

Semantic taxonomies and NP-coordinations

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1. Introduction

I discuss the novel data of Korean NP-coordination constructions in which a non-final conjunct is incompatible with the main verb, as exemplified in (1). In (1a) the first conjunct *pap* ‘rice’ is semantically incompatible with *mai-ess-ta* ‘drank,’ and in (1b) the main verb *sin-ess-ta* ‘put on’ cannot be used with *moca* ‘hat’ (*ssu-* (lit.) ‘cover’ is appropriate for it). Yet, the sentences in (1) are all grammatical and this kind of NP-coordination is productive in Korean.

- (1) a. *ku-ka pap-kwa khephi-lul masi-ess-ta.*
he-Nom rice-and coffee-Acc drink-Pst-Dec
(lit.) ‘He drank the rice and the coffee.’
= ‘He ate the rice and drank the coffee.’ (distributive reading)
- b. *ku-ka moca-wa sinpal-ul sin-ess-ta.*
he-Nom hat-and shoes-Acc put.on-Pst-Dec
(lit.) ‘He covered the hat and put on the shoes.’ (distributive reading)

In (1a) the verb is interpreted as *mek-ess-ta* ‘ate’ in relation to *pap* ‘rice’ in the distributive reading (i.e., two events), which I focus on in this paper. In (1b), the verb is interpreted as *ssu-ess-ta* (lit.) ‘covered’ with relation to *moca* ‘hat.’ The question is then how to derive the appropriate verbal meanings related to the conjuncts incompatible with the main verbs. This is of empirical and theoretical importance, since to my knowledge, this kind of data has not been discussed before, and the syntax-semantics interface involved in the phenomenon poses significant challenges to prior analyses of coordinations.

I propose the hypothesis that some hypernym or sister of the main verb in semantic taxonomy is selected as the verbal meaning for the incompatible conjunct in the construction. I also argue that a directly compositional constructional analysis of the interface in Head-driven Phrase Structure Grammar (HPSG) (Pollard and Sag 1994, Sag *et al.* 2003) and Categorical Grammar (CG) (e.g., Dowty 1988, Steedman 1996, Jacobson 1996) can account for the data straightforwardly compared to alternative approaches.

2. Alternative approaches

Transformational analyses assume underlying clauses of a coordination sentence (Chomsky 1957, Ross 1967, Postal 1974). Then in order to derive the sentences in (1), the infelicitous underlying sources in (2) should be generated first.

- (2) a. *#ku-ka pap-ul masi-ess-ta.* b. *#ku-ka moca-lul sin-ess-ta.*
he-Nom rice-Acc drink-Pst-Dec he-Nom hat-Acc put.on-Pst-Dec
(lit.) #‘He drank the rice.’ (int.) ‘He put on the hat.’

The verb *sin-ess-ta* ‘put on’ can be used only with nouns like *sinpal* ‘shoes’ or *yangmal* ‘socks.’

Multiple dominance analyses (e.g., McCawley 1982, Bachrach and Katzir 2009) and ellipsis accounts (Yatabe 2001, Crysmann 2003, Beavers & Sag 2004, *inter alia*), which directly relate the main verb to the conjuncts incompatible with the verb, basically have the same problem. If we hypothesize that in (1) *mek-ess-ta* ‘ate’ is elided, since it is semantically similar to the main verb *masi-ess-ta* ‘drank,’ which is closer to the last conjunct, then the sentence in (3) should have the additional meaning that Marcus pulled Jane and pushed Mary. But this is not the case (see other mismatch data against ellipsis in Abbott 1976, Levine 2011, Kubota 2013, among others).

- (3) *Marcus-ka Jane-kwa Mary-lul mil-ess-ta.*
Marcus-Nom Jane-and Mary-Acc push-Pst-Dec
‘Marcus pushed Jane and Mary.’

Furthermore, all these approaches bear the theoretical burden of additional complex operations to

change the accusative object (*pap-ul* ‘rice-Acc’) to the conjunct with the morphological coordinator (*pap-kwa* ‘rice-and’) in syntax.

