HPSG part 1

Similarities to Government-Binding syntax:

- "Structure is determined chiefly by the interaction between highly articulated lexical entries and parameterized universal principles of grammatical well-formedness, with rules reduced to a handul of highly general and universally available phrase structure (or immedediate dominance) schemata." (Pollard & Sag, 2)

- Many directly analogous principles: BT(A), BT(B), X-bar theory, ECP.

Differences:[1]

- **Non-derivational**: role played by movement is apportioned to different mechanisms: unification, lexical rule (passive), ordering statements (no head movement).

- **"HPSG does not permit its analyses to refer to:**
  - phonologically and morphologically abstract (i.e. non-observable) case distinctions (so-called "Cases");
  - phonologically abstract affixes;
  - phonologically inert functional heads;
  - structure-destroying movement operations, especially "covert" movements (to "Logical Form") whose existence is not empirically observable. (Webelhuth et al, 4)

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1 Feature structures and grammar rules

Standard assumptions about phrase structure.

- **Perspective: each immediate dominance relation is licensed.**

- **A tree is well formed just in case each local subtree (that is, a mother node with its daughters) within it either:**

  1. is a well-formed *lexical* tree [features dominating word as terminal], or
  2. is in one-to-one (tree-to-rule) correspondence with some rule of the grammar. [p. 34]

- **Theory is neutral between top-down and bottom-up construction.**

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[1] I take no stand for now on which of these (if any) might be "real" differences and which (if any) might be spurious or misleading. These are issues we will discuss.

Feature: property

Type: a class of entities, defined in terms of the features (properties) appropriate to describe members of that class. For example, [NUM sg] and [NUM pl] can be defined so as to be relevant to the type of nouns and NPs, but not prepositions. The notion *noun* may be best understood not as an atomic category, but as the supertype for number, person, etc.

Unification: an operation that can apply to two feature structure descriptions D_1 D_2. Unification combines the information from the two descriptions, so long as there's no conflict.

If a particular description D_1 is satisfied by a set of feature structures S_1 (for example, the set of English verbs of any person specification) and another description D_2 is satisfied by another set of feature structures S_1 (for example, the set of elements specified as 3rd person), the unification of D_1 and D_2 is satisfied by the intersection of S_1 and S_2 (3rd-person verbs).

Notation: matching letters or numbers in boxes representing the value of a feature.

(1) **Example 1 - headedness (p.65):**

$$\begin{bmatrix} \textit{phrase} \\ \textbf{HEAD} \ \boxed{1} \\ \textbf{VAL} \begin{bmatrix} \textbf{COMPS intrans} \\ \textbf{SPR} \quad \textbf{needy} \end{bmatrix} \end{bmatrix} \rightarrow \begin{bmatrix} \textit{word} \\ \textbf{HEAD} \ \boxed{1} \\ \textbf{VAL} \begin{bmatrix} \textbf{COMPS strictly trans.} \\ \textbf{SPR} \quad \textbf{needy} \end{bmatrix} \end{bmatrix} \textbf{NP}$$

(2) **Example 2 - agreement (p. 70)**[2]

$$\begin{bmatrix} \textit{phrase} \\ \textbf{HEAD} \ \boxed{1}\,\textit{verb} \\ \textbf{VAL} \begin{bmatrix} \textbf{COMPS} \quad \text{intrans.} \\ \textbf{SPR} \quad \text{not needy} \end{bmatrix} \end{bmatrix} \rightarrow \begin{bmatrix} \textbf{"NP"} \\ \textbf{HEAD} \begin{bmatrix} \textbf{AGR} \ \boxed{2} \end{bmatrix} \end{bmatrix} \begin{bmatrix} \textit{phrase} \\ \textbf{HEAD} \ \boxed{1} \begin{bmatrix} \textbf{AGR} \ \boxed{2} \end{bmatrix} \\ \textbf{VAL} \begin{bmatrix} \textbf{COMPS} \quad \text{intrans.} \\ \textbf{SPR} \quad \text{needy} \end{bmatrix} \end{bmatrix}$$

[2] The COMPS and SPR values are informally stated here. See below.

