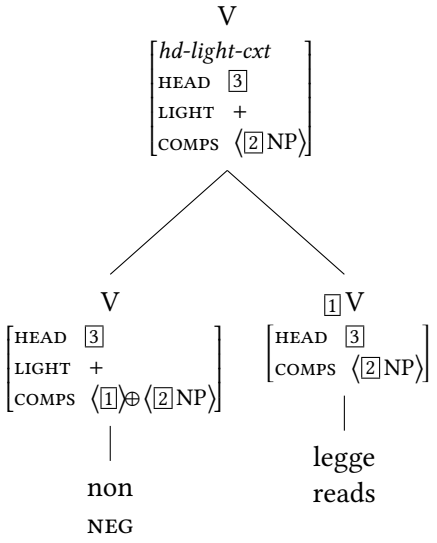


Figure 9: Verb complex structure of (47)

tries to offer a unified approach to the distributional possibilities in three different languages. by assigning the negative expression in each language to a specified topological field. The linear-based approach assumes that constituents have an order domain to which ordering constituents apply. Borsley (2006), accepting the analysis of Kim (2000) where *non* is taken to be a type of clitic-auxiliary, posits the following order domain:

(48) $\left[\text{DOM}\left\langle\left[\begin{array}{l}\textit{first}\\ \langle\text{Gianni}\rangle\end{array}\right], \left[\begin{array}{l}\textit{second}\\ \text{NEG }+\\ \langle\text{non}\rangle\end{array}\right], \left[\begin{array}{l}\textit{third}\\ \langle\text{telephona}\rangle\end{array}\right], \left[\begin{array}{l}\textit{third}\\ \text{NEG }+\\ \langle\text{a nessuno}\rangle\end{array}\right]\right\rangle\right]$

The only required constraint that Borsley (2006) needs to postulate is that a negative element bearing the positive NEG feature is either in the second or the third field. One advantage of this direction is to allow Borsley (2006) to attribute the properties of Welsh negation to the difference in the domain value of the same NEG element. Unlike Italian, the NEG bearing negative is in the second or the third field, as illustrated in the following domain for the sentence (44b) (from (49) Borsley (2006)):[14]

[14]Different from Borsley (2006), Borsley & Jones (2000) offer a selectional analysis of Welsh negation. That is, the finite negative verb selects two complements (e.g., subject and object) while the nonfinite negative verb selects a VP. See Borsley & Jones (2000) for details.

(49) $\left[\text{DOM}\left\langle\left[\begin{array}{l}\textit{second}\\ \langle \text{dw}\rangle\end{array}\right], \left[\begin{array}{l}\textit{third}\\ \langle \text{i}\rangle\end{array}\right], \left[\begin{array}{l}\textit{third}\\ \text{NEG } +\\ \langle \text{ddim}\rangle\end{array}\right], \left[\begin{array}{l}\textit{third}\\ \langle \text{wedi gweld neb}\rangle\end{array}\right]\right\rangle\right]$

6 Other related phenomena

In addition to these work focusing on the distributional possibilities of negation, there have also been work on genitive negation and negative concord.

Przepiórkowski (2000) focuses on non-local genitive of negation in Polish where the object argument is not accusative but genitive marked with the presence of negative marker as in (50ab). The assignment of genitive case to the object is also effective in the unbounded relation as shown in (51a) (data from Przepiórkowski (2000)):

(50) a. Lubię Marię
like-1st.SG Mary-ACC
'I like Mary.'

b. Nie lubię Marii/*Marię
not like-1st.SG Mary-GEN/Mary-ACC
'I don't like Mary.'

(51) a. Janek wydawał się lubić Marię.
John seemed RM like-INF Mary-ACC
'John seemed to like Mary.'
Janek nie wydawał się lubić Marii/Marię.
John not seemed RM like-INF Mary-GEN/Mary-ACC
'John did not seem to like Mary.'

To account for this kind of phenomena, Przepiórkowski (2000) develops an HPSG-based analysis with the assumption that the combination of the negative morpheme *nie* with the verb stem introduces the feature NEG.[15] The case assignment constraint such that a NEG verbal expression assigns the GEN to its non-initial argument ensures the object NP in (50ab) to be GEN-marked (adopted from Przepiórkowski (2000)):

(52) POLISH CASE ASSIGNMENT RULE:

[15] In Polish, negation is realized as the prefix *nie* to a verbal expression. Przepiórkowski & Kupść (1999); Przepiórkowski (2000; 2001: see).

$$\begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{neg} & + \end{bmatrix} \\ \textsc{arg-st} & \langle \text{XP}, \text{YP}[\textsc{case}\ \textit{str}] \rangle \end{bmatrix} \quad \mapsto \quad \left[\textsc{arg-st} \ \langle \text{XP} \rangle \oplus \langle \text{NP}[\textsc{case}\ \textit{gen}] \rangle \oplus L \right]$$

This type constraint will ensure that the object complement of (50a) to be GEN-marked due to the negative word *nie lubię*. As for the long distance GEN in (51a), Przepiórkowski (2000) allows the VP complement of raising verbs like *seem* to optionally undergo the lexical argument composition, yielding the following for the matrix verb in (51a):

(53)
$$\begin{bmatrix} \textsc{form} & \langle \text{nie wydawał się} \rangle \\ \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{neg} & + \end{bmatrix} \\ \textsc{arg-st} & \left\langle \text{NP}, \text{VP}\left[\textsc{comps} \left\langle \boxed{1}\text{NP} \right\rangle \right] \right\rangle \oplus \langle \boxed{1}\text{NP}[\textit{str}] \rangle \end{bmatrix}$$

This lexical specification allows the object NP of the verb to get GEN-marked in accordance with the constraint in (52).[16] In his analysis, the feature NEG thus tightly interacts with the mechanism of argument composition and construction-based case assignment (or satisfaction).

Negative concord also also concerns negation that we often find in languages like French, Italian, Polish, and so forth. De Swart & Sag (2002) investigates negative concord in French where multiple occurrences of phonologically negative constituents express either double negation or single negation:

(54) Personne n'aime personne.
None likes no.one
'No one is such that they love no one.' (DN)
'No one likes anyone.' (NC)

The double negation reading in (54) has two quantifiers while the single negation reading is an instance of negation concord where the two quantifiers merge into one. De Swart & Sag (2002), assuming that the information of each quantifier is stored in QSTORE and retrieved at the lexical level in accordance with constraints on the verb's arguments and semantic content. For instance, the verb *n'aime* in (54) will have two different ways of retrieving the QSTORE value as in the following:[17]

[16] When there is no argument composition, the positive verb *lubić* assigns ACC to the object NP.
[17] The QSTORE value contains information roughly equivalent to first order logic expressions like *NO*x[Person(x)]. See De Swart & Sag (2002).

(55) a.
$$\begin{bmatrix} \textsc{form} & \langle n'aime \rangle \\ \textsc{arg-st} & \langle \mathrm{NP}[\textsc{store}\ \{\boxed{1}\}], \mathrm{NP}[\textsc{store}\ \{\boxed{2}\}] \rangle \\ \textsc{quants} & \langle \boxed{1}, \boxed{2} \rangle \end{bmatrix}$$

b.
$$\begin{bmatrix} \textsc{form} & \langle n'aime \rangle \\ \textsc{arg-st} & \langle \mathrm{NP}[\textsc{store}\ \{\boxed{1}\}], \mathrm{NP}[\textsc{store}\ \{\boxed{2}\}] \rangle \\ \textsc{quants} & \langle \boxed{1} \rangle \end{bmatrix}$$

In (55ba), the two quantifiers are retrieved, inducing double negation (¬∃x¬∃y[Love(x,y)]) while in (55bb), the two have a resumptive interpretation in which the two are merged into one (¬∃x∃y[Love(x,y)]).[18] This analysis, coupled with the complement treatment of *pas* as a lexically stored quantifier, can account for why *pas* does not induce a resumptive interpretation with a quantifier (from De Swart & Sag (2002)):

(56) Il ne va pas nulle part, il va á son travail.
'He does not go nowhere, he goes to work.'