Alternatively, we may also hypothesize that *pap* ‘rice’ in (1) takes its possible telic role (*mek-* ‘eat’) as the related verbal meaning (see qualia roles in Pustejovsky 1995). However, there seems to be no independent evidence for the telic role (*ku-ka pap-ul hay-ss-ta* (lit.) ‘He did the rice.’ = ‘He cooked/*ate the rice.’) Thus we need a new approach to properly analyze the NP-coordination constructions.

3. Semantic taxonomies

To get a small model of some direct hypernym-hyponym relations in Korean, I make use of a semantic taxonomy from WordNet, entailment relations, and thesaurus. I represent the direct hypernym as ordered pairs, as in (4a). Then the direct hyponyms of a lexical item can be represented as in (4b); (4c,d) are examples of (4b).

- (4) a. $\text{Hypernym} = \{ \langle x, y \rangle \mid y \text{ is the direct hypernym of } x \} = \{ \langle [[mek-]], [[sepchwiha-]] \rangle, \langle [[masi-]], [[sepchwiha-]] \rangle, \langle [[ip-]], [[chakyongha-]] \rangle, \langle [[cha-]], [[chakyongha-]] \rangle, \langle [[sin-]], [[chakyongha-]] \rangle, \langle [[kki-]], [[chakyongha-]] \rangle, \dots \}$
- b. $\text{Hyponym}(x) = \{ y \mid \langle y, x \rangle \in \text{Hypernym} \}$
- c. $\text{Hyponym}(\text{Hypernym}([[masi-]])) = \text{Hyponym}([[sepchwiha-]]) = \{ [[mek-]], [[masi-]] \}$
- d. $\text{Hyponym}(\text{Hypernym}([[ip-]])) = \text{Hyponym}([[chakyongha-]]) = \{ [[ip-]], [[cha-]], [[sin-]], [[kki-]], [[ssu-]], [[mey-]], [[may-]] \}$

Based on the Korean semantic taxonomies in (4a), the hypothesis is examined. First, the associated verbal meaning of the first conjunct in (1a) cannot be something like ‘gobble’ or ‘peck’ (hyponyms of ‘eat’ in English), which corresponds to the combination of a manner adverb and *mek-* ‘eat’ in Korean. These phrases are not in the semantic taxonomies of lexical items in (4a), so they cannot be the associated meaning in (1a). Second, in the following sentence, *sin-ess-ta* ‘put on’ is incompatible with *ankyeng* ‘glasses,’ and *ankyeng* ‘glasses’ here can have multiple related verbal meanings, *kki-* (lit.) ‘insert’ and *ssu-* (lit.) ‘cover’ (i.e., some sisters of *sin-* ‘put on’).

- (5) *Tom-i ankyeng-kwa sinpal-ul sin-ess-ta.*
 Tom-Nom glasses-and shoe-Acc put.on-Pst-Dec
 (lit.) ‘Tom inserted/covered the glasses and put on the shoes.’

Third, the direct hypernym of *masi-* ‘drink’ and *mek-* ‘eat’ is *sepchwiha-* ‘ingest,’ and this verb seems marginally acceptable for the related verbal meaning of *pap* ‘rice’ in (1a). The direct hypernym of *sin-* ‘put on’ is *chakyongha-* ‘put on’ and this can be more naturally used for *ankyeng* ‘glasses’ in (5). There appears to be no appropriate hypernym of *sepchwiha-* ‘ingest’ or *chakyongha-* ‘put on.’

4. Syntax

If an adverb appears in between the final conjunct and the main verb, the sentence with the distributive reading becomes ungrammatical, as in (6), unlike typical NP-coordination constructions.

- (6) a. *Mary-ka moca-wa sinpal-ul (*chenchenhi) sin-ess-ta.*
 Mary-Nom hat-and shoes-Acc slowly put.on-Pst-Dec
 (lit.) ‘Mary covered the hat and put on the shoes.’ (distributive reading)
- b. *Mary-ka pap-kwa khephi-lul (*kuphakey) masi-ess-ta.*
 Mary-Nom rice-and coffee-Acc urgently drink-Pst-Dec
 ‘Mary ate the rice and drank the coffee.’ (distributive reading)

This behavior is expected from the hypothesis, since in (6a) *ssu-* (lit.) ‘cover’ is not a sister of the main verb modified by the adverb in the semantic taxonomy, and in (6b) *met-* ‘eat’ is not a sister of *kuphakey masi-ess-ta* ‘urgently drank’ in the semantic taxonomy. The adverb makes the meaning of the main verb too specific to be a sister of the verbal meaning appropriate for the incompatible conjunct. Also, recall that phrases are not posited in the semantic taxonomies.