(3) **Example 3 - propagation of slash feature**...

(4) **Example 4 - relation between "raised" NP and the predicate it is an argument of...**

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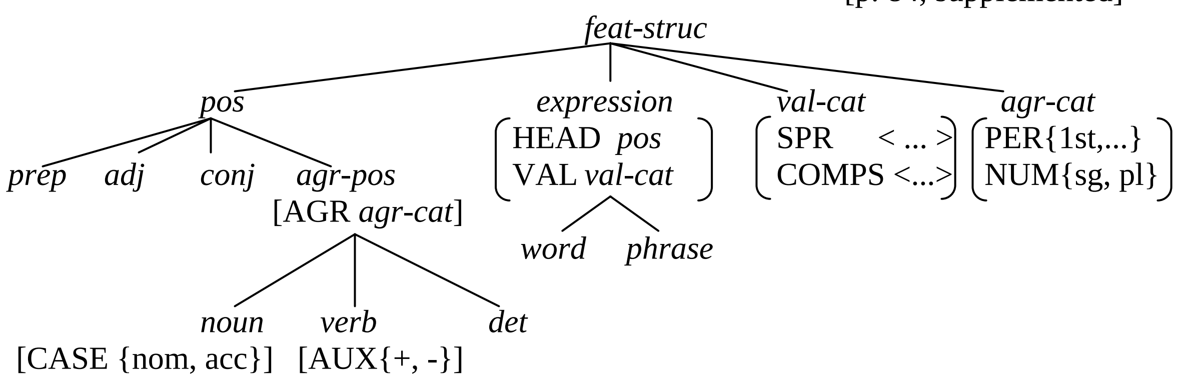
2 <u>Counterparts to X-bar theory</u>

A type hierarchy:

[p. 84, supplemented]



- **Introduce the feature HEAD licensed by the type *expression*. The feature HEAD takes as its value a set of features. What features are they? Answer: those grouped under subtypes of the type *pos* (part of speech).**

What are the subtypes of *pos*?

- **The type *agr-pos* is an immediate subtype of *pos* and licenses the feature AGR.**
- **Subtypes of *agr-pos* include *noun, verb and det* (*this, that, these, those*), which license other features not discussed in chapter 3.**
- **The types *prep, adj and conj* are immediate subtypes of *pos* -- no AGR stuff here! -- and presumably license features also not discussed in chapter 3.**
- **Reason for viewing noun, verb, etc as types in the first place: they are *constraints* on the occurrence of other features (e.g. CASE), not atomic values of a POS feature.**

  So, when we informally say that HEAD takes "noun" as its value, we really mean that it takes a feature structure licensed by the type *noun* as its value.

- **What is the feature AGR? A feature that takes features as its value — those features proper to the type *agr-cat*. This allows us to represent Agreement as a single operation — a unification of AGR specifications (cf. the notion of "ϕ-features")**

(5) **Example:** $\left[\textbf{HEAD}\begin{bmatrix}\textit{noun}\\ \textbf{AGR}\begin{bmatrix}\textbf{PER 3rd}\\ \textbf{NUM pl}\end{bmatrix}\end{bmatrix}\right]$

More precisely:

$$\left[\textbf{HEAD}\begin{bmatrix}pos \mid agr-pos \mid noun\\ \textbf{AGR}\begin{bmatrix}agr-cat\\ \textbf{PER 3rd}\\ \textbf{NUM pl}\end{bmatrix}\end{bmatrix}\right]$$

- **The type *expression* (remember *expression* from the first bullet?) has subtypes *word and phrase*. These subtypes (in chapter 3 at least) do not license any particular features, but they are mentioned in rules of grammar.**

(6) **HEAD FEATURE PRINCIPLE (HFP)** (p. 86)
In any headed phrase, the HEAD value of the mother and the HEAD value of the head daughter must be identical.