In this standard French example, De Swart & Sag (2002), accepting the analysis of **kim:00** as *pas* as a complement, specifies the adverbial complement *pas* to be included the negative quantifier in the QUANTS value. This means there would be no resumptive reading for standard French, inducing double negation as in (57):[19]

(57)
$$\begin{bmatrix} \textsc{form} & \langle ne\ va \rangle \\ \textsc{arg-st} & \langle Adv_{\mathbf{I}}[\textsc{store}\ \{\boxed{1}\}], \mathrm{NP}[\textsc{store}\ \{\boxed{2}\}] \rangle \\ \textsc{quants} & \langle \boxed{1}, \boxed{2} \rangle \end{bmatrix}$$

Przepiórkowski & Kupść (1999) and Borsley & Jones (2000) also investigate negative concord in Polish and Welsh and offer HPSG analyses. Consider a Welsh example from Borsley & Jones (2000):

(58) Nid oes neb yn yr ystafell
NOT is no.one in the room
'There is no one in the room.'

Borsley & Jones (2000), identifying n-words with the feature NC (negative concord), takes the verb *nid oes* to bear the positive NEG value, and specifies the subject *neb yn* to carry the positive NC (negative concord) feature. This selectional

[18] See De Swart & Sag (2002) for detailed formulation of the retrieval condition of stored value.
[19] See De Swart & Sag (2002) for cases where *pas* induces negative concord.

approach, interacting with well-defined features, tries to capture how more than one negative elements are corresponding to a single semantic negation.[20]

7 Conclusion

One of the most attractive consequences of the derivational perspective has been that one uniform category, given other syntactic operations and constraints, explains the derivational properties of all types of negation in natural languages, and further can provide a surprisingly close and parallel structure among languages, whether typologically related or not. However, this line of thinking, first of all, runs the risk of missing the peculiar properties of each type of negation. Each individual language has its own way of expressing negation, and further has its own restrictions in the surface realizations of negation which can hardly be reduced to one uniform category.

In the nonderivational HPSG analyses for the four main types of sentential negation that we have reviewed in this chapter, there is no uniform syntactic element, though a certain universal aspect of negation does exist, viz. its semantic contribution. Languages appear to employ various possible ways of negating a clause or sentence. Negation can be realized as different morphological and syntactic categories. By admitting morphological and syntactic categories, we have been able to capture their idiosyncratic properties in a simple and natural manner. Further this theory has been built upon the lexical integrity principle, the thesis that the principles that govern the composition of morphological constituents are fundamentally different from the principles that govern sentence structures. The obvious advantage of this perspective is that it can capture the distinct properties of morphological and syntactic negation, and also of their distribution, in a much more complete and satisfactory way.

Acknowledgements

I thank reviewers of this chapter for comments and suggestions, which helped improve the quality of this chapter. I also thank Bob Borsley and Stefan Müller for detailed comments on the earlier version. My thanks also go to Rok Sim and Jungsoo Kim for helpful feedback.

[20] See Borsley & Jones (2000) for detailed discussion.

References

Abeillé, Anne & Danièle Godard. 1994. The syntax of French auxiliaries. Ms. UFRL and CNRS, Université Paris 7.

Abeillé, Anne & Danièle Godard. 1997. The syntax of French negative adverbs. In M.-L. Rivero (ed.), *Negation and polarity: Syntax and semantics*, 1–27. Amsterdam: John Benjamins.

Baker, Curtis L. 1989. *English syntax*. Cambridge, MA: The MIT Press.

Baker, Curtis L. 1991. The syntax of English *not*: The limits of core grammar. *Linguistic Inquiry* 22. 387–429.

Belletti, Adriana. 1990. *Generalized verb movement*. Torino: Rosenberg & Sellier.

Bender, Emily & Alex Lascarides. 2013a. On modeling scope of inflectional negation. In Elisabeth Norcliffe & Philip Hofmeister (eds.), *The core and the periphery: data-driven perspectives on syntax inspired by ivan a. sag*, 101–124. Stanford: CSLI Publications.

Bender, Emily & Alex Lascarides. 2013b. On modelling scope of inflectional negation. In Philp Hofmeister & Elisabeth Norcliffe (eds.), chap. On modelling scope of inflectional negation, 101–124. Stanford, CA: CSLI Publication.

Bonami, Olivier & Gert Webelhuth. 2013. The phrase-structural diversity of periphrasis: a lexicalist account. In Marina Chumakina & Greville G. Corbett (eds.), *Periphrasis : the role of syntax and morphology in paradigms*, 141–167. Oxford University Press.

Borsley, Robert. 2006. A linear approach to negative prominence. In Stefan Müller (ed.), *Proceedings of the hpsg06 conference*, 60–80. Stanford, CA: CSLI Publication.

Borsley, Robert & Bob Jones. 2000. The syntax of welsh negation. *Transactions of the Philological Society* 98(1). 15–47.

Borsley, Robert & Bob Jones. 2005. *Welsh negation and grammatical theory*. University of Wales Press.

Borsley, Robert & Mohamed Krer. 2012. An hpsg approach to negation in libyan arabic. *Essex Research Reports in Linguistics* 61(2). 1–24.

Bratt, Elizabeth Owen. 1996. *Argument composition and the lexicon: lexical and periphrastic causatives in korean*. Stanford University, MA PhD Dissertation.

Bresnan, Joan & Sam A. Mchombo. 1991. The lexical integrity principle: evidence from bantu. *Natural Language and Linguistic Theory* 13. 181–254.

Chomsky, Noam. 1991. Some notes on economy of derivation and representation. In R. Friedin (ed.), *Principles and parameters in comparative grammar*, 417–454. Cambridge, MA: The MIT Press.

Chomsky, Noam. 1993. A minimalist program for linguistic theory. In Kenneth Hale & Samuel Keyser (eds.), *The view from building*, 1–52. Cambridge, MA: MIT Press. Reprinted in Chomsky 1995.

Chomsky, Noam. 1995. *The minimalist program*. Cambridge, MA: The MIT Press.

Chung, Chan. 1998a. Argument composition and long-distance scrambling in Korean. In Erhard W. Hinrichs, Andreas Kathol & Tsuneko Nakazawa (eds.), *Complex predicates in nonderivational syntax* (Syntax and Semantics 30), 159–220. San Diego: Academic Press.

Chung, Daeho. 1998b. Wh-scope identification via quasi-binding. *Japanese/Korean Linguistics* 7. 293–309.

Crowgey, Berthold. 2010. Discontinuous negation in hausa. In Stefan Müller (ed.), *Proceedings of the hpsg10 conference*, 269–287. Stanford, CA: CSLI Publication.

Crowgey, Joshua. 2012. An a priori typology of sentential negation from an hpsg perspective. In Stefan Müller (ed.), *The proceedings of the 19th international conference on head-driven phrase structure grammar*.

Crowgey, Joshua & Emily Bender. 2011. Analyzing interacting phenomena: word order and negation in basque. In Stefan Müller (ed.), *Proceedings of the hpsg 2011 conference*, 46–59. Stanford, CA: CSLI Publication.

