TL2, Assignment 1

Sample answers

1. Head-Subject-Complement Schema
   This ID schema allows a head to combine with all of its complements and its subject at the same time. The basic structure of the resulting phrase is as follows:

   (1)

$$
{}_{\textit{hd-ph}}\begin{bmatrix} \text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle\ \rangle \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \\ \text{DTRS} & \begin{bmatrix} \textit{head-subj-comp-struc} & \\ \text{HD-DTR} & \textit{word} \\ \text{SUBJ-DTR} & \textit{list} \\ \text{COMPS-DTRS} & \textit{list} \end{bmatrix} \end{bmatrix}
$$

   Use this schema to give an HPSG analysis of the following German sentence:

   (2) Trinkt Mary Whisky?
   drink-*3sg* Mary-*nom* whisky-*acc*
   'Does Mary drink whisky?'

   Give lexical entries for the verb and both nouns, incorporate them into the schema above, and show how the HFP, ValP, and SemP interact to give us a more fully specified AVM for the phrase.

   (3) Lexical entry for *trinkt*:

$$
{}_{\textit{word}}\begin{bmatrix} \text{PHON} & \langle \textit{trinkt} \rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & {}_{\textit{verb}}\begin{bmatrix} \text{VFORM} & \textit{fin} \\ \text{AUX} & - \\ \text{INV} & \textit{bool} \end{bmatrix} \\ \text{VALENCE} & \begin{bmatrix} \text{SUBJ} & \left\langle \boxed{1}\ \text{NP}_{\boxed{2}}[\textit{nom}, -\text{PRD}] \right\rangle \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \left\langle \boxed{3}\ \text{NP}_{\boxed{4}}[\textit{acc}, -\text{PRD}] \right\rangle \end{bmatrix} \\ \text{ARG-ST} & \langle \boxed{1}, \boxed{3} \rangle \end{bmatrix} \\ \text{CONT} & {}_{\textit{drinking}}\begin{bmatrix} \text{DRINKER} & \boxed{2} \\ \text{DRUNK} & \boxed{4} \end{bmatrix} \\ \text{CONX} & \textit{context} \end{bmatrix} \\ \text{NONLOC} & \textit{nonlocal} \end{bmatrix} \end{bmatrix}
$$

   (4) Lexical entry for *Mary*:

$$
{}_{\textit{word}}\begin{bmatrix} \text{PHON} & \langle \textit{mary} \rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & {}_{\textit{noun}}\begin{bmatrix} \text{CASE} & \textit{case} \\ \text{PRD} & \textit{bool} \end{bmatrix} \\ \text{VALENCE} & \begin{bmatrix} \text{SUBJ} & \textit{list} \\ \text{SPR} & \textit{list} \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \textit{nom-obj} & \\ \text{IND} & \boxed{2}\ {}_{\textit{ref}}\begin{bmatrix} \text{PER} & \textit{3rd} \\ \text{NUM} & \textit{sg} \\ \text{GEN} & \textit{fem} \end{bmatrix} \\ \text{RESTRS} & \{\ \} \end{bmatrix} \\ \text{CONX} \mid \text{BKGRD} & \left\{ {}_{\textit{naming}}\begin{bmatrix} \text{NAME} & \textit{Mary} \\ \text{BEARER} & \boxed{2} \end{bmatrix}, {}_{\textit{male}}\begin{bmatrix} \text{INST} & \boxed{2} \end{bmatrix} \right\} \end{bmatrix} \\ \text{NONLOC} & \textit{nonlocal} \end{bmatrix} \end{bmatrix}
$$

   (5) Lexical entry for *Whisky*:

$$
{}_{\textit{word}}\begin{bmatrix} \text{PHON} & \langle \textit{whisky} \rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & {}_{\textit{noun}}\begin{bmatrix} \text{CASE} & \textit{case} \\ \text{PRD} & \textit{bool} \end{bmatrix} \\ \text{VALENCE} & \begin{bmatrix} \text{SUBJ} & \textit{list} \\ \text{SPR} & \textit{list} \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \textit{nom-obj} & \\ \text{IND} & \boxed{4}\ {}_{\textit{ref}}\begin{bmatrix} \text{PER} & \textit{3rd} \\ \text{NUM} & \textit{sg} \\ \text{GEN} & \textit{neut} \end{bmatrix} \\ \text{RESTRS} & \left\{ {}_{\textit{whisky}}\begin{bmatrix} \text{INST} & \boxed{4} \end{bmatrix} \right\} \end{bmatrix} \\ \text{CONX} \mid \text{BKGRD} & \textit{set} \end{bmatrix} \\ \text{NONLOC} & \textit{nonlocal} \end{bmatrix} \end{bmatrix}
$$