→*Note:* In "Bare Phrase Structure", all features of a lexical item are, in effect, HEAD features, since the label of a category formed by Merge is the full set of features of one of the elements that merged.

In textbook HPSG, this is not the case. For example, complementation features are passed from daughter to mother. See the next section.

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3 Subcategorization and complementation

- **COMPS feature: a list, e.g. <NP, NP> or < > (null list)**

(7) **HEAD -COMPLEMENT RULE - version 1**[p. 96]]

$$\begin{bmatrix} \textit{phrase} \\ \text{VAL}\begin{bmatrix}\text{COMPS}\ \langle\,\rangle\end{bmatrix}\end{bmatrix} \rightarrow \text{H}\begin{bmatrix}\textit{word} \\ \text{VAL}\begin{bmatrix}\text{COMPS}\ \langle\boxed{1},\ldots,\boxed{n}\rangle\end{bmatrix}\end{bmatrix}\ \boxed{1}\ldots\boxed{n}$$

- **SPR (specifier) feature: also a list, e.g. <NP> or < > (null list).**

→*Note:* SPR is a list to allow one to talk about fulfilled (discharged) vs. unfulfilled SPR features. This is how the concept "maximal projection" is developed. [Note: this yields a "somewhat bare phrase structure", in which X' can be maximal, but not X°.]

(8) **NOM (our N') and VP (our V') are unsaturated -- still needing SPR:**

$$\text{NOM} = \begin{bmatrix}\textit{phrase} \\ \text{HEAD}\ \ \textit{noun} \\ \text{VAL}\begin{bmatrix}\text{COMPS} & \langle\,\rangle \\ \text{SPR} & \langle\begin{bmatrix}\text{HEAD}\ \ \textit{det}\end{bmatrix}\rangle\end{bmatrix}\end{bmatrix}$$

$$\text{VP} = \begin{bmatrix}\textit{phrase} \\ \text{HEAD}\ \ \textit{verb} \\ \begin{bmatrix}\text{COMPS} & \langle\,\rangle \\ \text{SPR} & \langle\text{NP}\rangle\end{bmatrix}\end{bmatrix}$$

→*Note:* V is the head of the clause. There is no INFL or T node. Likewise, N is the head of nominal phrases.

(9) **NP and S (unlike NOM and VP) are saturated:**

$$\text{NP} = \begin{bmatrix}\textit{phrase} \\ \text{HEAD}\ \ \textit{noun} \\ \text{VAL}\begin{bmatrix}\text{COMPS} & \langle\,\rangle \\ \text{SPR} & \langle\,\rangle\end{bmatrix}\end{bmatrix} \qquad \text{S} = \begin{bmatrix}\textit{phrase} \\ \text{HEAD}\ \ \textit{verb} \\ \textbf{VAL}\begin{bmatrix}\text{COMPS} & \langle\,\rangle \\ \text{SPR} & \langle\,\rangle\end{bmatrix}\end{bmatrix}$$

This is the consequence of a phrase-structure rule that accomplishes this saturation (pay attention to SPR!)

(10) **HEAD SPECIFIER RULE - version 1** (p. 102)

$$\begin{bmatrix}\textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle\,\rangle \\ \textbf{SPR} & \langle\,\rangle\end{bmatrix}\end{bmatrix} \rightarrow \boxed{2}\qquad \textbf{H}\begin{bmatrix}\textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\text{SPR}\ \ \boxed{2}\end{bmatrix}\end{bmatrix}$$

- **The SPR feature must be passed up from the lexical item through the first projection of this item (compare how EPP works on a head that may have modifiers below its specifier):**