Dahl, Östen. 1979. Typology of sentence negation. *Linguistics* 17. 79–106.

De Swart, Henriette & Ivan Sag. 2002. Negation and negative concord in romance. *Linguistics and Philosophy* 25. 373–417.

Dryer, Matthew S. 2005. Negative morphemes. *The World Atlas of Language Structures*. 454–457.

Ernst, Thomas. 1992. The phrase structure of english negation. *Linguistic Review* 9. 109–144.

Haegeman, Liliane. 1995. *The syntax of negation*. Cambridge University Press, Cambridge.

Haegeman, Liliane. 1997. The syntax of n-words and the neg criterion. In F. Martineau D. Forget P. Hirschbuhler & M.-L.Rivero (eds.), *Negation and polarity: syntax and semantics*, 115–137. John Benjamins, Amsterdam.

Hagstrom, Paul. 2002. Implications of child errors for the syntax of negation in korean. *Journal of East Asian Linguistics* 11(3). 211–242.

Han, Chung-hye, Lidz Jeffrey & Julien Musolino. 2007. V-raising and grammar competition in korean: evidence from negation and quantifier scope. *Linguistic Inquiry* 38(1). 1–47.

Hilpert, Martin. 2016. Change in modal meanings. *Constructions and Frames* 8(1). 66–85.

Jackendoff, Ray. 1972. *Semantic interpretation in generative grammar*. The MIT Press.

Kathol, Andreas. 2000. *Linear syntax*. New York, Oxford: Oxford University Press.

Kato, Yasuhiko. 1997. Review of the syntax of negation by l.haegeman. *Language* 73. 391–394.

Kato, Yasuhiko. 2000. Interpretive asymmetries of negation. In L. R. Horn & Y. Kato (eds.), *Negation and polarity: syntactic and semantic perspective*, 62–87. Oxford: Oxford University Press.

Kelepir, Meltem. 2001. *Topics in turkish syntax: clausal structure and scope*. MIT dissertation.

Kim, Jong-Bok. 2000. *The grammar of negation: a constraint-based grammar*. Stanford: CSLI Publications.

Kim, Jong-Bok. 2016. *The syntactic structures of korean: a construction based perspective*. Cambridge: Cambridge University Press.

Kim, Jong-Bok & Ivan Sag. 1996. French and english negation: a lexicalist alternative to head movement.

Kim, Jong-Bok & Ivan A. Sag. 2002. Negation without head movement. *Natural Language and Linguistic Theory* 20(2). 339–412.

Kim, Jong-Bok & Peter Sells. 2008. *English syntax: anintroduction*. Stanford: CSLI Publications.

Klima, Edward S. 1964. Negation in english. In J. A. Fodor & J. J. Katz (eds.), *The structure of language: readings in the philosophy of language*, 246–323. Englewood Cliffs, NJ: Prentice-Hall.

Kupść, Anna & Adam Przepiórkowski. 2002. Morphological aspects of verbal negation in polish. In Peter Kosta & Jens Frasek (eds.), *Current approaches to formal slavic linguistics*, 337–346. Frankfurt: Peter Lang.

Lasnik, Howard. 1995. Verbal morphology: syntactic structures meets the minimalist program. In H. Campos & P. Kempchinsky (eds.), *Evolution and revolution in linguistic theory: essays in honor of charlos otero*, 251–275.

Miller, Philip H. 1992. *Clitics and Constituents in Phrase Structure Grammar*. New York. Published version of 1991 Ph. D. thesis, University of Utrecht, Utrecht.

Mitchell, Erika. 1991. Evidence from finnish for pollock's theory of ip. *Linguistic Inquiry* 22. 373–379.

Monachesi, Paola. 1993. Object clitics and clitic climbing in italian hpsg grammar. In *Proceedings of the sixth conference on european chapter of the association for computational linguistics*, 437–442. Association for Computational Linguistics.

Monachesi, Paola. 1998. Italian restructuring verbs: a lexical analysis. complex predicates in nonderivational syntax. *Syntax and Semantics* 30. 313–368.

Müller, Stefan. 2016. *Grammatical Theory: From Transformational Grammar to Constraint-Based Approaches* (Textbooks in Language Sciences 1). Berlin: Language Science Press. DOI:10.17169/langsci.b25.167

Newmyer, Fredrick. 2006. Boundaries of Meaning: Neo-Gricean Studies in Pragmatics and Semantics in Honor of Laurence R. Horn. In Betty Birner & Gregory Ward (eds.), chap. Negation and Modularity, 247–268. John Benjamins.

Payne, John R. 1985. Negation. In Timothy Shopen (ed.), *Language typology and syntactic description 1: clause structure*, 197–242. Cambridge: Cambridge University Press.

Pollock, Jean-Yves. 1989. Verb movement, universal grammar, and the structure of ip. *Linguistic Inquiry* 20. 365–424.

Pollock, Jean-Yves. 1994. Checking theory and bare verbs studies in honor of richard s. kayne. In Gulielmo et al Cinque (ed.), *Paths towards universal grammar*, 293–310. Georgetown University Press.

Przepiórkowski, Adam. 2000. Long distance genitive of negation in polish. *Journal of Slavic Linguistics* 8. 151–189.

Przepiórkowski, Adam. 2001. Optional and multiple long distance genitive of negation in polish. In Gerhild Zybatow, Uwe Junghanns, Grit Mehlhorn & Luka Szucsich (eds.), *Current issues in formal slavic linguistics*, 337–346. Frankfurt: Peter Lang.

Przepiórkowski, Adam & Anna Kupść. 1999. Eventuality negation and negative concord in polish and italian. In Robert Borsley & Adam Przepiórkowski (eds.), *Slavic in head-driven phrase structure grammar*, 211–246. Stanford, CA: CSLI Publication.

Sag, Ivan A. 2012. Sign-based construction grammar: an informal synopsis. *Sign-based construction grammar* 193. 69–202.

Vasishth, Shravan. 2000. Word order, negation and negative polarity in hindi. *OSU Working Papers in Linguistics* 53. 108–131.

Vikner, Sten. 1997. V^0 to I^0 movement and inflection for person in all tenses. In Liliane Haegeman (ed.), *The new comparative syntax*, 189–213. London: Longman.

Warner, Anthony. 2000. English auxiliaries without lexical rules. In Robert D. Borsley (ed.), *Syntax and semantics*, vol. 32, 167–220. San Diego: Academic Press. DOI:10.1163/9781849500098

Zanuttini, Raffaella. 1991. *Syntactic properties of sentential negation: a comparative studies of romance languages*. University of Pennsylvania PhD Dissertation.

Zanuttini, Raffaella. 1997. Negation and verb movement. In L. Hageman (ed.), *The new comparative syntax*, 214–245. London & New York: Longman.

Zanuttini, Raffaella. 2001. *Negation and clausal structure*. Oxford: Oxford University Press.

Zeijlstra, Hedde. 2007. On french negation. *Berkeley Linguistic Society* 35. 447–458.

Zeijlstra, Hedde. 2015. The morpho-syntactic realization of sentential negation. In A. Alexiadou & T. Kiss (eds.), *The international syntax handbook*, 275–310. Berlin: Mouton de Gruyter.

