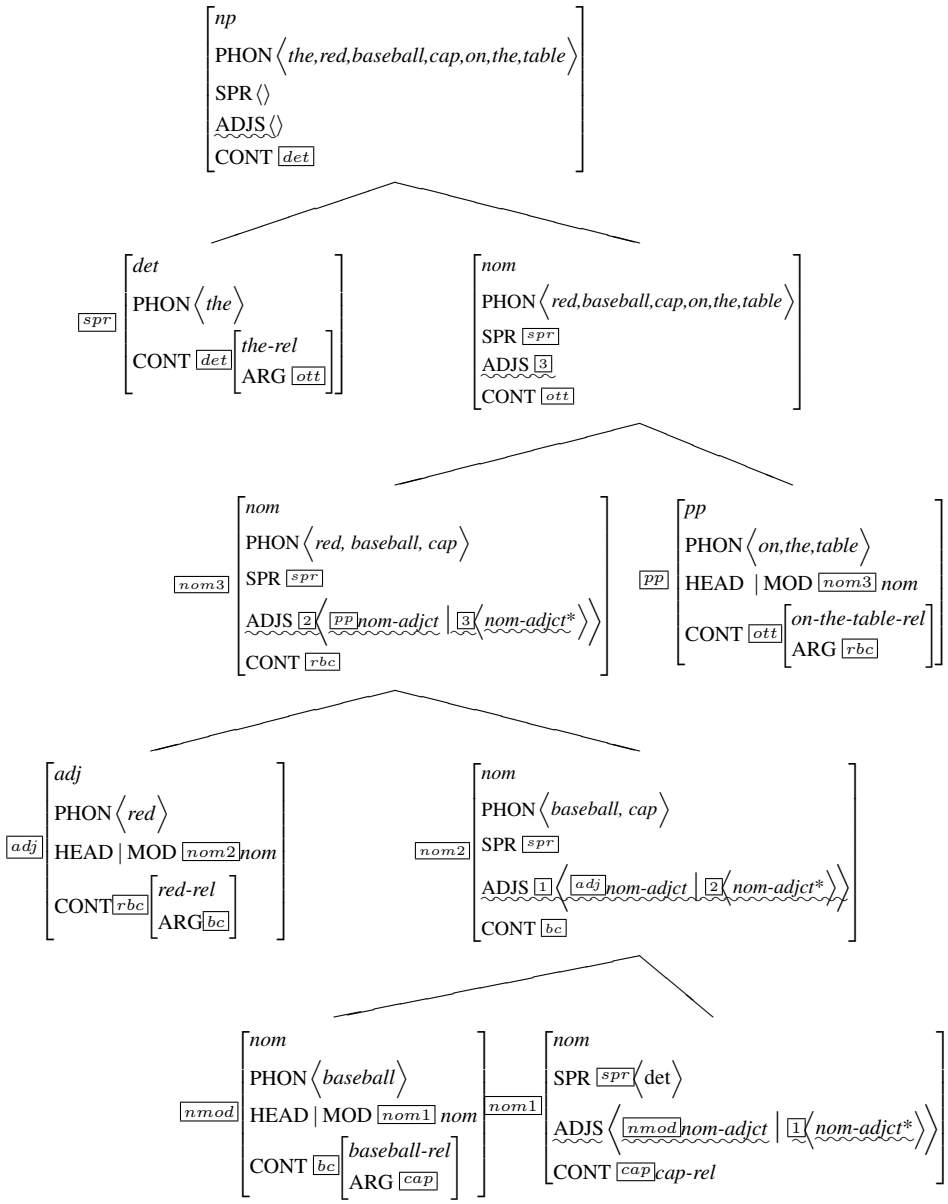


Figure 3: The projections of *the red baseball cap on the table*

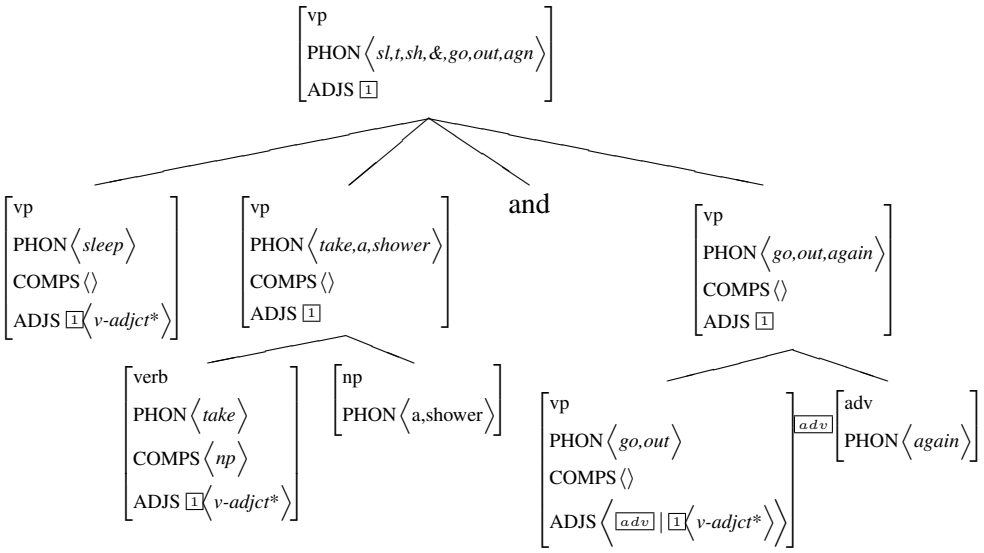


Figure 4: VP coordination example with ADJS

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

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

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

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

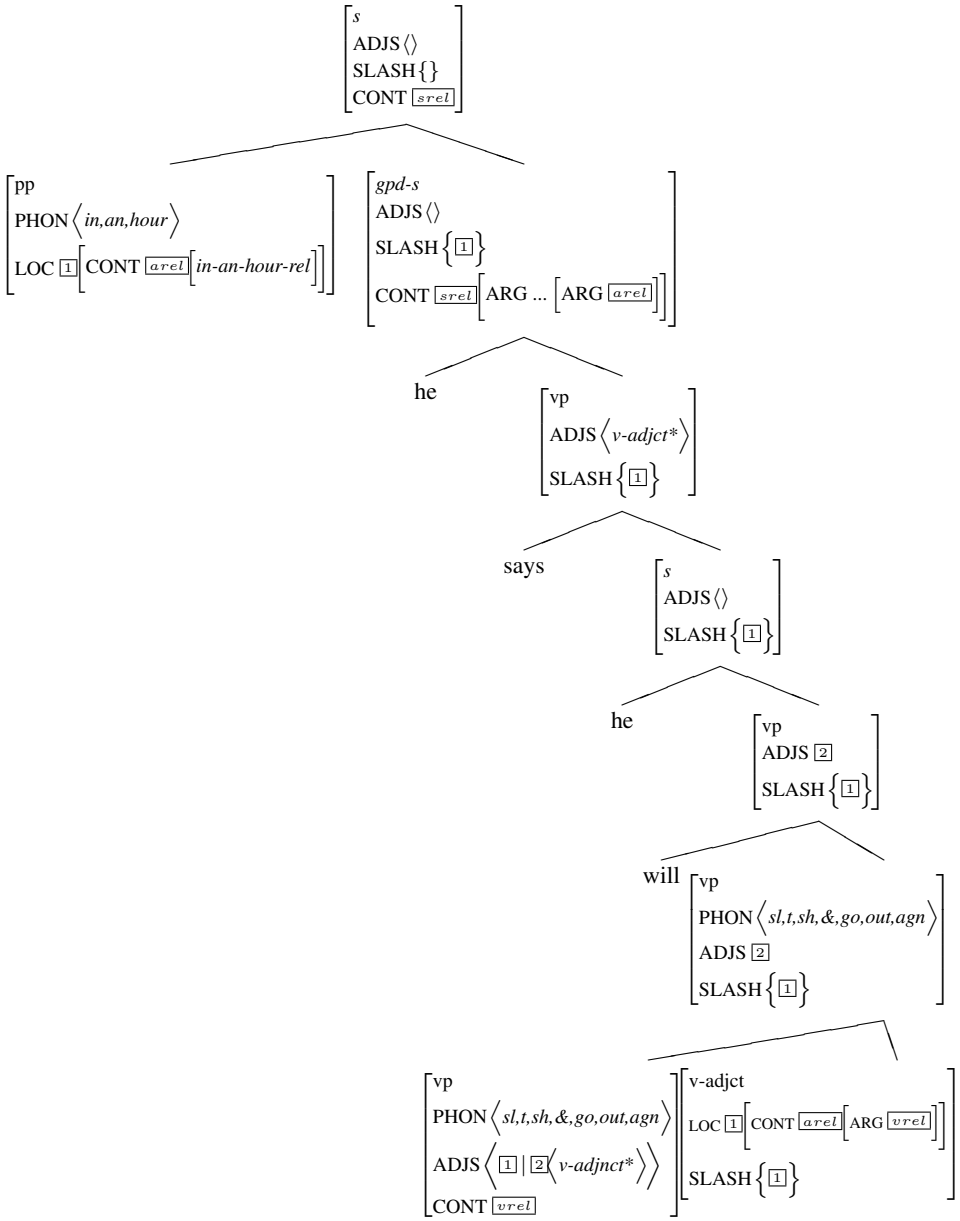


Figure 5: Cumulatively scoping adjunct extracted

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

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

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

3.2 Korean adverbial case-marking

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

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

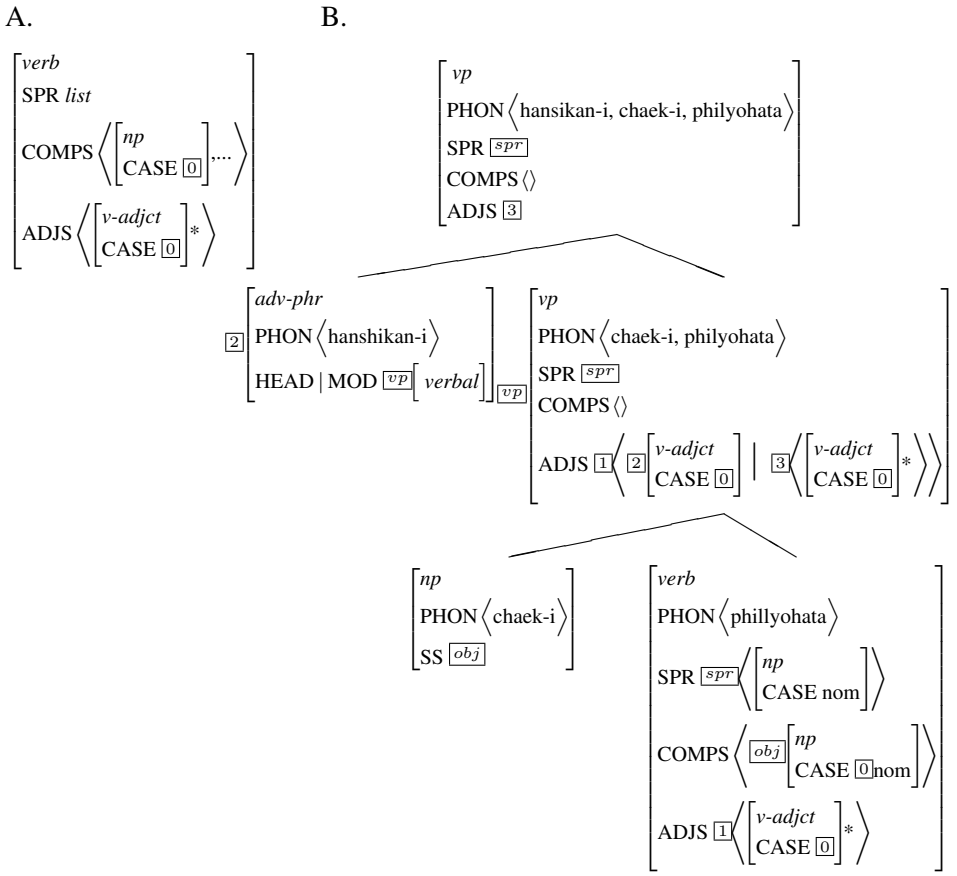


Figure 6: Korean adverbial case-marking

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

The analysis of (5b) is shown in Figure 6. This case-assignment pattern, where an adverbial attaching to a VP receives the same case as the VP's external argument, is accounted for as an indirect structure sharing between a COMPS element of the verb and the adverbial. The feature structure on the left, (A) in Figure 6, is that of Korean verbs in general with the ADJS list. Notice that the top element of the COMPS list is unified with the elements in the ADJS list, which captures the fact that adverbials receive the same case as the first external argument, whatever it may be.

(B) represents the projections with the case-marked adjunct *hansikan-i* ('for an hour') of the verb *philyohata* ('need'), which selects for the nominative case for its external argument. After the Head-Complement projection, COMPS will be discharged, while ADJS percolate up, just like the familiar staggered discharge mechanism. The top element of the ADJS list is then discharged in the upper Head-

Adjunct projection, though leaving the upper node again with a list of zero or any number of adjuncts.

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

4 Two remaining issues

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

4.1 Scope ambiguity

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

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

is perfectly acceptable, suggesting inverse scope readings are available in some languages.[8] In a related argument, the A-as-C advocates claim the configurational analysis is *over*specified, predicting spurious ambiguity between, say, *red fast car* and *fast red car*.[9]

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

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

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

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

However, these arguments cut both ways. A flat analyst will have the opposite difficulty: that of excluding the wrong readings and differentiating distinct readings, as opposed to our problem of including the right ones and equating the same ones. As suggested by Kasper (1994) and discussed in more detail by Bonami and Godard (2007) and Sato (2008), we believe that ultimately the linearisation technique initiated by Reape (1993) should be employed to overcome these difficulties, given the complex interrelationship between word order and scope. Linearisation approaches can complement traditional phrase structure construals by providing more flexible renderings of phrase structures into linear sequences. For example, it is straightforward in the linearisation approach to generate for both the German example above and its English counterpart the same (plausible) semantic interpretation, namely:

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

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

4.2 'Syntactic' case-marking

The other issue concerns the problems of 'syntactic' —as opposed to 'lexical'— case-marking behaviour that involves relations that hold amongst arguments and adjuncts, such as case alteration in Finnish and Korean (Maling, 1993; Wechsler and Lee, 1996). Our approach to the adverbial case-marking, as it is in the present proposal, predicts *all* the adverbials attaching to the same VP to receive the same case, which is contradicted by an example like the following:

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

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

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

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

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

These are difficult phenomena for any lexicalist system to handle, but some of them are accounted for by relating the valence features to the more global ARG-ST and DEPS features in HPSG (Przepiórkowski, 1999). Such an extension is perfectly amenable to the analysis presented here, although we have avoided their use not to go too far beyond the core interest of the present paper, and to adhere to its general spirit of conservatism.

References

Beavers, John and Sag, Ivan. 2004. Coordinate Ellipsis and Apparent Non-Constituent Coordination. In *Proceedings of HPSG04*, pages 48–69.

Bonami, Olivier and Godard, Danièle. 2007. Integrating Linguistic Dimensions: the scope of adverbs. In *Proceedings of HPSG07*.

Bouma, Gosse, Malouf, Robert and Sag, Ivan. 2001. Satisfying Constraints on Extraction and Adjunction. *Natural Language and Linguistic Theory* 19(1).

Ebert, Christian. 2005. *Formal investigations of underspecified representations*. Ph. D.thesis, King's College London.

Gunji, Takao. 1999. On Lexicalist Treatments of Japanese Causatives. In Levine and Green (1999).

Hukari, Thomas and Levine, Robert. 1995. Adjunct extraction. *Journal of Linguistics* 31, 195–226.

Kasper, R. 1994. Adjuncts in the Mittelfeld. In J. Nerbonne, K. Netter and C. Pollard (eds.), *German in Head-Driven Phrase Structure Grammar*, pages 39–69, Stanford: CSLI.

Levine, Robert and Green, Georgia (eds.). 1999. *Studies in Contemporary Phrase Structure Grammar*. CUP.

Levine, Robert and Hukari, Thomas. 2006. *The unity of Unbounded Dependency Constructions*. CSLI.

Maling, Joan. 1993. Of nominative and accusative: the hierarchical assignment of grammatical case in Finnish. In A. Holmberg and U. Nikanne (eds.), *Case and other functional categories in Finnish syntax*, pages pp. 49–74, Mouton de Gruyter.

Manning, C., Sag, I. and Iida, M. 1999. The Lexical Integrity of Japanese Causatives. In Levine and Green (1999).

Müller, Stefan. 1996. The Babel-System - An HPSG Fragment for German, a Parser and a Dialog Component. In *Proceedings of the Fourth International Conference on the Practical Application of Prolog*.

Pollard, Carl and Sag, Ivan. 1994. *Head-Driven Phrase Structure Grammar*. CSLI.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph. D.thesis, Universität Tübingen, Germany.

Reape, Mike. 1993. *A Formal Theory of Word Order*. Ph. D.thesis, Edinburgh University.

Sato, Yo. 2008. *Implementing Head-Driven Linearisation Grammar*. Ph. D.thesis, King's College London.

van Noord, Gertjan and Bouma, Gosse. 1994. The Scope of Adjuncts and the Processing of Lexical Rules. In *Proceedings of COLING 94*.

Wechsler, Stephen and Lee, Yae-Sheik. 1996. The domain of direct case assignment. *Natural Language and Linguistic Theory* 14, 629–664.

Yatabe, Shuichi. 2002. Nihongo ni okeru hitei-ji, ryôka-shi no sukôpu no kettei [Determination of the scope of negators and quantifiers in Japanese]. In *Rekishikon to Tôgo [Grammatical Theory: Lexicon and Syntax]*, University of Tokyo Press.

Memory management for unification-based processing of typed feature structures

Karen Steinicke
Universität Tübingen

Gerald Penn
University of Toronto

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 189–203

Steinicke, Karen & Gerald Penn. 2008. Memory management for unification-based processing of typed feature structures. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 189–203. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.11.
CC-BY 4.0

Abstract

We consider two alternatives for memory management in typed-feature-structure-based parsers by identifying structural properties of grammar signatures that may be of some predictive value in determining the consequences of those alternatives. We define these properties, summarize the results of a number of experiments on artificially constructed signatures with respect to the relative rank of their asymptotic cost at parse-time, and experimentally consider how they impact memory management.

1 Introduction

Memory management deals with organizing the compiled object of a computer program so as to consume less memory for the same amount of work. When the overall memory consumption becomes so large that it swaps out to disk, better memory management can also make the compiled object considerably faster. HPSG parsing, particularly with large grammars such as the English Resource Grammar (Copestake and Flickinger, 2000), has a number of problems with memory consumption. Very often, parsing charts must be pruned or chart-parsing must be terminated early because the overall memory consumption is too great for a grammar developer's desktop computer.

Memory managers must decide how to allocate memory to an application over the course of an execution, detect when an application no longer requires a certain location in memory, and recycle locations that are no longer needed. A central concern to all of these tasks is the size of the blocks of memory that are allocated, monitored and recycled.

Current HPSG parsers do have memory managers — relying on the operating system is simply not an option. The ALE system (Carpenter and Penn, 1996) uses SICStus Prolog's memory manager, and the LKB (Copestake and Flickinger, 2000) uses Allegro Common Lisp's memory manager. PET (Callmeier, 2001) actually comes with a few options, including using pools of fixed-size memory blocks à la C++, a Windows-style virtual memory manager, and a special 2-stack version of the model that Prolog uses. LiLFeS (Makino et al., 1998) has its own memory manager for logic programming with typed feature structures, which at least in early versions of that system, put its performance well behind that of SICStus Prolog (Penn, 2000).

In the context of HPSG parsing, the central memory management question has been whether to (re-)allocate memory for feature structures in blocks that exactly correspond to the arity of their current type (a block consists of an encoding of the type plus n pointers to each of the n appropriate feature values for that type) or to allocate it in blocks that are, on occasion, larger or smaller than what is currently needed. The argument for adding extra space is connected to the subtype polymorphism that is inherent to the logic of typed feature structures. While each type does have a fixed arity of features appropriate to it, that type may be promoted to a subtype, whereupon it may acquire more such features. If extra space is allocated to

the feature structure at the outset, the *frame* that stores the type and pointers to the appropriate feature values does not need to be resized, moved or reallocated. The argument for allocating less space is equally compelling, especially when certain feature values can be inferred from context. There is, in fact, a great experimental evidence that in large practical grammars, it pays even to re-derive certain feature values as needed. Research on this began with Goetz's work on the Troll system (Goetz, 1993), in which he coined the term *unfilling*, and nearly every system for HPSG parsing since then has experimented with some form of this. We will not discuss unfilling more in this paper; for the purposes of this study, one can either leave even more cells empty or tighten the representation up even further, so the same choice that we address here remains present even when unfilling is used.

Most of the previous work on "memory management" in HPSG parsing has focussed on specialized unification algorithms for this task that avoid copying. While these exert a great influence upon the operating conditions of the memory manager, they do not by themselves manage memory, nor do they completely answer the central question posed above: what the size of the allocated frames should be. Lower-level research that directly pertains to that question is far more sparse and what there is is mostly anecdotal. Penn (2000) experimented with what he called a *variable* approach, in which the number of available feature slots was exactly the number of appropriate features to the current type, and a *fixed* approach, in which enough extra space was allocated, as determined by a coarse modularization of the type signature and a graph colouring algorithm, to guarantee that the frame would never need to be relocated. He tested both of these on two grammars: the ALE HPSG grammar (Penn, 1993) 93), in which the fixed approach was slightly better, and a categorial grammar written in typed feature logic for the telephone banking domain from Bell Labs, in which the fixed approach was significantly better. Callmeier (2001) also experimented with a fixed and variable approach, although his description of his fixed approach involved modularization with no graph colouring. He found that the variable approach worked better on the English Resource Grammar, and that the fixed approach worked slightly better on the Japanese Verbmobil grammar. While it is clear from both theses that the authors appreciated that the signatures and the distribution of feature structures over types played a very prominent role in determining which method was better, neither leaves the reader with any indication of what it specifically is about those signatures that would favour either of these approaches.

Our purpose in undertaking the study described here has been to complement this earlier work on real grammars by testing both approaches on a range of analytically formulated signatures with very controlled characteristics. This control allows us to determine some of the various dimensions of a type signature's complexity that influence whether the fixed or variable approach will be more beneficial. Real grammars are still important, as are the corpora on which they are evaluated, because these provide the empirical distributions over these characteristics that determine the weights on these analytic variables as they combine to yield the overall cost of the memory management strategy used. Our belief, however,

is that the study of real grammars was perhaps premature. Prior to the present study, we did not even know what the variables were — hence the oblique timings reported in previous work on this subject.

Some of those variables are very task-specific, actually. For example, chart parsing is $\mathcal{O}(n^{MM}G^2\delta^2)$, and the number of edge accesses is known to be influenced by the edge's position and the parsing control strategy. We focussed on unification. This is important to everyone who uses feature structures. HPSG has the added benefit of a type system for its feature structures, which allows us to do more static analysis and less empirical analysis than in grammar formalisms in which their untyped historical precursors are used.

The potential benefits of this direction of research are twofold. First, it can serve as a guide to grammar writers, so that they may be able to choose more efficient encodings of linguistic constructions in signatures, when several acceptable ones present themselves. Second, it can serve as a guide to system developers, who will be able to produce smarter, more flexible compilers — perhaps some day ones that generate code which adapts its representations of feature structures in response to the empirical distributions measured over several of the variables proposed here.

Section 2 enumerates the variables that we tested, and illustrates how some simple signatures change as a result of varying these dimensions of signature structure. Section 3 discusses the results of our experimental comparison of these variables, and Section 4 then focusses on the specific issue of fixed vs. variable frame allocation, and how these variables influence that choice. This can be seen as a case study in how these variables, and a static analysis of the signature more generally, can provide us with a deeper understanding of how grammars behave.

2 Dimensions of Signature Structure

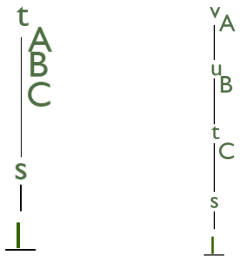
We measured the effects of varying each of the following dimensions of a signature's structure, both individually and together.

2.1 Arity Growth

Arity growth refers to how quickly a subtype chain confers additional appropriate features onto its types as a function of height. The signature in Figure 1(a) has faster arity growth than the signature in Figure 1(b). Both allocate the same number of appropriate features to their maximally specific type, but Figure 1(b) does so one at a time through a longer chain.

2.2 Chromatic density

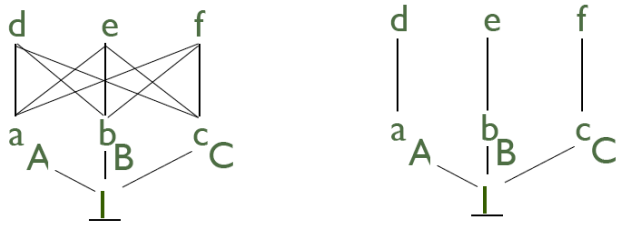
Signatures with a high chromatic density have more different pairs of features that are appropriate to a single type than signatures with low chromatic density. In Figure 2(a), for example, the pairs A and B, B and C, and A and C are all appropriate to some common type (three of them in each case, actually — d, e and f). In fact,



(a) (b)

Figure 1: An illustration of (a) fast arity growth vs. (b) slow arity growth.

all three together are appropriate to a common type. In Figure 2(b), on the other



(a) (b)

Figure 2: An illustration of (a) high chromatic density vs. (b) low chromatic density.

hand, there are still three features, but we will never find one of them in a feature structure where another is appropriate.

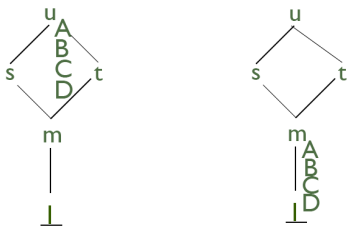
Signatures with low chromatic density require smaller frames in the fixed approach than signatures with high chromatic density (Penn, 1999).

2.3 Drag

Drag is related to chromatic density, but is also effected by how high within subtype chains the feature introducers are situated. In Figure 3(a), a fixed approach would need to assign as large of a frame to m as it does to u, in spite of the fact that m has no appropriate features of its own. m has a higher drag there than it has in Figure 3(b), because in Figure 3(b), it could use every slot that it is allocated by a fixed approach, in spite of the fact that its frame would be the same size.

2.4 Mesh

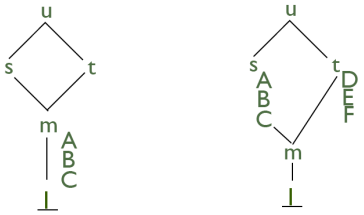
Mesh determines how many corresponding feature values must be (recursively) unified when two feature structures having a particular pair of types are unified.



(a) (b)

Figure 3: An illustration of (a) high drag vs. (b) low drag.

The pair s and t has a higher mesh in the signature of Figure 4(a) than it does in that of Figure 4(b), because, while they both have three appropriate features defined



(a) (b)

Figure 4: An illustration of (a) high mesh vs. (b) low mesh.

in both signatures, their sets of features are disjoint in Figure 4(b).

2.5 Static Typability

In a statically typable signature, the successful unification of two well-typed feature structures is always well-typed. In a non-statically typable signature, the results of successful unifications must be checked to ensure that they are. Figure 5 is a statically typable signature. Figure 6 is very close to Figure 5, but it is not statically typable, because the result of unifying feature structures of types s and t, even when successful, may not yield a feature structure that has an A value of type e. If successful, it will always yield a value at A that is consistent with e in the absence of inequations and extensional types, so it is often well-typable, even when not well-typed, but the addition of an extra maximally specific subtype of d to the signature could easily prevent even that. Non-statically typable signatures require more work to unify, in general.

Usually, we speak of an entire signature being statically typable or not, but we can easily generalize this to a degree of static typability by counting the number or percentage of type pairs for which unification would require this extra amount of type checking.

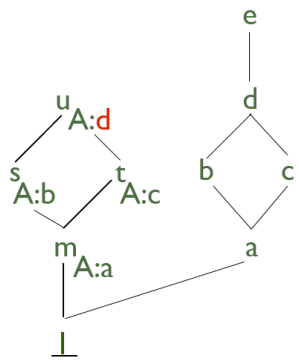


Figure 5: A statically typable signature.

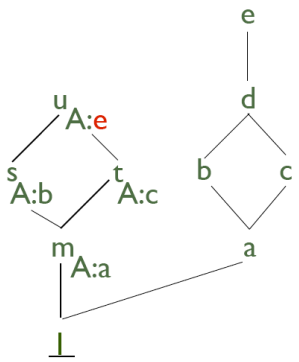


Figure 6: A non-statically typable signature.

2.6 Trailing

Trailing refers to the overhead of tracking a sequence of small changes to a data structure in memory (a *trail*) so that they can be undone in reverse order. Applications of backtracking search strategies often employ this. In the context of feature-structure-based all-paths parsing, backtracking can arise as a result of description-level disjunctions, subtype declarations in which a type has more than one immediate subtype (at least in some interpretations of subtyping), logic programs with predicate-level disjunctions or multiple clause definitions, or phrase structure rule systems in which the left-hand-side categories of two or more rules are unifiable.

Chart parsers almost by definition prefer the cost of structure copying to the cost of backtracking found in shift-reduce parsing, for example. Even within chart parsers, however, there are aspects of access to the parsing chart relative to which copying vs. trailing again trade off. This latter trade-off has been ignored for the most part, mainly because the re-discovery of dynamic programming within the

computational linguistics community happened to coincide with an infatuation for Prolog implementations of parsers, within which this kind of precise control over chart access was not available without a considerably greater amount of effort (Penn and Munteanu, 2003). Even with that effort — or without Prolog — the choice of copying vs. trailing is more crucial and more complicated to optimally resolve in the case of feature-structure-based parsing because of the size of the feature structures.

As for the other potential sources of backtracking, and therefore trailing, the trend within the HPSG community over the last thirteen or more years has been to mercilessly hunt them down and eliminate them. The English Resource Grammar at its inception deliberately ruled out the use of explicit disjunction operators, at the description or predicate level, for the sake of both efficiency and portability. The LKB, PET and later parsers adopted what was, at the time, ALE's very anomalous interpretation of subtyping and constraint resolution in order to back away from potentially very costly backtracking searches, curiously without the logic programming mechanisms that one needs in order to make this constraint resolution strategy sound and complete. We will return to this topic in Section 3.

We did not measure the cost of delaying (Penn, 2004).

3 Relative Cost

Given an abstract signature, such as one of the examples above, and a skeletal parsing control program, both of which can be modified to independently vary all of the parameters given in the last section, plus a constant underlying implementation of the unifier, we may first ask which parameter is inherently more costly than the other. Given a choice between making a grammar less chromatically dense or more statically typable, for example, which of these directions of development will result in a faster parser?

It is very difficult, and perhaps impossible, to answer this question in a way that generalizes over all grammars and all implementations. The parser implementation used in these experiments is described in great detail in Steinicke (2007). It is a reimplementation of the Warren Abstract Machine, modified to operate on typed terms that allow for subtype polymorphism, arity growth and non-static typability. It is written in C++ and was compiled with GNU C++ 4.1. All of the experimental runs described in this paper were run on an AMD athlon 64/3000 with 512 MB of RAM, and were iterated for 200,000 unifications per single time measurement reported. Approaching the implementation at this very low level allows us to rule out parochial properties of the memory managers used in higher-level programming languages, and focus on a single, fairly neutral implementation. The one very strong, although still common assumption made is that working (non-chart-edge) memory is allocated from a global stack that we maintain, in keeping with the architecture of the WAM. So we are doing something typical and reasonable, if not generalizable.

The base signature and parsing control are also described in Steinicke (2007). All of the experiments reported involve modifying aspects of these to vary the number of unifications, number of trail unwindings, size of the feature structures, etc. Again, this does not generalize over all grammars that linguists write, nor even look similar to a single grammar of a human language. There is also a serious concern with determining comparable units of measure along which each of these parameters varies. What we can do is spot asymptotic trends as these dimensions grow very large to formulate a neutral appraisal of their cost in the limit. The neutrality arises from our choice of implementation. The asymptotes allow us to generalize without committing to a single choice of units.

Asymptotically, then, the relative costs of these variables, in decreasing order are:

1. Static typability
2. Trailing
3. Chromatic density
4. Drag
5. Mesh
6. Arity growth

The relative ordering the same for fixed and variable frame allocation, although the disparity between them does change.

There are a few surprises here. Arity growth, arguably the most distinctive aspect of the logic of typed feature structures relative to other record logics, actually does not matter all that much. Also, (non-)static typability outranks even trailing in cost. This is interesting because non-statically typable signatures can also be unfolded so as to restore static typability, much in the same way that the English Resource Grammar's type system was unfolded to eliminate various sources of disjunction. Figure 7 shows the unfolding of Figure 6, for example. The English Resource Grammar did not do this, however, perhaps because there is no explicit operator in the description language for typed feature logic that can be held accountable for non-static typability. It arises from a conspiracy among several sources of appropriateness constraints.

Just so, what makes disjunctions dangerous is their ability to team up in networks to form NP-hard problems, not trailing specifically (although it is number two on our list). In fact, the presence of disjunctions does not even necessitate a backtracking search strategy.

4 Frame Allocation

Returning to the question of fixed vs. variable frame allocation, we can now consider this in the context of the variables that have been proposed. This is achieved

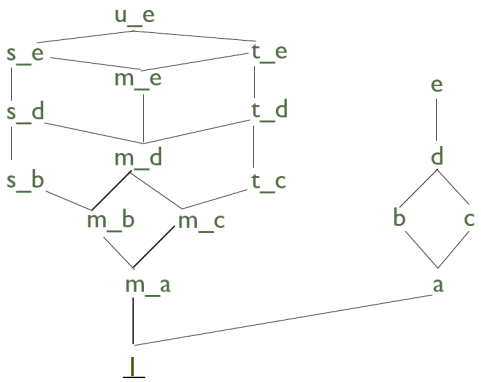


Figure 7: Eliminating non-static typability

by rerunning the above experiments, but now allowing the underlying implementation of the unifier to vary between the two allocation methods. In the case of the fixed method, graph colouring was used. The results are shown in Figure 8. Looking at both of the extremal cases, Figure 9 shows our experimental timings

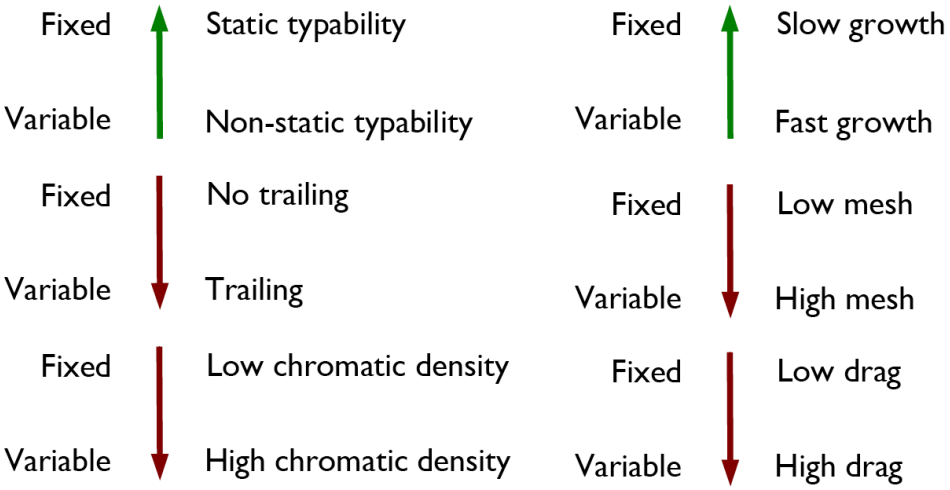


Figure 8: The influence of each variable upon the choice of fixed vs. variable frame allocation.

as the number of unused feature value slots increases for both the fixed and variable approaches when all of the variables are set to values that favour the variable approach. In this circumstance, the variable approach is clearly better. Figure 10 shows the same as the total number of features increases when all of the variables are set to values that favour the fixed approach. Here, the fixed approach is better,

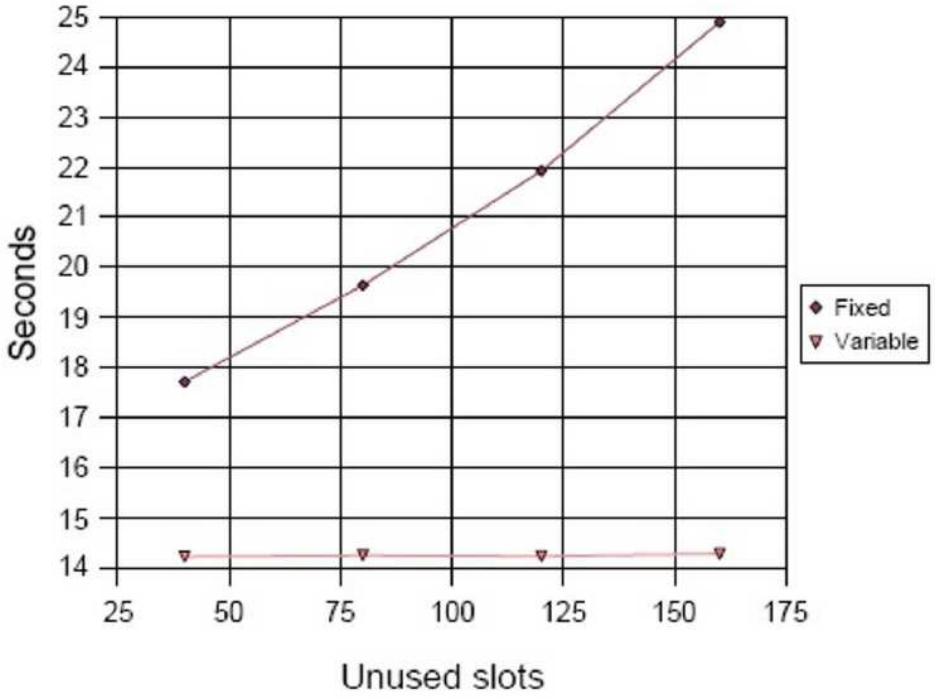


Figure 9: Experimental timings with every variable set to favour variable frame allocation.

but not by as wide of a margin. To illustrate the relative importance of trailing, Figure 11 shows the same measurement when all of the variables are set to the same values (favouring fixed), except that trailing on just one choice point is added. The presence of more trailing favours the variable approach. This one variable is enough to tip the balance. By the time the number of features exceeds 200, the fixed approach in this experiment was slower, in spite of the other variable settings. Figure 12 shows the same sort of inversion when the variables are all set to favour the fixed approach except that no pair in the unified types was statically typable. No other single variable setting results in an inversion on the size of features that we tested.

Turning to the English Resource Grammar again, Callmeier (2001) tells us that the variable approach is better with this grammar than a fixed approach with no graph colouring. Why might this be? The ERG is not at all statically typable (favouring the variable approach), has a very limited amount of trailing (fixed), a relatively high chromatic density across its different modules (variable), low drag (fixed), high mesh (variable), but fast arity growth (variable). We cannot simply count the properties that favour one or the other and decide on that basis — crucially, all of these are weighted by the empirical distribution of unification opera-

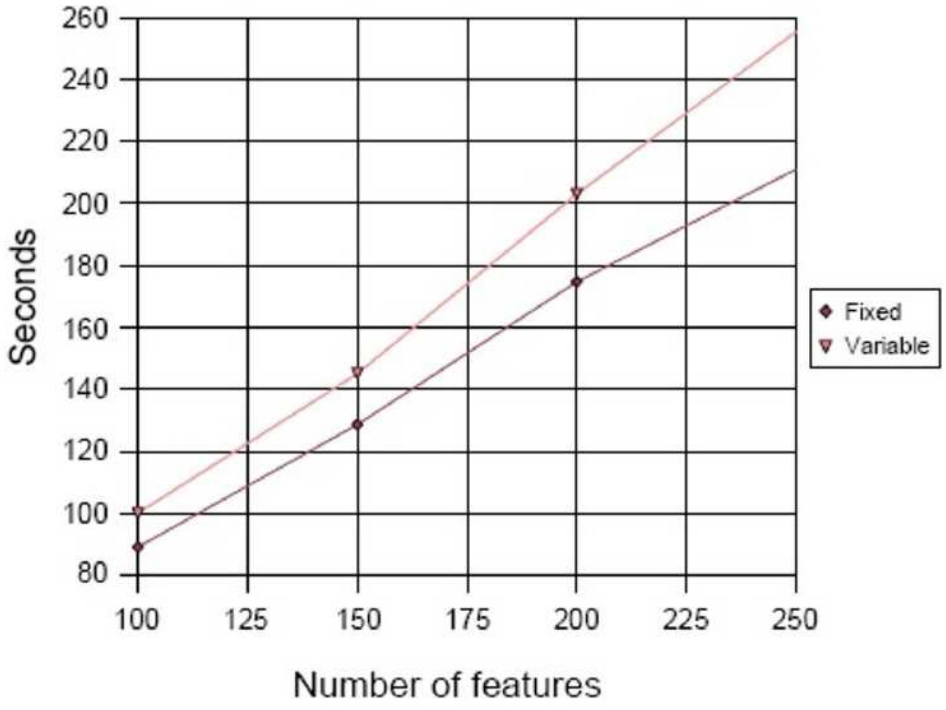


Figure 10: Experimental timings with every variable set to favour fixed frame allocation.

tions over pairs of types for the corpus that we use to evaluate the ERG. We did not calculate those weights. For what it is worth, however, the supervening importance of static typability and trailing provides no clear answer to this question, and in fact, the ERG is significantly faster with the fixed approach that ALE 4.0 introduced than with its earlier variable approach. ALE is written in Prolog, and there are doubtlessly many aspects of the Prolog compiler that favour the fixed strategy since Prolog terms themselves have fixed arities. Nevertheless, this does suggest that perhaps there is nothing about the ERG that strongly militates against either alternative, and that the choice in the case of ERG implementations ultimately hinges upon other design decisions.

5 Conclusion

We have identified a collection of the source-code level correlates of memory management costs evident in unifying typed feature structures. Since we can understand these primarily as structural properties pertaining to signatures (subtyping plus appropriateness conditions), they have the promise to guide grammar developers as well as system developers in building more efficient parsers. The structural

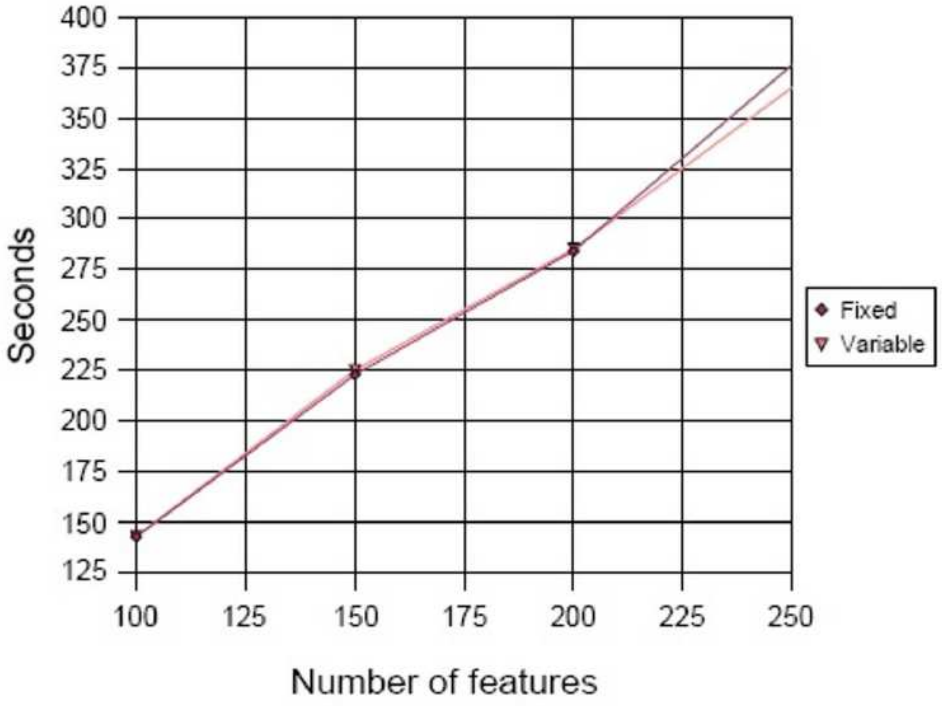


Figure 11: Experimental timings with every variable set to favour fixed frame allocation except trailing. One choice point is used.

properties complement our ability to embed grammars into existing systems and test their time and space efficiency on corpora. Static typability and trailing appear to be the most significant of these variables, in that by themselves they have the ability to override the settings of all of the other variables.

With respect to the specific issue of whether to use fixed-sized frames or variable-sized frames (that must then be resized), we can classify each of these variables according to its preference. With respect to the even more specific issue of which strategy to use with the ERG, we are unable to make a definite conclusion. Very clearly, the next step in demonstrating the value of our proposed sort of analysis would be to collect distributional data from the unifier input during parsing with a large grammar like the ERG, in order to show that our static analysis combined with these empirical data have the ability to definitively predict various resource consumption aspects of the parsing task.

References

Callmeier, U. 2001. *Efficient Parsing with Large-Scale Unification Grammars*. Masters Thesis, Universitaet des Saarlandes.

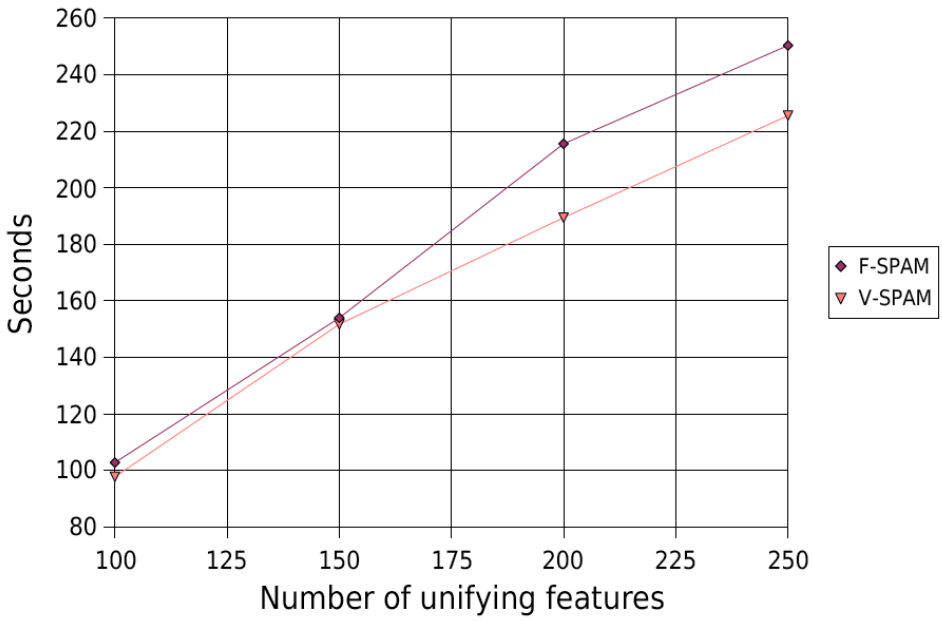


Figure 12: Experimental timings with every variable set to favour fixed frame allocation except static typability. No pair of unified types was statically typable.

Carpenter, B. and Penn, G. 1996. Compiling Typed Attribute-Value Logic Grammars. In H. Bunt and M. Tomita (eds.), *Recent Advances in Parsing Technologies*, pages 145–168, Kluwer.

Copestake, A. and Flickinger, D. 2000. An open-source grammar development environment and broad-coverage English grammar using HPSG. In *Proceedings of the Second conference on Language Resources and Evaluation (LREC-2000)*.

Goetz, T. 1993. *A Normal Form for Typed Feature Structures*. Masters Thesis, Universität Tübingen.

Makino, T., Torisawa, K. and Tsuji, J. 1998. LiLFeS — Practical Unification-Based Programming System for Typed Feature Structures. In *Proceedings of the 36th Annual Meeting of the Association for Computational Linguistics and the 17th International Conference on Computational Linguistics (COLING/ACL-98)*, volume 2, pages 807–811.

Penn, G. 1993. *A Utility for Typed Feature Structure-based Grammatical Theories*. Masters Thesis, Carnegie Mellon University.

Penn, G. 1999. An Optimized Prolog Encoding of Typed Feature Structures. In *Proceedings of the 16th International Conference on Logic Programming (ICLP-99)*, pages 124–138.

Penn, G. 2000. *The Algebraic Structure of Attributed Type Signatures*. Ph. D.thesis, Carnegie Mellon University.

Penn, G. 2004. Balancing Clarity and Efficiency in Typed Feature Logic through Delaying. In *Proceedings of the 42nd Annual Meeting of the Association for Computational Linguistics (ACL-04)*, pages 240–247.

Penn, Gerald and Munteanu, Cosmin. 2003. A Tabulation-Based Parsing Method that Reduces Copying. In *Proceedings of the 41st Annual Meeting of the Association for Computational Linguistics*, pages 200–207.

Steinicke, K. 2007. *Memory Management for Logic Programming with Typed Feature Structures*. Masters Thesis, Universität Tübingen.

Automatic construction of Korean verbal type hierarchy using Treebank

Sanghoun Song
Korea University

Jae-Woong Choe
Korea University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 204–221

Song, Sanghoun & Jae-Woong Choe. 2008. Automatic construction of Korean verbal type hierarchy using Treebank. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 204–221. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.12.
CC-BY 4.0

Abstract

The lexical information of verbal lexemes, such as verbs and adjectives, plays an important role in syntactic parsing, because the structure of a sentence mainly hinges on the type of verbal lexemes. The question we address in this research is how to acquire the 'argument structure' (henceforth ARG-ST) of verbal lexemes in Korean. It is well known that manual build-up of type hierarchy usually cost too much time and resources, so an alternative method, namely automatic collection of relevant information is much more preferred. This paper proposes a procedure to automatically collect ARG-ST of Korean verbal lexemes from a Korean Treebank. Specifically, the system we develop in this paper first extracts lexical information of ARG-ST of verbal lexemes from a 0.8 million graphic word Korean Treebank in an unsupervised way, checks the hierarchical relationship among them, and builds up the type hierarchy automatically. The result is written in an HPSG-style annotation, thus making it possible to readily implement the result in an HPSG-based parser for Korean. Finally, the result is evaluated with reference to two Korean dictionaries and also with respect to a manually constructed type hierarchy.

1 Introduction

One of the key issues in writing a comprehensive grammar of a natural language in the HPSG style is how to build up type hierarchies on a large scale. In particular, since the lexical information of verbal lexemes, such as verbs and adjectives, takes an important role in syntactic parsing, argument structures (hereafter ARG-STs) hold the key position in describing a grammar within the HPSG framework, so building up type hierarchies on a large scale should begin with collecting relevant information about ARG-ST.

What we are concerned with in this study is how to build up the verbal type hierarchy in a more efficient way. It is well known that type hierarchy built-up manually usually cost too much time and resources; therefore an alternative method, namely automatic compilation of relevant information is much more preferred.

This study aims to introduce a systematic procedure to collect

† We would like to thank to Jong-Bok Kim, Kiyong Lee, and Jieun Jeon for their help throughout this research. We appreciate the comments on an earlier version of this paper from anonymous readers, and also are thankful for the comments from Hans Uszkoreit, Dan Flickinger, Laurie Poulson, and some other members of the audience during the HPSG conference held at Keihanna, Japan. July 28-30, 2008. Of course, all remaining errors are our own responsibilities.

relevant ARG-STs in Korean verbal system, and to construct the Korean verbal type hierarchy. The procedure will be carried out in a fully automatic way. The data compilation will be based on the results extracted from the *Sejong Korean Treebank*.

This paper is constructed as follows. Chapter 2 provides a brief comparison of ways to extract information of ARG-STs, namely, a traditional manual extraction from dictionaries vs. an automatic extraction from large scale language resources adopted in this study. In chapter 3, we introduce the whole process to get relevant ARG-STs from a Korean Treebank and build up Korean verbal type hierarchy in a systematic and automatic way. Chapter 4 discusses the evaluation of the result of this study with reference to two dictionaries and also with reference to a manually constructed verbal type hierarchy. Chapter 5 is the conclusion of this paper.

2 The Treebank Approach

One way to collect the ARG-ST information of Korean verbal items in a comprehensive way would be to consult the dictionary. For example, the *Yonsei Korean Dictionary*[1] lists the following three types of construction for the adjective *elyep-* 'difficult', a typical 'tough' class verb in Korean.[2]

(1) a. *enehak-i* ***elyep**-ta.*
linguistics-NOM **difficult**-DC
'Linguistics is difficult.'
b. *nay-ka* *kongpwu-ka* ***elyep**-ta.*
I-NOM study-NOM **difficult**-DC
'It is difficult for me to study.'
c. *enehak-ul* *kongpwu-ha-ki-ka* ***elyep**-ta.*
linguistics-ACC study-LV-NMS-NOM **difficult**-DC
'It is difficult to study linguistics.'

The examples in (1) shows that *elyep-* 'difficult' can be divided into several types according to its ARG-ST; <NP(*nom*)>, <NP(*nom*), NP(*nom*)>, and <S(*nom*)>, which correspond to (1a-c) respectively.

An alternative way to collect ARG-ST information on a large scale

[1] The verbal category in this dictionary covers 49,552 entries altogether.

[2] The abbreviations of this paper are as follows.
ACC: Accusative case marker, COMP: Complementizer affix, DAT: Dative case marker, DC: Declarative sentence-type marker, DET: Determiner, DIR: Directive case marker, LOC: Locative case marker, LV: Light verb, NOM: Nominative case marker, NMS: Nominalizer suffix, PAST: Past tense marker

is to make use of some available corpora or Treebanks.[3] Compared to the dictionary based approach, the Treebank approach has at least two obvious advantages. The first is that the Treebank approach would provide the frequency for each ARG-ST as well, which would become crucial for building a stochastic parser. Another advantage of the Treebank approach is that we can minimize the inconsistency or some possible errors in the compilation process of the dictionary. For example, it is up to the judgment of the compiler(s) that she or he selected the three constructions given in (1) for *elyep-*; other compiler(s) could have added another to (1), or even excluded one from (1). In fact, a different dictionary, the *Sejong Electronic Dictionary*,[4] lists six different case frames for the same adjective, and in general it is not an easy task to pinpoint the source of the difference.

There are two Korean Treebanks currently available; the *Sejong Korean Treebank* (henceforth SKT) which has been sponsored by the Korean government and the *Penn Korean Treebank* (henceforth PKT) which has been researched at the Univ. of Pennsylvania. The major characteristics of the two are as follows: (i) SKT contains approximately eight hundred thousand graphic words consisting of various genres (e.g. novels, academic articles, etc.), while PKT includes about two hundred thousands of graphic words, which is only composed of military manuals or newspaper articles. (ii) The empty categories are specified in PKT, while there is no empty category in SKT. (iii) Finally, oblique cases can be tagged as complements in PKT, whereas in SKT they are excluded from being possible candidates for complements. Between the two, we chose SKT for its size and the balance in its composition. However, since SKT does not contain empty categories, it should be noted that the result of this study would likewise be more 'surface-oriented'.

An important problem one faces in dealing with the ARG-ST of the Korean language is the difficulty of differentiating arguments from adjuncts. Korean, a typical pro-drop style language, allows any element of the sentence be omitted, possibly except for the head. It is one of the most controversial and tough issues in Korean Linguistics to distinguish arguments from adjuncts in Korean as is well documented and discussed in the literature (e.g. Chae 2000).

Consider the following.

---

[3] For example, Manning (1993) shows a method to acquire subcategorization frames from unlabelled corpora. Sarkar and Zeman (2000) also make use of machine learning techniques for the identification of subcategorization frames, using the Prague dependency Treebank. They use some statistical measures, including *t-score* that we also take advantage of in this study, in their solution to label dependents of a verb as either arguments or adjuncts.

[4] The version used for this study contains 18,618 verbal items.

(2) a. *Mia-ka* *yenphil-ul* ***chayksang-eyta*** *noh-ass-ta.*
Mia-NOM pencil-ACC **desk-LOC** put-PAST-DC
'Mia put a pencil on the desk.' (a complement)
b. *Mia-ka* *yenphil-ul* ***seylo-lo*** *noh-ass-ta.*
Mia-NOM pencil-ACC **length-DIR** put-PAST-DC
'Mia put a pencil lengthwise.' (an adjunct)

According to the *Yonsei Korean Dictionary*, the ARG-STs of *noh-* 'put' are <NP(*nom*), NP(*acc*), NP(*loc*)> or <NP(*nom*), NP(*acc*)>. Thus, sentence (2a) corresponds to the first ARG-ST that contains a locative case, while sentence (2b) corresponds to the second one without any oblique complements. That is, *chayksang-eyta* 'on the desk' in (2a) is a complement of *noh*, whereas *seylo-lo* 'lengthwise' in (2b) is a mere adjunct according to the standard view. However, both *chayksang-eyta* and *seylo-lo* are tagged as 'NP_AJT' in SKT.

The same problem, though in a lot less degree, crops up in English as is well known. Let us consider 'put' class verbs in (3) taken from Levin (1993:111). According to Levin's explication, sentence (3b) and (3c) sound deviant because the obligatory arguments are omitted. That is, in this example, 'on the desk' functions as a complement.

(3) a. 'John put the book on the desk.'
b. *'John put on the desk.'
c. *'John put the book.'

This kind of linguistic phenomenon has to be taken into consideration in automatic acquisition of the argument structures from corpora. For example, Manning (1993) raises the need for some methodology to verify whether the prepositional phrase 'on the table' in (4) must be an argument of the verb 'put' or not.

(4) 'John put [$_{NP}$ the cactus] [$_{PP}$ on the table].'

In other words, a systematic approach is required to divide dependents of verbs into arguments or adjuncts, even when obtaining argument information automatically.

As a way to cope with this problem of the argument-adjunct distinction, we took a practical, construction based approach in this study. We first took the ARG-ST in its broadest sense, thus including every possible NPs, VPs, and Ss that are dependent on a predicate. From the resulting set of candidates (i.e. dependents), we selected only the significant ones as argument structures of the predicate by introducing a statistical method. In a sense we adopted a construction-based method relying on the frequency of the relevant construction. Note that we do not distinguish arguments from adjuncts in its original sense, nor we distinguish between oblique cases from

grammatical cases. This again reflects our surface-oriented and frequency-based approach.

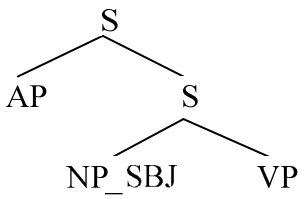
In counting the frequency of ARG-ST, we excluded the verbs or adjectives in the so-called relative clauses in Korean. Relative clauses can raise a troublesome issue in terms of extracting subcategorization frames from corpora, because one of the arguments appears outside of the relative clauses. Unfortunately, there is no way to retrieve its case or functional information with respect to the verbal element in relative clauses. We therefore excluded the verbs or adjectives in relative clauses. Those cases account for approximately 7.5% of all verbal elements in the SKT.

3 Implementation

In this section, we will introduce our basic methodology, step by step, to construct a verbal type hierarchy automatically.

We processed data in Treebanks on the basis of the 'Parse-Tree' algorithm. Data structure of the 'Parse-Tree' algorithm[5] consists of three elements; the mother node (MN), the left daughter node (LDN), and the right daughter node (RDN). Figure (5) represents a typical 'Parse-Tree' structure.

(5)



The first S is the MN of its LDN AP, and its RDN S, while the RDN S, the second S in the tree, is the MN of its LDN NP_SBJ and its RDN VP at the same time. In brief, every node is linked to the head node in a hierarchic binary form.[6]

One of the most prominent distributional characteristics of CFG rules in SKT is that the MN depends upon the RDN almost invariably, which directly reflects the fact that Korean belongs to head-final languages. Therefore, the search paths to extract arguments from a tree structure will be as in the following pictures (6), (9) and (14).

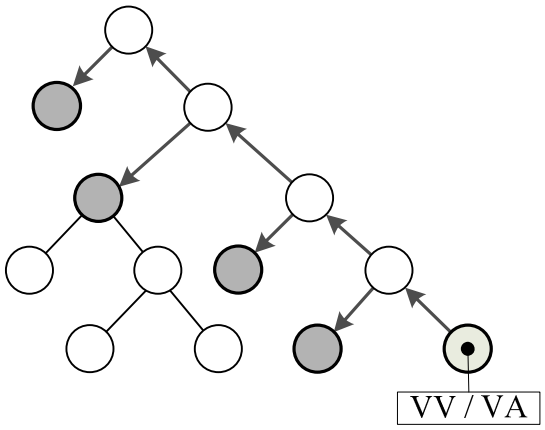
(6) illustrates the main process to acquire arguments with grammatical cases, such as nominatives or accusatives; if a node includes a

[5] Technically speaking, the 'Parse-Tree' algorithm is grounded upon a stack on the principle of 'Last In First Out' (LIFO). The stack has two basic operations; 'push' and 'pop'. The former adds a new node to the top of the stack, and the latter removes and returns the top node on the stack.

[6] SKT adopted a strict binary format for its hierarchical analyses.

verb ‘VV’ or an adjective ‘VA’, the node is the starting position for a search.

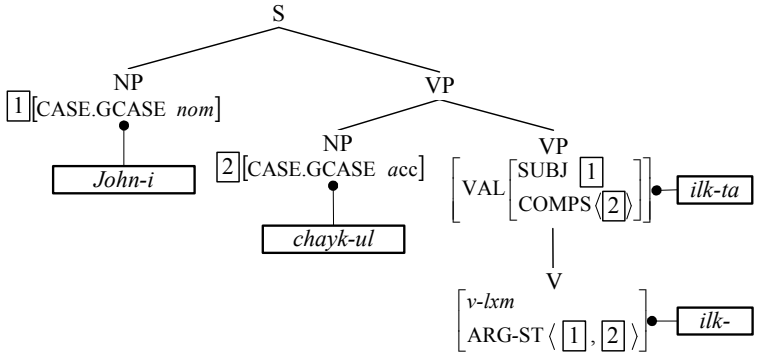
(6)



The algorithm traverses up the tree, checking the left node of its ancestor nodes repeatedly, and collecting relevant cases: if the left node can be a member of ARG-ST of the verbal lexeme, the node becomes an element of candidate set of ARG-ST. Since information about the function, such as ‘SBJ’ or ‘OBJ’, is annotated on each node in SKT in most cases, this process can be carried out with consistency. For instance, let us take a look at sentence (7) in which a typical transitive verb is used. The corresponding tree derivation will be as (8).

(7) *John-i* *chayk-ul* *ilk-ta*.
John-NOM book-ACC read-DC
‘John reads a book.’

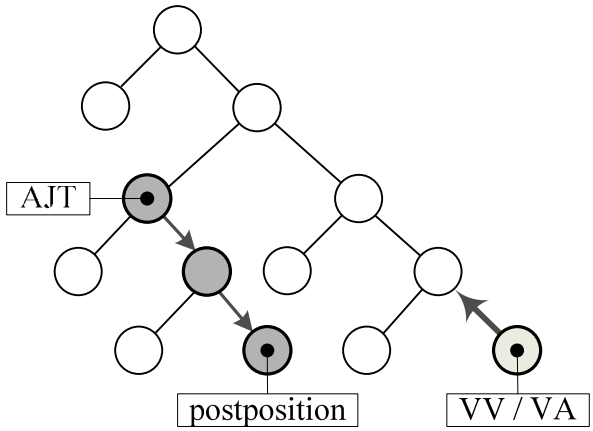
(8)



In (8), VP that contains the main verb *ilk-* ‘read’ will be the starting point. First, *chayk* ‘book’ with an accusative case is taken as a relevant dependent of *ilk-*, and next, ‘John’ in the subject position is also taken. After going through further procedure, <NP(*nom*), NP(*acc*)> is added as an ARG-ST of the verb *ilk-*.

Next, (9) indicates how the candidate set of ARG-ST takes NPs with oblique cases as its element. If a left node of an ancestor node of verbal lexeme is tagged as 'AJT', the node becomes the starting point.

(9)



Since oblique cases in Korean largely hinge on postpositions attached to NP just as oblique cases in English hinge on prepositions, if the final RDN contains a postposition, the final node also becomes an element of candidate set. Oblique cases in Korean determined by postpositions are given in the table below, which is adapted from Sohn (1999:213).

case	**postposition**	**meaning**
dative	*ey, eykey, hanthey, tele…*	'to'
locative	*ey, eykey, hanthey, eyta…*	'on,at,in'
source	*eyse, eykeyse…*	'on,at,in'
ablative	*pwuthe, lopwuthe , sepwuthe…*	'from'
directive	*lo, ulo…*	'towards'
instrumental	*lo, ulo, ulosse…*	'with'
comitive	*wa, kwa, hako, lang…*	'with'
connective	*mye, imye, wa, na…*	'in addtion to, and ,or'
comparative	*pota*	'than'
equative	*chelem, kathi, mankhum…*	'as, like, as much as'

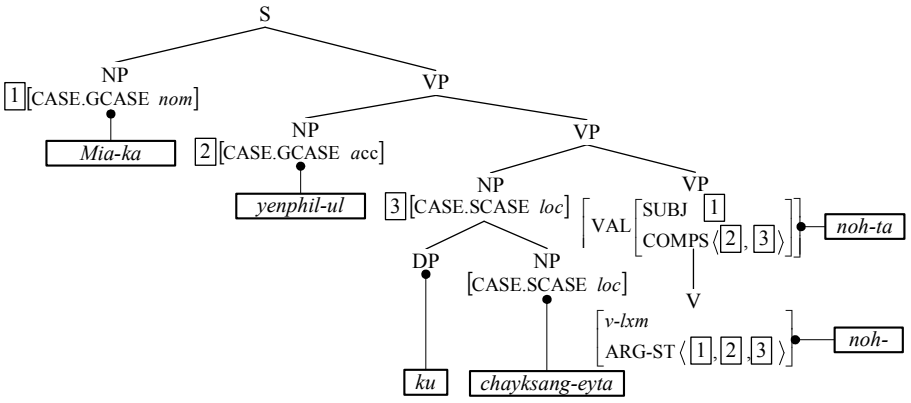
Table 1 : Postpositions in Korean

On the basis of the above, some heuristic assumptions to substitute a postposition with its representative form are taken as a way to deduce representative types of oblique cases. Let us take an example that includes an oblique noun phrase. In (10), *chayksang-eyta* 'on the desk' is coded with a locative case.

(10) *Mia-ka yenphil-ul ku chayksang-**eyta** noh-ta*.
Mia-NOM pencil-ACC DET desk-**LOC** put-DC
'Mia puts a pencil on the desk.'

In this case, it would be more plausible to regard this NP as a complement of the main verb, as was discussed in Section 2, though it is annotated as an adjunct in SKT. (11) stands for the derivation of (10).

(11)

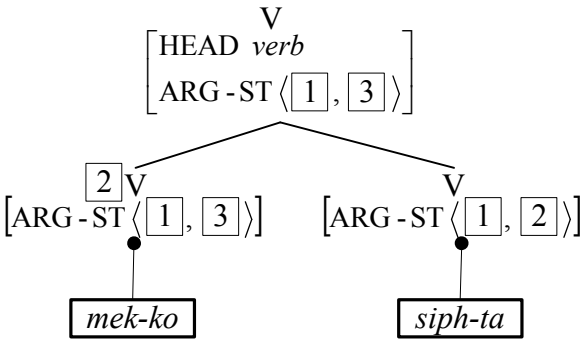


Based on our search path to collect dependents, in the above structure, the NP 3 will be the starting point. And then, the search path goes through its right daughter, finding a postposition such as a locative case marker *-eyta*. As a result of the previous and this procedures, <NP(*nom*), NP(*acc*), NP(*loc*)> will be added as an ARG-ST of the verb *noh-* 'put'. Essentially, the compilation of oblique dependents, in our system, largely depends on the appearance of postposition.

The third search path is for rather troublesome cases, such as complex predicates which consist of a verb plus an auxiliary. In that case, the ARG-ST of the sentence is determined by the main verb. Kim (2004) provides an analysis of Korean auxiliary constructions within the HPSG framework. According to his analysis, since what is responsible for the argument structure in Korean complex predicates is not an auxiliary but the main verb, the mother-category inherits the ARG-ST from the main verb directly. For example, in (12), taken from Kim (2004), where *mek-* 'eat' combines with *siph-* 'would like to', both *John* and *ppang* 'bread' are analyzed as arguments of *mek-*, not the auxiliary *siph-*, as presented in (13).

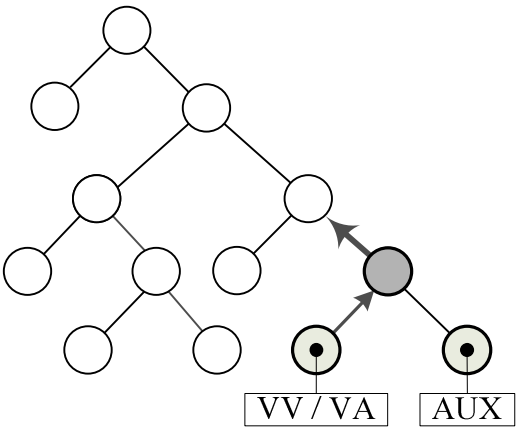
(12) *John-i ppang-ul* [$_{v}$[$_{v}$***mek**-ko*] [$_{v}$***siph**-ta*]].
John-NOM bread-ACC eat-COMP would like to-DC
'John would like to eat bread.'

(13)

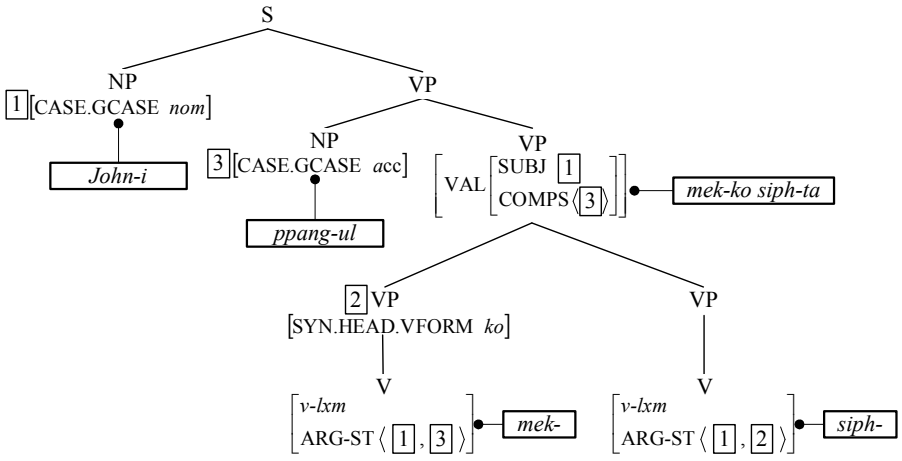


The starting point to collect dependents in complex predicates, therefore, is different from the previous cases. In this case, the starting point of the search path is the parent node of the verbal lexeme, which is marked as a dark circle in (14).

(14)



(15)



In the above diagram, which shows a kind of complex predicate, the starting point turns into the upper node of both the main verb *mek-* 'eat' and the corresponding auxiliary *siph-* 'would like to'. Then, the same procedure as in (6) will be applied so that we can get the pertinent ARG-ST of *mek-* as <NP(*nom*), NP(*acc*)>, which are represented by [1] and [3], respectively, in the above diagram.

3.1 Algorithms

In order to handle the cases presented so far, we have implemented a computer program module, coded in the ANSI C++ programming language. There are two major algorithms to extract the candidate set of ARG-ST from SKT; one is the 'Parse-Tree' algorithm given in (16), the other is the 'Traverse' algorithm to treat (6), (9), and (14). Let us look into the algorithm of building up the 'Parse-Tree' structure.

(16)
```
1:  parse_tree(n):
2:     n→left = n→right = n→parent = NIL
3:        if n is not a terminal node:
4:        n→right = pop()
5:        n→left = pop()
6:        if n→left is NIL:
7:             n→left = n→right
8:        n→right = NIL
9:     n→left→parent = n→right→parent = n
10:    push(n)
```

If there is a new node which is not yet processed (line 1), the left of the node, the right of the node, and the parent of the node are assigned a NULL value (line 2). If the node is not a terminal node (i.e. a non lexical entry) (line 3), the left and right of the node are assigned a value popped from the stack (line 4-5). Since there can be a node without its right, in that case (line 6), this algorithm swaps left with right and assigns a NULL value to the right (line 7-8). The current node naturally becomes the parent node of both its LDN and its RDN (line 9). Finally, this algorithm pushes the node processed so far into the stack in order to link with other nodes (line 10).

(17) and (18) are our 'Traverse' algorithms to collect relevant elements of verbs or adjectives recursively. In (18), line 2 is for the third search path represented in (14), line 5 is for the first search path in (6), and line 6 is for the second search path for oblique cases, shown in (9).

(17)
```
1:  traverse(n):
2:     if n is not NIL:
3:       get_argst(n→parent)
4:       traverse(n→left)
5:       traverse(n→right)
```

(18)
```
1:  get_argst(n):
2:     if next(n) is AUX:                …(14)
3:        n = n→parent
4:     while n is not NIL:
5:        get_arg(n→left)                …(6)
6:        get_postposition(n→right)      …(9)
7:        n = n→parent
```

Based upon these algorithms, we could extract dependents of verbal lexemes from treebanks in an unsupervised way.

3.2 ARG-ST

Sets of ARG-ST of verbal lexemes extracted so far need further process for two reasons. One is that SKT, as stated before, does not discern between oblique NPs as arguments and those as adjuncts. Hence, it is necessary to decide whether an oblique case is qualified to be an element of the ARG-ST or not. The other is that there is no empty category in SKT; therefore, it is not clear whether a surface ARG-ST is saturated with underlying arguments or not. The previous studies that seek to acquire subcategorization frames from corpora have proposed various solutions to this kind of puzzles. Among them, Sarkar and Zeman (2000), who concentrate on filtering of adjuncts from observed data, employ some stochastic techniques as a way to distinguish valid ARG-STs from invalid ones. In line with their proposal, in order to obtain ARG-STs on the basis of a single criterion, we also use a statistical device, in particular, *t-score* since it is quite simple to apply and suffices to our purpose. If the elements and their frequency value of each ARG-ST of a verbal entry is given, *t-score* will be calculated on the basis of the formula (19), where *m* is short for 'the mean of frequencies,' *x* means 'each frequency,' *N* stands for 'the number of ARG-STs,' and *s* is for 'the standard deviation of frequencies.'

(19)
$$t = \frac{(m - x)\sqrt{N}}{s}$$

Then each *t-score* is compared with the cut-off value presented at 25% significance level in the *t-distribution* table.[7] If *t-score* is smaller than the cut-off point, that means the ARG-ST is not meaningless; therefore, it is regarded as one of the valid ARG-STs.

As an example of the selection process, let us take *elyep-* 'difficult'.

[7] We tested a couple of cut-off values and settled with the given one for now as the most appropriate one based on our intuition. It could be an arbitrary decision and obviously needs further research, but the way the cut-off value applies to each verbal lexeme is fixed and consistent.