(11) **HEAD COMPLEMENT RULE - version 2** (p. 102)

$$\begin{bmatrix}\textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\textbf{SPR} & \langle\boxed{a}\rangle \\ \textbf{COMPS} & \langle\,\rangle\end{bmatrix}\end{bmatrix} \rightarrow \quad \textbf{H}\begin{bmatrix}\textit{word} \\ \textbf{VAL}\begin{bmatrix}\text{SPR} & \boxed{a} \\ \text{COMPS} & \langle\boxed{1},\ldots\boxed{n}\rangle\end{bmatrix}\end{bmatrix}\ \boxed{1},\ldots,\boxed{n}$$

Factor out of these rules a general *Valence Principle*:

(12) **The Valence Principle** (p. 106)

Unless the rule says otherwise, the mother's values for the VAL features (SPR and COMPS) are identical to those of the head daughter [i.e. SPR and COMPS are "head features" by default]

(13) **HEAD SPECIFIER RULE (p. 106)**

$$\begin{bmatrix} \textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\textbf{SPR} & \langle\ \rangle\end{bmatrix}\end{bmatrix} \rightarrow \boxed{2} \quad \textbf{H}\begin{bmatrix}\textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\textbf{SPR} & \boxed{2} \\ \textbf{COMPS} & \langle\ \rangle\end{bmatrix}\end{bmatrix}$$

(14) **HEAD COMPLEMENT RULE** (p.106)

[No mention of SPR, thanks to the Valence Principle.]

$$\begin{bmatrix} \textit{phrase} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle\ \rangle\end{bmatrix}\end{bmatrix} \rightarrow \quad \textbf{H}\begin{bmatrix}\textit{word} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle \boxed{1},\ldots\boxed{n}\rangle\end{bmatrix}\end{bmatrix} \boxed{1},\ldots,\boxed{n}$$

4 Agreement

A 3rd-person verb has the following value for VAL:

(15) $$\begin{bmatrix}\textbf{SPR} & \left\langle \begin{matrix}\textbf{HEAD}\begin{bmatrix}\textit{noun} \\ \text{AGR} & \textit{3sing}\end{bmatrix} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle\ \rangle \\ \textbf{SPR} & \langle\ \rangle\end{bmatrix}\end{matrix}\right\rangle\end{bmatrix}$$

A non-3rd-person verb has the following value for SPR:

(16) $$\begin{bmatrix}\textbf{SPR} & \left\langle \begin{matrix}\textbf{HEAD}\begin{bmatrix}\textit{noun} \\ \text{AGR} & \textbf{\textit{non}}\text{ - }\textit{3sing}\end{bmatrix} \\ \textbf{VAL}\begin{bmatrix}\text{COMPS} & \langle\ \rangle \\ \text{SPR} & \langle\ \rangle\end{bmatrix}\end{matrix}\right\rangle\end{bmatrix}$$

→*Quiz question*: What is the point of the VAL value for SPR?

But more generally:

(17) **Specifier-Head Agreement Constraint (SHAC) [p. 107]**

Verbs and common nouns must be specified as:

5 Indices etc. ("semantics")

(18) $$\left\langle \textbf{Pat}, \begin{bmatrix}\textbf{SYN} & \begin{bmatrix}\textbf{HEAD}\begin{bmatrix}\textit{noun} \\ \text{AGR} & \textit{3sing}\end{bmatrix} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle\ \rangle \\ \textbf{SPR} & \langle\ \rangle\end{bmatrix}\end{bmatrix} \\ \textbf{SEM} & \begin{bmatrix}\textbf{MODE ref} \\ \textbf{INDEX } i \\ \textbf{RESTR} \left\langle\begin{bmatrix}\textbf{RELN name} \\ \textbf{SIT } s \\ \textbf{NAME Pat} \\ \textbf{NAMED } i\end{bmatrix}\right\rangle\end{bmatrix}\end{bmatrix}\right\rangle$$ [112]