Chapter 20

Ellipsis

Joanna Nykiel
Kyung Hee University, Seoul

Jong-Bok Kim
Kyung Hee University, Seoul

This chapter provides an overview of HPSG analyses of ellipsis. The structure of the chapter follows three types of ellipsis, nonsentential utterances, predicate ellipsis, and nonconstituent coordination, with three types of analyses applied to them. The analyses characteristically don't admit silent syntactic material for any ellipsis phenomena with the exception of certain types of nonconstituent coordination.

1 Introduction

Ellipsis is a phenomenon that involves a noncanonical mapping between syntax and semantics. What appears to be a syntactically incomplete utterance still receives a semantically complete representation, based on the features of the surrounding context, be the context linguistic or nonlinguistic. The goal of syntactic theory is thus to account for how the complete semantics can be reconciled with the apparently incomplete syntax. One of the key questions here relates to the structure of the ellipsis site, that is, whether or not we should assume the presence of invisible syntactic material. This chapter begins by introducing three types of ellipsis (nonsentential utterances, predicate ellipsis, and nonconstituent coordination) that have attracted considerable attention and received treatment within HPSG. We next overview existing evidence for and against the so-called WYSIWYG ('What You See Is What You Get') approach to ellipsis, where no invisible material is posited at the ellipsis site. Finally, we walk the reader through three types of HPSG analyses applied to the three types of ellipsis presented in section 2.

Joanna Nykiel & Jong-Bok Kim. N.d. Ellipsis. In Stefan Müller, Anne Abeillé, Robert D. Borsley & Jean-Pierre Koenig (eds.), *Head-Driven Phrase Structure Grammar*. prepublished version. Berlin: Language Science Press. [Preliminary page numbering]

2 Three types of ellipsis

Depending on the type of analysis by means of which HPSG handles them, elliptical phenomena can be broadly divided into three types: nonsentential utterances, predicate ellipsis, and nonconstituent coordination. We overview the key features of these types here before discussing in greater detail how they have been brought to bear on the question of whether there is invisible syntactic structure at the ellipsis site or not. We begin with stranded XPs, which HPSG treats as nonsentential utterances, and then move on to predicate and argument ellipsis, followed by phenomena known as nonconstituent coordination.

2.1 Nonsentential utterances

This section introduces utterances smaller than a sentence, which we refer to as nonsentential utterances (NUs). These range from Bare Argument Ellipsis (BAE) (1), including fragment answers (2), to direct or embedded sluicing (3)-(4). Sluicing hosts stranded wh-phrases and has the function of an interrogative clause, while BAE hosts XPs representing various syntactic categories and typically has the function of a declarative clause.[1]

(1) A: You were angry with them.
B: Yeah, angry with them and angry with the situation.

(2) A: Where are we?
B: In Central Park.

(3) A: So what did you think about that?
B: About what?

(4) A: There's someone at the door.
B: Who?/I wonder who.

The theoretical question NUs raise is whether they are parts of larger sentential structures or rather nonsentential structures whose semantic and morphosyntactic features are licensed by the surrounding context. To adjudicate between these views researchers have looked for evidence that NUs in fact behave as if they were fragments of sentences. As we will see in section 3, there is evidence to support both of these views. However, HPSG doesn't assume that NUs are underlyingly sentential structures.

[1]Several subtypes of nonsentential utterances can be distinguished, based on their contextual functions, which we don't discuss here (for a recent taxonomy, see Ginzburg 2011).

2.2 Predicate ellipsis and argument ellipsis

The section looks at three constructions whose syntax includes null, hence noncanonical, elements. They are Verb Phrase Ellipsis (VPE), Null Complement Anaphora (NCA), and argument drop (or pro drop). VPE features stranded auxiliary verbs (5) and NCA is characterized by omission of complements to some lexical verbs (6). Argument drop refers to omission of a pronominal subject or an object argument, as illustrated in (7) for Polish.

(5) A: I didn't ask George to invite you.
B: Then who did?

(6) Some mornings you can't get hot water in the shower, but nobody complains.

(7) Pia późno wróciła do domu. Od razu poszła spać.
PIA LATE GOT TO HOME RIGHT AWAY WENT SLEEP
'Anna got home late. She went straight to bed.'

Here the question is whether these null elements should be assumed to be underlyingly present in the syntax of theses constructions, and the answer is no.

2.3 Nonconstituent coordination

We focus on two instances of nonconstituent coordination, Right Node Raising (RNR) and gapping (Ross 1967), illustrated in (8) and (9) respectively. In RNR, a single constituent located in the right-peripheral position is associated with both conjuncts. In gapping, a finite verb is associated with both (or more) conjuncts but only present in the leftmost one. This results in what appears to be coordination of standard constituents and elements not normally defined as constituents (a stranded transitive verb in (8) and a cluster of subject NP and object NP in (9)).

(8) Ethan sold and Rasmus gave away all his CDs.

(9) Ethan gave away his CDs and Rasmus his old guitar.

To handle such constructions the grammar must either be permitted to coordinate noncanonical constituents, to generate coordinated constituents parts of which can undergo deletion, or to coordinate nonsentential utterances. As we will see, HPSG makes use of the latter two options.

3 Evidence for and against invisible material at the ellipsis site

This section is concerned with NUs and VPE since this is where the contentious issues arise of where ellipsis is licensed (sections 3.3. and 3.4) and whether there is invisible syntactic material in an ellipsis site (sections 3.1 and 3.2). Below we consider evidence for and against invisible structure found in the ellipsis literature; the evidence is based not only on intuitive judgments, but also experimental and corpus data.

3.1 Connectivity effects

Connectivity effects refer to parallels between NUs and their counterparts in sentential structures, thus speaking in favor of the existence of silent sentential structure. We focus on two kinds here: case-matching effects and preposition-stranding effects (for other examples of connectivity effects, see Ginzburg & Miller 2018). It's been known since Ross (1969) that NUs exhibit case-matching effects, that is, they are typically marked for the same case that is marked on their counterparts in sentential structures. (10) illustrates this for German, where case matching is seen between a wh-phrase functioning as an NU and its counterpart in the antecedent.

(10) Er will jemandem schmeicheln, aber sie wissen nicht
HE WILL SOMEONE.DAT FLATTER, BUT THEY KNOW NOT
wem/*wen.
WHO.DAT/*WHO.ACC
'He wants to flatter someone, but they don't know whom.'

Case-matching effects are crosslinguistically robust in that they are found in the great majority of languages with overt case marking systems, and therefore, they have been taken as strong evidence for the reality of silent structure. The argument is that the pattern of case matching follows straightforwardly from the silent structure that embeds an NU and matches the structure of the antecedent clause. However, a language like Hungarian poses a problem for this reasoning (see Jacobson 2016). Hungarian has verbs that assign one of two cases to their object NPs with no meaning difference, but case matching is still required between an NU and its counterpart, whichever case is marked on the counterpart. To see this, consider (11) from Jacobson (2016: 356). The verb *hasonlit* assigns either sublative (SUBL) or allative (ALL) case to its object, but if SUBL is selected

for an NU's counterpart, the NU must match this case.

(11) A: Ki-re hasonlit Péter?
WHO.SUBL RESEMBLES PETER
A: 'Who does Peter resemble?'
B: János-ra/*János-hoz.
JÁNOS.SUBL/*JÁNOS.ALL
B: 'János.'

Jacobson (2016) notes that there is some speaker variation regarding the (un)acceptability of case mismatch here at the same time that all speakers agree that either case is fine in a corresponding nonelliptical response to (11A). This last point is important, because it shows that the requirement of—or at least a preference for—matching case features applies to NUs to a greater extent than it does to their nonelliptical equivalents, challenging connectivity effects.