(6) Structure for sentence (2):

$$
\begin{bmatrix}
\text{HEAD} & \boxed{5}\ \begin{bmatrix}\text{VFORM} & fin\\ \text{AUX} & -\\ \text{INV} & +\end{bmatrix}_{verb}\\
\text{VAL} & \begin{bmatrix}\text{SUBJ} & \boxed{6}\ \langle\ \rangle\\ \text{SPR} & \boxed{7}\ \langle\ \rangle\\ \text{COMPS} & \boxed{8}\ \langle\ \rangle\end{bmatrix}\\
\text{CONT} & \boxed{9}\ \begin{bmatrix}\text{DRINKER} & \boxed{2}\\ \text{DRUNK} & \boxed{4}\end{bmatrix}_{drinking}\\
\text{DTRS} & \begin{bmatrix}
\textit{head-subj-comp-struc} & \\
\text{HD-DTR} & \begin{bmatrix}\text{PHON} & \langle trinkt\rangle\\ \text{CAT} & \begin{bmatrix}\text{HEAD} & \boxed{5}\\ \text{VALENCE} & \begin{bmatrix}\text{SUBJ} & \left\langle \boxed{1}\ \text{NP}_{\boxed{2}}\right\rangle = \text{append}(\boxed{6}, \langle\boxed{1}\rangle)\\ \text{SPR} & \langle\ \rangle = \text{append}(\boxed{7}, \langle\ \rangle)\\ \text{COMPS} & \left\langle \boxed{3}\ \text{NP}_{\boxed{4}}\right\rangle = \text{append}(\boxed{8}, \langle\boxed{3}\rangle)\end{bmatrix}\\ \text{ARG-ST} & \langle\boxed{1}, \boxed{3}\rangle\end{bmatrix}\\ \text{CONT} & \boxed{9}\end{bmatrix}\\
\text{SUBJ-DTR} & \left\langle\begin{bmatrix}\text{PHON} & \langle mary\rangle\\ \text{SYNSEM} & \boxed{1}\ \begin{bmatrix}\text{CAT} & \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{CASE} & nom\\ \text{PRD} & -\end{bmatrix}_{noun}\\ \text{VAL} & \begin{bmatrix}\text{SUBJ} & \langle\ \rangle\\ \text{SPR} & \langle\ \rangle\\ \text{COMPS} & \langle\ \rangle\end{bmatrix}\end{bmatrix}\\ \text{IND} & \boxed{2}\ \begin{bmatrix}\text{PER} & 3rd\\ \text{NUM} & sg\\ \text{GEN} & fem\end{bmatrix}_{ref}\end{bmatrix}\end{bmatrix}\right\rangle\\
\text{COMPS-DTRS} & \left\langle\begin{bmatrix}\text{PHON} & \langle whisky\rangle\\ \text{SYNSEM} & \boxed{3}\ \begin{bmatrix}\text{CAT} & \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{CASE} & acc\\ \text{PRD} & -\end{bmatrix}_{noun}\\ \text{VAL} & \begin{bmatrix}\text{SUBJ} & \langle\ \rangle\\ \text{SPR} & \langle\ \rangle\\ \text{COMPS} & \langle\ \rangle\end{bmatrix}\end{bmatrix}\\ \text{IND} & \boxed{4}\ \begin{bmatrix}\text{PER} & 3rd\\ \text{NUM} & sg\\ \text{GEN} & neut\end{bmatrix}_{ref}\end{bmatrix}\end{bmatrix}\right\rangle
\end{bmatrix}
\end{bmatrix}_{hd\text{-}ph}
$$

The Head Feature Principle ensures that the head daughter's HEAD value ($\boxed{5}$) is passed to the phrase.

The Valence Principle ensures that the SYNSEM value of the subject daughter ($\boxed{1}$) is removed from the head daughter's SUBJ list, and the remainder of the list ($\boxed{6}$, the empty list) is passed to the phrase. Similarly, the SYNSEM value ($\boxed{3}$) of the complement daughter is removed from the head daughter's COMPS list, and the rest of the list ($\boxed{8}$, also empty) is passed to the phrase. And finally, the ValP ensures that the head daughter and the mother phrase both have the empty list ($\boxed{7}$) as their SPR value.

The Semantics Principle passes the head daughter's CONTENT value ($\boxed{9}$) to the entire phrase.

Briefly comment on the following points:

(a) Could we assign a structure to this sentence using the Head-Complement and Head-Subject rules instead?

Applying the Head-Complement rule would create the VP *trinkt Whisky*. But this is not a contiguous string in our sentence. If we then applied the Head-Subject rule, the subject NP *Mary* would have to appear outside of the VP constituent (i.e., *Mary* [*trinkt Whisky*] or [*Trinkt Whisky*] *Mary*). However, in our sentence *Mary* intervenes between the verb and object. Assuming that word order reflects constituency, there cannot be a VP contituent *trinkt Whisky* in this sentence. Therefore, it seems that the Head-Subject and Head-Complement rules cannot be used to analyze this sentence.

(b) How can we block the corresponding sentence in English?

(7) * Drinks Mary whisky?

In English the Head-Subject-Complement Schema is used only for inverted structures: yes/no questions ("Is Mary ordering dessert?"), *wh*-questions ("Which dessert is Mary ordering?"), and some less common constructions ("Had he only known. . . ," "Never will we meet again.")