(19) $$\left\langle \textbf{aches}, \begin{bmatrix}\textbf{SYN} & \begin{bmatrix}\textbf{HEAD} \begin{bmatrix}\textit{verb}\end{bmatrix} \\ \textbf{VAL}\begin{bmatrix}\textbf{COMPS} & \langle\ \rangle \\ \textbf{SPR} & \langle \textbf{NP}_i\rangle\end{bmatrix}\end{bmatrix} \\ \textbf{SEM} & \begin{bmatrix}\textbf{MODE prop} \\ \textbf{INDEX } s \\ \textbf{RESTR} \left\langle\begin{bmatrix}\textbf{RELN ache} \\ \textbf{SIT } s \\ \textbf{ACHER } i\end{bmatrix}\right\rangle\end{bmatrix}\end{bmatrix}\right\rangle$$ [p.144]

(20) **Semantic Compositionality Principle**
In any well-formed phrase structure, the mother's RESTR value is the sum of the RESTR values of the daughters.

- **Thus, for a sentence like *Pat aches*, the RESTR value of S tells us that *i* is the ACHER and *Pat* is *i*.) [see p. 144 for concrete example]**

(21) **Semantic Inheritance Principle**
In any headed phrase, the mother's MODE and INDEX values are identical to those of the head daughter.

- **Thus S inherits the MODE value "prop" from V.**

We thus read from the SEM features of S the predicate, theta-roles and indices associated with those theta roles in the whole clause.

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6 Modification

Figure removed due to copyright reasons.
Please see:
Sag, Ivan, Thomas Wasow, and Emily Bender. *Syntactic Theory: A Formal Introduction*. 2nd ed. Stanford, CA: Center for the Study of Language and Information, 2003, p. 146. ISBN: 1575864002.

e.g. 'a student unaware of the regulations' [p. 146]

Read "MOD" as "modifies". Note that the modified constituent is bigger than a head that still needs its complements.

---

7 BT(A)/BT(B)

(22) **Argument Realization Principle [p. 206]**
A word's value for ARG-ST is $\boxed{a} \oplus \boxed{b}$ (append $\boxed{b}$ to $\boxed{a}$), where $\boxed{a}$ is its value for SPR and $\boxed{b}$ is its value for COMPS.

- The ARG-ST list is a device for ranking arguments, with the specifier outranking complements, and the complements ranked according to their linear order (given the HEAD-COMPLEMENT RULE in (11).

- The ARG-ST list is suited to a Binding Theory without c-command and without shells/cascades/little VPs.

Ranking
If A precedes B on some ARG-ST list, we say that A *outranks* B.

(23) **Binding Theory**
BT(A): A [MODE ana] element must be outranked by a coindexed element.
BT(B): A [MODE ref] element must not be outranked by a coindexed element.

Argumental PPs: Prepositions that allow their objects to serve as antecedents for PP-external anaphors share the MODE and INDEX values of their objects.

(24)
$$\left\langle \textit{to}, \begin{bmatrix} \textbf{SYN} & \begin{bmatrix} \textbf{HEAD} & \textit{prep} \\ \textbf{VAL} & [\textbf{SPR}\ \langle\ \rangle] \end{bmatrix} \\ \textbf{ARG-ST} & \left\langle \begin{bmatrix} \textbf{SYN} & \left[\textbf{HEAD} \begin{bmatrix} & \textbf{NP} \\ \textbf{CASE} & \textbf{acc} \end{bmatrix}\right] \\ \textbf{SEM} & \begin{bmatrix} \textbf{MODE} & \boxed{1} \\ \textbf{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \right\rangle \\ \textbf{SEM} & \begin{bmatrix} \textbf{MODE} & \boxed{1} \\ \textbf{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \right\rangle$$

[see p. 212]

In effect, the PPs are the antecedents for the anaphors in sentences like *I spoke to Sandy about himself*.

BT(C)?

Let Y and Z be *synsem* objects...Then Y *o-commands* Z just in case Y locally o-commands (outranks) X dominating Z. (Pollard and Sag 1994, p. 253).

Long-distance anaphora?

BT(A) *per* Pollard and Sag 1994, p.254:
A locally o-commanded (outranked) anaphor must be locally o-bound.