Similarly problematic for case-based parallels between NUs and their sentential counterparts are some Korean data. Korean NUs can drop case markers more freely than their counterparts in nonelliptical clauses can, a point made in Morgan (1989). Observe the following exchanges:

(12) A: Nwukwu-ka ku chaek-ul sa-ass-ni?
WHO.NOM THE BOOK.ACC BUY.PST.QUE
A: 'Who bought the book?'
B: Yongsu-ka/Yongsu/*Yongsu-lul.
YONGSU.NOM/YONGSU/*YONGSU.ACC
B: 'Yongsu.'
B′: Yongsu-ka/*Yongsu ku chaek-ul sa-ass-e
YONGSU.NOM/*YONGSU THE BOOK.ACC BUY.PST.DECL
B′: 'Yongsu bought the book'

When an NU corresponds to a nominative subject in the antecedent (as in 12B), it can be either marked for nominative or caseless. However, replacing the same NU with a full sentential answer, as in (12B′), rules out case drop from the subject. This strongly suggests that the case-marked and caseless NUs couldn't have identical source sentences if they were to derive via PF-deletion.[2] Data like these

[2]Nominative differs in this respect from three other structural cases, dative, accusative and genitive, in that the latter may also be dropped from nonelliptical clauses (see Morgan 1989, Lee 2016, Kim 2016).

led Morgan (1989) to propose that not all NUs have a sentential derivation, an idea later picked up in Barton (1998).

The same pattern is associated with semantic case. That is, in (13), an NU can optionally be marked for comitative like its counterpart in the A-sentence or be caseless. But being caseless is not an option for the NU's counterpart.

(13) A: Nwukwu-wa/*nwukwu hapsek-ul ha-yess-e?
WHO.COM/*WHO SITTING.TOGETHER.ACC DO.PST.QUE
A: 'With whom did you sit together?'
B: Mimi-wa/*Mimi.
MIMI.SRC/MIMI
B: 'With Mimi/*Mimi.'

The generalization for Korean is then that NUs may be optionally realized as caseless but may never be marked for a different case than is marked on their counterparts.

Overall, case-marking facts show that there is some morphosyntactic identity between NUs and their antecedents, though not to the extent that NUs have exactly the features that they would have if they were constituents embedded in sentential structures. The Hungarian facts also suggest that aspects of the argument structure of the antecedent relating to case licensing are relevant for an analysis of NUs.[3]

The second kind of connectivity effects goes back to Merchant (2001, 2004) and highlights apparent links between wh- and focus movement and the features of NUs. The idea is that prepositions behave the same under wh- and focus movement as they do under clausal ellipsis, that is, they pied-pipe or strand in the same environments. If a language (e.g., English) permits preposition stranding under wh- and focus movement (*With what did Harvey paint the wall?* vs *What did Harvey paint the wall with?*), then NUs may surface with or without prepositions, as illustrated in (14) for sluicing and BAE.

(14) A: I know what Harvey painted the wall with.
B: (With) what?/(With) primer.

If there indeed was a link between between preposition stranding and NUs, then we would not expect prepositionless NUs in languages without preposition stranding. This expectation is disconfirmed by an ever-growing list of nonpreposition-stranding languages that do feature prepositionless NUs: Brazilian Portuguese

[3]Hungarian and Korean are in fact not the only problematic languages; for a list, see Vicente (2015).

(Almeida & Yoshida 2007), Spanish and French (Rodrigues et al. 2009), Greek (Molimpakis 2018), Bahasa Indonesia (Fortin 2007), Emirati Arabic (Leung 2014), Russian (Philippova 2014), Polish (Szczegielniak 2008, Nykiel 2013, Sag & Nykiel 2011), Czech (Caha 2011), Bulgarian (Abels 2017), and Serbo-Croatian (Stjepanović 2008, 2012). A few of these studies have presented experimental evidence that prepositionless NUs are acceptable, though — for reasons still poorly understood — they typically don't reach the same level of acceptability as their variants with prepositions do (see Nykiel 2013 for Polish and Molimpakis 2018 for Greek).

It is evident from this research that there is no grammatical constraint on NUs that keeps track of what preposition-stranding possibilities exist in any given language. On the other hand, it doesn't seem sufficient to assume that NUs can freely drop prepositions, given examples of sprouting like (15), in which prepositions are not omissible (see Chung 2006, 2013 on the inomissibility of prepositions under sprouting). The difference between (14) and (15) is that there is an explicit phrase the NU corresponds to (in the HPSG literature this phrase is termed a Salient Utterance (Ginzburg & Sag 2000) or a Focus-Establishing Constituent (Ginzburg 2012)) in the former but not in the latter.

(15) A: I know Harvey painted the wall.
B: *(With) what?/Yeah, *(with) primer.

This issue has not received much attention in the HPSG literature, though see Kim (2015).

3.2 Island effects

One of the predictions of the view that NUs are underlyingly sentential is that they should respect island constraints on long-distance movement. But as illustrated below, NUs (both sluicing and BAE) exhibit island-violating behavior.[4]

(16) A: Harriet drinks scotch that comes from a very special part of Scotland.
B: Where? (Culicover & Jackendoff 2005: 245)

(17) A: The administration has issued a statement that it is willing to meet with one of the student groups.
B: Yeah, right—the Gay Rifle Club. (Culicover & Jackendoff 2005: 245)

[4]Merchant (2004) argued that BAE, unlike sluicing, does respect island constraints, an argument that was later challenged (see e.g, Culicover & Jackendoff 2005, Griffiths & Lipták 2014). However, Merchant (2004) focused specifically on pairs of wh-questions and answers like (2) and ran into the difficulty of testing for island-violating behavior, since a well-formed antecedent couldn't be constructed.

Among Culicover & Jackendoff's (2005: 245) examples of well-formed island-violating NUs are also sprouted NUs (those that correspond to implicit Salient Utterances) like (18)-(19).

(18) A: John met a woman who speaks French.
B: With an English accent?

(19) A: For John to flirt with at the party would be scandalous.
B: Even with his wife?

Other research assumes that sprouted NUs are one of the two kinds of NUs that respect island constraints, the other kind being contrastive NUs, illustrated in (20) (Chung, Ladusaw & McCloskey 1995, Merchant 2001, Griffiths & Lipták 2014).

(20) A: Does Abby speak the same Balkan language that Ben speaks?
B: *No, Charlie. (Merchant 2001)

Schmeh et al. (2015) explore the acceptability of NUs like (20) compared to NUs introduced by the particle *Yes* depicted in (21). (20) differs from (21) in terms of discourse function in that it corrects rather than supplement the antecedent, which is signaled by a different response particle.

(21) A: John met a guy who speaks a very unusual language.
B: Yes, Albanian. (Culicover & Jackendoff 2005: 245)

Schmeh et al. (2015) find that corrections lower acceptability ratings compared to supplementations and propose that this follows from the fact that corrections induce greater processing difficulty than supplementations do, and hence the acceptability difference between (20) and (21). This finding makes it plausible that the perceived degradation of island-violating NUs could ultimately be attributed to nonsyntactic factors, e.g., the difficulty of successfully computing a meaning for them.

In contrast to NUs, many instances of VPE appear to obey island constraints, as would be expected if there was unpronounced structure from which material was extracted. An example is depicted in (22) (note that the corresponding sluicing NU is fine).

(22) *They want to hire someone who speaks a Balkan language, but I don't remember which they do [~~want to hire someone who speaks t~~].
(Merchant 2001: 6)

(22) contrasts with well-formed examples like (23) and (24), from Ginzburg & Miller (2018).