If the order of NP-(*k*)*wa* and NP-(*l*)*ul* in (6) is switched resulting in (7), these sentences have

only the collective readings (i.e., one event); the distributive operator *kakkak* ‘each’ cannot be used with the sentences but other adverbs can appear right before the main verbs.

- (7) a. *Mary-ka sinpal-ul moca-wa (chenchenhi/#kakkak) sin-ess-ta.*
 Mary-Nom shoes-Acc hat-and slowly/each put.on-Pst-Dec
 ‘Mary put on the shoes with the hat (slowly).’
 b. *Mary-ka khephi-lul pap-kwa (kuphakey/#kakkak) masi-ess-ta.*
 Mary-Nom coffee-Acc rice-with urgently/each drink-Pst-Dec
 ‘Mary drank the coffee with the rice (urgently).’

Pap-kwa ‘rice-with’ in (7) is a comitative adjunct involved in the collectivity, but in (6) with the distributive reading, *pap-kwa* ‘rice-and’ is a part of the coordinate structure; in general comitative adjunct cannot be involved in a distributive interpretation. Interestingly, *kakkak* ‘each’ does not seem to be able to modify the sentences like (1), as shown in (8). In (8) the distributive operator *kakkak* ‘each’ seems to directly relate the semantics of the main verb to each of the conjuncts resulting in the ungrammaticality.

- (8) *#ku-ka pap-kwa khephi-lul kakkak masi-ess-ta.*
 he-Nom rice-and coffee-Acc each drink-Pst-Dec
 (int.) ‘He ate the rice and drank the coffee.’ (distributive reading)

In sum, if the NP-(*k*)*wa* is part of the NP-coordinations in (6), the constructions in (6) must have the distributive readings and an adverb cannot directly modify the main verbs.

5. Other predictions

The NP-coordinations above have only two conjuncts. If the hypothesis is correct, then it should be also applied to NP-coordinations with more than two conjuncts. This is borne out as follows:

- (9) *kunye-ka pap-kwa khephi-wa sakwa-wa mwul-/#kheyikh-ul masi-ess-ta.*
 she-Nom rice-and coffee-and apple-and water-/cake-Acc drink-Pst-Dec
 ‘She ate the rice, drank the coffee, ate the apple, and drank the water.’

The noun *sikyey* ‘watch’ can be used only with the verb *cha-* ‘put on,’ so in (10) if *sikyey* ‘watch’ is the last conjunct, the sentence in (10) is implausible.

- (10) *ku-ka ankyeng-kwa yangmal-kwa moca-wa sinpal-/#sikyey-lul sin-ess-ta.*
 he-Nom glasses-and socks-and hat-Acc shoes-/watch-Acc put.on-Pst-Dec
 (lit.) ‘He inserted/covered the glasses, put on the socks, covered the hat, and put on the shoes.’

I assume that *phiwu-* ‘smoke’ is not a co-hyponym of *masi-* ‘drink’ in the small model of semantic taxonomies, since *sepchwihwa-* ‘ingest’ (the direct hypernym of *masi-*) can be hardly used with *tampay* ‘cigarette’ (*#tampay-lul sepchwihay-ss-ta* ‘cigarette-Acc ingest-Pst-Dec’). Thus the following NP-coordination construction sounds bad:

- (11) *#ku-ka tampay-wa pap-kwa khephi-lul masi-ess-ta.*
 he-Nom cigarette-and rice-and coffee-Acc drink-Pst-Dec
 (int.) ‘He smoked the cigarette, ate the rice, and drank the coffee.’