The hierarchy is a *prominence* hierarchy that cares about θ-roles. Thus:

(25) **ok** John and Mary knew that the journal had rejected each other's papers.

---

8 The secret, silent world of ARG-ST:

- Present and discussThe feature SPR on a verb projects a syntactic specifier only thanks to the HEAD-SPECIFIER rule.
- We could have a rule that allows SPR *not* to project a syntactic specifier.
- In such a case, BT would still behave "as if" the specifier were present.

(26) **Imperative rule**

$$\begin{bmatrix} \textit{phrase} & \\ \textbf{HEAD} & [\textit{verb}] \\ \begin{bmatrix}\textbf{SPR} & \langle\ \rangle \\ \textbf{COMPS} & \langle\ \rangle\end{bmatrix} & \\ \textbf{SEM} & \begin{bmatrix}\textbf{MODE dir} \\ \textbf{INDEX}\ s\end{bmatrix}\end{bmatrix} \rightarrow \begin{bmatrix} \textbf{HEAD} & \begin{bmatrix}\textit{verb}\\ \text{FORM base}\end{bmatrix} \\ \textbf{VAL} & \begin{bmatrix}\textbf{SPR} & \langle \text{NP[PER 2nd]}\rangle \\ \textbf{COMPS} & \langle\ \rangle\end{bmatrix} \\ \textbf{SEM} & [\textbf{INDEX}\ s]\end{bmatrix}$$

- Because the word whose SPR feature yielded the phrase on the right side of (26) has a 2nd person NP as the first member of ARG-ST, it will behave for binding like any sentence with a 2nd person subject.
- But the SPR feature was "cancelled" without the presence of any NP daughter of the imperative phrase.

(27) a. *Shoot you!
b. Shoot yourself!

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9 The lexicon

Lexeme vs. word:
1. ***Lexeme:*** corresponds to a family of related words, e.g. what *runs* and *run* have in common.
2. ***Word:*** along with ***phrase***, a subtype of *expression*, i.e. a type that licenses the feature structures that form the units of phrase structure.
3. Both *lexeme* and *expression* are subtypes of *synsem* (a subtype of *feat-struc*).
4. The feature ARG-ST is defined for both *lexeme* and *word*.

Since properties like argument structure, raising, control etc. are uniform across the various forms of a word, these are properties that the word inherits from the lexeme by *lexical rule*.

Type hierarchies + notion of 'default' [p. 229]

(28) If T_2 is a subtype of T_1, then:
a. every feature specified as appropriate for T_1 is also appropriate for T_2 , and
b. every *inviolable* constraint associated with T_1 affects all instances of T_2, *and*
c. *every default constraint* (symbol "/") *associated with T_1 affects all instances of T_2 except where suppressed by a conflicting constraint associated with T_2.*
[inelegant italicized text mine, representing pp. 229ff]

Example: Common nouns do not need to be individually specified for a null COMPS list, since that is the default for nouns. At the same time, a noun may be specified as taking an object (i.e. having a non-null COMPS list), since the null COMPS list is merely a default for nouns:

(29)

$$\begin{bmatrix} \textit{cn-lxm} & \\ \text{SYN} & \left[\text{HEAD} \begin{bmatrix}\textit{noun} & \\ \text{AGR} & [\text{PER}\ \textit{3rd}]\ \ -\end{bmatrix}\right] \\ \text{ARG-ST} & \langle \text{DP}_i\rangle \oplus /\langle\ \rangle \\ \text{SEM} & \begin{bmatrix}\text{MODE} & /\ \text{ref}\\ \text{INDEX} & i\end{bmatrix}\end{bmatrix}$$

General laws like SHAC will play a role in fleshing out the feature structure of actual lexemes — yielding in this instance agreement between the determiner and the noun.