It had originally 28 ARG-STs, as given in (19)[8], before applying *t-score*.

(20) *elyep*/VA

<VP(nom)>	85
<NP(nom)>	49
<S(*nom*)>	11
<VP(*nom*), NP(*dat*)>	10
<NP(*nom*), NP(*dir*)>	6
<NP(*nom*), NP(*dat*)>	5
<NP(*nom*), VP(*nom*), NP(*src*)>	4
...	

After applying *t-score*, however, only four ARG-STs are considered as candidates for building up the type hierarchy, as shown below.

(21) *elyep*/VA

<VP(*nom*)>	85
<NP(*nom*)>	49
<S(*nom*)>	11
<VP(*nom*), NP(*dat*)>	10

Let us compare our result with the description of the same adjective in the *Yonsei Korean Dictionary,* which was previously shown in (1). In (22), we added ARG-ST information to each example in (1) for the purpose of comparison with (21).

(22) a. **<NP(*nom*)>**

enehak-i *elyep-ta.*
linguistics-NOM difficult-DC
'Linguistics is difficult.'

b. **<NP(*nom*), NP(*nom*)>**

nay-ka *kongpwu-ka* *elyep-ta.*
I-NOM study-NOM difficult-DC
'It is difficult for me to study.'

c. **<S(*nom*)>**

enehak-ul *kongpwu-ha-ki-ka* *elyep-ta.*
linguistics-ACC study-LV-NMS-NOM difficult-DC
'It is difficult to study linguistics.'

It turns out that while (22a) and (22c) are included in our result, (22b), <NP(*nom*), NP(*nom*)>, is not. The most frequent type in (20), <VP(*nom*)>,

[8] The numbers on the right side are the frequency value for each item in SKT.

is not given in (22), but perhaps it can be considered as a case of (22c),[9] though the distribution of <S(*nom*)> and <VP(*nom*)> in SKT should not be ignored. <VP(*nom*), NP(*dat*)>, whose frequency value is 10, is not reflected in (22). Perhaps it has something to do with the the difference on the status of 'NP(*dat*)', that is, whether it should be treated as a valid argument or not.

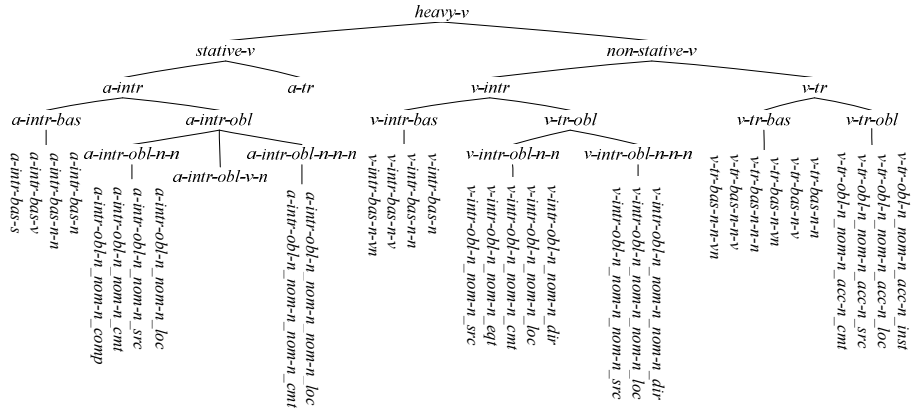
Then the main and clear difference between (21) and (22) would be (22b), which does not appear in (21). In fact, it appeared only once in SKT. It is very interesting to note that the construction given in (22b) is the so-called multiple nominative construction, one of the most hotly and widely debated topics in Korean linguistics, as it is claimed to show one of the major characteristics of the Korean language. Therefore, the significance and implication of the difference regarding (22b) would need further investigation, which we leave for future research.

3.3 The Type Hierarchy

After the valid set of ARG-STs is acquired, our system draws the type hierarchy of verbal lexemes automatically. There are six depths in our type hierarchy. The top node of the hierarchy is *regular-v*, which is divided into two subtypes at the second depth; *stative-v* for adjectives and *non-stative-v* for verbs. Types in the third depth are divided according to transitivity, and types in the fourth depth are divided according to whether the ARG-ST of the lexeme can contain oblique cases. If an oblique case can appear in the ARG-ST, *-obl-* is attached to the type name; otherwise, *-bas-* is attached. The fifth depth classifies types into subtypes in conformity with the category of arguments; such as NP, VP, or S. Finally, the last depth is related to the case of arguments, such as *nom*, *acc*, or *dat*. The whole type hierarchy that our system built up is sketched out below.

[9] In SKT, the difference between an S and a VP is the presence or absence of the nominative marked NP on the surface. So, the example in (22c), which would treated as a case of <S(*nom*)> in the *Yonsei Korean Dictionary*, is to be considered as <VP(*nom*)> in (21) as the nominalized clause *enehak-ul kongpwu-ha-ki-ka* 'to study linguistics' lacks its internal subject on the surface.

(23)



To begin with, our system generate only three types; *regular-v*, *stative-v*, and *non-stative-v*. By checking all verbal lexemes which appear ten or more times in SKT, the type hierarchy automatically branches out whenever a new type comes out.

For example, *noh* 'put' <NP(*nom*), NP(*acc*), NP(*loc*)>, presented in (4a), which belongs to *v-tr-obl-n_nom-n_acc-n_loc* generates four types hierarchically, if there has not been corresponding types yet; *v-tr*, *v-tr-obl*, *v-tr-obl-n-n-n*, and itself. We also designed our system to be a stringent or shallow one, minimizing unnecessary branches in the hierarchy. For example, the v-*tr-obl-n-n-n* type is deleted after the whole type hierarchy is built up, because the type has no subtypes. That is, after a type hierarchy has been built up once, our system gets rid of types without subtypes from the tentative hierarchy, and minimizes the depth of hierarchy.

Let us now consider *elyep-* 'difficult' mentioned above. As shown before, there are four ARG-STs which fall under *elyep-*; <VP(*nom*)>, <NP(*nom*)>, <S(*nom*)>, and <VP(*nom*), NP(*dat*)>. Since *elyep-* is an adjective, all four belong to *a-intr* type in the above hierarchy (23). Among them, since the last one, <VP(*nom*), NP(*dat*)>, takes an oblique case (i.e. datives) as its argument, it belongs to the *a-intr-obl* type. The others that do not take any kind of oblique cases as their argument come under the *a-intr-bas* type. Table in the below shows the matching between them. Note that if there are no subtypes under a node, the node will be discarded in order to make the hierarchy as shallow as possible. For example, although an ARG-ST <VP(*nom*), NP(*dat*)> seems to belong to the *a-intr-obl-v_nom-n_dat* type, its type is specified as *a-intr-obl-v-n*, because there are no sister type that shares its parent type.

ARG-ST	type	frequency	proportion
<VP(nom)>	*a-intr-bas-v*	85	42.3%
<NP(nom)>,	*a-intr-bas-n*	49	24.4%
<S(nom)>,	*a-intr-bas-s*	11	5.5%
<VP(*nom*), NP(*dat*)>.	*a-intr- obl-v-n*	10	5.0%

Table 2 : Types of elyep- 'difficult'

All in all, the result of this study consists of two parts. One is the whole type hierarchy of verbal lexemes in Korean. There are 50 types in the resulting type hierarchy. The other is the set of lexical information of verbal lexemes, which includes information about frequency. The result of our analysis includes 915 verbal entries (91 adjectives and 824 verbs). Since an adjective or a verb can belong to two or more types, the total number of lexicons is 1,572. Each ARG-ST has its own frequency value. Since the results of our study are written in a type definition language, it would be possible to implement the result in an HPSG-based parser, such as the LKB system.

4 Evaluation

As a way to check how well our result fits with other known language resources, we compared our ARG-STs with three available resources separately, the *Yonsei Korean Dictionary* (*eval1*), the *Sejong Korean Electronic Dictionary* (*eval2*), and also a type hierarchy, built up manually, proposed in Kim et al. (2006) (*eval3*). In order to evaluate the results of our analysis, we make use of *precision*, *recall*, and *F-measure* (Manning and Schütze 1999:268) as given below.[10]

(24) $$precision = \frac{tp}{tp + fp}$$

(25) $$recall = \frac{tp}{tp + fn}$$

(26) $$F = \frac{1}{\alpha \frac{1}{P} + (1-\alpha)\frac{1}{R}}$$

[10] According to Manning and Schütze (1999), *precision* is defined as 'a measure of the proportion of selected items that the system got right', *recall* is defined as 'the proportion of the target items that the system selected', and *F-measure* is one of 'the combined measures of *precision* and *recall*'. In the formula (26), *P* is short for *precision, R* means *recall.* And as for α, 'α = 0.5' is normally selected.

The comparison was done as follows; After selecting at random one hundred entries from our list, we observed the differences. If an ARG-ST of our results is compatible with that of the *Yonsei Korean Dictionary* or the *Sejong Korean Electronic Dictionary*, *tp* (true positives) will increase. If an ARG-ST of our results does not appear in the dictionary, *fn* (false negatives) will increase. In the reversed cases, *fp* (false positives) will increase. Let us call this evaluation process *eval1* and *eval2*, respectively. The following table shows the comparison.

	eval1	*eval2*	*eval3*
precision	80.66%	79.01%	55.56%
recall	79.35%	71.50%	62.50%
$F_{\alpha=0.5}$	80.00%	75.07%	58.82%

Table 3 : Evaluations

The values of *eval1* and *eval2* are fairly high, which are at the similar level reported in Sarkar and Zeman (2000). On the other hand, the values of *eval3* are relatively low. We have yet to sort out where the major source of the difference lies.

5 Conclusion

In this paper we have proposed a method of automatically building up a type hierarchy for verbal lexemes based on parsed corpora. We introduced algorithms to collect all the possible ARG-ST and its frequency for a given verbal lexeme, to select appropriate ARG-STs from the candidate set, and finally to build a comprehensive type hierarchy for Korean verbal lexemes. The type hierarchy we have reached in this study, according to our random sample comparison, appears to match reasonably well with the information provided in two of the available resources, though a more thorough and in-depth comparison would be necessary.

We have taken a very practical and surface-oriented approach in selecting ARG-STs that form the basis of the type hierarchy, thus obviating the difficult task of resolving the argument-adjunct distinction problem in Korean. There is also certain flexibility in the selection process: for example, the significance level we chose was at 25%, a very loose one, but if we choose the significance level at a stricter level, say, 10%, or 5%, the result would be a much more simple type hierarchy. On the other hand, if we choose a yet looser one, the resulting type hierarchy would be a much more fine-grained and complex one.

We believe the analysis given in this study brings up some specific and interesting questions and issues for more theoretically oriented linguistics as well as for computational linguistics. Discussion of these and related issues, and their implications, would certainly need further investigation.

References

Chae, Hee-Rahk. 2000. Complements vs. Adjuncts (in Korean). *Studies in Modern Grammar* 19:69-85.

Kim, Jong-Bok and Jaehyung Yang. 2004. A constraint-based approach to Korean auxiliary constructions and its computational implementation. *Language Research* 40(1): 195-226.

Kim, Jong-Bok et al. 2006. Building up Korean Verbal Hierarchy. Paper presented at *Conference of Korean Lexicology*, Seoul.

Levin, Bath. 1993. *English Verb Classes and Alternations: a Preliminary Investigation.* Chicago: University Of Chicago Press.

Manning, Christopher D.. 1993. Automatic Acquisition Of A Large Subcategorization Dictionary From Corpora. Paper presented at *The 31st Annual Meeting of the Association for Computational Linguistics*, Columbus, Ohio.

Manning, Christopher D. and Hinrich Schütze (1999) *Foundations of Statistical Natural Language Processing.* Cambridge: The MIT Press.

Sarkar, Anoop and Daniel Zeman. 2000. Automatic Extraction of Subcategorization Frames for Czech. Paper presented at *COLING-2000*.

Sohn, Ho-Min. 1999. *The Korean Language*. Cambridge: Cambridge University Press.

An analysis of pseudopartitives and measure phrases that say no to extra rules

Wai Lok Tam
Queen Mary University of London

Yo Sato
King's College

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 222–233

Tam, Wai Lok & Yo Sato. 2008. An analysis of pseudopartitives and measure phrases that say no to extra rules. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 222–233. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.13.
CC-BY 4.0

Abstract

Our analysis of pseudopartitives and measure phrases draws on the idea of 'of' as a copula in a pseudopartitive. The copular analysis allows us to avoid the complications caused by treating either the numeral-noun combination before the of-phrase or the of-object as the head of a pseudopartitive on agreement, and hence to account for all the agreement patterns without creating any extra rule. We also outline how we can extend our analysis to handle measure phrases that do not co-occur with of-phrases by treating these measure phrases as anaphoric, an analysis that can adapt to the anaphoric constructions in classifier languages. Such an analysis does not only come closer to the intuition of native speakers but also have an appeal from the perspective of the universality of languages.

1 Introduction

In this paper, we present our HPSG analysis of English measure phrases(MP) in pseudopartitives. Our analysis is motivated by gaps we find in two proposals on how MPs can be handled in HPSG. The first is Flickinger and Bond (2003). It does not cover pseudopartitives. The measure words they look at are mostly restricted to units of measurement. The second proposal is Wright and Kathol (2003). It deals with pseudopartitives but it says very little about units of measurement. Although these two papers complement each other in terms of coverage, the grammar rules given by them do not. It remains a challenge to provide a better coverage of pseudopartitives, particularly if we are to avoid creating extra rules for handling MPs.

2 Coverage of Existing Proposals

Let us go into more details on the coverage of Flickinger and Bond (2003). The following AVM is the SYNSEM of an MP generated by the measure phrase rule in this paper:

$$\begin{bmatrix} \text{CAT}|\text{HEAD} & \textit{noun} \\ \text{CONT} & \begin{bmatrix} \text{INDX} & \left[\text{PERNUM} \;\; \textit{3sing}\right] \\ \text{RELS} & \left\{\begin{array}{l}\text{DEGREE_RELS, CARD_RELS,}\\ \text{NOUN_RELS}\end{array}\right\} \end{bmatrix} \end{bmatrix}$$

The above representation admits MPs mainly formed by numerals and units of measurement and accounts for the use of such MPs as the modifying noun in noun-noun compounds (1) and as a NP by itself (2).

(1) I bought a **fourteen inch** candlestick.

(2) **Three gallons** was enough.

The representation cannot be used for analysing (3) whose main verb agrees with the plural form of the measure word. The measure words used in such sentences are typically a collection of individuals.

(3) **Three herds** of deer are spotted.

Given that Flickinger and Bond (2003) make no claim about pseudopartitives, we do not say there is anything wrong with their analysis, except that the rule is given too general a name. It generates only a subset of MPs for a subset of contexts that they can occur in.

Let us move on to Wright and Kathol (2003). The following AVM is the rule that generates MPs found in their paper:

$$\left[\begin{array}{ll}
\textsc{synsem} & \left[\textsc{cont} \left[\begin{array}{ll} \textsc{ind} & \boxed{3} \vee \boxed{6}\left[\textsc{pernum}\ \boxed{7}\right] \\ \textsc{restr} & \boxed{4} \cup \left\{ \left[\begin{array}{ll} \textsc{measure} & \boxed{2} \\ \textsc{substance} & \boxed{4} \end{array}\right], \left[\begin{array}{ll} \textit{equiv} & \\ \textsc{arg1} & \boxed{6} \\ \textsc{arg2} & \boxed{3} \end{array}\right] \right\} \end{array}\right]\right] \\
\textsc{base} & \left[\begin{array}{ll} \textsc{comps} & \langle \boxed{5} \rangle \\ \textsc{coll} & \textit{bol} \\ \textsc{cont} & \left[\begin{array}{ll} \textsc{ind} & \boxed{1}\left[\textsc{pernum}\ \boxed{7}\right] \\ \textsc{restr} & \boxed{2} \end{array}\right] \end{array}\right] \\
\textsc{compl} & \boxed{5}\left[\begin{array}{ll} \textsc{head} & \textit{prep} \\ \textsc{cont} & \left[\begin{array}{ll} \textsc{ind} & \boxed{3} \\ \textsc{restr} & \boxed{4} \end{array}\right] \end{array}\right]
\end{array}\right]$$

Depending on the value of the COLL feature, the rule generates 1 or 2 representations of an MP. An MP is defined as a constituent formed by a measure word and an of-phrase in Wright and Kathol (2003). Assigning a positive value to the COLL feature of the measure word would allow the main verb to agree either with the object of "of" or the measure word itself. So both (3), whose main verbs agree with the measure word "herds", and (4), whose main verb agrees with the object of "of", can be accepted by the rule if we assign a positive value to the COLL feature of "herd(s)".

(4) One **herd of cows** cool themselves with mud.

Assigning a negative value to the COLL feature of the measure word would disallow the main verb from agreeing with the object of "of", thus ruling out the unacceptable sentence (5):

(5) *A **pile of logs** were burning

It is possible to use the COLL feature for handling some of the problematic agreement patterns demonstrated by MPs formed with units of measurement. Assigning a positive value to the COLL feature of the units of measurement ”inches” in (6) and (7) would make both sentences acceptable.

(6) Fourteen **inches of cable** is used.

(7) Fourteen **inches of cable** are used.

However, there is no means by which to licence the most problematic agreement pattern illustrated by 8, in which the main verb neither agrees with the measure word nor the object of “of”.

(8) Three **pounds of potatoes** is used.

3 Solution for Increasing Coverage

The first part of our solution to the problem described above comprises the lexical entry of a numeral and the lexical entries of two types of measure words given below. Measure words are treated as a subclass of nouns that carry a *qty* (for quantify) value for the QQP feature. The QQP feature determines whether a noun is a measure word that quantifies its sister (*qty*), an attributive noun that qualifies its sister (*qly*) or a predicative noun (*prd*). Both measure words and attributive nouns carry non-empty SPEC values. By the SPEC values they carry, measure words are divided into two types. A measure word of the first type would specify the number of its sister to be either equivalent to its own number or singular. A measure word of the second type would specify the number of its sister to be equivalent to its own number. Units of measurement belong to the first type. The optional singular number of the index of its sister captures the idea that a unit of measurement may grind the denotatum of the object of “of” to a mass. The second type of measure words includes collections of individuals, containers and shape classifiers like “pieces”. The plural number of the indices of their sisters captures the idea that they individuate the denotata of their sisters by dividing them into countable portions/parts.

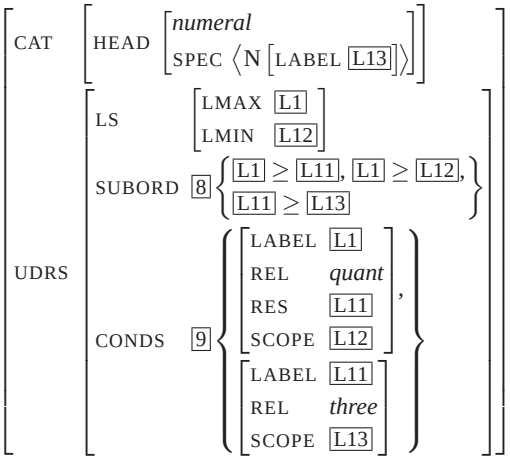


Figure 1: three

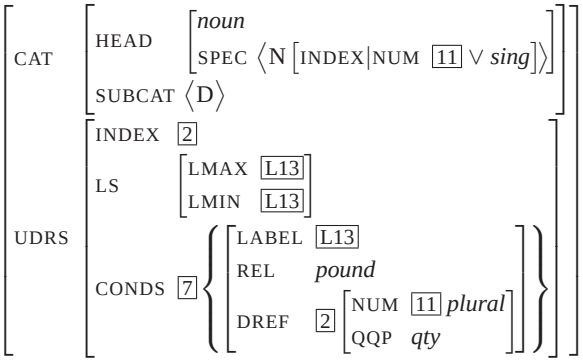


Figure 2: pounds

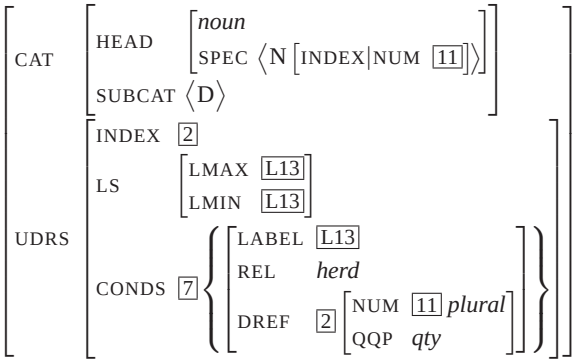


Figure 3: herds

Before we move on to explain what we will do with these lexical entries, let us give some explanation on the use of indices (boxed numbers) in figures that illustrate how our proposal works. From this section onwards, indices represented by the same boxed number are shared across figures, excluding Figure 3 and Figure 2. An index used in each of these two AVMs is shared with indices represented by the same boxed number in other figures. But between these two representations of measure words, indices represented by the same boxed number are not shared.

Now let us start constructing a pseudopartitive by applying schema 4 of Pollard and Sag (1994) and a revised version of the semantic principle of Reyle (1995) that works with an NP analysis of DET-N combinations to the lexical entry of "three" and the lexical entry of one of the measure words given above. The original version, which unifies the top label and the bottom label of the head daughter with those of the mother, would only work with a DP analysis of DET-N combinations. The revised version of the semantic principle Reyle (1995) would unify the top label and the bottom label of a quantifer with those of the constituent formed by the quantifier and a noun when the quantifier is the non-head daughter. The revised version is given in Figure 4.

$$\begin{bmatrix}
\textsc{cat} & \left[\textsc{head}\ \boxed{93}\right] \\
\textsc{udrs} & \begin{bmatrix}
\textsc{ls} & \boxed{99} \\
\textsc{subord} & \boxed{98} \cup \boxed{95} \\
\textsc{conds} & \boxed{97} \cup \boxed{94}
\end{bmatrix} \\
\textsc{nhdtr} & \begin{bmatrix}
\textsc{cat} & \left[\textsc{head}\ \textit{quant}\right] \\
\textsc{udrs} & \begin{bmatrix}
\textsc{ls} & \boxed{99} \\
\textsc{subord} & \boxed{98} \\
\textsc{conds} & \boxed{97}
\end{bmatrix}
\end{bmatrix} \\
\textsc{hdtr} & \begin{bmatrix}
\textsc{cat} & \left[\textsc{head}\ \boxed{93}\right] \\
\textsc{udrs} & \begin{bmatrix}
\textsc{ls} & \boxed{96} \\
\textsc{subord} & \boxed{95} \\
\textsc{conds} & \boxed{94}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}$$

Figure 4: Revised semantic principle

Our first step yields the following representations of MPs:

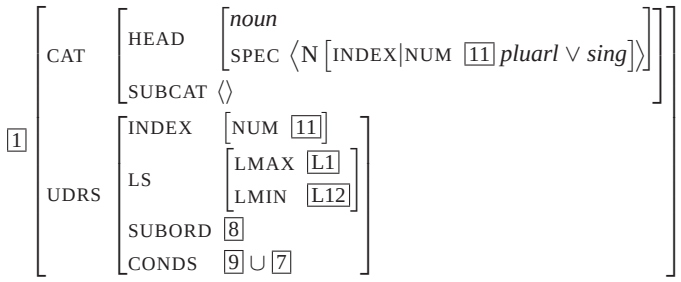


Figure 5: three pounds

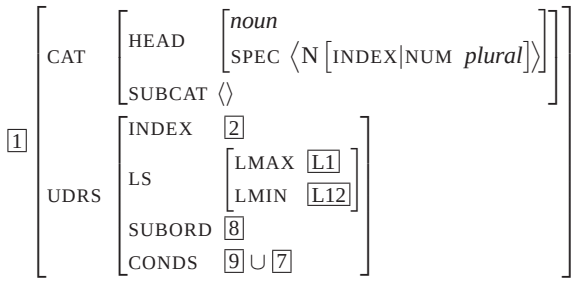


Figure 6: three herds

The second part of our solution comprises the lexical entry of “of”, which is given an analysis different from that of “of” as used as a preposition in partitives. The differences in syntactic behaviour between pseudopartitives and partitives can be illustrated by Sentences 9 10, 11 and 12, which are taken from Selkirk (1976) and cited by Stickney (2004).

(9) A few of the leftover turkey has been eaten.

(10) A few has been eaten of the leftover turkey.

(11) A few of leftover turkey has been eaten.

(12) *A few has been eaten of leftover turkey.

It is possible to extract “of the leftover turkey” from the partitive 9 and from 10, whereas it is not possible to extract “of leftover turkey” from the pseudopartitive 11 and form 12. This means “of the leftover turkey” is a constituent whereas “of leftover turkey” is not. Therefore we put both a subject and an object in the SUBCAT list of “of” when it is used in a pseudopartitive. This means “of” would not form a constituent without cancelling out both its subject and object.

Further, to achieve a closer correspondence between the syntax and semantics, we invoke the copular analysis of "of" supported by Stickney (2004) and credited to den Dikken (1998). The equivalence relation between the denotatum of the of-object and the denotatum of the preceding NP given in Wright and Kathol (2003) as the semantic representation of "of" is the same equivalence relation between the subject and the object of a copula. A copular analysis is also useful for avoiding the agreement problem caused by the plural forms of units of measurement in grammar engineering. The copular head can prevent the verb that takes the pseudopartitives in question as subject from directly interacting with either the measure word or the object of "of". Below is the representation of "of":

$$\left[\begin{array}{ll} \textsc{cat} & \left[\begin{array}{ll} \textsc{head} & \textit{mon} \\ \textsc{subcat} & \left\langle \textsc{np}\left[\begin{array}{ll}\textsc{index} & \boxed{2}\\ \textsc{label} & \boxed{\textsc{l13}}\end{array}\right], \textsc{np}\left[\textsc{index}\ \boxed{4}\right]\right\rangle \end{array}\right] \\ \textsc{udrs} & \left[\begin{array}{ll} \textsc{index} & \boxed{5} \\ \textsc{ls} & \left[\begin{array}{ll}\textsc{lmax} & \boxed{\textsc{l13}}\\ \textsc{lmin} & \boxed{\textsc{l13}}\end{array}\right] \\ \textsc{conds} & \boxed{6}\left\{\left[\begin{array}{ll}\textsc{label} & \boxed{\textsc{l13}}\\ \textsc{rel} & \textit{part_rel}\\ \textsc{dref} & \boxed{5}\\ \textsc{arg}1 & \boxed{4}\\ \textsc{arg}2 & \boxed{2}\end{array}\right]\right\} \end{array}\right] \end{array}\right]$$

Figure 7: of

Notice that the HEAD value is typed to (instead of the conventional *preposition*), *mon*, *monotonic category*, which is projected to Schwarzschild (2006)'s "monotonic constructions". Syntactically, a monotonic construction is headed by 'of', but behaves like a noun phrase, inheriting the categorial properties from the lower NP.[1] Semantically, its interpretation uses a dimension that is monotonic relative to the part-whole relation in the domain given by the noun regarded as the semantic core of the noun phrase. Let us go into more details on how this part-whole relation works. The *part_rel* in the CONDS list of "of" creates a discourse referent corresponding to the sum of some part(s) whose material makeup is specified by its ARG2 value and whose size(the size of each part) is specified by its ARG1 value. Whether the sum of these parts (the DREF value of the *part_rel* and the INDEX of "of") is a singular individual(*sing*), a mass *sing* or a plural individual *plural* is determined by the SPEC value of the MP to be combined with the projection of "of". The projection of "of" is formed by applying schema 2 and the semantic principle of Reyle (1995) to the lexical entry of a noun and the lexical entry of "of". This yields the following representation of an of-phrase:

[1]It requires more syntactic work to precisely characterise the categorial nature of *mon*, however, particularly to determine its exact locus in the type hierarchy.

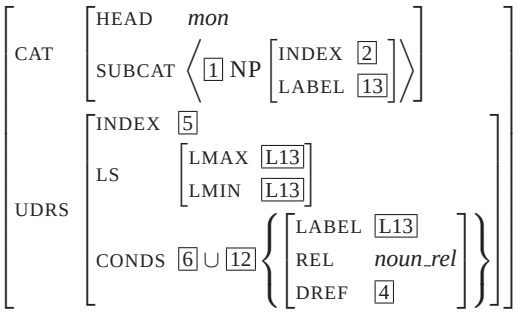


Figure 8: an of-phrase

Now we can construct a pseudopartitive by applying Schema 4 and our modified version of the semantic principle of Reyle (1995) to the of-phrase and the MP represented by Figure 5 or 6. The representation of the resulting pseudopartitive is given below:

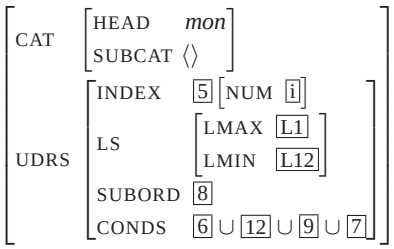


Figure 9: a pseudopartitive

For "three pounds of potatoes", the INDEX value i would be a disjunction of singular or plural, allowing the MP to combine with singular and plural forms of the main verb of a pseudopartiive.

4 Handling Coercion by Salient Plural Individuals

We still have (4) left. Wright and Kathol (2003) point out that the agreement pattern exhibited by this sentence cannot be generalized to all combinations of measure words and of-objects, as illustrated by 5. Even for (4), replacing the plural verb "cool" with its singular form is found to be equally, if not more acceptable among native speakers. Wright and Kathol (2003) see the agreement pattern exhibited by (4) as a result of coercion by some salient plural individuals. Although dealing with saliency falls outside the scope of a grammar, we are aware that being animate appears to be a prerequisite for a plural individual to be salient in all the acceptable examples given by Wright and Kathol (2003). So we create a rule that allows the not-so-acceptable agreement pattern only when the of-object is animate. The rule

would convert the lexical entry of "of" to the representation given in figure 4. Note the *animate* value assigned to ARG1|ANI of the *part_rel*.

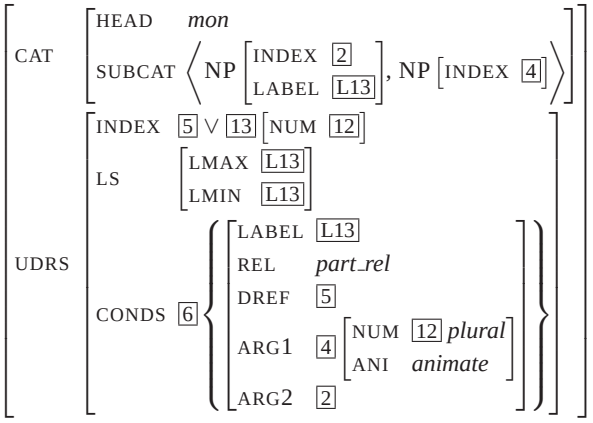


Figure 10: "of" as a result of coercion

The projection of this "of" has the options to unify its INDEX value with 5, whose NUM value is determined by the SPEC|UDRS|INDEX|NUM value of the measure word, or unify its INDEX value with 13, whose NUM value is determined by the UDRS|NUM value of the object of "of". The later option would admit (4) but reject (5).

5 Extension

The proposal that we have given above can be further extended to cover (2) in a more intuitive way. We call such construction "anaphoric" following Downing (1996)'s work on classifiers. We have confirmed with native speakers that the meaning of (2) is far more often "A quantity of some substance equivalent to three gallons is enough" than "A degree equivalent to three gallons is enough". To capture this, we propose a unary rule that empties the SPEC list of an MP and introduce into the background the *part_rel* and *noun_rel* supplied by the head of a pseudopartitive. This rule, whose representation is given in figure 14 is introduced as an instance of a class of rules for handling a variety of specifiers used anaphorically in the following monotonic constructions:

(13) Too much is wasted

(14) Two million are killed

Given that this paper is about pseudopartitives, we omit the details about the generalization. When compared to Flickinger and Bond (2003)'s rule, our rule has

an appeal from the perspective of the universality of languages. The backbone of the rule given below can be adapted (with all the agreement features removed) to apply to anaphoric constructions of classifier languages like Japanese and Mandarin.

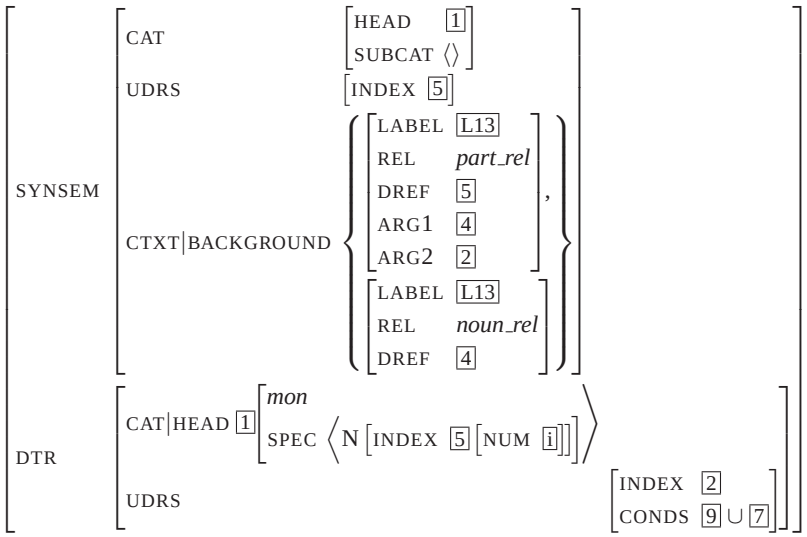


Figure 11: anaphoric construction rule

6 Conclusion

We have stuck to our claim that no extra rules is to be created for our analysis of pseudopartitives. Our analysis of pseudopartitives that exhibit the more acceptable agreement pattern only draws on general principles proposed in Pollard and Sag (1994) and Reyle (1995). Our revision of the semantic principle of Reyle (1995) is geared more towards a general approach to the analysis of DET-N combinations than a compositional semantics customized for pseudopartitives. The pursuit for this theoretical economy has a practical motivation. Restricting the number of rules and introducing rule classes rather than specific rules when new rules are needed for increasing coverage go hand in hand with our attempt at restricting the number of features as presented in [author's paper]. Placing these constraints on grammar engineering makes a wide-coverage grammar easy for grammar writers to maintain and developers of NLP systems to use. Our actual implementation of the work presented here in ENJU (Miyao et al., 2004) also comes with a simplified output format (an alternative to the standard AVM format) that captures the gist of our HPSG analysis in Penn Treebank bracketing style such that members of the NLP community can share the fruit of our research with members of the HPSG community.

References

den Dikken, M. 1998. Predicate Inversion in DP. In A. Alexiadou and C. Wilber (eds.), *Possessors, predicates, and movement in the determiner phrase*, pages 215–257, John Benjamins.

Downing, Pamela. 1996. *Numeral Classifier Systems: The Case of Japanese*. Philadelphia: John Benjamins.

Flickinger, Dan and Bond, Francis. 2003. A two-rule analysis of measure noun phrases. In *Proceedings of the 10th International Conference on Head-Driven Phrase Structure Grammar*, pages 111–121, Stanford: CSLI Publications.

Miyao, Yusuke, Ninomiya, Takashi and Tsujii, Jun'ichi. 2004. Corpus-oriented Grammar Development for Acquiring a Head-driven Phrase Structure Grammar from the Penn Treebank. In *Proceedings of the First International Joint Conference on Natural Language Processing*, pages 684–693, Hong Kong.

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

Reyle, Uwe. 1995. Principle based semantics for HPSG. In *Proceedings of the 7th Conference on European chaper of the Association of Computational Linguistics*, pages 9–16, Dublin: Morgan Kaufmann Publishers Inc.

Schwarzschild, Roger. 2006. The Role of Dimensions in the Syntax of Noun Phrases. *Syntax* 9(1), 67–110.

Selkirk, E. O. 1976. Some Remarks on Noun Phrase Structure. In *MSSB-UC Irvine Conference on the Formal Syntax of Natural Language*, pages 285–316.

Stickney, Helen. 2004. The Pseudopartitive and its Illusory Projections. UMass Amherst Manuscript.

Wright, Abby and Kathol, Andreas. 2003. When a Head is Not a Head: A Constructional Approach to Exocentricity in English. In Jong-Bok Kim and Stephen Wechsler (eds.), *Proceedings of the 9th International Conference on Head-Driven Phrase Structure Grammar*, pages 373–389, Stanford: CSLI Publications.

The representation of syllable structure in HPSG

Jesse Tseng
CNRS

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 234–252

Tseng, Jesse. 2008. The representation of syllable structure in HPSG. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 234–252. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.14. CC-BY 4.0

Abstract

This paper proposes a representation for syllable structure in HPSG, building on previous work by Bird and Klein (1994), Höhle (1999), and Crysmann (2002). Instead of mapping segments into a a separate part of the sign where syllables are represented structurally, information about syllabification is encoded directly in the list of segments, the core of the PHONOLOGY value. Higher level prosodic phenomena can operate on a more abstract representation of the sequence of syllables derived from the syllabified segments list. The approach is illustrated with analyses of some word-boundary phenomena conditioned by syllable structure in French.

1 Introduction

In Pollard and Sag (1994) the value of the PHONOLOGY attribute is assumed to be a list of unanalyzed phoneme strings corresponding to words or lexemes. It has become common practice to further simplify the PHON value to contain orthographic forms. This convention has arisen because in most HPSG work, the primary function of the PHON value is to encode surface word order, and a simple indication of each word's identity is sufficient for these purposes.

For analyses that need to refer to the phonological properties of words and phrases, this kind of "placeholder" representation is of course inadequate. Given the flexibility of the typed feature structure formalism, however, several different approaches for enriching this part of the HPSG sign can be (and have been) imagined. Recent interest in HPSG phonology has focused on phenomena at the level of the prosodic word and above (Klein, 2001; Bonami and Delais-Roussarie, 2006). At the same time, work in morphophonology and phonosyntax makes reference to the segmental phonology of words (e.g. Bonami et al., 2004). In this paper I will concentrate on the level of syllable structure, and develop a framework for the representation of syllables in HPSG building on insights from existing proposals.

2 Segments

2.1 Segmental features

The smallest phonologically meaningful unit in most theories is the segment. Segments are typically defined as collections of phonological features encoding, for example, voicing, the position and configuration of the various articulators, the manner of articulation. Each feature generally has a predefined set of possible values, and the features are grouped into bundles based on empirical evidence such as covariation in assimilation phenomena. This kind of feature geometry can be straightforwardly encoded in HPSG.

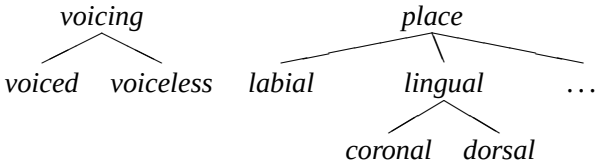
[†]I would like to thank the anonymous reviewers and the participants of HPSG 2008 and Gergana Popova for valuable comments. Special thanks also to Berthold Crysmann.

Bird and Klein (1994), for example, adopt the boolean features of Clements (1985):

(1)
$$\begin{bmatrix} \textit{segment} & & \\ \text{LARYNGEAL} & \begin{bmatrix} \text{SPREAD} & \textit{bool} \\ \text{CONSTRICTED} & \textit{bool} \\ \text{VOICED} & \textit{bool} \end{bmatrix} & \\ \text{SUPRALARYNGEAL} & \begin{bmatrix} \text{MANNER} & \begin{bmatrix} \text{NASAL} & \textit{bool} \\ \text{CONTINUANT} & \textit{bool} \\ \text{STRIDENT} & \textit{bool} \end{bmatrix} \\ \text{PLACE} & \begin{bmatrix} \text{CORONAL} & \textit{bool} \\ \text{ANTERIOR} & \textit{bool} \\ \text{DISTRIBUTED} & \textit{bool} \end{bmatrix} \end{bmatrix} & \end{bmatrix}$$

This proposal does not make much use of types. Höhle (1999), in contrast, takes full advantage of this formal notion of HPSG. Part of his signature is reproduced below:[1]

(2) a.
$$\begin{bmatrix} \textit{segment} & & \\ \text{SEGMPROPER} & \begin{bmatrix} \textit{segmproper} & & \\ \text{VOICING} & \textit{voicing} & \\ \text{VELUM} & \textit{velum} & \\ \text{TONGUE} & \begin{bmatrix} \textit{tongue} & \\ \text{VERTICAL} & \textit{vertical} \\ \text{HORIZONTAL} & \textit{horizontal} \end{bmatrix} & \\ \text{CONSTRICTION} & \textit{nelist}(\textit{place}) & \end{bmatrix} & \end{bmatrix}$$

b.


None of these authors seems particularly committed to any specific proposal for segmental representation. Empirical and analytical issues remain open (what distinctions are needed, how they should be encoded). The point is that the HPSG formalism is able to directly accommodate any model within this general approach.

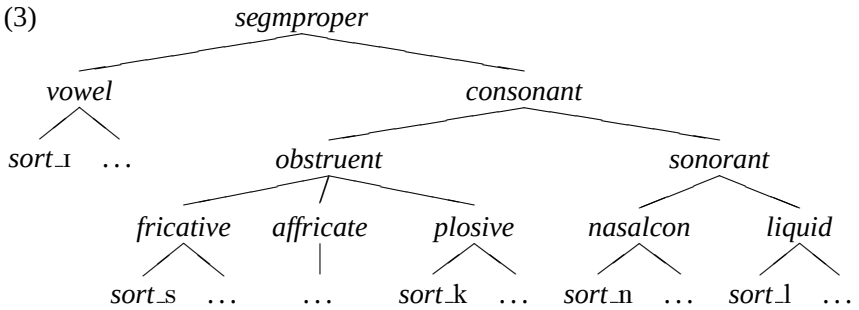
In such models, a segment can be uniquely identified by specifying the corresponding matrix of distinctive features. It is convenient, however, to reify individual segments as named objects in the type hierarchy. Höhle does this by defining

[1]The attribute CONSTRICTION is in fact only appropriate for the *segmproper* subtype *consonant*; see (3) below.

phonemic sorts such as *sort_*ɪ, *sort_*y, *sort_*k, *sort_*d, *sort_*n, etc. Such maximal types are not only useful as abbreviatory devices. They provide a way of explicitly specifying the inventory of segments in a given language (with idiosyncratic gaps and outliers that do not reflect generalizations over phonological features).

These segmental sorts are the leaves of a hierarchy that can be enriched with intermediate types representing natural classes of segments. For Höhle, these are subtypes of *segmproper*, for which he proposes the following hierarchy:

(3)



This hierarchy can be extended with further intermediate types, for example, underspecified archiphoneme types that subsume the segmental sorts corresponding to their allophones.

A natural extension is to allow multiple inheritance and introduce other dimensions of variation in the segmental hierarchy. For example, Höhle encodes quantity by introducing *long* and *short* as subtypes of *segment*, but one could also add a QUANTITY dimension directly to the *segmproper* hierarchy in (3). In this particular case, it might be better in fact to encode this information using a feature rather than with types. But the idea of multiple inheritance will be crucial in the approach outlined in §4.

2.2 Lists of segments

In the physical realization of words and phrases, there is often no clear boundary between successive segments, and this overlapping articulation is responsible for many diachronic and synchronic phonological phenomena. But for the purposes of phonological analysis, most formal models assume that segments are realized one after the other. Previous proposals for HPSG phonology adopt this idealized representation, encoding the segmental content of words as a list of segments.

In fact, Bird and Klein (1994) propose a PHON value that includes three lists of segments, with the elements of the overall "skeletal" list split into a list of consonants and a list of vowels. Once again, this is a straightforward HPSG implementation of an existing phonological model, this time autosegmental phonology (Goldsmith, 1990). The following structure, for example, represents the word *kicaaw* (Sierra Miwok):

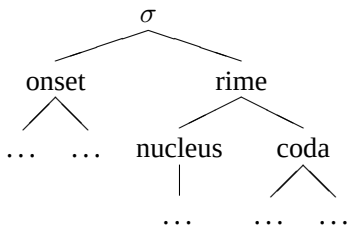
(4)
$$\begin{bmatrix} \textit{phon} & \\ \textsc{con} & \langle \boxed{1}\,\mathrm{k}, \boxed{3}\,\mathrm{c}, \boxed{5}\,\mathrm{w} \rangle \\ \textsc{vow} & \langle \boxed{2}\,\mathrm{i}, \boxed{4}\,\mathrm{a} \rangle \\ \textsc{skel} & \langle \boxed{1},\boxed{2},\boxed{3},\boxed{4},\boxed{4},\boxed{5} \rangle \end{bmatrix}$$

The separation of consonant and vowel "tiers" in the autosegmental model allows an analysis of nonconcatenative morphophonological phenomena, such as the templatic morphology of Sierra Miwok and Semitic languages. Höhle (1999) demonstrates, however, that the insights of the autosegmental analysis can be incorporated into an HPSG account without introducing additional list attributes for the tiers. After all, the elements in the overall list of segments—the value of SEGMENTAL-STRING in Höhle's model—are typed (consonant vs. vowel), and the description language of HPSG allows the relevant operations to be carried out directly on this list.[2]

3 From segments to syllables

It is widely—though by no means universally—accepted that segments are organized into syllables, the next larger unit of phonological structure. The following tree structure is a common representation of the internal organization of a syllable:

(5)



It is usually assumed, moreover, that a syllable must have a nucleus, while the onset and coda can be absent in certain situations.

3.1 Lists of syllables

Bird and Klein present an implementation of a model of this kind. They assume that *phon* objects have a SYLLABLES list that encodes the result of parsing the list of segments (now called SEGS) into a sequence of *syl* objects. Syllabification of phonological phrases is subject to the following recursive constraint:[3]

[2] Höhle also argues against interpreting the segment list as a "timing tier", cf. the representation of the long vowel in (4). As mentioned briefly at the end of §2.1, it is preferable to encode quantity as part of the representation of each segment.

[3] Bird and Klein's notation, reproduced here, is somewhat improper, but the intended meaning should be clear.

(6) a.
$$\left[\begin{array}{ll} \textit{phon-phrase} & \\ \textsc{syls} & \left\langle \left[\begin{array}{ll} \textsc{ons} & \boxed{1}\ \textit{onset} \\ \textsc{nuc} & \boxed{2}\ \textit{nucleus} \\ \textsc{coda} & \boxed{3}\ \textit{coda} \end{array}\right] \right\rangle \oplus \boxed{4} \\ \textsc{segs} & \boxed{1} \oplus \boxed{2} \oplus \boxed{3} \oplus \boxed{5} \end{array}\right] \Rightarrow \left[\begin{array}{ll} \textit{phon-phrase} & \\ \textsc{syls} & \boxed{4} \\ \textsc{segs} & \boxed{5} \end{array}\right]$$

b.
$$\left[\begin{array}{ll} \textit{phon-phrase} & \\ \textsc{syls} & \langle\,\rangle \\ \textsc{segs} & \langle\,\rangle \end{array}\right]$$

I will discuss Bird and Klein's proposals more fully in the following sections.

While Höhle does not discuss syllable structure in any detail, the general model he sketches seems to follow an approach similar to that of Bird and Klein.

(7)
$$\left[\begin{array}{ll} \textit{phon} & \\ \textsc{segmental-string} & \textit{list}(\textit{segment}) \\ \textsc{hierarch} & \left[\begin{array}{ll} \textit{hierarch} & \\ \textsc{syllables} & \textit{list}(\textit{syllable}) \\ \textsc{feet} & \textit{list}(\textit{foot}) \\ \textsc{phonwords} & \textit{list}(\textit{nelist}(\textit{segment})) \end{array}\right] \end{array}\right]$$

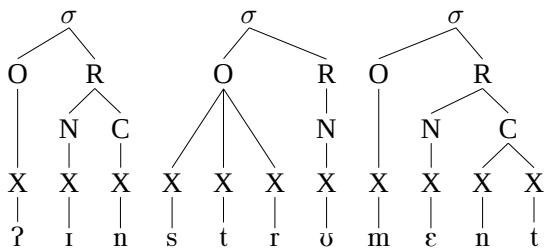
In other words, he assumes that the elements of the SEG-STRING list are organized into objects of type *syllable*, which appear in the SYLLABLES list. Syllables are in turn organized into feet. In most cases, the associations between levels of prosodic structure are rather straightforward and subject to strong well-formedness constraints (e.g. the Strict Layer Hypothesis, Selkirk, 1984). Höhle recognizes, however, that the relations between successive levels are not always so simple. According to some analyses, segments are not always exhaustively syllabified (e.g. extrasyllabicity), and some syllables are not fully integrated into feet (e.g. extrametricality/extraprosodicity). By the time he gets to the list of phonological words, Höhle gives up on the idea of making its value a list of *phonword* objects, a type which would presumably be defined in terms of *foot* objects, defined in turn in terms of *syllable* objects, defined in terms of *segments*. Instead, the value of PHONWORDS is declared to be less constrained, and to make direct reference to segments. No precise definitions are proposed for *syllable* and *feet*, either—i.e., it is left open whether they should be represented as lists or as more richly structured objects like Bird and Klein's *syl*. Höhle's comments seem to suggest that in the general case, it may turn out that the attributes SYLLABLES and FEET might also select values of the more flexible type *list*(*nelist*(*segment*)).

3.2 Problems with structural encoding

In this section I will point out some technical and conceptual difficulties with the kinds of approaches we have just seen, where hierarchical prosodic structure is encoded using hierarchically embedded representations. I will focus on the analysis of syllabification presented by Bird and Klein (1994).

Consider the English word *instrument*, for which we might assume the pronunciation [ʔin.stru.mɛnt]. This syllabic structure is shown in (8a) using tree notation and in (8b) as an AVM.

(8) a.



b.

$$\begin{bmatrix} \text{SYLS} & \left\langle \begin{bmatrix} \text{ONS} & \langle ʔ \rangle \\ \text{NUC} & \langle ɪ \rangle \\ \text{CODA} & \langle n \rangle \end{bmatrix}, \begin{bmatrix} \text{ONS} & \langle s,t,ɹ \rangle \\ \text{NUC} & \langle ʊ \rangle \\ \text{CODA} & \langle\,\rangle \end{bmatrix}, \begin{bmatrix} \text{ONS} & \langle m \rangle \\ \text{NUC} & \langle ɛ \rangle \\ \text{CODA} & \langle n,t \rangle \end{bmatrix} \right\rangle \\ \text{SEGS} & \langle ʔ, ɪ, n, s, t, ɹ, ʊ, m, ɛ, n, t \rangle \end{bmatrix}$$

Apart from the absence of the rime subgrouping in (8b), which I assume is a simplification for expository purposes rather than a theoretical claim on the part of Bird and Klein, there are some important differences between these two structures. In the AVM, the segments are represented twice, or more precisely, each segment appears in two places by re-entrancy (not indicated in the figure above). Moreover, the attributes ONS, NUC, and CODA are unordered.

Thus a number of fundamental constraints on the well-formedness of syllables that hard-wired into the classic tree representation in (8a) have to be stated explicitly in the HPSG model. These include constraints against crossing branches and multiple association. Such illicit configurations can be represented just as easily as legitimate syllabifications in AVM form:

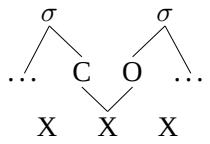
(9) a.

$$\begin{bmatrix} \text{SYLS} & \left\langle \ldots, \begin{bmatrix} \text{ONS} & \langle \boxed{2} \rangle \\ \text{NUC} & \langle \boxed{1} \rangle \end{bmatrix}, \ldots \right\rangle \\ \text{SEGS} & \langle \ldots, \boxed{1}, \boxed{2} \ldots \rangle \end{bmatrix}$$

b. $\begin{bmatrix} \text{SYLS} & \left\langle \ldots, \left[\text{CODA} \quad \left\langle \boxed{1} \right\rangle \right], \ldots \right\rangle \\ \text{SEGS} & \left\langle \ldots, \boxed{1}, \ldots, \boxed{1}, \ldots \right\rangle \end{bmatrix}$

At the same time, some kinds of "interesting" configurations are possible in both representations. For example, ambisyllabicity could be represented as follows:[4]

(10) a.



b. $\begin{bmatrix} \text{SYLS} & \left\langle \ldots, \left[\text{CODA} \quad \left\langle \boxed{1} \right\rangle \right], \left[\text{ONS} \quad \left\langle \boxed{1} \right\rangle \right], \ldots \right\rangle \\ \text{SEGS} & \left\langle \ldots, \boxed{1}, \ldots \right\rangle \end{bmatrix}$

It has always been recognized, of course, that the vast majority of structures in HPSG that are well-formed according to the signature have to be filtered out by grammatical constraints. In general, the expressive potential of the formalism is seen as an advantage by most practitioners of HPSG, as it enforces transparency and explicitness in analyses. It should always be kept in mind, however, that each time a new attribute is introduced, its value must be filled in somehow. Bird and Klein propose the syllabification constraint shown in (6) above, for example, to instantiate the value of SYLS. With the appropriate definitions for the types *onset*, *nucleus*, and *coda*, this constraint does allow canonical syllable structures as in (8b), and it could be modified if desired to allow structures like (10). But any variant of the constraint will have continue to enforce a measure of redundancy in the representation: the identity and order of the segments in the SEGS list must be preserved. In other words, in such an approach, information that is already present in one part of the sign must be systematically reproduced in another.

A more conceptual problem with the analysis of Bird and Klein is the assumption of exhaustive syllabification in (6). Phonological accounts of syllabification usually establish a set of rules and principles that allow every (grammatical) word or phrase to be completely parsed into syllables, and they typically strive to ensure that this syllabification is unique. This implies, among other things, that the boundaries between syllables are always well-defined. In reality, though, syllable boundaries can be difficult to identify (Angoujard, 1997).

Several kinds of evidence are available for determining syllabification in a given language: speaker's intuitions (both introspective and semi-conscious, as in the case of secret languages and games), phonetic criteria, and phonological phenomena conditioned by syllable structure. For most languages, these criteria can be used reliably to identify syllable "peaks" and "troughs", but they are not always

[4]Geminate consonants would receive a distinct representation, with the same segment appearing twice on the SEGS list; recall however fn. 2 on the use of the segments list as a timing tier.

sufficient for locating a precise syllable boundary in every trough. This is especially true of so-called "stress timing" languages like English. One manifestation of this difficulty is the phenomenon of ambisyllabicity, mentioned above in (10), in which it can be argued that a consonant occupies adjacent coda and onset positions at the same time. Another example of this indeterminacy is provided by the word *instrument* (8b), for which the alternative syllabification [ʔɪns.tru.mɛnt] can also be defended (Wells, 1990).

Bird and Klein's model can be modified to allow two distinct, complete syllabifications of a word like *instrument*. This does not seem to be the right approach, however: the syllabification is not ambiguous, but indeterminate. It simply does not matter which syllable the [s] belongs to. A more radical reformulation of the constraint in (6) could relax the requirement of exhaustive syllabification and skip over some elements of SEGS in certain situations. But then these segments would appear nowhere in the SYLS value. There is no way to partially specify the role of a segment. We know, for instance, that the [s] in *instrument* is not a nucleus, but there is no way to express this in the SEGS and SYLS model (except again indirectly, using an explicit disjunction of incompatible feature structures).

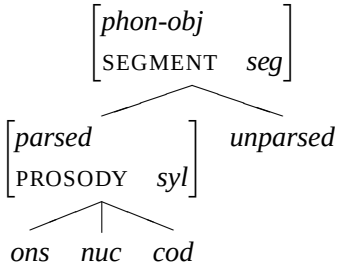
4 Building on the segments list

The foregoing discussion leads us to the conclusion that constructing syllables in a separate part of the sign has undesirable consequences. In the remainder of this paper I will show that it is possible, and preferable, to encode information about syllabification (and higher levels of prosodic structure) directly in the list of segments by enriching segmental representations.

4.1 Type-based Prosodic Phonology

This idea has much in common with the Type-based Prosodic Phonology model presented by Crysmann (2002), extending proposals by Walther (1999). Crysmann assumes a simpler PHON structure than those discussed thus far, cf. (6) and (7). His PHON value is a list of *phon-obj* elements (segments with their articulatory features encoded in the SEGMENT value).

(11) a. $\left[\text{PHON} \quad \textit{list}(\textit{phon-obj})\right]$

b.


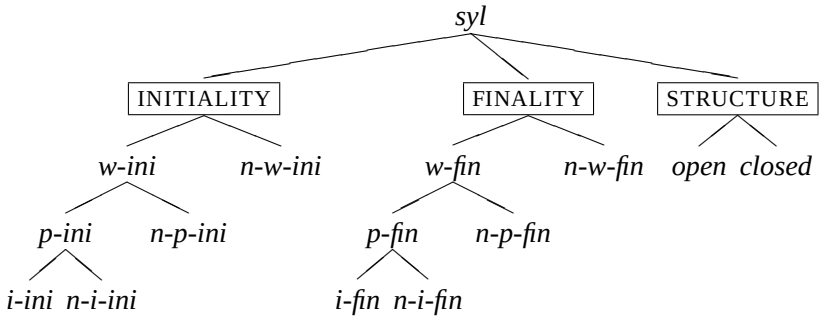
To represent syllabic structure in this approach, segments are not copied or mapped to another part of the sign, but their representations are enriched with prosodic information, directly in the segments list. The position of a segment within its syllable is encoded by means of subtypes of *phon-obj* (with the possibility that in some situations, a segment can remain unsyllabified, or *unparsed*).

Syllable grouping is encoded using the PROSODY value. Consecutive segments that occupy the onset, nucleus, and coda positions of the same syllable have token-identical PROS values. For example, the word [ʔin.stru.mɛnt] would be represented as follows:

(12)
$$\left[\text{PHON}\ \left\langle \begin{bmatrix}\textit{ons}\\ \text{S}\ \ \text{ʔ}\\ \text{P}\ \ \boxed{1}\end{bmatrix}, \begin{bmatrix}\textit{nuc}\\ \text{S}\ \ \text{ɪ}\\ \text{P}\ \ \boxed{1}\end{bmatrix}, \begin{bmatrix}\textit{cod}\\ \text{S}\ \ \text{n}\\ \text{P}\ \ \boxed{1}\end{bmatrix}, \begin{bmatrix}\textit{ons}\\ \text{S}\ \ \text{s}\\ \text{P}\ \ \boxed{2}\end{bmatrix}, \begin{bmatrix}\textit{ons}\\ \text{S}\ \ \text{t}\\ \text{P}\ \ \boxed{2}\end{bmatrix}, \begin{bmatrix}\textit{ons}\\ \text{S}\ \ \text{r}\\ \text{P}\ \ \boxed{2}\end{bmatrix}, \begin{bmatrix}\textit{nuc}\\ \text{S}\ \ \text{ʊ}\\ \text{P}\ \ \boxed{2}\end{bmatrix}, \begin{bmatrix}\textit{ons}\\ \text{S}\ \ \text{m}\\ \text{P}\ \ \boxed{3}\end{bmatrix}, \begin{bmatrix}\textit{nuc}\\ \text{S}\ \ \text{ɛ}\\ \text{P}\ \ \boxed{3}\end{bmatrix}, \begin{bmatrix}\textit{cod}\\ \text{S}\ \ \text{n}\\ \text{P}\ \ \boxed{3}\end{bmatrix}, \begin{bmatrix}\textit{cod}\\ \text{S}\ \ \text{t}\\ \text{P}\ \ \boxed{3}\end{bmatrix} \right\rangle\right]$$

In addition, PROS values choose from a rich system of types, part of which is shown below:

(13)



This multiple inheritance hierarchy allows the specification of the position and function of the syllable in question. In particular, the combinations of INITIALITY and FINALITY subtypes are used to indicate the composition of larger prosodic domains. If the syllable is at the left or right periphery of the prosodic word, it has the type *w-ini* or *w-fin*, respectively. Non-peripheral syllables bear the complementary types. In the example above, the syllable identified as 1 has the type *w-ini & n-w-fin*, syllable 2 is *n-w-ini & n-w-fin*, and syllable 3 is *n-w-ini & w-fin*. The other types are used analogously at the levels of phonological phrases and intonation phrases. This system of types can naturally be extended as needed. The relevant aspects of prosodic structure can thus be encoded directly in the segmental representation, without actually constructing a prosodic constituency tree using recursively embedded feature structures.

4.2 Questions and simplifications

Crysmann's proposals are extensive and technically detailed (at times bewilderingly so), and his framework is applied to an impressive array of analyses. My purpose in this section is to bring up a number of questions about the general approach and to suggest some modifications.

First of all, using the segments list to represent the entire prosodic hierarchy (up to intonation phrases) raises concerns of locality. In this model, we could conceivably define a constraint requiring the first syllable of the second prosodic word of a phonological phrase to have a liquid coda, for example, or that the consonant [t] can only appear in the onset of the final syllable of an intonation phrase:

(14) a.
$$\left[\begin{array}{l} \textit{dom-obj} \\ \textsc{ph} \quad \textit{list}(\left[\textsc{p}\ \boxed{1}\ \textit{p-ini}\right]) \oplus \textit{list}(\left[\textsc{p}\ \ \textit{n-w-ini}\right]) \oplus \left\langle \left[\textsc{p} \quad \boxed{2}\ \textit{w-ini}\right], \ldots \right\rangle \end{array}\right]$$
$$\Rightarrow \left[\textsc{ph} \quad \left\langle \ldots, \left[\begin{array}{ll} \textit{cod} & \\ \textsc{s} & \textit{liquid} \\ \textsc{p} & \boxed{2} \end{array}\right], \ldots \right\rangle\right]$$

b. $$\left[\begin{array}{ll} \textit{phon-obj} & \\ \textsc{s} & \textsc{t} \end{array}\right] \Rightarrow \left[\begin{array}{ll} \textit{ons} & \\ \textsc{p} & \textit{i-fin} \end{array}\right]$$

These examples are obviously contrived, and there may in fact be phenomena where high level domains have to make reference to segmental content and the internal structure of syllables. Syllabification itself, after all, is best formulated as a constraint on phonological phrases, cf. (6). For most higher level phenomena, however, it would be preferable to enforce some notion of locality. This can be done by introducing an abstract list corresponding to the sequence of syllables. In contrast to the SYLS of Bird and Klein (1994), the members of this list do not provide a full phonological description of the syllables and their internal structure.

This proposal shares aspects of the analysis of phrasal prosody of Bonami and Delais-Roussarie (2006). They start from a flat list of segments (like the one assumed here), and they construct a more abstract structure—the metrical grid—containing one column for each syllable. At this level of analysis, only the succession of syllables is relevant, and information such as the identity of syllable nuclei or the nature of syllable boundaries is unnecessary and should be inaccessible (or only exceptionally accessible). I will develop this idea further at the end of this section.

Other questions are raised by Crysmann's PROSODY feature. Recall that token identity of this value among consecutive segments indicates membership in the same syllable. This membership is determined by the syllabification principles of the language (that specify the possible nuclei, onsets, and codas, and how to determine syllable boundaries), subject to the following well-formedness conditions

(among others):[5]

(15) a. $$\textit{dom-obj} \Rightarrow \neg \left[\textsc{ph} \quad \begin{array}{c} \textit{list} \oplus \left\langle \boxed{1}\, \textit{ons}, \boxed{2}\, \textit{ons} \vee \textit{nuc} \right\rangle \oplus \textit{list} \\ \wedge \neg \left(\boxed{1} \left[\textsc{p}\ \boxed{0} \right] \wedge \boxed{2} \left[\textsc{p}\ \boxed{0} \right] \right) \end{array} \right]$$

b. $$\textit{dom-obj} \Rightarrow \neg \left[\textsc{ph} \quad \begin{array}{c} \textit{list} \oplus \left\langle \boxed{1}\, \textit{nuc} \vee \textit{cod}, \boxed{2}\, \textit{cod} \right\rangle \oplus \textit{list} \\ \wedge \neg \left(\boxed{1} \left[\textsc{p}\ \boxed{0} \right] \wedge \boxed{2} \left[\textsc{p}\ \boxed{0} \right] \right) \end{array} \right]$$

c. $$\textit{dom-obj} \Rightarrow \neg \left[\textsc{ph} \quad \textit{list} \oplus \left\langle \begin{bmatrix} \textit{nuc} \\ \textsc{p} \quad \boxed{0} \end{bmatrix} \right\rangle \oplus \textit{list} \oplus \left\langle \begin{bmatrix} \textit{nuc} \\ \textsc{p} \quad \boxed{0} \end{bmatrix} \right\rangle \oplus \textit{list} \right]$$

d. $$\textit{dom-obj} \Rightarrow \neg \left[\textsc{ph} \quad \textit{list} \oplus \left\langle \textit{ons}, \textit{cod} \right\rangle \oplus \textit{list} \right]$$

The last constraint effectively requires every syllable to have a nucleus, and (15c) requires distinct nuclei to be associated with distinct syllables. (15a) and (15b) are implicational constraints that impose token-identity of PROS values for certain sequences of *phon-obj* elements. Together, the constraints interact to ensure that the PHON value of domain objects is parsed into syllables of the form onset-nucleus-coda (with possibly empty onset and/or coda), each with a unique PROS value.

We can ask at this point whether it is necessary to use token-identity of PROS values in this way. If the syllabification rules of the language identify an onset-nucleus-coda grouping, then the corresponding sublist of segments already constitutes a syllable. The PROS value, which encodes positional information, etc. in accordance with (13), does need to be linked to the syllable, for example in the representation of its nucleus. But what additional benefit is gained by copying this PROS value to all of the other segments of the syllable (onset and coda, if present)? And furthermore, is it crucial for syllables to be associated with unique PROS values, as required by the implicit inequality constraint in (15c)?

A significant simplification of the role of Crysmann's PROS feature can be achieved by introducing a SYLLABLES list of the kind discussed above, with abstract objects corresponding to syllables (but providing no direct access to their detailed internal content). This attribute is added to the PHON value, with the existing list of segments moved into SEGMENTS. First of all, we need to modify the part of the signature shown in (11b) to make PROSODY appropriate only for the subtype *nuc*. Then, we set up a one-to-one correspondence between the *nuc* elements of the SEGS list and the elements of the SYLLS list. This can be done with a recursively defined relational constraint[6] or using the following pair of bidirectional implications:

[5] The formulation of (15b) corrects a minor mistake in Crysmann (2002), p. 281.

[6] Cf. the construction of the metrical grid in Bonami and Delais-Roussarie (2006).

(16) a.
$$\begin{bmatrix} \textit{dom-obj} \\ \textsc{phon} \mid \textsc{segs} \quad \textit{list} \oplus \left\langle \begin{bmatrix} \textit{nuc} \\ \textsc{pros} \quad \boxed{0} \end{bmatrix} \right\rangle \oplus \textit{list} \end{bmatrix}$$
$$\Leftrightarrow \begin{bmatrix} \textit{dom-obj} \\ \textsc{phon} \mid \textsc{sylls} \quad \textit{list} \oplus \left\langle \boxed{0} \right\rangle \oplus \textit{list} \end{bmatrix}$$

b.
$$\begin{bmatrix} \textit{dom-obj} \\ \textsc{phon} \mid \textsc{segs} \quad \textit{list} \oplus \left\langle \begin{bmatrix} \textit{nuc} \\ \textsc{pros} \quad \boxed{0} \end{bmatrix} \right\rangle \oplus \textit{list} \oplus \left\langle \begin{bmatrix} \textit{nuc} \\ \textsc{pros} \quad \boxed{1} \end{bmatrix} \right\rangle \oplus \textit{list} \end{bmatrix}$$
$$\Leftrightarrow \begin{bmatrix} \textit{dom-obj} \\ \textsc{phon} \mid \textsc{sylls} \quad \textit{list} \oplus \left\langle \boxed{0} \right\rangle \oplus \textit{list} \oplus \left\langle \boxed{1} \right\rangle \oplus \textit{list} \end{bmatrix}$$

Now that the uniqueness of each syllable is ensured by its position in the SYLLS list, there is no need to impose token non-identity of PROS values, as in (15c). Two nuclei could happen to have token identical values "by accident"; it is not clear what this would mean, but it seems unnecessary to block the possibility explicitly. They would still correspond to two elements in the SYLLS list. In practice, as the information encoded in the PROS value is enriched, type and feature incompatibilities will prevent such accidental structure sharing anyway.

In this modified approach, it is no longer possible to use the PROS feature directly to pick out all of the segments of a particular syllable. And because PROS values are not guaranteed to be unique, it is not even possible to choose an element from SYLLS and immediately identify the corresponding nucleus in SEGS. These operations can still be done, but in a more roundabout way: with information about the position of the element in the SYLLS list, the corresponding nucleus can be located, and any consecutive *onset* objects to the left and any consecutive *coda* objects to the right of this nucleus in the SEGS list are members of the same syllable.

Similarly, rules such as those invented in (14) to illustrate locality violations are not technically ruled out, but they become much harder to formulate. In other words, this modified model contains more or less the same information as that of Crysmann's original proposal, but the re-structuring of the information makes predictions about the rarity or markedness of certain kinds of prosodic interaction.

5 Case study: French

In this final section I offer a more concrete illustration of the proposed framework by sketching the analyses of a number of phenomena from French. Bird and Klein (1994) also use French examples for their model of syllabification, so I will primarily concentrate on the same range of data.

5.1 Structurally-encoded syllables

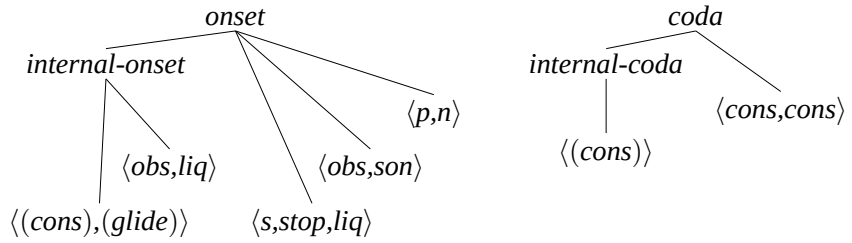
Bird and Klein present a declarative analysis of the distribution of French schwa, an "unstable" vowel that can be left unrealized in certain lexical and syntactic environments, conditioned in large part by the syllabic structure of words in context.

(17) debout [də̲.bu] *vs* il est debout [i.lɛ.də̲.bu] / [i.lɛd̲.bu]
standing he is standing

The analysis is inspired by the autosegmental treatment of Tranel (1987a), in which schwa is underlyingly unlinked (to a V node) but must become linked and therefore realized phonologically if the surrounding consonantal configuration cannot otherwise be syllabified.

To implement the insights of this analysis in their HPSG model, Bird and Klein provide a provisional statement of the phonotactics of French, based on Tranel (1987b). Syllable nuclei are always single vowels; in other words, the type *nucleus* is defined as ⟨*vowel*⟩. Permissible onsets and codas are enumerated in the following type hierarchies:

(18)



The *internal* subtypes are meant to capture the generalization that word-internal onsets and codas are more restricted than word-initial onsets and word-final codas. These definitions, in combination with the syllabification constraint formulated in (6), produce possible syllable structures for phonological phrases.

Some empirical and technical problems should be mentioned at this point. The precise inventory of possible onsets and codas is incomplete (for example, *exploit* [ɛksplwa] 'feat' contains a sequence of consonants at the syllable boundary that cannot be accommodated), and Bird and Klein acknowledge this. I will not pursue the issue further.

Bird and Klein do not explain how the type distinctions between word-internal and word-peripheral onsets and codas can be put to use as constraints on syllabification. A crucial assumption of the analysis is that words are not fully syllabified at the lexical level, since the syllabic structure at word boundaries cannot yet be determined. But at the phonological phrase level, where full syllabification takes place, the SEGS value is a long list of segments with no indication of word boundaries. One could argue that this information in fact needs to be propagated so that it remains visible at the phrasal level. The formulation of the constraint in (6) would have to be modified in order to apply different restrictions depending on the context within the phrase.

The fact that both onsets and codas can be empty, and that some sequences of segments can appear in both positions, leads to many cases of indeterminacy. Bird and Klein, however, assume full and unique syllabification, and they achieve this by formulating additional constraints that echo the familiar principle of onset maximization. In the simplest case, if only one consonant appears at a syllable boundary, it must be syllabified as the onset, leaving the preceding coda empty, rather than vice versa. So for instance *euro* should be analyzed as [ø.ʁo], not as [øʁ.o]. Another onset maximization constraint involves obstruent-liquid sequences, which always syllabify together in French, as in [a.bʁi] 'shelter' (where the consonant sequence could otherwise be split across two syllables: [ab.ʁi]). Obstruent-liquid sequences are notorious for their unusual behavior. Historically, for example, in the transition from Latin to French, the syllable boundary shifted at least twice.

As discussed in §3.2, indeterminacy is sometimes an inherent characteristic of syllable boundaries, and an adequate analysis should be able to accommodate it, and not strive to eliminate it artificially. It should be said that French is relatively unproblematic in this regard, and Bird and Klein's onset maximization constraints are not unreasonable. It has already been pointed out, however, that as a general model, their SYLS structures are ill-equipped to deal with cases where the appropriate representation would be a genuinely underspecified syllable boundary.

5.2 Type-encoded syllables

Recall that in my approach, information about syllable structure is added directly to the list of segments, and no separate syllabic "constituent structure" is built. First of all, I redefine Bird and Klein's types *onset* and *coda* as description-language abbreviations for disjunctions of lists (since the interpretation of the onset and coda inventories in (18) as type hierarchies leads to some technical difficulties):

(19) onsets
  a. internal-onset $\equiv \langle$(*cons*), (*glide*)$\rangle \vee \langle$*obs, liq*$\rangle$
  b. onset $\equiv$ internal-onset $\vee \langle$s, *stop, liq*$\rangle \vee \langle$*obs, son*$\rangle \vee \langle$p, n$\rangle$

(20) codas
  a. internal-coda $\equiv \langle$(*cons*)$\rangle$
  b. coda $\equiv$ internal-coda $\vee \langle$*cons, cons*$\rangle$

We can now use these abbreviations—along with the fact that syllable nuclei in French consist of single vowels—to define syllable patterns.

(21) a. initial-syllable $\equiv$ onset $\oplus \langle$(*vowel*)$\rangle \oplus$ internal-coda
  b. medial-syllable $\equiv$ internal-onset $\oplus \langle$*vowel*$\rangle \oplus$ internal-coda
  c. final-syllable $\equiv$ internal-onset $\oplus \langle$(*vowel*)$\rangle \oplus$ coda
  d. monosyllable $\equiv$ onset $\oplus \langle$(*vowel*)$\rangle \oplus$ coda

Distinct definitions are provided for word-initial, word-medial, and word-final syllables for two reasons. First, this is necessary in order to enforce the distinction

between word-internal and word-peripheral onsets and codas. Word-medial syllables are the most restricted: they must contain a vowel and their onsets and codas are taken from the reduced word-internal inventories. Initial and final syllables are less constrained on their word-peripheral side. Second, and more crucially for the analysis of schwa and other word-boundary "readjustment" phenomena, peripheral syllables are allowed not to contain a vowel (or more precisely, to contain an optional vowel).

Using these definitions we can formulate the following constraint on words:

(22) $\textit{word} \Rightarrow \left[\textsc{segs} \quad (\textit{init-syll} \oplus \textit{med-syll}^{*} \oplus \textit{fin-syll}) \vee \textit{monosyll}\right]$

The first clause of the disjunction is for words of two or more syllables (the Kleene star notation indicates the occurrence of zero or more medial syllables), the second for monosyllables.