Only the auxiliaries can invert in English:

(8)

$$
\begin{bmatrix} verb & \\ \text{INV} & + \end{bmatrix} \Rightarrow \begin{bmatrix} verb & \\ \text{AUX} & + \end{bmatrix}
$$

The auxiliaries are the copula *be*, the modals (*can, will, should*, etc.), and certain uses of *have* and *do*. Main verbs like *drinks* are [-AUX], so by (8) they must also be specified as [-INV]. The ungrammatical sentence in (1b) would not be licensed by the Head-Subject-Complement rule because *drinks* cannot undergo inversion.

2. Attributive adjectives

Recall the lexical entry we assumed for the $\overline{\text{N}}$ modifier *black* in *the black coffee*):

(9)

$$
\begin{bmatrix}
\text{PHON} & \langle black\rangle\\
\text{CAT} & \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{MOD} & \begin{bmatrix}\text{CAT} & \begin{bmatrix}\text{HEAD} & noun\\ \text{SPR} & \langle[\ ]\rangle\\ \text{COMPS} & \langle\ \rangle\end{bmatrix}\end{bmatrix}\end{bmatrix}_{adj}\end{bmatrix}
\end{bmatrix}_{word}
$$

Briefly discuss the following:

(a) The [SPR : ⟨[ ]⟩] requirement on the modified $\overline{\text{N}}$ is too restrictive (i.e., the grammar undergenerates). Give examples of grammatical phrases that would not be licensed by assuming this lexical entry.

The feature [MOD | SPR : ⟨[ ]⟩] means that the adjective only combines with an $\overline{\text{N}}$ that (eventually) selects exactly one specifier. This is too restrictive because *black* can appear in NPs that contain more than one specifier, as in (10a), or no specifiers, as in (10b):

(10) a. Kim brought [these two black suits].
b. Sandy only wears [black clothes].

The lexical entry for the noun *suits* in (10a) has to carry the feature [SPR : ⟨[ ], [ ]⟩], in order to combine with the two determiners *two* and *these*, while the entry for the mass noun *clothes* in (10b) would need to specify [SPR : ⟨ ⟩] since it takes no determiner. Neither of these nouns could therefore combine with *black*, given the lexical entry in (9) above, since that requires the modified noun to have a SPR list of length one.

(b) Why can't we say [MOD | VAL | SPR : ⟨ ⟩] instead?

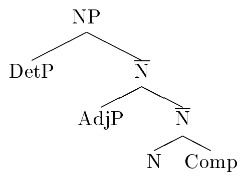
This would generate the NP *black clothes* in (10b), but it would also allow *black* to modify any SPR-saturated noun or noun phrase. For example, *these two suits* and *the coffee* both have empty SPR lists, so we would wrongly allow the following:

(11) a. * Kim brought [black these two suits].
b. * Who ordered [black the coffee]?

(c) Suggest some possible solutions to this problem.

The difficulty is that we are trying to capture the notion of intermediate projections from X-bar theory, using only the VALENCE features of HPSG. Adjectives are adjoined to $\overline{\text{N}}$:

(12) $\overline{\text{X}}$ structure for NP:



The adjective can only combine with the noun after it has formed an $\overline{\text{N}}$ constituent with its complements (if any). In HPSG terms, the MOD value of the adjective must be specified as [COMPS : ⟨ ⟩]. On the other, the adjective has to combine with the noun before the noun takes its specifiers. In HPSG terms, the SPR valency cannot have been discharged. However, as we have seen, it is inadequate simply to require a non-empty SPR list on the noun, because some nouns do not take a specifier. On the other hand, allowing an emtpy SPR list for these nouns will incorrectly analyze examples like (11).

In fact there are generalizations to be made about the presence or absence of a specifier in an NP. In most cases, an $\overline{\text{N}}$ must combine with a determiner to become a full NP. NPs headed by plural nouns and mass nouns, however, do not necessarily include a determiner:

(13) a. Kim collects [stamps].
b. This soup needs [salt].

This is an interesting issue, but we are concerned here with the respresentation of *adjectives*, not nouns. It is intuitively wrong to suppose that there should be one lexical entry for *black* if it modifies a mass or plural noun, and another one if it modifies a singular count noun. Besides, we still have the problem of NPs containing multiple specifiers as in (10a).

The easiest solution seems to be the addition of a binary (i.e., boolean) feature that indicates whether a nominal projection contains a determiner or not. We could add the feature DETERMINED, where [+DET] means that the noun has combined with its determiner(s) and [−DET] means it has not. In other words, an $\overline{\text{N}}$ projection would have the following specification:

(14)

$$\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{SPR} & \textit{list} \\ \text{DET} & - \end{bmatrix}$$

Now by giving the adjective *black* the specification [MOD : N[−DET]], we block the ungrammatical examples in (11), without having to specify the exact number of determiners that the noun will eventually take.

This solution is modelled on a proposal by Netter (1994). We have only touched on some of the issues involved in the syntactic analysis of NPs.