(30) **Subtypes of *cn-lxm* ("common noun lexeme"):**

a. *cntn-lexm*: [ARG-ST < [COUNT +], ...>]
b. *massn-lxm*: [ARG-ST < [COUNT -], ...>]

<u>Things to remember:</u>

- No directionality ("constraint-based architecture"). Thus, the Argument Realization Principlr (ARP) -- which builds the ARG-ST from SPR and COMPS, also builds SPR and COMPS from ARG-ST:

> (31) **<u>Argument Realization Principle (ARP)</u>**
> A <u>word</u>'s value for ARG-ST is $\boxed{a} \oplus \boxed{b}$ (append $\boxed{b}$ to $\boxed{a}$), where $\boxed{a}$ is its value for SPR and $\boxed{b}$ is its value for COMPS.

The *lexicon* states which type a lexical item belongs to. From this, given the type declarations in the grammar of the language, we know the full feature specification of the lexical item.

- A word that belongs to the type "*cn-lxm*", bears particular values for SYN, SEM and ARG-ST thereby. Inside the feature-structures associated with lexeme types appear more familiar POS types (*noun*, *verb*, etc.), which restrict the kinds of features the words in question may bear.

Example: The streamlined lexical entry for *dog* lists only the information not predictable from its type:

(32) $<dog, \begin{bmatrix} \textit{cntn-lxm} & \\ \textit{SEM} & \begin{bmatrix} \text{INDEX} & i \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{dog} \\ \text{INST} & i \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}>$

The full feature structure can be built on the basis of (1) type properties and (2) principles such as SHAC [p. 239]:

(33) $<dog, \begin{bmatrix} \textit{cntn-lxm} & \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{noun} & \\ \text{AGR} & \boxed{1}\begin{bmatrix}\text{PER} & \textit{3rd}\end{bmatrix} \\ \text{VAL} & \begin{bmatrix}\text{SPR} & \left\langle \begin{bmatrix}\text{AGR} & \boxed{1}\end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \textit{SEM} & \begin{bmatrix} \text{MODE} & \text{ref} \\ \text{INDEX} & i \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{dog} \\ \text{INST} & i \end{bmatrix} \right\rangle \end{bmatrix} \\ \text{ARG-ST} & \left\langle \begin{matrix} \text{DetP} \\ [\text{COUNT} \ +] \end{matrix} \right\rangle \end{bmatrix}>$

Terminology*:** the sound/feature-structure pair in (32) is called a ***lexical sequence.

***Other lexemes*:**

1. A variety of verb types, with distinct (and obvious) ARG-ST constraints [pp. 240ff]
   verb-lxm ~> siv-lxm, piv-lxm, tv-lxm
   tv-lxm ~> stv-lxm, dtv-lxm, ptv-lxm

2. Various constrant lexemes:
   predp-lxm
   argmkp-lxm
   adj-lxm
   adv-lxm
   conj-lxm
   det-lxm

Clinton Deploys Vowels to Bosnia

Cities of Sjlbvdnzv, Grzny to Be First Recipients

Before an emergency joint session of Congress yesterday, President Clinton announced US plans to deploy over 75,000 vowels to the war-torn region of Bosnia. The deployment, the largest of its kind in American history, will provide the region with the critically needed letters A,E,I,O and U, and is hoped to render countless Bosnian names more pronounceable.

"For six years, we have stood by while names like Ygrjvslhv and Tzlynhr and Glrm have been horribly butchered by millions around the world," Clinton said. "Today, the United States must finally stand up and say 'Enough.' It is time the people of Bosnia finally had some vowels in their incomprehensible words. The US is proud to lead the crusade in this noble endeavor."

The deployment, dubbed Operation Vowel Storm by the State Department, is set for early next week, with the Adriatic port cities of Sjlbvdnzv and Grzny slated to be the first recipients. Two C-130 transport planes, each carrying over 500 24-count boxes of "E's," will fly from Andrews Air Force Base across the Atlantic and airdrop the letters over the cities.

Citizens of Grzny and Sjlbvdnzv eagerly await the arrival of the vowels. "My God, I do not think we can last another day," Trszg Grzdnjkln, 44, said. "I have six children and none of them has a name that is understandable to me or to anyone else. Mr. Clinton, please send my poor, wretched family just one 'E.' Please."