Following Bird and Klein, I assume that words like *debout* (17) or *fenêtre* 'window' have a lexically underspecified SEGMENTS list containing an optional schwa in their initial syllable:

(23) a. debout: $\left[\textsc{segs} \quad \left\langle \text{d, (ə), b, u} \right\rangle\right]$ b. fenêtre: $\left[\textsc{segs} \quad \left\langle \text{f, (ə), n, ɛ, t, ʁ} \right\rangle\right]$

The constraint in (22) verifies the phonotactic well-formedness of the medial onsets and codas. The special treatment of the initial syllable allows the optional schwa to remain optional. If full syllabification were applied were applied already, the schwa would be forced to appear (since ⟨d, b⟩ and ⟨f, n⟩ are not possible onsets according to (19)). On the other hand, a form like **d(e)b.pnout* would be rejected for containing an unsyllabifiable medial onset, and **ft(e).nê.tre* would be rejected for having an impossible word-initial onset.

Final syllables also require this special treatment, because they are the locus of vowel elision (24) and *enchaînement* of final consonants (25):

(24) quoique [kwa.kə̲] *vs* quoiqu' intéressant [kwa.kɛ̃.te.ʁe.sɑ̃]
albeit albeit interesting

(25) avec [a.vɛk̲] *vs* avec un ami [a.vɛ.k̲œ̃.na.mi]
with with a friend

The final schwa of *quoique* is also represented as an optional segment in its lexical SEGS list: ⟨k, w, a, k, (ə)⟩. The final consonant of *avec* is of course not optional, since it is realized in all contexts. The constraint in (22) checks that ⟨k⟩ is a possible coda, but it does not actually declare it to be a coda (since it can turn out to be an onset in phrasal combinations). In fact, no subsyllabic roles are instantiated by this constraint.

At this point, moreover, no attempt is made to reduce ambiguity in syllabification at the word level. Words like *euro* and *abri*, discussed above, will simply satisfy the constraint in (22) in more than one way. This does not result in multiple analyses, however, because so far we are only doing pattern matching, without

adding any information when a pattern is found. Bird and Klein discuss the case of *demande̲rions* 'we would ask', in which the choice between a syllabification with and without the second (underlined) schwa can in principle be made at the word level:

(26) a. $\left[\text{SEGS} \quad \left\langle \text{d, (ə) | m, ɑ̃ | d, ə | ʁ, j, ɔ̃} \right\rangle\right]$

b. $*\left[\text{SEGS} \quad \left\langle \text{d, (ə) | m, ɑ̃, d | ʁ, j, ɔ̃} \right\rangle\right]$

c. $\left[\text{SEGS} \quad \left\langle \text{d, (ə), m, ɑ̃, d, (ə), ʁ, j, ɔ̃} \right\rangle\right]$

For Bird and Klein, the pronunciation without schwa in (26b) is excluded by the onset maximization constraint requiring obstruent-liquid clusters to syllabify together: so ⟨d, ʁ⟩ must be in the onset, but ⟨d, ʁ, j⟩ is not an allowable onset, according to (19). In my analysis, at the word level, there is no way to enforce onset maximization, since the constraint in (22) only checks potential syllable structures and does not actually instantiate them. So both SEGS lists in (26) are maintained: in other words, both of the schwas in *de̲mande̲rions* remain optional (26c).

In ordinary phrasal combinations, the SEGS lists of the daughters are concatenated to yield the SEGS list of the mother.[7] The following constraint is the counterpart to Bird and Klein's syllabification constraint (6):

(27) $\textit{phrase} \Rightarrow \left[\text{SEGS} \quad \textit{syllable}^{+}\right]$

In other words, a phonological phrase has to look like the concatenation of one or more syllables. There is no need to define a recursive relation as in (6) to be sure that all of the elements of SEGS are parsed. Just as in the word-level constraint in (22) above, the sequence of syllables identified automatically partitions the entire SEGS list. But in this case, the definition of syllable does not just specify a pattern to match: it also enriches the representation by instantiating the type each segment as *onset*, *nucleus*, or *coda*, cf. the hierarchy in (11b).

(28) $\text{syllable} \equiv \text{onset} \;\&\; \textit{list}(\textit{onset}) \oplus \left\langle \textit{vowel} \;\&\; \textit{nucl} \right\rangle \oplus \text{coda} \;\&\; \textit{list}(\textit{coda})$

As discussed in §4, the linear ordering already inherent in the SEGS list is now enriched with information about syllabification. Most of the structure encoded in Bird and Klein's SYLS list is represented directly in the SEGS list. At this point, if desired, we can express onset maximization principles as constraints on SEGS. For example, [ø.ʁo] (*euro*) and [a.bʁi] (*abri*) can be preferred to [øʁ.o] and [ab.ʁi]. And the schwa-less pronunciation of *demanderions* in (26b) can be excluded by

[7] I leave aside cases of consonant liaison, where a "latent consonant" appears at the boundary between two words. The proposals in this paper are compatible with the analysis of liaison developed in Bonami et al. (2004, 2005). Unlike schwa in the present analysis, the liaison consonant must not be treated as an optional segment.

prohibiting sequences of an obstruent segment of type *coda* followed by a liquid segment of type *onset*.[8]

Note also that according to (28), every syllable must contain a vowel. If a word like *debout*, with an optional schwa thanks to the definition of initial-syllable (21a), appears at the beginning of the phonological phrase, the schwa will have to be realized. Within the phrase, the realization of schwa in word-initial syllables will be conditioned by the preceding context. Words like *avec* will either have their final consonant syllabified as a coda, or in the onset of the following syllable, again depending on the phrasal context.

5.3 Discussion

The analysis presented here has more or less the same empirical coverage as the original account of Bird and Klein (1994). I have extended the implementation of some word-level phonotactic conditions that were left out of their account, and suggested how the approach can be applied to some other word boundary phenomena (elision, *enchaînement*). But the main purpose of this presentation is to demonstrate that the insights and the results of the original analysis can be preserved while dispensing with the hierarchical encoding of syllable structure.

As discussed already, however, there are technical and conceptual advantages to the type-based encoding of syllable structure in the segments list, in particular with regard to underspecification. With a structural encoding of syllables, there is no easy way to capture the sometimes unstable and fuzzy interactions at syllable boundaries. In the type-based approach, underspecification is a simple matter of enriching the type hierarchy with intermediate types such as *non-nucl*. Even a disjunctive type specification like *ons* $\vee$ *cod* would be much simpler than the disjunction of complex feature structures that is required to express the same idea in the structural approach.

The segments list approach also allows segments to be associated with particular syllabic positions, either in specific lexical items or as a general property of the language, thus constraining the application of phrasal syllabification (28). This is not specifically relevant to the analyses discussed here, but it provides a natural way to express, for instance, the fact that [ŋ] is restricted to coda position, or that there are no syllabic consonants in French. Such generalizations cannot be elegantly expressed in the structural approach.

References

Angoujard, Jean-Pierre. 1997. *Théorie de la syllabe*. Paris: CNRS Editions.

Bird, Steven and Klein, Ewan E. 1994. Phonological analysis in typed feature systems. *Computational Linguistics* 20, 455–491.

[8] Other analyses should also be considered; the point here is that Bird and Klein's account can be reproduced with the current proposal.

Bonami, Olivier, Boyé, Gilles and Tseng, Jesse. 2004. An integrated approach to French liaison. In Gerhard Jäger, Paola Monachesi, Gerald Penn and Shuly Wintner (eds.), *Proceedings of Formal Grammar 2004*, pages 29–45, Nancy: Loria.

Bonami, Olivier, Boyé, Gilles and Tseng, Jesse. 2005. Sur la grammaire des consonnes latentes. *Langages* 158, 89–100.

Bonami, Olivier and Delais-Roussarie, Elisabeth. 2006. Metrical phonology in HPSG. In Stefan Müller (ed.), *Proceedings of the 13th International Conference on HPSG*, pages 39–59, Stanford, CA: CSLI Publications.

Clements, Nick G. 1985. The geometry of phonological features. *Phonology* 2, 223–250.

Crysmann, Berthold. 2002. *Constraint-based Coanalysis: Portuguese cliticisation and morphology-syntax interaction in HPSG*. Ph. D.thesis, Universität des Saarlandes.

Goldsmith, John A. 1990. *Autosegmental and metrical phonology*. Oxford: Blackwell.

Höhle, Tilman N. 1999. An Architecture for Phonology. In Robert D. Borsley and Adam Przepiórkowski (eds.), *Slavic in Head-Driven Phrase Structure Grammar*, pages 61–90, Stanford, CA: CSLI Publications.

Klein, Ewan. 2001. Prosodic constituency in HPSG. In Ronnie Cann, Claire Grover and Philip Miller (eds.), *Grammatical Interfaces in HPSG*, pages 169–200, Stanford, CA: CSLI Publications.

Pollard, Carl and Sag, Ivan A. 1994. *Head-Driven Phrase Structure Grammar*. Stanford, CA: CSLI Publications, distributed by University of Chicago Press.

Selkirk, Elisabeth O. 1984. *Phonology and Syntax*. Cambridge, MA: MIT Press.

Tranel, Bernard. 1987a. French schwa and nonlinear phonology. *Linguistics* 25(5), 845–866.

Tranel, Bernard. 1987b. *The Sounds of French. An Introduction*. Cambridge: Cambridge University Press.

Walther, M. 1999. *Deklarative Prosodische Morphologie*, volume 399 of *Linguistische Arbeiten*. Tübingen: Niemeyer.

Wells, John C. 1990. Syllabification and allophony. In Susan Ramsaran (ed.), *Studies in the pronunciation of English: A commemorative volume in honour of A. C. Gimson*, pages 76–86, London: Routledge.

Predicate complements

Frank Van Eynde

University of Leuven

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 253–273

Van Eynde, Frank. 2008. Predicate complements. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 253–273. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.15.
CC-BY 4.0

Abstract

This paper briefly presents the canonical HPSG treatment of predicate complements (Section 1) and points out a number of problems with it (Section 2). Then it presents an alternative (Section 3) and shows how it avoids or solves the problems with the canonical treatment (Section 4).

1 The raising treatment of the predicate complements

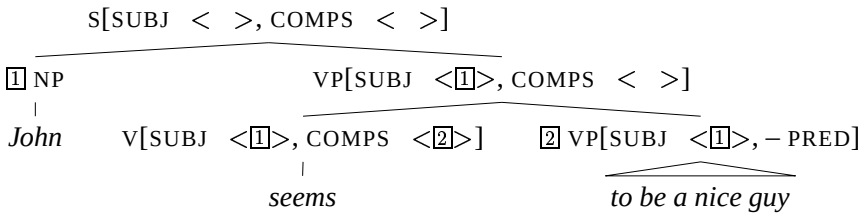
In mainstream HPSG predicate complements are treated along the same lines as complements of raising verbs. Prima facie evidence is provided by the minimal pairs in (1) and (2).

(1) a. John seems to be a nice guy.
b. John seems a nice guy.

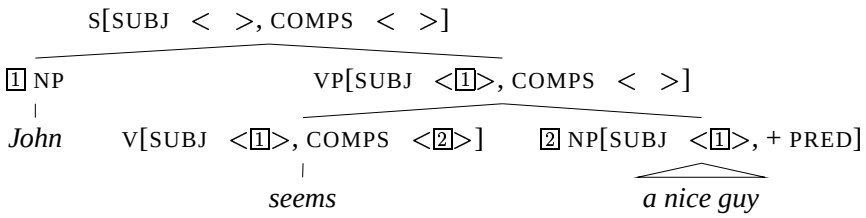
(2) a. Bob considers his brother to be a genius.
b. Bob considers his brother a genius.

After analogy with the analysis of (1a), in which the unexpressed subject of the VP complement is identified with the subject of the raising verb, as illustrated in (3), the NP complement in (1b) is assumed to have an unexpressed subject, which is identified with the subject of the predicate selecting verb, as illustrated in (4).[1]

(3)



(4)



†For their comments and suggestions for improvement I thank the anonymous reviewers of the HPSG-2008 programme committee, the attendants of the conference, my colleagues at the Centre for Computational Linguistics in Leuven and the editor of this volume.

[1]This treatment is advocated in chapter 3 of Pollard and Sag (1994). For an application to German, see (Müller, 2002, 103-9). It can be extended straightforwardly to the sentences in (2), where the unexpressed subject of the most oblique complement is identifi ed with the direct object of *considers*.

What differentiates (3) from (4) is captured by the PRED feature. Its value is positive when the complement is used in predicate position, and negative otherwise. The feature is included in the HEAD value of the nouns, the verbs, the adjectives and the prepositions. Words which must be (the head daughter of) a predicate complement are lexically marked as [+ PRED], words which cannot be (the head of) a predicate complement are marked as [– PRED], and words which may but need not be (the head of) a predicate complement have the underspecified value *boolean*. Most words belong to the third class, but there are some which are inherently [+ PRED], such as the adjectives *ready, asleep* and *ablaze*, and some which are inherently [– PRED], such as the adjectives *wooden*, *mere*, *utter* and *former*. The negative value is also assigned to the infinitives, the gerunds, the perfect participles and the finite verbs; only the present and the passive participles can be [+ PRED], see (Gazdar et al., 1985, 111), (Pollard and Sag, 1987, 64) and (Ginzburg and Sag, 2000, 25).

2 Problems

There are several problems with the canonical HPSG treatment of the predicate complements. I will group them in four classes.

2.1 Nominal predicates

Since nouns are not the kind of words that are commonly thought of as taking a subject, special measures are needed to provide them with a non-empty SUBJ list when they are used as predicates. To this end, the lexical rules which map nominal lexemes onto words are enriched with information about the value of PRED and SUBJ, as in the Singular Predicative Noun Lexical Rule (Ginzburg and Sag, 2000, 409).

(5)
$$\begin{bmatrix} \textit{lexeme} \\ \text{ARG-ST} \ \left\langle \boxed{1} \right\rangle \oplus \boxed{A} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \ \textit{noun} \end{bmatrix} \Longrightarrow_{LR} \begin{bmatrix} \textit{word} \\ \text{ARG-ST} \ \left\langle \boxed{2}, \boxed{1} \right\rangle \oplus \boxed{A} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{AGR} \mid \text{NUM} \ \textit{sing} \\ \text{PRED} \ + \end{bmatrix} \\ \text{SPR} \ \left\langle \boxed{1} \right\rangle \\ \text{SUBJ} \ \left\langle \boxed{2} \right\rangle \end{bmatrix} \end{bmatrix}$$

In words, the noun is marked as singular and [+ PRED] and its ARG-ST value gets an extra member that is realized as a subject.

This rule does the job it is tailored to do, but it has the undesirable consequence of introducing a systematic ambiguity. Since every noun which can be used in predicative position can also be used in non-predicative positions (and vice versa), we need two entries for every noun: a [+ PRED] one with a singleton SUBJ list and

a [– PRED] one with an empty SUBJ list. The latter are derived by the Singular Attributive Noun Lexical Rule (Ginzburg and Sag, 2000, 190). Besides, the plural nouns show the same systematic ambiguity. Admittedly, the postulation of lexical ambiguities is unavoidable in any grammar with nontrivial coverage, but this one is particularly unfortunate since it affects a very large and constantly growing class of words.

Another problem concerns the combinations of a possessive determiner with a deverbal noun, as in (6).

(6) This hotel was her first choice.

Since the possessive denotes the one who makes the choice, it would seem logical to treat it as the subject of the noun, but instead it is the subject of the copula, *this hotel*, which has to be treated as such. To model combinations of this kind Stowell (1983) has proposed to allow deverbal predicative nouns to have two subjects, but this is not compatible with the HPSG claim that the SUBJ list contains at most one *synsem* object.

A third problem for (5) is that it only applies to common nouns. Proper nouns and pronouns are not subsumed, since they have an empty ARG-ST list. Yet they do occur in predicate position.

(7) a. The winner is Daniel D. Lewis.
b. That must be her.

That there is a problem with predicative proper nouns is also acknowledged in (Pollard and Sag, 1987, 66). The usual escape route involves the postulation of an ambiguity between the predicating use of the copula, as in *be a nice guy*, and the identifying use, as in (7). What this distinction is about and how the ambiguity can be resolved in context is usually left implicit, but even if these questions can be answered satisfactorily, the problem remains, since the predicating *be* is compatible with pronominal complements, as in (8a–8b), and with proper nouns, as in (8c–8d).

(8) a. He is somebody with an impeccable track record.
b. No matter what happens, she will remain herself.
c. This is typically Microsoft.
d. This movie is SO Woody Allen.

Besides, the introduction of an ambiguity between predicating and identifying *be* raises thorny issues for the treatment of noun phrases with a definite determiner. The one in (9a), for instance, could be argued to be a complement of the identifying *be*, given the synonymy with (7a), but for those in (9b–9c) it seems more appropriate to treat them as complements of the predicating *be*.

(9) a. Daniel D. Lewis is the winner.
b. These plumbers are the best we could find in this town.

c. Every lawyer is the star of his own universe.

In sum, the postulation of an ambiguity between identifying and predicating *be* raises more problems than it solves.

2.2 Gerundial, infinitival and clausal predicates

The raising treatment is also problematic for gerundial and infinitival predicates. The unexpressed subjects of the gerund in (10a) and of the infinitive in (10b), for instance, are not identical to the subject of the copula: it is not the pleasure that is eating and drinking and it is not the worry that gets rid of detractors.[2]

(10) a. The greatest pleasure on earth is eating oysters and drinking champagne.
b. His main worry now is to get rid of his detractors.

Instead, the unexpressed subjects have arbitrary reference. Another problem with these complements concerns their PRED feature. Gerunds are explicitly claimed to be [– PRED] in (Ginzburg and Sag, 2000, 203) and infinitives are [– PRED] too, but (10a) and (10b) are undeniably grammatical.

Also the *that* clause in (11) does not fit the raising mould for the obvious reason that it already contains a subject.

(11) The main problem is that we have run out of cash.

Complements like those in (10) and (11) are also discussed in Dalrymple et al. (2004) where they are called 'closed' predicates.

2.3 Lack of generality

The proposal to treat the predicate complements in the same way as the complements of raising verbs (modulo the PRED value) is inspired by the fact that there are verbs, such as *seem* and *consider*, which are used in both ways, as shown in (1) and (2). The force of this argument is weakened, though, by the fact that there are also many predicate selectors that cannot be used as raising verbs. *Stay* and *become*, for instance, combine with predicate complements, but not with nonfinite VPs.

(12) a. Let us stay (*to be) calm.
b. He became (*to be) a lawyer.

In other words, the fact that some of the predicate selecting verbs are also used as raising verbs does not by itself demonstrate that predicate selecting verbs ARE raising verbs. For comparison, the fact that some of the predicate selecting verbs

[2]This is explicitly confirmed in (Pollard and Sag, 1994, 115): "We assume, following Postal (2974,1977) that the subjects of gerunds never undergo raising."

are also used as ordinary transitive verbs, as illustrated for *grow* and *make* in (13–14), does not by itself demonstrate that they ARE ordinary transitive verbs.

(13) a. He grew angry.
b. He grows potatoes.

(14) a. He made us crazy.
b. He made us a cake.

2.4 The status of the PRED feature

The presence of the boolean PRED feature in the HEAD value suggests that it has the same status as the other information that is canonically found in HEAD values, such as part of speech, verb form and case. A closer look, though, reveals more differences than similarities. Part of speech, for one, concerns an inherent property of a lexical item which it furthermore shares with its phrasal projection. *Teacher*, for instance, is a noun and *a teacher* is a noun phrase, no matter whether it is used as a subject, a complement or a conjunct. By the same token, *has* is a finite verb and *she has a dog* is a finite clause, no matter whether it is used as a main clause, a complement clause or a conjunct. Being predicative, by contrast, does not concern an inherent property of a lexical item. *Teacher* is predicative in *be a teacher* and nonpredicative in *tease a teacher*. There is, hence, nothing in the word *teacher* itself, which makes it predicative or nonpredicative. This suggests that the [+/– PRED] dichotomy is a functional (or a relational) distinction rather than a categorial one, and that it, therefore, belongs in the features which model selection (ARG-ST and the valence features) rather than in the HEAD feature.[3]

Something along these lines is in fact also pondered in (Pollard and Sag, 1987, 66): "why posit a new feature PRED to distinguish those words and phrases that can appear in postcopular position? Why not simply say that the copula just happens to subcategorize for a disjunction of catgeories, including NPs, PPs, certain APs, passive-participial VPs and present-participial VPs?" The answer given there is that precisely the same collection of categories has the ability to occur in a number of other syntactic functions or positions, such as the controlled adjunct function in (15) and the most oblique complement position of the *there* constructions in (16).

(15) a. Kim came back from Texas a Republican.
b. Kim came back from Texas in a boxcar.
c. Kim came back from Texas ready for anything.
d. Kim came back from Texas driving a Bentley.
e. Kim came back from Texas pursued by lawmen from four states.

[3]For comparison, to distinguish subjects from other dependents, one does not include a boolean SUBJ feature in the HEAD values all nouns, which is then resolved to positive in case they are used as a subject, and to negative otherwise. Instead, the distinction is canonically made in terms of valence features.

(16) a. There is a donkey in the garden.
b. There is a donkey asleep in the garden.
c. There is a donkey sleeping in the garden.
d. There is a donkey stuffed with kapok.

This argument is weakened, though, by the fact that many of the words and phrases which can be used in predicate position cannot be used in these positions. Controlled adjuncts, for instance, cannot take the form of a definite or pronominal NP, nor of an adjective which denotes an individual level predicate, as shown in (17).

(17) a. * Kim came back from Texas my neighbor.
b. * Kim came back from Texas the man we need.
c. * Kim came back from Texas somebody with good taste.
d. * Kim came back from Texas male.

Conversely, there are words and phrases which can be used as controlled adjuncts but not as predicate complements.

(18) a. Kim came back from Texas owning a ranch and an oil well.
b. Kim came back from Texas in order to participate in the election.
c. Kim came back from Texas after having bought a home there.

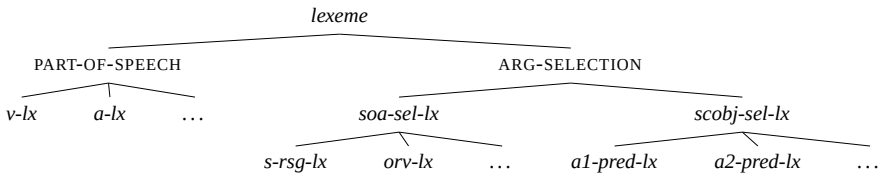
(19) a. * Kim is owning a ranch and an oil well.
b. * Kim is in order to participate in the election.
c. * Kim is after having bought a home there.

Moreover, the most oblique complement of the *there* construction cannot be nominal, no matter whether it is definite or indefinite.

3 Analysis

I will now propose a treatment of the predicate complements which avoids the problems which were presented in Section 2. The starting point is the assumption that raising verbs and predicate selecting verbs belong to mutually distinct classes of lexemes. In terms of the bidimensional hierarchy of lexemes, proposed in (Ginzburg and Sag, 2000, 20), they belong to separate subtypes of the ARG-SELECTION partition.

(20)



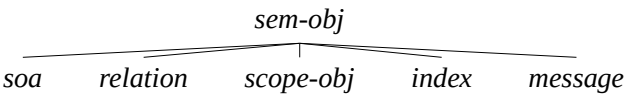
While the raising verbs belong to the class of lexemes which select a state of affairs as their most oblique argument, the predicate selecting verbs belong to the class of lexemes which select a scope-object as their most oblique argument.

(21) a. *soa-sel-lx* $\Longrightarrow$ $\left[\text{ARG-ST} \quad \textit{nelist} \oplus \left\langle \left[\text{CONTENT} \quad \textit{soa}\right]\right\rangle\right]$

b. *scobj-sel-lx* $\Longrightarrow$ $\left[\text{ARG-ST} \quad \textit{nelist} \oplus \left\langle \left[\text{CONTENT} \quad \textit{scope-obj}\right]\right\rangle\right]$

To spell out what these terms mean I start from the hierarchy of CONTENT values in (Ginzburg and Sag, 2000, 386).

(22)

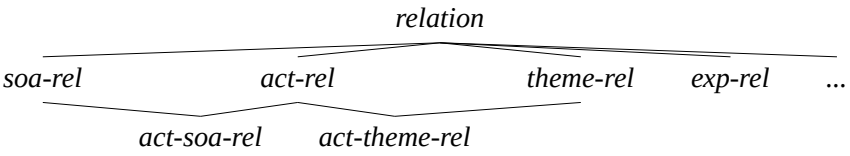


Objects of type *s(tate-)o(f-)a(ffairs)* consist of a nucleus and a list of quantifiers.

(23) $\begin{bmatrix} \textit{soa} \\ \text{NUCLEUS} \quad \textit{relation} \\ \text{QUANTS} \quad \textit{list}\left(\textit{quant-rel}\right) \end{bmatrix}$

The NUCLEUS value is an object of type *relation* and contains the semantic roles which a lexeme assigns. The inventory of those roles can be very large, as in Pollard and Sag (1994) and Ginzburg and Sag (2000), which employ such roles as VISITOR and VISITED, but there are also proposals which employ a rather limited inventory, such as those of Wechsler (1995), Davis (2001) and Müller (2002). It is the latter approach that I will adopt. To spell out which roles are relevant for which classes of lexemes I use the following hierarchy of relations.

(24)



Act-rel and *soa-rel* are taken from (Davis, 2001, 92). They stand, respectively, for relations which involve an actor and relations which involve a state of affairs.

(25) $\begin{bmatrix} \textit{act-rel} \\ \text{ACTOR} \quad \textit{index} \end{bmatrix}$ $\begin{bmatrix} \textit{soa-rel} \\ \text{SOA-ARG} \quad \textit{soa} \end{bmatrix}$

Theme-rel replaces Davis' *undergoer-rel*. The reason for this change is that the notion of 'undergoer' is defined in such a way that only action verbs can assign this role, whereas the verbs of interest in this paper include many stative verbs. I also add *exp-rel* for relations which involve an experiencer, as in Müller (2002).

(26)
$$\begin{bmatrix} \textit{theme-rel} \\ \text{THEME} \quad \textit{index} \end{bmatrix} \quad \begin{bmatrix} \textit{exp-rel} \\ \text{EXPERIENCER} \quad \textit{index} \end{bmatrix}$$

Lexemes which assign more than one role are subsumed by types which inherit from the respective simple types, such as *act-soa-rel* and *act-theme-rel*.

The CONTENT values of type *scope-object* consist of an index and set of restrictions, as illustrated by the one of *sailor* in (27).

(27)
$$\begin{bmatrix} \textit{scope-obj} \\ \text{INDEX} \quad \boxed{1}\ \textit{index} \\ \text{RESTR} \left\{ \begin{bmatrix} \textit{fact} \\ \text{PROP} \begin{bmatrix} \textit{proposition} \\ \text{SIT} \quad s \\ \text{SOA} \begin{bmatrix} \textit{soa} \\ \text{QUANTS} \quad \langle\,\rangle \\ \text{NUCLEUS} \begin{bmatrix} \textit{sailor-rel} \\ \text{INSTANCE} \quad \boxed{1} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

The index stands for an entity in the universe of discourse, and the RESTR(ICTION) value adds constraints on its denotation. In this case it consists of the fact that the entity is a sailor. The indices are comparable to predicate logic variables and the scope-objects to formulae like 'x | *sailor*(x)'.

As pointed out in (Ginzburg and Sag, 2000, 136), the restrictions are usually abbreviated as *sailor*(1), but it is crucial for a proper understanding of the notion *scope-object* to realize that its restriction is a set of facts.[4] Since facts invariably contain the NUCLEUS attribute and since the latter's value is of type *relation*, it follows that also nouns denote a relation, even if they do not take any arguments to assign a semantic role to. In that case they have one attribute, INSTANCE, whose value is identified with their index, as in (27). To model this I assume that all objects of type *relation* have this attribute.

(28)
$$\begin{bmatrix} \textit{relation} \\ \text{INSTANCE} \quad \textit{index} \end{bmatrix}$$

For the verbs, this implies that the relations which they denote contain both the names of the semantic roles which they assign and the INSTANCE attribute. The NUCLEUS value of the verb *bite*, for instance, looks as follows:

[4] In the type hierarchy facts and propositions are subtypes of *message* Ginzburg and Sag (2000).

(29) $\begin{bmatrix} \textit{act-theme-rel} \\ \text{INSTANCE} \quad \textit{index} \\ \text{ACTOR} \quad \textit{index} \\ \text{THEME} \quad \textit{index} \end{bmatrix}$

The values of the ACTOR role and the THEME role are supplied by respectively the first and the second argument of the verb and the value of the INSTANCE attribute stands for the situation which the verb denotes. It is, hence, comparable to a Davidsonian event variable.

Having introduced the basic notions, I now focus on the raising lexemes (Section 3.1) and the predicate selectors (Section 3.2).

3.1 Raising lexemes

The English raising lexemes are either subject-to-subject or subject-to-object raisers. The specific properties of the former are spelled out in the following constraint (Ginzburg and Sag, 2000, 22).[5]

(30) *s-rsg-lx* $\Rightarrow$ $\left[\text{ARG-ST} \left\langle \left[\text{LOCAL} \ \boxed{1}\right], \left[\text{SUBJ} \left\langle \left[\text{LOCAL} \ \boxed{1}\right] \right\rangle\right] \right\rangle\right]$

This type subsumes among others the use of *seem* in (1a). To spell out the CONTENT value I make a finer-grained distinction between two subtypes. The first subsumes the lexemes which denote a relation of type *soa-rel* and which, hence, assign the SOA-ARG role to their complement.[6]

(31) *s-s-rsg-lx* $\Rightarrow$ $\left[\begin{array}{l} \text{ARG-ST} \quad \textit{nelist} \oplus \left\langle \left[\text{CONTENT} \ \boxed{1} \textit{soa}\right] \right\rangle \\ \\ \text{SS} \mid \text{LOCAL} \mid \text{CONTENT} \begin{bmatrix} \textit{soa} \\ \text{NUCLEUS} \begin{bmatrix} \textit{soa-rel} \\ \text{SOA-ARG} \ \boxed{1} \end{bmatrix} \end{bmatrix} \end{array}\right]$

This type subsumes the modal and the aspectual subject raisers, including the modal *be* in (32).

(32) a. The best is yet to come.
b. They are to be informed on a daily basis.

[5] Nothing in my treatment depends on whether the shared information is limited to the LOCAL values, as in (Ginzburg and Sag, 2000, 21), or extended to the SYNSEM value as a whole, as in older versions of HPSG.

[6] Notice that *soa* is not the same as *soa-rel*. While the former stands for a state of affairs, the latter stands for a relation in which one of the arguments is a state of affairs.

The second subtype subsumes the lexemes which are semantically vacuous, such as the auxiliary *do* and the progressive and the passive *be*. They simply inherit the CONTENT value of their complement.

(33) *v-s-rsg-lx* $\Rightarrow$

$$\begin{bmatrix} \text{ARG-ST} & \textit{nelist} \oplus \left\langle \left[\text{CONTENT} \ \boxed{1}\ \textit{soa} \right] \right\rangle \\ \text{SS} \mid \text{LOCAL} \mid \text{CONTENT} & \boxed{1} \end{bmatrix}$$

The subject-to-object-raisers belong to the type *orv-lx* and have the properties which are spelled out in the corresponding constraint (Ginzburg and Sag, 2000, 22). Since they all denote a state of affairs, I include the CONTENT value in the definition of the type.

(34) *orv-lx* $\Rightarrow$

$$\begin{bmatrix} \text{ARG-ST} & \left\langle \text{NP}\boxed{1}, \left[\text{LOC} \ \boxed{3} \right], \begin{bmatrix} \text{SUBJ} & \left\langle \left[\text{LOC} \ \boxed{3} \right] \right\rangle \\ \text{CONT} & \boxed{2}\ \textit{soa} \end{bmatrix} \right\rangle \\ \text{SS} \mid \text{LOCAL} \mid \text{CONT} \mid \text{NUCLEUS} & \begin{bmatrix} \textit{exp-soa-rel} \\ \text{EXPERIENCER} & \boxed{1} \\ \text{SOA-ARG} & \boxed{2} \end{bmatrix} \end{bmatrix}$$

This subsumes among others the use of *considers* in (2a). The first argument supplies the EXPERIENCER role.

Since the ARG-SELECTION partition and the PART-OF-SPEECH partition are mutually independent, it is possible to define more specific types by multiple inheritance. The non-vacuous subject raising verbs, for instance, belong to a type that inherits from *v-lx*, on the one hand, and *s-s-rsg-lx* and its supertypes, on the other hand. In the same way, the subject raising adjectives, such as *likely*, belong to a type that inherits from *a-lx* and *s-s-rsg-lx*. The vacuous subject raisers and the subject-to-object raisers are all verbs, at least in English.

3.2 Predicate selectors

I assume that the predicate selectors belong to the lexemes which select a *scope-object* as their most oblique argument. This implies that the complement of the copula in *I am a sailor* is of the same semantic type as the complememt of the transitive verb in *I met a sailor*. This is not undesirable, since there is nothing in the noun phrase itself which singles it out as either a predicate or a direct object, see Section 2.4. The difference in interpretation is entirely due to the selecting verb, and it is hence in the CONTENT value of the verb that the distinction between predicate and object complements has to be captured.

For verbs which select an object complement, such as *met*, I adopt the canonical treatment, as in:

(35)
$$\begin{bmatrix} \text{ARG-ST} & \left\langle \text{X}\boxed{1}, \text{Y}\boxed{2} \right\rangle \\ \text{SS}\,|\,\text{LOCAL}\,|\,\text{CONTENT}\,|\,\text{NUCLEUS} & \begin{bmatrix} \textit{act-theme-rel} \\ \text{INSTANCE} \quad \textit{index} \\ \text{ACTOR} \quad \boxed{1}\,\textit{index} \\ \text{THEME} \quad \boxed{2}\,\textit{index} \end{bmatrix} \end{bmatrix}$$

For verbs which select a predicate complement the representation is more complex, since there is not only the relation between the verb and its arguments which has to be captured, but also the relation between the predicate and its target. To accommodate this I make a distinction between the selectors of a predicate whose target is the first argument, such as the use of *seems* in (1b), and the selectors of a predicate whose target is the second argument, such as the use of *considers* in (2b).

The former denote a relation of type *exp-soa-rel*. The value of the EXPERIENCER attribute is the index of an optional PP complement, such as the one in *he seems an excellent choice to me*, and the value of SOA-ARG is a state of affairs. The nucleus of this state of affairs is the requirement that the indices of the predicate and its target (the subject) be coreferential.

(36) *a1-pred-lx* $\Rightarrow$
$$\begin{bmatrix} \text{ARG-ST} & \left\langle \text{NP}\boxed{1}\left(, \text{PP}\boxed{2}\right), \text{Z}\boxed{3} \right\rangle \\ \text{SS}\,|\,\text{LOC}\,|\,\text{CONT}\,|\,\text{NUCL} & \begin{bmatrix} \textit{exp-soa-rel} \\ \text{EXPERIENCER} \quad \boxed{2}\,\textit{index} \\ \text{SOA-ARG}\,|\,\text{NUCL} & \begin{bmatrix} \textit{coref-rel} \\ \text{INST} \quad \boxed{3}\,\textit{index} \\ \text{THEME} \quad \boxed{1}\,\textit{index} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Notice that the constraint requires coreferentiality of the indices, rather than identity. Identity would be too restrictive, since it implies agreement for person, number and gender, whereas the predicate does not need to share the person, number and gender values of the target, as illustrated by (37).[7]

(37) a. I am a linguist.
b. We are a team.

This style of analysis in which the predicate and its target have different indices which are required to be coreferential is similar to the one that Richard Montague proposed in Montague (1970): "the 'is' of such formulas as 'v_0 is a horse' may be identified with the 'is' of identity, and the indefinite singular term 'a horse' treated, as usual, existentially." (Allegranza, 2006, 78), from which this quote is taken, comments: "the example 'Mary is a woman' will allow the FOL-style translation (38a), which is logically equivalent to (38b).

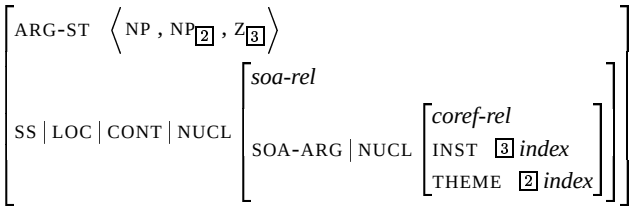
[7]The proposal to include features for person, number and gender in the indices is defended at length in chapter 2 of Pollard and Sag (1994) and has been taken on board in most of the HPSG literature.

(38) a. *for at least one x*: woman(*x*) *and* Mary = *x*
b. woman(Mary)

Given the simplicity of (38b), it is not surprising that this was often adopted as direct logical translation of the English sentence, skipping the step (38a). But theoretically, the more elaborate analysis proves rewarding insofar as it contributes to a uniform semantic treatment of NPs and their determiners, which can be worked out in a compositional fashion."

The selectors of predicates whose target is identified with the second argument are treated along the same lines.

(39) *a2-pred-lx* ⇒



This class of lexemes can further be partitioned depending on whether their first argument is assigned the ACTOR role, as in *he drives me crazy*, or the EXPERIENCER role, as in *she considers him an idiot*.

In contrast to the raising lexemes, which contain a few semantically vacuous verbs, the predicate selectors all denote a relation of type *soa-rel*, also the copula. Since this deviates from the canonical GPSG/HPSG treatment, in which the copula is treated as semantically vacuous, I add some arguments.

First, the copula belongs to a paradigm which also includes verbs like *remain*, *become* and *seem*, and its meaning contrasts with those of the other members. *He was ill*, for instance, has another meaning than *he became ill*, *he remained ill* and *he seemed ill*, and this difference must be due to the fact that the verbs have different meanings, since the subject, the predicate and the tense are all identical. Second, in many languages the copula can be combined with a complement that denotes the experiencer, as in the Dutch *dat is me een raadsel* 'that is a riddle to me' and *het is me om het even* 'it is all the same to me', and the German *es ist mir zu kalt* 'it is too cold for me'. It is not clear what other word could assign this role. Third, the fact that the copula can be omitted in certain contexts in certain languages, such as Russian and Hungarian, does not by itself prove that it is semantically vacuous. Otherwise, one might as well conclude from the absence of the articles in Latin that the articles are semantically vacuous in the languages that have them.

Since the ARG-SELECTION partition is orthogonal to the PART-OF-SPEECH partition, we can define more specific types by multiple inheritance. The selectors of subject-oriented predicates, for instance, belong to a type that inherits from *v-lx* and *a1-pred-lx*. There is also a type which inherits from *p-lx* and *a1-pred-lx*. It subsumes the so-called absolutive *with*, as used in *with John ill we have to find a*

substitute.[8] The selectors of predicates whose target is the second argument must have at least three arguments and are all verbs: They, hence, inherit from *v-lx* and *a2-pred-lx*.

4 Solving the problems

Let us now return to the problems that were mentioned in section 2 and check whether they are avoided or solved by the new treatment.

4.1 Nominal predicates

The three problems with the nominal predicates are no longer there. First, the nouns are not treated as systematically ambiguous, since the distinction between their predicative uses and their other uses is not made in the AVMs of the nouns, but in the CONTENT value of the lexemes which select them. Second, the problem with pronouns and proper nouns disappears, since their CONTENT value is of the required type, i.e. *scope-object*. Third, there are no complications with the interpretation of the notion 'subject' in deverbal nouns, since predicative nouns are not required to select a subject.

4.2 Gerundial, infinitival and clausal predicates

Solving the problems with the closed predicate complements is less obvious. I'll discuss the three types one by one, starting with the gerunds.

Gerunds typically occur in positions which are canonically taken by NPs, such as the subject position, the direct object position, the prepositional object position and the predicate position.

(40) a. Swimming in the open sea is dangerous.
b. He recommended taking a hot bath.
c. She is not afraid of walking in the dark.
d. The greatest pleasure on earth is eating oysters and drinking champagne.

To capture this commonality I assume that they have the same type of CONTENT values as the nouns. More specifically, I assume that the lexical rule which derives gerunds from verbal lexemes changes the latter's CONTENT value from *soa* to *scope-object*.[9]

[8] To model the fact that the first argument must be realized as a complement I assume that the preposition is assigned the empty SUBJ list in the lexicon.

[9] The addition of the suffix is entirely regular from a phonological point of view, but orthographically, adjustments are needed in certain cases, such as consonant gemination (*swimming*), *-e* deletion (*having*) and *-ie/-y* substitution (*dying*). It is immaterial at this point whether the gerunds are treated as nouns, as verbs or as members of a separate part of speech. All that matters at this point is their semantic type.

(41)
$$\left[\begin{array}{l} \textit{lexeme} \\ \textsc{phon}\ \boxed{A} \\ \textsc{ss}\,|\,\textsc{loc}\left[\begin{array}{l}\textsc{cat}\,|\,\textsc{head}\ \textit{verb} \\ \textsc{content}\ \boxed{1}\,\textit{soa}\end{array}\right] \end{array}\right] \Longrightarrow_{LR}$$

$$\left[\begin{array}{l} \textsc{phon}\ \boxed{A} \oplus \left\langle \text{ing} \right\rangle \\ \textsc{ss}\,|\,\textsc{loc}\,|\,\textsc{cont}\left[\begin{array}{l}\textit{scope-obj} \\ \textsc{index}\ \boxed{2}\left[\begin{array}{l}\textit{index} \\ \textsc{person}\ \ 3 \\ \textsc{number}\ \ \textit{sing}\end{array}\right] \\ \textsc{restr}\left\{\left[\begin{array}{l}\textit{fact} \\ \textsc{prop}\,|\,\textsc{soa}\ \boxed{1}\left[\textsc{nucl}\,|\,\textsc{inst}\ \boxed{2}\right]\end{array}\right]\right\}\end{array}\right] \end{array}\right]$$

The CONTENT value of the verbal lexeme, which is of type *soa*, is integrated in the RESTR attribute of the gerund. This is straightforward since the facts which make up the RESTR value invariably contain an *soa* object. Besides, the gerund is assigned an index. It stands for instances of whatever the verb denotes, such as swimming, walking or eating. Just like in the case of the nouns, the index recurs in the object of type *relation*, as the value of the INSTANCE attribute. Assuming that the indices of gerunds are third person and singular we account for the fact that they only combine with third person singular verbs when they are used in subject position, as in (40a).

Having a CONTENT value of type *scope-object*, the gerund can be used as the complement of a predicate selector, but not as the complement of a raising verb.

Infinitives have CONTENT values of type *soa* and are, hence, compatible with raising lexemes but not with predicate selectors. However, in the same way as the *ing* forms are differentiated between a gerundial and a participial use, we can distinguish between two uses of the infinitives. In one use they denote a state of affairs and occur as complements of raising lexemes, but in another use they denote a scope object and occur as predicate complements or as subjects, as in (42).

(42) a. His main worry now is to get rid of his detractors.
b. To eat smoked salmon at this time of the year is dangerous.

Since the presence of *to* is obligatory in these positions, we can treat it as the word that triggers the change from the typically verbal CONTENT value (*soa*) to the typically nominal value (*scope-object*). Its properties are captured in (43).

(43)
$$\left[\begin{array}{l}\textsc{phon}\ \ \langle \text{to} \rangle \\ \textsc{arg-st}\ \ \left\langle \left[\begin{array}{l}\textsc{vform}\ \ \textit{bare-inf} \\ \textsc{subj}\ \ \langle X_{ref} \rangle \\ \textsc{content}\ \ \boxed{1}\,\textit{soa}\end{array}\right] \right\rangle \\ \textsc{ss}\,|\,\textsc{loc}\left[\begin{array}{l}\textsc{cat}\left[\begin{array}{l}\textsc{head}\ \ \textit{prep} \\ \textsc{subj}\ \ \langle\,\rangle\end{array}\right] \\ \textsc{cont}\left[\begin{array}{l}\textsc{index}\ \ \boxed{2}\left[\begin{array}{l}\textit{index} \\ \textsc{person}\ \ 3 \\ \textsc{number}\ \ \textit{sing}\end{array}\right] \\ \textsc{restr}\ \left\{\left[\textsc{prop}\,|\,\textsc{soa}\ \ \boxed{1}\left[\textsc{nucl}\,|\,\textsc{inst}\ \ \boxed{2}\right]\right]\right\}\end{array}\right]\end{array}\right]\end{array}\right]$$

In words, *to* selects a bare infinitive which denotes a state of affairs and integrates the latter in its RESTRICTION value. Its third person singular index accounts for the agreement with the finite verb in (42b).

The unexpressed subject of the selected infinitive must be referential (Ginzburg and Sag, 2000, 50–57), but its reference is arbitrary. Crucially, it is not identified with the subject of the verb that selects the *to* infinitive. The SUBJ list of *to* itself is declared empty. Given the Argument Realization Principle this implies that the selected bare infinitive is realized as a complement.

The treatment of this use of *to* as a preposition may at first look outlandish, given the wide-spread acceptance in GPSG/HPSG of Geoff Pullum's proposal to treat it as a nonfinite auxiliary verb Pullum (1982). Nonetheless, there are several arguments which support it. First, *to* is a preposition in all of its other uses, including the combination with gerunds, as in *object to being treated badly*. Second, it is morphologically invariant, just like the other English prepositions (but unlike the verbs). Third, it shows some of the typical properties of the argument marking prepositions, such as an empty SUBJ list and a CONTENT value of type *scope-object*. Fourth, the positions in which these *to*-infinitives occur (predicate and subject) can also be taken by PPs.

(44) a. They are not in the mood.
b. After dinner is a good time for a walk.

The arguments which Pullum (1982) adduces against the prepositional status are numerous (ten), but their relevance for the analysis of this particular use of *to* is limited, since they all pertain to its other use, i.e. the one in which it yields a VP which denotes a state of affairs.[10]

[10] Also for that use, it is not necessary to assume that *to* is an auxiliary verb. If one treats the bare infinitival VP as the head and *to* as its functor, the combination is an SOA denoting VP, no matter what the part of speech of *to* is, see Van Eynde (2004).

Clauses have CONTENT values of type *message* and, hence, do not match the requirements which the predicate selectors impose on their most oblique argument. This accounts for the ill-formedness of (45).

(45) * The main problem is we have run out of cash.

The sentence becomes well-formed, though, if the clausal predicate is introduced by the complementizer *that*. The same holds for clauses in subject position.

(46) *(That) she did that all on her own still puzzles me.

This suggests that the addition of the complementizer can be treated as the factor that triggers a change of the CONTENT value. More specifically, the complementizer takes a finite clause which denotes a proposition as its argument and integrates the proposition in its RESTR value.

(47)
$$\left[\begin{array}{l}
\textsc{phon} \quad \langle \text{that} \rangle \\
\textsc{arg-st} \quad \left\langle \left[\begin{array}{l} \textsc{vform} \quad \textit{finite} \\ \textsc{subj} \quad \langle\,\rangle \\ \textsc{content} \quad \boxed{1}\,\textit{proposition} \end{array}\right] \right\rangle \\
\textsc{ss}\,|\,\textsc{local} \left[\begin{array}{l} \textsc{cat} \left[\begin{array}{l} \textsc{head} \quad \textit{noun} \\ \textsc{subj} \quad \langle\,\rangle \end{array}\right] \\ \textsc{cont} \left[\begin{array}{l} \textsc{index} \quad \boxed{2} \left[\begin{array}{l} \textit{index} \\ \textsc{person} \quad \textit{3} \\ \textsc{number} \quad \textit{sing} \\ \textsc{gender} \quad \textit{neuter} \end{array}\right] \\ \textsc{restr} \quad \left\{ \left[\begin{array}{l} \textit{fact} \\ \textsc{prop} \quad \boxed{1}\left[\textsc{soa}\,|\,\textsc{nucl}\,|\,\textsc{inst} \quad \boxed{2}\right] \end{array}\right] \right\} \end{array}\right] \end{array}\right]
\end{array}\right]$$

The constraint that the index is third person singular accounts for the agreement with the finite verb in (46), and the assignment of an empty SUB list to the complementizer accounts for the fact that its argument must be realized as a complement.

The assumption that the complementizer is a pronoun flies in the face of a long-standing practice to treat the complementizers as members of a separate part of speech, but it is not unmotivated. First, it is homophonous to a demonstrative pronoun, not only in English, but also in Dutch (*dat*) and German (*dass*).[11] Second, the index of the complementizer has the same agreement values as the homophonous demonstrative pronoun. Third, the complementizer shares the typically pronominal properties of having an empty SUBJ list and a CONTENT value of

[11] Also in the Romance languages the corresponding complementizers are homophonous to pronouns: the French *que* and the Italian *che*, for instance, are also used as interrogative pronouns.

type *scope-obj*. Fourth, it entails that the *that* clauses in subject and predicate position are NPs, so that it is not necessary to express generalizations about subjects in disjunctive terms (CP or NP).

The possible objection that pronouns are not the kind of words that normally take a complement is not so strong, since it is not uncommon for a pronoun to take a postnominal dependent, as illustrated by the AP in *something soft and slimy*, the NP in *who the hell*, the PPs in *those of you*, *everybody in this room* and *what on earth* and the clause in *those who are about to leave*.

Just like *to*, the complementizer has another use in which it yields a clause which denotes a proposition, rather than an NP which denotes a scope-object. That use is not relevant, though, for the topic of this paper.

4.3 Generality

The raising treatment of the predicate complements has been argued to lack generality, in that the co-existence of raising and predicate selecting uses is limited to a small subset of the predicate selectors. Whether the alternative treatment fares better in terms of generality depends on whether it is applicable to all constructions which are canonically thought of as predicative. To check this let us first restate the criterial properties of the predicate complements in the present treatment: first, they denote a scope-object and, second, their index is co-referential with the index of the target of the predicate. So far, we have seen that these properties subsume the nominal, gerundial, infinitival and clausal predicates. What is left then are the adjectival and prepositional predicates.

For the adjectival predicates it is easy to demonstrate that they are subsumed by the criterial properties, since the adjectives are canonically assigned the same type of CONTENT values as the nouns. The one of *clever*, for instance, is of type *scope-object* and is, hence, comparable to the formula 'x | *clever*(x)'. Semantically speaking, its contribution is of the same kind as that of a common noun.

Prepositional predicates fit the mould as well if the predicative PPs have a CONTENT value of type *scope-object*. To ensure this their head daughter must have the properties spelled out in (48).

(48)
$$\left[\begin{array}{l}\text{ARG-ST}\ \left\langle \text{NP}\boxed{2}\right\rangle \\ \text{SS}\mid\text{LOCAL}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \ \textit{prep}\\ \text{SUBJ}\ \left\langle\ \right\rangle\end{array}\right]\\ \text{CONT}\left[\begin{array}{l}\text{INDEX}\ \ \boxed{1}\ \textit{index}\\ \text{RESTR}\ \left\{\left[\text{PROP}\mid\text{SOA}\mid\text{NUCL}\left[\begin{array}{l}\textit{prep-rel}\\ \text{INST}\ \ \boxed{1}\\ \text{THEME}\ \ \boxed{2}\end{array}\right]\right]\right\}\end{array}\right]\end{array}\right]\end{array}\right]$$

In words, the preposition takes an NP argument which must be realized as a complement since its SUBJ list is declared empty, and it denotes the set of entities which

stand in the relevant relation to the index of the complement. The CONTENT value of *in Paris*, for instance, is comparable to the formula 'x | *in*(x, paris)'. When combined with a predicate selector, index 1 is required to be co-referential with the index of the target of the predicate, just like in the case of the nominal and adjectival predicates.

Independent evidence for this treatment is provided by the fact that the argument marking prepositions are standardly assigned an empty SUBJ list and a CONTENT value of type *scope-object*. Since predicates are arguments, it is no surpise that they have these properties as well. Notice also that they behave in the same way with respect to binding.

(49) a. They$_i$ are talking to themselves$_i$/*them$_i$.
b. They$_i$ do not agree with one another$_i$/*them$_i$.

(50) a. They$_i$ stay among themselves$_i$/*them$_i$.
b. They$_i$ are after one another$_i$/*them$_i$.

In sum, there is no need for any stipulations to make sure that the predicative APs and PPs are assigned a CONTENT value of type *scope-object*, since that is the value which they are canonically assigned anyway.

4.4 The omission of the PRED feature

The problems with the status of the PRED feature are no longer an issue, since the analysis of Section 3 does not employ this feature. What is an issue, though, is the question whether the functions of the PRED feature are also fulfilled in the new treatment.

First, its role of distinguishing predicate complements from other types of complements is taken over by the CONTENT value of the selecting verbs. Whether *a sailor*, *clever* or *in the box* is a predicate complement or not is made explicit in the semantic properties of the lexemes that select them.

Second, the role of singling out the words that must or cannot be used as predicates by the assignment of a positive, c.q. negative, value for PRED in their lexical entry can be taken over by the independently motivated SELECT feature, as used in Van Eynde (2004). It is part of the HEAD value of all signs and models the requirements which an adjunct, specifier or marker imposes on its head sister. Its value is either an object of type *synsem* which then has to unify with the SYNSEM value of the selected head sister or *none*.[12]

(51) $\begin{bmatrix} \textit{head} \\ \text{SELECT} \quad \textit{synsem} \ \vee \ \textit{none} \end{bmatrix}$

[12] In terms of the type hierachy of Pollard and Sag (1994) SELECT replaces the features MOD and SPEC.

The value *none* is assigned when the nonhead daughter does not select its head sister. Subjects and complements, for instance, do not select their head sister. Now, since predicates are complements, we can single out the words that must be used as (heads of) predicates by assigning them a SELECT value of type *none*. Likewise, we can single out the words that cannot be used as (heads of) predicates by assigning them a SELECT value of type *synsem*. The former include *ready, ablaze* and *asleep*; the latter include *wooden, mere, utter* and *former*.

5 Conclusion

In the canonical HPSG treatment the criterial properties of predicate complements are defined in syntactic terms: their HEAD value contains the [+ PRED] feature and their selectors are treated as raising verbs (Section 1). This treatment is infelicitous for nominal predicates and inappropriate for gerundial, infinitival and clausal predicates. Besides, the assumption that predicate selecting uses are a kind of raising uses lacks generality and the PRED feature lacks proper motivation (Section 2).

The alternative treatment defines the criterial properties of predicate complements in semantic terms: they denote a scope-object and their index is co-referential with that of the target of the predicate (Section 3). The resulting treatment solves or avoids the problems that were raised in Section 2, and is sufficiently general to apply to all constructions which are canonically treated as predicative (Section 4).

References

Allegranza, V.(2006), *The Signs of Determination. Constraint-based Modelling across Languages*, Peter Lang.

Dalrymple, M., Dyvik, H. and Holloway King, T.(2004), Copular complements: closed or open?, *in* M. Butt and T. Holloway King (eds), *Proceedings of the LFG04 Conference*, CSLI Publications, Stanford, pp. 188–198.

Davis, A.(2001), *Linking by types in the hierarchical lexicon*, CSLI Publications, Dordrecht.

Gazdar, G., Klein, E., Pullum, G. and Sag, I.(1985), *Generalized Phrase Structure Grammar*, Basil Blackwell, Oxford.

Ginzburg, J. and Sag, I.(2000), *Interrogative Investigations*, CSLI, Stanford.

Montague, R.(1970), English as a formal language, *in* B. Visentini (ed.), *Linguaggi nella societàe nella tecnica'*, Edizioni di Comunità, Milano.

Müller, S.(2002), *Complex predicates*, CSLI, Stanford.

Pollard, C. and Sag, I.(1987), *Information-based Syntax and Semantics*, CSLI Publications, Stanford.

Pollard, C. and Sag, I.(1994), *Head-driven Phrase Structure Grammar*, CSLI Publications and University of Chicago Press, Stanford/Chicago.

Pullum, G.(1982), Syncategorematicity and English infinitival *to*, *Glossa* **16**, 181–215.

Stowell, T.(1983), Subjects across categories, *Linguistic Review* **2**, 285–312.

Van Eynde, F.(2004), Minor Adpositions in Dutch, *Journal of Comparative Germanic Linguistics* **7**, 1–58.

Wechsler, S.(1995), *The semantic basis of argument structure*, CSLI Publications, Stanford.

Dualist syntax

Stephen Wechsler

University of Texas at Austin

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 274–293

Wechsler, Stephen. 2008. Dualist syntax. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 274–293. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.16.

CC-BY 4.0

Abstract

A dualist syntax has two components: (1) the lexicon, a structured set of formatives ('words'); and (2) rules for combining those formatives into utterances. This paper defends syntactic dualism against three 'monist' challenges. First, evidence for lexical argument structure can be found in deverbal nominalization, which preserves that structure systematically. Second, words represent the smallest units for idiom formation and contextual polysemy effects, which is expected on the dualist view but not if word meanings are composed in the syntax. Third, the count/mass properties of nouns suggest an interleaving of conceptual and grammatical information in semantic composition.

1 The autumnal trees of monism

Like many theories, HPSG assumes that syntax is organized into two components:

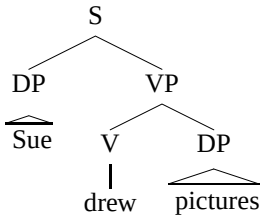
(1) a. Lexicon: A structured set of formatives ('words').

b. Combinatory syntax and semantics: Rules for combining those formatives into utterances.

I introduce the term *dualist syntax* for this grammatical architecture (cp. *lexicalism*, on one interpretation of this term). Under this dualist conception, a lexical entry contains, among other things, subcategorization information indicating the local syntactic contexts in which the word can appear. Meanwhile, the combinatory syntax and semantics specifies language-wide instructions on how to combine words, e.g. the verb precedes its object in English, but follows it in Japanese. Here's a familiar HPSG style lexical entry, followed by a tree:

(2) *draw:* $\begin{bmatrix} \text{SUBJ} & \langle \text{DP}_i \rangle \\ \text{COMPS} & \langle \text{DP}_j \rangle \\ \text{CONTENT} & \textbf{draw}\prime(i,j) \end{bmatrix}$

(3)

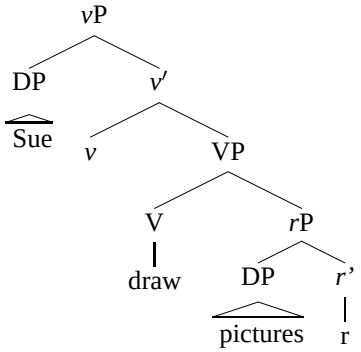


Recent years have seen the rise of certain *monist* challenges to dualism (Marantz 1997; Borer 2005a,b; Harley 2004, *inter alia*). Such approaches eschew sub-lexical syntactic or semantic structure such as semantic decomposition and lexical category specifications, positing instead that apparent sub-lexical structure is actually

built in syntax in the same process by which words are combined into utterances. Marantz (1997) sums up this challenge aptly with the slogan 'The lexicon is dead'.

On the most extreme monist assumptions, content words such as verbs are featureless radicals. Some or all thematic roles are eliminated from the lexical entries, instead assigned by silent 'light verbs' such as 'little *v*' that are assumed to occupy functional head positions in elaborate phrase structures that typically include only a few words among many phonologically empty terminal nodes. In the following simpified structure, *draw* lacks thematic roles; the silent 'light verbs' *v* and *r* assign the agent and theme roles to their respective specifiers:

(4)



To borrow an evocative metaphor (from Anthony Woodbury, p.c.), these are *autumnal trees*, with many bare branches, to which only a few words cling like dead leaves, as the winter of transformational syntax ominously approaches.

Is there a substantive, empirically testable difference between the dualist and monist approaches? My search for substantive arguments has turned up three putatively pro-monist, anti-dualist arguments in the literature. In this paper I argue that in all three cases, the facts actually favor, if anything, syntactic dualism.

2 Argument one: deverbal nominals

Certain English causative alternation verbs allow optional omission of the agent argument (5), while the cognate nominal disallows expression of the agent (6):[1]

(5) a. that John grows tomatoes

b. that tomatoes grow

(6) a. *John's growth of tomatoes

b. the tomatoes' growth, the growth of the tomatoes

In contrast, nominals derived from obligatorily transitive verbs such as *destroy* allow expression of the agent, as shown in (8a):

(7) a. that the army destroyed the city

[1]This section is based on Wechsler 2007.

b. *that the city destroyed

(8) a. the army's destruction of the city

b. the city's destruction

Following a suggestion by Chomsky (1970), Marantz (1997) argued that these data show that the agent role is lacking from lexical entries. In verbal projections (5) and (7) the agent role is assigned in the syntax by little *v*. Nominal projections like (6) and (8) lack little *v* so they lack a *structural* source for the agent role. Pragmatics takes over to determine which agents can be expressed by the possessive: the possessive can express 'the sort of agent implied by an event with an external rather than an internal cause' because only the former can be 'easily reconstructed' (from Marantz 1997; see also Harley and Noyer 2000): the destruction of a city has a cause external to the city, while the growth of tomatoes is internally caused by the tomatoes themselves (Haspelmath, 1993; Smith, 1970).

Marantz points out that this explanation is unavailable if the noun is derived from a verb with an argument structure specifying its agent if there is one. The problem for a dualist syntax is that nothing can be plausibly expected to block the deverbal nominal from inheriting the agent of a causative alternation verb.

The empirical basis for this argument is the mismatch between the allowability of agent arguments, across some verb-noun cognate pairs: e.g. *grow* allows the agent but *growth* does not. But how general is the *grow/growth* pattern? If it is the norm, as implied by Marantz and others, then this may indeed suggest that the agent role is supplied by the syntactic configuration. But conversely, if exact matches between noun and verb are the norm, and especially if the few mismatches can be independently explained, then this becomes powerful evidence for exactly the position Marantz seeks to attack. It would show that the verb does specify its agent role (or lack thereof) in the lexicon, and the noun inherits the agent if and only if the verb has one.

The facts strongly support the latter generalization: near-total parallelism between verb and noun, with ready explanations for the few counter-examples. First consider non-alternating theme-only intransitives ('unaccusatives'), as in (9) and transitives as in (10). The pattern is clear: if the verb is agentless, then so is the noun:

(9) *arriv(al), disappear(ance), fall*, etc.:

a. A letter arrived.

b. the arrival of the letter

c. *The mailman arrived a letter.

d. *the mailman's arrival of the letter

(10) *destroy/destruction, construct(ion), creat(ion), assign(ment)*, etc.:

a. The army is destroying the city.

b. the army's destruction of the city

Already this favors the dualist view. For the monist, the badness of (9c) and (9d) would have to receive independent explanations: (9c) is disallowed because a feature of the root ARRIVE prevents it from appearing in the context of *v* (Harley and Noyer 2000), while (9d) would be ruled out because the cause of an event of arrival can't be easily reconstructed from world knowledge. This implausible duplication in two separate components of the linguistic system would be replicated across all the intransitive and non-alternating transitive verbs.

What about causative alternation verbs? The claim that the *grow(th)* pattern is typical of causative alternation verbs will be dubbed *Chomsky's Conjecture*:

(11) Chomsky's Conjecture: Noun cognates of causative alternation verbs lack the agent argument.

Besides *grow(th)*, Chomsky (1970, examples 7c and 8c) cited two other examples, both experiencer predicates: *John amused (interested) the children with his stories* versus **John's amusement (interest) of the children with his stories*. But this was later shown by Rappaport (1983) and Dowty (1989) to have an independent aspectual explanation. Deverbal experiencer nouns like *amusement* and *interest* typically denote a mental state, where the corresponding verb denotes an event in which such a mental state comes about or is caused. These result nominals lack not only the agent but all the eventive arguments of the verb, because they do not refer to events. Exactly to the extent that such nouns can be construed as representing events, expression of the agent becomes acceptable.

In a response to Chomsky (1970), Carlota Smith (1972) surveyed Webster's dictionary and concluded that Chomsky's Conjecture is false: 'There are many counterexamples to this [Chomsky's] claim: *explode, divide, accelerate, expand, repeat, neutralize, conclude, unify*, and so on at length.' (Smith 1972:137) Harley and Noyer (2000) also noted many so-called 'exceptions': *explode, accumulate, separate, unify, disperse, transform, dissolve/dissolution, detach(ment), disengage-(ment)*. The simple fact is that these are not exceptions because there is no generalization to which they can be exceptions. These long lists of verbs represent the norm, especially for suffix-derived nominals (in *-tion, -ment*, etc.).

As for zero-derived nominals, many of these also allow the agent, such as *change, release*, and *use*: *My constant change of mentors from 1992-1997. The frequent release of the prisoners by the governor. The frequent use of sharp tools by underage children.* (examples from Borer 2003, fn. 13). Pesetsky (1995:79, ex. 231) assigns a star to *the thief's return of the money*, but it sounds fine to me, the OED lists a transitive sense for the noun *return* (definition 11a), and corpus examples like *her return of the spoils* are easily found.

Like the experiencer nouns mentioned above, many zero-derived nominals lack event readings, and thus reject all the arguments of the corresponding eventive verb: **the freeze of the water, *the break of the window*, and so on. Others

marginally allow event readings, and to the extent that they do, agents are possible. In my judgment, *his drop of the ball* is slightly odd, but *the drop of the ball* has exactly the same degree of oddness.

In short, the facts seem to point in exactly the opposite direction from what has been assumed by the monists. Chomsky's Conjecture is false.

Now, what is special about *grow(th)*? The answer is simple. When the noun *growth* entered the English language, causative *grow* did not exist! There was only intransitive *grow*. The OED provides these dates of the earliest attestations of *grow* and *growth*:

(12) a. intransitive *grow*: c725 'be verdant' ... 'increase'
b. the noun *growth*: 1587 'increase'
c. transitive *grow*: 1774 'cultivate crops'

Thus *growth* entered the language at a time when transitive *grow* did not exist. The argument structure and meaning were inherited by the noun from its source verb, and then preserved into present-day English. This makes perfect sense from the dualist perspective in which words have predicate argument structures. Nominalization by *-th* suffixation is not productive in English, so *growth* is listed in the lexicon. To explain why *growth* lacks the agent we need only assume that a lexical entry's predicate argument structure dictates whether it takes an agent argument or not. So even this one word, cited repeatedly in the anti-lexicalist polemics, turns out to provide evidence for dualism.

3 Argument two: sublexical scope

3.1 Two approaches to sublexical scope

Monist approaches eschew sub-lexical semantic structure such as semantic decomposition, positing instead that apparent sub-lexical structure is actually built in syntax. This move has reopened an old debate between 'Generative Semantics' and lexical decomposition, and involves some of the same phenomena as the earlier debate (Lakoff 1965, Dowty 1979). Verbs like *get*, *give*, and transitive *want* incorporate a possession component:

(13) a. John wants the car. $\leftrightarrow$ John wants to have the car.
b. John got the car. $\leftrightarrow$ John came to have the car.
c. Mary gave John the car. $\leftrightarrow$ Mary caused John to have the car.

Durative adverbials can modify the implicit "have" state (McCawley 1974; Ross 1976; Dowty 1979, *inter alia*):

(14) a. John wanted the car (for two days). (want or have for two days)
b. John got the car (for two days). (have for two days)

c. John gave me the car (for two days). (have for two days)

This suggests these sentences have an underlying semantic 'have' formative. The question is how this formative enters the picture.

On one view 'have' is in the lexical decomposition of the verb, as in (15b) for *want* (a simplified version of the analysis in Dowty 1979). The verb *want*$_1$ in (15a) takes a clausal (or controlled) complement, as in *John wants very much [for it to rain]*. The verb *want*$_2$ in (15b) is the transitive variant in (14a). Using an underspecification semantics such as Minimal Recursion Semantics (Copestake et al. 2005), we need to do little more than merely introduce the 'have' state as an elementary predication, as in (15c). This alone makes it available for durative adverbials to scope over.

(15) a. *want*$_1$:= $\lambda P \lambda x[want'(x, P)]$

b. *want*$_2$:= $\lambda y \lambda x[want'(x, have'(x, y))]$

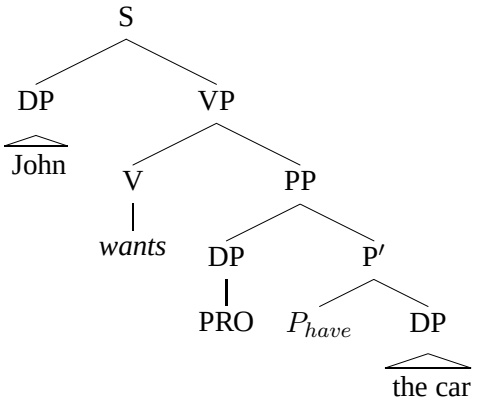
c. *want*$_2$:

$$\begin{bmatrix} \text{SUBJ} & \langle \text{DP}_i \rangle \\ \text{COMPS} & \langle \text{DP}_j \rangle \\ \text{CONTENT} & \text{s1: } \{ \text{want}(\text{s, i, s2}), \text{have}(\text{s2, i, j}) \} \end{bmatrix}$$

See Egg (1999) and Beavers et al. (to appear) for detailed formal accounts of sub-lexical scope within underspecification semantics.

The other approach posits a silent syntactic formative (McCawley, 1974), as in the analysis by Harley (2004):

(16)



Durative adverbials can adjoin to this putative PP, thus explaining the scope facts. Harley (2003) motivated the PP on the basis of controlled PP complements of *want*:

(17) John wants [PRO off the team].

Harley argued that since *want* allows this type of complement anyway, we need only posit the silent preposition HAVE.

3.2 Evidence from idioms and contextual polysemy

Which approach is right? An argument that the 'have' formative is syntactic was put forth by McCawley (1974), and more recently revived by Richards (2001) and Harley (2004). They note the parallel *verb*+DP idioms across *have*, *want*, *get*, and *give*, such as *give/get the creeps* and *give/take/get flak*:

(18) a. John gave everyone flak.

b. You get flak (when you take a stand)

They explain the parallelism by positing a single underlying idiom, "HAVE flak", which then combines with causal or inchoative semantic formatives:

(19) a. John CAUSE everyone [HAVE flak].

b. You BECOME [HAVE flak].

According to their account, the verb *have* is the spell-out of BE+HAVE, *get* is BECOME+HAVE, and *give* is CAUSE+HAVE. So the idiom parallels follow from the syntactic approach to sub-lexical scope. However, on the lexical decomposition view, the 'have' formative is embedded in a lexical decomposition (see (15a,c)) and hence unavailable to form idioms, since it is not a syntactic formative. On that view the idiomatic interpretations would have to be stipulated separately for each collocation.

In a different theoretical setting, McCawley (1974) made essentially the same argument regarding *want+DP*, an argument later revived by Harley (2004:258-9):

> significantly, the various "readings" that any *have DP* expression can have are all available with a *want DP* expression. When *have*'s complement is a DP that denotes offspring, like *daughter* or *child*, as in *John has a daughter*, *have* easily receives a 'parenting' interpretation, and this is exactly the most felicitous interpretation for the covert *have* in *John wants a daughter*. (Harley 2004:258-9)

The central empirical claim, then, is that the same idioms that can be formed from *have* can also be formed with the 'have' component of verbs like *get*, *give*, and transitive *want*. As far as I know this quite interesting empirical claim has never been explored fully and systematically, although I've taken some initial steps (Wechsler 2008). Put more broadly, the theoretical question is this: What are the minimal units from which idioms are composed?

So far, the facts support the lexical decomposition view (Wechsler (2008)). First consider the *want (to have) DP* cases discussed by McCawley and Harley. When the DP is relational as in *John has a sister*, the main predicate comes from the noun, not the verb. Simplifying somewhat, analyses along the following lines have long been proposed (Partee 1999, citing a 1987 Landman and Partee unpublished abstract; Tham 2006; Wechsler 2006; Beavers et al to appear):

(20) a. *have* = $\lambda P \lambda x \exists y [P(x, y)]$

b. *a sister* = $sister'$

c. *a headache* = $headache'$

d. *John has a sister* = $\exists y[sister'(John, y)]$

e. *John has a headache* = $\exists y[headache'(John, y)]$

Details vary but the key for now is that the same *have* appears with all relational nouns, whether *sister, headache,* etc. This analysis can be extended to the other verbs in (21):

(21) a. *want* = $\lambda P \lambda x[want'(x, \exists y[P(x, y)])]$

b. *get* = $\lambda P \lambda x[BECOME(\exists y[P(x, y)])]$

c. *give* = $\lambda y \lambda P \lambda x[CAUSE(x, BECOME(\exists y[P(x, y))]$

d. *John wants a sister* = $want'(John, \exists y[sister'(John, y)])$

e. *Eliza got a headache.* = $BECOME(\exists y[headache'(Eliza, y)])$

f. *The music gave me a headache.* = $CAUSE(music, BECOME(\exists y[headache'(me, y)]))$

Beavers et al (to appear) propose a unified analysis of relational and non-relational DP complements of these verbs of possession, citing non-zeugmatic coordination like *John has a nice car and an even nicer sister who bought it for him*. Both variants are treated as the light verb *have*, roughly (20a). In *John has a nice car*, the possession relation comes from *car*, extending Barker's (1995) analysis of genitives like *John's car*, in which the noun *car* is type-shifted to select a possessor argument. Anyway, for the present purposes, the crucial point is that we don't need many *have*'s such as a 'parenting have', 'kinship have', 'disease have' (for headaches), and so on. There is just one *have* for all relational nouns, and if Beavers et al (to appear) are right then the same one is used for true possession as well.

For the same reason, the collocations exhibiting parallelism (*get flak, give flak,* etc.) are not really idioms. They are compositional phrases involving figurative senses of the DP plus the standard 'light' meaning of the verbs. For example, *flak* refers to 'a barrage of abuse or adverse criticism' (OED), and frequently appears without any of the support verbs *get, take,* or *give* ((22a-c) are cited in the OED; (22d,e) are from the British National Corpus):

(22) a. 1968 *N.Y. Times 20 May, 46.* In spite of the current flak between Mayor Lindsay and...the...administrator of Boston and New Haven..., the potential for the city is unlimited.

b. 1969 A. LURIE *Real People, 163.* Well, all right. So why all the flak?

c. 1976 T. STOPPARD *Dirty Linen, 25.* Isn't that going to cause rather a lot of flak in the... P.L.P.?

d. Just imagine the flak flying about if we have bad results.

e. I expect the flak. If we get beat, it's my fault

In short, collocations like *get flak* are no more idiomatic than *get criticism*. Similar comments apply to the other putative idioms that distribute across support verbs.

On the other hand, English has many truly non-compositional idioms. Crucially, they do not exhibit this parallelism across support verbs. For example, *have a baby* on the 'give birth to a baby' meaning does not transfer to the other verbs, as shown in (23) (from Wechsler 2008).

(23) a. Natalie doesn't want to have a baby, so she's going to adopt one.

b. #Natalie doesn't want a baby, so she's going to adopt one.

As shown by the contrast in (23), the phrase *want a baby*, in contrast to *have a baby*, is general with respect to the ways of satisfying this desire. This phrase is not ambiguous between 'want to give birth to a baby' and other possibilities such as adoption.