The hypothesis seems to be applicable to any NP-coordination in which an incompatible conjunct appears, it is not the last conjunct, and a co-hyponym of the main verb is compatible with the conjunct.

6. Formal analysis

I adopt the semantics of coordination analysis in CG (e.g., Dowty 1988), and integrate it into the framework of HPSG. The noun *khephi* ‘coffee’ has multiple senses, among which I assume that $[[khephi]] = \lambda x. x$ is liquid coffee. And $[[pap]] = \lambda x. x$ is rice. The bare NP *pap* can be definite or indefinite, and so $[[pap2]] =$ the unique entity which is rice and $[[khephi2]] =$ the unique entity which is liquid coffee (via the application of the iota-operator in Partee 2004). Since the object of *masi-* ‘drink’ must be liquid, its denotation can be represented as $[[masi-]] = \lambda x: x$ is liquid $\lambda y. y$ drink x .

The coordinator *-(k)wa* ‘and’ is an affix; it is indirectly defined by the lexical rule in (12a)

(adapted from e.g. Partee and Rooth 1983, Dowty 1988, Pollard and Sag 1994). Now *pap-kwa* in (12b) is licensed as the output of (12a); the referent (marked with $\boxed{2}$) of the input is type-shifted in the output and the type of *g* is the variable $\langle a, b \rangle$ (type-polymorphism), since *pap-kwa* ‘rice-and’ can be a part of the nominative subject or accusative object in a sentence.

(12) a. Coordinator Lexical Rule:

b. *pap-kwa* ‘rice-and’:

$$\left[\begin{array}{l} \text{INPUT} \left\langle \boxed{1}, \left[\begin{array}{l} \textit{nominal} \\ \text{PHON} \langle \boxed{3} \rangle \\ \text{SEM} \left[\begin{array}{l} [\lambda f: f \in D_{\langle e, t \rangle} \& \exists! x [f(x) = 1], \text{ty}[f(y) = 1] ([\boxed{3}])] \\ = \boxed{2} [\text{the unique } x \text{ such that } [[\boxed{3}]] (x) = 1] \end{array} \right] \end{array} \right\rangle \right. \\ \left. \text{OUTPUT} \left\langle F_{(k)wa}(\boxed{1}), \left[\text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2})](y) \Pi g(y)] \right] \right\rangle \right. \end{array} \right] \left[\begin{array}{l} \text{PHON} \langle \textit{pap-kwa} \rangle \\ \text{HEAD} \mid \text{FORM } \textit{kwa} \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\text{the unique entity which is rice})](y) \Pi g(y)] \right] \end{array} \right]$$

The accusative NP *khephi-lul* ‘coffee-Acc’ in (13b) is licensed via the Object Lexical Rule in (13a), and the type of *P* is specified as $\langle e, \langle e, t \rangle \rangle$.

(13) a. Object Lexical Rule:

b. *khephi-lul* ‘coffee-Acc’:

$$\left[\begin{array}{l} \text{INPUT} \left\langle \boxed{1}, \left[\begin{array}{l} \textit{nominal} \\ \text{PHON} \langle \boxed{3} \rangle \\ \text{SEM} \left[\boxed{2} [\text{the unique } x \text{ such that } [[\boxed{3}]] (x) = 1] \right] \end{array} \right\rangle \right. \\ \left. \text{OUTPUT} \left\langle F_{/lul}(\boxed{1}), \left[\begin{array}{l} \text{HEAD} \mid \text{GCASE } \textit{acc} \\ \text{SEM} \left[\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{2}) \right] \end{array} \right] \right\rangle \right. \end{array} \right] \left[\begin{array}{l} \text{PHON} \langle \textit{khephi-lul} \rangle \\ \text{HEAD} \mid \text{GCASE } \textit{acc} \\ \text{SEM} \left[\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\text{the unique entity which is liquid coffee}) \right] \end{array} \right]$$

Since there are basically two types of combination in the NP-coordinations with more than two conjuncts, I posit the two combination rules, *bi-conj-ph-1* in (14) and *bi-conj-ph-2* in (15). In the former, NP-(*k*)*wa* combines with another NP-(*k*)*wa*. In the semantics of this combination, I assume that the truth-condition is composed of the truth-conditions of the conjuncts with the *meet* operator (Partee and Rooth 1983). In (15), *bi-conj-ph-1* combines with the accusative NP conjunct, and the type variable $\langle a, b \rangle$ of *g* is then specified as $\langle \langle e, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$.