Said Sjlbvdnzv resident Grg Hmphrs, 67: "With just a few key letters, I could be George Humphries. This is my dream."If the initial airlift is successful, Clinton said the United States will go ahead with full-scale vowel deployment, with C-130's airdropping thousands more letters over every area of Bosnia. Other nations are expected to pitch in as well, including 10,000 British "A's" and 6,500 Canadian "U's." Japan, rich in A's and O's, was asked to participate, but declined.

The airdrop represents the largest deployment of any letter to a foreign country since 1984. During the summer of that year, the US shipped 92,000 consonants to Ethiopia, providing cities like Ouaouoaua, Eaoiiuae, and Aao with vital, lifegiving supplies of L's, S's and T's. The consonant-relief effort failed, however, when vast quantities of the letters were intercepted and hoarded by violent, gun-toting warlords.

10 Lexical rules

Lexemes undergo ["no they don't!"] a **Lexical Rule** that yields a *word*, as a precondition to playing a role in a syntactic tree. [Page 292 is crucial here!]

Inflectional Examples:

(34) **Singular Noun Lexical Rule [p. 252]**

$$< \boxed{1}, [\textit{noun - lxm}] > \;\Rightarrow\; < \boxed{1}, \begin{bmatrix} \textit{word} \\ \text{SYN} \;\; [\text{HEAD} \;\; [\text{AGR} \;\; [\text{NUM } \textit{sg}]]] \end{bmatrix} >$$

(35) **Plural Noun Lexical Rule [p. 254]**

$$< \boxed{1}, \textit{cntn} - \textit{lxm} > \;\Rightarrow\; < F_{NPL}(\boxed{1}), \begin{bmatrix} \textit{word} \\ \text{SYN} \;\; [\text{HEAD} \;\; [\text{AGR} \;\; [\text{NUM pl}]]] \end{bmatrix} >$$

(36) **3rd-Singular Verb Lexical Rule [p. 256]**

$$< \boxed{3}, \begin{bmatrix} \textit{verb - lxm} \\ \text{SEM} \;\; [\text{REST } \boxed{a}] \end{bmatrix} > \;\Rightarrow$$

$$< F_{3SG}(\boxed{3}), \begin{bmatrix} \textit{word} \\ \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{FORM} & \text{fin} \\ \text{AGR} & \textit{3sing} \end{bmatrix} \end{bmatrix} \\ \text{SEM} \;\; [\text{RESTR } \boxed{a} \oplus \ldots] \\ \text{ARG} - \text{ST} \; \langle [\text{CASE nom}], \ldots \rangle \end{bmatrix} >$$

[Non-inflecting lexemes undergo a rather contentless rule converting them to words; p. 259.]

- In the textbook, these rules are viewed as features licensed by types with names such as *i-rule*, because they are organized in a type-hierarchy. (The fact that their output is a *word* is one of the things they inherit from the supertype *l-rule*, which is why this notation is missing in the actual rules of pp. 250ff.) I supress that in this handout, in favor of more familiar and perspicuous arrows. More later...

Derivational examples:

(37) **Agent Nominalization Lexical Rule**

$$< \boxed{2}, \begin{bmatrix} \textit{stv-lxm} \\ \text{ARG-ST} \ \langle \text{X}_i , \text{NP}_j \rangle \\ \text{SEM} \ [\text{index } s] \end{bmatrix} > \ \Rightarrow$$

$$< F\text{-}er(\boxed{2}), \begin{bmatrix} \textit{cntn-lxm} \\ \text{ARG-ST} \left\langle \text{Y} \left(, \begin{bmatrix} \text{PP}_j \\ \text{FORM of.} \end{bmatrix} \right) \right\rangle \\ \textit{SEM} \ [\text{INDEX } i] \end{bmatrix} >$$

Quiz question: What type is the output in (37)? How does an -er nominalization get to be a word?