Many more idioms can be added to this ((24a,b) are from McCawley 1974):

(24) a. I had a ball. ('enjoyed myself')
*I want a ball.

b. I had it out with Fred. ('argued angrily')
*I want it out with Fred.

c. C'mon, have a heart and give my kid an A. ('be compassionate')
*I don't want a heart, and besides, he flunked the exam.

d. The okra is ready. Go ahead, have at it! ('do something heartily')
*But I don't want at it! Yuck!

e. I've been had! ('cheated')
(*)I've been wanted! ('someone wanted to cheat me')

f. He had it away with his mistress. (had casual sex with'; Brit. dial.)
*He wanted it away with his mistress.

g. I'll 'ave you! ('beat you, exact revenge on you'; Brit. dial.)
(*)I want you!

h. Don't have a cow, man! ('have an extreme reaction'; Bart Simpson)
(*)What if I want a cow?

As shown by these examples, true idioms do not extend from *have* to *want*.

More research is needed before we can generalize confidently from such data, but there seems to be a discernable trend: Words represent the smallest level of granularity for idiom-formation and contextual polysemy effects. The sublexical formatives evidence by adverbial scope facts do not show contextual polysemy or form idioms. Assuming for the sake of argument that this is a valid generalization, then it has important implications for the dualist versus monist controversy. Namely, this generalization is predicted on the dualist view, but not the monist view.

3.3 Syntactic evidence

Different phrase structures are posited under the dualist analysis (25a) and Harley's (2004) monist analysis (25b).

(25) a. Dualist analysis: John wants [a lollipop]$_{DP}$.

b. Monist analysis: John wants [PRO P$_{HAVE}$ a lollipop]$_{PP}$.

There is considerable syntactic evidence favoring the dualist structure.

First, the history of English undercuts the original motivation for the controlled PP (recall (17) above). The earliest attestations of *want* actually took a DP object, with the meaning 'lack' (c1200). From 'lack' it drifted to 'desire'; and started taking infinitive complements (1706). (It's not clear which of these two happened first.) It was not until 1836 that we find directional PP's and particles as in *I want in, I want in* (OED example). It is anachronistic to cite the PP complements as the basis for DP complements, when the PPs were a very late innovation that showed up at least 500 years after the DPs. Also, these PPs were, and still are, rather specialized for indicating implicit motion, as the OED notes. We cannot say **I want in Austin* to mean 'I want to be in Austin.' But the *want+DP* cases never involve motion.

The want+PP pattern is found in other Germanic languages. This 'go-deletion', as it is sometimes called in Swedish grammars, is independent of the *want+DP* pattern. Like English *want*, Swedish *vilja* 'want' allows go-deletion but not DP objects (26), while *önska* 'want, wish' allows DP objects but not 'go-deletion' (27). Both allow infinitives:

(26) a. Jag vill äta middag.
I want eat.INF dinner
'I want to eat dinner.'

b. Jag vill hem / in i rummet.
I want home / into in room.DEF
'I want (to go) home / into the room.'

c. *Jag vill en ny bil.
I want a new car
('I want a new car.')

(27) a. Jag önskar att åka til Tyskland.
I wish to travel to Germany

b. Jag önskar en ny bil.
I wish a new car

c. *Jag önskar hem / in i rummet.
I wish home / into in room.DEF

So the want+DP pattern and the 'go-deletion' pattern do not correlate either historically or across closely related languages, suggesting that the two patterns are unrelated.

Secondly, *want* passivizes, suggesting it takes a DP direct object and not a PP: *The war was not wanted (by anyone).* English sometimes allows 'prepositional passives' like *Mary was being stared at*. But these are rather poor with controlled PPs: **??The team was not wanted off (by anyone).* This contrast is expected on the dualist structure but not on the monist structure. Similarly, adjectivalization is possible only for the DP taking verb: *an unwanted war* versus **an unwanted off of team* or **an unwanted into house*.

Harley (2004, p. 264, footnote 8) notes another problem for the PP analysis: an overt NP can replace PRO in the go-deletion type PP (28a), but not in the putative PP structure posited for the DP complements (28b,c):[2]

(28) a. John wants Bill/PRO off the team.

b. *John wants Bill a beer.

c. *John wants [Bill P_{HAVE} a beer]$_{PP}$.

Next, if the apparent DP complements of *want* are really PPs, then they should coordinate just as well with (uncontroversial) PPs as with other DPs (the latter would be covert PPs). But coordination with PPs is almost impossible, as predicted by the Dualist Analysis:

(29)	a. I want [a vodka martini] and [a hot bath].	DP+DP
	b. I want [out of these wet clothes] and [into a hot bath].	PP+PP
	c. *I want [out of these wet clothes] and [a martini].	*PP+DP
	d. *I want [a martini] and [out of these wet clothes].	*DP+PP

On the monist analysis all of the bracketed phrases in (29) are PPs, making it mysterious that (29a,b) sound so much better than (29c,d).

English infinitival relative clauses allow pied piping of PPs (30a) or the fillerless bare (or 'simple infinitival') type (30b), but disallow DP fillers (30c).

(30) a. a bench [on which]$_{PP}$ to sit ____

b. a bench to sit on ____

c. *a bench [which]$_{DP}$ to sit on ____

If the complement of *want* were a PP as claimed then it should be possible to relativize it in infinitivals, but it is not:

(31) a. a reasonable type of bike to want ____ for commuting

[2]Harley (2004, p. 264, footnote 8) floats an idea for solving this problem, which will not be discussed here for lack of space.

b. *a reasonable type of bike [P$_{have}$ which]$_{PP}$ to want ____ for commuting

c. a reasonable sort of outcome to wish for ____

d. a reasonable sort of outcome [for which]$_{PP}$ to wish ____

On the putative PP structure shown in (31b), the contrast with (31d) is mysterious.

In contrast to PP complements, direct objects famously resist separation from their verb by an adverb (32a,b). Once again, we find a clear contrast between DP complements of *want*, and true PPs (32c-f):

(32) a. He nibbled quietly [on the carrot].

b. He nibbled (??quietly) [the carrot].

c. He wants desperately [out of his job].

d. He wants (??desperately) [a better job].

Yet another property distinguishing PPs from DPs is modification by *right*:

(33) a. So you bring this poor dog in from the rain,
Though he just wants right [back out]$_{PP}$. (Metallica)

b. *He just wants right [a rapid exit]$_{DP}$.

Covert HAVE was originally proposed to explain the scope of durative adverbials (14) in terms of adjunction. But (33b) shows that putative PP constituent does not allow modification normally permitted for PPs.

Harley (2004), citing McIntyre (2002), argued for the monist analysis on the grounds that neither *have* (34a) nor *want* (34b) is a particle shift verb:

(34) a. He had { his jacket off / *off his jacket }.

b. The doctor wants { those clothes off / *off those clothes }.

The idea is that parallel constraints on the local syntactic environment of the two verbs can be explained by positing a silent HAVE in both. In my personal judgment, shifting is better in (34a) than (34b), and the former can be found on the web, for what it's worth: *'A fox,' he gloated to the housekeeper once he'd had off his coat.* (www). Moreover, with other particles the contrast is much sharper:

(35) a. He had { his jacket on / on his jacket }.

b. He wanted { his jacket on / *on his jacket }.

A check of the British National Corpus turned up many hits like (35a) for the string *[pers. pron.] had on [poss. pron.]*, but none for *[pers. pron.] wanted on [poss. pron.]*. With regard to particle shift, the two verbs are not parallel after all.

Finally, *want* can coordinate and share its object with other transitive verbs, as in *The bear wanted, got, and ate it.* (We know this is V-zero coordination and not right node raising out of coordinated VPs because right node raising is not

possible with unstressed pronouns like *it*.) Such coordination is expected if all these verbs select DP, but it is problematic if some select PP and others DP, since the complement *it* cannot be both at once.

My arguments above focus specifically on the covert PP analysis from Harley (2004). But in a broader sense these arguments are completely general. For example, suppose we try to rescue the syntactic (monist) analysis by replacing the PP with an outer DP shell.[3] Hence the PP in (25b) would be replaced by [PRO HAVE [a lollipop]$_{DP_1}$]$_{DP_2}$ (the numbers in DP1 and DP2 have no formal significance and are for identification only). The idea would be that DP2 has the same category label (namely DP) as any other DP, so on this view we would expect *a lollipop* to have the same syntactic properties, regardless of whether it is the object of *want* or in some other context such as *The dog ate a lollipop*— which is what I showed in this section.

But the whole point of the syntactic analysis is that DP2 differs syntactically from other DPs. If they are truly identical then the extra structure for the outer DP2 shell, as well as PRO and silent HAVE, are merely graphical decorations with no syntactic interpretation. On the other hand, if the syntactic representations really differ then it should be possible to demonstrate that difference empirically. The arguments above support the conclusion that there is no difference and that therefore the syntactic analysis is wrong.

4 Argument three: count and mass nouns

Our last case study concerns Borer's (2005a,b) particularly strong statement of the monist theoretical perspective. Borer distinguishes two types of formatives, *listemes* and *f-morphs*. Listemes, which are content words such as nouns, verbs, and adjectives, have no grammatical features. As far as the grammar is concerned, they are pure atoms, without subcategorization frames, argument structure, lambda abstracts, part-of-speech category such as N or V, or minor category features such as count versus mass noun. A listeme is associated only with an agrammatical conceptual representation. Borer (2005a:11) submits that there is

> no direct interface between the conceptual system and the grammar, in that properties of concepts do not feed directly into any determination of grammatical properties. A substantive listeme is a unit of the conceptual system, however organized and conceived, and its meaning, part of an intricate web of layers, never directly interfaces with the computational system.

In contrast, f-morphs, which are functional morphemes such as plural inflection, determiners, numerals, and classifiers, do have grammatical features. For Borer, the grammar (or 'computation') deals in rigid, categorical values, while the conceptual system is highly malleable and subject to contextual factors. This leads her

[3]This was suggested by a member of the audience at Wechsler (2008).

to the interesting prediction that in conflicts between the two, it is the concepts that stretch to fit the exigencies of the grammatical construction. Let us consider her illustration of this point, an analysis of the count/mass distinction.

By way of background, traditional grammars often distinguish count nouns such as *suggestion* from mass nouns such as *advic*e, with respect to whether they allow plurals (*suggestions; *advices*), indefinite articles (*a suggestion; *an advice*), quantification by *too much* (*??too much suggestion; too much advice*), and *one*-anaphora (*John gave me (some) suggestions and Mary gave me one too.; *John gave me (some) advice and Mary gave me one too*). However, it has long been noted that nouns of one type can often be forced into the other type:

(36) 'grinding': count noun ⇒ mass noun

a. Jonas is eating a banana. (count)

b. There's too much banana in this cake. (mass)

(37) 'portioning': mass noun ⇒ count noun

a. I drank too much beer last night. (mass)

b. Would you like a beer? (count)

In detailed lexicalist analyses, Copestake (1992) and Copestake and Briscoe (1995) analyze this as *systematic polysemy*, in which a class of words productively alternates between systematically related senses. Copestake and Briscoe (1995) generate the sense extensions with productive lexical rules: a 'grinding rule' converts a count noun into a mass noun, while a 'portioning rule' applies in the opposite direction. This analysis is very detailed and sophisticated, combining Krifka's (1989) mereological account of nominal reference with Link's (1983) treatment of plurals, and carefully addressing the empirical question of the scope and productivity of various sense extension rules: for example, whether there is a special 'animal-grinding' rule deriving a mass noun referring to the meat or flesh of the animal denoted by the corresponding count noun (e.g. *too much chicken*), or whether it should be subsumed under a more general grinding rule. My sketch of this work does not do it justice but it will suffice to illustrate the basic strategy and the form of the grammatical theory under a lexicalist approach.

On Borer's monist theory, words like *banana* and *beer*, like all listemes, are grammatical atoms. So they cannot be distinguished by a count / mass lexical feature; nor does Borer allow for lexical rules or coercion. All noun type listemes denote masses. Instead of coercion, the f-morphs themselves impose structure on these listeme-denoted masses: *divider* f-morphs (e.g. plural inflection) portion out the mass into countable entities; *counter* f-morphs (*several, two, there*, etc.) count out portioned entities; and some f-morphs (*a(n), one, each, every*) perform both functions at once.

Since all listemes start out as masses, the grinding function is eliminated entirely, with mass interpretations simply arising in the absence of a divider f-morph. A seemingly 'coerced' phrase like *three waters* ('three portions, e.g. glasses, of

water') has the same grammatical analysis as *three cats*. It is the plural morpheme itself that does the portioning, with pragmatics and world knowledge determining that the appropriate portion of cat-mass is an individual cat, while the appropriate portion of water-mass depends on context, e.g. a glass of water in one context, a kind of water in another.

While the coercion of listemes between count and mass is fairly free, Borer observes that the addition of a divider morpheme makes an expression more resistant to coercion. Hence *There's too much rabbit in this stew* sounds much better than **There's too much rabbits in this stew*. For Borer, **too much rabbits* is ruled out by the grammatical computation as a clash between the $[\pm Divider]$ and $[\pm Counter]$ features of the f-morphs $[plural]$ and *much* (Borer 2005a:104ff). Such examples illustrate 'the complete impossibility of coercibility, or type-shifting, whenever the noun in question is marked by means of overt inflection.' (Borer 2005a:105)

Borer's argument goes as follows: on a lexical coercion account, if we can coerce *rabbit* into a mass, then why can't we coerce *rabbits* into a mass? Pluralia tantum nouns provide Borer with a particularly striking evidence since 'just like regular plurals, they cannot be coerced into a mass context' (Borer 2005a:105, ex. 26b): **There's too much scissors around this house.* Thus the malleability observed in rich conceptual representations should not be captured in grammatical coercion rules, nor indeed in the grammar at all, because the grammar proper is not susceptible to coercion. Borer's theory explains this observation by keeping the computational grammar radically insulated from the effects of such conceptual representations.

Let us assess this argument. Assuming, as seems reasonable, that some words are more semantically malleable than others, then in conflicts the malleable ones will stretch more than the rigid ones, and a clash between two rigid ones will sound worst of all. And ungrammaticality due to errors of 'agreement' between formal grammatical features have a more pronounced quality than what results from semantic incompatibility.

The question is whether this interaction between malleable and rigid semantics justifies the radical separation that Borer advocates. As it turns out, f-morphs like plural actually *can* be coerced into masses:

(38) How much refried beans / chopped nuts / scrambled eggs / mashed potatoes / mashed yams were consumed yesterday?

A listeme like *chopped* converts a plural like *nuts* into a mass, which therefore accepts the mass quantifier *much*. Interestingly, chopping doesn't seem to help examples like **too much chopped rabbits*, perhaps because a single rabbit is large enough to provide a reasonable amount of rabbit meat for a stew (cp. *#too much chopped nut*). Examples like (38) show that the computation and conceptual representations are interleaved in semantic composition: first the plural *-s* (an f-morph) applies to the noun, indicating more than one unit; then *chopped* (a listeme) converts it to a mass; and then *too much* (an f-morph) measures the amount of that

mass. This seems to be contradict Borer's basic supposition that computational grammar— in this case the $[\pm Divider, \pm Counter]$ feature system— is blind to the rich conceptual properties of listemes.[4]

As for pluralia tantum nouns, a subset of them actually do appear with mass quantifiers (Copestake (1992:98), Sag et al (2003:124–5)): cp. *How much feces / grits / collard greens / clothes are there?*

So the radical separation between conceptual and grammatical systems seems unwarranted. Still, the lexicon may not be the right place for all mass-count conversion. For example, consider the 'beverage portioning' rule that allows us to order *two waters*, but not to point out a puddle by saying **There's a water on the floor*. Beverage portioning is not (only) lexical: one could order *a Stoli and kiwi juice, please*, where *Stoli and kiwi juice* is a conjoined phrase produced by the syntax.

Let us posit that a concept has some structure, including preferred *Individuation Units* (IUs). If the concept is a word meaning, then its structure *ipso facto* becomes lexicosemantic structure. The phrase *two beers* draws its IUs either from the conceptual representation of 'beverage' (the IU is roughly a serving, as in *two beers, please*) or, since beer is found in many varieties, another IU is 'kinds' (*They serve two beers that I like*). If a concept lacks any potential IU's at all, then it can never appear in count noun contexts: this may be the case for the concepts denoted by the words *evidence, furniture,* and *clothing*. This approach captures the positive aspects of Borer's approach. But it crucially rejects the monist principle of grammar-free words, since syntax and compositional semantics refer directly to (the IUs within) the conceptual representation of words.

In addition, there is important evidence that count versus mass is also a *formal* feature of at least some nouns: nouns preserve their count/mass-dependent distribution even when they denote kinds (Krifka 1995).

(39) What do you value most in life?

a. Flattery. / Advice. / Evidence. / Fruit.

b. *Compliment. / *Suggestion / *Clue. / *Vegetable.

These NPs refer to the kinds or concepts themselves, not to particular specimens, so there is no question of portioning by f-morphs. This would seem to require a lexical feature, presumably a simple grammaticalization of the conceptual representation, produced by a rule stating that a noun denoting an IU-less concept is marked as a mass noun. The concept 'flattery' lacks IUs, so the word *flattery* is classified as a mass noun and thus can appear in singular form without a specifier, as in (39a).

Summarizing, we saw from cases like *too much chopped nuts* that functional and content morpheme meanings are interleaved in semantic composition. Some aspects of the count/mass split should perhaps be pushed out of the lexicon proper into pragmatic conceptual structure, but then noun syntax is crucially sensitive

[4] If it turns out that such examples are not problematic for Borer's theory, then I no longer know what the theory actually predicts.

to that structure. Moreover, at least some nouns lexicalize grammatical features reflecting their conceptual structures.

5 Conclusion: the autonomy of the lexicon

The old Generative Semantics idea of generating sublexical semantic structure along with the compositional semantics of sentences has been revived in recent years. But the attempts to support this approach have back-fired. First we saw evidence that lexical argument structure is autonomous from the syntactic expression of it: deverbal nouns preserve the argument structure of the cognate verbs (contrary to what is often claimed), but systematically differ in syntax. Our second case study reached the tentative conclusion that word meaning is the smallest unit for contextual polysemy. Sub-lexical semantic formatives, even those available for some adverbial modification, are unavailable for forming idioms with surrounding words— a problem for monist approaches that treat such formatives as if they were words. Finally, the mass/count distinction fails to support Borer's notion of a computational syntax hermetically sealed off from the vagaries of conceptual knowledge. The available evidence still supports a dualist syntax comprising two components: *words*— which are interfaces between conceptual representations and grammatical subcategorization instructions— and the *combinatory rules* that abide by those grammatical instructions.

References

Barker, Chris: 1995, *Possessive Descriptions*. CSLI Publications, Stanford.

Beavers, John, Elias Ponvert, and Stephen Wechsler: to appear, 'Possession of a Controlled Substantive: Light *have* and Verbs of Possession', in *Proceedings of Semantics and Linguistic Theory (SALT) 18*. University of Massachusetts, Amherst, MA, March 21-23, 2008.

Borer, Hagit: 2003, 'Exo-skeletal vs. endo-skeletal explanations', in John Moore and Maria Polinsky (eds.), *The Nature of Explanation in Linguistic Theory*. CSLI and University of Chicago Press, Chicago.

Borer, Hagit: 2005, *Structuring Sense, Volume I: In Name Only*. Oxford University Press, Oxford.

Borer, Hagit: 2005, *Structuring Sense, Volume II: The Normal Course of Events*. Oxford University Press, Oxford.

Chomsky, Noam: 1970, 'Remarks on Nominalization', in R. Jacobs and P. Rosenbaum (eds.), *Readings in English Transformational Grammar*, 184-221. Ginn and Co., Waltham MA.

Copestake, Ann: 1992, *The representation of lexical semantic information*, PhD dissertation, University of Sussex.

Copestake, Ann and Ted Briscoe: 2005, 'Semi-productive Polysemy and Sense Extension', *Journal of Semantics* **12 (1)**, 15.

Copestake, Ann, Dan Flickinger, Carl Pollard, and Ivan A. Sag: 2005, 'Minimal Recursion Semantics: An Introduction', *Research on Language and Computation* **3**, 281–332.

Dowty, David: 1979, *Word Meaning and Montague Grammar*. Reidel, Dordrecht.

Dowty, David: 1989, 'On the Semantic Content of the Notion of "Thematic Role"' in Gennaro Chierchia, Barbara H. Partee, and Raymond Turner (eds.), *Properties, Types and MeaningVolume II: Semantic Issues*. Kluwer, Dordrecht, 69–129.

Egg, Marcus: 1999, 'Deriving and Resolving Ambiguities in *wieder*-Sentences', in *Proceedings of the 12th Amsterdam Colloquium*.

Harley, Heidi: 2004, 'Wanting, Having, and Getting: A Note on Fodor and Lepore 1998', *Linguistic Inquiry* **35**, 255–267.

Harley, Heidi and Rolf Noyer: 2000, 'Formal versus encyclopedic properties of vocabulary: Evidence from nominalizations', in Bert Peeters (ed.), *The Lexicon-Encyclopedia Interface*. Elsevier, Amsterdam.

Haspelmath, Martin: 1993, 'More on the typology of inchoative/causative verb alternations', in Bernard Comrie and Maria Polinsky (eds.), *Causatives and transitivity*, 87-120. John Benjamins, Amsterdam.

Krifka, Manfred: 1989, 'Nominal reference, temporal constitution and quantification in event semantics', in R. Bartsch, J. van Benthem, and P. von Emde Boas (eds.), *Semantics and Contextual Expression*, 75115. Foris Publications, Dordrecht.

Lakoff, George: 1965, *On the Nature of Syntactic Irregularity*. PhD thesis, Harvard University.

Link, Godehard: 1983, 'The logical analysis of plurals and mass terms: A lattice-theoretical approach', in Bäerle, Schwarze, and von Stechow (eds.), *Meaning, Use and Interpretation of Language*, 302–23. de Gruyter, Berlin.

McCawley, James D.: 1974, 'On Identifying the Remains of Deceased Clauses', *Language Research* **9**, 73–85.

McIntyre, Andrew: 2002, 'The verb get and the syntactic semantics of VP', Ms., University of Leipzig.

Marantz, Alec: 1997, 'No Escape from Syntax: Don't Try Morphological Analysis in the Privacy of Your Own Lexicon', *U.Penn Working Papers in Linguistics* **4.2**, 201–25.

Partee, Barbara H.: 1999, 'Weak NP's in HAVE Sentences', in J. Gerbrandy, M. Marx, M. de Rijke, and Y. Venema (eds.), *JFAK, a Liber Amicorum for Johan van Benthen on the occasion of his 50th Birthday*, 39–57. University of Amsterdam, Amsterdam.

Pesetsky, David: 1995, *Zero Syntax: Experiencers and Cascades*. MIT Press, Cambridge.

Rappaport, Malka: 1983, 'On the nature of derived nominals', in M. Rappaport B. Levin, and A. Zaenen (ed.), *Papers in Lexical-Functional Grammar* Indiana University Linguistics Club, Bloomington, 113–42.

Richards, Norvin: 2001, 'An Idiomatic Argument for Lexical Decomposition', *Linguistic Inquiry* 183–192.

Ross, John Robert: 1976, 'To Have Have and to Not Have Have', in M. A. Jazayery, E. C. Polomé, and W. Winter (eds.), *Linguistic and Literary Studies in Honor of Archibald A. Hill*, 263–270. Mouton, The Hague.

Sag, Ivan, Thomas Wasow, and Emily Bender: 2003, *Syntactic Theory: A Formal Introduction, 2nd edition*. CSLI Publications, Stanford.

Smith, Carlota S.: 1970, 'Jespersen's "move and change" class and causative verbs in English', in M. A. Jazayery, E. C. Polomé, and W. Winter (eds.), *Linguistic and Literary Studies in Honor of Archibald A. Hill*, 101-09. Mouton, The Hague.

Smith, Carlota S.: 1972, 'On Causative Verbs and Derived Nominals in English', *Linguistic Inquiry* **3** 136-38.

Tham, Shiao Wei: 2006, 'The Definiteness Effect in English *Have* Sentences', in P. Denis, E. McCready, A. Palmer, and B. Reese (eds.), *TLS 8*, 137–149. Cascadilla Proceedings Project, Somerville.

Wechsler, Stephen: 2006, 'Having a topic, wanting a focus', *Proceedings of 4th Workshop on Discourse Structure*, 498-506. University of Texas, Austin. March 3-5, 2006.

Wechsler, Stephen: 2007, 'A Diachronic Account of English Deverbal Nominals', in Charles B. Chang and Hannah J. Haynie (eds.), *Proceedings of the 26th West Coast Conference on Formal Linguistics*, 498-506. Cascadilla Proceedings Project, Somerville.

Wechsler, Stephen: 2008, 'Idioms, Light Verbs, and Lexical Decomposition'. NORMS Workshop on Argument Structure, Lund University, February 6.

Transparent free relatives in English

Eun-Jung Yoo
Seoul National University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 294–304

Yoo, Eun-Jung. 2008. Transparent free relatives in English. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 294–304. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.17.
CC-BY 4.0

Abstract

Transparent free relatives (TFRs) are constituents involving a WH-gap dependency in which the phrase that is predicated of the gap associated with *what*, not the *wh*-phrase itself, functions as the syntactic and semantic 'nucleus.' Previous analyses have either treated TFRs as a construction radically different from ordinary FRs, utilizing such mechanisms as parenthetical placement or grafts, or assimilated them to ordinary FRs, relying on abstract/empty head elements and a vague semantic relation holding between the gap and the predicate phrase. In this paper, we investigate how the puzzling properties of English TFRs can be accounted for in HPSG. The paper shows that the 'transparency' effect of TRFs can be handled by feature inheritance from the 'nucleus' predicate phrase, together with a constructional constraint that deals with the exocentric property of TFRs.

1 Introduction

Transparent free relatives (TFRs) are bracketed phrases in examples like (1), which, despite their formal resemblance to standard free relatives (SFRs) involving filler-gap relations, demonstrate some significant differences.

(1) a. He made [what appears to be **a radically new proposal**].
b. He made an uninspired and [what I'd describe as **catastrophic**] decision.
c. I didn't get a chance to talk to him [what you might call **privately**].
d. He felt my mother was [what he called **poisoning my mind**]. (Grosu 2003:248)

Most notably, TFRs are different from SFRs in that as in (1), the (bold-faced) predicate parts, not the *wh*-phrases, function as the syntactic and semantic 'nucleus'. Within the TFRs in (1), each bold-faced phrase, which is dubbed as 'transparent nucleus (TN)' by Grosu (2003), is predicated of what corresponds to the trace of *what*. Thus, TFRs are often described as involving a small clause consisting of the trace of *what* and a predicate XP, as in (2).

(2) He made [what appears to be [$_{SC}$ t **a radically new proposal**]]. (Grosu 2003:278)

Syntactic headhood of a TN is exhibited through category matching. As shown in each example in (1), the syntactic category of the TN (i.e., the bold-faced part) matches to that of the TFR (i.e., the bracketed part). This is most clearly demonstrated in examples like (1b), in which the TFR must be an ADJP as an NP modifier, not being an NP inheriting the category of *what*.

Semantically, given a TN, the rest of the TFR is felt to be a parenthetical modifier of the TN, involving a 'hedging' effect. However, it is different from a normal parenthetical or a simple modifier that does not affect the core content. As shown in

(3), it is possible that even the speaker does not assume the proposition expressed by the TN (or the 'small clause') to be true.

(3) a. There is now on your plate [what no one in his right mind would call _ **a steak**] (e.g., because it is in fact a dead rat).
b. Bill is [what nobody would call _ **an optimist**]. (He thinks the world will end soon.)

In this respect, we assume a more formal characterization suggested in Grosu (2003:279), which states that a TN needs to be "in the scope of a TFR-internal intensional operator".

Furthermore, in contrast to ordinary FRs in examples like *John ate what she cooked*, which have a definite or a (free choice) universal interpretation, a TFR may have an indefinite reading as evidenced by its occurrence in an existential *there* sentence in (4).

(4) There is [what appears to be **an error**] in this program. (Wilder 1999:688)

In addition, while SFRs involve a set of *wh*-words such as *what*, *who*, *how*, *when*, and *where*, with their corresponding *-ever* forms, TFRs employ only *what*.

(5) a. Bob is a boring and [what/*who/*where I would describe as highly irritating] person.
b. Bob can be a boring and [what(*ever) I would describe as highly irritating] person. (Grosu 2003:307)

On the other hand, since both TFRs and SFRs have a basic internal structure involving a filler-gap dependency, the same string of a clause may be ambiguous between an SFR and TFR (Wilder 1999:694).

(6) This was [what I described as sophisticated]. (ambiguous)

In (6), the bracketed clause can be either interpreted as a definite NP as an SFR or as an AP as a TFR.

In this paper, we investigate how the puzzling properties of English TFRs can be accounted for in HPSG. This paper shows that the 'transparency' effect of TRFs can be handled by feature inheritance from the TN, together with a constructional constraint that deals with the exocentric property of TFRs.

2 Previous Analyses of TFRs

Since the phenomenon was first introduced under the term *pseudo-free relatives* by Nakau (1971), and elaborated by Kajita (1977), TFRs had been largely unattended to in syntactic literature, until Wilder (1999), Grosu (2002, 2003), and Riemsdijk (2000, 2001, 2006a,b) carried out a more systematic investigation on the properties and grammatical analyses of the construction.

Except for Grosu (2002, 2003), other works treat TFRs as a construction radically different from ordinary relatives. In Wilder (1999), a TFR, which exists as a phrase marker independent of the matrix clause in syntax, is parenthetically placed to be left-adjacent to the nucleus XP, and then the overlapping underlined part undergoes backward deletion, as shown in (7).

(7) John bought < what he took to be a guitar > a guitar (PF representation, Wilder:693)

However, as Riemsdijk (2000, 2001) points out, such an analysis has a critical problem that it cannot account for TFRs that have 'string-medial' TNs as in (8).

(8) I just saw [what might well be taken for **a meteor** by naive observers when visibility is rather poor]. (Grosu 2003:288)

Riemsdijk (2006b) takes a further move and proposes that sentences with TFRs be derived by 'grafts' by which two independent input trees are connected via external remergers of internal elements, thus sharing a constituent (i.e., the TN of a TFR). According to Riemsdijk, the derivation of (9) consists of three steps in (10).

(9) I ate what they called a steak.

(10) a. Step 1 (internal merge of the subject of the TFR)

input tree B (TFR):
$[_{IP}$ they $[_{vP}$ (they) $[_{VP}$ call $[_{SC}$ what $[_{DP}$ a steak]]]]]

b. Step 2 (internal (re-)merger (*wh*-movement) of *what*)

input tree B (TFR):
$[_{CP}$ what $[_{IP}$ they $[_{vP}$ (they) $[_{VP}$ call $[_{SC}$ (what) $[_{DP}$ a steak]]]]]]

c. Step 3 (**external merge of an internal element** in the TFR to the partial matrix tree)

input tree A (matrix):
.. $[_{V'}$ eat $[_{DP}$ a steak]]

input tree B (TFR):
$[_{CP}$ what $[_{IP}$ they $[_{vP}$ (they) $[_{VP}$ call $[_{SC}$ (what) $[_{DP}$ a steak]]]]]]

$\Rightarrow$ *input tree A with a graft* (matrix):
.. $[_{V'}$ eat $[_{DP}$ **a steak**]] (The DP node is shared with that of the input tree B.)

As Riemsdijk (2006:27) himself discusses, such a derivation violates Phase Theory under the (standard) assumption that the building of tree B is completed before the graft in Step 3 is applied. In order to avoid this problem, Riemsdijk (2006:28) claims that "graft may apply at any state (DP, SC, VP, *v*P) until the *v*P is sent off to spell-out (PF)."

However, without an explicit account of the mechanism by which Phase Theory, graft, and spell-out interact with one another, it is largely left unclear how such process works. Furthermore, although Riemsdijk argues that grafts are natural phenomena that arise from merge, he does not provide any specific constraint that is necessary to restrict the huge amount of overgenerated TFR or other structures that may result from various external-internal merge possibilities.

By contrast, in Grosu (2003), TFRs are analyzed as basically the same kind of construction as ordinary FRs, which consist of a null head and a CP with an initial *wh*-phrase.

(11) a. SFR
$[_{XP}\ [_{X(P)}$ e] $[_{CP}$ *wh*-XP$_i$ $[_{C'}\ [_{C}$ [Def]] $[_{IP}$ ... t$_i$...]]]]
b. TFR
$[_{XP}\ [_{X(P)}$ e] $[_{CP}$ *what*$_i$ $[_{C'}\ [_{C}$ [Def]] $[_{IP}$ ... $[_{SC}$ t$_i$ TN] ...]]]]
(Equative relation: $[_{SC}$ t$_i$ $\Leftrightarrow$ TN])

According to Grosu, the transparency effect is induced from the 'equative' relation holding between the small clause subject, i.e., the trace of *what*, and the TN within a TFR.

However, Grosu's analysis of TFRs has some drawbacks. First, in both (11a) and (11b), it is not clear and how the syntactic category of the *wh*-phrase is identified with that of the empty head. Second, Grosu fails to provide a precise syntactic mechanism by which the syntactic (and semantic) features of a TN are passed into the trace of *what* in (11b). Although Grosu claims that this is made possible through the equative relation between the trace of *what* and the TN, it is not clear al all how the equation of semantic objects (i.e., properties) in TFRs guarantees syntactic matching between the trace of *what* and the TN. Therefore, in this 'unified' analysis, the syntactic (and semantic) parallelism between TFRs and ordinary FRs remains only schematic, without theoretical details provided.

3 An HPSG Analysis

Our analysis focuses on explaining two major properties of TFRs, that is, i) the predicate phrase is the syntactic nucleus of TFRs, and ii) TFRs are far more restricted than the other kinds of *wh*-clauses such as relative clauses and SFRs.

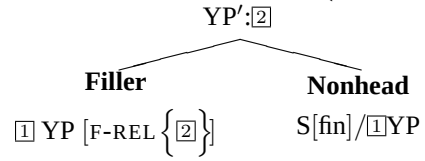
First of all, in order to distinguish the *wh*-phrase occurring in TFRs, a new feature TFR(EL) is introduced with its value a set of indices. Accordingly, *what*, the only *wh*-phrase used in TFRs, is assumed to have the following specification:

(12) *what*: $\begin{bmatrix} \text{CONT}|\text{IND}\ \boxed{1} \\ \text{TFR}\left\{\boxed{1}\right\} \end{bmatrix}$

Although the *wh*-phrase is a filler as in other types of *wh*-clauses, the following clause with a gap does not constitute the head in TFRs. In this respect, we analyze

TFRs as a kind of exocentric filler-base construction in (13) proposed by Wright and Kathol (2003).

(13) Filler-nonhead construction (for free relatives, Wright and Kathol:383)



However, in contrast to the FR construction in Wright and Kathol, in which major HEAD information comes from the filler daughter, in our analysis of TFRs, the HEAD information indirectly comes from that of the TN embedded in the nonhead daughter S, as will be shown shortly.

Next, in order to capture the generalization that the TN is predicated of (the trace of) *what* (Wilder 1999, Grosu 2003) in examples like (14), the constraint in (15) is posited.

(14) John invited [what she took to be _ a policeman].

(15) EXT-HEAD-Licensing Constraint (preliminary)

$$\begin{bmatrix} \textit{word} \\ \text{HEAD } \boxed{2} \\ \text{SUBJ } \langle [\text{TFR } \{\boxed{1}\}] \rangle \end{bmatrix} \Rightarrow \left[\text{EXT-HEAD } \boxed{2}\right]$$

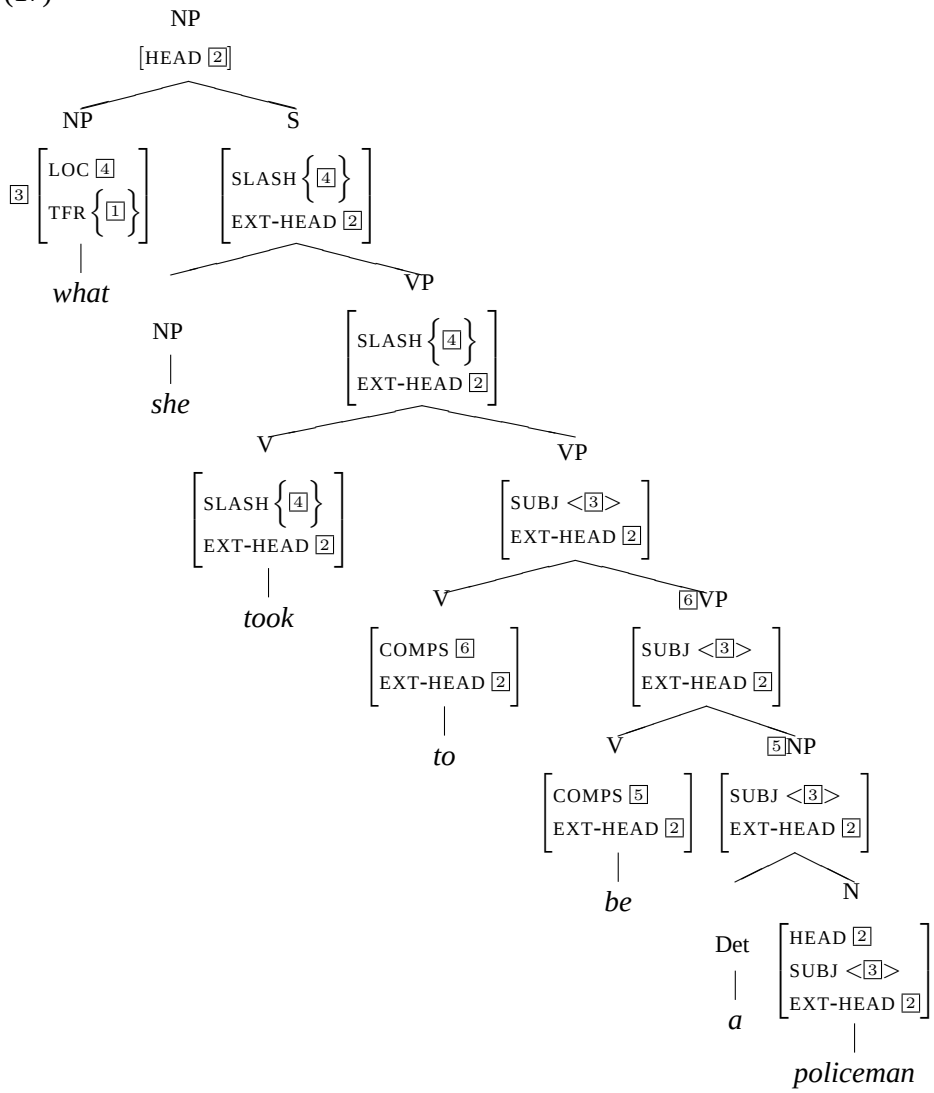
The constraint (15) is imposed on any word that may appear as the lexical head of a TN phrase. Accordingly, it has an effect of restricting TNs to the phrases that take the TFR *wh*-phrase, *what*, as its (expressed or unexpressed) subject. In (15), the feature EXT-HEAD is introduced so that the HEAD information of the TN may be inherited into other phrases. We assume that basically, the EXT-HEAD is subject to Ginzburg and Sag's (2000) Generalized Head Feature Principle (GHFP). Additionally, at a lexical level, we need a restricted version of "Amalgamation Constraint" (cf. Ginzburg and Sag, for WH and STORE features) for the EXT-HEAD, as in (16).

(16) EXT-HEAD-Amalgamation Constraint

$$\begin{bmatrix} \textit{word} \\ \text{VAL}|\text{COMPS} \left\langle \begin{bmatrix} \text{SUBJ } \langle [\text{TFR } \{\boxed{1}\}] \rangle \\ \text{EXT-HEAD } \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix} \Rightarrow \left[\text{EXT-HEAD } \boxed{2}\right]$$

The constraint (16) states that the lexical amalgamation of the EXT-HEAD value occurs when a word have a TFR *wh*-phrase as its subject. Accordingly, the inheritance of the EXT-HEAD value of the TN in (14) can be illustrated as in (17).

(17)



In (17), the filler-gap dependency is constrained by the Argument Realization Principle and SLASH-Amalgamation Constraint (cf. Ginzburg and Sag 2000, and Bouma et al. 2001), and the verb *took* has the following information:

(18) *took*

$$\begin{bmatrix} \text{COMPS} \left\langle \begin{bmatrix} \text{SUBJ} \left\langle \begin{bmatrix} \text{LOC} \{\boxed{4}, \boxed{1}\} \\ \text{TFR} \{\boxed{1}\} \end{bmatrix} \right\rangle \\ \text{EXT-HEAD } \boxed{2} \end{bmatrix} \right\rangle \\ \text{SLASH} \{\boxed{4}\} \\ \text{EXT-HEAD } \boxed{2} \end{bmatrix}$$

Moreover, in (17), the EXT-HEAD values of the lexical heads *to* and *be* are also governed by (16).

At this point, there is one important addition to be made on the constraint (15), because the constraint (15) as it is will cause an undesirable consequence for subject raising predicates with respect to their EXT-HEAD values. For example, predicates *be* and *to* in (14) as well as *appears* in (1a) would project their own HEAD values into EXT-HEAD values by (15), and this will make a conflict with the EXT-HEAD values that they inherit from the TNs by the constraint (16). In order to prevent the constraint (15) from applying to subject raising predicates, we revise the constraint as in (19):

(19) EXT-HEAD-Licensing Constraint (revised)

$$\begin{bmatrix} \textit{word} \\ \text{HEAD } \boxed{2} \\ \text{SUBJ } \langle [\text{TFR } \{\boxed{1}\}] \rangle \\ \text{COMPS } \neg\langle [\text{SUBJ } \langle [\text{TFR } \{\boxed{1}\}] \rangle] \rangle \end{bmatrix} \Rightarrow \left[\text{EXT-HEAD } \boxed{2}\right]$$

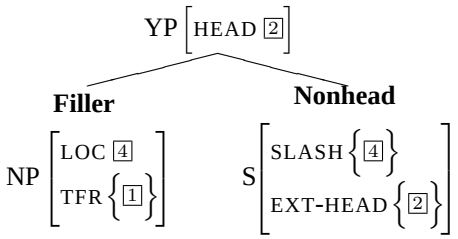
Therefore, the constraint in (16) and (19), together with the GHFP, can account for how the HEAD information of the bold-faced TN parts is inherited into the given TFR in more complex sentences as in (20).

(20) a. There is now in that corner [what might conceivably be assumed [to look like **a dragon** to me] by anyone unfamiliar with my perceptions].

b. I just noticed [what may well seem [to be construable as **an NP** by proponents of LFG] to people unfamiliar with that theory].[1] (Grosu 2003:288)

Now, another important question is how the top portion of a TFR clause is licensed. As mentioned earlier, we propose that TFRs constitute a kind of exocentric filler-base construction in the sense of Wright and Kathol. As a subtype of *filler-nonhead-construction*, we propose the *tr(ansparent-)fr(ee)-rel(ative)-cx*, with its constructional constraint in (21).

(21) *tr-fr-rel-cx* ⇒



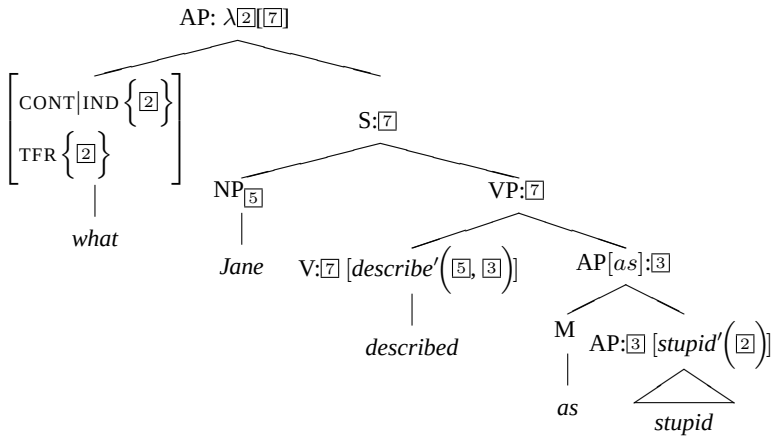
[1] In examples like (20b), the element *as* can probably be treated as a kind of marker, rather than a preposition, as in small clause constructions such as *We regard Kim as quite acceptable* and *We regard Kim as among the most acceptable candidates*. (Cf. Pollard and Sag 1994:108-110)

Accordingly, the top NP in (17) has the HEAD value that is structure-shared with the EXT-HEAD value of the nonhead daughter, which is inherited all the way from the TN, *a policeman*.

While the HEAD value of a TFR is treated as being identical with that of the TN, the semantics of the TFR should be different from that of the TN, because the interpretation of the other parts of the TFR, including an intensional operator, must be included as well. For TFRs with a non-nominal interpretation as in (22), we can derive the CONTENT value as in (23).

(22) The decision was [what Jane described as stupid].

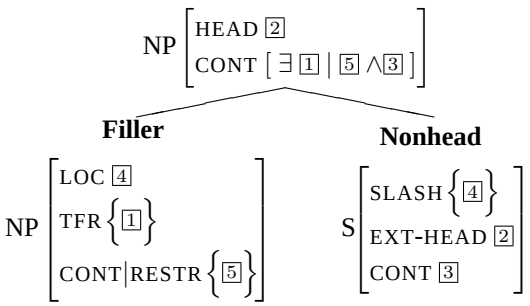
(23) Example of *tr-fr-rel-cx* (a non-nominal case)



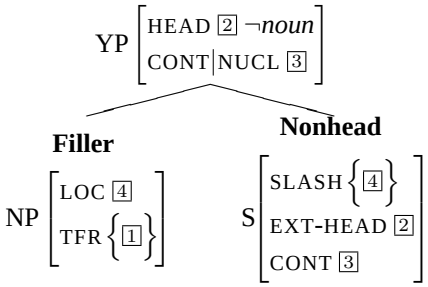
In (23), the CONTENT|NUCLEUS value of a non-nominal TFR is assumed to be structure-shared with that of the nonhead daughter S. (See the second constructional constraint for non-nominal TFRs in (24).)

On the other hand, for TFRs with a nominal interpretation, we assume that an existential quantifier is introduced to the constructional content of the *tr-fr-rel-cx*, because examples like (14) are interpreted as 'John invited someone that she took to be a policeman.' In TFRs with a nominal interpretation, the meaning of the nonhead daughter S contributes to the restriction of the quantifier, which is guaranteed by the additional constraints of the construction *tr-fr-rel-cx*.

(24) *tr-fr-rel-cx* ⇒

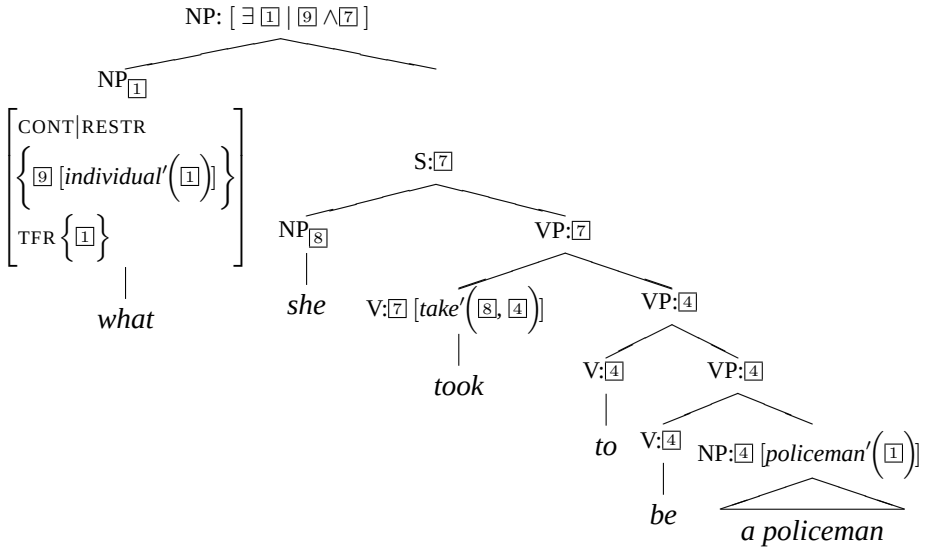


or



Accordingly, the semantics part of (17) can be represented as in (25).

(25) Example of *tr-fr-rel-cx* (a nominal case)



Therefore, we can account for the unique properties of TFRs with existing theoretical apparatus of HPSG, without radically different assumptions on syntactic representations such as grafts. Furthermore, the paper shows that the feature inheritance mechanism inducing transparency effects in TFRs, which is left vague in such works as Grosu (2003), can be explained in terms of precise constraints in HPSG.

References

Bouma, Gosse, Robert Malouf, and Ivan A. Sag. 2001. Satisfying Constraints on Extraction and Adjunction. *Natural Language and Linguistic Theory* 19, 1-65.

Ginzburg, Jonathan. and Ivan A. Sag. 2000. *Interrogative Investigation*. CSLI Publications.

Grosu, Alexander. 2002. Strange Relatives at the Interface of Two Milennia. *GLOT International State-of-the article* 6, 1-21.

Grosu, Alexander. 2003. A Unified Analysis of Standard and Transparent Free

Relatives. *Natural Language and Linguistic Theory* 21: 247-331.
Kajita, Masaru. 1977. Towards a dynamic Model of Syntax. *Studies in English Linguistics* 5, 44-66.
Nakau, Minoru. 1971. The Grammar of the Pseudo-Free Relative Pronoun *what*. *English Linguistics* 6, 2-47.
Pollard, Carl and Ivan A. Sag. 1994. *Head-Driven Phrase Structure Grammar*. University of Chicago Press.
van Riemsdijk, Henk. 2000. Free Relatives Inside Out: Transparent Free Relatives as Grafts. In B. Rozwadowza (ed.), *PASE Papers in Language Studies: Proceedings of the 8th Annual Conference for the Study of English*. University of Wroclaw.
van Riemsdijk, Henk. 2001. A Far from Simple Matter: Syntactic Reflexes of Syntax-Pragmatics Misalignments. In I. Kenesei and R. M. Harnish (eds.) *Semantics, Pragmatics and Discourse: Perspectives and Connections: A Festschrift for Ferenc Kiefer*, 21-41. Amsterdam: John Benjamins.
van Riemsdijk, Henk. 2006a. Free Relatives. In M. Everaert and H. v. Riemsdijk (eds.), *The Blackwell Companion to Syntax* Vol. II, 338-382. Blackwell.
van Riemskijk, Henk. 2006b. Grafts follow from Merge. In M. Frascarelli (ed.) *Phases of Interpretation, Studies in Generative Grammar* 91, 17-44. Berlin: Mouton de Gruyter.
Wilder, Chris. 1999. Transparent Free Relatives. In K. N. Shahin et al. (eds.), *Proceedings of the Seventeenth West Coast Conference on Formal Linguistics*, 685-699. Stanford: CSLI Publications.
Wright, Abby. and Andreas Kathol. 2003. When a Head is Not a Head: A Constructional Approach to Exocentricity in English. In J.-B. Kim and S. Wechsler (eds.), *Proceedings of the 9th International Conference on Head-driven Phrase Structure Grammar*, 373-389. CSLI Publications.

Part II
Contributions to the Workshop

Two types of NP preposing in French

Anne Abeillé
University of Paris 7

Danièle Godard
CNRS, France

Frédéric Sabio
University of Paris 7

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 306–324

Abeillé, Anne, Danièle Godard & Frédéric Sabio. 2008. Two types of NP preposing in French. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 306–324. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.18.
CC-BY 4.0

Abstract

We contrast two types of sentences with a preposed NP in French in a construction based HPSG grammar. They differ with respect to different grammatical aspects (syntax, semantics, pragmatics and phonology), which cluster uniquely into constructions. Both are colloquial, a reason why they have been recognized only recently (see Zribi-Hertz 1986, 1996, Sabio 1995, 2006). Accordingly, we rely for the data on spoken corpora (Corpaix, CFRP) as well as on our intuitions. Both constructions involve a partitioned semantics but this mode of composition is associated with different effects. One construction is characterized semantically: the preposed NP is the theme of a categorical proposition. The other construction is characterized pragmatically: it is associated with an independent declarative clause, a typical use of which is to signal a break in the interaction.

1. Introduction[1]

Our aim is to contrast two types of complement fronting in French, that can be found in declarative clauses, and frequently occur in every day speech. Examples of construction 1 and construction 2 are given in (1) and (2), respectively. The preposed NP is italicized.[2,3]

(1) a. *Le chocolat* j'adore. (Chocolate I adore)
    b. *Paris* je connais pas [CFRP] (Paris I don't know)

(2) a. *huit ans* je devais avoir [CRFP] (eight years I must have had)
    b. *des moulins à légumes* ça s'appelait [CRFP] (vegetable mills that was called)

The NP complement occurs as a left peripheral element, before the (pronominal) subject. Such examples clearly differ from well known cases of preposed NPs in French, which are commonly found in (clitic) left dislocation (3a), as well as wh questions (3b) or wh exclamative clauses (3c) :

[1] This study is part of the PROGRAM project on the interface of prosody with syntax and semantics in French prosody. Aspects of it have been presented at the Workshop on spoken corpora (Lyon, January 2008), at the CMLF (Paris, July 2008) and at the CIL conference (Seoul, July 2008). We thank for their comments José Deulofeu, Caroline Féry, Jacques Jayez, Manuel Leonetti, Jean-Marie Marandin as well as the audiences at these events.

[2] Corpaix is a corpus of spoken French collected by the GARS at University of Provence (it consists mostly of interviews). CRFP is a spoken corpus, funded by DGLLF, collected at the beginning of this century in several French towns and balanced for sex, age, social status. We follow common transcription practice in not having punctuation marks nor capital letters in examples taken from spoken corpora.

[3] Throughout the text, we give glosses rather than translations.

(3) a. *Marie*, tout le monde l'adore. (Marie everyone loves her)
b. *Quel âge* il avait ? (Which age he had ?)
c. *Quel chapeau* tu as ! (What a hat you have !)

We systematically contrast the syntactic, semantic and pragmatic properties of the two constructions, before presenting a formal analysis in HPSG. While the syntactic difference does not correlate with an information structure distinction (see Prince 1998, 1999 and Fanselow and Lenertovà 2008 for a similar conclusion about complement fronting in English, and in German and Czech respectively), it clearly correlates with other distinctions, one construction being characterized semantically, and the other being characterized form an illocutionary point of view (it corrresponds to a speech act).
Although they have been largely overlooked in the literature, some of their properties have been studied by Pohl 1984, Sabio 1995, 2006, Zribi-Hertz 1986, 1996, Hakihiro 2004. A prosodic study still remains to be done.

2. Syntactic properties

In the two constructions (cx 1 *vs* cx 2), illustrated in (1) and (2) above, the preposed NP is associated with a grammatical function within the sentence. More precisely, these sentences contain a predicate with an unrealized syntactic argument (an object in (1), (2a), a predicative complement in (2b)), which is somehow linked to the preposed NP. This contrasts with a hanging topic as in (3).

(3) a. *Le cinéma* alors on se décide ? (the movie then we make a decision?)
b. euh *la mairie de Saintes* on connaît le le candidat socialiste qui vient de se déterminer [CRFP]
(hum the town council of Saintes we know the the socialist candidate who has just made his decision)

Let us first look at cx 1. The preposed constituent is a NP or a VP (4a) ; but the missing constituent always has the same grammatical function: it is an object. Moreover, the verb belongs to the class of verbs which take an optional complement (4b):

(4) a. *Travailler seule*, je ne supporte pas (Working alone, I can't stand)
b. A : Tu aimes le chocolat ? (you like the chocolate?)
B : J'adore. (I adore)

Accordingly, a sentence identical with that of cx 1, but without the preposed NP, remains grammatical. The relation between the preposed NP and the

missing object can be a long distance dependency; however, it does not obey island constraints (the missing object can be within a relative clause or an adjunct clause):

(5) a. *Le chocolat*, elle a dit [qu'elle adorait].
(the chocolate, she said that she adored)
b. *Le chocolat*, je ne connais personne [qui n'aime pas].
(the chocolate I know nobody who does not like)
c. *Les F3*, il faut être fou [pour supporter].
(The F3 appartments, one must be crazy to stand)

In fact, construction 1 has the properties of left dislocation, with an anaphoric relation between the preposed constituent and some pronominal element in the sentence. Indeed, the missing object alternates here with the general pronoun *ça* ('that', 'it'), which is attested in our corpora:

(6) a. *Le chocolat* j'adore ça. (the chocolate I adore it)
b. *la montagne* j'a- j'adore ça [CFRP] (the mountain I adore it)
c. *les expressions modernes* j' j'aime pas trop ça quoi [Corpaix]
(the modern expressions I don't like that that much you know)

It is well known that clitic left dislocations do not obey island constraints (e.g. Delais *et al.* 2004):

(7) a. *Le chocolat,* je ne connais personne [qui n' aime pas ça].
(Chocolate, I know no one who dislikes it)
b. *Marie*, il faudrait être fou [pour la supporter].
(Marie, you must be crazy to bear with her)

As is the case with clitic-left-dislocations, we can have (another) left-dislocated NP, which is not ordered with respect to the preposed NP:

(8) a. Moi, *le chocolat*, j'adore (ça) (me, the chocolate, I love (that))
b. *Le chocolat*, moi, j'adore (ça) (the chocolate, me, I love (that))

Thus, construction 1 can be analyzed as involving a left dislocated NP, linked to an unrealized pronoun (Zribi Hertz 1986).[4] It remains to be shown that the verb has a null pronominal complement rather than being detransitivized. The *faire* causative construction provides a test for transitivity (e.g. Abeillé *et al.* 1998), since the causee is marked with preposition *à* with a transitive infinitival verb and is unmarked otherwise. In (9b), *manger* (to eat) is detransitivized.

[4] See Laurens 2008 for similar examples of right dislocations with null pronouns.

(9) a. Il fera manger la soupe **aux** enfants / ***les** enfants
(He will make eat their soup to the children / the children)
b. Il fera manger **les** enfants / ***aux** enfants
(He will make eat the children / to the children)
c *Les F3,* rien ne pourra **leur** faire aimer / ***les** faire aimer
(F3, nothing will make like to them / them)

In cx 1, the causee must be marked with *à* (9c) and is thus transitive. We propose that the object is a null pronoun, interpreted like 'ça' (*that*) (Zribi-Hertz 1986, 1996). We thus call cx 1 the 'ça-dislocation-construction'.

In cx 2, on the other hand, the preposed constituent can be of various categories (NP, AP, PP, AdvP); it is linked to a missing constituent with various syntactic functions (object, predicative complement, oblique complement or specifier) .

(10) a. [*Trois heures*]$_{NP}$, il avait de retard, le train [specifier]
(3 hours, it had of delay, the train)
b. [*Extrême-gauche*]$_{NP}$, elle était. (extreme-left she was) [predicative]
c. [*Place de la Nation*]$_{NP}$, on est allés. (Nation square we went) [oblique]
d. [*A moitié anglaise*]$_{AP}$ elle était. (half British she was) [predicative]
e. [*A une sorcière*]$_{PP}$ tu ressembles. (to a witch you resemble) [oblique]
f. [*Gentiment*]$_{AdvP}$ il s'est comporté. (kindly he behaved) [oblique]

The fronted complement enters into long distance dependencies (11a), and can correspond to an obligatory complement (as with *avoir*, (11b)). Contrary to what we observed with cx 1, it is difficult to insert a pronoun (in the place of the missing constituent), or it has a different meaning (11c).

(11) a. *Huit ans*, je crois qu'il avait à l'époque.
(eight years I think he had at the time)
b. A. Il avait quoi, huit ans, à l'époque ?
(he had what, eight years, at the time?)
B. *Il avait. (he had)
c. Huit ans, elle les avait / ?elle avait ça.
(she had them / that = 'at least that')

Moreover, contrary to what we have seen with cx 1, cx 2 obeys island constraints:

(12) a. **Huit ans*, je ne vois personne [qui ait ici].
(eight years, I see nobody who has here)

b. **18 ans* on ne peut pas voter [sans avoir].
(18 years you can't vote without having)

We conclude that the preposed NP is a filler in cx 2. Example (10a) confirms the filler gap dependency, since it contains an object of the form *de N*, which is only licensed by negation or the extraction of a specifier *(*Il avait de retard, le train,* It had of delay, the train, *vs Combien il avait de retard, le train ?* How much did it have of delay, the train, Abeillé *et al.* 2005). Another property shared by cx 2 and extraction constructions is the possible occurrence of the complementizer *que* after the fronted element in non standard varieties (noted with %):

(13) a. %*Trente euros* **que** ça m'a coûté ! (30€ that it costed me)
b. *%Où* **que** c'est que je vais le mettre ? [corpaix]
(where that it is that I am going to put it ?)

To summarize, the preposed NP in cx 1 is a left dislocated phrase, while it is a filler in cx 2.

3. Semantic Properties

The two constructions also contrast semantically. First, the content of cx 1 involves a general proposition, while cx 2 is not so constrained; second, the proposition in cx 1 is categorical, while it is thetic in cx 2.

3.1. General vs unspecified proposition

With cx 1, the content of the sentence is general: neither the NP nor the sentence can be associated with the denotation of a particular. The NP denotes a kind, a type, or an abstract object. Hence the contrast between (14a) and (14b,c). If a proper name is preposed as in (14d) (from Grevisse and Goosse 2008), it cannot refer to an individual but to the property of having this name (in the context of parents choosing a name for their baby for example):

(14) a. *La musique classique*, je (ne) connais pas bien / j'apprécie beaucoup. [cx 1]
(the classical music, I don' know very well / I appreciate a lot)
b. ??*Ton offre / Ton frère*, tu sais que tout le monde apprécie.
(your offer / your brother, you know that everybody appreciates)
c. ??*La musique classique*, j'ai apprécié dans ce concert.
(the classical music, I appreciated in the concert)
d. *Marine*, j'aime bien. ((being called) Marine I like)

Confirmation of the constraint is given by the fact that, instead of an NP, one can have a preposed infinitival VP object, denoting a property (4a). In addition, the verb is typically an individual level predicate with respect to its object (Kratzer 1995), like *apprécier* (to appreciate)*, adorer* (to adore), *détester* (to hate), *haïr* (to hate), *ne pas supporter* (to not stand), *ignorer* (to ignore). It can be a stage level predicate, if there is a quantification or an habitual or iterative aspectual operator, such that there is no unique situation associated with the sentence; rather it describes a period over time, or a generalization over a behavior.

(15) *Ce genre de repas, simple mais avec de bons produits*, [cx 1]
(this type of meal, simple but based on good products)
a. je n'avais encore jamais mangé à Paris. (I had never eaten in P., yet)
b. on trouve rarement aujourd'hui. (one rarely finds nowadays)
c. ??j'ai justement mangé hier. (I ate yesterday actually)

Neither cx 2, nor the dislocation with an explicit pronoun (other than *ça*), are similarly constrained; they can denote a general (16a) or a particular proposition (16b,c):

(16) a. *45mn*, on peut attendre le bus, sur cette ligne. [cx 2]
(45mn, one can wait for the bus, on this line)
b. et là, tu sais ce qui lui est arrivé – *une antenne* ils lui ont jeté sur la tête [Corpaix] [cx2] (and then, you know what happened to him – an antenna they threw to his head)
c. *La musique classique*, j'en ai justement écouté hier. (the classical music, I listened to some yesterday) [clitic left-dislocation]

3.2. categorical vs thetic proposition

The second semantic difference between the two constructions concerns the (logical) form of the proposition: it is categorical in cx 1, while it is thetic in cx 2. We take the distinction between thetic *vs* categorical sentences to be semantic rather than structure informational (see Ladusaw 1994; Kim 1998 argues that the distinction may induce different truth conditions). In a categorical proposition, a property is predicated of (the referent of) an argument, which is a (sentence) theme, whereas a thetic proposition describes a situation as a whole.
It is important to distinguish the notion of Discourse Topic, which belongs to the domain of Information Structure, from that of a sentence theme, which characterizes the semantic role of the distinguished argument in a categorical proposition. However, it is notoriously difficult to associate distinctive

properties with the notion of sentence theme (Jacobs 2001).[5] We rely here on four properties; the two first ones are borrowed from Jacobs' notion of semantic subject; the two others come from Marandin's distinction between categorical and thetic propositions (2007). (i) the theme is a semantic argument of the predicate; (ii) it occurs to its left and is the last to saturate it; (iii) it shows an affinity with definite NPs; (iv) a categorical proposition favors individual level predicates (specially dispositions).
Cx 1 exhibits the four properties. The head sentence is turned into a predicate, because the null pronoun semantically contributes a variable; this predicate is saturated by the preposed NP. As we have seen, the verb denotes a disposition of its subject, due to its lexical semantics (like *aimer, ignorer*) or to its aspectual or quantificational environment, which induces a generalization. In addition, the preposed NP is definite (see the examples above, (1),(3),(5),(7),(14a),(15)), or has an affinity with a definite NP (17).

(17) a. ??*un repas simple, avec de bons produits*, on sert rarement au restaurant à Paris. [cx 1] (a simple meal, based on good products, one rarely finds in a restaurant in Paris)
b. *un repas de ce genre*, on sert rarement au restaurant à Paris. [cx 1] (this type of meal one rarely finds in a restaurant in Paris)

Cx 2 clearly has properties (i) and (ii). The gap is semantically a variable, as has been proposed in a general way for filler head constructions (see Webelhuth 2007 for an implementation in HPSG), hence turning the head sentence into a semantic predicate. This predicate is saturated by application to the filler. The preposed NP is also to the left of the predicate. But the parallelism between the two constructions stops there. The NP is preferably an indefinite; in particular, measure expressions are frequent (denoting duration, frequency, age, a sum of money):

(18) a. *Onze heures* elle est restée chez les juges [cx 2] [*Canard Enchaîné*, 2006] (11 hours she stayed with the judges)
b. tu l'as pas vu une seule fois aux informations – *pas une fois* tu l'as vu [cx 2] [Corpaix]

Definite NPs are not impossible, but not favored.

(19) a. Tu sais ce qui est arrivé ? *Le candidat du patron*, ils ont refusé ! (You know what happened ? The boss' candidate they refused !)
b. A: Je cherche mes lunettes. (I'm looking for my glasses)
B: *Tes lunettes*, tu cherches ? (Your glasses you're looking for ?)

[5] There can be a hierarchy of themes, a question which we leave aside here, see Webelhuth 2007.

In fact, the preposed NP is not constrained semantically; in particular, it can be non referential, being a predicative NP (20a,b) or an idiom chunk (20c):[6]

(20) a. j'ai écrit dans le journal local d'Aire-sur-la-Lys je me rappelle plus maintenant ah *l'Echo de la Lys* // ça s'appelait je crois bien [cx 2] [Corpaix] (I wrote in the local newspaper fo Aire-sur-la-Lys I cannot recall now Ah l'Echo de la Lys it was called I think)
b. *Horreur*, je lui faisais, docteur. [cx 1] [R. Forlani, *Ma chatte ma folie,* 1992, 15] (horror she had of me, doctor)
c *Des clopinettes* il m' a donné. (peanuts he gave me)

Finally, dispositions are not favored (any predicate is possible, and there is no aspectual constraint). Since the proposition in cx 2 is not categorical, then, it is thetic.

To conclude, the two constructions share their compositional mode: both are characterized by a partitioned semantics (e.g. Krifka 2001), where the sentence translates as a predicate, which is saturated by application to the (denotation of the) preposed NP. However, they crucially differ both regarding the type of content (general *vs* unspecified) and the type of logical form (categorical *vs* thetic proposition). While there is no correlation a priori between the generality of the proposition and the other properties, it is tempting to relate partitioned semantics and a categorical proposition. Construction 2 shows that this would be wrong: there is no correlation between a compositional mode and a specific logical form for the sentence. In other words, a thetic proposition is perfectly compatible with a partitioned semantics. While the distinguished element of cx 1 plays a special role in semantics (it is the theme in a categorical proposition), it is not the case in construction 2. As we see below, the charaterization of construction 2 is at the illocutionary level.

[6] Notice that the fronted NP in (20b) is light in the sense of Abeillé and Godard 2000. Only special stress enables it to be extracted.

4. Discourse and Pragmatic properties

4.1. Information Structure properties

The two constructions have sometimes been contrasted in terms of information structure, cx 1 being called 'topicalization' and cx 2 being called 'focalization'. The focus *vs* ground distinction is not relevant here, if it is understood in terms of new / old information. Topicalization is wrong if it is understood as Discourse Topic, it is not wrong if it is meant for the sentence theme (see section 3.2).
In cx 1, the left dislocated NP is not always part of the ground (as is sometimes said of left dislocated phrases): it can be a (partial) answer to a question (21a), thus being an informational focus; it can also introduce a (sub) discourse topic (21b).

(21) a. A. Quelle est la matière qui t'a le moins plu et pourquoi ?
(what is the topic that you liked less and why ?
B. euh *la grammaire* j'ai pas du tout apprécié parce que en fait j'étais pas très bonne [cx 1] [Corpaix]
(grammar I really did not like, because in fact I was not very good)

b. A. Comment ont-ils reçu les auteurs du 19° ?
(how did they react to 19° century authors?)
B. *Balzac*, ils ont bien aimé ; ils peuvent s'identifier aux héros. *La poésie*, ils ont plus de mal à apprécier. [cx1]
(Balzac they liked, they can identify themselves with the heroes; Poetry, they have more difficulty appreciating)

In cx 2, the filler NP can be a narrow focus (20a). But it can also be part of an all focus utterance as in (16b), where the whole sentence answers a question of type 'what happened' ; it can also consist completely of repeated material (22), with an unclear informational status (it is possibly a reassertion, in which case it would be like an all focus utterance, in spite of the repetition).

(22) Mon père il va m'acheter un petit mouton *un petit mouton* il va m'acheter. [cx 2] [Corpaix]
(My father he is going to buy me a small lamb a small lamb he is going to buy me)

That a left peripheral complement in a given construction is compatible with several informational status has already (although not frequently) been noted in the literature. Prince 1998, 1999 shows that fronted NPs in English can

correspond to old (23a) or new (23b) information (she underlines the part of the sentence with prosodic stress):

(23) a. A. What does he (= John) think of Sam ?
B. Sam he doesn't like – think of someone else
b. Let's assume there's a device which can do I – a parser let's call it. What follows ? (J.D. Fodor)

More recently, Fanselow and Lenertovà 2008 show that left fronted complements in German declaratives can correspond to a narrow focus, a (discourse) topic or be part of a wider focus.

(24) a. [A. What did you see there?]
B. [Eine LaWIne] haben wir gesehen !
(An avalanche-acc have we seen)
b [A. I've heard the mayor has been arrested. Who reported him to the police?]
B. [Den Bürgenmeister] hat wohl der Villenbesitzer angezeigt.
(The mayor-acc has supposedly the villa-owner-nom reported)
c. [A. What's new , What happened?]
B. [Einen Hasen] habe ich gefangen.
(A rabbit-acc have I found)

Their general conclusion, which indeed also applies to French, and construction 2 in particular, is that, *contra* most generative analyses, leftwards movement is not triggered by, or does not correlate with informational features.

4.2. Illocutionary status

The two French constructions under study crucially differ concerning their illocutionary properties. While cx 1 is not specified, cx 2 is pragmatically characterized.
First, cx 2 differs form cx 1 with respect to the two following properties: it cannot be embedded ((25a) *vs* (25b)); it can only be a declarative clause (neither an interrogative (25c) *vs* (25d), nor an imperative (25e)), although it can have a questioning or injunctive value in context (26).

(25) a. Tu sais bien que *le chocolat*, j'adore depuis toujours. [cx 1]
(you know that the chocolate, I have always adored)
b. *On m'a raconté *qu'une antenne* on lui avait jeté sur la tête. [cx 2]
(I was told that an antenna they threw on his head)
c. *Le chocolat*, est-ce que tu aimes toujours ? [cx 1]
(the chocolate, is it the case that you still love)

d. **Une antenne*, pourquoi / est-ce qu'on lui a lancé sur la tête ? [cx 2] (an antenna, why did / is it the case that they throw on his head)
e. **Du Rodopyl*, prends ! (Rodopyl, take)

(26) a *Huit ans* il avait ? (Eight years he had ?)
b *Du Rodopyl* tu prends, n'oublie pas ! (Rodopyl you take, don't forget)

This shows that cx 2 is defined as an utterance type rather than a sentence type. We assume that the clause type is uniquely associated with a content type, but not with a speech act (Beyssade and Marandin 2006). We analyze (26a,b) as a confirmation request and a confirmation order, respectively.
Second, cx 2 can be an answer to a question, where the preposed NP functions as a narrow focus (*Quel âge il avait ? – Huit ans il avait*, What was his age ? – eight years he had). It is not easily an 'out of the blue utterance', but requires an antecedent (as in a 'reprise utterance', Godard & Marandin 2006).[7] But very often, it is not part of a smooth progression. for instance, it is not integrated in a narration: a continuation with a sentence where the NP is a theme is not appropriate: (27b), where *ce* refers to the whole preceding situation, is a felicitous continuation for (16a), not (27a), where *elle* refers back to the antenna. No such constraint exists on cx 1 (28).

(27) et là, tu sais ce qui lui est arrivé – *une antenne* ils lui ont jeté sur la tête [Corpaix] [cx2] (and then, you know what happened to him – an antenna they threw to his head) (= (16b))
a. #Elle était complètement fichue. (it was completely ruined)
b. C'était vraiment bête (it was rather stupid)

(28) *Le chocolat*, j'adore ; c'est délicieux, et en plus ça remonte le moral. [cx 1] (the chocolate, I adore; it is delicious, and it lifts one's spirits)

Cx 2 frequently contributes additional information, or a correction, that is information which is 'relevant' to the discourse topic (or the topmost QUESTION UNDER DISCUSSION) rather than a straightforward continuation in a narrative (Ginzburg 2008).
Lastly, cx 2 is typically associated with speaker's attitudes (surprise, admiration, disgust, justification etc.). We call the preposed NP a 'center' for the clause. It may be the locus for an additional information that was left unresolved in the preceding discourse (as in (20a)), or for a correction, the NP corresponding to the point of disagreement (that is the case with (10b),

[7] It can also be used as an initial move in routine situations (such as shop interaction): - *Des oranges, il me faut*. (oranges, I need), which can be analyzed as genre-relevant utterances (Ginzburg 2008).

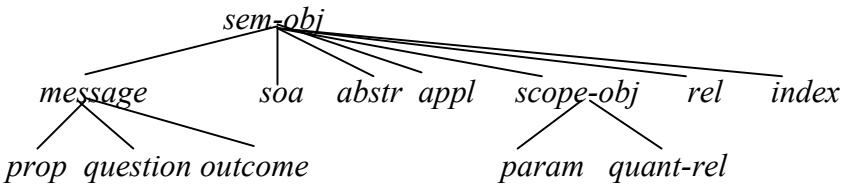
which is an answer to the question *Elle était socialiste ?* She was a socialist?; interaction noted on the fly); in such cases, the preposed NP may well correspond to a narrow focus, as it does in question-answer pairs. Alternatively, the partition of the sentence serves to make the utterance more dramatic, highlighting that part of the situation that seems particularly worth of notice (as in (16b)), and justifying a pause in the discourse, a reaction on the part of the audience etc. The role of the preposed NP then appears to be that of a figure (reminiscent of the figure-ground distinction in cognitive linguistics).[8] We call the whole construction a 'dramatic extraction'.

5. HPSG analysis

We use the construction-based version of HPSG (Ginzburg and Sag 2000) to account for our constructions, which are both based on a partitioned semantics.