(23) He managed to find someone who speaks a Romance language, but a Germanic language, he didn't [~~manage to find someone who speaks t~~].

(24) He was able to find a bakery where they make good baguette, but croissants, he couldn't [~~find a bakery where they make good t~~].

As Ginzburg & Miller (2018) rightly point out, we don't yet have a complete understanding of when or why island effects show up in VPE. Its behavior is at best inconsistent, failing to provide convincing evidence for silent structure.

3.3 Structural mismatches

Because structural mismatches are not permitted by NUs (see Merchant 2005, 2013),[5] this section focuses on VPE and developments surrounding the question of which contexts license it. In a seminal study of anaphora, Hankamer and Sag (1976) classified VPE as a surface anaphor with syntactic features closely matching those of an antecedent present in the linguistic context. They argued in particular that VPE is not licensed if it mismatches its antecedent in voice. Compare (25) and (26) from Sag & Hankamer (1984: 327).

(25) * The children asked to be squirted with the hose, so we did.

(26) The children asked to be squirted with the hose, so they were.

[5]Ginzburg & Miller (2018) cite examples—originally from Beecher (2008)—of sprouting NUs with nominal, hence mismatched, antecedents, e.g., (i).

(i) We're on to the semi-finals, though I don't know who against.

Somewhat similar examples, where NUs appear to take APs as antecedents, appear in COCA:

(ii) A: Well, it's a defense mechanism. B: Defense against what?

(iii) Our Book of Mormon talks about the day of the Lamanite, when the church would make a special effort to build and reclaim a fallen people. And some people will say, Well, fallen from what?

The NUs in (ii)–(iii) repeat the lexical heads whose complements are being sprouted (*defense* and *fallen*), that is, they contain more material than is usual for NUs (cf. (i)). It seems that without this additional material it would be difficult to integrate the NUs into the propositions provided by the antecedents and hence to arrive at the intended interpretations.

This proposal places tighter structural constraints on VPE than on other verbal anaphors (e.g., *do it/that*) in terms of identity between an ellipsis site and its antecedent and has prompted extensive evaluation in a number of corpus and experimental studies in the decades following Hankamer & Sag (1976). Below are examples of acceptable structural mismatches reported in the literature, ranging from voice mismatch (27) to nominal antecedents (28) to split antecedents (29).

(27) This information could have been released by Gorbachev, but he chose not to [release it]. (Hardt 1993: 37)

(28) Mubarak's survival is impossible to predict and, even if he does [survive], his plan to make his son his heir apparent is now in serious jeopardy. (Miller & Hemforth 2014:)

(29) Wendy is eager to sail around the world and Bruce is eager to climb Mt. Kilimanjaro, but neither of them can [do the things they want], because money is too tight. (Webber 1978:)

There are two opposing views that have emerged from the empirical work. The first view takes mismatches to be grammatical and connects degradation in acceptability to violation of certain independent discourse (Kehler 2002, Miller 2011, Kertz 2013, Miller & Hemforth 2014, Miller & Pullum 2014) or processing constraints (Kim et al. 2011). Two types of VPE have been identified on this view through corpus work—auxiliary choice VPE and subject choice VPE—each with different discourse requirements with respect to the antecedent (Miller 2011, Miller & Hemforth 2014, Miller & Pullum 2014). The second view assumes that there is a grammatical ban on structural mismatch but violations thereof may be repaired under certain conditions; repairs are associated with differential processing costs compared to matching ellipses and antecedents (Arregui et al. 2006, Grant et al. 2012). If we follow the first view, it is perhaps unexpected that voice mismatch should consistently incur a greater penalty under VPE than when no ellipsis is involved, as recently reported in Kim & Runner (2017). Kim & Runner (2017) stop short of drawing firm conclusions regarding the grammaticality of structural mismatches, but one possibility is that the observed mismatch effects reflect a construction-specific constraint on VPE. HPSG analyses take structurally mismatched instances of VPE to be unproblematic and fully grammatical, while also recognizing construction-specific constraints: discourse or processing constraints formulated for VPE may or may not extend to other elliptical constructions, such as NUs (see Ginzburg & Miller 2018 for this point).

3.4 Nonlinguistic antecedents

Like structural mismatches, the availability of nonlinguistic antecedents for an ellipsis points to the fact that it needn't be interpreted by reference to and licensed by a structurally identical antecedent. Although this option is somewhat limited, VPE does tolerate nonlinguistic antecedents, as shown in (30)–(31) (see also Hankamer & Sag 1976, Schachter 1977).

(30) Mabel shoved a plate into Tate's hands before heading for the sisters' favorite table in the shop. "You shouldn't have." She meant it. The sisters had to pool their limited resources just to get by. (Pullum & Miller 2014, ex. 23)

(31) Once in my room, I took the pills out. "Should I?" I asked myself. (Pullum & Miller 2014, ex. 22a)

Pullum & Miller (2014) provide an extensive critique of the earlier work on the ability of VPE to take nonlinguistic antecedents, arguing for a streamlined discourse-based explanation that neatly captures the attested examples as well as examples of structural mismatch like those discussed in section 3.3. The important point here is again that VPE is subject to construction-specific constraints which limit its use with nonlinguistic antecedents.

NUs appear in various nonlinguistic contexts as well. Ginzburg & Miller (2018) distinguish three classes of such NUs: sluices (32), exclamative sluices (33), and declarative fragments (34).

(32) (In an elevator) What floor? (Ginzburg & Sag 2000: 298)

(33) It makes people "easy to control and easy to handle," he said, "but, God forbid, at what a cost!" (Ginzburg & Miller To appear, ex. 34a)

(34) BOBADILLA turns, gestures to one of the other men, who comes forward and gives him a roll of parchment, bearing the royal seal. "My letters of appointment." (COCA)

In addition to being problematic from the licensing point of view, NUs like these have been put forward as evidence against the idea that they are underlyingly sentential, because it is unclear what the structure that underlies them would be (see Ginzburg & Sag 2000, Culicover & Jackendoff 2005, Stainton 2006).[6]

[6] This is not to say that a sentential analysis of fragments without linguistic antecedents hasn't been attempted. For details of a proposal involving a 'limited ellipsis' strategy, see Merchant (2004, 2010).

4 Analyses of NUs

It is worth noting at the outset that the analyses of NUs within the framework of HPSG are based on an elaborate theory of dialog (Ginzburg 1994, Ginzburg & Cooper 2004, 2014, Larsson 2002, Purver 2006, Fernández 2006, Fernández & Ginzburg 2002, Fernández et al. 2007, Ginzburg & Fernández 2010, Ginzburg et al. 2014, Ginzburg 2012, 2013) and on a wider range of data than is common practice in the ellipsis literature. Existing analyses of NUs go back to Ginzburg & Sag (2000), who recognize declarative fragments (35) and two kinds of sluicing NUs, direct sluices (36) and reprise sluices (37) (the relevant fragments are bolded). The difference between direct and reprise sluices lies in the fact that the latter are requests for clarification of any part of the antecedent. For instance, in (37) the referent of *that* is unclear to the interlocutor.

(35) "I was wrong." Her brown eyes twinkled. "Wrong about what?" "**That night**." (COCA)

(36) "You're waiting," she said softly. "**For what?**" (COCA)

(37) "Can we please not say a lot about that?" "**About what?**" (COCA)

Ginzburg and Sag (2000: 304) make use of the constraint shown in (38) (we have added information about the MAX-QUD) to generate NUs.