(14) [*pap-kwa mwul-kwa*] ‘rice-and water-and’:

$$\left[\begin{array}{l} \textit{bi-conj-ph-1} \\ \text{DTRS} \left\langle \left[\begin{array}{l} \text{PHON} \langle \textit{pap-kwa} \rangle \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2}) \text{the unique entity which is rice}](y) \Pi g(y)] \right] \end{array} \right], \left[\begin{array}{l} \text{PHON} \langle \textit{mwul-kwa} \rangle \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{3}) \text{the unique entity which is water}](y) \Pi g(y)] \right] \end{array} \right] \right\rangle \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2})](y) \Pi [\lambda P_a \cdot P(\boxed{3})](y) \Pi g(y) \Pi g(y)] \right. \\ \left. = \lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2})](y) \Pi [\lambda P_a \cdot P(\boxed{3})](y) \Pi g(y) \right] \end{array} \right]$$

(15) [*pap-kwa mwul-kwa khephi-lul*] ‘rice-and water-and coffee-Acc’:

$$\left[\begin{array}{l} \textit{bi-conj-ph-2} \\ \text{DTRS} \left\langle \left[\begin{array}{l} \textit{bi-conj-ph-1} \\ \text{PHON} \langle \textit{pap-kwa mwul-kwa} \rangle \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2})](y) \Pi [\lambda P_a \cdot P(\boxed{3})](y) \Pi g(y)] \right] \end{array} \right], \left[\begin{array}{l} \text{PHON} \langle \textit{khephi-lul} \rangle \\ \text{SEM} \left[\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{4}) \text{the unique entity which is liquid coffee} \right] \right] \end{array} \right] \right\rangle \\ \text{SEM} \left[\lambda g_{\langle a, b \rangle} \lambda y_a \cdot [\lambda P_a \cdot P(\boxed{2})](y) \Pi [\lambda P_a \cdot P(\boxed{3})](y) \Pi g(y) \Pi g(y) \Pi (\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{4})) \right. \\ \left. = \lambda y_{\langle e, \langle e, t \rangle \rangle} \cdot [\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{2})](y) \Pi [\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{3})](y) \Pi [\lambda P_{\langle e, \langle e, t \rangle \rangle} \cdot P(\boxed{4})](y)] \right. \\ \left. = \lambda y_{\langle e, \langle e, t \rangle \rangle} \cdot y(\boxed{2}) \Pi y(\boxed{3}) \Pi y(\boxed{4}) \right] \end{array} \right]$$

In (16), a subtype of the general *hd-comp-ph*, the last conjunct must be compatible with the main verb (i.e. $y(\underline{n}) \in D_{\langle e, t \rangle}$ in $A(\underline{n})$), then $y(\underline{n})$ is involved in the truth-condition of the construction. But if a non-final conjunct is incompatible with the main verb (i.e. $y(\underline{n}) \notin D_{\langle e, t \rangle}$ in $B(\underline{n})$), then for the element z of the set S such that $z(\underline{2})$ is defined, $z(\underline{2})$ is connected with the *join* operator. $[[masi-ess-ta]]$ (the unique entity which is liquid coffee) and $[[masi-ess-ta]]$ (the unique entity which is water) are defined; so $[[drank]](\underline{3})$ and $[[drank]](\underline{4})$ are connected with the operator *meet*. However, $[[drank]](\underline{2})$ is not defined; $[[mek-ess-ta]]$ and $[[sepchwihay-ss-ta]]$ are the members of the set S ; $[[mek-ess-ta]](\underline{2})$ and $[[sepchwihay-ss-ta]](\underline{2})$ are defined; and so they are connected with the *join* operator.