5.1. Partitioned semantics

We assume the following hierarchy of semantic objects, which are possible values for CONT, (*abst(raction), appl(ication)* are taken from Webelhuth 2007):



As in Ginzburg and Sag 2000, *message* is the type of content appropriate for clauses, *proposition* for declarative clauses, *question* for interrogative clauses

[8] The content of cx 1 is a categorical proposition (section 3.2). On the other hand, the preposed NP is acceptable at the beginning of an interrogative sentence (25c), whose content is not of type *question* (Ginzburg and Sag 2000). This would be problematic if the expression with which the preposed NP combines were of type *question*. However, there are reasons to think that it is the entire clause, including the preposed NP, that is interpreted as a question, rather than the segment of the clause which begins with an interrogative word (*est-ce que* in (25c)). This move is required for the combination of some initial adverbs with declarative and interrogative clauses, where the entire clause comprising the initial adverb (which occurs before the wh constituent) must be interpreted as an interrogative clause (Bonami and Godard 2007). Given that a proposition is an element of a question (Ginzburg and Sag 2000), we assume that a proposition is available to combine with the preposed NP in (25c).

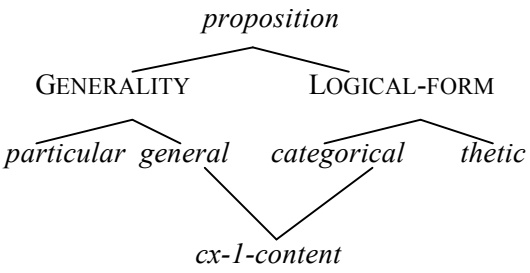
and *outcome* for imperative clauses. Soa are descriptions of situations. Following Webelhuth 2007 who shows the necessity of a more articulated semantics than is usuallly done in HPSG, in particular for head-filler phrases, we propose the type of *partitioned soa*. We add the PARTITION (*partitioned/ non-partitioned*) dimension to the REALITY (*realis/irrealis*) and POLARITY dimensions (*pos/neg*) in Ginzburg and Sag 2000.
A partitioned-soa is the basis of a categorical proposition (the content in cx 1) and of the content of a centered-clause (cx 2). It has a nucleus of type *application*, that applies a (lambda) abstraction to an argument:

(29) *partitioned-soa* => $\begin{bmatrix}\text{QUANTS} & \text{list}(\textit{quant - rel})\\ \text{NUCLEUS} & \textit{application}\end{bmatrix}$

application => $\begin{bmatrix}\text{FUNC} & \textit{abstr}\\ \text{ARG} & \textit{sem - obj}\end{bmatrix}$

abstraction => $\begin{bmatrix}\text{VAR} & \textit{param}\\ \text{BODY} & \textit{soa}\end{bmatrix}$

The parameter in *abstr* corresponds to an argument with respect to which the predicate is not saturated (e.g. the subject combining with the content of a VP), or a SLASH value (in extraction constructions), or a STORE value (in dislocations).
We assume a two dimensional classification of the content of propositions:



We define the content of a categorical proposition, which is the type of content appropriate for cx 1, as based on a partitioned-soa, with a feature THEME whose value corresponds to the argument saturating the predicate. We give it a list value in order to account for relative thematicity when there are several themes (as in the case of multiple left-dislocations):

(30) *categorical-proposition* => $\begin{bmatrix}\text{SITUATION} & \textit{s}\\ \text{SOA} & \begin{bmatrix}\textit{partitioned - soa}\\ \text{NUCLEUS } \textit{appl}\,(\textit{abstr})([1])\end{bmatrix}\\ \text{THEME} & <[1]> \;+\; \text{L}\end{bmatrix}$

5.2. Left-dislocated constructions

For the syntax of cx 1, we rely on a more general analysis of left-dislocations. Following Engdhal and Vallduví 1996, Balari 1998, Alexopoulou and Kolliakou 2002, we analyze left-dislocations as follows: (i) there is a specific head-dislocated phrase (32); (ii) pronominal elements (including *ça* and the null pronoun in cx 1) optionally put a parameter in the STORE value (31); (iii) this parameter is coindexed with the left-dislocated phrase. The null *pro* has a non-canonical SYNSEM, with an index of type *abstract-object,* like that of *ça* in French:

(31) $$\textit{ça} \rightarrow \begin{bmatrix} \text{CONT} & [1]\textit{parameter}\,[\text{INDEX}\ \textit{abstract-obj}] \\ \text{STORE} & \{([1])\} \end{bmatrix}$$

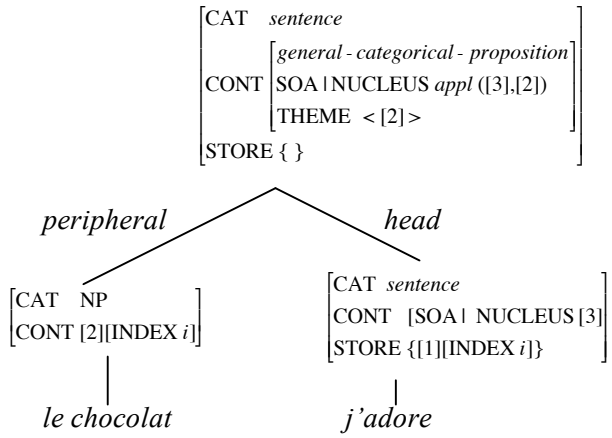
$$\textit{pro} \rightarrow \begin{bmatrix} \textit{non-canonical} & \\ \text{CONT} & \textit{parameter}\,[1]\,[\text{INDEX}\ \textit{abstract-obj}] \\ \text{STORE} & \{([1])\} \end{bmatrix}$$

(32) $$\textit{head-dislocated-phrase} \rightarrow \begin{bmatrix} \text{CAT} & \textit{sentence} \\ \text{CONT} & \begin{bmatrix} \textit{categorical-prop} & \\ \text{SOA} & \begin{bmatrix} \textit{partitioned-soa} \\ \text{NUCLEUS}\ \textit{appl}\,([3],[1]) \end{bmatrix} \\ \text{THEME} & <[1]> + \text{L} \end{bmatrix} \\ \text{STORE} & \text{S} \\ \text{HD-DTR}\,[2] & \begin{bmatrix} \text{CAT} & \textit{sentence} \\ \text{CONT} & \left[\text{SOA} \mid \text{NUCLEUS}\,[3]\right] \\ \text{STORE} & \{[\text{INDEX}\ i]\} \cup \text{S} \end{bmatrix} \\ \text{DTRS} & < \begin{bmatrix} \text{CAT} & \text{NP or VP} \\ \text{CONT} & [1][\text{INDEX}\ i] \end{bmatrix}, [2] > \end{bmatrix}$$

We define *ça-dislocation*, the type of cx 1, as follows:

(33) *ça-dislocation-cx* →
head-dislocated-phrase & $\begin{bmatrix} \text{CONT} & \begin{bmatrix} \textit{general-proposition} \\ \text{THEME} & <[\textit{abstract-obj}]> \end{bmatrix} \end{bmatrix}$

An example is the following:



5.3. Dramatic extraction construction

For the syntax of cx 2, we rely on the general head-filler schema proposed in Bouma *et al.* 2001.

(34) *head-filler-phrase* →

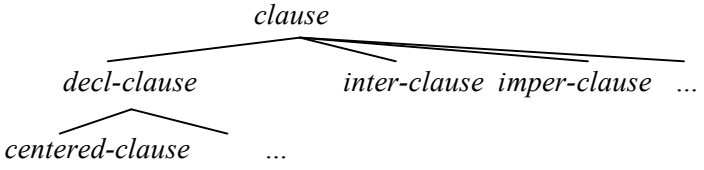
CAT	[HEAD [0] *verbal*]
SLASH	S
HEAD - DTR [2]	[CAT | HEAD [0] SLASH {[1]} ∪ S]
DTRS	< [LOC [1]],[2] >

We associate cx 2 with a type of clause with a 'center' (which can be a narrow focus or a figure in an all-focus utterance).[9]

(35) *centered-clause* →

declarative - clause	
CONT	*proposition* SOA [*partitioned - soa* NUCLEUS *appl* ([3], [1])]
CENTER [CONT [1]]	

We define a centered-clause as a subtype of declarative clause, assuming the following (partial) hierarchy of clauses:



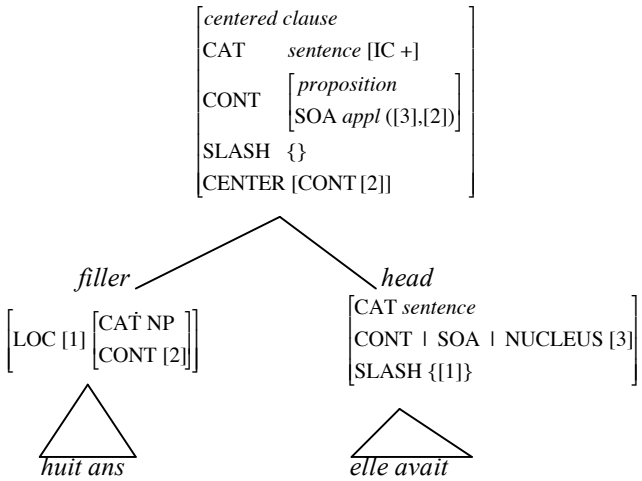
[9] We assume that in idiomatic expressions such as (20c) , the fronted NP makes a non null semantic contribution.

The dramatic extraction, the type of cx 2, combines a head-filler phrase with a centered proposition (where IC stands for 'independent clause').

(36) *dramatic-extraction-cx* →

head-filler-phrase & $\begin{bmatrix} \textit{centered-clause} \\ \text{CAT} \quad [\text{IC} +] \\ \text{CONT} \quad \begin{bmatrix} \textit{proposition} \\ \text{SOA} \begin{bmatrix} \textit{partitioned-soa} \\ \text{NUCLEUS } \textit{appl}([4],[2]) \end{bmatrix} \end{bmatrix} \\ \text{CENTER} \quad [\text{CONT } [2]] \\ \text{HEAD-DTR } [3] \begin{bmatrix} \text{CONT} \mid \text{SOA} \mid \text{NUCLEUS } [4] \\ \text{SLASH } \{[1]\} \end{bmatrix} \\ \text{DTRS} < [\text{LOC } [1] \ [\text{CONT } [2]\ ], [3] > \end{bmatrix}$

An example is the following:



Conclusion

The contrast between two types of NP preposing in French leads to three conclusions. First, the need for constructions as clusters of unrelated properties. It is tempting to link the pragmatics of cx 2 with filler status of the NP. This would be wrong: an argument PP can be a filler, without acquiring the same pragmatic properties (for a comparable point, see Prince 1998); moreover, the preposed NP in cx 2 is not associated with a unique informational status: it can be a narrow focus or part of an all focus utterance. Second, the need for (at least) two types of saliency. A partitioned content can highlight a constituent because it is a (semantically salient) theme (in a

categorical proposition) or because it is a (pragmatically salient) figure (in a centered proposition). Third, the lack of correlation between an all focus utterance and a thetic proposition. In this analysis, the content in construction 2 (the dramatic extraction construction) is a thetic proposition; yet, the proposed NP can function as a narrow focus. This non coincidence is expected if we are right to clearly distinguish between the two dimensions; but it is worth noticing, and promises new developments: we expect cross classification; for instance, do we have an all focus utterance with a categorical proposition (the sentence *God is eternal* may be a candidate)? Do we have a thetic proposition with an NP functioning as a figure, as well as a narrow focus (this may be the analysis for the clefted NP in *C'est la police qui arrête le voisin*, It is the police who are arresting the neighbor, as an answer to 'What is happening?).

References

Abeillé A.; D. Godard; I. A. Sag, 1998. Two Kinds of Composition in French complex
Predicates. In A. Kathol *et al.* (eds) *Complex Predicates in non transformational Syntax*, 1-41. New York: Academic Press.

A. Abeillé; D. Godard. 2000. French word Order and lexical Weight. In R. Borsley (ed) *The nature and function of Syntactic Categories*, 325-358. New York: Academic Press.

Abeillé A.; O. Bonami; D. Godard; J. Tseng. 2004. The Syntax of French de-N' Phrases. in S. Müller (ed), *Proceedings of the HPSG Conference*, 6-26. Stanford: CSLI Publications.

Alexopoulou, T.; D. Kolliakou. 2002. On Linkhood, Topicalization and Clitic Left Dislocation. *Journal of Linguistics*: 38(2), 193-245.

Balari, S. 1998. Pronouns, variables and extraction. In S. Balari, L. Dini (eds) *Romance in HPSG*, CSLI Publications, 151-218.

Beyssade, C.; J-M. Marandin. 2006. The Speech Act Assignment Problem Revisited: Disentangling Speaker's Commitment from Speaker's Call on Addressee. In O. Bonami, P. Cabredo-Hoffher (eds), *Empirical Studies in Syntax and Semantics* 6, 37-68. on-line publ. (http://www.cssp.cnrs.fr/eiss6/index.html)

Bonami, O.; D. Godard. 2007. Adverbes initiaux et types de phrases en français. In A. Cuniță, C. Lupu and L. Tasmowski (eds), *Studii di Lingvistică şi Filologie Romanică,* 50-57 . Bucarest : Editura Universității din Bucureşti.

Delais, E.; J. Doetjes ; P. Sleeman. 2004. Dislocation. In F. Corblin, H. de Swart (eds), *Handbook of French Semantics*, 501-528. Stanford: CSLI Publications.

Engdahl, E.; E. Vallduví. 1996. Information Packaging in HPSG. *Working Papers in Cognitive Science 12,* University of Edinburgh.

Fanselow G.; D. Lenertovà. 2008. Left peripheral focus: mismatches between syntax and information structure. to appear in *Natural Language and Linguistic Theory*.

Ginzburg, J.; I. A. Sag. 2000. *Interrogative Investigations*. Stanford : CSLI Publ. and Chicago : The University of Chicago Press.

Ginzburg, J. 2008. *Semantics and Conversation*. Stanford: CSLI Publications (forthcoming)

Godard, D.; J-M. Marandin. 2006. Reinforcing negation : the case of Italian. In Muller, S. (ed), *Proceedings of HPSG 06*, 174-194. Stanford : CSLI Publications.

Grevisse, M.; A. Goose. 2008. *Le Bon usage*. Louvain-la-neuve : Duculot.

Hakihiro, H. 2004. *Contribution à l'étude de la valence verbale en français contemporain*, la non réalisation du complément d'objet direct. Thèse de doctorat, Université d'Aix-en-Provence.

Jacobs, J. 2001. The Dimensions of Topic-Comment. *Linguistics* 39, 641-681.

Kim, Y. 1998. Information articulation and truth conditions of existential sentences, *Language and Information*, 67-105.

Kratzer, A. 1995. Stage level and individual level predicates. In G. Carlson and F.J. Pelletier (eds). *The Generic Book*, 125-175. Chicago : The University of Chicago Press.

Krifka, M. 1993. Focus and presupposition in dynamic interpretation. *Journal of Semantics* 10, 269-300.

Ladusaw, W. 1994. Thetic and categorical, stage and individual, weak and strong. In M. Harvey and L. Santelman (eds), *Proceedings of SALT IV*, 220-229.

Laurens F. 2008. French predicative verbless utterances. In *Proceedings of HPSG 2008*, S. Müller (ed), CSLI Publications.

Marandin, J-M. 2007. Thème de Phrase. In Godard, D.; F. Corblin; L. Roussarie (eds), *Dictionnaire de sémantique en ligne*. http://www.semantique-gdr.net/dico/index.php/Accueil

Pohl, J. 1984. *Documents pour servir à l'étude des phrases du type Les fleurs, j'aime*. In Romanistisches Jahrbuch. Berlin : Walter de Gruyter, Band 35, 36-58.

Prince, E. 1998. On the Limits of Syntax, with reference to Left-Dislocation and Topicalization. In P. Culicover and L. McNally (eds), *The Limits of Syntax*, 281-302. New York: Academic Press.

Prince, E. 1999. How not to mark topics: 'Topicalization' in English and Yiddish. In *Texas Linguistic forum*, University of Texas Press, Austin.

Sabio, F. 1995. Micro-syntaxe et macro-syntaxe : l'exemple des compléments antéposés en français. *Recherches sur le français parlé* 13, 111-155.

Sabio, F. 2006. L'antéposition des compléments en français contemporain : l'exemple des objets directs, *Linguisticae Investigationes* 29, 173-182.

Webelhuth, G. 2007. Complex Topic comment Structures in HPSG. In S. Müller (ed), *Proceedings of the HPSG 07 Conference*. CSLI Publ., 306-322.

Zribi-Hertz, A. 1986. *Relations anaphoriques en français*; esquisse d'une grammaire générative raisonnée de la reflexivité et de l'ellipse structurale. Thèse d'Etat, University Paris 8.

Zribi-Hertz, A. 1996. *L'Anaphore et les pronoms*. Villeneuve d'Ascq: Presses du Septentrion.

Non-restrictive relative clauses, ellipsis and anaphora

Doug Arnold
University of Essex

Robert D Borsley
University of Essex

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 325–345

Arnold, Doug & Robert D Borsley. 2008. Non-restrictive relative clauses, ellipsis and anaphora. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 325–345. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.19. CC-BY 4.0

Abstract

Non-restrictive relative clauses (NRRCs) can modify constituents which undergo 'pragmatic enrichment' when they appear in answers to questions. For example, in an interchange like: 'A: What did Jo think? B: That you should say nothing, which is surprising.' What B says is surprising is that 'Jo thinks ...' On the face of it, this might seem problematic for approaches to NRRCs which assume 'syntactic integration' and to support an 'orphan' analysis, where NRRCs are combined with purely conceptual representations. In this paper we examine a range of elliptical and anaphoric phenomena, and show that this conclusion is misplaced. In fact, the phenomena argue strongly in favour of a syntactically integrated analysis.

.

1 Introduction

Blakemore (2006) points out that B's answer in (1) is understood as 'Just as we predicted, *Jo thinks* you should say nothing' (though the syntactic host of the *as*-parenthetical is apparently just *you should say nothing*):

(1) A: What did Jo think?
B: Just as we predicted, you should say nothing.

In other words, the host of the *as*-parenthetical is 'pragmatically enriched' with content from the preceding question (specifically, *Jo thinks…*). Blakemore suggests that this supports an 'orphan' analysis, in which "the parenthetical is inserted not into a syntactic representation at the level of grammatical representation, but into a conceptual representation at the level of pragmatic or utterance interpretation".[1]

We have similar data with non-restrictive relative clauses (NRRCs). In (2) B expresses surprise that *Jo thinks* you should say nothing (not just that you should say nothing):

(2) A: What did Jo think?
B: You should say nothing, which is surprising.

This might lead one to expect that such examples would provide evidence for an orphan analysis of NRRCs, as can be found in, for example, Safir (1986); Fabb (1990); Espinal (1991); Burton-Roberts (1999); and Peterson (2004).

[†]This material has been presented at HPSG08 in Keihanna and the 2008 LAGB at Essex. We are grateful to participants at those events, and to our colleagues at Essex: Nancy Kula, Lousia Sadler, and Andrew Spencer for useful comments. Of course, none of these are responsible for remaining unclarities and mistakes.

[1]Cf. Potts (2002b) and Potts (2002a) for a 'syntactically integrated' account of *as*-parentheticals.

However, on closer inspection such examples turn out to provide evidence *against* such an analysis and in favour of the kind of syntactically integrated analysis provided in, for example, Jackendoff (1977); Perzanowski (1980); Kempson (2003); Potts (2003, 2005); Del Gobbo (2003, 2007); Egg (2007) and, from an HPSG perspective, Arnold (2004, 2007). In fact, as we will demonstrate, the analysis of such examples follows straightforwardly from Arnold's approach and the sort of approach to ellipsis and anaphora that is developed in Ginzburg and Sag (2000) (G&S).

These observations seem to be novel. We are not aware of any previous exploration of this interaction between NRRCs, ellipsis and anaphora in any framework.

The paper is organized as follows. In Section 2 we will present some data involving ellipsis and anaphora that show that Blakemore's suggestion cannot be extended to NRRCs, and that appear problematic for any kind of 'conceptual attachment' analysis of NRRCs. In Section 3 we will show that these data follow straightforwardly from the G&S approach to ellipsis and anaphora and the analysis of NRRCs presented in Arnold (2004, 2007). In Section 4 we will show that the same pattern of behaviour occurs with other forms of ellipsis. Section 5 will examine some apparent counter-examples. Section 6 summarizes the paper, and returns briefly to *as*-parentheticals.

2 Phenomena

Consider first a pair of examples where there is no ellipsis or anaphora (other than that involved in any relative clause):

(3) Kim owns a dog, which is regrettable.
(4) Kim owns a dog, which is a dachshund.
(5) Kim owns a dog, which is lucky.

Here we have an NRRC following a clause with a final NP, and the antecedent can be either the clause *Kim owns a dog* as in (3) or the NP *a dog* as in (4). As one might expect, this can lead to ambiguity, as in (4), which may be interpreted as saying either than Kim's owning a dog is lucky, or that Kim's dog itself is lucky.

Consider now examples involving ellipsis (so-called 'bare argument ellipsis'). We have examples with question-answer pairs as in (6) and examples with conjoined clauses as in (7).

(6) A: Who owns a dog?
B: Kim, which is regrettable.

(7) Lee owns a dog — and Kim (too), which is regrettable.

In both cases the relative pronoun can be interpreted as 'Kim owns a dog', (i.e. it has a 'propositional' antecedent).[2] In question-answer examples with the right fragment and the right NRRC, ambiguities arise. Thus, the first response in (8) is ambiguous. It may mean either that B's receiving a pullover for Christmas was nice, or that the pullover itself was nice. The other responses are unambiguous because of the way subject-verb agreement works inside the NRRC.

(8) A: What did you get for Christmas?
B: A pullover, which was nice.
B': Socks, which was nice.
B": Socks, which were nice.

What is not possible in examples like these is for an NP inside the 'missing material' to be antecedent for the NRRC:

(9) A: Who owns a dog?
B: *Kim, which is a dachshund.

This is unlike the situation with an ordinary anaphoric pronoun:

(10) A: Who owns a dog?
B: Kim, and it's a dachshund.

We have a similar situation with anaphora, such as the anaphoric relation between 'propositional lexemes' like *yes*, *no*, *probably*, *unfortunately* and their antecedents. Consider the following:

(11) A: Does Kim own a dog?
B: Yes, which is regrettable.

Here the relative pronoun has the 'propositional' antecedent *yes* (interpreted as 'Kim owns a dog'). It is not possible for it to have an antecedent inside the interpretation of *yes*:

(12) A: Does Kim own a dog?
B: *Yes, which is a dachshund.

Again, there is no problem with ordinary anaphora:

(13) A: Does Kim own a dog?
B: Yes, and it's a dachshund.

There are two main approaches to ellipsis and anaphora: either (i) the gap or the anaphor has a syntactic structure similar to the antecedent and is a superficial matter; or (ii) there is no invisible syntactic structure but some interpretive mechanism assigns an interpretation like that of the antecedent. Whichever approach is taken, the bare argument *Kim* in (6), (7), (9), and (10), and the propositional lexeme *yes*

[2]Of course, in (7) the NRRC can also be interpreted as having the whole co-ordinate structure (*Lee owns a dog — and Kim (too)*) as its antecedent.

in (11) and (12) and (13) will have essentially the same conceptual representation as *Kim owns a dog* in (3) and (4), since they have the same meaning. If NRRCs are only integrated into a larger structure at the level of conceptual representation, the NRRCs in these examples should be able to combine either with the conceptual representation of *Kim owns a dog* or the conceptual representation of *a dog*. Hence one would expect (9) and (12) to be acceptable. The fact that they are not seems to pose a serious problem for such approaches.

In the following section we will show how these and other facts involving the interaction of NRRCs, ellipsis and anaphora follow automatically when a 'syntactically integrated' approach to NRRCs, such as that put forward in Arnold (2004, 2007),[3] is combined with an approach to ellipsis and propositional lexemes such as that proposed in G&S.

3 Analysis

Arnold's analysis of NRRCs is a straightforward extension of the analysis of restrictive relatives in Sag (1997), the main features can be seen in the representations of (14a) and (14b) given in (15) and (16).[4]

(14) a. Kim owns a dog, which is regrettable.
b. Kim owns a dog, which is a dachshund.

The main point to note here is that NRRCs normally form a syntactic constituent with their heads, which can be of essentially any category (unlike restrictives, which only modify nominals — in fact, careful inspection will show that the *only* difference between the representations in (15) and (16) is the category of the antecedent — S vs NP). The result is a *head-adjunct* construction, where the relative clause is the adjunct, which selects its head via the MOD feature in the normal way, and the antecedent of the relative pronoun is the 'index' of the head. The relation

[3] Other 'syntactically integrated' approaches to NRRCs would presumably work equally well, see references above.

[4] Here and below we use a number of abbreviations and simplifications. In particular, we will use $NP_{\boxed{1}}$ for an NP whose CONTENT | INDEX is $\boxed{1}$, and $S_{\boxed{1}}$ for an S whose CONTENT | SITUATION value is $\boxed{1}$. We use the term 'index' loosely for $\boxed{1}$ in either case. We will generally write whole CONTENT values as pairs consisting of an 'index' and a set of restrictions, in a form like the following:

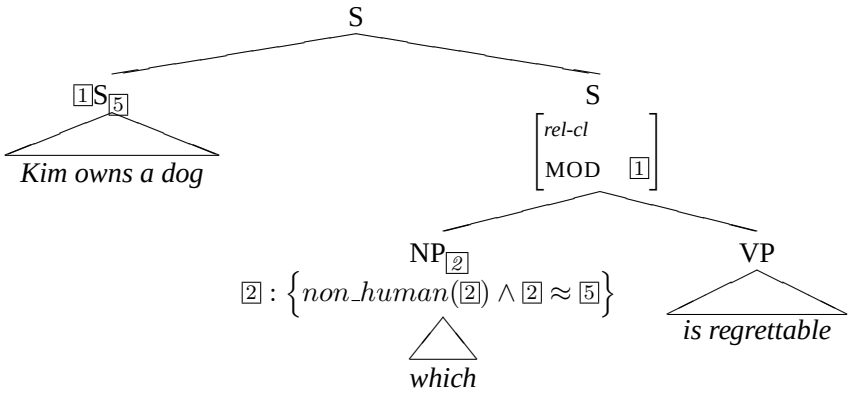
(i) $y : \{dog(y)\}$ (for *a dog*)

(ii) $s : \left\{ \begin{array}{c} \exists y, x | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \\ \wedge named(x, Kim) \end{array} \right\}$ (for *Kim owns a dog*)

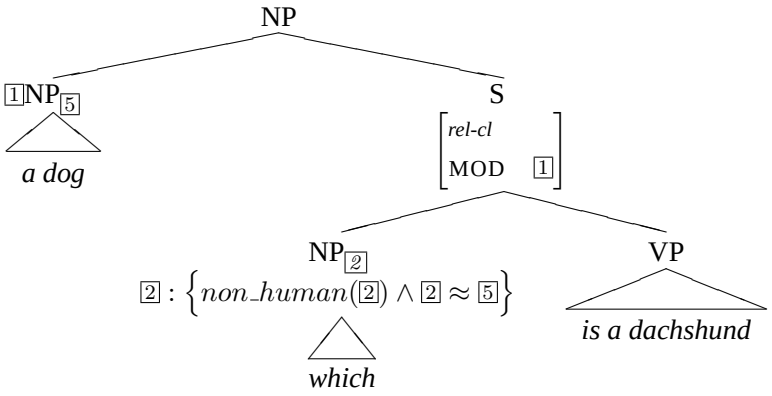
The second of these describes a situation s which is an 'owning situation' involving two entities x and y, x fills the role of 'owner' in s, and is named 'Kim' (in s), and y is a dog, and is the object that is owned (in s). Translating these representations into Discourse Representation Theory (DRT) notation or the Situation Theoretic notation used in G&S is straightforward. In the DRT case it involves little more than making explicit reference to the 'situation' variable into the conditions, so that for example $owner(x)$ becomes $owner(s, x)$, and putting existentially bound variable with the 'index' to provide the universe for the discourse structure.

between a relative pronoun in an NRRC and its antecedent is treated as one of 'anaphoric dependence' (much like an ordinary pronoun — this is expressed in the restriction $\boxed{2} \approx \boxed{5}$ in the CONTENT of *which*, where $\boxed{2}$ is the index of *which*, and $\boxed{5}$ is the index or situation variable of whatever the relative clause modifies).[5]

(15)



(16)



These examples involve NRRCs attached to NP and S, but NRRCs can attach to a wide range of antecedents:

(17) a. They have done the washing, which they said they would. (VP)

[5] A further feature of the analysis is that the content of a relative clause gets 'wide scope' — in DRT terms, it goes directly into the top box. For example, in *Kim thinks that Ron Paul, who isn't even running, will win the election*, the content of the NRRC is not part of Kim's beliefs (in fact, it is inconsistent with them, since one cannot win an election without running for election), rather it is an assertion of the speaker's. This feature of the analysis is not important here, but it means that the compositional semantics of a construction made up of an XP plus NRRC does not contain the semantics of the NRRC (it is generally just the same as that of the XP). Since this is a potential source of confusion, we will usually omit any mention of content on the root nodes of structures involving NRRCs.

This treatment of the CONTENT is the main difference between this analysis of NRRCs and Sag's analysis of restrictives in Sag (1997). The other differences are that NRRCs are not limited to modifying NPs, and that in the case of restrictives the relation between the index of the relative pronoun and the antecedent should be tighter — probably identity rather than anaphoric dependence as is the case with NRRCs.

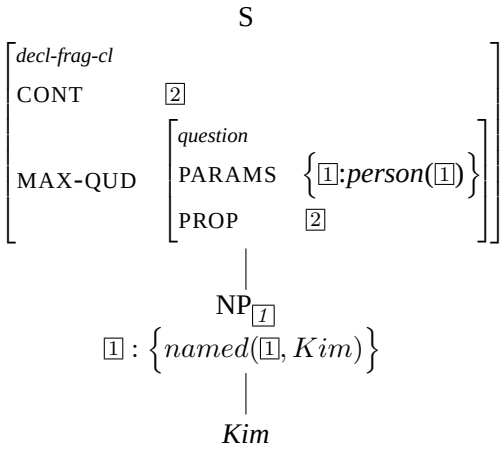
b. They hid the books under the bed, which is a good place. (PP)
c. They painted the house red, which is a nice colour. (AP)
d. They dressed carefully, which is also how they talk. (ADVP)

Now consider the analysis of a case of 'bare NP ellipsis' such as B's utterance of *Kim* in (18):

(18) A: Who owns a dog?
B: Kim.

The basic outline of G&S's analysis can be seen in (19). *Kim* is treated as an NP which is the sole daughter of a *declarative-fragment-clause*, whose CONTENT (a *proposition*) is the value of the PROP feature in the current MAX-QUD (the current 'question under discussion').[6]

(19)



In the case of A's utterance in (18), this proposition is roughly (20) (the question being roughly: for which x, where x is human, is this proposition true). G&S's account involves a variety of constraints interacting to ensure that the normal content of *Kim* is combined with this proposition, giving (21) as the content of *Kim* in this context.[7]

[6]We have written MAX-QUD instead of the more precise CONTEXT | MAX-QUD, and we ignore the internal structure of the PROP value, which should contain a SITuation value and a SOA value, the latter containing a list of *quantifier*s and a set of conditions (the value of NUCLEUS).

[7]From an intuitive point of view, one can just think of this as unifying the content of the *declarative-fragment-clause* into the content of the question in place of the wh-phrase content. A more precise account of what happens in (19) is as follows (cf. G&S:304ff). G&S treat *declarative-fragment-clause* as a subsort of *head-fragment-phrase*. Thus, *Kim* is automatically a *head-fragment-phrase*, and because of this, its CAT and CONT | INDEX values are identified with those of the element of CONTEXT | SAL-UTT (which, in this context, is *who*). Identifying the CAT values ensures that, for example, that only and NP will be an acceptable fragmentary answer to a '*who*' question. Identifying the CONT | INDEX values has the effect of 'coindexing' *who* and the fragment answer *Kim*, so that the index associated with *Kim* enters the proposition associated with *Who owns a dog?* in the right place. Because *Kim* is a *declarative-fragment-clause*, its MAX-QUD contains the *question* corresponding to *Who owns a dog?*, and the QUANTS and NUCL of this question are combined with those that come from *Kim*. In (19), we have (mis-)represented this as though the proposition involved in the question

(20) $s : \left\{ \exists x, y | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \right\}$

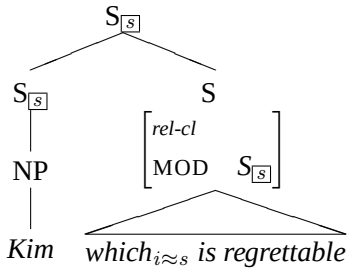
(21) $s : \left\{ \begin{array}{c} \exists y, x | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \\ \wedge named(x, Kim) \end{array} \right\}$

The key points of the analysis can be seen in the representation in (22), which involves an S with propositional content, whose sole daughter is an NP with content appropriate for an NP.

(22)
$$\begin{array}{c} \text{S}_{\boxed{s}} \\ s : \left\{ \begin{array}{c} \exists y, x | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \\ \wedge named(x, Kim) \end{array} \right\} \\ | \\ \text{NP}_{\boxed{x}} \\ x : \left\{ named(x, Kim) \right\} \\ | \\ \textit{Kim} \end{array}$$

Clearly, this makes available just two attachment points for NRRCs, and just two antecedents for relative pronouns: an NRRC can be adjoined to the mother S node, as in (23), or the daughter NP node, as in (24), corresponding to the two grammatical possibilities in (25). Notice there is no attachment point available corresponding to *a dog*, hence no way of licensing the ungrammatical utterance B".[8]

(23)

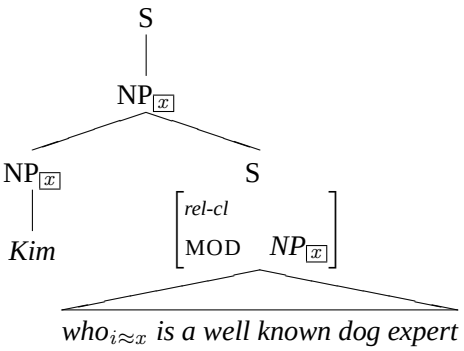


was simply unified with the proposition expressed by the answer, which is close enough for present purposes.

A final detail is that we have made the condition $\{named(\boxed{1}, Kim)\}$ part of the CONTENT here, whereas G&S treat it as part of the BACKGROUND. Nothing hangs on this.

[8] A careful reader may notice that the same index appears on the S dominating *Kim*, and root node in (23). This is not a mistake, though it may be confusing given that the former is interpreted as describing a situation where Kim owns a dog and the latter is seems to be about a different situation (in which the first situation is said to be regrettable). But, as noted in footnote 5, under the analysis we assume, the content of an NRRC is not part of the compositional semantics of its mother node — so, *compositionally* the two nodes in question in (23) are identical, and have the same index. One might think of the root node of (23) as having two kinds of content — a local content corresponding to *Kim owns a dog*, and a 'global', non-compositional content corresponding to 'That Kim owns a dog is regrettable'.

(24)



(25) A: Who owns a dog?
B: Kim, which is regrettable.
B': Kim, who is a well-known dog expert.
B": *Kim, which is a dachshund.

The impossibility of having an NP inside the 'missing material' as antecedent for the NRRC, which produces the contrast in grammaticality between (6) and (9) above, thus falls out automatically. This analysis extends straightforwardly to other kinds of bare argument ellipsis, such as the following.[9]

(26) A: What colours suit Kim's dog?
B: Orange and yellow, which is surprising. (AP)
B': Orange and yellow, which are nice colours.
B": *Orange and yellow, which is a dachshund.
(cf. Orange and yellow suit Kim's dog, which is a dachshund.)

(27) A: Where would be a good place for Kim's dog?
B: Under the bed, which is surprising. (PP)
B': Under the bed, which is where I keep all my pets.
B": *Under the bed, which is a dachshund.
(cf. Under the bed would be a good place for Kim's dog, which is a dachshund.)

(28) A: What upset Kim's dog?
B: That she bought a pair of cats, which is not surprising, because dogs hate cats. (S)
B': That she bought a pair of cats, which is surprising because she *hates* cats.
B": *That she bought a pair of cats, which is dachshund.
(cf. That she bought a pair of cats upset Kim's dog, which is dachshund).

In each case, response B shows that it is possible to have an NRRC that modifies the pragmatically enriched content of the declarative fragment; the B' response shows that it is possible to modify the 'normal' content of the declarative fragment; the

[9] G&S only deal explicitly with nominal *declarative-fragment-clauses*, because they want to avoid discussing the semantics of adjuncts (p303), but the extension to cases like those in (26)–(28) seems straightforward.

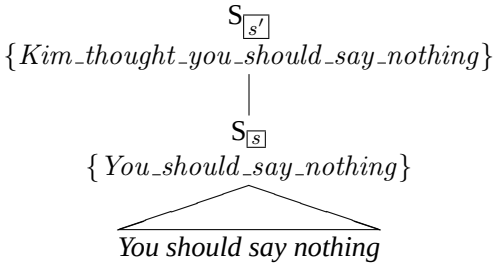
ungrammaticality of response B" shows that it is *not* possible to modify material that has been ellided; the B" example is followed by an example that shows that an NRRC is possible when there is no ellipsis.

Notice that (28), where the argument is clausal, parallels (2), the example we began with above, which is repeated here:

(29) A: What did Jo think?
B: You should say nothing, which is surprising.

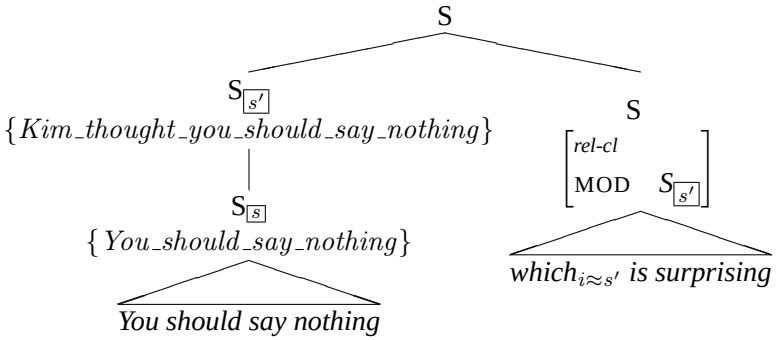
In this context, where the proposition in MAX-QUD is roughly 'Jo thought X' (corresponding to *What did Jo think?*), if *You should say nothing* is interpreted as a *declarative-fragment-clause*, its content will be combined with this proposition to give content similar to *Jo thought you should say nothing*. Thus, without the NRRC, one would get a representation like the following for *you should say nothing*:

(30)



Here there are two possible Ss that an NRRC can attach to. In the case of (2)/(29), it is the higher 'pragmatically enriched' S that is the natural point for attachment, as in (31), and the NRRC is interpreted as expressing surprise in relation to this enriched content.

(31)



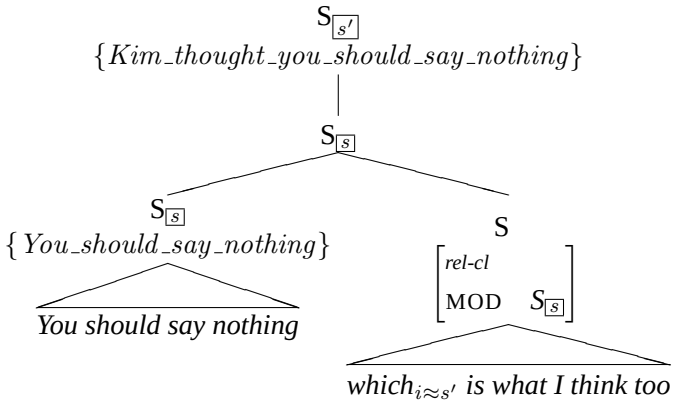
The 'pragmatic enrichment' observed in (2)/(29) is thus a straightforward consequence of this analysis of NRRCs and the G&S approach to questions and elliptical answers.

Of course, the analysis also (correctly) predicts that attachment to the lower S node should be possible. This is exemplified in (32) and (33), where B is naturally

interpreted as saying that she also thinks you should say nothing.[10]

(32) A: What did Jo think?
B: That you should say nothing, which is what I think too.

(33)

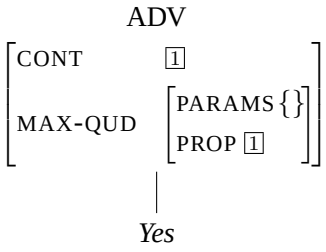


More generally, though the formal mechanics will be different, this will extend to all cases of bare argument ellipsis, such as (7), repeated here as (34a) so long as they are treated as having the same content as their antecedents.[11]

(34) a. Lee owns a dog — and Kim, which is regrettable.
b. *Lee owns a dog — and Kim, which is a dachshund.

Turning now to the data involving propositional lexemes, the main outlines of G&S's analysis of items such as *yes*, *no*, *probably*, *regrettably*, *unfortunately*, etc. can be seen in (35).

(35)



[10]Of course, it is also possible to attach an NRRC to *nothing*, as in: *What did Jo think? That you should say nothing, which is what you always say*.

[11]The formal mechanics will be different because MAX-QUD presumably does not play a crucial role in the examples in (34).

It is perhaps worth noting that some sentence fragments require a more complex treatment than G&S's. Cullicover and Jackendoff (2005, 242) highlight examples like the following:

a. A: Why don't you fix me a drink?
B: In a minute, ok?
b. A: Let's get a pizza.
B: OK - pepperoni?

In (a), a full sentential equivalent of the answer would be something like 'I will fix you drink in a minute, ok?' and in (b) it would be something like 'Should we get a pepperoni pizza?'. Something more than MAX-QUD is required here.

Yes is analyzed as an adverb with propositional content; specifically, the propositional content associated with the question under discussion (MAX-QUD). In the case of (11) and (12), repeated here as (36), the proposition is (37), (the same as the proposition associated with *Kim* in the examples above). The representation of B's reply can be seen in (38).

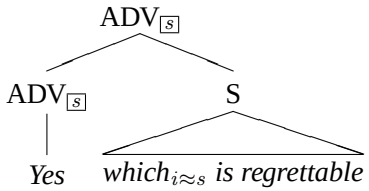
(36) A: Does Kim own a dog?
B: Yes.

(37) $s : \left\{ \begin{array}{c} \exists y, x | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \\ \wedge named(x, Kim) \end{array} \right\}$

(38) $\begin{array}{c} \text{ADV}_{\boxed{s}} \\ s : \left\{ \begin{array}{c} \exists y, x | own_rel(s) \wedge owner(x) \wedge owned(y) \wedge dog(y) \\ \wedge named(x, Kim) \end{array} \right\} \\ | \\ \textit{Yes} \end{array}$

This gives us just one attachment point for an NRRC, as in (39), licensing an utterance such as B, but not B' in (40), and capturing the contrast noted in (11) and (12) above.

(39)



(40) A: Does Kim own a dog?
B: Yes, which is regrettable.
B': *Yes, which is a dachshund.

The point about inaccessibility of non-overt conceptual material to NRRCs is perhaps even clearer with other propositional lexemes, where there is a difference between the content of the antecedent proposition and the lexeme. For example, *no* expresses the negation of the antecedent.

(41) $\begin{array}{c} \text{ADV}_{\boxed{s}} \\ s : \left\{ \neg p \right\} \\ | \\ \textit{No} \end{array}$

As one would expect on this approach, there is only one attachment point, and only one interpretation for examples like (42): the NRRC can only be taken as modifying the content of the propositional lexeme ($\neg p$) not the content of its antecedent (p), though the latter is conceptually present. For example, in (42), *which is a pity* can only be interpreted as 'it is a pity that Kim does not own a dog'. Notice that

with ordinary anaphora it is possible to access the non-negated content, if one uses a conditional (such as *and it would be a pity*). But this is not possible with an NRRC:

(42) A: Does Kim own a dog?
B: No, which is a pity.
B': *No, which would be a pity.
B": No, and it would be a pity.

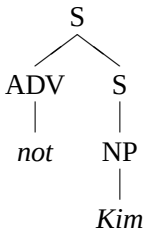
Similar points emerge with examples in which *not* combines with a sentence fragment. Consider the following:

(43) A: Who went to Paris?
B: Not Lee, which is unfortunate.

(44) A: Who went to Paris?
B: Not Lee, which would have been unfortunate.

In (43) the answer means that it is unfortunate that Lee didn't go to Paris. In (44) it means that it would have been unfortunate if Kim had gone to Paris. This is not surprising if *not* in examples like this combines with a declarative fragment clause to form a larger declarative fragment clause. This would give the following structure for *not Kim*:

(45)



Here, unlike with *no*, there two constituents to which a clausal NRRC can be attached: the higher S and the lower S, predicting the two interpretations noted above.[12] Notice that, as we would expect, it is not possible for an NRRC to have an antecedent inside the ellided material, though this is possible with an ordinary pronoun:

(46) A: Who went to Paris?
B: *Not Lee, which he wouldn't have liked.
B: Not Lee, and he wouldn't have liked it.

Thus the facts are quite straightforward for the approach that we are assuming.

[12]Of course, it is also possible to attach an NRRC to the NP, as in e.g. *Not Kim, who never goes anywhere*.

4 Other Forms of Ellipsis and Anaphora

The pattern that we have discussed above is also found with other kinds of ellipsis. In what follows, we will exemplify with respect to a variety of elliptical processes.

4.1 VP Ellipsis

VP Ellipsis (VPE) is exemplified in (47). (48a) is an example with an NRRC without ellipsis, showing an NRRC attached to *a camel*. (48b) shows that if *ridden a camel* is ellided *a camel* is no longer available as the antecedent of an NRRC; (48c) shows that it remains accessible to ordinary anaphora; (48d) simply shows that an NRRC can attach to, and modify, the clause containing the ellipsis, as one would expect (so the ungrammaticality of the case involving ellipsis does not reflect some incompatibility between VPE and NRRCs).[13]

(47) I have never ridden a camel, but Kim has. (=ridden a camel)

(48) a. I have never ridden a camel, but Kim has ridden a camel, which stank horribly.
b. *I have never ridden a camel, but Kim has ___, which stank horribly.
c. I have never ridden a camel, but Kim has ___, it stank horribly.
d. I have never ridden a camel, but Kim has ___, which surprises me, because she is scared of animals.

4.2 N' Ellipsis

N' Ellipsis is exemplified in (49). (50a) is an example without ellipsis showing an NRRC attached to *Sandy*. (50b) shows that if *pictures of Sandy* is ellided *Sandy* is no longer available as the antecedent of an NRRC; (50c) shows that *Sandy* remains accessible to ordinary anaphora. (50d) shows that what remains after ellipsis can be modified by an NRRC.[14]

(49) Lee took two pictures of Sandy, so Kim took three ___. (=pictures of Sandy)

(50) a. Lee took two of pictures of Sandy, so Kim took three pictures of Sandy, who must be one of the most photographed people around.

[13] We often mark the ellipsis site with ___. This is purely expository — it is not supposed to suggest the presence of empty syntactic structure.

[14] In the case of (50c), one might wonder whether the pronoun is anaphoric to the ellided instance of *Sandy* or the overt instance in the preceding clause. Nothing crucial to our analysis hangs on this, but it is interesting to note that the antecedent of a ordinary pronoun can be in the ellided material. Consider: *Personnel hired two secretaries, so Accounts had to sack three. They were really upset*. Here it is natural to take the antecedent of *they* to be the three secretaries sacked from Accounts. Similarly with VPE in (48c) what stank horribly is the camel that Kim rode, which is only present in the interpretation of the ellided VP, and not mentioned explicitly.

b. *Lee took two of pictures of Sandy, so Kim took three ___, who must be one of the most photographed people around.
c. Lee took two of pictures of Sandy, so Kim took three ___, she must be one of the most photographed people around.
d. Lee took two of pictures of Sandy, so Kim took three ___, which turned out well.

4.3 Sluicing

Sluicing is exemplified in (51). (52a) is an example where no sluicing has occurred; (52b) shows that material that has been removed by sluicing is not available to be the antecedent of an NRRC, (52c) shows that it can be the antecedent of an ordinary pronoun; (52d) shows that the material that remains after sluicing can be the antecedent of an NRRC.

(51) I know Frazier beat Ali, but I don't remember how/why/when. (=Frazier beat Ali)

(52) a. I know Frazier beat Ali, but I don't remember how/why/when Frazier beat Ali, who many think was the greatest champion ever.
b. *I know Frazier beat Ali, but I don't remember how/why/when, who many think was the greatest champion ever.
c. I know Frazier beat Ali, but I don't remember how/why/when — many think he was the greatest champion ever.
d. I know Frazier beat Ali, but I don't remember how/why/when, which is what you really want to know.

4.4 Comparative Ellipsis

Comparative ellipsis is exemplified in (53). (54a) is an example involving an NRRC, but without ellipsis; (54b) shows that ellided material is not available as the antecedent of an NRRC; (54c) shows that it *is* accessible for ordinary anaphora; (54d) shows that the constituent that remains after deletion can be modified by an NRRC.

(53) a. Sam is happier in London than Kim was in London.
b. Sam is happier in London than Kim was ___.
c. Sam is happier in London than Kim ___.

(54) a. Sam is happier in London than Kim was in London, which was too busy for her.
b. *Sam is happier in London than Kim (was) ___, which was too busy for her.
c. Sam is happier in London than Kim (was) ___, it was too busy for her.

d. Sam is happier in London than Kim (was) ___, which is not surprising.

4.5 *Or not* Anaphora

What we might call '*or not* anaphora' involves a rather different propositional lexeme. It is exemplified by (55).

(55) Whether Kim knows the answer or not, we will talk to him.

(56a) is an example with an NRRC and no anaphora; (56a) shows that an NRRC cannot have an antecedent inside the interpretation of anaphoric *not*; (56c) shows that this is possible with ordinary anaphora; (56d) shows that an NRRC can have the whole interpretation of anaphoric *not* as its antecedent.

(56) a. Whether Kim knows the answer or doesn't know the answer, which is 42, we will talk to him.
b. *Whether Kim knows the answer or not, which is 42, we will talk to him.
c. Whether Kim knows the answer or not, and it's 42, we will talk to him.
d. Whether Kim knows the answer or not, which would be surprising, we will talk to him.

5 Apparent Counter-examples

At first glance (57) looks as if it might be a counter-example to this analysis:

(57) A: Do you think United will win this weekend?
B: Yes, which will put them into the top three.

At first glance, it seems that on our account the content of *yes* should be 'I think. . . ', and it should be this content that is modified by the NRRC. But this is not the interpretation we get for (57) — the natural interpretation involves B saying that a win will put United into the top three, she is not claiming that what she *thinks* can do this. In other words, the NRRC is understood as modifying the embedded clause. But this should not be possible on our analysis (any more than it is possible for an NRRC to modify part of 'Kim owns a dog' when this proposition is expressed as *yes*). According to our account, it seems (57) should be bad, but it is fine.

However, this ignores the crucial role played by MAX-QUD in our account. What the propositional anaphor *yes* affirms is the proposition associated with the MAX-QUD, and it is this content that is accessible to the NRRC. This is not necessarily the same as the proposition associated with the question as posed. In the case in hand, the question seems to be about B's cognitive state, but with an example like this it is quite possible for B to take it as a question about reality, so that the proposition expressed by *yes* becomes something like (58), and it is this that the

NRRC modifies.

(58) s:$\{United_will_win_this_weekend\}$

Notice that if this is taken to be the proposition associated with MAX-QUD it should also be possible to respond to A's question in (57) with a short-answer such as *yes, they will*. This is indeed the case:

(59) A: Do you think United will win this weekend?
B: Yes, they will.
B: Yes, they will, which will put them into the top three.

Interchanges such as (60) and (61) might also appear to be counter-examples (they are based an example from Jackendoff (1972, 272) involving ordinary anaphora):

(60) A: Did Kim turn the hot dog down flat?
B: Yes, which would not have happened with the filet mignon.
B': Yes, which would not have happened with Jo.

(61) A: Who turned the hot dog down flat?
B: Kim, which would not have happened with the filet mignon.
B': Kim, which would not have happened with Jo.

The reason these may appear to be counter-examples is as follows. We have repeatedly shown that NRRCs cannot be understood as modifying 'part' of the content of their antecedents, but this is what seems to be going on here. The interpretation of *Kim* in (61), and *yes* is a proposition involving a turning-down-flat event with Kim as agent and the hot dog as theme. This cannot be the interpretation of *which* here, the interpretation of *which* must be only part of this event (in B, it would be the event minus the hot dog, in B" the event minus Kim).

These will be counter-examples to analyses that are superficially very similar to ours, but not to our actual analysis. Specifically, these are counter-examples to analyses that identify the content of the relative pronoun in an NRRC with that of its antecedent, or which co-index the relative pronoun and the antecedent. Crucially, our analysis involves 'anaphoric dependence' between relative pronoun and antecedent, not identity (cf. the representations (15) and (16) have $\boxed{2} \approx \boxed{5}$, not $\boxed{2} = \boxed{5}$). The prediction is that there should be the same sort of flexibility with *which* and a propositional antecedent (as we have here) that one finds with other pronouns that take such antecedents, specifically *it* and *that*. This is correct:

(62) a. Kim turned the hot dog down flat. It would not have happened with the filet mignon.
b. Kim turned the hot dog down flat. That would not have happened with the filet mignon.

What seems to be going on in cases like these is that the event or situation that the pronoun denotes is not the event or situation described by the antecedent, but a

'supertype', or 'abstraction' of it. This is also characteristic of *one*-anaphora. In an example like (63), the dog that Kim is scared of may be big or not, brown or not, and stupid or not (actually getting all the interpretive possibilities may require some imaginative placement of intonation focus on the adjectives in the antecedent):

(63) a. Kim is not scared of this big brown stupid dog, but she is scared of that one.

The interpretation of *one*, and other pronouns shows some flexibility, but the flexibility is strictly limited by the head of the antecedent. For example, in the case of *one* in (63) the antecedent may be various kinds of dog, but it must be a dog. Similarly, with (62) while the denotation of the pronouns there can be an event/situation involving Kim (or not), and a hot dog (or not), it must be a turning-down-event, as indicated by the head (in this case the verb).

This is just what we observe with NRRCs, as in (60)/(61). The descriptive insight underlying our analysis involves an anaphoric relation between the index of the relative pronoun in an NRRC and the index of its antecedent, the phrase to which it is attached in the syntax. Far from being counter-examples to our analysis, examples like (60)/(61) are entirely consistent with it.

6 Conclusion

In this paper we have investigated the interaction of ellipsis and anaphora with NRRCs. We have shown that it is not possible for an NRRC to modify any part of the ellided material (in cases of ellipsis), or any part of the interpretation of a propositional anaphora. This is unlike the situation with ordinary pronouns, which can have antecedents inside some missing material or inside the interpretation of an anaphor. These observations provide compelling evidence against the idea that NRRCs are orphans, only integrated into a larger structure at some conceptual level. In contrast, the facts are unproblematic for a syntactically integrated approach to NRRCs. In fact they follow in a straightforward way from the analysis of NRRCs developed in Arnold (2004, 2007) and the approach to ellipsis and anaphora outlined in G&S.

It is perhaps worth adding that we expect that there should be nothing specific to English in any of this. We would expect the facts to be parallel in any language which has broadly similar processes of ellipsis and propositional anaphors and where NRRCs can take propositional/clausal antecedents.

It is, finally, interesting to ask whether these rather clear conclusions also apply in the case of the *as*-parentheticals that were our point of departure. It would be natural to assume that their interaction with ellipsis and anaphora is like that of NRRCs which we have discussed in the preceding pages. It seems, however, that the data are more problematic here. To set the scene, consider the following:

(64) Jo will be upset that United lost, (just) as the bookmakers predicted.

This is potentially ambiguous: it has a natural interpretation where *(just) as the bookmakers predicted* is taken as a comment on the content of the embedded clause *United lost*, so that it entails *The bookmakers predicted that United would lose*. It also has another, factually implausible, interpretation according to which the bookmakers made predictions about Jo's state of mind. This interpretation involves the *as*-parenthetical being associated with the main clause.

Now consider a case of propositional anaphora:

(65) A: Will Jo be upset that United lost?
B: *Yes, as the bookmakers predicted.

B seems to have only the factually implausible interpretation involving bookmakers predicting Jo's emotions. This is consistent with our analysis of NRRCs — for example, notice that the corresponding examples involving NRRCs are similarly bad (again B is grammatical if the NRRC is taken as modifying the content of *yes*, but the interpretation is factually implausible):

(66) A: Will Jo be upset that United lost?
B: *Yes, which the bookmakers predicted.

Likewise, the following *as*-parenthetical is bad, in the same way as the NRRC in B':

(67) A: Will Jo be upset that United lost?
B: *No, as the bookmakers predicted.
B': *No, which the bookmakers predicted.

Again, this is what one would expect if the analysis of *as*-parentheticals were similar to that of NRRCs.

But not all cases are so straightforward. The following case of an *as*-parentheticals is not hugely different from (66), and seem to us to be fully acceptable, in contrast with the corresponding NRRC (which our account correctly predicts to be impossible):

(68) A: Is Jo convinced that United will loose?
B: Yes, (just) as the bookmakers predicted.
B': *Yes, which the bookmakers predicted.

Notice this B has the same factually plausible interpretation we observed with (64), where the *as*-parenthetical is associated not with the content of *yes*, but with 'missing' content (specifically, 'that United will loose').

It is not clear to us why as-parentheticals should differ from NRRCs in this way. One possibility is that it has something to do with the fact, noted by Blakemore (2006) and others, that as-clauses have a predicative use, as in (69).

(69) It is just as the bookmakers predicted.

However, we will leave this issue to future research.

References

Arnold, Doug. 2004. Non-Restrictive Relative Clauses in Construction Based HPSG. In Stefan Müller (ed.), *Proceedings of the 11th International Conference on Head-Driven Phrase Structure Grammar*, pages 27–47, Stanford: CSLI Publications.

Arnold, Doug. 2007. Non-Restrictive Relatives are not Orphans. *Journal of Linguistics* 43(2), 272–309.

Blakemore, Diane. 2006. Divisions of Labour: the Analysis of Parentheticals. *Lingua* 116, 1670–1687.

Burton-Roberts, Noel. 1999. Language, Linear Precedence and parentheticals. In Peter Collins and David Lee (eds.), *The Clause in English*, volume 45 of *Studies in Language Companion Series*, pages 33–51, Amsterdam: John Benjamins.

Cullicover, Peter W and Jackendoff, Ray. 2005. *Simpler Syntax*. Oxford: Oxford University Press.

Del Gobbo, Francesca. 2003. *Appositives at the Interface*. Ph. D.thesis, University of California, Irvine, Ca.

Del Gobbo, Francesca. 2007. On the Syntax and Semantics of Appositive Relative Clauses. In Nicole Dehé and Yordanka Kavalova (eds.), *Parentheticals*, Linguistik Aktuell, No. 106, pages 173–201, Amsterdam: John Benjamins Publishing Company.

Egg, Markus. 2007. The Syntax and Semantics of Relative Clause Modification. In Khal'il Simanan, Maarten de Rijke, Remko Scha and Rob van Son (eds.), *Proceedings of the Sixteenth Computational Linguistics in the Netherlands*, pages 49–56, Universiteit Amsterdam.

Espinal, M.T. 1991. The Representation of Disjunct Constituents. *Language* 67, 726–762.

Fabb, Nigel. 1990. The Difference Between English Restrictive and Non-Restrictive Relative Clauses. *Journal of Linguistics* 26, 57–78.

Ginzburg, Jonathan and Sag, Ivan A. 2001. *Interrogative Investigations: the Form, Meaning and Use of English Interrogatives*. Stanford, Ca.: CSLI Publications.

Jackendoff, Ray. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge Mass.: MIT Press.

Jackendoff, Ray. 1977. *X-bar Syntax: a Study of Phrase Structure*. Cambridge, Mass: MIT Press.

Kempson, Ruth. 2003. Nonrestrictive Relatives and Growth of Logical Form. In *Proceedings of the West Coast Conference on Formal Linguistics*, volume 22, pages 301–314.

Perzanowski, D. 1980. Appositive Relatives Do Have Properties. In *Proceedings of the 10th Northeast Linguistic Society Meeting (NELS X)*, pages 355–368, Ottowa.

Peterson, Peter. 2004. Non-Restrictive Relatives and Other Non-Syntagmatic Relations in an LF Framework. In *Proceedings of LFG 2004*, pages 391–397, Christchurch, NZ.

Potts, Chris. 2002a. The Lexical Semantics of Parenthetical-*as* and Appositive-*which*. *Syntax* 5(1), 55–88.

Potts, Christopher. 2002b. The Syntax and Semantics of *As*-Parentheticals. *Natural Language and Linguistic Theory* 20(3), 623–689.

Potts, Christopher. 2003. *The Logic of Conventional Implicatures*. Ph. D.thesis, UC Santa Cruz.

Potts, Christopher. 2005. *The Logic of Conventional Implicatures*. Oxford: Oxford University Press.

Safir, K. 1986. Relative Clauses in a Theory of Binding and Levels. *Linguistic Inquiry* 17, 663–698.

Sag, Ivan A. 1997. English Relative Clause Constructions. *Journal of Linguistics* 33(2), 431–484.

Clitic left dislocation and focus projection in Spanish

Felix Bildhauer
Freie Universität Berlin

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 346–357

Bildhauer, Felix. 2008. Clitic left dislocation and focus projection in Spanish. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 346–357. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.20. CC-BY 4.0

Abstract

The information-structural status of clitic left dislocated arguments in Spanish has been argued to depend crucially on their thematic role. Earlier HPSG analyses of related phenomena in other languages do not take into account this sort of information. A formalization will be presented which can handle differences in information-structure arising from different thematic roles of clitic left dislocated phrases.

1 Introduction

Spanish has a left dislocation construction in which the fronted phrase is doubled by a clitic within the core sentence whenever Spanish provides a clitic for the fronted category. The corresponding construction in Italian is discussed in Cinque (1990), where it is termed *clitic left dislocation* (henceforth CLLD). Various authors have pointed out that, from the point of view of information-structure, CLLD is a topic-marking construction (e. g. Zubizarreta, 1998; Zagona, 2002; Casielles-Suárez, 2004). On these approaches, *topic* and *focus* designate disjoint portions of an utterance and are thus mutually exclusive.[1]

On the other hand, it has been observed that whether or not a CLLD-ed constituent can be interpreted as part of the focus depends on its thematic role (Contreras, 1976; Gutierrez-Bravo, 2006, among others). For example, Gutierrez-Bravo (2006) argues that sentence (1a), where the indirect object is CLLD-ed, has unmarked constituent order in the sense that it allows for a sentence focus interpretation (adequate in out-of-the-blue utterances). The examples in (1b)–(1c), each of which constitutes the first sentence of a newspaper article, illustrate the same point. On the other hand, (2) displays no clitic left dislocation, but the subject cannot be interpreted as part of the focused portion of the utterance.[2]

(1) a. [A Juan$_{IO}$ le gustan$_{V}$ los chocolates$_{S}$]$_{F}$
to Juan to.him-CL appeal the chocolates
'Juan likes chocolates.'

b. [A Carlos Fuentes no le gustan las fronteras]$_{F}$[3]
to Carlos Fuentes not to.him-CL appeal the frontiers
'Carlos Fuentes doesn't like frontiers.'

[†]I would like to thank Stefan Müller, Roland Schäfer and three anonymous reviewers for discussion and helpful comments. All remaining errors are mine.

[1]For Zagona, a topic is a special part of the ground, which in turn is complementary to focus. Zubizarreta, while assuming a twofold distinction between focus/ground and topic/comment, states explicitly that a topic can never be part of a focus.

[2]In (2), the indirect object is doubled by a pronominal clitic although it is not CLLD-ed. This phenomenon is pervasive with indirect objects in Spanish and is not directly relevant for the issue at hand. Glosses: S=subject, O=direct object, IO=indirect object, A=accusative marker, [...]$_{F}$=focus.

[3]*El País*, 09/10/1997. Carlos Fuentes, escritor.

c. [Al dinero$_{IO}$ no le gustan$_{V}$ las incertidumbres$_{S}$]$_{F}$[4]
to.the money not to.it-CL appeal the insecurities
'The world of finance doesn't like insecurity.'

(2) Los chocolates$_{S}$ le gustan$_{V}$ [a Juan$_{IO}$]$_{F}$.
[the chocolates to.him-CL appeal to Juan
'JUAN likes chocolates.'

The behavior of the CLLD-ed *experiencer* objects in (1) contrasts with CLLD-ed *theme* objects, which arguably cannot be interpreted as part of the focus. Example (3) illustrates the latter case (square brackets indicate what is assumed here to be largest focus that is compatible with the construction).

(3) Este partido$_{O}$ [Boca$_{S}$ lo está jugando$_{V}$ desde hace dos meses.]$_{F}$
this match Boca it-CL is playing from make two months
'This match, Boca has been playing it for two months.'

Thus, clitic left dislocation blocks focus projection to the entire structure in some cases, whereas it yields unmarked linear order and the corresponding broad focus reading in other cases. Earlier HPSG accounts of clitic left dislocation, such as Engdahl and Vallduví (1996) for Catalan and Alexopoulou and Kolliakou (2002) for Modern Greek, are based on Vallduví's (1992) threefold partition into *focus*, *link* and *tail*. A link is a sentence-initial aboutness topic, and link and tail jointly constitute the ground. In these analyses, a CLLD-ed constituent is invariably interpreted as a link. Since links are defined as being part of the ground, these accounts do not in principle allow a wide-focus interpretation of CLLD constructions, and thus do not cover cases like (1) above.

In what follows, I will propose an HPSG approach that can handle the differences in focus projection arising from different thematic roles of the CLLD-ed phrase. Instead of Vallduví's (1992) three-way categorization of information-structural primitives, an orthogonal two-dimensional distinction between topic/comment and focus/ground is assumed. The topic/comment and focus/ground partitions of a sentence are allowed to overlap in ways excluded under Vallduví's approach. In particular, nothing prevents topics from being embedded within foci, such that out-of-the-blue utterances like those in (1) may still be analyzed as containing an aboutness topic.[5]

[4] *El País*, 30/06/1997. Inversiones de baja tensión.

[5] The idea that topic and focus may be embedded within each other is not new. Chafe (1976) suggested that all-new sentences can be construed as conveying information about a particular entity, and thus contain an aboutness topic (a subject, in his terminology). More recently, Frey (2004) has argued that the focused part of a sentence may in principle contain an aboutness topic. Conversely, Krifka (2007) proposes that contrastive topics (as discussed in Büring, 1997) are contrastive precisely because they contain a focus which introduces alternatives. See also Steedman (2000). In this paper I will not be concerned with topic instantiation. The HPSG formalization presented below leaves topic instantiation in CLLD constructions underspecified.

2 Clitic left dislocation

As noted by Cinque (1990), Balari (1998) and others, clitic left dislocation differs from other long distance dependencies in that it fails to correlate with phenomena typically observed with ordinary extraction, such as sensitivity to islands and obligatory subject inversion in Spanish. Balari argues that clitic left dislocation constructions are weak unbounded dependencies: only indices are shared between the fronted phrase and the clitic, while binding theory is relied on for ruling out ungrammatical dislocations. However, CLLD-ed phrases in Spanish show case agreement with the corresponding clitic, and since CASE is not represented on indices, it is hard to see how such an approach can rule out case mismatches. Alexopoulou and Kolliakou (2002) propose an account of *clitic left dislocation* in Modern Greek. At the heart of their proposal lies a set-valued CLITIC feature, which is an additional non-local feature and serves to optionally collect information about cliticized arguments. As with other non-local features, the CLITICS set is passed up to dominating nodes. In analogy to SLASH dependencies, a phrasal type *clld-phrase* finally licenses the combination of a left dislocated constituent with a head daughter that has an appropriate object in its CLITIC set. Alexopoulou and Kolliakou argue that these objects cannot be of type *local*, as is commonly assumed for SLASH dependencies. The reason is that *local* objects contain semantic information specifying (in the case of nouns) the subtype of *nominal object*. Assuming that object clitics are specified as *pronominal*, this may conflict with the specification of the dislocated phrase, which may or may not be pronominal. In order to overcome this difficulty, Alexopoulou and Kolliakou propose that a dislocated phrase and the corresponding clitic share only HEAD values. To ensure sharing of agreement information, they are forced to modify the commonly assumed HPSG feature geometry such that agreement features are represented in the HEAD path (instead of INDEX). However, such a move will complicate an account of symmetric coordination, and it does not really seem to be necessary either: if *clld-phrase* does not require token identity of the non-head daughter's LOCAL value with some element in the head daughter's CLITIC set, the problem does not arise. Instead, sharing of only HEAD and INDEX values can be specified in *clld-phrase*, as illustrated in Figure 1.[6] Note that the head daughter must be saturated for its complements, but may still subcategorize for a subject, thus allowing CLLD-phrases to intervene between the subject and the VP.

As noted above, the information-structural partitioning I am assuming here divides an utterance into *focus*/*ground* and *topic*/*comment*. Unlike Engdahl and Vallduví's (1996) and Alexopoulou and Kolliakou's (2002) approaches, the focused portion of a sentence may include the non-head daughter in a *clld-phrase* in some cases. Moreover, the non-head daughter need not always be interpreted as a topic. Focus projection will be modeled by means of an interface constraint between linearisation and information-structure, which will take into account in-

[6] Here, the CLITICS feature takes a list as its value.

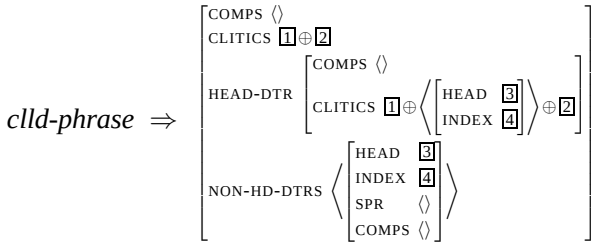


Figure 1: Constraint on phrasal type *clld-phrase*

formation associated with the thematic role of the fronted constituent.

3 Thematic roles

Within the current HPSG feature geometry, information about thematic roles is contained in the semantic contribution of the head that assigns these roles to its dependents. Role attributes proposed in the HPSG literature range from specific features for every semantic relation (Pollard and Sag, 1994) to very generic attributes (Flickinger et al., 2003), with most approaches falling somewhere in between (e. g. Davis, 2001). The current grammar architecture does not provide a means to retrieve this kind of information from the dependents when these are realized syntactically. While it seems clear that information derived from thematic roles is needed in order to appropriately constrain focus projection in clitic left dislocation constructions, it is not desirable to directly associate discourse function with thematic roles. The reason is that the relationship between linearisation, thematic role and discourse function may be affected by specific constructions (such as passive, see Contreras, 1976), and possibly also by extensions of a head's argument structure. Moreover, as pointed out by Müller (1999) (who discusses a suggestion by Uszkoreit, 1986), representing thematic roles on the dependents that carry them is problematic because a dependent may be assigned different roles by different verbs in a complex predicate. To avoid these complications, I suggest to model the connection between semantics and linearisation by means of a mediating boolean-valued feature UPV (*unmarked preverbal*), located under LOCAL. A head may then specify which of its dependents, if any, can be realized as a non-head daughter in a broad-focus CLLD construction. These specifications need not be stipulated for every single verb, but can be expressed as constraints on lexical types. To illustrate, the statements in (4a)–(4b) constrain the UPV value of transitive verbs and intransitive psych verbs of the *gustar*-class, respectively. Linking of arguments to thematic roles is included here for expository purposes, and nothing hinges on the rather specific role attributes.

(4) a. *strict-tr-v-lxm* ⇒

$$\begin{bmatrix} \text{ARG-ST} & \left\langle \begin{bmatrix} \text{UPV} & + \\ \text{INDEX} & \boxed{1} \end{bmatrix}, \begin{bmatrix} \text{UPV} & - \\ \text{INDEX} & \boxed{2} \end{bmatrix} \right\rangle \\ \text{RELS} & \left\langle \begin{bmatrix} \text{AGENT} & \boxed{1} \\ \text{THEME} & \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$$

b. *io-unerg-itr-v-lxm* ⇒

$$\begin{bmatrix} \text{ARG-ST} & \left\langle \begin{bmatrix} \text{UPV} & - \\ \text{INDEX} & \boxed{1} \end{bmatrix}, \begin{bmatrix} \text{UPV} & + \\ \text{INDEX} & \boxed{2} \end{bmatrix} \right\rangle \\ \text{RELS} & \left\langle \begin{bmatrix} \text{THEME} & \boxed{1} \\ \text{EXPERIENCER} & \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$$

As for (4a), the assumption is somewhat simplified since it presupposes that all transitive verbs assign a THEME and an AGENT role. In fact, verbs like *temer* 'to fear' are transitive, but the subject is arguably an EXPERIENCER rather than an AGENT. However, the constraint in (4a) could be further refined such that it applies only to the relevant subset of transitive verbs.

4 Interface constraints

Instantiation of the FOCUS value in CLLD constructions can now be made sensitive to the UPV value of the dislocated constituent. In addition to the HEAD and INDEX values, the UPV value must be shared between the relevant object in the head verb's CLITICS list and the dislocated phrase. This can be achieved by slightly modifying the constraint on *clld-phrase*, as shown in Figure 2.

clld-phrase ⇒

$$\begin{bmatrix} \text{COMPS} & \langle\rangle \\ \text{CLITICS} & \boxed{1} \oplus \boxed{2} \\ \text{HEAD-DTR} & \begin{bmatrix} \text{COMPS} & \langle\rangle \\ \text{CLITICS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \boxed{3} \\ \text{INDEX} & \boxed{4} \\ \text{UPV} & \boxed{5} \end{bmatrix} \right\rangle \oplus \boxed{2} \end{bmatrix} \\ \text{NON-HD-DTRS} & \left\langle \begin{bmatrix} \text{HEAD} & \boxed{3} \\ \text{INDEX} & \boxed{4} \\ \text{UPV} & \boxed{5} \\ \text{SPR} & \langle\rangle \\ \text{COMPS} & \langle\rangle \end{bmatrix} \right\rangle \end{bmatrix}$$

Figure 2: Revised constraint on phrasal type *clld-phrase*

The interface constraint in Figure 3 on the following page may now refer to the UPV feature: if the dislocated constituent is [UPV −], then its semantic contribution cannot be part of the focus. In this case, the FOCUS value of the entire *clld-phrase* must be identical to that of the head daughter. On the other hand, if the fronted phrase is [UPV +], the constraint in Figure 3 does not apply, thus allowing for a reading where the *clld-phrase* as a whole contributes to focus.

FOCUS is a list-valued feature here, and a phrase's FOCUS value may become instantiated in one of two ways: either all the daughters' FOCUS values are col-

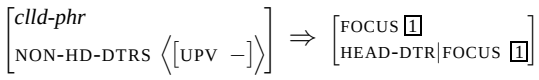


Figure 3: Syntax/information-structure interface constraint on *clld-phrase*

lected (see De Kuthy, 2002), or the phrase's FOCUS list contains as its single element the phrase's RELS value. The latter case corresponds to focus projection, where the semantics of the entire phrase contributes to focus. Focus projection is assumed here to be generally possible unless some constraint blocks it. The interface constraint in Figure 3 is one such constraint. It will block focus projection whenever a CLLD-ed constituent is not the one which, according to its thematic role, may appear preverbally in unmarked constituent order.