(38)

Head-Fragment Construction

$$\begin{bmatrix} \text{CAT} & S \\ \text{CTXT} & \begin{bmatrix} \text{MAX-QUD} & \lambda\{\pi^i\} \\ \text{SAL-UTT} & \left\{\begin{bmatrix} \text{CAT} & \boxed{2} \\ \text{CONT} & [\text{IND} \ \ i] \end{bmatrix}\right\} \end{bmatrix} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{CAT} & \boxed{2} \\ \text{CONT} & [\text{IND} \ \ i] \end{bmatrix}$$

Let us see how this constructional constraint allows us to license NUs and capture their properties, including the connectivity effects we discussed in section 3.1. Note first that any phrasal category can function as an NU, that is, can be mapped onto a sentential utterance as long as it corresponds to a Salient Utterance (SAL-UTT). This means that the head daughter's syntactic category must match that of a SAL-UTT, which is an attribute supplied by the surrounding context as a (sub)utterance of another contextual attribute—the Maximal Question under Discussion (MAX-QUD). The two contextual attributes SAL-UTT and MAX-QUD are introduced specifically for the purpose of analyzing NUs. The

context gets updated with every new question-under-discussion, and MAX-QUD represents the most recent question-under-discussion, while SAL-UTT is the (sub)utterance with the widest scope within MAX-QUD. To put it informally, SAL-UTT represents a (sub)utterance of a MAX-QUD that has not been resolved yet. Its feature CAT supplies information relevant for establishing morphosyntactic identity with an NU, that is, syntactic category and case information, and (38) requires that an NU match this information. Meanwhile, MAX-QUD provides the propositional semantics for an NU and is, typically, a unary question. The content of MAX-QUD can be supplied by linguistic or nonlinguistic context. In the prototypical case, MAX-QUD arises from the most recent wh-question uttered in a given context (39), but can also arise (via accommodation) from other forms found in the context, such as constituents bearing focal accent (40) and constituents in need of clarification (41), or from a nonlinguistic context (42).[7]

(39) A: What did Barry break?
B: The mike.

(40) A: Barry broke the MIKE.
B: Yes, the only one we had.

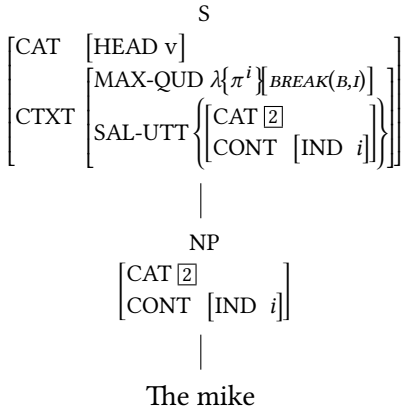
(41) A: Barry broke the mike.
B: Who?

(42) (Cab driver to passenger on the way to airport) A: Which airline?

The existing analyses of NUs (Ginzburg 2012, Sag & Nykiel 2011, Kim 2015, Abeillé et al. 2014, Abeillé & Hassamal 2017) are based on Ginzburg and Sag's (2000) constraint. Below we illustrate how it is applied to the declarative fragment in (39).

[7]Ginzburg (2012) uses the notion of the Dialog Game Board (DGB) to keep track of all information relating to the common ground between interlocutors. The DGB is also the locus of contextual updates arising from each new question-under-discussion that is introduced.

(43)



This construction-based analysis, in which dialogue updating plays a key role in the licensing of NUs, can also offer a simple account of sprouting examples like (36).[8] As discussed in Kim (2015), we could take an unrealized oblique argument of the verb *wait* as an instance of indefinite null instantiation (INI) (see Ruppenhofer and Michaelis 2014):

(44) Lexical entry for *wait*:

$$\begin{bmatrix} \text{FORM} \langle \textit{WAIT} \rangle \\ \text{ARG-ST} \left\langle \text{NP}_{I} \ \text{PP}_{X} \right\rangle \\ \text{SYN} \begin{bmatrix} \text{SUBJ} \langle \text{NP}[\textit{OVERT}] \rangle \\ \text{COMPS} \langle \text{PP}[\textit{INI}] \rangle \end{bmatrix} \\ \text{SEM} \ \textit{WAIT}(I, X) \end{bmatrix}$$

The lexical information specifies that the second argument of *wait* can be an unrealized indefinite NP while the first argument needs to be an overt one. Now consider the dialogue in (36). Uttering the sentence *You're waiting?* would then update the DGB with a SAL-UTT represented by the unrealized NP:

[8] Ginzburg and Sag (2000: 330) suggest a way of analyzing sprouted NUs, such as (i). The implied direct object of *eat* functioning as SAL-UTT here would appear as a noncanonical synsem on the verb's ARG-ST list, but not on the COMPS list, and thereby be able to provide appropriate morphosyntactic identity information.

(i) A: And what did you do then?
B: I ate.
A: What?

(45)
$$\left[\begin{array}{l}\text{DGB}\left[\begin{array}{l}\text{SAT-UTT}\left[\begin{array}{ll}\text{SYN} & \text{PP}\left[\begin{array}{l}\textit{INI}\\ \text{PFORM } \textit{FOR}\\ \text{IND } X\end{array}\right]\\ \text{SEM} & \textit{WAIT.FOR}(I,X)\end{array}\right]\end{array}\right]\end{array}\right]$$

The fragment *for what?*, matching this SAL-UTT, projects a well-formed NU in accordance with the Head-Fragment Construction.[9]

The advantages of the nonsentential analyses sketched here follow from their ability to capture limited morphosyntactic parallelism between NUs and SAL-UTT without having to account for why NUs don't behave like constituents of sentential structures. The island-violating behavior of NUs is unsurprising on this analysis, as are attested cases of structural mismatch and situationally controlled NUs.[10] However, some loose ends still remain. (38) currently has no means of capturing certain connectivity effects: it can't rule preposition drop out under sprouting and it incorrectly rules out case mismatch in languages like Hungarian for speakers that do accept it (see discussion around example (11).[11]

5 Analyses of predicate/argument ellipsis

The first issue in the analysis of VPE is the status of an elided VP. It is assumed to be a *pro* element due to its pronominal properties (see Lobeck 1995, Lopez 2000, Kim 2006, Aelbrecht and Harwood 2015, Ginzburg and Miller 2018). For instance, VPE applies only to phrasal categories (46–47), can cross utterance boundaries (48), can override island constraints (49–50), is subject to the Backwards Anaphora Constraint (51–52).

(46) *Mary will meet Bill at Stanford because she didn't _ John.

(47) Mary will meet Bill at Stanford because she didn't _ at Harvard.

(48) A: Tom won't leave Seoul soon.
B: I don't think Mary will _ either.

(49) John didn't hit a home run, but I know a woman who did. (CNPC)

[9] See the detailed analysis of such sprouting examples in Kim (2015).

[10] The rarity of NUs with nonlinguistic antecedents can be understood as a function of how easily a situational context can give rise to a MAX-QUD and thus license ellipsis (see Miller & Pullum 2014 for this point with regard to VPE).

[11] See, however, Kim (2015) for proposals envoking a case hierarchy specific to Korean to explain case mismatch and introducing an additional constraint to block preposition drop under sprouting.

(50) That Betsy won the batting crown is not surprising, but that Peter didn't know she did _ is indeed surprising. (SSC)

(51) *Sue didn't [e] but John ate meat.

(52) Because Sue didn't [e], John ate meat.

Argument ellipsis we find in languages like Polish and Korean can also be taken to be ellipsis of a pronominal expression, as in (53).