(16) $[[pap-kwa mwul-kwa khephi-lul] masi-ess-ta]$ ‘rice-and water-and coffee-Acc drink-Pst-Dec’:

$$\left[\begin{array}{l}
 \text{hd-coord-comp-ph} \\
 \text{DTRS} \langle \left[\begin{array}{l} \text{bi-conj-ph-2} \\ \text{PHON} \langle \text{pap-kwa mwul-kwa khephi-lul} \rangle \end{array} \right], \left[\begin{array}{l} \text{v-tr} \\ \text{PHON} \langle \text{masi-ess-ta} \rangle \end{array} \right] \rangle \\
 \text{CONTEXT} \left[\text{TAXO} \left[S = \text{Hyponym}(\text{Hypernym}(\text{[[drank]])}) \cup \text{Hypernym}(\text{[[drank]])} - \{\text{[[drank]]}\} \right] \right] \\
 \text{SEM} \left[\begin{array}{l}
 \left[\lambda y_{\langle e, t \rangle}. [A(\underline{2}) \vee B(\underline{2})] \prod [A(\underline{3}) \vee B(\underline{3})] \prod y(\underline{4}) \right] (\text{[[drank]])} \\
 = \prod_{z \in S \text{ such that } z(\underline{2}) \in D_{\langle e, t \rangle}} z(\underline{2}) \prod \text{[[drank]]}(\underline{3}) \prod \text{[[drank]]}(\underline{4}) \\
 = \text{[[ate]]}(\underline{2}) \prod \text{[[ingested]]}(\underline{2}) \prod \text{[[drank]]}(\underline{3}) \prod \text{[[drank]]}(\underline{4}) \\
 = \lambda x. [\text{[[ate]]}(\underline{2})(x) \prod \text{[[ingested]]}(\underline{2})(x)] \prod \text{[[drank]]}(\underline{3})(x) \prod \text{[[drank]]}(\underline{4})(x)
 \end{array} \right]
 \end{array} \right]$$

, where $A(\underline{n}) = \text{if } y(\underline{n}) \in D_{\langle e, t \rangle}$, then $y(\underline{n})$

$$B(\underline{n}) = \text{if } y(\underline{n}) \notin D_{\langle e, t \rangle}, \text{ then } \prod_{z \in S \text{ such that } z(\underline{n}) \in D_{\langle e, t \rangle}} z(\underline{n})$$

The infelicitous sentences $\#ku-ka khephi-wa pap-ul masi-ess-ta$. ‘he-Nom coffee-and rice-Acc drank’ and $\#ku-ka moca-wa khephi-lul masi-ess-ta$. ‘he-Nom hat-and coffee-Acc drank’ are not licensed, since in the former the final conjunct *pap* ‘rice’ is incompatible with the verb *masi-ess-ta* ‘drank,’ and in the latter the non-final conjunct *moca* ‘hat’ is not compatible with any member of the set of taxonomic sister(s) and hypernym of the verb. The sentence $\#ku-ka pap-ul masi-ess-ta$. ‘he-Nom rice-Acc drank’ is also ruled out, since *hd-coord-com-ph* is applied only to coordinations, and the object is incompatible with the verb. The construction rule *hd-coord-com-ph* can be applied to the sentence *ku-ka Jane-kwa Tom-lul mil-ess-ta*. ‘He pushed Jane and Tom,’ and since the two conjuncts are compatible with the verb, it does not allow a taxonomic interpretation.

7. Conclusion

Based on semantic taxonomies, I proposed a constraint-based direct compositional analysis of Korean NP-coordination constructions with normal or taxonomic interpretations. I leave to future work its extension to other kinds of coordinations and different languages.

Selected references: • Dowty, David R. 1988. Type-raising, Functional Composition, and Nonconstituent Coordination. • Jacobson, Pauline. 1996. The Syntax/Semantics Interface in Categorical Grammar. • Kim, Jong-Bok and Jaehyung Yang. 2006. Coordination Structures in a Typed Feature Structure Grammar. • Levine, Robert. 2011. Linearization and its discontents. • Partee, Barbara and Mats Rooth. 1983. Generalized conjunction and type ambiguity. • Pollard, Carl and Ivan Sag 1994. *Head-driven Phrase Structure Grammar*. • Steedman, Mark. 1996. *Surface Structure and Interpretation*.