Analyses of sentences (1a) and (3) above are given in Figures 4 and 5 on the next page, respectively. In each case, they describe an interpretation with a maximally large constituent in focus. Both sentences have other readings, not illustrated here, in which the focused part is smaller. The important point is that the dislocated constituent cannot be interpreted as focused in (3), while it may or may not be part of the focused portion in (1a).

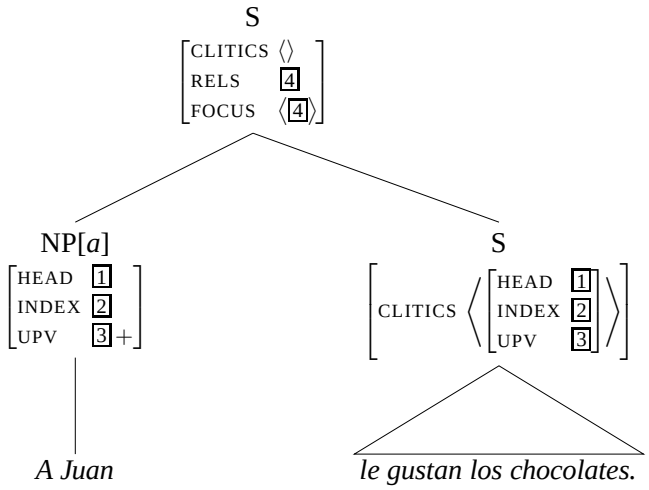


Figure 4: Broad focus reading with a CLLD-ed *experiencer* object

5 An alternative

In this section I will very briefly discuss a proposal by Vogel and Villada (2000), who analyze the preverbal EXPERIENCER-NP of *gustar*-verbs not as an instance of clitic left dislocation, but rather as a quirky (dative) subject. Consequently, the

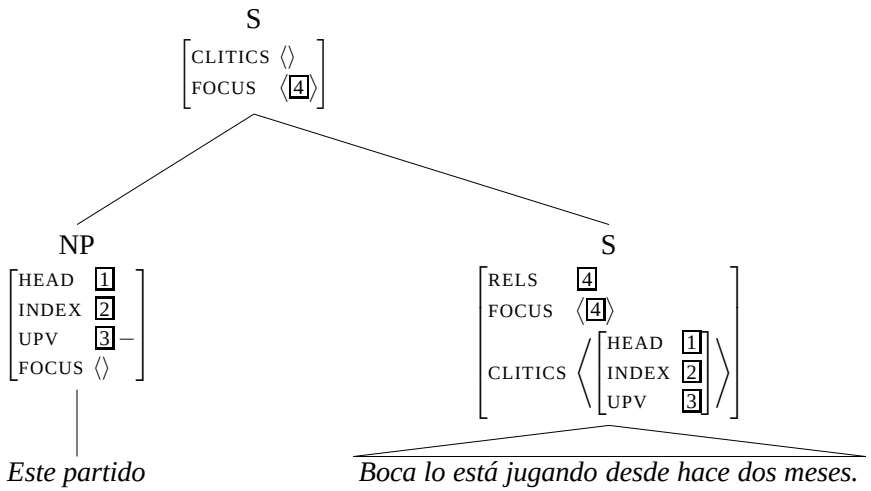


Figure 5: Restricted focus projection with a CLLD-ed *theme* object

combination of the preverbal EXPERIENCER-NP with a verbal head daughter is licensed by their equivalent of a *head-subject-phrase*.[7] This approach allows one to maintain the generalization that only SVO order licenses a wide focus reading. One of their main arguments for treating the dative-NP as a quirky subject is that it can be raised by verbs such as *parecer* 'to seem', which they illustrate with data like (5):

(5) A Leslie le parecieron gustar los regalos.
To Leslie CL seemed to.like the presents
'Leslie seemed to like the presents.'

However, as I see it, it is not entirely clear that the dative NP in (5) is raised to the subject of *parecer*. Another possibility is that (5) is a clitic left dislocation construction. One piece of evidence that would seem to point in this direction is the rather marginal acceptability of the clitic on *parecer*.[8] If *parecer* makes the EXPERIENCER argument of the embedded verb its own argument, one would expect the clitic to be fully acceptable (see accounts of Romance clitic climbing by Miller and Sag, 1997; Monachesi, 1998; Abeillé and Godard, 2002, and others). On Vogel and Villada's approach, the fact that *parecer* does not generally allow clitic climbing would have to be stipulated in the lexicon. On the other hand, this

[7] Vogel and Villada actually propose to revert to a representation of syntactic arguments on a single SUBCAT list for Spanish. The relevant ID schema is then the one that licenses a saturated phrase with a head daughter that has a single element in its SUBCAT list.

[8] In the 150 million words CREA corpus, none of the six verbs Vogel and Villada give as examples of the *gustar*-class occurs embedded under *parecer* with upstairs clitics. See also Fernández Soriano (1999) on the opaqueness of *parecer* with respect to clitic climbing.

behavior is predicted if *parecer* can only raise the (grammatical) subject of the embedded verb, and the preverbal dative-NP is treated a CLLD-ed phrase.

Vogel and Villada's analysis would be supported if it could be shown that ordinary object NPs do not occur preverbally with raising verbs, as this would exclude clitic left dislocation as an explanation for (5). But the corpus data in (6)–(9) illustrate that CLLD is possible with raising verbs. Thus, although it looks promising to analyze examples like the one in Figure 4 as a sort of *head-subject-phrase*, I believe more evidence is still needed to show that the construction is substantially different from clear cases of clitic left dislocation.

(6) [Esta corrección] la suele hacer el centro coordinador mundial
this correction it-CL does.usually make the center coordinator world
de observaciones heliofísicas ...[9]
of observations heliophysics
'It's usually the world heliophysics coordination center that makes these corrections.'

(7) Cuando [a una sociedad] la empiezan a analizar los sociólogos, ay mi
when A a society her-CL begin to analyse the sociologists oh my
Dios ...[10]
god
'When sociologists begin to analyse a society, oh my god ...'

(8) [A mi hermano] le dejaban de llamar por teléfono los amigos ...[11]
A my brother him-CL stopped to call by telephone the friends
'(As for) my brother, his friends stopped calling him.'

(9) [A Cristina] ... le acaban de comprar el chándal.[12]
to Cristina to.her-CL just.did to buy the tracksuit
'Cristina has just been bought the tracksuit.'

6 Conclusion

The formalization proposed here makes available on a verb's dependents just the right amount of information that is necessary in order to constrain focus projection in Spanish clitic left dislocation constructions. Following Contreras (1976), Gutierrez-Bravo (2006) and others in assuming that the crucial factor is the thematic role of the dislocated constituent, I showed how the connection between thematic roles and unmarked constituent order can be established at a point where

[9] José María Oliver. *Manual práctico del astrónomo aficionado*. Barcelona: De Vecchi, 1992, p. 42.

[10] Fernando Vallejo. *La virgen de los sicarios*. Santafé de Bogotá: Alfaguara, 1999, p. 64.

[11] TVE 1, 23/04/87, Debate: El Sida

[12] *El Mundo*, 07/09/1994. La vuelta al cole. Más de un cuarto de billón de pesetas en material escolar.

information about thematic roles is retrievable without complications, that is, in the lexicon. Constraining focus projection indirectly by using a mediating feature (UPV) seems to be more promising than stating a direct connection between thematic roles and unmarked order, since changes in a verb's argument structure may affect unmarked linearisation of the arguments, while their thematic roles need not change. Focus instantiation has only been sketched in the present proposal, and it is clear that prosodic factors as well as linearisation constraints in the postverbal field have to be taken into account in order to restrict it further.

References

Abeillé, Anne and Godard, Danièle. 2002. The Syntactic Structure of French Auxiliaries. *Language* 78(3), 404–452.

Alexopoulou, Theodora and Kolliakou, Dimitra. 2002. On Linkhood, Topicalization and Clitic Left Dislocation. *Journal of Linguistics* 38, 193–245.

Balari, Sergio. 1998. Pronouns, Variables, and Extraction in HPSG. In Balari and Dini (1998), pages 151–217.

Balari, Sergio and Dini, Luca (eds.). 1998. *Romance in HPSG*. Stanford: CSLI Publications.

Belletti, Adriana and Rizzi, Luigi. 1988. Psych-Verbs and Theta-Theory. *Natural Language and Linguistic Theory* 6, 291–352.

Büring, Daniel. 1997. *The Meaning of Topic and Focus. The 59th Bridge Accent*. London and New York: Routledge.

Casielles-Suárez, Eugenia. 2004. *The Syntax-Information Structure Interface. Evidence from Spanish and English*. London: Routledge.

Chafe, Wallace L. 1976. Givenness, Contrastiveness, Definiteness, Subjects, Topics and Point of View. In Li (1976), pages 25–55.

Cinque, Guglielmo. 1990. *Types of A'-dependencies*. Cambridge, Mass.: MIT Press.

Contreras, Heles. 1976. *A theory of word order with special reference to Spanish*. Amsterdam: North-Holland.

CREA. 2008. Real Academia Española. Corpus de referencia del español actual. `http://www.rae.es`.

Davis, Anthony R. 2001. *Linking by Types in the Hierarchical Lexicon*. Stanford: CSLI Publications.

De Kuthy, Kordula. 2002. *Discontinuous NPs in German*. Stanford: CSLI Publications.

Engdahl, Elisabeth and Vallduví, Enric. 1996. Information Packaging in HPSG. In Claire Grover and Enric Vallduví (eds.), *Studies in HPSG*, Edinburgh working papers in cognitive science, No. 12, pages 1–31, Edinburgh: Centre for Cognitive Science, University of Edinburgh.

Fernández Soriano, Olga. 1999. El pronombre personal. Formas y distribuciones. Pronombres átonos y tónicos. In Ignacio Bosque and Violeta Dumonte (eds.), *Gramática descriptiva de la lengua española*, pages 1209–1273, Madrid: Espasa-Calpe.

Flickinger, Dan, Bender, Emily M. and Oepen, Stephan. 2003. MRS in the LinGO Grammar Matrix. A Practical User's Guide, `http://faculty.washington.edu/ebender/papers/userguide.pdf`.

Frey, Werner. 2004. A Medial Topic Position for German. *Linguistische Berichte* 198, 153–190.

Gutierrez-Bravo, Rodrigo. 2006. *Structural Markedness and Syntactic Structure*. New York and London: Routledge.

Krifka, Manfred. 2007. Basic Notions of Information Structure. In Caroline Féry, Gisbert Fanselow and Manfred Krifka (eds.), *Interdisciplinary Studies on Information Structure*, Working Papers of the SFB 632, No. 6, pages 13–56, Potsdam: Universitätsverlag.

Li, Charles N. (ed.). 1976. *Subject and Topic*. New York: Academic Press.

Miller, Philip H. and Sag, Ivan A. 1997. French Clitic Movement without Clitics or Movement. *Natural Language and Linguistic Theory* 15(3), 573–639.

Monachesi, Paola. 1998. Decomposing Italian Clitics. In Balari and Dini (1998), pages 305–357.

Müller, Stefan. 1999. *Deutsche Syntax deklarativ. Head-Driven Phrase Structure Grammar für das Deutsche*. Linguistische Arbeiten, No. 394, Tübingen: Max Niemeyer Verlag, `http://hpsg.fu-berlin.de/~stefan/Pub/hpsg.html`.

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

Steedman, Mark. 2000. Information Structure and the Syntax-Phonology Interface. *Linguistic Inquiry* 31, 649 – 689.

Uszkoreit, Hans. 1986. Constraints on Order. *Linguistics* 24, 883–906.

Vallduví, Enric. 1992. *The informational component*. New York: Garland.

Vogel, Carl and Villada, Begoña. 2000. Spanish Psychological Predicates. In Ronnie Cann, Claire Grover and Philip Miller (eds.), *Grammatical Interfaces in HPSG*, Studies in Constraint-Based Lexicalism, No. 8, pages 251–266, Stanford: CSLI Publications.

Zagona, Karen. 2002. *The syntax of Spanish*. Cambridge: Cambridge University Press.

Zubizarreta, Maria Luisa. 1998. *Prosody, Focus and Word Order*. Cambridge, Massachusetts: MIT Press.

On the syntax of direct quotation in French

Olivier Bonami
Université Paris-Sorbonne

Danièle Godard
LLF

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 358–377

Bonami, Olivier & Danièle Godard. 2008. On the syntax of direct quotation in French. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 358–377. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.21.
CC-BY 4.0

Abstract

Direct quotation raises three major problems for grammatical modelling: (i) the variety of quoted material (which can be a non linguistic behavior, or a sign in a different language), (ii) the embedding of an utterance inside another one, (iii) a special denotation, the content of the quotation being the utterance itself. We propose a unary rule, which turns the quoted material into a linguistic sign whose content is itself a behavior, which entertains a resemblance relation to the behavior demonstrated by the speaker. Syntactically, direct quotation comes in two varieties: it can be the complement of a quotative verb, or constitutes a head sentence, modified by an adjunct containing a quotative verb whose complement is extracted and identified with its local features.

1 Introduction

Quotation has recently been amply studied for its implications for the philosophy of language (see Cappelen & Lepore 2007 and references cited therein), semantics (see e.g. Geurts & Maier 2005, Potts 2007) or the foundations of grammar (e.g. Postal 2004), as well as for its stylistic and pragmatic effects (particularly in the French tradition). On the other hand, few studies address the question of its grammatical features in any detail. We take up this question for French direct quotation, which we briefly define by comparison with other varieties of quotation. After summarizing Clark and Gerrig's (1990) view of (direct) quotation as 'demonstration', and explaining how it helps understanding its paradoxical pragmatic properties, we propose an HPSG analysis. First, a unary rule, the *quotation phrase*, turns the quoted material (be it linguistic or not) in a linguistic sign, whose content is a behavior; it accounts for the fact that the quoted material is inserted into the syntax of French, whether it is linguistic or not, and whether it is in French or not, as well as for the special semantic and pragmatic properties of the quotation. Second, the quotation can have two grammatical functions: it is the complement of a quotative verb, or a head clause, modified by an adjunct containing a quotative verb whose complement is extracted, and identified with it.

[†]Aspects of the research reported here were presented at a seminar of the SFB 441 Project A5 at the University of Tübingen (March, 2008), and at the first Congrès Mondial de Linguistique Française (Paris, July 2008) in addition to the HPSG 2008 Conference. We thank for their comments and suggestions the audiences at these events, and in particular Anne Abeillé, Doug Arnold, Tibor Kiss, Frank Richter, Manfred Sailer, and Jan-Philip Söhn, as well as three anonymous reviewers. This research was partially supported by the ANR project PRO-GRAM (`http://pro-gram.linguist.jussieu.fr/`).

2 What is quotation?

2.1 Varieties of quotation

A quotation is an expression in mention, for which the responsible agent is different from the speaker; it is typically signaled by quotes (on writing) or a special prosody (in oral speech). Quotations vary in their pragmatic status. In direct quotation (1a), the speaker reports the speech acts of an agent adopting the perspective of that agent. Thus clause types within the quotation reflect the agent's illocutionary acts, not the speaker's; and indexicals take their reference from the reported speech situation, not from the utterance situation. Hence, the first person possessive determiner *mon* in (1a) refers to Marie, not to the speaker. Direct quotations contrast with so-called 'indirect quotations' (Cappelen & Lepore, 2007), where speech acts are reported from the speaker's perspective, and indexicals are interpreted with respect to the utterance situation; here, reference to Marie is taken up by the third person possessive determiner (1b).[1] They also contrast with so-called 'free indirect speech' (1c), where indexicals take their reference in the utterance situation, but clauses types within the quotation do report the quoted agent's illocutionary acts. In (1c), the interrogative clause reports a question that Marie (not the speaker) asks, but it is a third person determiner that refers to her. Finally, they contrast with cases of 'pure quotation' or 'pure mention' (1d), where the quoted material does not stant for a linguistic *instance* but for a linguistic *type*: in (1d), *blue* refers to the word 'blue', not to some agent's utterance of that word. In the remainder of this paper we will concentrate on direct quotation.

(1) a. Marie a dit : "Mon frère est arrivé".
Marie said: "My brother has arrived."

b. Marie a dit que son frère était arrivé.
Marie said that her brother had arrived.

c. Marie s'interrogeait. Son frère était-il arrivé ?
Marie was wondering. Did her brother arrive?

d. Le mot anglais *blue* veut dire "bleu". *The English word* blue *means 'blue'.*

Direct quotations occur in at least four different constructions: as the complement of a quotative verb (1a); as the head clause with a quotative adjunct, as in (2); as a syntactically integrated part of a sentence, such as the NP *le Président* in (3), variously characterized as mixed quotation (Davidson 1979), 'textual island' (Authier 1992), hybrid quotation (Brabanter, 2005), or subclausal quotation (Potts 2007); or as a stand-alone utterance (4), an *open quotation* in the sense of Recanati (2001).

[1] The term 'indirect quotation' is a convenient misnomer here. There is literally no quotation in (1b), whose syntax and compositional semantics are strictly parallel to that of non-speech related attitude reports. Rather, the sentence reports that a speech act whose content is described by the subordinate clause took place.

(2) a. “Mon frère est arrivé”, annonce Marie.
“My brother has arrived”, Marie announces.

b. “Mon frère est arrivé”, comme a dit Marie.
“My brother has arrived”, as Marie said.

c. Selon Marie, “il n’y a pas pire menteur que mon frère.”
According to Marie, “nobody is a worse liar than my brother.”

(3) Marie annonce que le “Président” est arrivé.
Marie announces that the “President” has arrived.

(4) “Mon frère est arrivé”. Voilà ce qu’a dit Marie.
My brother has arrived. That’s what Marie said.

Much of the recent semantic and philosophical literature focuses on hybrid and open quotation, which pose important semantic problems. However, they are syntactically quite uninteresting: from a syntactic point of view, hybrid quotations are plain constituents that get the same distribution they would have if used rather than mentioned; and open quotations are simple clauses. Here we concentrate on the other cases, that is, quotative complements (1a) and *incidental quotative clauses*, or IQCs (2a).[2]

They raise three major problems for grammatical modelling. First, the quoted object can be non-linguistic, as in (5). Second, an utterance seems to be embedded in the utterance of another agent. Third, the quotation seems to have a special denotation, its content being the quoted utterance itself, rather than an ordinary content type (e.g. Delaveau 1988, Potts 2007). We briefly explain the theory of quotation which, in our view, accounts best for these properties, before proposing an HPSG analysis, at least for quotations that are amenable to a grammatical representation.

(5) a. Paul a fait : `[speaker frowns]`
Paul went . . .

b. La voiture a fait : `[speaker moves his hand in a zigzag]`
The car went . . .

2.2 Direct quotation as demonstration

We adopt Clark and Gerrig’s view (1990) of quoting as “demonstration”: they contrast quotation, as a mode of communication, both with with describing (the usual one) and monstrating (see deictic elements). Demonstration is similar to mimicking, the speaker imitating the original behavior of another agent. Demonstration has two properties. First, it is a pretend act rather than an illocutionary act: in (1a) the speaker does not assert that Marie’s brother has arrived, but pretends to be Marie making that assertion. This explains the formal and pragmatic properties of direct quotation. On the one hand, the sentence type conforms to what is required

[2] See (Desmets and Roussarie, 2000) for an HPSG analysis of reportive *comme* clauses and (Bonami and Godard, to appear) for a comparison between *comme* clauses and IQCs.

by the original illocutionary act : affirmative in (1a) and (2), interrogative in (6a), imperative in (6b); and indexicals are shifted: in the utterance situation the speaker pretends to be in, Marie is speaking, not him. On the other hand, the speaker does not take responsibility for the act: he does not assert the quotation in (1a) or (2), does not ask a question in (6a), or give an order in (6b).

(6) a. Qui vient, a demandé Marie.
Who is coming, Marie asked

b. Allez vous laver les mains, a dit Marie.
Go wash your hands, Marie said

Second, demonstration is selective: the speaker chooses among the aspects of the original situation which ones he wants to reproduce. This is worth emphasizing, because it goes against a common view which contrasts direct quotation, said to faithfully reproduce the original behavior, and indirect quotation, which is said to be unfaithful. This common view is mistaken, resulting from a confusion between the two dimensions of the typology of quotations. The point is clear in (7) which illustrates two extreme cases, where either the phonetic realization or the content is highlighted. Thus, a quotation is a sign (partially) reproducing a sign or behavior.

(7) a. Il a dit *infractus* et pas *infarctus*.
He said 'infractus' instead of 'infarctus'

b. Marie a dit en chinois : "le Président est arrivé".
Marie said in Chinese: "The President has arrived."

3 Quotation in HPSG

Accounting for these observations within an HPSG grammar is not a trivial task. Here, we provide a rather direct encoding that is heuristically useful, but encounters some foundational problems. These problems as well as a possible solution are outlined in the appendix. In our preliminary account, we take quite literally the idea that the content of a quotation can be a linguistic sign. First, we assume that the content of a quotation is a *behavior*; linguistic signs are particular subtypes of *behavior*, so that when the quoted behavior is linguistic, the content of the quotation is a sign. A partial hierarchy of *behavior* objects is given in Figure 1, whose specifics will be justified shortly. We will not commit ourselves to any specific feature geometry for behaviors, except for the assumption that each behavior has a LOCUS feature indicating the individual who is the locus of the behavior; in linguistic signs the LOCUS coincides with the speaker (8).

(8) a. $\textit{behavior} \rightarrow \left[\text{LOCUS} \quad \textit{ind}\right]$

b. $\textit{ling-sign} \rightarrow \begin{bmatrix} \text{LOCUS} & \boxed{1} \\ \text{SS}|\text{LOC}|\text{CX}|\text{C-INDS}|\text{SPKR} & \boxed{1} \end{bmatrix}$

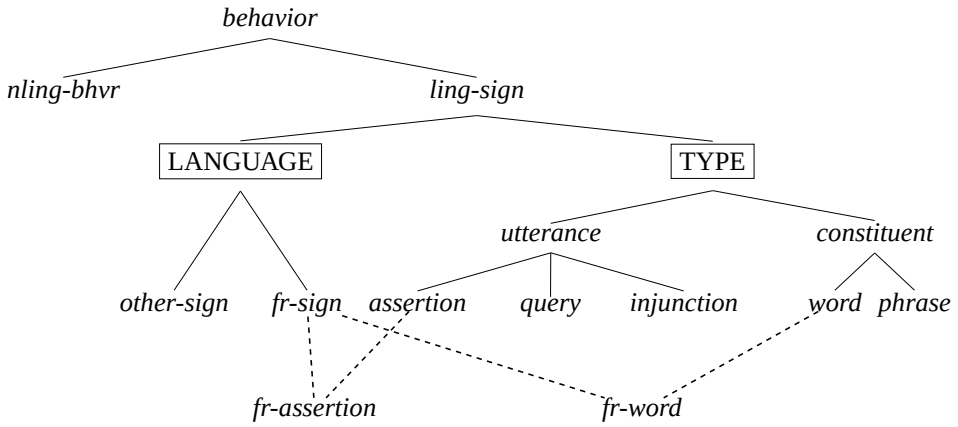


Figure 1: Hierarchy of quotable behaviors

The second move is to introduce quotations in syntactic trees. This is not an easy task, because of the formal diversity of the quoted material (e.g. Delaveau 1988, Clark & Gerrig 1990, Postal 2004). It can be a sentence (1a), a word (7a), an ungrammatical sentence (9a), a realization of an utterance containing repairs or stuttering (9b), a sign in a different language (9c), a nonlinguistic sign (5a), or even a non-sign (5b). This suggests to Postal (2004) that quotative complements should be treated as an open slot, providing in turn a strong argument in favor of a constraint-based approach to syntax. While Postal's analysis is elegant in the general case, it remains that we need a syntactic analysis of at least some quotations. In the IQC construction, the quotative clause can be linearized in the middle of the quoted material (10a). This works only if the quoted material is linguistic (10b) and in the same language (10c), but when it does, the point of insertion is constrained syntactically; e.g. it cannot occur in the middle of a word (10d).

(9) a. Paul a écrit : "Marie est content", avec une faute d'accord.
Paul wrote "Marie est content", making an agreement mistake.

b. Paul a dit : "Marie croy. . . savait que je viendrais".
Paul said: "Marie believ. . . knew that I would come."

c. Paul a dit : "I'm asleep!"
Paul said: "I'm asleep!"

(10) a. Le Président, dit Marie, est déjà arrivé.
(litt.) *The President, said Marie, has already arrived.*

b. *Pshhhhh, fit le ballon, shhhh.
(litt.) *Pshhhhh, went the balloon, shhh.*

c. *The President, dit Marie, has already arrived."

d. *Le Pré, dit Marie, sident est déjà arrivé.

To account for this data we assume the unary construction in (11).[3] This construction takes any behavior, and turns it into a linguistic sign whose content is itself a behavior. The demonstration (2) and the behavior that is actually referred to (1) are not identified, because we know from (7b) that they can differ in important ways; rather, there is a background assumption that the demonstration resembles some aspects of the quoted behavior. We assume that, for a French grammar, signs in French (*fr-sign*) are the only *behavior*s with a linguistic analysis in terms of the familiar HPSG feature geometry. Thus only these are amenable to a syntactic analysis making the insertion of an IQC possible.

(11)
$$\left[\begin{array}{ll} \textit{quotation-ph} & \\ \textsc{content} & \boxed{1}\ \textit{behavior} \\ \textsc{context} & \left[\textsc{background} \quad \left\{\textsf{resembles}(\boxed{2},\boxed{1})\right\}\right] \end{array}\right]$$
$$\Big|$$
$$\boxed{2}\textit{behavior}$$

4 Complement quotation

Let us now turn to the analysis of complement quotation as in (1a), or (5). Interestingly, quotative verbs can select properties of the quoted behavior, even when that behavior is not linguistic or homolinguistic. While quotation verbs are quite diverse, three classes can be identified from that point of view. Verbs such as *dire* 'say' can take any complement as long as it is a linguistic sign: it can be in any language (7b) and of any linguistic category (7a), but a non linguistically conventionalized sound emission will not do (12). Verbs such as *affirmer* 'state', *demander* 'ask' or *ordonner* 'order' select an utterance with a specific illocutionary type (13a,b), but the language is not constrained (13c). Finally *faire* 'do' accepts all behaviors, linguistic or otherwise (5). This data motivates the details of the hierarchy in Figure 1, and is accounted for by the lexical entries in (14). These give rise to the analysis in Figure 4 for (2).

(12) *Paul a dit "hips"
Paul sait "hips" (=Paul hiccupped)

(13) a. Paul affirma : "Marie n'est pas là".
Paul stated: "Marie is not there."
b. *Paul affirma : "Est-ce que Marie est là ?"
Paul stated: "Is Marie there?"
c. Paul affirma : "Marie is there".

[3] It is natural to assume that quotation marks in writing are the exponent of this construction, when present.

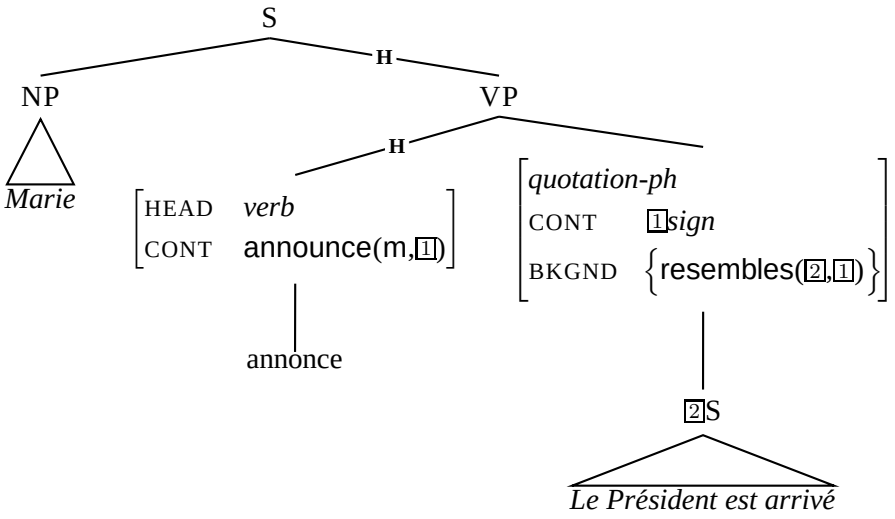


Figure 2: Sample analysis for a complement quotation construction

(14) Direct quotation verbs

a. *dire* 'say':

$$\begin{bmatrix} \text{ARG-STR} & \left\langle \text{NP}_{\boxed{1}}, \begin{bmatrix} \text{CONT} & \boxed{2}\begin{bmatrix} \textit{ling-sign} \\ \text{LOCUS} & \boxed{1} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{CONT} & \text{say}(\boxed{1},\boxed{2}) \end{bmatrix}$$

b. *affirmer* 'state':

$$\begin{bmatrix} \text{ARG-STR} & \left\langle \text{NP}_{\boxed{1}}, \begin{bmatrix} \text{CONT} & \boxed{2}\begin{bmatrix} \textit{assertion} \\ \text{LOCUS} & \boxed{1} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{CONT} & \text{state}(\boxed{1},\boxed{2}) \end{bmatrix}$$

c. *faire* 'do':

$$\begin{bmatrix} \text{ARG-STR} & \left\langle \text{NP}_{\boxed{1}}, \begin{bmatrix} \text{CONT} & \boxed{2}\begin{bmatrix} \textit{behavior} \\ \text{LOCUS} & \boxed{1} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{CONT} & \text{do}(\boxed{1},\boxed{2}) \end{bmatrix}$$

(15) Marie annonce : "Le Président est arrivé."
Marie announces : "The President has arrived."

Note that, contrary to traditional grammar but in line with Authier-Revuz (1992) and Postal (2004), we assume that quotations are ordinary complements. This account directly for a number of important obervations. Quotations linearize like complements: they must follow the verb but can be followed by a complement

(16a). They can be embedded (16b). They can be (pseudo-)clefted (16c). Finally, they obey selectional restrictions (12-13).

(16) a. Paul a lancé : "donne-moi la main" à Marie, avant de traverser.
Paul called out "give me your hand" to Marie, before crossing the street.

b. Je crois que Paul a lancé à Marie : "Donne-moi la main".
I think that Paul called out to Marie : "Give me your hand."

c. Ce que Paul a dit, c'est "laisse-moi tranquille".
What Paul said was "Leave me alone."

With most verbs, the quotation is an object. However, some intransitive verbs can also introduce a quotation: *s'exprimer* 'to express oneself', *acquiescer* 'to agree', *sourire* 'to smile' etc. (Delaveau 1988). Such verbs combine with a manner adverb or PP, typically *ainsi* 'this way', which we analyze as a complement. Thus, the quotation is also a complement with these verbs, although not an object.[4]

5 IQCs as adjuncts with extraction

Sentences containing IQCs contrast strongly with sentences containing quotative complements. Parts of the quotation may precede the IQC, but there is no evidence that any part of the quotation is a complement of the quotation verb: in particular, no IQC can be followed by one of the verb's complements (17a). The IQC construction cannot be embedded (17b); and the quotation can not be (pseudo-)clefted (17c). On the other hand, the quotation respects the same selectional restrictions with respect to the quotative verb as quotative complements do—compare (18a) with (12) and (18b) with (13b).

(17) a. * "Le Président", annonçait Paul, "est déjà arrivé", à Marie.
the President announced Paul is already arrived to Marie

b. *Je crois que "Donne-moi la main" a lancé Paul à Marie.
I think that "Give me your hand", Paul called out to Marie.

c. * Ce que, annonçait Paul, c' est
that which announced Paul that is

"Le Président est déjà arrivé".
the President is already arrived

[4]These intransitive quotative verbs can also combine with a manner adverb, followed by a quotation, as in (i). We take this to be an instance of open quotation, where it is an independent clause, anaphorically linked to the adverb.

(i) Marie s'est exprimée ainsi : "Puisqu'il le faut, j'irai."
Marie expressed herself in this way: "Since it is necessary, I will go."

(18) a. * “Hips !”, dit Paul.
“Hips!”, Paul said.

b. * “Est-ce que Marie est là ?”, affirma Paul.
“Is Mary there?”, Paul stated.

To account for this, we assume that (i) IQCs are adjuncts to independent clauses (the quotation), and (ii) they are extraction constructions where the gap is identified with the modified quotation. Thus syntactically, IQCs are quite similar to bare (*that*-less) relative clauses (19): in both cases, the content of the gap element within an adjunct clause is identified with the content of the head the adjunct clause combines with.[5]

(19) The book$_i$ [you ordered $___{}_i$] has arrived.

This is made explicit in the construction in (20), which is used in a simple example in Figure 3. Notice that this analysis allows one to account for selectional restrictions such as those in (18) in much the same way as one accounts for selectional restrictions imposed by the verb in a relative clause on the noun modified by the relative clause: selectional restrictions are passed from the verb’s lexical entry through SLASH and MOD to the head.

(20) *head-IQC-ph→head-adj-ph* $\wedge$

$$\begin{bmatrix} \text{S} & \\ \text{IC} & + \\ \text{SLASH} & \{\} \end{bmatrix}$$

$$\text{H}$$

$$\begin{bmatrix} \textit{quotation-ph} \\ \text{SYNSEM} \quad \boxed{1} \end{bmatrix} \qquad \begin{bmatrix} \text{S} & & & \\ \text{MOD} & \boxed{1} & [\text{LOC} & \boxed{2}] \\ \text{SLASH} & \{\boxed{2}\} & & \end{bmatrix}$$

That IQCs are extraction constructions is confirmed by three properties that oppose them to other adjunct clauses. First, IQCs give rise to two types of subject inversion (see Kayne, 1972, for the basic description of inversion patterns in French): simple affixal subject inversion (21a), and subject NP inversion (21b); complex inversion is ruled out (21c). Notice that in subject NP inversion, the subject can be followed by a complement of the verb; as (Bonami et al. 1999) shows, this can only occur in extraction contexts. Second, IQCs belong to a family of incidental clausal constructions of French, traditionally called *incises*, which share the property of being embedded without a formal mark of embedding (initial complementizer, preposition, or wh- phrase). In some incidental clauses, the host clause corresponds to a pronoun within the incidental clause (22a). But this is incompatible with (direct) quotation: if the host is a direct quotation, as indicated by the reference of the first

[5]Of course bare relative clauses and IQCs are quite different semantically: bare relative clauses are intersective modifiers, whereas, clearly, IQCs semantically embed the head they combine with.

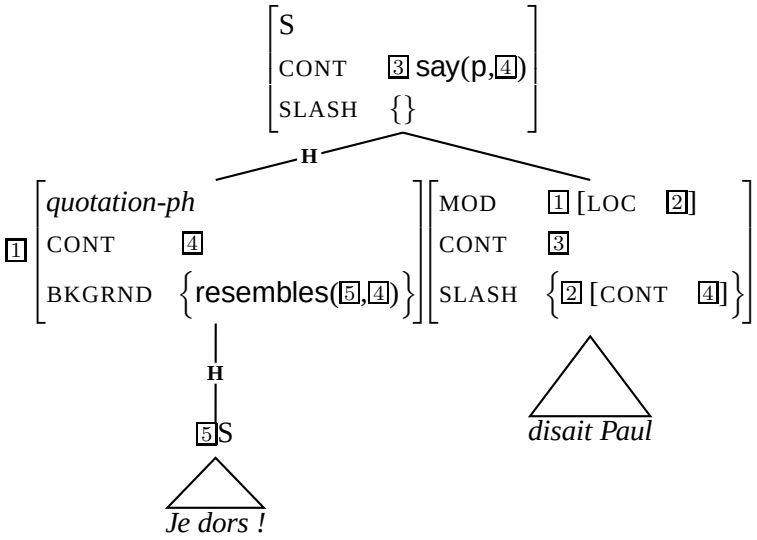


Figure 3: A simple IQC

person possessive determiner in (22b), then the incidental clause must contain a gap. Third, there is an unbounded dependency between the quotation and the quotative verb (23a); once again this does not work in non-quotative adjunct clauses (23b).

(21) a. "Le Président est arrivé", annonça-t-elle à la presse.
"The President has arrived", she announced to the Press.

b. "Le Président est arrivé", annonça Marie à la presse.
"The President has arrived", Marie announced to the Press.

c. * "Le Président est arrivé", Marie annonça-t-elle à la presse.

(22) a. Son$_i$ frère, Marie$_i$ l'a dit, est arrivé.
(litt.) Her brother, Marie said so, has arrived.

b. *Mon$_i$ frère est arrivée, Marie$_i$ l'a dit.
My$_i$ brother has arrived, Marie$_i$ said it.

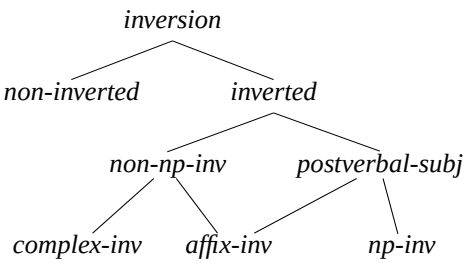
(23) a. "Je n'en peux plus", semblait croire pouvoir dire Paul.
"I am worn out", Paul seemed to believe to be able to say.

b. *"Je n'en peux plus", Paul semblait le dire.
"I am worn out", Paul seemed to say it.

(20) accounts directly for the properties discussed so far except the distribution of subjects. We adopt a version of the linearization approach to extraction-triggered inversion of Bonami *et al.* (1999). The head feature INV takes one of the values in (24a); an *np-inv* value triggers noncompaction of VP complements (while all other dependents are compacted in French). (24b) makes sure that no preverbal subject,

be it affixal or phrasal, is possible in IQCs, ruling out complex inversion.[6]

(24) a.



b. *head-IQC-ph* $\rightarrow \left[\text{NHD-DTRS} \quad \left\langle \left[\text{INV} \quad \textit{postverbal-subj}\right] \right\rangle\right]$

Most of the quotative verbs which occur in IQCs are the same ones that take a quotative complement (except for the gap status of the argument). However, some verbs are possible in IQCs that may not introduce a quotative complement (Cornulier, 1973; Delaveau, 1988; Monville Burston, 1993), as illustrated in (25) and (26). Many of these verbs are propositional attitude verbs turned into speech verbs by metaphorical extension (25). Others are originally intransitive verbs reporting a linguistic or otherwise expressive behavior (26). To account for such cases, we assume that verbs like *imaginer* or *hoqueter* have a lexical entry where they subcategorize for a quotation gap. The entry in (27) allows the verb to occur in IQCs, but not with a complement quotation, because the second argument is a gap.

(25) a. "Maintenant, je me transforme en boule de feu", imagina Paul.
"Now I transform into a fireball", Paul imagined.

b. *Paul imagina : "Maintenant je me transforme en boule de feu."
Paul imagined: "Now I transform into a fireball."

(26) a. "Je n'en peux plus", hoqueta Marie.
"I can't stand it anymore", Marie gasped.

b. *Marie hoqueta : "Je n'en peux plus."
Marie gasped: "I can't stand it anymore."

(27) *imaginer* 'imagine':

$$\left[\begin{array}{ll} \text{ARG-STR} & \left\langle \text{NP}\boxed{1}, \left[\begin{array}{ll} \textit{gap} & \\ \text{CONT} & \boxed{2}\left[\begin{array}{ll} \textit{assertion} & \\ \text{LOCUS} & \boxed{1} \end{array}\right] \end{array}\right] \right\rangle \\ \text{CONT} & \text{imagine_and_state}(\boxed{1},\boxed{2}) \end{array}\right]$$

[6](24b assumes inversion to be mandatory, as it is in formal standard French. Inversion is only optional in informal standard French (i). Nonstandard varieties also allow the construction in (ii), where the IQC is introduced by a complementizer.

(i) "J'en peux plus", Paul m'a dit.

(ii) "J'en peux plus", qu'il a dit.

6 IQCs as incidental adjuncts

We finally discuss the prosodic and linearization properties of IQCs. IQCs have an incidental prosody. Incidentals are phrases which are prosodically autonomous, and tend to be separated from the rest of the sentence by some feature on their right boundary (Fagyal 2002, Mertens 2004, Delais-Roussarie 2005). IQCs have the same positional freedom as other incidental adjuncts, such as adverbs (Bonami & Godard 2007), with one difference: IQCs cannot be the first element of an utterance (although they can begin a clause).

(28) a. * Dit Marie, "Le Président est déjà arrivé".
Says Marie the President is already arrived

b. Le Président, dit Marie, est déjà arrivé.

c. Le Président est, dit Marie, déjà arrivé.

d. Le Président est déjà arrivé", dit Marie.

e. "J'ai promis de le faire", a dit le Président. "Et, a-t-il ajouté, je le ferai".
(litt.) *"I promised to do it" said the President. "and", added he, "I will do so."*

In some (but by no means all) constructions, incidentality correlates with other properties, in particular pragmatic properties. For example, integrated relative clauses (so-called 'restrictive RCs') are part of the main content, whereas incidental relative clauses ('nonrestrictive RCs') convey conventional implicatures (Potts, 2005). This is not the case with IQCs: they are part of the main content, as shown by the fact that they can be denied with the usual means.

(29) A: "Le Président est arrivé", a annoncé Marie.
"The president has arrived", Marie announced.

B: C'est faux ; c'est le chef de cabinet qui l'a dit !
That's not true—the chief of staff said that!

We follow Bonami & Godard's (2007) analysis of incidental adjuncts: incidental adjuncts are clause modifiers, which may linearize in various positions due to the absence of compaction of the head VP daughter inside the French sentence. Adjunct phrases are always compacted, and non-head daughters are compacted in a general way: the only phrases that are not compacted are complement VPs marked as [INV *np-inv*]. Figure 4 illustrates this general analysis in the case of a modal adverb.

We thus take ICQs to be incidental adjuncts. To account for their placement properties, we need to be more precise about the phonology and word-order domains of quotation phrases. When a French sentence is quoted, the IQC may linearize anywhere among the main constituents of that sentence. This follows directly if the quotation phrase (which dominates the quotative sequence, see (11)) inherits the DOM elements of its daughter. When what is quoted is not a French sentence

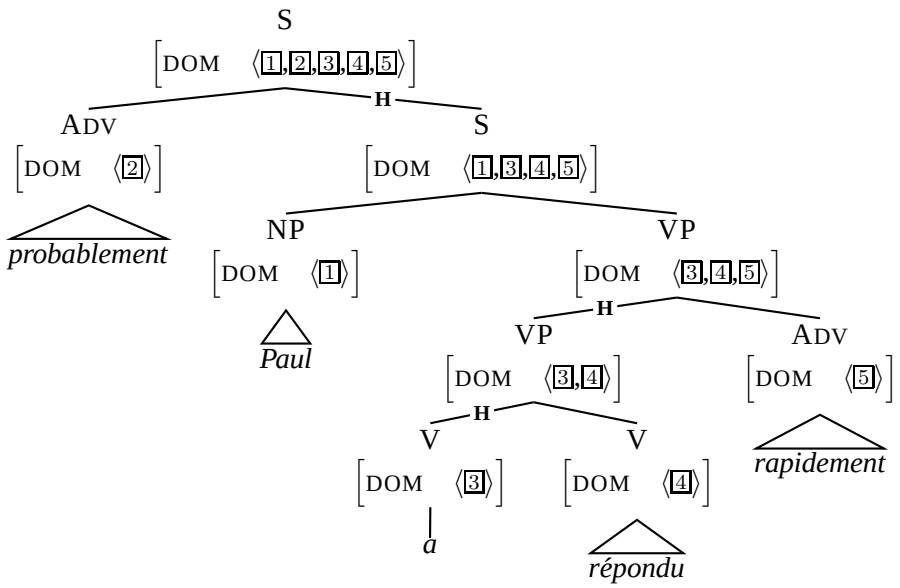


Figure 4: Bonami and Godard's (2007) analysis of incidental adjuncts

(i.e. is a non linguistic sign, or a sign in a foreign language), there is no syntactic analysis for the quoted element, and thus no DOM value to inherit. As a consequence, the IQC may only linearize at the right edge of the quotation (30–31). In addition, the quotation needs not have a PHONOLOGY that conforms to French phonotatics—it may even involve no sound production. To account for this, we operate a distinction between *homolinguistic* and *non-homolinguistic* quotation phrases (32). French homolinguistic quotations are quotations of a French sign. Their phonology is normal French phonology, and their DOM value is inherited from the embedded sign. Non-homolinguistic quotations can be the quotation of any type of behavior. They have a single object on their domain, whose phonology is of a special type *any-phon*, which is a placeholder for any type of realization (that does not need to conform to French phonotactics).

(30) a. "Pshhhhhhh", fit le pneu de la voiture.
The car's tire went "pshhhhh".

b. *"Pshhhh, fit le pneu de la voiture, "shhhh"

(31) a. "Ich bin hungrich", dit Paul.
"Ich bin hungrich", Paul said.

b. *"Ich bin", dit Paul, "hungrich". le pneu de la voiture.

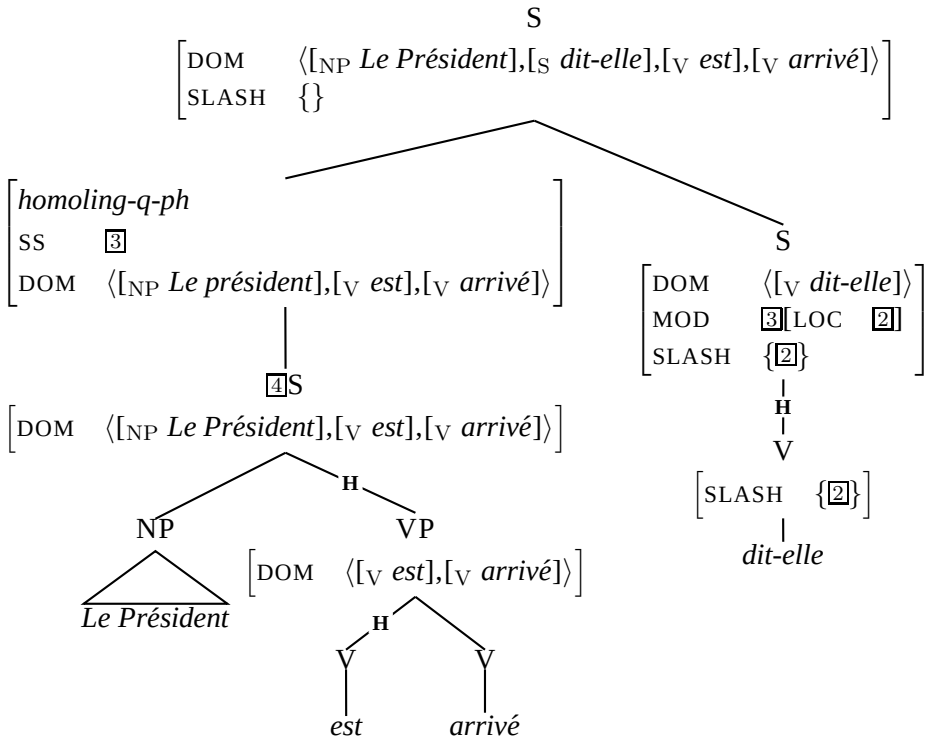


Figure 5: Analysis for (28b)

(32) a. *homoling-q-ph* →*quotation-ph* ∧ [PHON *fr-phon*; DOM 1] — [*fr-sign*; DOM 1]

b. *other-q-ph* →*quotation-ph* ∧ [DOM ⟨[*dom-obj*; PHON *any-phon*]⟩] — *behavior*

Figure 5 illustrates most features of the analysis. The contrast between (28a) and (28e) follows from a constraint on complete utterances.[7]

[7]That constraint may be generalized to other types of incidental clauses, such as the ones in (i-ii). We leave this issue to a future study.

(i) Paul a, semble-t-il, répondu à Marie.
Paul has, it seems, answered Marie.

(ii) *Semble-t-il, Paul a répondu à Marie.

(33) *utterance*→$\left[\text{DOM} \quad \left\langle \neg\left[\text{SLASH} \quad \left\{\left[\text{CONT } \textit{behavior}\right],\ldots\right\}\right],\ldots\right\rangle\right]$

A A more realistic semantics for quotation

In section 1, on the basis of Clark and Gerrig's view of quotation as demonstration, we proposed a semantics for quotation that can be summarized as in (34b).

(34) a. Marie a dit "Mon frère est arrivé."
Marie said "My brother has arrived."

b. $\exists u[\mathsf{resembles}(u, \text{“}\texttt{Mon frère est arrivé}\text{”}) \wedge \mathsf{say}(\mathsf{m}, u)]$
Marie produced an utterance that resembles the utterance the speaker produces when he says "Mon frère est arrivé."

This analysis was then encoded in HPSG, using the unary *quotation-ph* defined in (11). This HPSG analysis has three problematic features. First, the argument of the say relation is taken to be a *sign*, whereas entities occurring as component parts of CONTENT values are normally segregated to a subhierarchy of semantic objects (*sem-obj*). Using nonsemantic objects as arguments to relations is bound to pose problems when an explicit model-theoretic semantics for CONTENT values is constructed. Although it is customary in HPSG studies to leave aside the construction of such an explicit semantics, when possible one should avoid proposing analyses that hamper such a construction. Second, since non-linguistic behavior can be quoted, the proposed analysis forces us to model explicitly non-linguistic behavior as part of the HPSG type hierarchy. Although such an extension is quite limited as presented here (in Figure 1 we only introduced a few new types, and did not propose a featural analysis of non-linguitic behaviors or of non-homolinguistic signs), it modifies the very definition of the empirical domain modelled by an HPSG theory. Such a move should be thouroughly motivated, and it is not clear that quotation is a sufficient motivation. Finally, there is a more directly analytic problem with the proposed analysis: it does not give us the right logic for quotations. When a quotation occurs in the scope of negation or a quantifier, the resembles relation can be embedded in that scope, as illustrated in (35–36). In effect, quotations behave like indefinite NPs whose restrictor is the resembles relation. The use of BACKGROUND in (11) does not allow such a scopal behavior, because BACKGROUND information always gets maximal scope.

(35) Marie n'a pas dit "Je dors."
$\neg\exists u[\mathsf{resembles}(u, \text{“}\texttt{Je dors}\text{”}) \wedge \mathsf{say}(\mathsf{m}, u)]$

(36) Tout le monde a dit "Je dors."
$\forall x[\mathsf{human}(x) \rightarrow \exists u[\mathsf{resembles}(u, \text{“}\texttt{Je dors}\text{”}) \wedge \mathsf{say}(x, u)]]$

We now outline an alternative analysis.[8] The general idea is to keep the CONTENT value of the quotation distinct from the quoted sign in the feature structure, but to equate them via a metaconstraint on the model theoretic interpretation of CONTENT object. To make this idea precise, we need to be explicit about the interpretation of HPSG descriptions. Let $[\![\cdot]\!]_{ling}$ be the interpretation function that maps HPSG descriptions to feature structures (or other appropriate model objects). $[\![\cdot]\!]_{ling}$ maps the CONTENT value of a sign to a feature structure, which is the HPSG equivalent of a logical form for that sign. So one still needs to provide a model-theoretic interpretation of that object; let us call $[\![\cdot]\!]_{sem}$ the function providing that interpretation.

Whereas HPSG descriptions are interpreted in a very specific domain (of feature structures or other appropriate objects), CONTENT values are interpreted in an very general domain, containing (models of) individuals, properties, propositions, etc. Since this domain is very general, we can assume that it also includes as a component part the domain of feature structures; that is, the domain of $[\![\cdot]\!]_{ling}$ is a proper part of the domain of $[\![\cdot]\!]_{sem}$. Then we can take quotations to have feature structures of type *sign* as their interpetation via the $[\![\cdot]\!]_{sem}$ interpretation function. This allows us to cleanly separate CONTENT values from signs in the syntax of HPSG descriptions (and in the linguistic interpretation $[\![\cdot]\!]_{ling}$ of these descriptions) while keeping the intuition that the CONTENT of a quotation is a sign. Specifically, we replace the definition of *quotation-ph* in (11) with the one in (37). The metaconstraint linking the two interpretation functions makes sure that the semantic interpretation of the index u' coincicides with the linguistic interpretation of the quoted sign.[9]

(37) *homoling-q-ph* $\rightarrow$

$$\begin{bmatrix} \text{PHON} & \textit{fr-phon} \\ \text{CONT} & \boxed{1} \\ \text{STORE} & \left\{ \boxed{1} \begin{bmatrix} \exists\textit{-rel} & \\ \text{IND} & u \\ \text{RESTR} & \left\{ \mathsf{resembles}(u, u') \right\} \end{bmatrix} \right\} \\ \text{DOM} & \boxed{2} \end{bmatrix}$$

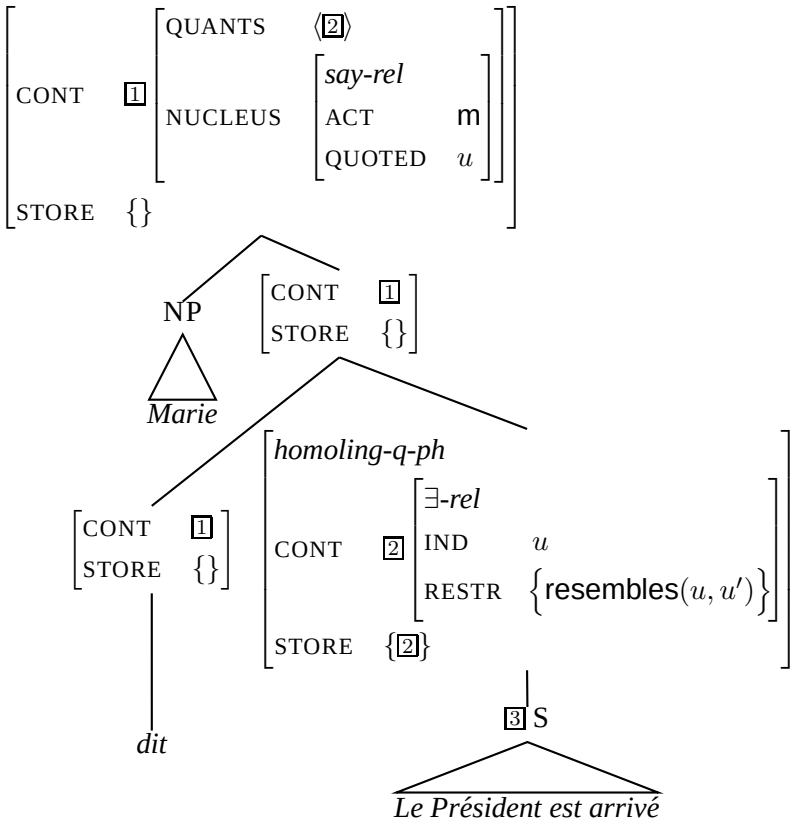
$$\Big| \quad \boxed{3} \begin{bmatrix} \textit{sign} & \\ \text{DOM} & \boxed{2} \end{bmatrix}$$

Metagrammatical constraint: $[\![u']\!]_{sem} = [\![\boxed{3}]\!]_{ling}$

Notice that we are assuming a treatment of scope along the lines of (Ginzburg and Sag, 2000). The new analysis is illustrated in Figure 6. On this analysis, nonlinguistic behaviors need not be modelled explicitly. The type hierarchy in Figure 1 is dropped in favor of a more conventional hierarchy of (homolinguistic) signs.

[8] We are indebted to Frank Richter and Manfred Sailer for suggesting this approach

[9] The formalization of this metaconstraint is far from trivial, and depends heavily on controversial assumptions on the foundations of HPSG. We leave this issue for future work.



where $[\![u']\!]_{sem} = [\![\boxed{3}]\!]_{ling}$.

Figure 6: The final analysis of direct quotation

Selectional restrictions of quotative verbs need not be encoded explicitly as typing requirements on CONTENT values, as in (14), but can be assumed to be verified at the level of model-theoretic semantic interpretation.[10] The Non-homolinguistic quotations are treated as a lexical entry[11] with a special phonology (38). The mimicking relation is not made explicit for nonhomolinguistic quotations, because non-homolinguistic behavior is not modelled explicitly.

[10] Alternatively, selectional restrictions can be verified syntactically by using a subtyping of indexes.

[11] Or alternatively, as a phrase with an empty DTRS list.

(38) *other-quotation* $\rightarrow$ *word* $\wedge$
$$\begin{bmatrix} \text{PHON} & \textit{any-phon} \\ \text{CONT} & \boxed{1} \\ \text{STORE} & \left\{ \boxed{1} \begin{bmatrix} \exists\textit{-rel} & \\ \text{IND} & u \\ \text{RESTR} & \{\} \end{bmatrix} \right\} \end{bmatrix}$$

References

Authier-Revuz, Jacqueline. 1992. Repères dans le champ du discours rapporté. *L'information grammaticale* 55, 38–42.

Bonami, Olivier and Godard, Danièle. 2007. Integrating Linguistic Dimensions: The Scope of Adverbs. In Stefan Müller (ed.), *Proceedings of the 14th International Conference on Head-Driven Phrase Structure Grammar*, pages 25–45, Stanford: CSLI Publications.

Bonami, Olivier and Godard, Danièle. to appear. Les ajouts de citation du français : éléments de classification. In Élisabeth Richard (ed.), *Entre oral et écrit : incise, incidente, parenthèse*, Presses Universitaires de Rennes.

Bonami, Olivier, Godard, Danièle and Marandin, Jean-Marie. 1999. Constituency and word order in French subject inversion. In Gosse Bouma, Erhard Hinrichs, Geert-Jan Kruijff and Richard T. Oehrle (eds.), *Constraints and resources in natural language semantics*, Studies in constraint-based lexicalism, pages 21–40, Stanford: CSLI Publications.

Brabanter, Philippe de. 2005. *Hybrid Quotation. Belgian Journal of Linguistics 17*.

Cappelen, Herman and Lepore, Ernest. 2007. *Language Turned on Itself*. Oxford: Oxford University Press.

Clark, Herbert H. and Gerrig, Richard J. 1990. Quotations as demonstrations. *Language* 66, 764–805.

Cornulier, Benoît de. 1973. *Considérations illustrées de quelques arbres et enrichies de plus de mille exemples sur les incises en français contemporain*. Ph. D.thesis, Université de Provence.

Davidson, Donald. 1979. Quotation. *Theory and Decision* 11, 27–40, reprinted in *Inquiries into Truth and Interpretation*, Oxford University Press, 1984.

Delais-Roussarie, Elisabeth. 2005. La prosodie des incidentes en français. *Cahiers de grammaire* 30, 129–138.

Delaveau, Annie. 1988. La Voix et les bruits. Note sur les verbes introducteurs du discours rapporté. *LINX* 18, 125–135.

Desmets, Marianne and Roussarie, Laurent. 2000. French reportive *comme* clauses: a case of parenthetical adjunction. In Dan Flickinger and Andreas Kathol (eds.), *Proceedings of the 7th Internationa Conference on HPSG*, pages 43–62.

Fagyal, Zsuszanna. 2002. Prosodic boundaries in the vicinity of utterance-medial parentheticals in French. *Probus* 14, 93–111.

Geurts, Bart and Maier, Emar. 2005. Quotation in context. *Belgian Journal of Linguistics* 17, 109–128.

Ginzburg, Jonathan and Sag, Ivan A. 2000. *Interrogative Investigations. The Form, Meaning, and Use of English Interrogatives*. Stanford: CSLI Publications.

Jackendoff, Ray. 1984. On the Phrase *the Phrase* 'the Phrase'. *Natural Language and Linguistic Theory* 2, 25–37.

Kayne, Richard S. 1972. Subject inversion in French interrogatives. In J Casagrande and B Saciuk (eds.), *Generative studies in Romance languages*, pages 70–126, Newbury House.

Mertens, Piet. 2004. Quelques aller-retour entre la prosodie et son traitement automatique. *Le français moderne* 72, 39–57.

Monville Burston, Monique. 1993. Les *verba dicendi* dans la presse d'information. *Langue française* 98, 48–66.

Postal, Paul M. 2004. *Skeptical Linguistic Essays*. Oxford: Oxford University Press.

Potts, Christopher. 2005. *The Logic of Conventional Implicatures*. Oxford: Oxford University Press.

Potts, Christopher. 2007. The dimensions of quotation. In Chris Barker and Pauline Jacobson (eds.), *Direct Compositionality*, pages 405–431, Oxford: Oxford University Press.

Pullum, Geoffrey K. and Scholz, Barbara C. 2001. On the Distinction between Model-Theoretic and Generative-Enumerative Syntactic Frameworks. In *Proceedings of LACL 2001*, Springer Verlag, Berlin.

Recanati, François. 2001. Open Quotation. *Mind* 110, 637–687.

Verb form alternations in Mauritian

Fabiola Henri
Université Paris-Sorbonne

Anne Abeillé
LLF

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 378–398

Henri, Fabiola & Anne Abeillé. 2008. Verb form alternations in Mauritian. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 378–398. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.22.
CC-BY 4.0

1 Introduction

As is the case with some Creoles and African languages (Bantu, Gur among others) Mauritian has an alternation between two verb forms[1]: a short and a long form (henceforth SF and LF)[†], as is the case in (1a) where the verb has a long form without complement and in (1b) where the verb has a short form with a complement.

(1) a. Mo ti manze (*manz).
1SG PST eat.LF (*SF)
'I ate.'

b. Mo ti manz (*manze) kari.
1SG PST eat.SF (*LF) curry
'I ate curry.'

Analyses in terms of government and case assignment (Syea (1992); Hertz and LiPookTan (1987)) or predicate raising (functional/ecological analysis) (Seuren (1990)) have been proposed to account for the phenomenon, comparing it with auxiliary reduction not available in English when followed by a trace. The explanation as it is then accounts for vowel truncation as well as the absence of the copula in declarative clauses. However, as already suggested by Hertz and LiPookTan (1987), there are cases where the short form appears and where the verb does not seem to assign case, in which case an independent mechanism should be used so that case assignment is applied independently from government. The analysis advocated by Seuren (1990) also happens to be inadequate as intensively argued by Syea (1992). Basically, he formulates a principle of "maximizing semantic transparency" which regulates the output structures of predicate raising thus blocking the application of verbal truncation[2].

We propose an alternative account, precisely a constraint-based account of verb form alternation in Mauritian which accounts for the lack of LF with complements but we also consider discourse factors which enable LF to appear with a complement in case of Verum Focus (Höhle (1992)). As far as syntactic constraints are concerned, verbal alternation is but another example of verb sensitivity to argument realization (*cf.* Bouma et al. (2001) for other examples) and provides an argument in favor of a lexical analysis of extraction phenomena.

[1] We prefer to say that there is alternation instead of truncation (Syea (1992); Hertz and LiPookTan (1987)) or syncopation (Seuren (1990)).

[†] We wish to thank Jean-Marie Marandin, Danièle Godard, Olivier Bonami, and Frédéric Laurens for their comments and feedback on this paper. All remaining mistakes are of course our own. We also wish to thank Muhsina Allesaib and Chin Lan Leung for their judgments on the Mauritian data and Jeanne Fortilus on the Haitian data.

[2] For a critical analysis of Seuren (1990)'s work see Syea (1992). Note also that Verbal Truncation has been thought of as being a semantic phenomenon by Papen & Corne Papen (1978); Corne (1982)

2 Basics on Short Forms and Long Forms

Baker (1972) observes that 70% of the verbal lexicon is subject to this alternation and that those verbs are all vowel final *e* or *i*.

(2) a. Pol pou vinn (*vini) kot mwa.
Paul IRR come.SF (*LF) PREP 3SG.acc
'Paul will come at my place.'

b. Pol pou vini (*vinn).
Paul IRR come.LF (*SF)
'Paul will come.'

We admit four verb classes with respect to their morphology and the context in which they appear as is illustrated in (3).

(3)

	e ***-final***	***i*** ***-final***	**Others**	
			Non-alternating verbs	**Copula**
Short Form	al, manz, konn, avoy, touy, ferm, res, ploy, tann, rant, tom, mouy, pers...	sort vinn	bwar, krwar, pini, le balye, tenir, kouver, fer promne, atann, viv ...	-
Long Form	ale, manze, kone avoye, touye, ferme reste, ploye, tande rantre, tonbe, mouye, perse...	sorti vini		ete

We consider that we have different lexical entries for Long and Short Forms which have different syntactic constraints. These concern some *i* final verbs (only two of them) and *e* final verbs[3] which are phononologically determined (section 2.1). The third class concerns verbs that have the same form in both environments, i.e the same form would appear where a SF or a LF is expected. And finally we consider the copula as a special class having no short counterpart and, as Henri and Abeillé (2007) demonstrate, appear in extraction contexts (See section 4.2).

2.1 Morphophonological Rules

The citation form being always the LF, Corne 1982 (pp 50-52) proposes the following phonological rules. The first rule stipulates that a syllable-final *r* lengthens when a vowel precedes it. The second says that the final vowel is deleted if the verb belonging to the appropriate class is followed by specified items (here X). The problem with this rule is that a verb like *kone* 'to know', which is a stative, is also subject to truncation. The third rule concerns homorganic stop-nasal assimilation while the fourth has to do with denasalization. Finally the last rule affects

[3]These are basically French verbs form the first and third group

those verbs which have a consonant cluster like *reste, paste* and so on. However verbs like *koste, aste, poste, promne,* among others, do not allow truncation[4].

(4) a. $r \rightarrow$: / V___ $\left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$ **eg: /marse/ → /maːs/**

b. $\begin{bmatrix} V \\ \text{-Back} \end{bmatrix} \rightarrow \emptyset$ /VC____# + X]Action **eg: /koze/ → /koz/**

c. $\begin{bmatrix} \text{+cons} \\ \text{+voice} \\ \text{+stop} \end{bmatrix} \rightarrow \begin{bmatrix} \text{+cons} \\ \text{+nas} \end{bmatrix}$ / $\begin{bmatrix} \text{-cons} \\ \text{+nas} \end{bmatrix}$____ # **eg: /demãde/ → /demɑn/**

d. $\begin{bmatrix} \text{+cons} \\ \text{+nas} \end{bmatrix} \rightarrow \begin{bmatrix} \text{-cons} \\ \text{-nas} \end{bmatrix}$ / ____ $\begin{bmatrix} \text{+cons} \\ \text{+nas} \end{bmatrix}$ **eg: /tõbe/ → /tom/**

(only oral vowels occur before nasal consonants)

e. $C_2 \rightarrow \emptyset$ / VC_1____ $\begin{bmatrix} V \\ \text{-back} \\ \text{-high} \end{bmatrix}$#

Condition: C_1 is not *r* **eg: /reste/ → /res/**

Note that the rules are applicable to new verbs as well provided they fit into the given rules: a verb like *fakse* 'to fax'[5] does not undergo alternation but one like *telesarze* 'to download' does. The same goes for *mail* 'to mail or *chat* 'to chat' since, unlike French, they didn't pattern on the verbs of the first group but retained their English forms.

We are not dealing with a phonological phenomenon here, but a truly morphological alternation[6]. Only certain verbs are concerned (not all verbs with *e* or *i* final are shortened.) As will be seen in the following section, shortening applies only under syntactic (and eventually pragmatic) conditions and not under phonological constraints. In other words, neither the phonological form of the complement nor adjacency is a determining factor for vowel shortening in Mauritian.

[4]He also notes a very interesting fact that some verbs which do not usually undergo truncation do so when they are reduplicated because they are strictly intransitive. Examples of these are *ronf-ronfle* 'to snore-snore' or *tranb-tranble* 'to shiver-shiver' for instance, which we leave aside for the purpose of this paper. See Henri (to appear) on Verbal Reduplication.

[5]This is expected since all verbs having phonemic sequence /-kse/ (*bokse* 'to box', *takse* 'to tax', *pakse* (civil pact of solidarity) and so forth. This suggests that the last rule provided by Corne (1982) is insufficient or not constrained enough.

[6]See Crysmann (2005) for a similar argument in cases of Final Vowel Shortening in Hausa.

(5) a. Li manze (*manz) toultan
3SG eat.LF (*SF) always
'He always eats.'

b. Li manz (*manze) toultan kari poul
3SG eat.SF (*LF) always curry chicken
'He always eats chicken curry.'

3 The data: Syntactic Constraints

The data in this section shows that SFs and LFs of Mauritian verbs are clearly syntactically driven and encode argument realization sensitivity on the verb.

3.1 Short Forms

Leaving discourse aside for the moment the verbal form is SF if it has a canonical complement and otherwise LF.

(6) a. Zan inn zet (*zete) enn sak.
John PERF throw.SF (*LF) a bag
'John has thrown away a bag.'

b. Zot/Mari (pou/va) manz (*manze) banann.
3SG/John IRR/IRR.IND eat.SF (*LF) banana
'They/Mary will/would eat banana.'

c. Mo/Nou res (*reste) malad.
1SG/1PL stay.SF (*LF) sick
'I/We remain sick.'

Hence in (6a)-(6c), the verb remains invariable whether the subject is singular or plural, masculine or feminine, or whatever TMA marker precedes it, but has a short form because it is followed by an NP (6a), a bare noun (6b), and an AP (6c). The object needs not be adjacent to the verb, as is demonstrated in (5b). With a verb like *dat* a temporal PP is obligatorily needed as complement hence triggering the SF (7a). (7b) shows an adverbial type of complement and the verb still has the SF because the AdvP is analyzed as a truly selected dependent of the verb:

(7) a. Liv la dat (*date) depi sink an.
book DEF date.SF (*LF) since five year
'Lit. The book dates from five years ago.'

b. Zan koz (*koze) bien.
John speak.SF (*LF) well
'John speaks well.' (Generally)

Similarly, VP complements (8a)-(8c) behave like any phrasal complements previously mentioned, thus allowing the SF to surface, even those marked by the marker *pou* (8c)[7].

(8) a. Zan pe konn (*kone) dans (*danse) sega.
John PROG know.SF (LF) dance (LF) sega
'Lit. John is knowing how to dance the sega.'

b. Zan ti vinn (*vini) manze (*manz).
John PST come.SF (*LF) eat (*SF)
'Lit. John came to eat.'

c. Zan pans (*panse) [pou pas (*pase) so HSC_{VP}].
John think (*LF) AUX pass.SF (*LF) 3SG.POSS HSC
'Lit. John thinks of passing his HSC.'

Contrary to other languages,in particular Haitian and Hausa, which both have a verb form alternation, a pronominal complement also triggers the SF.

(9) Mo'nn trouv (*trouve) li.
1SG'PERF see.SF (*LF) 3SG
'I have seen him/her.'

Postverbal subjects with unaccusative verbs also trigger SFs, which is expected if we analyze them as complements. This concerns a sub-class of intransitive verbs which have the possibility of having a (non-agentive) inverted subject. For instance inversion is possible with *arive* 'to arrive', *reste* 'To stay/remain' but not with *koze* 'to speak/talk'.

(10) a. Inn ariv (*arive) enn aksidan.
PERF arive.SF (*LF) IND accident
Lit. '(There) has happened an accident.'

b. Enn aksidan inn arive (*ariv).
IND accident PERF arrive.LF (*SF)
'An accident has happened.'

(11) a. Enn profeser inn koze (*koz)
A teacher perf speak.LF (*sf)
'A teacher has spoken.'

b. *Inn koze enn profeser.

c. *Inn koz enn profeser.

[7]This marker is to be distinguished from the irrealis *pou*. It has the same properties of infinitival 'to' in English and can be analyzed an an auxiliary verb which takes an 'non-finite' phrase as complement.

3.1.1 Ditransitives

Ditransitives are like other verbs and thus have a SF if one of their complements or both are present as in (12).

(12) Mo'nn donn (*done) Zan enn sak.
1SG'PERF give.SF (*LF) John a bag
'I have given John a bag.'

(13) a. Kisannla Zan inn donn (*done) enn sak?
who John PERF give.SF (*LF) a bag?
'To whom has John given a bag?'

b. Ki Zan inn donn (*done) Mari?
what John PERF give.SF (*LF) Mary
'What has John given Mary?'

If both complements are extracted LF surfaces (14).

(14) Ki Zan inn done (*donn)?
what John PERF give.LF (*SF)
'What has John given?'

3.2 Long Forms

The LF appears when the verb has no complements as illustrated in (1a). It are also available if PPs and adverbials follow the verb because they are modifiers. (15) requires LF since the adverbial phrase *depi yer* is an adjunct.

(15) Nou/Zan (ti/pe) marse (*mars) depi yer.
2PL/John walk (*SF) since yesterday
'We/John walk(s)/was/is walking since yesterday.'

Prepositional Phrases can either be considered as truly selected dependents of the verbs, thus requiring the SF or as adjuncts thus trigering the LF. Compare for instance (16a vs 16b) and (17a vs 17b) where the PP complements either trigger a LF or a SF and a clear semantic difference is apparent.

(16) a. Zan/li pe/ti mars lor disab.
John/he PROG/PST walk.SF PREP sand
'John/He is/was walking on the sand.'=(location.)

b. Zan/li pe/ti marse lor disab.
John/he PROG/PST walk.LF PREP sand
'John/He is/was walking on the sand.'(=Directional.)

(17) a. Li pe al dan loto.
3SG PROG go.SF PREP car
'He intends to go by car.'

b. Li pe ale dan loto.
3SG PROG go.LF PREP car
'Lit. He is going by car (as we speak)

(18)-(19b) show that the LF is again needed if the verb is followed by clauses. Nonetheless, a distinction needs to be made between the first example (18) and the other ones (19a-19b). LF is expected in (18) since it is followed by an adjunct clause but not in (19a-19b). It has been actually observed crosslinguistically that sentential complements are less integrated than phrasal ones. This is the case for instance in German where they are extraposed and in incorporating languages where they are not incorporated, etc.

(18) Zan pa manze (*manz) [parski li malad].
John NEG eat (*SF) because 3SG sick
'John doesn't eat because he's sick.'

(19) a. Zan panse (*pans) [(ki) banann la pa bon].
John think (*SF) COMP banana DEF NEG good
'John thinks (that) the banana is not good.'

b. Mo pa kone (*konn) [kifer li pa kontan mwa/kot Mari ete].
1SG NEG know (*SF) why 3SG NEG like 1SG.ACC/where Mary COP
'I don't know why he doesn't like me/where Mary is.'

Notice also that linear order is important in case of two complements. In (20a-20b), the verb *demande* has two complements. In the first case, the verb is LF because the first complement is a clause while in (20b), the verb is SF because the first complement is not a clause.

(20) a. Mari inn demande (*SF) [kiler la] [ar tou dimounn].
Mary PERF ask.LF (*SF) what-time DEF with all people
Lit. 'Mari asked what time it was to everyone.'

b. Mari inn demann (*LF) [ar tou dimounn] [kiler la].
Mary PERF ask.SF (*LF) with all people what-time DEF
'Mari asked everyone what time it was.'

Hence, it seems that linear order and the type of complement are decisive when it comes to selection of the verb form.

3.2.1 Extraction

Extraction of the complement calls for the LFs : extraction of a NP in (21a), of an adverb in (21b) and of a PP in (21c).