(53) Mimi-ka *pro* po-ass-ta.
Mimi.NOM pro see.PST.DECL
'Mimi saw (him)'

In accounting for *pro*-drop phenomena, we do not need to posit a phonologically empty pronoun if the level of argument structure is available (see Bresnan 1982). We simply encode the required pronominal properties in the argument structure. In the framework of HPSG, we represent this as the following Argument Realization Constraint allowing mismatch between argument-structure and syntactic-valence features:[12]

(54) Argument Realization Constraint (ARC):

$$\textit{v-word} \Rightarrow \begin{bmatrix} \text{SYN|VAL} \begin{bmatrix} \text{SUBJ} & \boxed{A} \\ \text{COMPS} & \boxed{B} \ominus \textit{list(pro)} \end{bmatrix} \\ \text{ARG-ST } \boxed{A} \oplus \boxed{B} \end{bmatrix}$$

The argument realization here tells us that a *pro* element in the argument structure need not be realized in the syntax. For example, as represented in (55), the transitive verb *po-ass-ta* 'see.PST.DECL' takes a *pro* object NP as its argument and thus the *pro* NP is not instantiated as the syntactic complement of the verb.

(55) Lexical entry for *po-ass-ta*

$$\begin{bmatrix} \textit{v-word} \\ \text{FORM } \langle \textsc{po-ass-ta} \rangle \\ \text{SYN} \begin{bmatrix} \text{HEAD } \text{|VFORM} & \textit{fin} \\ \text{VAL} \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST } \langle \boxed{1}\text{NP, NP}[\textit{pro}] \rangle \end{bmatrix}$$

[12] Expressions have two subtypes: overt and covert ones, the latter of which has two subtypes, *pro* and *gap*. See Sag (2012) for details.

Similarly, English VPE is analyzed as a language-particular VP *pro* drop phenomenon normally licensed by auxiliary verbs. This idea can be formalized as in (56):

(56) Aux-Ellipsis Construction:

$$\begin{bmatrix} \textit{AUX-ELLIPSIS-WD} \\ \text{ARG-ST} \langle \boxed{1}\text{XP}, \boxed{2}\text{YP}[\textit{PRO}] \rangle \end{bmatrix}$$

$$\Big|$$

$$\begin{bmatrix} \textit{AUX-V-LXM} \\ \text{ARG-ST} \langle \boxed{1}\text{XP}, \boxed{2}\text{YP} \rangle \end{bmatrix}$$

What this tells us is that an auxiliary verb selecting two arguments can be projected into an elided auxiliary verb whose second argument is realized as a small *pro*. Note that this argument is not mapped onto the syntactic grammatical function COMPS. (56) will also project a structure like the one in Figure 1.

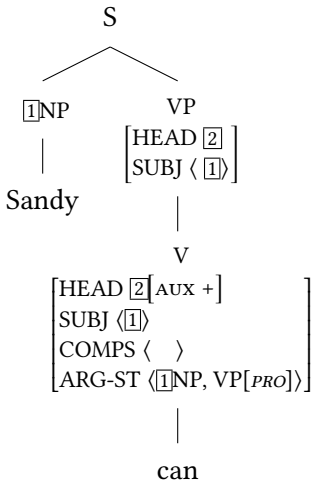


Figure 1: add caption

The head daughter's COMPS list (VP[bse]) is empty because the second element in the ARG-ST is a *pro*.

6 Analyses of nonconstituent coordination and gapping

In this section, we focus on RNR and gapping, whose analyses we address in separate subsections below.

6.1 Right Node Raising

A characteristic property of RNR is that it's the only phenomenon where seemingly incomplete structure has consistently attracted HPSG analyses involving deletion of silent material. All existing analyses of RNR (Abeillé et al. 2016, Beavers & Sag 2004, Chaves 2008, 2014, Crysmann 2003, Yatabe 2001, 2012) agree on this point, although some of this work proposes more than one mechanism for accounting for coordination of nonconstituents (Chaves 2014, Yatabe 2001, 2012, Yatabe & Tam 2018).

The RNR literature engages with the question of what kind of deletion it is that targets shared material, based on the kind of material that may be RNRaised and the range of mismatches permitted between the left and right conjuncts.[13] For instance, Chaves (2014: 839–840) concludes that RNR can't be syntactic deletion because it exhibits various argument-structure mismatches (57–58) and can target material below the word level (59–60).

(57) Sue gave me—but I don't think I will ever read—[a book about relativity].

(58) Never let me—or insist that I—[pick the seats].

(59) We ordered the hard- but they got us the soft-[cover edition].

(60) Your theory under- and my theory over[generates].

Furthermore, RNR can target strings that are not subject to any known syntactic operations, such as rightward movement (Chaves 2014: 865).

(61) I thought it was going to be a good but it ended up being a very bad [reception].

(62) Tonight a group of men, tomorrow night he himself, [would go out there somewhere and wait].

[13] Although we refer to the material on the left and right as conjuncts, it is been known since Hudson (1976, 1984) that RNR extends to other syntactic environments than coordination (see Chaves (2014) for stressing this point).

(63) They were also as liberal or more liberal [than any other age group in the 1986 through 1989 surveys].

RNRaised material can also be discontinuous, as in (64–65) (Chaves 2014: 868; citing Whitman 2009: 238–240).

(64) Please move from the exit rows if you are unwilling or unable [to perform the necessary actions] without injury.

(65) The blast upended and nearly sliced [an armored Chevrolet Suburban] in half.

This evidence leads Chaves (2014) to propose that: (1) only 'true' RNR should be accounted for via the mechanism of surface-based deletion, (2) this deletion is sensitive to morph form identity, and (3) the targets of RNR are any linearized strings, whether constituents or otherwise. Chaves' (2014: 874) constraint licensing RNR is given in 54. It permits the M(orpho)P(honology) feature of the mother to contain only one instance (represented as L_3 in (66)) of the two morphophonologically identical sequences [FORM F_1],...,[FORM F_n] present in the daughters; the leftmost of these sequences undergoes deletion. The final list in the mother, L_4, may be empty or nonempty, depending on whether RNR is discontinuous.

(66) Backward periphery deletion construction

$$\left[\begin{array}{l}\textsc{phrase}\\ \text{MP } L_1\text{:}\textit{ne-list} \circ L_2\text{:}\textit{ne-list} \circ L_3 \circ L_4\end{array}\right] \Rightarrow$$

$$\left[\begin{array}{l}\textsc{phrase}\\ \text{MP } L_1 \circ \langle [\text{FORM } F_1],\ldots,[\text{FORM } F_n]\rangle \circ L_2 \circ L_3 : \langle [\text{FORM } F_1],\ldots,[\text{FORM } F_n]\rangle \circ L_4\end{array}\right]$$

Chaves' (2014) proposal reflects the idea that nonconstituent coordination is a multi-faceted phenomenon, requiring more than one kind of analysis. Indeed, the HPSG literature includes analyses based on NP-ellipsis or A(cross) T(he) B(oard) extraposition (Chaves 2014) and on phonological vs syntactic deletion (Yatabe 2001, 2012, Yatabe & Tam 2018). Abeillé et al. (2016) argue for a finer-grained analysis of French RNR based on phonological deletion. Their empirical evidence reveals a split between functional and lexical categories in French such that the former permit mismatch between the two conjuncts (where determiners or prepositions differ) under RNR, while the latter don't.

6.2 Gapping

HPSG analyses of gapping fall into two kinds: one kind draws on Beavers and Sag's (2004) deletion-based analysis of nonconstituent coordination (Chaves 2009)