(21) a. Tibaba ki mo mama ti veye (*vey) toule zour.
DP.baby COMP 1SG.POSS mother PST look-after (*SF) every day
'It's little babies that my mother looked after every day.'

b. Kimanyer Zan koze (*koz)?
How John talk.LF (*SF)
'How does John talk?'

c. Kot Zan pe marse (*mars)?
where John PROG walk.LF (*SF)
'Where is John walking?'

Unlike extractions, left or right dislocated complements call for SFs since a pronoun is needed as illustrated .

(22) a. Kari la, Zan ti manz (*manze) li.
curry def John PST eat.SF (*LF) 3SG
'The curry, John ate it.'

b. Zan ti manz (*manze) li, kari la.
John PST eat.SF (*LF) 3SG curry DEF
'John ate it, the chicken.'

This provides another argument in favor of a lexical-based analysis of extraction (Abeillé et al. (1998); Miller and Sag (1997); Crysmann (2005); Bouma et al. (2001)).

3.2.2 Passives

Let us note that LFs/SFs alternation is not available in the passive voice (23a)-(23b).

(23) a. Zan ti'nn oblize (*obliz) vann so lakaz.
John PST'PERF oblige.LF (*SF) sell 3POSS house
'John was being obliged to sell his house.'

b. Mari pe gagn bate (*bat) ar so mama.
Mary PROG get beat.LF (*SF) with 3SG.POSS mother
'Mary is getting beaten by her mother.'

We thus consider that we have another lexical entry for passive forms[8].

To sum up this section, we have seen that SFs appear when the verb has a canonical (non-clausal) complement and LFs appear when the verb is sentence-final or if it is followed by clausal complements or adjuncts. In the following

[8]For a descriptive analysis of passives in Mauritian see Veronique (1984).

section, we will see that there are cases where LFs are possible with non-clausal complements in declaratives, that is, where the SF is generally expected as previously demonstrated.

4 Discourse Constraints: Verum Focus

Interestingly, LFs may appear with a canonical complement in the context of specific dialogical moves. In (24b) for instance, we have an example of "proposition denial" and the reverse is also available (25b) (Geurts (1998)).

(24) a. SPEAKER A: Mo pe al kwi kari poul parski Zan kontan manz kari poul.
(I'm going to cook chicken curry because John likes to eat chicken curry.)

b. SPEAKER B: Be non. Zan pa MANZE kari poul.
But no. John NEG eat.LF curry chicken
'No, John doesn't EAT chicken curry.'

(25) a. SPEAKER A: Mo bizin al kwi enn lot zafer parski Zan pa manz kari poul.
(I need to cook something else because John doesn't eat chicken curry.)

b. SPEAKER B: Be non. Zan MANZE kari poul.
But no. John eat.LF curry chicken
'No, John EATS chicken curry.'

LFs are also possible in what Godard and Marandin (2006) call an "instance of deferment" (26b) and in incredulity questions (26d). However, these constructions are not necessarily associated with utterances because they can be embedded under verbs of perception, speech and opinion.

(26) a. SPEAKER A: Ki sa djaket la pe fer la? Mo ti zet tou bann vye zafer. (What is this jacket doing here? I threw away every old stuff.)

b. SPEAKER B: To ti ZETE sa djaket la?
2SG PST throw DEM jacket DEF
'Lit. You THREW away this jacket.'

c. SPEAKER B: Mo pa kone ki pou manze? Kapav rougay dan frizider la! (I don't know what to eat. Maybe the rougay in the fridge).

d. SPEAKER A: To pou MANZE sa rougay la!!!??
2SG IRR eat.LF DEM rougay DEF
'You will EAT this rougay?' (Hertz and LiPookTan (1987))

(27) Mo ti krwar Mari pa MANZE (*MANZ) kari poul!
1SG PST think Mary NEG eat.LF eat.SF curry chicken
'I thought Mary don't EAT chicken curry.

In their analysis of verb forms in Mauritian, Hertz and LiPookTan (1987) note that LFs can appear with complements (26d) and analyze this as contrastive focus. One argument against contrastive focus is the fact that the LF is not available as in (28a) and in (28b) on the second verb when a contrast or alternative is available.

(28) a. Li pa ti MANZE kari la, li ti (*DEVORE) devor kari la!.
3SG NEG PST eat.LF curry DEF, 3SG PST (*devour.LF) SF curry DEF
'He didn't EAT the curry, he devoured it.'

b. Zan pa ti DONN Mari liv la, li ti PRET (*prete) li.
John NEG PST give Mary book DEF, 3SG PST lend.SF (*LF) 3SG.ACC
'John didn't give Mary the book, he lent it to her.'

We also argue against verb focus since the LF is not possible in cases of narrow focus in an answer to a question as in (29b).

(29) a. Ki to'nn fer ar poul la? (What did you do with the chicken?)

b. Mo'nn MANZ (*MANZE) li.
1SG'PERF eat.SF LF li
'I ate chicken.

We believe instead that the phenomenon here is Verum focus, that is to say LFs with complements emphasize the truth or falseness of the proposition expressed by the sentence. Verum focus is used to highlight aspects of the polarity of the proposition expressed by the clause (Höhle (1992)). Indeed, the contexts we have seen are based on polarity reversal (often illustrated by *non* in both (25b)-(24b)). Verum focus as defined by Höhle (1992) does not require the proposition it asserts to have been explicitly evoked in the previous discourse (30b)).

(30) a. SPEAKER A: Dokter dir fime pa bon pou lasante. (Doctors say that smoking is bad for health.)

b. SPEAKER B: Lakoz samem mo'nn ARETE fime.
because this 1SG'PERF stop.LF smoke.LF
'This is why I STOPPED smoking.

LFs with non-clausal complements are possible only with declaratives which convey assertions, incredulity questions and so on, but are excluded with interrogatives, exclamatives and imperatives. If the phenomenon is Verum focus, this is expected.

(31) a. *Kisannla ki'nn MANZE roti? (Who ATE the roti?)

b. *MANZE kari poul la! (EAT the chicken curry!)

c. *Ala li MANZE roti sa boug la! (How he EATS roti this man!)

A final argument involves embedding. As said earlier, declaratives with LFs can be embedded under verbs of saying (*dir-*'to tell') or propositional attitudes (*krwar-*'to believe') but not under mandative (*le-*'want'), decidative predicates (*deside-*'to decide') or factive predicates (*kone-*'to know').

(32) a. Mo ti krwar Mari pa MANZE kari poul!
1SG PST think Mary NEG eat.LF curry chicken
'I thought Mary didn't EAT chicken curry.'

b. To pa ti dir mwa (ki) to pa MANZE kari poul!!!??
2SG NEG PST tell 1SG.ACC that 2SG NEG eat curry chicken
'Didn't you tell me that you don't EAT chicken curry!?

c. *Mo kone ki Zan MANZE kari poul.
1SG know that John eat.LF curry chicken
'I know that John EATS chicken curry.

d. *Mo'nn deside (ki) li MANZE kari poul.
1SG'PERF decide that 3SG eat.LF curry chicken
*'I've decided that he/she EATS chicken curry.'

Based on Ginzburg and Sag (2000)'s semantic ontology, clauses with LFs having complements should be of content type *proposition* and not *outcome* or *fact*. This is again expected with Verum Focus[9].

4.1 The copula

In Henri and Abeillé (2007), we argue that the copula *ete* is peculiar and has no null counterpart (whether as an empty element as has usually been suggested Baker and Syea (1991); Syea (1997) or as a phonologically empty element Bender (2001)). Recall that the copula in MC appears in extraction contexts. Based on the distribution of weak pronouns, TMA markers and the negator, we argue against a null copula in declaratives. Seuren (1990) proposes that *ete* should be considered as the long form and the short form as an empty element. A strong argument supporting our idea that the copula doesn't undergo alternation concerns Verum Focus. If *ete* was a LF, we would expect it in Verum focus contexts (33b).

(33) a. SPEAKER A: Zan pa'nn vinn lekol zordi. Li malad. (John didn't come to school today. He's sick.)

b. SPEAKER B: *Zan ETE malad?
John COP sick
'John IS sick?

[9]For a preliminary study of the prosody of such constructions see Henri et al. (2008).

We thus admit another “verbal class" corresponding to the copula which has only one form with specific constraints. (*cf.* Table (3)). We summarize our findings as follows:

(34)

Environment	SF	LF
V with canonical phrasal CPLTS (NPs,APs,ADVPS,VPs,PPs)	yes	no
V with no CPLTS	no	yes
V with adjuncts	no	yes
V with clausal CPLTS	no	yes
Extracted CPLTS	no	yes
Verum Focus	no	yes

Hence MC verb form alternation is subject to both syntactic and discourse constraints (see section 6 for a discussion on other languages).

5 A constraint-Based account within HPSG

The analysis we propose is developed in the framework of HPSG (Head-Driven Phrase Structure Grammar (Pollard and Sag (1994); Sag et al. (2003); Ginzburg and Sag (2000))). Within a constraint-based framework like HPSG, (head) features are defined in terms of type-hierarchies. We redefine the attribute VFORM, which is a **HEAD** value, with two values *long* and *short* to account for the types of verb available in MC. Non-alternating verbs, that is those that have the same form in the different environments we described, have an underspecified VFORM value.

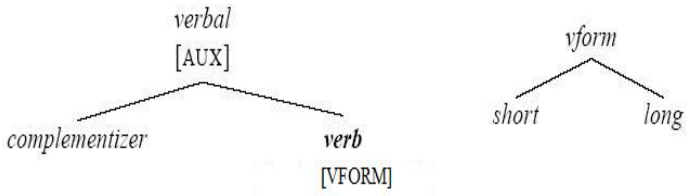


Figure 1: Type Hierarchy redefined

Notice also that we keep the feature AUX as a value of *verbal*. This is because we want to account for sentences where the complementizer *pou* is present. We define two lexical constraints to account for the occurrence of LFs and SFs. We put a lexical constraint on the verb: SFs need obligatorily to be followed by at least one non-clausal complement (35). We further define a lexical constraint on the occurrence of LF verbs (36).

(35) $$\begin{bmatrix} \textit{verb} \\ \text{HEAD} \mid \text{VFORM} \quad \textit{short} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{COMPS} \left\langle \boxed{2}\textit{non-clause} \right\rangle \oplus \textit{list} \end{bmatrix}$$

(36) $\left[\begin{array}{l} \textit{verb} \\ \text{VAL}\left[\text{COMPS} \quad \textit{list(clause)}\right] \end{array}\right] \Rightarrow \left[\text{VFORM} \quad \textit{long}\right]$

Notice that we leave the subject unspecified meaning that pro-drop is possible in both cases. In (35), the rule says that SFs are available iff the first element on the COMPS list is of type phrasal, while rule (36) says that if the element on the COMPS list is empty or clausal type, then we get a LF.

(37) a. Ti manz (*manze) poul pou nwel.
PST eat.SF (*LF) chicken for christmas
Lit. 'Ate chicken for christmas.'

b. Ki ti manze (*manz) pou nwel?
what PST eat.LF (*SF) for christmas
Lit. What did eat for christmas?

5.1 Formalizing Verum Focus

We follow Webelhuth (2007) in representing focused elements in a special subpart of a structured CONTENT. Recall that Verum Focus is a focus on polarity which is expressed as a boolean feature at the SOA level.

(38) $\left[\text{SOA}\left[\begin{array}{l} \textit{partioned-soa} \\ \text{NUCLEUS} \ \textit{rel} \\ \text{FOC} \ \textit{list(rel)} \end{array}\right]\right]$

We admit that in MC we have three types of LF verbs- normal ones, passives and focused verbs. To account for the occurrence of LFs in declaratives, we propose a constraint which says that a clause which is of type *proposition* and has a partitioned SOA which contains a focus on the (positive or negative) polarity of the clause.

(39) $\left[\begin{array}{l} \textit{clause} \\ \text{CAT}\left[\text{HEAD} \ \textit{verb}\right] \\ \text{CONT}\left[\begin{array}{l} \textit{proposition} \\ \text{SOA}\left[\begin{array}{l} \text{POLARITY} \ \boxed{2}\left\{+/-\right\} \\ \text{FOC}\left\langle\left[\begin{array}{l} \textit{polarity-rel} \\ \text{ARG} \ \boxed{2} \end{array}\right]\right\rangle \end{array}\right] \end{array}\right] \end{array}\right] \Rightarrow \left[\text{HEAD}\left[\begin{array}{l} \textit{verb} \\ \text{VFORM} \quad \textit{long} \end{array}\right]\right]$

To conclude our paper, we provide some comparative data from other languages which display the same type of alternation, particularly French and other French-based Creoles (Louisianese and Haitian) and some (possible) substrates (Hausa and Tswana).

6 Diachronic Explanation and Comparison with other Languages

Verbal alternation between SFs and LFs is found in other languages and we look at these related to MC.

6.1 French

Two types of verbal alternation can be found in French. First, in standard written French, the past participle agrees with with the direct object when it is not canonically realized.

(40) a. Pierre a écrit (*écrite) une lettre
Peter AUX (*written) written+AGR IND.FEM letter
'Peter has written a letter.'

b. La lettre que Pierre a écrite (*écrit)
DEF.FEM letter that Peter AUX written+AGR (*written)
'The letter that Peter has written.'

c. La lettre, Pierre l'a écrite (*ecrit)
The letter Peter PRO.CL'AUX written+AGR (*written)
'The letter, Peter has written it.'

We have a sort of LF **/ekrit/** and a SF **/ekri/** with respect to how the complement is realized. A canonical object triggers a SF while a non-canonical object triggers the LF. In the 17th-18th century, there were cases (observed by Vaugelas) where the SF was possible if the verb had another complement[10]:

(41) La lettre que Pierre a écrit pour vous
def letter that Peter has written for you
'The letter that Peter has written for you.'

Second, as argued by Veenstra and Becker (2003), spoken French simplified verbal morphology could be analyzed in terms of SFs and LFs. According to them, SFs/LFs alternation is a L2 phenomenon in Mauritian: **/ʒ(ə)/ty/õ/il mãnʒ/, /vu mãnʒe/ (present); /ʒ(ə)/ty/õ/il a mãnʒe/ (past)**. Their hypothesis is that second language speakers must have reanalyzed and grammaticalized this paradigm in Mauritian Creole and this should also be expected in other French-Based Creoles. We will consider here Haitian and Louisianese (Degraff (2001); Neumann (1985)). Other possible explanations come from the substrate: the SFs/LFs alternation could

[10]Past participle agreement was more alive in the 18th century and was also heard on final vowel participles.

- J'ai lu la lettre. (**/ly/**)
- La lettre que j'ai lue. (**/ly:/**)

be residuals of African languages. We look at Hausa and Tswana data (Crysmann (2005); Creissels and Robert (1998); Veenstra (2007)) in section 6.3.

6.2 Other French-based Creoles : Haitian and Louisianese

In Haitian, the syntactic constraints seem to be quite similar to MC in (42a-42b) but apparently the SFs/LFs selection is also subject to dialectal variation. As Degraff (2001) suggests, there are variations where the long form is available with a canonical complement. However compared to MC, pronominal objects prevent verbal truncation (42c).

(42) a. Konbyen dan Tonton Bouki genyen (*gen)?
how-many tooth uncle Bouki has.LF (*SF)
'How many teeth does Uncle Bouki has?

b. Tonton Bouki gen (*genyen) 32 dan l.
Uncle Bouki has.SF (?LF) 32 teeth 3SG
'Uncle Bouki has (all of) his 32 teeth.

c. Tonton Bouki te gade (*gad) li.
Uncle Bouki PST look.LF (*SF) 3SG.ACC
'Lit. Uncle Bouki watched it.

An interesting point here again seems to be the occurrence of LFs in declaratives with canonical complements. According to our investigations the variation Degraff (2001) was suggesting is strongly correlated to what he himself called emphasis or some peculiar prosodic prominence. Basically, LFs in declaratives seem to be another case of Verum Focus in Haitian marked on the verb, where the epistemic implicature is that Uncle Bouki watched the movie (43).

(43) Tonton Bouki te GADE (*gad) yon fim.
Uncle Bouki PST look.LF (*SF) IND film
'Lit. Uncle Bouki watched a movie.

As for Louisianese, the difference is more outstanding. LFs/SFs alternation is used to mark tense and aspect. SFs are used in the present or habitual, imperative, after presentatives (44a)-(44b)[11] while LFs are used in the past or progressive (45b).

(44) a. Zordi le klos son (*sone) a onzer.
today the bell ring.SF (*LF) at eleven-hour
'Today the bell rings at eleven.'

b. Manj, manj, (*manje) ça va dèt frò
eat.SF eat.SF (*LF) it IRR get cold
'Eat, eat, it's going to get cold.'

[11] http://learnlouisianacreole.wordpress.com/category/12f-imperatives/

(45) a. Le klos ape sone (*son) aster.
the bell PROG ring.LF SF now
'The bell is ringing now.'

b. Yer le klos sone (*son) a witer.
yesterday the bell ring.LF SF at eight-hour
'Yesterday the bell rang at eight.'

Hence Louisianese departs from the constraints applying to the alternation SFs/LFs in Mauritian.

6.3 Substratic Influences

Disjunctive versus Conjunctive Verb Forms are the terms that have usually been used to define the alternation between long forms of verbs for some African languages (Tswana, Zulu for instance). Basically Disjunctive Forms are LFs and Conjunctive Forms are SFs. In Tswana, in the present positive tense, for example, the conjunctive/disjunctive distinction can be distinguished easily by a specific marker[12]. The conjunctive thus appears when the verb is followed by a complement while the disjunctive forms appears when it doesn't take any complement.

(46) a. di-kgomo di fula kwa noke-ng.
CL10-cow SM10 graze LOC river-LOC
'The cows graze/are grazing at the river.'

b. di-kgomo di a-fula
CL10-cow SM10 DISJ-graze
'The cows graze/are grazing.'

Creissels and Robert (1998) also argue that there are discourse constraints which apply when it comes to selection of disjunctive over conjunctive forms. For instance, focused postverbal complements trigger the disjoint form with a focus on the verb and is coreferent with the subject (47).

(47) Ba a-bina le bone.
SM3PL DISJ-dance CONJ 3PL
'They too dance/are dancing.'

The case of Hausa (Crysmann (2005)) is more similar to MC since SFs appear with canonical non-clausal complements and LFs with extraction and, like MC, the alternation does not concern all verb classes. This is illustrated in (48a) where the verb has a canonical complement and (48b) where the verb has no complement. However, in (48b), the verb would still be LF if it had a pronominal complement and this is where MC and Hausa differ. Hence pronominal affixation in Hausa triggers the LF in Hausa.

[12]The examples are taken from Creissels and Robert (1998); McCormack (2006).

(48) a. Na: ka:mà ki:fi.
1S.COMPL.ABS catch.V.GR1.C fish
'I caught fish.' (SF)

b. Na: ka:mà: (shi).
1S.COMPL.ABS catch.V.GR1.A/B (him)
'I caught it/(him). (LF)

Crysmann (2005) says that Final Vowel Shortening (FVS) is a morphosyntactic property of Hausa and is sensitive to argument realization (49a) and extraction (49b)). He argues that in cases of ditransitives, it is the strict argument realization pattern of the language which trigger the LF (49a).

(49) a. Na: ka:mà: wà Musa ki:fi.
1S.COMPL.ABS catch.V.GR1.D=A for Musa fish
'I caught fish for Musa.' (LF)

b. ki:fin dà na ka:mà:
fish.def comp 1S.COMPL.ABS catch.V.GR1.A
'The fish I caught.' (LF)

The author also notes that previous analyses of the factors triggering FVS wrongly mention adjacency as a determining factor (50a).

(50) a. Ya: shuùka kuma audùga:. (Hausa)
he.CMPL.ABS planted.V.GR1.C also wheat
'He also planted wheat.'

b. Li manz (*manze) toultan bann kosonnri. (Mauritian)
3SG eat.SF (*LF) always PLU rubbish
'He/She always eat rubbish.'

Hence as in Mauritian, an adverb intervening between the verb and its phrasal complement doesn't affect selection of the SF. To sum up, short forms in all the languages described above, except Louisianese, are definitely syntactically constrained and we represent these constraints in the table below:

(51)

Language	Types of verbs	Types of cplts	cplt realization
Mauritian	certain verbs	non clausal	canonical
French	past participles	direct object	canonical
Haitian	certain verbs	non pronominal	canonical
Louisianese	certain verbs + certain tenses	non pertinent	
Tswana	certain verb classes	unfocused complements	canonical
Hausa	certain verb classes	non-clausal	canonical

7 Conclusion

In this paper, we have argued that MC has two verb forms which are constrained by the type of complement they take. Short Forms occur if the verb has a canonical phrasal complement while Long Forms occur when the verb has no complements or adjuncts or clausal complements. For these constructions, we have proposed two lexical constraints to account for the syntactic occurrence of SFs and LFs. An interesting fact concerned the selection of LFs also available (with clausal complements) in the context of Verum Focus. In the last section we showed that the phenomenon could be a convergence of L2 acquisition of the superstrate (French) which actually can be found in other French-based Creoles and of the same phenomenon available in substrates, namely Hausa, Tswana or Zulu and certainly other African languages (which we didn't describe here). A more detailed description and analysis still needs to be done on the prosody and discourse constraints of the language.

References

Abeillé, Anne, Godard, Danièle, Miller, Philip and Sag, Ivan A. 1998. *Romance in HPSG*, Chapter French Bounded Dependencies. Stanford: CSLI Publications.

Baker, Philip. 1972. *Kreol: A description of Mauritian Creole*. Ann Arbor: Karoma.

Baker, Philip and Syea, Anand. 1991. On the copula in Mauritian Creole: Past and Present. In Francis Byrne and Thom Huebner (eds.), *Development and Structures in Creole Languages*, pages 59–175, Amsterdam: John Benjamins Publishing Company.

Bender, Emily. 2001. *Syntactic Variation and Linguistic Competence: The Case of AAVE Copula Absence*. Ph. D.thesis, Stanford University, Stanford, California.

Bouma, Gosse, Malouf, Robert and Sag, Ivan. 2001. Satisfying constraints on extraction and adjunction. *Natural Language and Linguistic Theory* (19), 843–863.

Corne, Chris. 1982. The Predicate in Isle de France Creole. In Philip Baker and Chris Corne (eds.), *Isle de France Creole. Affinities and Origins*, pages 31–48, Karoma: Arbor.

Creissels, Denis and Robert, Stéphane. 1998. Morphologie Verbale et organisation discursive de l'énoncé : le cas du Tswana et du Wolof. *Faits de Langues* (11-12), 145–160.

Crysmann, Berthold. 2005. *Yearbook of Morphology 2004*, Chapter An Inflectional Approach to Hausa Final Vowel Shortening, pages 73–112. Dordrecht: Springer.

Degraff, Michel. 2001. *Ken Hale: A Life in Language*, Chapter 2 : Morphology in Creole Genesis: Linguistics and Ideology, pages 53–121. MIT Press.

Geurts, Bart. 1998. The Mechanisms of Denial. *Language* 74(2), 274–307.

Ginzburg, Jonathan and Sag, Ivan. 2000. *Interrogative Investigations: The form, meaning and use of English Interrogatives*. Stanford: CSLI Publications.

Godard, Daniel and Marandin, Jean-Marie. 2006. Reinforcing Negation: The case of Italian. On-line Proceedings of the HPSG06 Conference, Sofia: CSLI Publications.

Henri, Fabiola and Abeillé, Anne. 2007. The syntax of copular constructions in Mauritian. On-line Proceedings of the HPSG-2007 Conference, Stanford: CSLI Publications.

Henri, Fabiola, Marandin, Jean-Marie and Abeillé, Anne. 2008. Information Structure Coding in Mauritian: Verum Focus expressed by Long Forms of Verbs. In *Predicate Focus, Verum Focus, Verb Focus: Similarities and Differences*, Universität Potsdam.

Hertz, Anne and LiPookTan, L. Jacques. 1987. Gouvernement et Syntagme Verbal: A propos de la troncation verbale en Créole Mauricien. *Documents de travail-Université Paris 8* (1), 57–86.

Höhle, Tilman. 1992. Ueber verum-fokus im Deutschen. *Linguistische Berichte* 4.

McCormack, Anna. 2006. A Further Look at Conjunctive and Disjunctive Forms in Setswana. *ZAS Papers in Linguistics* 43, 123–141.

Miller, Philip and Sag, Ivan A. 1997. French Clitic Movement without Clitics or Movement. *Natural Language and Linguistic Theory* 15, 573–639.

Neumann, Ingrid. 1985. *Le créole de Beaux Bridge, Louisiane: Etudes Morphosyntaxique, textes, Vocabulaire*, volume 7 of *Kreolische Bibliothek*. Hamburg: Helmut Buske Verlag.

Papen, Robert Antoine. 1978. *The French-based creoles of the Indian Ocean: an analysis and comparison*. Phd dissertation, University of California, San Diego, CA.

Pollard, Carl and Sag, Ivan. 1994. *Head-Driven Phrase Structure Grammar*. Stanford: CSLI Publications.

Sag, Ivan, Wasow, Thomas and Bender, Emily. 2003. *Syntactic Theory: A Formal Introduction*. CSLI Publications, second edition.

Seuren, Pieter. 1990. Verb Syncopation and Predicate Raising In Mauritian Creole. *Theoretical Linguistics* 1(13), 804–844.

Syea, Anand. 1992. The short and long form of verbs in Mauritian Creole: Functionalism versus formalism. *Theoretical Linguistics* 1(18), 61–97.

Syea, Anand. 1997. Copula, wh-trace, and the ECP in Mauritian Creole. *Linguistics* 35, 25–56.

Veenstra, Tonjes. 2007. Verb Allomorphy in French-related Creoles and the Syntax-Phonology Interface. *Zentrum für Allgemeine Sprachwissenschaft, Typologie und Universalienforschung* .

Veenstra, Tonjes and Becker, Angelika. 2003. The survival of inflectional morphology in French-related Creoles. *SSLA* (25), 285–306.

Veronique, Daniel. 1984. Typologie du predicat et formes du passif en Mauricien. *Claix* Le Passif(2), 53–74.

Webelhuth, Gert. 2007. Complex Topic-comment structures in HPSG. In Stefan Müller (ed.), *Proceedings of the HPSG07 Conference*, Stanford: CSLI Publications.

Children's use of argument structure, meta-knowledge of the lexicon, and extra-linguistic contextual cues in inferring meanings of novel verbs

Mutsumi Imai
Keio University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 399–416

Imai, Mutsumi. 2008. Children's use of argument structure, meta-knowledge of the lexicon, and extra-linguistic contextual cues in inferring meanings of novel verbs. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 399–416. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.23. CC-BY 4.0

Abstract

Verbs are the centerpiece of the sentence, and understanding of verb meanings is essential for language acquisition. Yet verb learning is said to be more challenging than noun learning for young children for several reasons. First, while nouns tend to denote concrete objects, which are perceptually stable over time, verbs tend to refer to action events, which are temporally ephemeral, and the beginning and the end of the action referred to by the verb are not clearly specified. Second, a verb takes nouns as arguments, and the meaning of a verb is determined as the relation between the arguments. To infer the meaning of a verb, children need to attend to the relation between the objects in the event rather than the objects themselves. In so doing, children make use of a variety of cues such as argument structure, meta-knowledge of the lexicon, and extra-linguistic contextual cues. In this paper, I present two lines of my recent research concerning young children's novel verb learning. Specifically, I first report a cross-linguistic study (Imai et al., 2008) examining how Japanese-, English-, and Chinese-speaking children utilize structural and non-structural, extra-linguistic cues when inferring novel verb meanings. Second, I present another study examining how young children utilize sound-meaning correlates (sound symbolism) in their inference of novel verb meanings. In the end, I evaluate the relative importance of structural cues among different cues children use in verb learning.

1 Introduction

One of the core questions in the literature of lexical development is what factors influence young children's verb learning, and whether verb learning is universally more difficult than noun learning. Gentner (1982) argued that children acquire nouns more easily and earlier than verbs because the concepts denoted by nouns easier to access than those denoted by verbs. According to this view (the universal noun advantage view), children should experience more difficulty in learning verbs than in learning nouns. Some researchers, however, challenged this view, arguing that the structural properties of the input language are more important than universal cognitive factors. In this view, verbs can be learned more easily and earlier than nouns if the input language has properties to foster verb learning (the input-dependent view). For example, in argument-dropping languages such

as Korean, Japanese and Chinese, verbs may appear more frequently than nouns in the input, and tend to appear in the most salient position in the sentence (Choi & Gopnik,1995; Gentner, 1982). Another factor that has been noted to foster verb learning is morphological simplicity (Gentner, 1982; Tardif,1996). In fact, researchers advancing the input-dependent view have presented data showing that Korean- and Chinese-speaking children have more verbs than nouns in their early vocabularies (Choi & Gopnik,1995, Tardif,1996).

In this paper, I report two studies I conducted recently with colleagues to examine factors influencing verb learning. In the first study, we investigated how Japanese-, English-, and Chinese-speaking children utilize structural and non-structural, extra-linguistic cues when inferring novel verb meanings (Imai. Li, Haryu, Okada, Hirsh-Pasek, Golinkoff & Shigematsu, 2008). The second study I report in this paper examined the role of a non-structural *linguistic* cue in young children's verb learning (Imai, Kita, Okada, & Nagumo, in press). Specifically, we tested whether sound-meaning correlates (sound symbolism) fosters early verb learning, helping children to extract the invariant of verb meaning. In the end, I evaluate the relative importance of structural cues among different cues children use in verb learning.

2 Study 1: A Cross-Linguistic Comparison of Novel Noun and Verb Learning

In this study, we investigated how Japanese-, Mandarin-, and English-speaking children learn novel nouns and verbs in controlled, experimental settings.[1] Three- and 5-year-olds from the three language groups saw a dynamic video scene in which a woman was performing a novel action with a novel object, and introduced either a novel noun or verb. The children were then presented with two test scenes. One of the test scenes was the Action-Same-Object-Different (AS) scene in which the same woman was doing the same action but with a different object from the original scene. The other was the Object-Same-Action-Different (OS) scene in which the same woman was performing a different action with the same object. The children were asked to which of the two test scenes the newly introduced word was extended. Comparing children learning these three languages is extremely interesting because the three languages have different structural properties, which may affect the relative ease/difficulty of verb learning by children. On the first dimension, argument dropping is allowed in Japanese and Chinese but not in English. As a consequence of this linguistic property,

[1] For the details of the study, please see Imai et al., 2008. See also http://web.sfc.keio.ac.jp/~imai/pdf/HPSG_imai-talk_2008.pdf for the power point slides for the presentation.

children learning Japanese or Chinese tend to hear verbs more frequently than children learning English do. As mentioned earlier, because of this distributional property, some researchers predict that children learning Japanese or Chinese will learn verbs earlier (and hence more easily) than nouns (Choi & Gopnik, 1995; Tardif, 1996). However, at the same time, this property may lead to the opposite prediction. It has been proposed that inferring the meaning of a verb is very difficult even for adults without cues from the argument structure (Gillette et al., 1999), and that children do utilize the structural cues in inferring verb meanings (e.g., Fisher, 1996; Hirsh-Pasek & Golinkoff, 1996). Thus, one could make the prediction that verb learning should be more difficult for children who are learning a language that occasionally allows argument dropping. (In fact, in Japanese, argument dropping occurs more than occasionally—it is *usually* dropped when the speaker believes that the arguments can be inferred from the context.) The second dimension is the presence of morphological inflection in verbs. On this dimension, Chinese contrasts not only to English but also to Japanese. While verbs are inflected in both English and Japanese, they are not in Chinese. In other words, nouns and verbs are not morphologically distinguished in Chinese. Remember that in Chinese and Japanese, verb arguments are often dropped, and a verb alone can constitute a sentence in the language. In the case of Japanese, even when this occurs, verbs can be identified by inflectional morphology. That is, when a verb is produced without the arguments, as in "Mite (Look), X-teiru (X-ing)," one can tell that the word X is a verb. However, in Chinese, when a word is produced on its own (and this can happen in a conversational discourse), it is difficult to tell whether it is a noun or a verb. In other words, one can identify a novel word as a verb *only when* it is embedded in an argument structure (see Li, Bates and MacWinney, 1993). It is of great theoretical interest to see whether the morphological simplicity of Chinese makes verb learning even easier when compared to Japanese, as argued by some researchers (Tardif, 1996). If children in all the three languages performed better in fast-mapping novel nouns than in fast-mapping novel verbs, it will be the strongest evidence for the universal noun advantage view. If the difficulty of noun and verb learning varies across the three languages, we can proceed to identify what properties of language affect the ease of word learning in young children.

2.1 The task and procedure

Three- and 5-year-old children from three language groups–Japanese, Mandarin Chinese, and English–were tested (Imai et al., in press; Mayer et al., 2003; Haryu et al., 2005). The children were all from monolingual families, living in Japan (a suburban Tokyo Metropolitan area), China (Beijing), and the United States (Philadelphia), respectively.

Six sets of video action events served as stimulus materials. Each set

consisted of a standard event and two test events. In each standard event, a young woman was doing a novel repetitive action with a novel object. The two test events were variants of the standard event. In one, the same person was doing the same action with a different object (Action-Same-Object-Change, henceforth AS) from the standard event. In the other, the person was doing a different action with the same object (Action-Change-Object-Same, henceforth OS). While watching the standard event, a child heard either a novel noun or a novel verb, depending on the condition. The child was then shown the two test videos, and was asked to which event the target word should be extended.

2.2 Conditions and instructions

Our major interest was to examine whether Japanese-, Chinese- and English-speaking children understand the basic principles governing noun generalization and verb generalization, so in all three language groups, children learned either six novel nouns or six novel verbs. In addition, we wished to see whether dropping of the verb arguments affects children's performance in learning novel verbs. Thus, in English and Japanese, we presented the verbs in two different forms: one with full arguments (Full Argument Verb condition), and the other with no arguments (Bare Verb condition). In providing the arguments, in English, the pronoun "she" served as the subject, and "it" as the object of the sentence (e.g., "*Look, she is X-ing it*"). In Japanese, the word "*oneesan* ('girl')" is used for the subject, and "*nanika* ('something')" was used in referring to the novel object.

As we noted earlier, in Chinese, when both arguments are dropped, one cannot tell whether the word is a verb or a noun. We thus conducted only the Noun and the Full Argument Verb conditions.

2.3 Children's performance in novel noun learning and novel verb learning

Children in all three languages in both age groups succeeded in the novel noun extension task. They extended a novel noun to the same object/different action event, and there was no crosslinguistic or developmental difference. Thus, 3-year-olds, regardless of the language they are learning, have a clear understanding that nouns refer to objects, and that the actions in which the referent object is used are irrelevant to the noun meaning.

In contrast to the success in the novel noun learning task, in none of the language groups, were 3-year-olds able to successfully extended novel verbs. It was not until they are 5 years old that children reliably can extend a novel verb to an event involving the same action but a different object. In this sense, the results suggest that learning a new verb is more difficult than learning a new noun. With this overall pattern in mind, however, we should also note

that the performance of Japanese-, Chinese-, and English-speaking children was not totally uniform. In fact, we found intriguing crosslinguistic differences in the pattern of novel *verb* learning. Specifically, the condition in which 5-year-olds successfully extended newly learned verbs varied across the three languages, which in turn suggests that children speaking different languages rely on different cues in learning verbs. Below, we describe how children of the three language groups generalized novel verbs in our task, starting with Japanese children.

Japanese children. Five-year-olds, but not 3-year-olds, showed understanding of the principle that verbs get extended on the basis of the sameness of actions, and that the objects that appear in a particular action event are variables that can be replaced across different instances. While the 5-year-olds extended a novel verb to the Action-Same-Object-Change test at reliably above chance level, the 3-year-olds showed only chance-level performance. To our surprise, Japanese children performed better when the verb was presented without the arguments than when it was presented with an explicit mention of the arguments. In summary, the pattern of the results from Japanese children suggest that 3-year-olds do tolerate a change in the actor but are unwilling to extend a newly learned verb to a new instance when the theme object is changed. This indicates that they do not fully understand the basic principle for verb extension-- that verbs are extended on the basis of the action independent of the object. Five-year-olds did seem to understand this principle well and were able to apply it immediately in a novel verb learning situation. Interestingly, however, they were able to do so when the arguments of the verb were omitted but not when they were explicitly mentioned.

English-speaking children. In spite of the linguistic differences between English and Japanese, English-speaking children's performance in the novel verb extension task was overall very similar to that of Japanese children: 3-year-olds showed chance-level performance, while 5-year-olds were able to extend a novel verb to the Action-Same-Object-Change test (Mayer et al., 2003).

There was one important difference between Japanese and English groups, however. Unlike Japanese children, who performed above chance in the Bare Verb condition but not in the Verb Full Argument condition, English-speaking 5-year-olds were able to extend the verb to the Action-Same-Object-Change test reliably above chance only when the verb arguments were specified ("Look, she is X-ing it"). They selected the AS tests only 55.6% when the verb arguments were omitted. This difference suggests that the structural characteristics of children's native language might influence the structural form in which children expect to hear a verb.

Chinese children and adults. The results from Chinese children were utterly surprising. Unlike Japanese and English-speaking children, both 3- and 5-year-olds selected the Object-Same-Action-Change test at *highly above*

chance level in the Verb Full Argument condition. This means that they mapped the novel verb to the object instead of the action: the Chinese 3- and 5-year-olds consistently selected the Object-Same-Action-Change test regardless of whether the word was presented as a noun or a verb.

Given these surprising results from Chinese children, we tested monolingual Mandarin-speaking adults living in Beijing, China, to see how they performed in the task. The Chinese adults who were assigned to the verb (with full arguments) condition selected the Action-Same-Object-Change (AS) test 100% of the time. These results suggest that (1) it was perfectly clear to Chinese-speaking adults that the target novel word presented in the Full Argument Verb condition was indeed a verb, and that (2) there was a large developmental shift from an object-naming bias to an action-naming bias in Chinese speakers.

To identify the age at which this shift takes place, we further tested 7- and 9-year-old Mandarin Chinese-speaking children in the Full Argument Verb condition and Bare Word condition. In the Full Argument Verb case, the 7-year-olds selected the AS test at chance (52.2%). At 9-years of age, Chinese children finally extended a novel verb to the AS test significantly above chance level (72%).

Given the surprising results from the Chinese speakers, we conducted a few different versions of the Verb Full Argument condition, trying to find a condition under which Chinese children (at least 5-year-olds) could reliably extend the verb to the action even when the object is changed.

First, the number of syllables in the word was changed. In the original study, we prepared novel words (both nouns and verbs) with two syllables. This was because two syllable words were most common for both nouns and verbs. However, verbs referring to simple actions such as “jump” “kick” “run” tend to be monosyllabic words. Thus, we constructed monosyllabic nonsense words and replicated the Verb Full Argument condition with them. Although this manipulation lifted the AS response a little, no statistically reliable difference was obtained.

We then provided additional linguistic cue to indicate that the novel word was a verb. In the original instruction in the Verb Full Argument condition, the experimenter said, “Ayi (girl) zai (progressive) X (novel word) yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)[ff01](She is X-ing something).” In this instruction, the novel word X could be unambiguously identified as a verb by the structure of the sentence, in particular, by the word order and the presence of the aspect marker “zai”. However, “zai” is also used as a verb, meaning roughly “to exist” or “to be present (at a place).” In this case, the word that comes after “zai” is usually a noun. Young children thus could have been confused because of this homonymous use of “zai” and mistakenly assumed that the word was a noun. We thus presented the verb in three different sentences using three different auxiliaries, namely, “zai,”

"zhengzai," and "yizhizai," all of which mark the progressive aspect, to provide even clearer and stronger clues that the novel word was a verb. However, again, this manipulation did not bring a statistically reliable increase in the Chinese children's performance.

Thus far, the results suggested that Chinese children as old as five years of age could not extend newly learned verbs to the same action in the face of a change in the object even when a novel word was presented in such a way as to make it clear that it was a verb. It is possible that the lack of morphological distinction between nouns and verbs makes it difficult for Chinese children to extract the extension principle for verbs, in contrast to the general assumption in the literature that Chinese is a verb-friendly language. At the same time, there must be conditions under which Chinese preschoolers, especially 5-year-olds, can extend to novel verbs to the action in the face of a change in the object. What cue do they need in addition to linguistic cues? We suspected that that the difficulty in identifying a word's grammatical form class solely from structural cues such as morphological marking or word order leads Chinese children to rely heavily on extra-linguistic cues.

Upon reflection, in this light, there is one property of our stimuli that may have given Chinese children a subtle cue that the object is the one that should be attended to in the event. We created the standard video clips in such a way that the actor holds the object for a moment (for about half a second) before starting the action. We did so to make sure that children see the object clearly, as the details of the object may not be clearly observable when it is in motion. Of course, the novel word was presented after the action started whether it was presented as a noun or a verb. It should be stressed that the object was not unnaturally highlighted in the original stimuli, and it did not affect Japanese or English- speaking children. However, if Chinese children were very sensitive to extra-linguistic, situational cues, this first segment of the video might have lead Chinese children to think that the object was in a way "topicalized".

To test this possibility, we removed the segment of the video clip in which the actor was holding the object. In the new video, thus, the object is already in motion at the very start of the event presentation. We replicated the Verb Full Argument condition with Chinese 3- and 5-year-olds with this version of the stimuli. We again presented the monosyllabic nonsense words in three sentences with three different aspect marking auxiliaries, in order to highlight that the word was a verb to give the children as much linguistic support as possible.

Consistent with our expectation, this manipulation—removing the half a second segment of the video clip in which the object was held still indeed brought a drastic change in Chinese children's performance in the verb learning task and their performance was now equivalent to the level of performance by Japanese- or English-speaking children. The Chinese

3-year-olds were now at the chance level, just like Japanese- and English-speaking 3-year-olds, and the Chinese 5-year-olds now selected the Action-Same test above chance level, just like their Japanese and English counterparts. We then conducted the noun condition with Chinese 3- and 5-year-olds using this revised stimuli to see whether they could still select the Object-Same test, and confirmed that they had no problem in doing so. Thus, it was not the case that Chinese children mapped the novel word simply to the most salient component of the event, whether it was a noun or a verb. They were able to extend a novel verb to the same action only when the action was maximally salient, but even under this condition, they had no problem in mapping a novel noun to the object. Taken together, this shows that Chinese 5-year-olds *can* extend novel verbs to the same action with a different object, but they need support from contextual and/or perceptual cues in order to do so. When contextual cues are in conflict with linguistic cues, it appears that Chinese preschoolers rely more heavily on extra-linguistic cues than linguistic cues, unlike Japanese or English-speaking children. It may be that the lack of obvious morphological distinction between nouns and verbs leads Chinese children to be more attentive to extra-linguistic cues than Japanese or English-speaking children are.

2.4 Discussion of Study 1

The research reviewed above provides us with important insights about factors affecting young children's verb learning. The fact that 3-year-olds succeeded in learning novel nouns but failed in learning novel verbs clearly suggests that verbs are universally more difficult to learn than nouns, and supports that cognitive factors play a prominent role over the language-specific structural factors in determining the ease of novel verb learning. At the same time, however, language-specific structural factors do affect the strategy young children take in their inference of verb meanings. Following the common assumption in the literature that learning an argument-dropping language gives an advantage to verb learning (Choi & Gopnik, 1995; Tardif, 1996), we had expected that Chinese and Japanese children might perform better than English-speaking children in the novel verb learning task. Furthermore, we had suspected that Chinese-speaking children might show even higher performance than Japanese-speaking children because of the morphological simplicity of Chinese verbs (Tardif, 1996). Contrary to these predictions, Chinese children did not perform any better than Japanese- or English-speaking children. In fact, Chinese speaking children showed greater difficulty in learning novel verbs than English- or Japanese-speaking children without extra scaffolding was provided. Chinese children were extremely sensitive to contextual cues when learning novel verbs for action events, and unless the action was made very salient, Chinese 5-year-olds were not able to map a novel verb to the action. It should be

noted that Chinese-speaking children did not determine the novel word form class solely based on contextual (or perceptual) saliency of the event, as they were able to map novel nouns to the objects under the action-salient situation.

Why were Chinese children so sensitive to contextual cues, even to the extent that linguistic cues that are apparent to Chinese-speaking adults were bluntly overridden. As discussed earlier, one important structural property that sets Chinese against Japanese and English is the lack of morphological distinction between nouns and verbs. Thus, unlike the case with Japanese or English, Chinese speakers cannot determine the grammatical form class of a word by morphological markings. Furthermore, even though word order provides a cue for determining the form class of each word in the sentence, it is only probabilistic: Although the basic word order is SVO, there are other word orders: OSV, SOV, and VOS are also found in the spoken language (Li, Bates, & MacWhinney, 1993). Thus, to identify the grammatical class of each word in the sentence and assign its thematic roles to it, Chinese speakers have to coordinate semantic, syntactic, semi-morphological grammatical cues such as aspect markers, object markers and passive markers in "a complex system of mutual constraints" (Li et al., 1993, p. 193). This linguistic property may lead Chinese children to rely more on extra-linguistic, contextual cues than on linguistic cues in novel word learning.

It is also noteworthy that the condition in which children performed best in our novel verb extension task was different for English- and Japanese-speaking children. The action events used in our research involve only three elements, an actor, an action, and an object. Thus, even when children heard a verb without the explicit mention of the subject and the object of the sentence, it should have been easy to infer what the dropped arguments would have been. In Japanese, it is natural to drop the arguments when the speaker thinks that the hearer can infer them from the observational and/or pragmatic cues. From the Japanese point of view, it was obvious that the subject was the actor and the theme object was the novel object, and hence it was more natural that the arguments be dropped in this case. Japanese children in fact could have been distracted by hearing this unnecessary information. In sharp contrast, English-speaking 5-year-olds extended the verb to the AS test only when the verb was accompanied by the pronouns "she" and "it." It appears that the English-speaking children would not extend a novel verb when the verb was presented in an unusual structural form, even though the arguments of the verb could have been easily inferred from observation of the event.

In the next section, I will present a study examining the influence of a non-structural, yet linguistic factor—the correlates between the sounds of words and their meanings– on young children's verb learning.

3 Study 2: Use of sound-meaning correlates in early verb learning

Since the time of Saussure, the arbitrary relationship between the sound of a word and its meaning has been held as an important principle of language (e.g., Saussure, 1916/1983). In mainstream linguistics, sound symbolism, in which the sound and meaning of words are systematically related, is considered to be a marginal phenomenon in language. However, many languages of the world have a large grammatically-defined word class in which sound symbolism is clear. For example, in Japanese, mimetics (*giongo/gitaigo*) include not only onomatopoeias for animal sounds (such as *nyaa* for cats) but also words referring to events and states in which sound is not essential. For example, the voiced initial consonant is associated with larger mass and the voiceless initial consonant is associated with smaller mass. In Japanese, mimetics can also refer to tactile, visual and emotional experiences: e.g., *nurunuru* 'being slimy', *pika* 'a flash of light', and *sowasowa* 'being restless'.

Japanese is by no means an exception among languages of the world. Many languages of the world have a similar grammatical class of words with clear sound symbolism (for an overview, see Hinton, Nichols, & Ohara, 1994; Nuckrolls, 1999; Voetlz & Kilian-Hatz 2001). Even in Indo-European languages such as English, there is clear sound symbolism in words such as *squeeze*, *squirt*, *squint*, *bump*, *thump*, and *plump* (e.g., Firth, 1935/1957, Reid, 1967), though such words do not form a distinct grammatically defined class. Systematic relations between certain phonemes and meanings have also been pointed out. For example, roughly half of the common English words starting with *gl-* imply something visual, as in *glance*, *glare*, *gleam*, *glimmer* (Bloomfield, 1933/1984; Bolinger 1950). Thus, the literature suggests that the principle of arbitrary relationship between the sound of a word and its meaning is not as absolute as Saussure had proposed.

There has been a body of empirical work which demonstrates the psychological reality of sound symbolism. Kohler found that when presented with a curvy round shape and a spiky angular shape(Kohler, 1929) one has the intuition that *baluma* is a better name for the former and *takete* is a better name for the latter (see also Ramachandran & Hubbard, 2001). Sapir (1929) also demonstrated that English speakers associate novel words containing the vowel /i/ with smallness more frequently than words containing /a/. This phenomenon has been described as magnitude sound symbolism.

An interesting observation is that sound-symbolic words, especially those which refer to action (*gitaigo*), are used abundantly in speech by and toward young children in Japanese (though use of these words is by no means limited to children's language, as mentioned earlier). In our previous unpublished study, twenty-two Japanese mothers described pictures depicting

a person acting in relation to an object (e.g., a boy throwing a ball, rolling a carpet, jumping over a flower, wiping a mirror with a cloth, etc.) to their children (18-20 months) as well as to an adult experimenter. Altogether, 577 references to the actions were made when the mothers were talking to their children, and 57% of the action references were made using mimetic words, and 39% were made using conventional verbs. In contrast, when the mothers described the pictures to the experimenter, 81% of the action references were made using conventional verbs, while only 12% were using mimetic words. Thus, the mothers used mimetics five times more often with the child than with the adult when referring to actions (see also Yoshida & Smith, 2006 for similar findings).

An intriguing possibility is that richness of mimetics in child-directed speech may play a scaffolding role in the acquisition of verbs. As discussed earlier, verbs are known to be difficult for young children to learn compared to object names (e.g., Gentner, 1982). To learn the meaning of a verb, children need to understand what aspect of the action events they are observing at the moment they hear the verb are invariant, and what aspect of the event can vary across the different events the verb refers to. This understanding is critical for children to be able to generalize the verb correctly, i.e., generalizing it only on the basis of the essential component of the verb meaning, while allowing changes in the variables.

Given the difficulty in learning verbs, perhaps care-takers' heavy use of sound-symbolic action words reflects their naive belief that the iconicity provided by sound symbolism may help children focus on the manner component of the action. In the study we report below, we empirically test this possibility. If the sound symbolism hypothesis is borne out, children who are taught novel mimetics that match the referent action should be able to generalize it in the face of a change of the theme object or the actor, whereas children of the same age should fail without the help of the sound symbolism. To test this hypothesis, we taught a group of 3-year-old Japanese children novel verbs that carried sound-symbolic properties. We also taught novel verbs which did not carry such properties to a different group of 3-year-olds. Here, we tested whether 3-year-old children were better able to generalize novel verbs to the same-manner action performed by a different actor when novel words carried sound symbolism than when the words did not have any sound-meaning relation.

Before testing this, however, it was necessary to establish that children are able to detect the sound symbolism in the stimulus materials. For this purpose, we first conducted an experiment examining whether Japanese children aged 25-month-olds and 3-year-olds, as well as English-speaking adults who have no knowledge of Japanese are able to match the target novel mimetic word which were supposed to carry sound symbolism to the target action video. I present this matching study as Study 2A, and the verb learning

(generalization) study as Study 2B below.[2]

3.1 Study 2A: Testing the ability of Japanese 25-months-olds, 3-year-olds, and English-speaking adults to detect sound-meaning correlates in the stimulus materials

3.1.1 Materials

Based on Hamano's analysis (Hamano, 1998), we created six *novel* Japanese mimetics expressing different manners of walking along the fast-slow and heavy-light dimensions: *batobato* (for running with heavy steps, with "b" expressing heavy forceful movement and "t" expressing hitting, see Hamano, 1998 for the description of this sound symbolism and that used for the following novel words), *chokachoka* (for fast walking with small steps, "ch" expressing light, subdued movement and unreliability, "k"expressing outward movement), *hyaihyai* (for semi-swift walking with light, playful steps, with "h" expressing weakness and unreliability and "y" expressing leisurely, unreliable motion), *tokutoku* (for casual, normal-speed walking with small steps, with "t" expressing a light tapping movement and lightness and "k" expressing outward movement), *yotoyoto* (for staggering, as if very tired, with "y" expressing leisurely, unreliable motion, and "t" expressing hitting of a surface) and *nosunosu*(for slow walking with very heavy steps, with "n" expressing sluggishness and "s" expressing friction). For each of the six novel mimetic words, we created two video clips with a character walking in a manner that, to our judgment, sound-symbolically either matched or did not match the mimetic. Specifically, the non-matching video in each novel mimetic word was created so that it clearly differed from the matching video along dimensions such as heaviness of movement, size of steps (large steps vs. small steps), and speed of movement. Altogether 12 videos were created.

3.1.2 Participants and Procedure of Study 2A

Eighteen 2-year-old (range=23-26 months, *M*=25 months, 10 boys and 8 girls) and 17 3-year-old (range=37-47months, *M*=42.7 months, 9 boys and 8 girls) monolingual Japanese children were tested. In addition, fifteen native Japanese speaking undergraduates and 18 native British English speaking undergraduates in the UK who had no knowledge of Japanese participated.

The 6 novel mimetics and the corresponding video clips with matching and non-matching actions described above were used. The participants were

[2] For full description of the study, see Imai, Kita, Nagumo & Okada (in press, *Cognition*).

tested individually. For each target mimetic, the sound-matching action and sound-non-matching action were presented simultaneously side by side, with the right-left position of the matching and non-matching videos counter-balanced across the 6 sets. Participants were instructed to select the action that they thought the word referred to.

3.1.3 Results of Study 2A

The Japanese adults selected the sound-symbolically matching action for each of the 6 novel mimetics 100% of the time. English adults also selected the matching action above chance level (64%). Japanese children, both 2-year-olds and 3-year-olds, selected the "matching" action significantly above chance (2-year-olds: 65.7%; 3-year-olds: 75%). These results showed that, even though the mimetics were newly created, Japanese adults were able to detect the match between the sound and the action perfectly, and this sound-action match was also detectable by English-speaking adults and Japanese children as young as 25 months old.

As it was established that Japanese children were able to detect the sound symbolism between the novel mimetic words and the target action, we now tested whether the sound symbolism played a scaffolding role in young children's novel verb learning.

3.2 Study 2B: Examination of the role of sound symbolism in young children's novel verb learning

3.2.1 Participants and procedure

Thirty four 3-year-olds were randomly assigned to either the *sound-symbolic mimetic verb* condition or the *non-sound-symbolic verb* condition. As in Experiment2A, six sets of visual stimuli were presented in PowerPoint slides. However, this time, each set consisted of two slides, with the first page showing a training event and the second page showing two test events. The action that sound-symbolically matched the target mimetic word served as the training event. In the same-action test event, the action was the same as the training event but the actor changed. In the same-actor event, the actor was the same but the action changed.

As in Experiment 1, children were tested individually by a female native speaker of Japanese at their preschool. In both conditions, children were first shown the training video with the verb. Each target video lasted approximately 5 second, and was shown twice. In both condition, the target novel word was repeated twice. The experimenter said the instruction sentence in natural, child-directed speech. Care was taken, however, that novel mimetic verbs as well as novel non-sound symbolic verbs were said at

the onset of the movement of the actor and at the same speed. They were then shown the two test events, and were asked to indicate to which video the verb should be generalized. In the *sound-symbolic mimetic verb* condition, the six verbs were those used in Experiments 2A (*chokachoka, hyaihyai, tokutoku, batobato, nosunosu and yotoyoto)*. In the *non-sound-symbolic verb* condition, the novel nonsense verbs were ones that had been used in previous novel verb learning studies with Japanese children (Imai et al., 2005). These verbs were presented in the morpho-syntactic form of regular, non-sound-symbolic verbs with no reduplication and they had no detectable sound-symbolic link between the word and action. The novel words used were: *chimoru, nuheru, rikoru, yachiru, nekeru, hekuru*. They are introduced in the same sentence frame used in the *sound symbolic mimetic verb* condition.

3.2.2 Results of Study 2B

Supporting the sound symbolism bootstrapping hypothesis, 3-year-olds were able to generalize the novel sound-symbolic verbs to the same action test at significantly above chance level (82%), but failed to do so when the verb did not carry sound-symbolic properties (54%). There was a statistically significant difference across the two conditions.

3.3 Discussion of Study 2

The fact that 3-year-olds did not succeed in generalizing non-sound-symbolic verbs may not be so surprising, considering that 3 consistently failed to generalize verbs that were not sound-symbolic in the face of change in the actor or the theme object in previous studies (e.g., Imai et al., 2005, 2008; Kersten & Smith, 2002). In this light, the fact that 3-year-olds were able to generalize the sound-symbolic verb at a rate over 80 % is very impressive. However, another possibility is that children selected the “correct” (i.e., the same-action) video simply because they were able to match the sound of the novel mimetic verb and the action at the test stage, without any consideration of which test event the verb learned in the training phase could be generalized to.

To rule out this possibility, we further conducted a control experiment. In this experiment, the target mimetic word taught did not sound-symbolically match the action in the training event. Hence, in the training phase, the target mimetic word did not sound-symbolically match the “correct” (in light of verb generalization) choice (i.e., the same-action test event with a different actor from the training event) either. However, the target mimetic verb sound-symbolically *did* match the “incorrect” choice (i.e., the same-actor test event with a different action). If the 3-year-olds in the sound-symbolic mimetic verb condition in Study 2B were simply sound-symbolically matching the word to the action during the test phase, the children in the control experiment should select the incorrect same-actor test event. A

separate group of 3-year-olds were tested. It turned out that, the 3-year-olds in the control study neither chose the "correct" sound symbolically non-matching test nor the "incorrect" test that sound symbolically matched the target verb. This result ruled out the concern that the 3-year-olds in the sound symbolically matching mimetic verb condition simply matched the sound to the action without being engaged in verb learning, and the hypothesis that sound symbolism fosters early verb learning.

4 General Discussion: The Role of Structural and Non-Structural Factors in Early Verb Learning

In this paper, I reported two recent studies I conducted that examined factors influencing early verb learning. Verb learning requires extracting the invariant of the relation between the objects serving as the verb arguments, and generalization solely on the bases on the invariant. The results of the two studies together indicate that this process is a challenge for young children independent of the structural properties of the input language, and support the view that the influence of cognitive factors is stronger than that of linguistic structural factors. In Study 1, Chinese children showed particularly severe difficulty in novel verb learning compared to Japanese and English-speaking age peers, suggesting that the lack of morphological distinction between nouns and verbs, together with the habit of dropping arguments may hinder rather than foster verb learning. Chinese children, however, seem to rely on extra-linguistic contextual cue in verb learning more strongly than Japanese- and English-speaking children, presumably to compensate the weakness of the structural information in the input language. The degree of success soared by 40 % with the scaffolding by contextual cue for Chinese children. In contrast, the additional structural cue—providing the verb in multiple sentence structures—raised the proportion of the correct generalization only by about 10%. The second study showed sound symbolism carried in the verb drastically improved Japanese 3-year-olds' performance of novel verb learning, again by about 40%. Sound symbolism is in the realm of language, but definitely not a structural factor. Sound symbolsim in fact lies between language and the world outside language, as it connects direct sensory experience to language. Clearly, children utilize multiple cues in verb learning, including perceptual cues, social cues, statistical cues, and structural cues (Hollich, Hirsh-Pasek & Golinkoff, 2002). The two studies I presented in this paper converge to suggest that, although children do use structural cues in their inference of verb meaning, if they are easily accessible, social and perceptual cues are more prominent factors than structural cues in early stages of verb learning.

References

Bloomfield, L. 1984. *Language*. Chicago: University of Chicago Press. (Original Work published 1933).

Bolinger, D. 1950. Rime, assonance, and morpheme analysis. *Word*, 6, 117-136.

Choi, S., & Gopnik, A. 1995. Early acquisition of verbs in Korean: A cross-linguistic study. Journal of Child Language, 22, 497-529.

de Saussure, F. 1983. *Course in general linguistics*. La Salle, IL: Open Court. (Original work published in 1916. Translated by R. Harris).

Firth, J. R. 1957. The use and distribution of certain English sounds. In J. R. Firth (Ed.), *Papers in linguistics* 1934 - 1951 (pp. 34-46). London: Oxford University Press. (Reprinted from Firth, J. R. (1935), English Studies, 17, 2-12).

Fisher, C. 1996. Structural limits on verb meaning: The role of analogy in children's interpretations of sentences. *Cognitive Psychology*, 31, 41-81.

Gentner, D. 1982. Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In S.A. Kuczaj (Ed.), *Language development*: *Vol. 2. Language, thought, and culture* (pp.301-334). Hillsdale, NJ: Erlbaum.

Hamano, S. 1998. *The sound-symbolic system of Japanese*. Stanford, CA & Tokyo, CSLI & Kuroshio Publisher.

Haryu, E., Imai, M., Okada, H., Li, L., Meyer, M. Hirsh-Pasek, K., & Golinkoff, R. 2005. Noun bias in Chinese children: novel noun and verb learning in Chinese, Japanese and English preschoolers. In A. Grugos, M. Clark-Cotton, &; S. Ha. (Eds.), Proceedings the 29th Annual Boston University Conference on Language Development. MA: Cascadilla Press. (pp.272-283)

Hinton, L.,, Nichols, J., & Ohala, J. (Eds.), 1994. *Sound Symbolism*. Cambridge, UK: Cambridge University Press.

Hirsh-Pasek, K., & Golinkoff, R. 1996. The origins of grammar. Cambridge, MA: MIT Press.

Hollich, G., Hirsh-Pasek, K., Golinkoff, R. 2000. Breaking the language barrier: An emergentist coalition model for the origins of word learning. *Monographs for the Society for Research in Child Development*, 65 (3).

Imai, M., Haryu, E., & Okada, H. 2005. Mapping novel nouns and verbs onto dynamic action events: Are verb meanings easier to learn than noun meanings for Japanese children? *Child Development*, 76, 340-355.

Imai, M., Li, L., Haryu, E., Okada, H., Hirsh-Pasek, K. & Golinkoff, R. 2008. Novel noun and verb learning in Chinese-, English-, and Japanese-speaking children. Child Development, 79, 979-1000.

Imai, M., Li, L., Haryu, E., Okada, H., Hirsh-Pasek, K., Golinkoff, R. & Shigematsu, J. 2008. Novel noun and verb learning in Chinese-, English-, and Japanese-speaking children. *Child Development*,79, 979-1000.

Imai, M. Kita, S., Nagumo, M. & Okada, H. in press. Sound symbolism facilitates early verb learning. *Cognition*.

Kersten, A., W., & Smith, L. (2002). Attention to novel objects during verb learning. Child Development, 73, 93-109.

Köhler, W. 1929. Gestalt psychology. New York: Liveright Publishing Corporation.

Li, P., Bates, E. & MacWinney, B. 1993. Processing a language without inflections: A reaction time study of sentence interpretation in Chinese. Journal of Memory and Language, 32, 169-192.

Meyer, M., Leonard, S., Hirsh-Pasek, K., Imai, M., Haryu, R., Pulverman, R., & Addy,D. 2003. Making a convincing argument: A cross-linguistic comparison of noun and verb learning in Japanese and English. Poster presented at the Boston University Conference on Language Development, Boston, MA.Nuckrolls, 1999

Ramachandran, V. S., & Hubbard, E. M. 2001. Synaesthesia - a window into perception, thought, and language. *Journal of Consciousness Studies*, 8, 3-34.

Reid, D. 1967. Sound Symbolism. Edinburgh: T. & A. Constable.

Sapir, E. 1929. A study in phonetic symbolism. *Journal of Experimental Psychology*, 12, 225-239.

Tardif, T. 1996. Nouns are not always learned before verbs: Evidence from Mandarin speakers' early vocabulary. *Developmental Psychology*, 32, 492-504.

Voeltz, F. K. E., & Kilian-Hatz, C. (Eds.), 2001. *Ideophones. Amsterdam*: John Benjamins.

Yoshida, H. & Smith, L. 2006. Dynamic properties of form and meaning and children's learning of verbs. Paper presented at the XVth International Conference of Infant Studies, Kyoto, Japan.

Reconsidering the coordinate structure constraint in Japanese and Korean: Syntactic constraint or pragmatic principle?

Yusuke Kubota
The Ohio State University

Jungmee Lee
The Ohio State University

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 417–435

Kubota, Yusuke & Jungmee Lee. 2008. Reconsidering the coordinate structure constraint in Japanese and Korean: Syntactic constraint or pragmatic principle? In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 417–435. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.24.
CC-BY 4.0

Abstract

Whether the Coordinate Structure Constraint (CSC) (Ross, 1967) is a syntactic constraint has been discussed much in the literature. This paper reconsiders this issue by drawing on evidence from Japanese and Korean. Our examination of the CSC patterns in relative clauses in the two languages reveals that a pragmatically-based approach along the lines of Kehler (2002) predicts the relevant empirical patterns straightforwardly whereas alternative syntactic approaches run into many problems. We take these results to provide strong support for the view that the CSC is a pragmatic principle rather than a syntactic constraint.

1 Introduction

Ross (1967) first noted that extraction from a single conjunct as in (1a) results in an unacceptable sentence but that, if extraction occurs from *both* conjuncts, then the sentence is grammatical, as in (1b) (the latter case is known as 'across-the-board' (ATB) extraction).[1,2]

(1) a. *This is the magazine that [John bought __] and [Mary bought the book].

b. This is the magazine that [John bought __] and [Mary didn't buy __].

Since Ross (1967), the above pattern has been accounted for in terms of a syntactic constraint known as the 'Coordinate Structure Constraint' (CSC). However, exceptions to the CSC such as the following, where extraction occurs from a single conjunct, were already noted by Ross himself:

(2) This is the whiskey that John [went to the store] and [bought __].

(3) This is the stuff that the guys in the Caucasus [drink __] and [live to be a hundred].

[†]For many insights and much encouragement, we would like to thank Bob Levine. Comments and suggestions from Peter Culicover, Detmar Meurers, Ivan Sag, Judith Tonhauser, Mike White and Shûichi Yatabe have been helpful. We regret that, due to time and space constraints, we have not been able to incorporate discussion of all of the issues that they have raised. Last but not least, special thanks go to Jeff Holliday and Wataru Uegaki for editorial assistance.

[1]Grammaticality judgments for sentences taken from previous literature are those reported in the respective sources. Other examples reflect our own grammaticality judgments. In this paper, when marking the acceptability of sentences we do not make a distinction between '(syntactically) ungrammatical' and '(semantically or pragmatically) infelicitous' but simply mark all unacceptable sentences (i.e. sentences rejected by native speakers) with *.

[2]A terminological note. In this paper, we only deal with cases of CSC violation involving the so-called 'element constraint' of the CSC (which prohibits extraction of elements *from* conjuncts). The other part of the CSC, the 'conjunct constraint' (which prohibits extraction *of* conjuncts themselves), is a totally different issue. Yatabe (2003) discusses some examples involving scrambling in Japanese that suggest that Japanese nominal coordination does not obey the conjunct constraint.

In (2) and (3), the events denoted by the two conjuncts hold asymmetric semantic relations, constituting either a temporally-ordered series of events (2) or a sequence of events related by a causal relation (3). Based on examples like these (for more data and discussion, see, e.g., Schmerling (1972), Goldsmith (1985), Lakoff (1986), Deane (1991) and Kehler (2002)), some researchers (such as Lakoff (1986), Deane (1991) and Kehler (2002)) have advocated an alternative view about the CSC wherein it is taken to be a pragmatic principle rather than a syntactic constraint.

Whether the CSC is a syntactic constraint or a pragmatic principle is still a highly controversial issue.[3] However, most discussion in the literature has centered on data from English alone, without much cross-linguistic considerations. This paper aims to make a first step in rectifying this situation and to shed a new light on the nature of the CSC by taking a closer look at the CSC patterns in two languages that are typologically distinct from English: Japanese and Korean. We focus on data involving what appear to be coordination constructions[4] in relative clauses in these languages. Crucially, under closer inspection, *both* the relative clause constructions and the apparent coordination constructions in Japanese and Korean turn out to have quite different syntactic properties from their English counterparts. As we will see below, these differences have significant implications for the issue under debate: we show that the syntactic differences of the relevant constructions pose almost insurmountable difficulties for syntactically-based approaches to the CSC whereas a pragmatically-based alternative automatically predicts the relevant data despite all of these syntactic differences.

2 Kehler's (2002) pragmatically-based analysis of the CSC effects in English

We start with a brief review of Kehler's (2002) pragmatically-based analysis of the CSC patterns in English. His work is actually not the first attempt to view the CSC as a pragmatic principle (for example, Lakoff (1986) and Deane (1991) are important precursors), but what makes his analysis remarkable is that it gives a simple and coherent account of the relevant data in terms of a more general theory of discourse relations, which receives independent motivation from a number of complex linguistic phenomena including VP ellipsis, gapping and temporal interpretaiton of utterances in discourse.

In Kehler's theory, sentences are interpreted to establish one of the following discourse relations to one another: Resemblance, Contiguity, and Cause-effect. The sentences in (1)–(3), repeated here as (4)–(6), exemplify each relation.

[3] For example, see Postal's (1998) fairly involved attempt to retain the CSC as a purely syntactic constraint; for a clear and concise critical review of Postal's approach, see Levine (2001).

[4] We use the term 'coordination-like constructions' to refer to these constructions as a group; for the reason that they are only *apparent* coordination constructions, see section 4.2.

(4) **Resemblance:**

a. *This is the magazine that [John bought __] and [Mary bought the book].

b. This is the magazine that [John bought __] and [Mary didn't buy __].

(5) **Contiguity:**

This is the whiskey that John [went to the store] and [bought __].

(6) **Cause-Effect:**

This is the stuff that the guys in the Caucasus [drink __] and [live to be a hundred].

The Resemblance relation holds between two clauses when the events denoted by them are construed as being similar or in contrast to one another, as in (4). The Contiguity relation holds between clauses that are construed as forming a sequence of temporally adjacent events, as exemplified in (5). Sentences like (6) exemplify the Cause-Effect relation.

The key idea in Kehler's account of the CSC patterns in English is that different discourse relations impose different constraints on the conjuncts of a coordinate structure in terms of what constitutes a coherent discourse. In particular, the Resemblance relation (but not the other two relations) imposes a requirement on each conjunct of a coordinate structure such that it be parallel to other conjuncts in *all relevant respects* (in what follows, we call this constraint the 'parallelism requirement'). Essentially, Kehler accounts for the (un-)acceptability of CSC violations in terms of the presence vs. absence of this parallelism requirement.

First, the contrast in (4) receives an account along the following lines. The crucial auxiliary assumption here, which is motivated by standard operational tests for topichood (for details, see Kehler (2002)), is that an extracted element is identified as the topic of the sentence from which it is extracted. Given this, the parallelism requirement dictates that the topic of the whole coordinate structure (i.e. the extracted element) be identified as the topic in *all* conjuncts. This explains why extraction from a single conjunct is unacceptable in sentences like (4a). In (4a), the topic of the whole coordinate structure is identified as the topic *only* in the first conjunct, due to the fact that extraction is taking place only from that conjunct. But this produces an asymmetry in terms of topichood in the two conjuncts and hence the parallelism requirement is violated. By contrast, if extraction occurs across the board, the head noun is identified as the topic for both conjuncts and thus the parallelism requirement is maintained. Hence, the ATB extraction cases like (4b) are correctly predicted to be acceptable.

Second, cases involving non-Resemblance relations such as (5) and (6) are crucially different from the above case involving the Resemblance relation in that they do *not* impose the parallelism requirement. From this it follows that the topic of the whole coordinate structure need *not* be distributed across all of the conjuncts. What this means in terms of CSC patterns is that non-ATB extraction is predicted

to be possible in these cases, since there is no problem if the topic of just a single conjunct is extracted and identified as the topic of the whole sentence.

Thus, Kehler's (2002) pragmatically-based analysis makes correct predictions about the CSC patterns in English. If this analysis is on the right track, we should expect to find similar patterns in constructions in other languages that have similar pragmatic functions as English extraction and coordination, even if the constructions in question turn out to have different syntactic properties from their English counterparts. The next section presents data from Japanese and Korean relative clauses involving coordination-like constructions as an instance of just such an empirical domain.

3 CSC patterns in Japanese and Korean relative clauses

This section presents data exemplifying the CSC patterns in Japanese and Korean relative clauses. We will review the properties of relative clauses and coordination-like constructions in these languages more closely in section 4. For the time being, it suffices to introduce some basic facts and terminology about the coordination-like constructions in the two languages. In Japanese and Korean, what appears to be a verbal coordination is expressed by marking the non-final conjuncts with the following morphemes: *-te* or *-i* in Japanese and *-ko* in Korean (see the examples below). We call these constructions the *-te*/*-i*/*-ko* constructions, respectively. Unlike in Japanese, there are two variants of the *-ko* construction in Korean due to the optionality of a tense marker in the non-final conjunct. We refer to the tensed and untensed variants as the 'tensed *-ko* construction' and the 'untensed *-ko* construction', respectively.

The CSC patterns in Japanese and Korean relative clauses are basically parallel to those in English. First, (7) and (8) exemplify cases involving the Resemblance relation in Kehler's terminology.

(7) a. *Kore-ga [John-ga __ kat-te/ka-i] [Mary-ga hon-o
this-NOM John-NOM buy-TE/buy-I Mary-NOM book-ACC
kat-ta] zassi-da.
buy-PAST magazine-COP
'This is the magazine that John bought and Mary bought the book.'

b. Kore-ga [John-ga __ kat-te/ka-i] [Mary-ga __ kaw-anakat-ta]
this-NOM John-NOM buy-TE/buy-I Mary-NOM buy-NEG-PAST
zassi-da.
magazine-COP
'This is the magazine that John bought and Mary did not buy.'

(8) a. *I kes-un [John-i __ sa(-ess)-ko] [Mary-ka chayk-ul
This thing-TOP John-NOM buy-PAST-KO Mary-NOM book-ACC
sa-n] capci-i-ta.
buy-PAST.REL magazine-COP-DECL
'This is the magazine such that John bought and Mary bought the book.'

b. I kes-un [John-i __ sa(-ess)-ko] [Mary-ka __
This thing-TOP John-NOM buy-PAST-KO Mary-NOM
an-sa-n] capci-i-ta.
NEG-buy-PAST.REL magazine-COP-DECL
'This is the magazine that John bought and Mary did not buy.'

Just like the corresponding English examples in (1), the CSC is obeyed when the two clauses are semantically symmetric: ATB relativazation is acceptable as in (7b) and (8b), but non-ATB relativization leads to unacceptablity as in (7a) and (8a).

By contrast, if the discourse relation between the two clauses is either Contiguity or Cause-Effect, the CSC pattern differs from the above case. The relevant examples are given below:

(9) a. Kore-ga [John-ga __ non-de/nom-i] [byooki-ga naot-ta]
this-NOM John-NOM take-TE/take-I sickness-NOM recover-PAST
kusuri-da.
medicine-COP
'This is the medicine that John took and then recovered from the sickness.'

b. Kore-ga [John-ga kesa oki-te/oki] [__
this-NOM John-NOM this.morning wake.up-TE/wake.up.I
tabe-ta] pan-da.
eat-PAST bread-COP
'This is the bread that John woke up this morning and ate.'

(10) a. I kes-un [John-i __ mek(*-ess)-ko] [byeng-i
This thing-TOP John-NOM take-PAST-KO sickness-NOM
na-un] yak-i-ta.
get.better-PAST.REL medicine-COP-DECL
'This is the medicine that John took and then recovered from the sickness.'

b. I kes-un [John-i onul-achim-ey shyawue-lul ha(*-ess)-ko]
This thing-TOP John-NOM this.morning-at shower-ACC take-PAST-KO
[__ mek-un] ppang-i-ta.
eat-PAST.REL bread-COP-DECL
'This is the bread that John took a shower this morning and ate.'

As shown in (9) and (10), if the two clauses are semantically asymmetric, the CSC does not obtain (except for the tensed *-ko* construction, in which it *does* seem to

obtain even in these cases). In these examples, although relativization does not occur across the board, that does not lead to unacceptability.

Now, as can be seen in the examples in (10), the CSC pattern in the tensed *-ko* construction differs from that in other constructions in question. In the tensed *-ko* construction, irrespective of the semantic relation holding between the two clauses, relativization from a single conjunct results in an unacceptable sentence. Thus, the CSC pattern in this construction might be taken as evidence for the claim that, at least for the Korean tensed *-ko* construction, the CSC is a real *syntactic* constraint. However, the tensed *-ko* sentences become significantly ameliorated with explicit phrases indicating the Cause-Effect or the Contiguity relation, as shown by the following examples:

(11) a. ?I kes-un [John-i __ mek-ess-ko] [*ku kyelkwa-lo*
This thing-TOP John-NOM take-PAST-KO the result-as
pyeng-i na-un] yak-i-ta.
sickness-NOM get.better-PAST.REL medicine-COP-DECL
'This is the medicine that John took and as a result recovered from the sickness.'

b. ?I kes-un [John-i onul achim-ey shyawue-lul ha-ess-ko]
This thing-TOP John-NOM today morning-at shower-ACC do-PAST-KO
[*ku taum-ey* __ mek-un] ppang-i-ta.
the next-at eat-PAST.REL bread-COP-DECL
'This is the bread that John woke up this morning and then ate.'

If the CSC effects in the tensed *-ko* construction were purely syntactic, the amelioration effect found in (11) would be totally unexpected. By contrast, although the unacceptability of the examples in (10) in the tensed variant still needs to be explained, the overall CSC pattern in the Japanese and Korean coordination-like constructions, including these amelioration cases, are fully consistent with the pragmatic approach along the lines of Kehler (2002), as we will discuss in more detail in section 5.

4 Properties of relative clauses and coordination-like constructions in Japanese and Korean

In the rest of the paper, we compare syntactically-based and pragmatically-based approaches to the CSC regarding what predictions they make with respect to the data we have seen in the previous section. But in order to embark on this task, we first need to clarify some basic syntactic and pragmatic properties of the relevant constructions in the two languages. Thus, in this section, we take a closer look at Japanese and Korean relative clauses and coordination-like constructions, highlighting the differences between these constructions and their English counterparts.

4.1 Properties of relative clauses in Japanese and Korean

4.1.1 The non-existence of a filler-gap linkage mechanism in Japanese and Korean relative clauses

Whether Japanese and Korean relative clauses involve a filler-gap linkage mechanism has been debated extensively in the literature. However, most of the arguments for filler-gap analyses depend heavily on theory-internal assumptions (in most cases, in some version of the GB theory; see, for example, Kameshima (1989) and Murasugi (1991) for such proposals). By contrast, by Occam's razor, empirical evidence clearly favors the alternative gapless analysis, as argued by Kuno (1973), Yoon (1993) and Matsumoto (1997). We reproduce here two pieces of evidence for the gapless analysis of relative clauses in Japanese and Korean discussed by these previous authors: (i) the existence of 'gapless' relative clauses, and (ii) the lack of island effects.

First, in Japanese and Korean, there are relative clauses that do not involve any empty positions as in (12), which have been referred to in the literature as 'gapless' relative clauses (cf. Kuno 1973).

(12) a. [gomu-ga yaker-u] nioi
rubber-NOM burn-NPST smell
literally: 'the smell such that rubber burns'
'the smell that characterizes the burning of rubber'

b. [komwu-ka tha-nun] naymsay
rubber-NOM burn-NPST.REL smell
literally: 'the smell such that rubber burns'
'the smell that characterizes the burning of rubber'

In the examples in (12), there is no missing element in the relative clause that would correspond to the 'filler', that is, the head noun. Thus, without invoking some ad-hoc mechanism, these examples cannot be accounted for in the filler-gap analysis. By contrast, this construction poses no problems for the gapless analysis, which does not presuppose the existence of an empty position in the relative clause.

Second, the lack of island effects in Japanese and Korean relative clauses provides further evidence against the filler-gap analysis, as has been pointed out by previous authors (Kuno 1973, Yoon 1993, Matsumoto 1997). (13) and (14) show that the Complex NP Constraint and the Adjunct Constraint are not obeyed in relative clauses in the two languages, respectively.

(13) a. [[__ ki-te i-ru] yoohuku-ga kitanai] sinsi
wear-TE PROG-NPST clothes-NOM dirty.NPST gentleman
'the gentleman such that the clothes that he is wearing is dirty'

b. [[__ ip-koiss-nun] yangpok-i telep-un] sinsa
wear-PROG-PRES.REL suit-NOM be.dirty-REL gentleman
'the gentleman such that the suit that he is wearing is dirty'

(14) a. [[__ sin-da ato] mina-ga kanasin-da] zyosei
die-PAST after all-NOM miss-PAST woman
'the woman that all missed after she died'

b. [[__ cwuk-un hwuey] motwu-ka kuliuweha-n] yeca
die-PAST.REL after all-NOM miss-PAST.REL woman
'the woman that all missed after she died'

If Japanese and Korean relative clauses involved a filler-gap linkage mechanism, they would be expected to obey island constraints just like English relative clauses. Thus, the lack of island constraints is problematic for the filler-gap analysis.

4.1.2 The pragmatic felicity condition on relative clauses in Japanese and Korean

Having established that Japanese and Korean relative clauses do not involve filler-gap dependency, the question arises as to how relative clauses in these languages are interpreted. In other words, how exactly is the relationship between the head noun and what appears to be the missing position in the relative clause established, assuming that the gapless analysis is correct? The consensus among researchers advocating the gapless analysis, building on Kuno's (1973) insight on the correlation between relativization and topicalization in Japanese, is that that relation is established purely pragmatically. Here, we briefly outline the key aspects of the gapless analysis by taking Yoon's (1993) analysis as an example. (It should be noted that Matsumoto's (1997) analysis of Japanese relative clauses is essentially along the same lines and that we thus assume that Yoon's analysis is applicable to the Japanese data as well.)

At the heart of Yoon's analysis is the pragmatic condition imposed on relative clauses in Korean that they are felicitous only when the head noun denotes an entity that is the most salient object or individual in the event described by the relative clause. With this general requirement, an analysis of (15), which involves a simple relative clause with an apparent gap in the object position, goes as follows.

(15) [John-i __ manna-un] salam
John-NOM meet-PAST.REL person
'the person that John met'

In Yoon's analysis, the relative clause in (15) simply involves a null pronoun in the object position, not a gap that syntactically corresponds to a filler. Thus, the relative clause denotes an event of John's meeting somebody, whose identity remains unspecified in the content expressed by the relative clause. Now, it is independently known that, in Japanese and Korean, null pronouns are felicitously used only when the identity of the missing element is recoverable from the context (cf., e.g., Kuno (1973, 18) and Kameyama (1985, 44–5)). What this means in terms of our example (15) is that, in order for the relative clause in this example to be interpretable at all, the identity of the unspecified individual has to be resolved in some way

or other. The most natural way to resolve that identity is to construe the relative clause as making some statement *about* that unspecified individual (in other words, to single out the individual in question as the most salient one), which then brings about the desired result that that individual is identified with the individual denoted by the head noun (by means of the general felicity condition imposed on relative clauses stated above). In other words, here, the link between the missing object and the head noun is established by means of an interaction of the pragmatic and syntactic/semantic properties of the linguistic expressions involved: on the one hand, there is the pragmatic requirement of the identification of the referent of the null pronoun in the relative clause, and, on the other hand, the basic syntactic/semantic function of a relative clause is to supply some information about the nominal expression that it modifies. These requirements are satisfied at the same time by construing the missing element in the relative clause to denote the most salient entity in the relevant event and thereby getting it identified with the head noun. And this is indeed the most readily available interpretation to native speakers of Korean (especially when the sentence is uttered in an out-of-the-blue context). Importantly, in this analysis, there is no syntactic coindexation between the missing element in the relative clause and the head noun.

The cases problematic for syntactic filler-gap analyses discussed in the preceding section can be straightforwardly dealt with in this pragmatically-based analysis. First, in gapless relative clauses like (12), there is no missing element in the relative clause, but the exact same mechanism of the interaction of the pragmatic and syntactico-semantic properties of relative clauses as in the above case carries over here. In the case of (12), we know from world knowledge that, when there is an event of rubber burning, the (distinct) smell of burning rubber can naturally be perceived as the salient entity in that event. Thus, in this sentence, the referent of the head noun (the smell) holds the salience relation to the event (of rubber burning) described by the relative clause in just the same way as in the case of the ordinary relative clause in (15). Second, regarding island effects, since the pragmatic analysis does not involve any syntactic filler-gap linkage mechanism, it correctly predicts that Japanese and Korean relative clauses do not exhibit island effects.

We take these results to strongly favor the pragmatically-based analysis of Japanese and Korean relative clauses along the lines of Yoon (1993) and Matsumoto (1997) over syntactic alternatives based on filler-gap linkage mechanisms.

4.2 Properties of *-te*/*-i*/*-ko* constructions in Japanese and Korean

Just like relative clauses in Japanese and Korean have very different syntactic properties from their English counterparts, what appear to correspond to English verbal (and sentential) coordination in these languages have very different morpho-syntactic properties from their English counterparts. Specifically, the *-te*/*-i*/*-ko* constructions in Japanese and Korean differ from English coordination in that the two clauses in these constructions are asymmetric with respect to the realization of post-verbal suffixes: the finiteness markers, namely, a tense marker in Japanese and

a mood marker in Korean, cannot appear in the non-final clauses in the *-te*/*-i*/*-ko* constructions. Relevant examples are given below:

(16) [John-ga zassi-o kat(*-ta)-**te/-i**] [Mary-ga hon-o
John-NOM magazine-ACC buy-PAST-TE Mary-NOM book-ACC
kat*(-ta)].
buy-PAST
'John bought the magazine and Mary didn't buy the book.'

(17) [John-i capci-lul sa(-ess)(*-ta)-**ko**] [Mary-ka chayk-ul
John-NOM magazine-ACC buy-PAST-DECL-KO Mary-NOM book-ACC
sa-ess*(-ta)].
buy-PAST-DECL
'John bought the magazine and Mary bought the book.'

In (16), the occurrence of the past tense marker *-ta* in the first clause makes the sentence strictly ungrammatical. Similarly, (17) is ungrammatical with the occurrence of the declarative marker *-ta* in the first clause. Due to this restriction on the occurrence of the finiteness marker, the *-te*/*-i*/*-ko*-marked clauses cannot stand alone as independent sentences (unlike the conjuncts in English sentential coordination).

Following Yuasa and Sadock (2002), we take percolation of categorical information as the criterion for the syntactic distinction between coordination and subordination. With this criterion, in terms of morpho-syntactic properties, all of the *-te*/*-i*/*-ko* constructions in Japanese and Korean are clearly subordination constructions since the finiteness specification of the whole sentence percolates only from the final clause.

In this section, we have seen that *both* relative clauses and the coordination-like constructions in Japanese and Korean have syntactic properties that are clearly different from those of their English counterparts. In the next two sections, we will examine the ramifications of the above independently observed facts about these constructions with respect to the predictions that syntactically-based and pragmatically-based analyses make on the data of Japanese and Korean CSC patterns that we have introduced in section 3.

5 Previous syntactic accounts of the CSC

As is the case with the two representative previous proposals (Tokashiki (1989) and Cho (2005)) that we are going to review in some detail in this section, *any* syntactic account of the CSC, due to the very fact that it is a *syntactic* account, would rest on the following two premises: (i) that the CSC is a constraint that is stated in terms of a filler-gap dependency mechanism and (ii) that only coordinate structures are sensitive to that constraint. But then, given what we have seen so far, it should already be clear that relative clauses and the coordination-like constructions in Japanese and Korean turn out to pose extremely severe difficulties to any such attempt, since the empirical evidence in both cases directly undermines the

premises that these approaches crucially presuppose. In the following subsections, we will see that these are indeed precisely the problems that syntactic approaches run into.

5.1 Tokashiki (1989)

Tokashiki (1989) notes that the *-te* and *-i* constructions in Japanese behave differently with respect to CSC effects. According to her, CSC effects obtain with the *-i* construction as in (18b), but not with the *-te* construction as in (18a).[5]

(18) a. Kore-ga Taroo-ga [oki-te] [__ arat-ta] kutu-da.
this-NOM Taro-NOM wake.up-TE wash-PAST shoe-COP
'These are the shoes that Taro washed after he woke up.'
(lit. *'These are the shoes that Taro woke up and washed.')

b. ?*Kore-ga Taroo-ga [oki] [__ arat-ta] kutu-da.
this-NOM Taro-NOM wake.up.I wash-PAST shoe-COP
intended: 'These are the shoes that Taro washed after he woke up.'
(lit. *'These are the shoes that Taro woke up and washed.')

Based on examples like those in (18), Tokashiki argues that the two constructions have different syntactic structures: the *-i* construction, in which the CSC holds, is syntactically coordinate, whereas the *-te* construction, in which the CSC does not hold, is syntactically subordinate.

There are several problems in Tokashiki's analysis. First, conceptually, the coordination vs. subordination distinction for the *-te* and *-i* constructions has no independent motivation. (As we have seen in the previous section, both constructions are clearly subordination constructions as far as morpho-syntactic properties are concerned.) This syntactic distinction is introduced solely for the purpose of explaining away the case of the *-te* construction, which purportedly does not obey the CSC.

Second, empirically, Tokashiki's generalization in terms of coordination vs. subordination does not perfectly correspond to the CSC patterns found in the actual

[5](18a) and (18b) are Tokashiki's original examples and the native speaking author of this paper agrees with her judgments. However, we doubt that the unacceptability of (18b) has anything to do with syntactic structure of the sentence per se. Rather, it seems that the unacceptability of (18b) is largely due to the asymmetry in prosodic weight between the two clauses. As can be seen in the following examples, if the first clause is made prosodically heavier than in (18b) by inserting an adverb or by replacing the predicate with a synonymous but longer expression, the acceptability of the example significantly improves:

(i) a. (?)Kore-ga Taroo-ga [asa hayaku oki] [__ arat-ta] kutu-da.
this-NOM Taro-NOM morning early wake.up-I wash-PAST shoe-COP
'These are the shoes that Taro washed after he woke up early in the morning.'

b. (?)Kore-ga Taroo-ga [me-o samas-i] [__ arat-ta] kutu-da.
this-NOM Taro-NOM wake up-I wash-PAST shoe-COP
'These are the shoes that Taro washed after he woke up.'

data after all. As Tokashiki notes herself, even the *-i* construction does not obey the CSC if the semantic relation between the two clauses is asymmetric. The following example illustrates the point:

(19) Kore-ga Taroo-ga [mise-e ik-i] [__ kat-ta] sake-da.
this-NOM Taro-NOM store-to go-I buy-PAST sake-COP
'This is the sake that Taro went to the store and bought.'
(Tokashiki, 1989, 70)

Tokashiki analyzes cases of the *-i* construction like the above as instantiating syntactic *sub*ordination (just like the *-te* construction), but she does not give any clear criterion as to how to tell apart cases involving coordination from cases involving subordination with the *-i* construction.

Exceptions to Tokashiki's generalization are not limited to the *-i* construction. In her analysis, relativization from a single clause in the *-te* construction is predicted to be possible *regardless of* the meaning expressed by the sentence, since the *-te* construction allegedly instantiates subordination uniformly. However, data that counterexemplify this prediction can be easily found:

(20) *[Taroo-ga kyoo uta-o utat-te] [Hanako-ga kinoo __
Taro-NOM today song-ACC sing-TE Hanako-NOM yesterday
hii-ta] gakki-wa gitaa-da.
play-PAST instrument-TOP guitar-COP
intended: 'The instrument such that Taro sang a song today and Hanako played it yesterday is the guitar.'

In (20) (where the semantic relation between the two clauses is Resemblance), even though the sentence involves the *-te* construction, relativization from a single clause is unacceptable.

Last but not least, Tokashiki's whole analysis crucially rests on an empirically untenable assumption about the structure of relative clauses in Japanese. Namely, she assumes that relativization in Japanese involves a movement-based filler-gap linkage mechanism in the GB framework and that the unacceptable patterns such as (18b) are unacceptable *because of* the violation of the CSC stated as a constraint on this syntactic movement operation. However, as we have already discussed in section 4, the assumption that Japanese relative clauses involve a filler-gap linkage mechanism is unwarranted.

5.2 Cho (2005)

Cho's (2005) account of the CSC patterns in Korean is very similar to Tokashiki's account of the Japanese case. The two variants of the *-ko* construction in Korean are analyzed as instantiating different syntactic structures: coordination and subordination.

Cho first classifies the 'conjunction' marker *-ko* into an 'adjunct' suffix (designated here as *-ko*$_1$) and a 'conjunct' suffix (designated here as *-ko*$_2$). He then argues

that each type is associated with different syntactic structures (i.e. coordination vs. subordination) and that they receive different interpretations (i.e. 'asymmetric' vs. 'symmetric'). The following table summarizes his proposal:

(21) The distinction between *-ko*$_1$ and *-ko*$_2$ (adapted from Cho 2005: 41)

	-ko$_1$ (adjunct suffix)	*-ko*$_2$ (conjunct suffix)
Meaning	'after', cause-effect, 'nonetheless' (concessive)	'and' (logical conjunction)
Structure	subordinate	coordinate
Stem	untensed	tensed
Constraints	none	CSC (with ATB)

Based on the above distinguishing properties of the two variants, Cho argues that the CSC effect obtains only in coordinate structures (i.e. the tensed variant) as in (22b), and not in subordinate structures (i.e. the untensed variant) as in (22a):

(22) a. Kim-i [pap-ul mek-ko], [__ mek-un] ppang
Kim-NOM rice-ACC eat-KO1 eat-PAST.REL bread
'the bread which Kim ate after eating the rice'

b. *Kim-i [pap-ul mek-ess-ko], [__ mek-un] ppang
Kim-NOM rice-ACC eat-PAST-KO2 eat-PAST.REL bread
'the bread which Kim ate the rice and ate' (Cho 2005: 39)

However, Cho's analysis suffers from the same theoretical and empirical problems as Tokashiki's analysis of the Japanese data. The coordination vs. subordination distinction for the two variants of the *-ko* construction not only lacks independent motivation but also cannot account for the whole range of empirical patterns.

In Cho's analysis, the CSC is not operative in the untensed *-ko* construction since it is analyzed as syntactically subordinate. However, the untensed *-ko* construction *does* actually obey the CSC when the two clauses are semantically symmetric as exemplified by the following data:

(23) a. *I kes-un [John-i __ sa-(ess)-ko] [Mary-ka chayk-ul
This thing-TOP John-NOM buy-PAST-KO Mary-NOM book-ACC
sa-n] capci-i-ta.
buy-PAST.REL magazine-COP-DECL
'This is the magazine that John bought __ and Mary bought the book.'

b. I kes-un [John-i __ sa-(ess)-ko] [Mary-ka __
This thing-TOP John-NOM buy-PAST-KO Mary-NOM
an-sa-n] capci-i-ta.
NEG-buy-PAST.REL magazine-COP-DECL
'This is the magazine that John bought and Mary did not buy.'

As can be seen in (23), regardless of the occurrence of the tense morpheme in the non-final clause, the ATB pattern is consistently acceptable but the non-ATB pattern is unacceptable. However, Cho's analysis incorrectly predicts the untensed

version of (23a) to be grammatical since the untensed *-ko* construction is syntactically subordinate for him.

Furthermore, the amelioration effects in the tensed *-ko* construction remains a total mystery in Cho's analysis. According to his analysis, the tensed *-ko* construction, being syntactically coordinate, should uniformly resist CSC violations. However, as we have seen in section 3, examples of the tensed *-ko* construction involving Contiguity and Cause-Effect relations improve significantly with the help of explicit expressions that indicate intended discourse relations (the relevant examples can be found in (11) at the end of section 3).

Finally, Cho's analysis suffers from the same problem as Tokashiki's analysis regarding the way in which the CSC is formulated. His syntactic CSC is formulated as a constraint on the distribution of the SLASH feature in coordinate structures in the HPSG framework, which crucially presupposes the problematic assumption that Korean relative clauses involve a filler-gap linkage mechanism.

Our examination of the previous syntactic accounts of the CSC by Tokashiki (1989) and Cho (2005) has vividly brought out the magnitude of both the theoretical and the empirical obstacles that *any* syntactic account of the CSC would face. Given this, it seems undeniable that we have to accept the conclusion that accounting for the CSC patterns in Japanese and Korean relative clauses in terms of a syntactic constraint simply does not work. In the next section, we show that, in sharp contrast to this striking failure of syntactic approaches, a pragmatically-based alternative straightforwardly predicts the relevant data.

6 Pragmatically-based analysis of the CSC patterns in relative clauses in Japanese and Korean

In section 3, we have seen that the CSC patterns in Japanese and Korean relative clauses are basically the same as in their English counterparts. In this section, we show that these patterns are indeed exactly what is predicted by a pragmatically-based approach to the CSC along the lines of Kehler (2002).

First, in cases involving the Resemblance relation, only the ATB pattern is acceptable, as exemplified by the following data reproduced from section 3:

(24) a. *Kore-ga [John-ga __ kat-te/ka-i] [Mary-ga hon-o
this-NOM John-NOM buy-TE/buy-I Mary-NOM book-ACC
kat-ta] zassi-da.
buy-PAST magazine-COP
'This is the magazine that John bought and Mary bought the book.'

b. Kore-ga [John-ga __ kat-te/ka-i] [Mary-ga __ kaw-anakat-ta]
this-NOM John-NOM buy-TE/buy-I Mary-NOM buy-NEG-PAST
zassi-da.
magazine-COP
'This is the magazine that John bought and Mary did not buy.'

(25) a. *I kes-un [John-i __ sa(-ess)-ko] [Mary-ka chayk-ul
This thing-TOP John-NOM buy-PAST-KO Mary-NOM book-ACC
sa-n] capci-i-ta.
buy-PAST.REL magazine-COP-DECL
'This is the magazine such that John bought and Mary bought the book.'

b. I kes-un [John-i __ sa(-ess)-ko] [Mary-ka __
This thing-TOP John-NOM buy-PAST-KO Mary-NOM
an-sa-n] capci-i-ta.
NEG-buy-PAST.REL magazine-COP-DECL
'This is the magazine that John bought and Mary did not buy.'

What is crucial in the pragmatic account is the property of relative clauses in Japanese and Korean that have been independently observed by previous authors (Yoon (1993) and Matsumoto (1997)) such that the head noun denotes a salient entity in the event described by the relative clause. Given this, relativization from a single clause violates the parallelism requirement in terms of what is identified as the salient entity across different clauses. By contrast, ATB relativization does not violate the parellelism requirement since, in this case, the head noun can be construed as denoting the salient entity with respect to *all* of the clauses involved.

The pragmatically-based analysis also correctly predicts that, with discourse relations other than Resemblance, non-ATB relativization in the *-te*/*-i*/*-ko* constructions is possible just like in English. The following are examples of Cause-Effect and Contiguity relations reproduced from section 3:

(26) a. Kore-ga [John-ga __ non-de/nom-i] [byooki-ga naot-ta]
this-NOM John-NOM take-TE/take-I sickness-NOM recover-PAST
kusuri-da.
medicine-COP
'This is the medicine that John took and then recovered from the sickness.'

b. Kore-ga [John-ga kesa oki-te/oki] [__
this-NOM John-NOM this.morning wake.up-TE/wake.up.I
tabe-ta] pan-da.
eat-PAST bread-COP
'This is the bread that John woke up this morning and ate.'

(27) a. I kes-un [John-i __ mek(*-ess)-ko] [byeng-i
This thing-TOP John-NOM take-PAST-KO sickness-NOM
na-un] yak-i-ta.
get.better-PAST.REL medicine-COP-DECL
'This is the medicine that John took and then recovered from the sickness.'

b. I kes-un [John-i onul-achim-ey shyawue-lul ha(*-ess)-ko]
This thing-TOP John-NOM this.morning-at shower-ACC take-PAST-KO
[__ mek-un] ppang-i-ta.
eat-PAST.REL bread-COP-DECL
'This is the bread that John took a shower this morning and ate.'

In the pragmatic account, the (un-)acceptability of relativization is determined solely by whether the parallelism requirement (imposed by the Resemblance relation) is violated or not. In other words, in the case of non-Resemblance relations, where the parallelism requirement is not operative, nothing goes wrong if the head noun establishes the salience relation just with a single clause. This correctly predicts that all of the sentences in (26) and (27) are acceptable (modulo the anomalous behavior of the tensed *-ko* construction, to which we will turn momentarily).

Finally, we turn to the problematic behavior of the tensed *-ko* construction, whereby it apparently resists CSC violations regardless of the discourse relation in question. We do not have space to discuss this issue in any detail here, but it turns out that the unacceptability of the tensed variant in examples like (27) receives an independent explanation once we take into account the subtle semantic and pragmatic differences between the tensed and untensed variants of the *-ko* construction (a detailed illustration of this is given in Kubota and Lee (2008)). Thus, the anomalous pattern of the Korean tensed *-ko* construction does not necessarily lend support for the view that (at least some part of) the CSC is a syntactic constraint. Further confirmation for this conclusion comes from the amelioration cases for the tensed *-ko* construction that we have already discussed. The relevant examples are reproduced here:

(28) a. ?I kes-un [John-i __ mek-ess-ko] [*ku kyelkwa-lo*
This thing-TOP John-NOM take-PAST-KO the result-as
pyeng-i na-un] yak-i-ta.
sickness-NOM get.better-PAST.REL medicine-COP-DECL
'This is the medicine that John took and as a result recovered from the sickness.'

b. ?I kes-un [John-i onul achim-ey shyawue-lul ha-ess-ko]
This thing-TOP John-NOM today morning-at shower-ACC do-PAST-KO
[*ku taum-ey* __ mek-un] ppang-i-ta.
the next-at eat-PAST.REL bread-COP-DECL
'This is the bread that John woke up this morning and then ate.'

As we have already pointed out in the previous section, this amelioration effect is

highly problematic for syntactic approaches to the CSC. By contrast, it receives a natural explanation in the present pragmatically-based approach. Essentially, in the account spelled out in Kubota and Lee (2008), the tensed *-ko* construction is associated with the function of denying the existence of any discourse relation between the relevant clauses. The overt indicators in examples in (28) help establish the discourse relations that license non-ATB relativization, but the discourse relations signalled by these indicators are inherently in conflict with the function of the tensed *-ko* construction, which is precisely to deny the existence of such discourse relations. Thus, it is correctly predicted that these sentences improve in their acceptability as compared to those lacking such indicators, but that they improve only to a certain extent and do not become fully acceptable.

To sum up, in this section we have seen that the pragmatically-based analysis of the CSC predicts all of the relevant data regarding the CSC patterns in Japanese and Korean relative clauses straightforwardly.

7 Conclusion

In this paper, we have examined the CSC patterns in Japanese and Korean relative clauses and have discussed their theoretical implications. In concluding our discussion, we would like to emphasize once again the importance of the particular empirical domain that we have considered in this paper for the purpose of furthering our understanding of the true nature of the CSC. That is, due to the fact that *both* the relative clause constructions and the coordination-like constructions in Japanese and Korean have properties that are arguably different from those of corresponding constructions in English, the pragmatically-based analysis and syntactically-based alternatives to it that we have compared make strikingly different predictions about the data set examined in this paper. Specifically, whereas the pragmatically-based analysis straightforwardly predicts the correct empirical patterns (except for the single anomalous case of the tensed *-ko* construction, for which an independently motivated explanation is available elsewhere), such a prediction is not available in syntactic approaches; in a syntactic account, one could at best accommodate cases that deviate from the 'basic' pattern by means of ad-hoc stipulations. We thus conclude that our cross-linguistic examination of the CSC patterns in Japanese and Korean provides strong support for the view that the CSC is a pragmatic principle rather than a syntactic constraint.

References

Deane, Paul. 1991. Limits to attention: A cognitive theory of island phenomena. *Cognitive Linguistics* 2(1):1–63.

Goldsmith, John A. 1985. A principled exception to the Coordinate Structure Constraint. In *CLS 21 Part 1: Papers from the General Session*, 133–143. Chicago Linguistic Society, University of Chicago.

Kameshima, Nanako. 1989. *The Syntax of Restrictive and Non-Restrictive Relative Clauses in Japanese*. Ph.D. thesis, University of Wisconsin, Madison.

Kameyama, Megumi. 1985. *Zero Anaphora: The Case of Japanese*. Ph.D. thesis, Stanford University.

Kehler, Andrew. 2002. *Coherence, Reference and the Theory of Grammar*. Stanford, California: CSLI Publications.

Kubota, Yusuke and Jungmee Lee. 2008. The Coordinate Structure Constraint as a discourse-oriented principle: Further evidence from Japanese and Korean. MS., The Ohio State University.

Kuno, Susumu. 1973. *The Structure of the Japanese Language*. Cambridge, Massachusetts: The MIT Press.

Lakoff, George. 1986. Frame semantic control of the Coordinate Structure Constraint. In A. M. Farley, P. T. Farley, and K.-E. McCullough, eds., *CLS 22 Part 2: Papers from the Parasession on Pragmatics and Grammatical Theory*, 152–167. Chicago: Chicago Linguistic Society.

Levine, Robert D. 2001. The extraction riddle: Just what are we missing? *Journal of Linguistics* 37:145–174.

Matsumoto, Yoshiko. 1997. *Noun-modifying Constructions in Japanese: A Frame Semantics Approach*. Amsterdam: John Benjamins.

Murasugi, Keiko. 1991. *Noun Phrases in Japanese and English: A Study in Syntax, Learnability and Acquisition*. Ph.D. thesis, University of Connecticut.

Postal, Paul M. 1998. *Three Investigations of Extraction*. Cambridge, Mass.: MIT Press.

Ross, John Robert. 1967. *Constraints on Variables in Syntax*. Ph.D. thesis, MIT. Reproduced by the Indiana University Linguistics Club.

Schmerling, Susan. 1972. Apparent counterexamples to the Coordinate Structure Constraint: A canonical conspiracy. *Studies in Linguistic Sciences* 2(1):91–104.

Tokashiki, Kyoko. 1989. *On Japanese Coordinate Structures: An Investigation of Structural Differences between the* -Te *Form and the* -I *Form*. Master's thesis, The Ohio State University.

Yatabe, Shûichi. 2003. Does scrambling in Japanese obey the Coordinate Structure Constraint? In *Nihon Gengogakkai Dai-126-kai Taikai Yokôshû (Proceedings of the 126th Meeting of the Linguistic Society of Japan)*, 262–267. Kyoto: Linguistic Society of Japan.

Yoon, Jae-Hak. 1993. Different semantics for different syntax: Relative clauses in Korean. In A. Kathol and C. J. Pollard, eds., *Papers in Syntax*, vol. 42 of *Ohio State University Working Papers in Linguistics*, 199–226. Department of Linguistics, The Ohio State University.

Yuasa, Etsuyo and Jerry M. Sadock. 2002. Pseudo-subordination: A mismatch between syntax and semantics. *Journal of Linguistics* 38(1):87–111.

The exclamative clause type in French

Jean-Marie Marandin
CNRS, Université Paris 7

Proceedings of the 15th International Conference on
Head-Driven Phrase Structure Grammar

National Institute of Information and Communications Technology, Keihanna

Stefan Müller (Editor)

2008

Stanford, CA: CSLI Publications

pages 436–456

Marandin, Jean-Marie. 2008. The exclamative clause type in French. In Stefan Müller (ed.), *Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar, National Institute of Information and Communications Technology, Keihanna*, 436–456. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2008.25. CC-BY 4.0

Abstract

My objective in this paper is to integrate scalar exclamatives into an HPSG grammar of French. First, a procedure to sort out scalar exclamatives from declaratives and interrogatives is proposed. Then, the main semantic and dialogical properties of exclamatives are presented: veridicity, ego-evidentiality, illocutionary double life and scalarity. Finally, assuming Ginzburg & Sag 2000, the exclamative clause type is defined.

1 Introduction[†]

Both the notions of clause type (CT) and that of exclamative clause type (ECT) are controversial. The former has been challenged on the grounds that CTs cannot be identified by a single syntactic pattern nor by a one-to-one matching with discourse acts (a. o. Gazdar 1981). The latter was dismissed for French on the grounds that there are no lexical items or syntactic forms specific to a putative exclamative CT (a. o. Milner 1978). This paper clearly goes against such a trend in positing an Exclamative Clause Type in the Grammar of French. First, I propose a procedure to recognize exclamatives from other types of clause. Then, I present the properties that set apart exclamatives from declaratives and interrogatives. Finally, the analysis is couched in an HPSG framework using Ginzburg & Sag's 2000 constructional approach to CTs.

2. Clause types

There are two main motivations to revive clause types. The first pertains to clausal complement selection. Verbs select clausal complements on the basis of their CT (a. o. Grimshaw 1979, Ginzburg & Sag 2000); for instance, they are sensitive to the divide declarative / interrogative. There are verbs selecting declaratives and no interrogatives, verbs that select interrogatives and no declaratives –even though open interrogatives and closed interrogatives have no syntactic feature in common– and verbs selecting open interrogatives and no closed interrogatives, etc. (Huddleston 1993). The second motivation is based on a re-appraisal of the illocutionary argument. Admittedly, CTs do not determine discourse acts (polyfunctionality of CTs), nevertheless the dialogue potential of clauses is constrained by their CTs. For

[†] I have benefited from many discussions with François Mouret, Anne Abeillé, Alain Kihm and the PhD students at U. Denis Diderot. I owe a lot to Claire Beyssade and our common work on dialogue, to Danièle Godard and Olivier Bonami who read and discussed several versions of the present analysis. All errors or misunderstandings are mine.

instance, Beyssade et Marandin 2006 argue that CTs determine one aspect of the dialogue act: the speaker's commitment. For both of these reasons, we may posit an ECT.

3 Procedure to recognize exclamatives

Crucially, clauses featuring a member of a closed list of words interpreted as high degree quantifiers (exclamative words (EWs) henceforth), differ systematically from declaratives or interrogatives with respect to four criteria. This gives us an explicit procedure to recognize the members of the ECT.

Exclamative words are categorially diverse: adverbs (*wh* or not), adjectives, determiners and complementizers.[1] They are given in Table 1.

Wh-adverb	*combien, que* (*de N*),	{Combien | que de rêves fous} tu fais ! *How many foolish dreams you have!*
Complementizer	*comme, que, ce que, qu'est-ce que, si*	Comme il regrette sa décision ! *How (much) he regrets his decision !* S'il est beau, ce type ! *How beautiful he is, this guy !*
Adverb	*si, tant, tellement*	Il est si beau ! *He is so beautiful !*
Adjective	*tel*	Il a une telle audace ! *He has such a cheek!*
Wh-determiner	*quel*	Quel chapeau il portait ! *What a hat he had!*

Table 1. Exclamative words in French.

3.1 Criteria

– C1. Complement selection: selection of clauses with exclamative words (CEWs) is different from that of declaratives or interrogatives. Note that *admettre* in (1) is factive: (1b) is ungrammatical although factivity is reputed the crucial factor for exclamative selection (since Elliott 1974).

(1) a. Paul a admis que Sue travaille beaucoup.
Paul admitted that Sue works a lot

[1] Gerard 1980 is the forerunner of the analysis of *comme, que, ce que, qu'est-ce que si* as complementizers. Due to space limitations, I leave aside verbless exclamatives and exclamative fragments (Laurens 2006), and the arguments supporting the categorical analysis of EWs.

b. * Paul a admis {comme | ce que} Sue travaille
Paul admitted how much Sue works

(2) a. Paul ne se demande plus comment Sue est venue.
Paul no longer wonders how Sue came
b. * Paul ne se demande plus {comme | ce que} Sue a souffert
Paul no longer wonders how much Sue suffered

– C2. Illocutionary potential: root CEWs do not play the role of prototypical root declaratives or interrogatives (a. o. Zanuttini & Portner 2003). They cannot play the prototypical role of declaratives, viz. answers or replies to questions.

(3) A.: {Comment va Paul? | Paul est-il beau?}
{How is Paul ? | Is Paul beautiful ?}
B.: #{Comme il est beau! | Il est tellement beau!}
{How beautiful he is ! | He is so beautiful !}

CEWs cannot be followed by a fragment which specifies their content (fragments following interrogatives contribute possible answers).

(4) a. Comment est-elle venue? En train?
How did she come? By train?
b. # Comme elle est grande! Deux mètres quarante!
How tall she is ! 2,40 meters !

– C3. Behavior of complement clause under negated matrix verbs: complement CEW's content is preserved under negation of the embedding verb. Both (5a) and (5b) implicate 'Il a beaucoup souffert hier' (*He suffered a lot yesterday*).

(5) a. Paul m'a écrit {combien | comme | ce qu} il avait souffert hier.
b. Paul ne m'a pas écrit {combien| comme | ce qu} il avait souffert hier.
Paul {wrote | did not write} to me how much he suffered yesterday

– C4. Compatibility with an overt perspective marker: CEWs are incompatible with overt perspective marker.

(6) a. *{Selon moi | d'après Marie}, qu'il est beau !
{According to me | in Mary's opinion}, how beautiful he is
b. * Il_j m'a écrit que, {d'après lui_j | d'après Marie}, il est tellement beau

c. * Je lui ai rappelé ce que {d'après moi | d'après Marie}, il est beau
I reminded him how beautiful {according to me | to Mary} he is

– C5: the content of the clause should contribute a scale of degree, quantity or intensity, either lexically (via a gradable expression) or via accommodation. (8b) does not feature any scalar expression, but it describes a situation of multiple death events and thus it can be interpreted as 'how many persons are dying in this town'.

(7) a. * Comme ce produit est périmé !
How this product is past its date of use
b. Comme ce produit est vieux !
How old this product is

(8) a. *{Comme | ce que) Jean meurt dans cette ville !
How Jean dies in this city
b. {Comme | qu'est-ce qu') on meurt dans cette ville !
How one dies in this city

Criteria C1 and C2 are directly relevant to posit a clause type. C2 and C3 – not discussed in previous literature to my knowledge– are crucial to characterize its semantics. C5 does not apply to CEWs with *quel* (and a number of verbless CEWs).[2]

3.2 Exclamative vs exclamation

There are clauses, which are commonly reputed exclamatives or exclamations, that do not meet the criteria above. I single out two cases. The former is made of clauses with intensive NPs or PPs such as those in (9):

(9) a. Paul a acheté un de ces cheval!
Paul bought one of these.PL horse.SG
'Paul bought such a horse!'
b. Paul est {d'un intelligent | d'une intelligence}!
Paul is {of.PREP an intelligent.N/A | of an intelligence}
'Paul is incredibly intelligent!'

[2] Degree expressions are either based on the comparison between arbitrary objects or on the comparison with a fixed standard (Benveniste 1948, Kennedy *to app.*). For example, the interpretation of *Quel chapeau (elle portait ce soir-là) !* (*What a hat (she had that night)!*) involves the ideal (or the anti-ideal) hat (in the speaker's view) (Lakoff 1987): 'she wore a hat having the features that make up the best/worse hat (best/worse in the speaker's view)'. In this paper, I only consider clauses with a scalar interpretation.

Clauses with intensive NPs or PPs behave like regular declaratives: they are selected by the same verbs, felicitous in answers, very hard to process in negative embeddings (like other intensive expressions), compatible with perspective markers and with non scalar content.

Criteria	Examples
C1	Paul a admis qu'elle avait été d'un calme pendant l'interview ! *Paul admitted that she had been quite calm during the interview.*
C2	A.: Comment allait Paul ? *How was Paul?* B.: Il avait une de ces forme ce matin ! *He was on such a form this morning!*
C3	* Paul ne m'a pas dit que Marie était d'un déprimé depuis quelques jours *Paul did not tell me that Marie was incredibly depressed since days.*
C4	Selon Paul, il avait une de ces forme ce matin !
C5	Il a un de ces chapeau ! C'est d'un périmé, ton truc ! *He has an incredible hat! That's well beyond its date of use!*

Table 2. Clauses with intensive XPs behave like regular declaratives

Rhetorical Questions (RQs) are the second case in point. RQs are interrogatives conveying a biased question whose answer is Common Ground and whose dialogue impact requires the activation of such a content. They do not have any specific selection properties, they are felicitous as replies and compatible with a fragment expressing the bias, felicitous with perspective markers and completely indifferent to the scalar / non scalar divide.

Criteria	Examples
C1	Je me demande si le pape est catholique? *I wonder whether the pope is Catholic.*
C2	A.: Marie a-t-elle accepté le poste? *Has Mary accepted the position ?* B.: Marie sait-elle refuser une offre qui flatte son ego ? *Does Marie knows how to refuse something flattering for her ego?* --- A.: Le pape est-il catholique? {Non ? | Oui ?} *Is the pope Catholic? {No? | Yes?}* B.: <..> A.: *Alors, arrête de me dire* [..] B.: < ..> A.: *Then stop saying* [..]
C4	Selon toi, Marie sait-elle refuser une offer qui flatte son ego ? *According to you, does Marie know how to refuse something flattering?*
C5	Mange-t-on des produits périmés pour le plaisir ? *Does one eat products past their date of use on purpose?*

Table 3. Intensive rhetorical questions behave like regular interrogatives

Since CEWs are the only clauses to show systematic differences with declaratives or interrogatives, I take it that that they are the only ones that should be analyzed as realizing a type of clause. CEWs are exclamatives and positing an ECT should enable one to capture their common properties.

4 Properties of the exclamative clause type

The criteria proposed above reveal the characteristic properties of the exclamative clause type.

4.1 Veridicity

As shown in (5) above, the content of complement exclamatives is preserved under negation of embedding verbs. More generally, exclamative content is preserved in the scope of a modal operator, the antecedent of a conditional and in questions. All utterances in (10) implicate 'Paul was very unhappy at school'.

(10) a. Il est possible que Paul dise {comme il a été malheureux | ce qu'il a pu être malheureux} à l'école.
It is possible that Paul says how unhappy he was at school
b. Si Paul te dit {comme il a été malheureux | ce qu'il a pu être malheureux} à l'école, alors tout ira bien.
If Paul tells you how unhappy he was at school, then all will be alright
c. A-t-il dit {comme | combien | ce qu} il avait été malheureux à l'école ?
Did he say how unhappy he was at school

Hence, exclamative content (EC) belongs to the veridical content of utterances, along with presuppositions (pps) and conventional implicatures (CIs). Veridical content is the content the speaker is committed to even though it is not asserted (Karttunen & Zaenen 2005). Then, the natural question is whether EC is akin to pps or to CIs, or something else. Tests based on other properties of veridical content, i. e. suspension and cancellation, are of little help in that matter (Jayez sd).[3] Nevertheless, an overlooked property provides us with an important cue.

[3] Root exclamatives pass the usual test of suspension, but not complement exclamatives.

(i) a. S'il se trompe, qu'est-ce qu'il se trompe !
If he is mistaken , how much mistaken he is
b. ?? S'il se trompe, je {t'écrirai | ne t'écrirai pas} {comme | ce qu'} il se trompe.
If he is mistaken, {I will | will not} write you how very mistaken he is

This is the usual situation with those tests whose results vary due to interferences with other aspects of the expressions triggering pps or CIs.

Cancellation of pps or CIs via negation in monologues yield natural segments of discourse, if it is correlated with an explicit perspective shift. The more explicit the shift is, the more natural the discourse is.

(11) a. Paul {est | n'est pas} allé chercher ses enfants à l'école. Selon la police, il n'a pas d'enfants.
Paul {went | did not go} and take his kids from school. According to the police, he has no kids.
b. Lance, le plus grand coureur de tous les temps, a gagné le tour. Selon moi, ce n'est pas le plus grand coureur et il a triché.
Lance, the greatest cyclist of all times, won. To me, he is not the greatest cyclist and he cheated.

ECs behave in the same way. Notice that the EC must be presented as the opinion of an agent who is a potential speaker. In (12), 'Pierre is very good' reflects Marie's opinion in the exclamative, it is then negated from the perspective of the speaker.

(12) Marie admire beaucoup Vergez. Elle m'a encore répété hier {combien | ce qu'} il avait été bon dans le procès Dupond. Pourtant, je sais qu'il n'a pas été bon dans cette affaire.
Marie admires Vergez a lot. She told me again how good he was in Dupond's affair. Yet, I know that he was not good in that case

This gives us the right perspective to analyze the incompatibility of exclamatives with explicit perspective markers (see (6) above). Such an incompatibility sets apart exclamative: inducers of pps or CIs are fien with perspective markers (13).

(13) a. Selon Paul, Sue ne fumait pas. Selon Pierre, elle a cessé de fumer.
According to Paul, Sue did not smoke. According to Pierre, she stopped smoking
b. Malheureusement pour Paul, Marie est revenue. Heureusement pour moi, elle est partie.
Unfortunately for Paul, Marie came back. Fortunately for me, she went away
c. # Selon Paul, les élèves ne sont pas bons. Selon Pierre, {comme ils sont forts | ils sont tellement forts !}.
According to Paul, the students are not good. According to Pierre, how good they are.

Exclamatives share such a trait with declaratives reporting inner state or experience.

(14) a. # A mon avis, je suis désolé.
To my opinion, I am sorry
b. # A ton avis, je suis désolé.
To your opinion, I am sorry

There is a difference though: (14b) may be salvaged as a questioning declarative, which is not an option available for exclamatives. This observation opens the way to capturing the specificity of EC.

4.2 Ego-evidentiality

Evidentiality is the grammaticalized marking of the source of content. Thus, direct or perceptual source, hearsay or inference are among the most often marked types of source in the languages of the world (Aikhenvald 2006). Garrett 2001 introduces the category of ego-evidentiality in his analysis of the intricate evidential system of Tibetan: in ego-evidentiality, the source of the content is the speaker's immediate and direct knowledge. In (14), both the content and the source of evidence are Ego; in exclamatives, only the source is Ego (the content may pertain to any state of affair).[4] I take it that the incompatibility with perspective markers results from redundancy or a conflict in the marking of the source of evidence.

This proposal enables one to account for the selection of exclamatives – remember that it cuts across the factive / nonfactive divide. Exclamative selectors present the speaker as having a direct access to the complement content and such direct access as being the warrant for her certainty. Hence, the fact that exclamatives are selected by verbs describing an experience of the content, be it perceptual or mental; verbs whose meaning involves hearsay (15b), inference (15c), an interactive process (15d) or a mental posture towards content other than intuition (15e) are no felicitous exclamative selectors.

(15) a. Il a entendu comme elle chantait bien.
He heard how well she sang
b. * Il a entendu dire comme elle chantait bien
He heard it said how well she sang
c. * Il en a{conclu | déduit} comme elle chantait bien
He concluded how well she sang
d. * Il a convaincu Paul comme elle chantait bien
He convinced Paul how well she sang

[4] EC is displaceable contrary to the meaning of supplemental expressions (Potts 2007b).

e. * Il croit comme elle chante bien
He believes how well she sang

The contrast in (16) illustrates the selection principle in a nutshell. The contrast involves the homonyous verbs *trouver* (Ducrot 1980). One of the condition on the felicitous use of the performative verb *trouver*$_1$ is that the content of the complement " is based on the experience (direct or indirect) of what is evaluated" (ibid: 84), while *trouver*$_2$ indicates that the content of the complement has been reached "after a research or the discovery of relevant pieces of evidence" (ibid: 60). As expected, exclamatives are only felicitous with *trouver*$_1$. [5]

(16) a. Je trouve qu'il a tellement tort dans cette affaire.
I think that he is so wrong in this affair
b. * Depuis ses dernières déclarations, il trouve qu'il a tellement tort dans cette affaire.
Since his last declarations, he discovered that he is so wrong in this affair

Ego-evidentiality and mirativity are different (Delancey 2001). Thus, the claim that exclamative content is ego-evidentially marked is sharply different from the view widely shared in the literature that exclamative content is mirative(-like): «Exclamation conveys surprise […] that entails a judgment by the speaker that a given situation is noncanonical » (Michalelis, 2001: 1039). The mirative conception is hard to reconcile with the actual gamut of uses of root exclamatives. For example, Zanuttini & Portner aptly note that "polite compliments like *what a delicious dinner he made !* don't imply that the quality of the dinner is surprising, amazing, or anything of the sort (he might always cook well)". It is even harder to reconcile with the actual use of complement exclamatives. For example, (17) is perfectly natural even though the exclamative content refers to a past situation and cannot involve any reaction of surprise.

(17) S'il realise un jour {comme | ce qu'} il a été heureux avec elle, il changera peut-être.
If he ever realizes how happy he was with her, then he will perhaps change

[5] By the way, *trouver*$_1$ only select exclamatives with adverbial exclamatives: * *Je trouve {comme | combien} elle est belle*. *Trouver*$_2$ is resolutive: it selects open interrogatives but not exclamatives, which is another example of the fact that interrogative selection and exclamative selection are distinct.

The evidential approach captures the expressive flavor of exclamatives without arbitrarily assuming that they have to express an emotive attitude, and in particular, surprise. Exclamatives in context can be associated with the expression of an emotion, just like any utterances of other types. Maybe it is the case with root exclamatives more often than not, but nothing supports the claim that exclamatives fare differently from intensive declaratives or intensive rhetorical questions.

4.3 Double illocutionary life

Root exclamatives do not have the same dialogue potential as declaratives or interrogatives. Another feature can be added that sets them apart from declaratives: they resist dialogue refutation (18B.a). Surely, the addressee may express his disagreement as in (18B.b). But, even in this case, A's exclamation goes through because it does not need to be taken up by the addressee.

(18) A.: Comme il est bête !
How silly he is
B.: a. #{Non ! | C'est faux !}
{No | That' not true}
b. {Je ne trouve pas | je ne suis pas d'accord}
{I do not agree | You're kidding}

A striking feature of root exclamatives is their monofunctionality: they always give rise to exclamations. By exclaiming, the speaker presents herself as being committed to the content of her utterance. Contrary to what is going on in asserting, she does not call on her addressee to make it shared or common ground. As Milner 1978 puts it, she merely asks the addressee to be the witness of her opinion. Now, such a characterization is only true of root exclamatives. As for complement exclamatives, they contribute to the content of the matrix assertions or questions. In other words, they contribute content that is asserted or questioned. This is shown by the behaviour of exclamatives with Discourse relations (DRs). DRs hold between asserted contents. DRs cannot relate two root exclamatives or an exclamative and a declarative, while they can relate two complement exclamatives. Take the CAUSE relation, holding between two declaratives in (19) where it is cued by *en effet* and *car*.

(19) a. Paul a travaillé dur. En effet, il devait beaucoup d'argent à ses parents.
Paul worked hard. Indeed he owed a lot of money to his parents

b. Marie lui a écrit que Paul avait beaucoup travaillé car il devait beaucoup d'argent à ses parents.
Marie wrote him that Paul worked hard because he owed a lot of money to his parents

The discourse in (20) featuring two complement exclamatives is well-formed; (21) involving a root exclamative and a declarative is not.

(20) a. Marie lui a écrit comme Pierre avait travaillé dur car il devait beaucoup d'argent à ses parents.
b. Marie lui a écrit comme Pierre avait travaillé dur. En effet, il devait beaucoup d'argent à ses parents.

(21) a. # Paul a travaillé si dur. En effet, il devait beaucoup d'argent à ses parents.
b. # Comme Paul a travaillé dur ! En effet, il devait beaucoup d'argent à ses parents.

4.4 Scalarity

It is not enough to say that exclamatives require a scalar content. Exclamative words behave like any other degree word: they are sensitive to the structure of the scale introduced in the context (Kennedy & McNally 2005b). It should be open or lower closed. Here, I restrict myself to scales of degrees associated with adjectives. Adjectives with a totally open scale yield felicitous exclamatives (22a), while adjectives with a totally closed scale do not (22b).[6]

(22) a. Comme le livre de Marie est intéressant!
How interesting Mary's book is
b. *{Ce que le verre de Marie est plein ! | Le verre de Marie est tellement plein !}
How full Marie's glass is

Adjectives with a lower closed scale yield felicitous exclamatives (23a), while adjectives with an upper closed scale do not (23b).

(23) a. Comme ta demande est injustifiée !
How unjustified your demand is
b. ?? Comme ta demande est justifiée
How justified your demand is

[6] When used imprecisely (Kennedy & McNally 2005b: 357), *plein* is felicitous in exclamatives: Comme la salle est pleine ce soir ! (How full the theater is to-night!).

It is often claimed that exclamatives involve a quantification along a dimension of unusualness (noncanonicity in Michaelis 2001). This would be the main difference with non-exclamative high degree words like *très* (very) ou *tout à fait* (quite). The claim is too strong: in most uses, there is not the slightest implication that the state of affair described in the exclamative deviates from the ordinary course of things. Moreover, it is incomplete: if something was unusual, it would be the high degree. Thus, high degree is the core of the content of exclamative quantification. It is common to distinguish between the high degree associated with *very* and that associated with *much* (Kennedy & McNally 2005b). *Very* involves a restriction of the comparison class: a very beautiful boy is a beautiful boy among the beautiful boys. On the other hand, *much* involves a degree "greater by a large amount than" the standard used for the quantification: a much desired change is a change desired to a degree *d* such that *d* is far above the standard of desirability. I have no decisive argument (besides intuition) to support the stance I adopt here that exclamative words side more with *much* than with *very*. If this proves wrong, it will not change the core of the analysis anyway

4.5 To sum up

Clauses that meet the five criteria presented above behave differently from declaratives and interrogatives. Their main characteristics pertains to the relation they bring about between their content and the speaker: the speaker (more rarely, the reported speaker) is the source of the content and she is committed to its truth.

5 An HPSG grammar of scalar exclamatives in French

Ginzburg & Sag 2000 (G&S henceforth) give a constructional definition of CTs in which the semantic type of the content represents the identifying feature of each CT: the content of declaratives is a proposition, the content of interrogatives a propositional abstract. Accordingly, constituency diversity is no longer an obstacle to positing CTs but a ground to recognize subtypes (which are necessary to establish the fine-grained selection of complements by verbs). From that perspective, G&S propose that (a) the content of exclamatives is a fact (rather than a proposition) and (b) exclamative words contribute an existential quantification on degrees and a restriction: the degree is "unusual". Proposal (a) is based on the assumption that verbs selecting exclamatives should be factive in English, which does not carry over to French. Proposal (b) is rooted in the mirative analysis of exclamatives, which I have shown to be inadequate above. I take up the overall framework, but reformulate the analysis of exclamatives on the basis of the descriptive generalizations I arrived at in the preceding sections: (a') the content is a proposition with ego-evidential status and (b') exclamative

words contribute an existential quantification and a restriction: the degree is much raised.

5.1 Framework

In G&S's constructional approach, clause types inherit both a CLAUSALITY type and a HEADEDNESS type. HEADEDNESS constrains the constituency, CLAUSALITY primarily constrains the content.

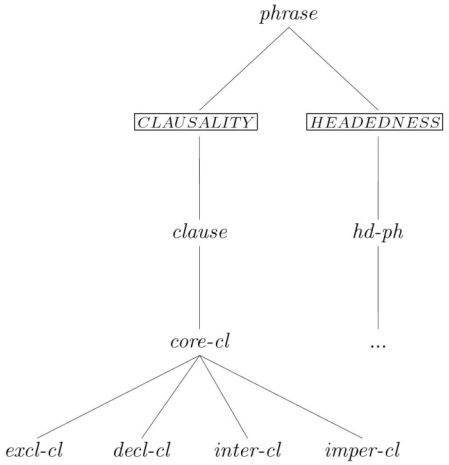


Fig. 1. Hierarchy of phrases

Words are hybrid entities contributing to both dimensions. Exclamative words will play a central role in the analysis I propose, which reflects the fact that there would be no ECT if there were no exclamative words. Finally, G&S posit special constructions (*hd-only-ph*) to cater for the illocutionary dimension of root clauses. Here I will slightly depart from the original framework by adopting proposals made by Bonami & Godard 2007, 2008 and Beyssade & Marandin 2006.

5.2 Exclamative words

Exclamative words (EWs) cannot be reduced to word use; they are not merely *wh*-expressions or degree words which gain exclamative meaning by virtue of being used with expressive or intensive content ("non-classifying judgment in Milner 1978). They have specific properties as shown above.[7] In

[7] Note that there are only three (out of twelve) items homonymous (i. e. having same form and same part of speech) with items occurring in another CT (with a different

order to set up the explicit compositional semantics of the ECT, I claim that they make two contributions: a quantifier and an evidential marker.

5.2.1 Quantification

EWs contribute a degree / quantity / intensity quantification (depending on the scale introduced in the content). Here, for ease of presentation, I restrict myself to degree quantification associated with adjectives. I stick to Kennedy &McNally's 2005b analysis of adjectives and degree words.

Adjectives denote relations between individuals and degrees.

(24) *gradable word* ⇒

$$\begin{bmatrix} \text{CONT} \begin{bmatrix} \textit{gradable-rel} \\ \text{ARG1 } \textit{ind} \\ \text{SCAL-ARG } d \end{bmatrix} \\ \text{STORE} \left\{ \begin{bmatrix} \textit{param} \\ \text{SCAL-ARG } d \end{bmatrix} \right\} \end{bmatrix}$$

Exclamative words are degree words that bind the degree contributed by gradable expressions. Like other degree words, they impose a restriction on the adjective's degree argument. I claim that it is the same restriction as that contributed by *much*: "the degree is far above the standard" (noted ">>") used for the property denoted by the adjective. In order to keep things simple, I assume that the standard is a constant fixed in the context.

(25) *high-deg-rel* ⇒ [*d* >> standard]

(26) *exclamative word* ⇒

$$\begin{bmatrix} \text{CONT} \left\{ \begin{bmatrix} \textit{high-deg-rel} \\ \text{SCAL-ARG } d \end{bmatrix} \right\} \\ \text{BKG} \left\{ \left[\text{STANDARD} = a \right] \right\} \end{bmatrix}$$

In *comme Paul est grand!* ou *Paul est si grand!*, the degree content is paraphrasable as 'There is a degree *d* to which Paul is tall and such that *d* is far above the standard degree used to qualify a human like Paul as tall'.

5.2.2 Evidential operator

The second contribution is to mark the content of the clause in which it occurs as ego-evidential. I introduce an evidential operator with two arguments: the source of the evidence and the content for which the evidence holds. This enables one to capture two features specific to this kind of

---

meaning): quantitative *combien* (*combien d'erreurs!*), *quel* and complementizer *si* (*s'il est beau, ce type!*).

evidential marking (McCready 2008): it may concern only part of a clause and the content it marks escape semantic embedding. As for ego-evidentiality, the source is the speaker (unless shifted, which I leave aside here) and the content the proposition in which the EW occurs.

(27) Ego-evidential operator ⇒

$$\begin{bmatrix} \textit{ego-evidence} \\ \textsc{source}\ \boxed{3} \\ \textsc{cont}\ \textit{proposition} \\ \textsc{cxt}\ \left[\textsc{c-ind} \mid \textsc{speaker}\ \boxed{3}\right] \end{bmatrix}$$

5.2.3 Exclamative words

Exclamative words have the same quantifying content whatever their part of speech. The quantifier is put into store, so that it is available at the clausal level for retrieval (complementizer EWs force the retrieval themselves). Moreover, I resort to the contextual feature COMMITMENT (CMT) introduced by Bonami & Godard 2008 to analyze evaluative adverbs. CMT inheritance works as other contextual features: the CMT of a clause is the union of the CMT of its daughters. It feeds the SPEAKER-ONLY-CMT slot in the DGB at the utterance level where its dialogical impact is effective.

Below are three entries for prototypical EWs. *Tellement* is an adverb modifying a gradable adjective locally (**Il m'a tellement semblé être beau*). *Comme* is a complementizer and associates either with the main relation (*Comme il est beau* !) or a gradable relation within a daughter (*Comme ils habitaient dans de belles maisons !* lit. : how they lived in beautiful houses).

$$\begin{bmatrix} \textit{tellement} \\ \textsc{cat}\ \begin{bmatrix} \textit{adverb} \\ \textsc{mod}\ \left[\ \textsc{cont}\ \textit{gradable-rel}\right] \end{bmatrix} \\ \textsc{cont}\ \left\langle \boxed{1} \begin{bmatrix} \textit{high-deg-rel} \\ \textsc{scal-arg}\ d \end{bmatrix} \right\rangle \\ \textsc{store}\ \{\boxed{1}\} \\ \textsc{cxt}\ \begin{bmatrix} \textsc{c-ind} \mid \textsc{sp}\ \boxed{6} \\ \textsc{bkg}\ \left[\textsc{standard}\boxed{3} = a\right] \\ \textsc{cmt}\ \left\{ \boxed{5} \begin{bmatrix} \textit{ego-evidence} \\ \textsc{source}\ \boxed{6} \\ \textsc{cont}\ \begin{bmatrix} \textit{prop} \\ \textsc{quants}\ \boxed{1} \oplus \mathrm{A} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

Fig.2: Adverbial *tellement*

$$\begin{bmatrix} \textit{comme} \\ \textsc{cat} \mid \textsc{head}\ c \\ \textsc{comps}\ \left\langle \begin{bmatrix} \textsc{store}\ \left\{ \boxed{2} \begin{bmatrix} \textit{param} \\ \textsc{scal-arg}\ d \end{bmatrix} \right\} \cup \boxed{\mathrm{A}} \\ \textsc{cont}\ \boxed{3} \end{bmatrix} \right\rangle \\ \textsc{cont}\ \begin{bmatrix} \textsc{quants}\ \left\langle \boxed{1} \begin{bmatrix} \textit{high-deg-rel} \\ \textsc{scal-arg}\ d \end{bmatrix}, \boxed{2} \right\rangle \oplus \boxed{\mathrm{B}} \\ \textsc{nucl}\ \boxed{3} \end{bmatrix} \\ \textsc{cxt}\ \begin{bmatrix} \textsc{c-ind} \mid \textsc{sp}\ \boxed{6} \\ \textsc{bkg}\ \left\{\left[\textsc{standard}\boxed{3} = a\right]\right\} \\ \textsc{cmt}\ \left\{ \boxed{5} \begin{bmatrix} \textit{ego-evidence} \\ \textsc{source}\ \boxed{6} \\ \textsc{cont}\ \begin{bmatrix} \textit{prop} \\ \textsc{quants}\ \boxed{1} \oplus \mathrm{A} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

Fig.3: Complementizer *comme*

I follow Abeillé & Godard 2007 for adverbal *combien*. Syntactically, it is a filler corresponding to a gap complement of the verb. Semantically, it behaves like *comme* (in a different register, which I leave aside here).

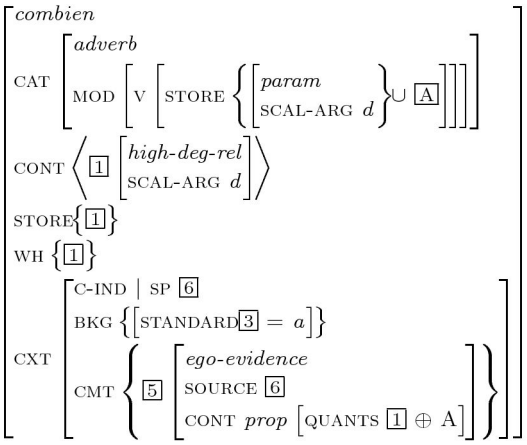
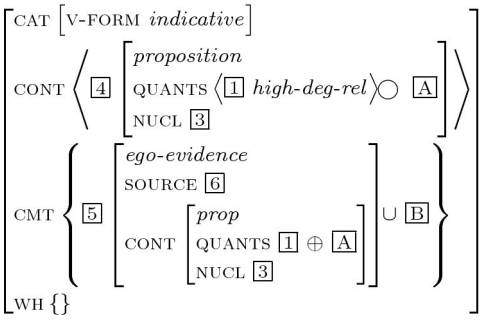


Fig.4: *Wh*-adverb (adverbal) *combien*

5.3 The exclamative clause type constraint

The constraint which unifies the exclamative clause type is inherited in the CLAUSALITY dimension. It forces the retrieval of the quantifier contributed by EWs; its content is a quantified proposition. The content in CMT (the content that is evidentially marked) is passed along; its dialogical contribution depends on whether the clause is root or complement.

(28) *exclam-cl* ⇒



Inheritance of subtypes in the dimension of HEADEDNESS accounts for the syntactic diversity of exclamatives. Below is a fragment of the hierarchy accounting for some instances of exclamative subtypes.

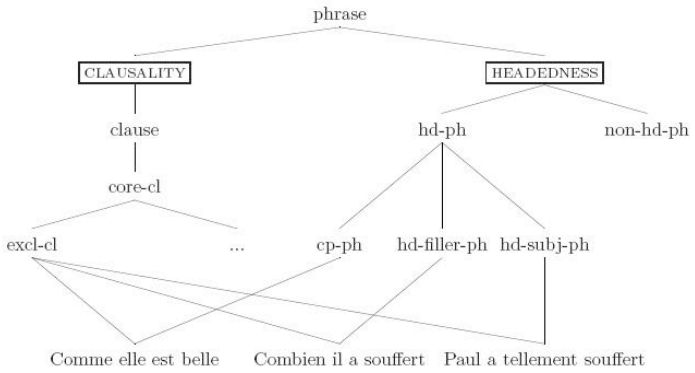


Fig.5: Subtypes of ECT (fragment)

5.4 Exclamative clauses in dialogue

5.4.1 Root exclamatives

Root exclamatives give rise to exclamations. In terms of update of the Dialogue Gameboard (DGB) (Ginzburg 2008), exclamations do not contribute to the interactive construction of the shared ground, but enlarge the contents the speaker chooses to get commited to publicly. Here, I assume Beyssade & Marandin's 2006 architecture of the DGB (see Fig.6 below). Two types of Speaker's commitment are distinguished: those that the speaker intends to share with the addressee (INTERACTIVE COMMITMENT) and those that she does not (SPEAKER-ONLY COMMITMENT). Moreover, a specific slot (CALL-ON-ADDRESSEE) is introduced to model the interactive working of the dialogue independently of the question/answer pair (QUD). It captures the content the speaker wants the addressee to get committed to.

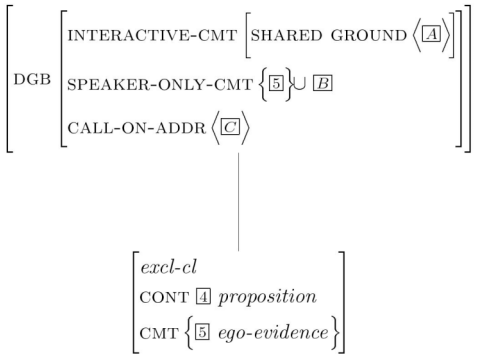
$$\left[\begin{array}{l}\text{DGB}\left[\begin{array}{l}\text{INTERACTIVE-CMT}\left[\begin{array}{l}\text{SHARED-GROUND } \textit{list}\\ \text{QUD } \textit{list}\\ \text{TO-DO-LIST } \textit{list}\end{array}\right]\\ \text{SPEAKER-ONLY-CMT } \textit{set}\\ \text{CALL-ON-ADDRESSEE } \textit{list}\\ \text{LATEST MOVE } \textit{list}\end{array}\right]\end{array}\right]$$

Fig.6. Dialogue Gameboard

Exclamation is conceived of as a dialogue move, i. e. a move that updates the DGB. It is analyzed as a *hd-only-phr* construction which directly encodes the updates in the DGB. Exclamations do not contribute new contents or any calls-on-addressee for the advancement of the current dialogue. They only contribute to the image the speaker gives of herself with respect to the topic

addressed in the exclamative. Notice that the propositional content remains available for the addressee to challenge (see (18.Bb) above). Schematically:

(29) *Exclamation* ⇒



5.4.2 Complement exclamatives

Complement exclamatives contribute part of the content of the matrix assertion or question, while the evidential character of this part escapes the asserting or the questioning. It is where the 'split' of the content into CONT and CMT is put to use. The analysis of *Paul n'a pas dit comme Marie est intelligente* (Paul did not say how intelligent Marie is) is sketched in Fig. 7 below. The content of the complement exclamative feeds the asserted content: the content the speaker is ready to add to the shared ground and that she calls on the addressee to accept as being shared ground. The content of CMT feeds the commitments the speaker does not ask the addressee to share.

This analysis is parallel to the analysis of evaluative adverbs given by Bonami & Godard 2008. This is no chance. There is indeed a communality between the two phenomena: evaluative adverbs and exclamatives contribute public cues about the attitude of the speaker towards what she is saying. These cues are not "at issue": they do no fuel the interactive incrementation of the shared ground while they influence the way how dialogue participants perform such an incrementation.

6 Conclusion

The proposal rests on two claims. First, high degree is not the hallmark of French exclamatives, but rather ego-evidentiality. Ego-evidentiality is responsible for the veridicity of exclamative meaning, which is different from factivity. Secondly, exclamative content is propositional. Thus, there is no one-to-on matching between CTs and types of content as claimed in G&S. On the technical side, I resort to the feature CMT to capture the dialogical resemblance between the meaning contributed by supplemental expressions

(Potts 2007a/b, Bonami & Godard 2007) and the evidential meaning contributed by exclamatives.

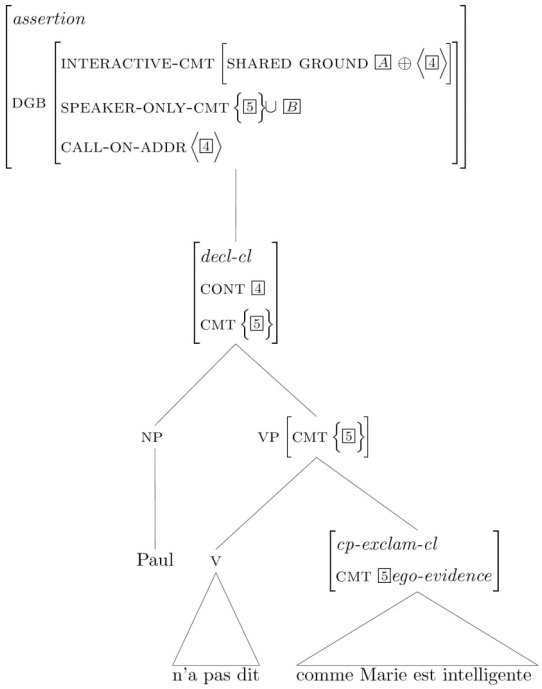


Fig. 7: Analysis of a complement exclamative

References

Abeillé, Anne and Godard, Danièle. 2003. The syntactic flexibility of French degree adverbs. In Stefan Müller (ed.), *Proc. 10th Intl Conference on HPSG*. Pages 26-46.

Abeillé, Anne and Godard, Danièle. 2007. *Y a-t-il de la quantification « à distance » dans le domaine adjectival ?* Ms Université Paris7.

Aikhenvald, Alexandra. 2006. Evidentiality in grammar. In Keith Brown (ed), *Encyclopedia of Language and Linguistics*, Volume 4 (article 0252). Oxford: Elsevier. Pages 320-5.

Benveniste, Emile.[1948] 1993. *Noms d'agent et noms d'action en indo-européen,* Paris: A. Maisonneuve.

Beyssade, Claire and Marandin, Jean-Marie. 2007. The Speech Act Assignment Problem Revisited: Disentangling Speaker's Commitment from Speaker's Call on Addressee. In Olivier Bonami and Patricia Cabredo-Hoffher (eds.), *Empirical Studies in Syntax and Semantics 6*. Pages 37-68. http://www.cssp.cnrs.fr/eiss6/.

Bonami, Olivier and Godard. Integrating Linguistic Dimensions: The Scope of Adverbs. In Stefan Müller (ed.), *Proc. 14th Intl Conf. on HPSG*. Pages 25-45.

Bonami, Olivier and Godard, Danièle. 2008. Lexical semantics and pragmatics of evaluative adverbs. In Louise McNally and Christopher Kennedy (eds), *Adverbs*

and Adjectives: Syntax, Semantics, and Discourse. Oxford : Oxford UP. Pages 274-304.
Delancey Scott. 2001. The mirative and evidentiality. *Journal of pragmatics* 33: 369-382.
Ducrot, Osvald. 1980. *Je trouve que*. In Osvald Ducrot *et al., Les mot du discours*. Paris: Minuit. Pages 57-92.
Elliott, Dale. 1974. Toward a grammar of exclamations. Foundations of language 11: 231-246.
Gazdar, Gerald. 1981. Speech act assignment. In Aravind Joshi *et al.* (eds), *Elements of Discourse Understanding*. Cambridge : Cambridge UP. Pages 64-83.
Garrett, Edward. 2001. *Evidentiality and Assertion in Tibetan*. PhD. Thesis, UCLA.
Gérard, Josselyne. 1980, *L'exclamation en français*. Tübingen: Niemeyer.
Ginzburg, Jonathan and Sag, Ivan A. 2000. *Interrogative Investigations*. Stanford, Ca.: CSLI.
Ginzburg, Jonathan. 2008. *Semantics and Conversation*. CSLI Publications
Grimshaw, Jane. 1979. Complement selection and the lexicon. *Linguistic Inquiry* 10: 279-326.
Huddleston, Rodney. 1993. Remarks on the construction *You don't believe who ED has married*. Lingua 91: 175-184.
Jayez J. sd. *Implicatures conventionnelles et presuppositions*. Jayez' home page.
Karttunen, Lauri and Zaenen, Annie. 2005, Veridicity. In Graham Katz *et al.* (eds), *Annotating, Extracting and Reasoning about Time and Events*. Dagstuhl Seminar Proceedings 05151.
Kennedy, Christopher. & McNally, Louise. 2005a. The syntax and semantics of multiple degree modification in English. In Stefan Müller (ed.), *Proc. of the 12th Intl Conf. on HPSG*. Pages 178-191.
Kennedy, Christopher. & McNally Louise. 2005b. Scale structure, degree modification, and the semantics of gradable predicates. *Language* 81.2 345-381.
Kennedy, Christopher. *To app*. Modes of comparison. CLS 43. Kennedy's home page.
McCready, Eric. 2008. Semantic heterogeneity in evidentials. McCready's home page.
Lakoff, Georges. 1987, *Women, fire, and dangerous things*. Chicago: University of Chicago Press.
Michaelis, Laura. 2001. Exclamative constructions. In Martin Hapelsmath *et al.* (eds), *Language Typology and Language Universals*, vol. 2. Berlin, New-York: W. de Gruyter. Pages 1038-1050.
Milner, Jean-Claude. 1978, *De la syntaxe à l'interprétation*. Paris: Le Seuil.
Potts, Christopher. 2007a. Into the conventional-implicature dimension. *Philosophy Compass* 4(2): 665-679.
Potts, Christopher. 2007b. The expressive dimension. Theoretical Linguistics 33(2):165-197 2007.
Sadock Jerrold M. and Zwicky Arnold M. 1985. Speech act distinctions in syntax. In Timothy Shopen (ed.), *Language typology and syntactic description,* vol 1. Cambridge: Cambridge UP. 155- 196.
Zanuttini, Raffaella and Portner, Paul. 2003. Exclamative clauses: at the syntax-semantics interface. *Language* 79(1), 39-8.