



Ling 566
Oct 29, 2019
Lexical Rules

Overview

- How lexical rules fit in
- Three types of lexical rules, constraints
- Example: Plural noun lexical rule
- Advice on writing lexical rules
- Constant lexemes
- ARG-ST & ARP
- The feature FORM

Lexical Types & Lexical Rules

- Lexemes capture the similarities among *run*, *runs*, *running*, and *ran*
- The lexical type hierarchy captures the similarities among *run*, *sleep*, and *laugh*, among those and other verbs like *devour* and *hand*, and among those and other words like *book*.
- Lexical rules capture the similarities among *runs*, *sleeps*, *devours*, *hands*, ...

Parsimony & Plausibility

- Lexical rules capture **productive** generalizations.
- There may be some ‘precompiling’ going on as well.

Three Kinds of Lexical Rules

- Inflectional: *lexeme to word*

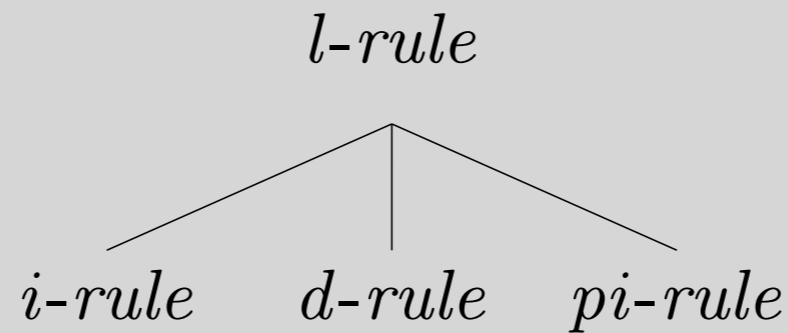
Examples?

- Derivational: *lexeme to lexeme*

Examples?

- Post-Inflectional: *word to word*
(Chapters 11, 13, 14)

Three Subtypes of *l-rule*

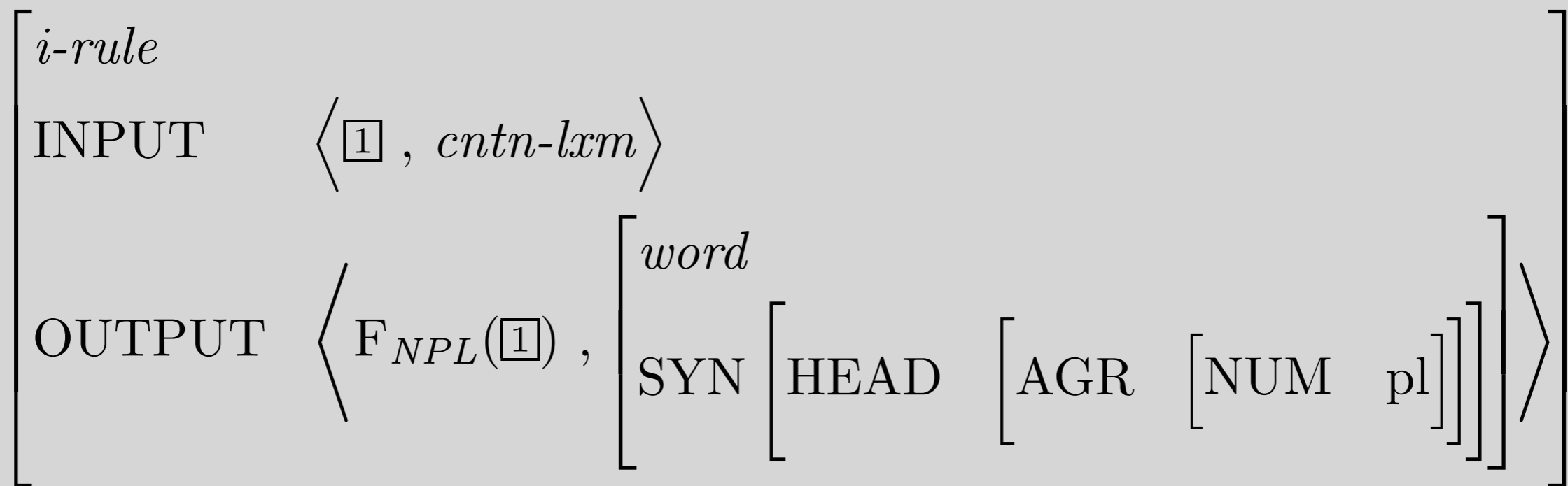


$$l\text{-rule} : \left[\begin{array}{l} \text{INPUT} \quad l\text{-sequence} \left\langle X, [\text{SEM} \quad / \boxed{2}] \right\rangle \\ \text{OUTPUT} \quad l\text{-sequence} \left\langle Y, [\text{SEM} \quad / \boxed{2}] \right\rangle \end{array} \right]$$

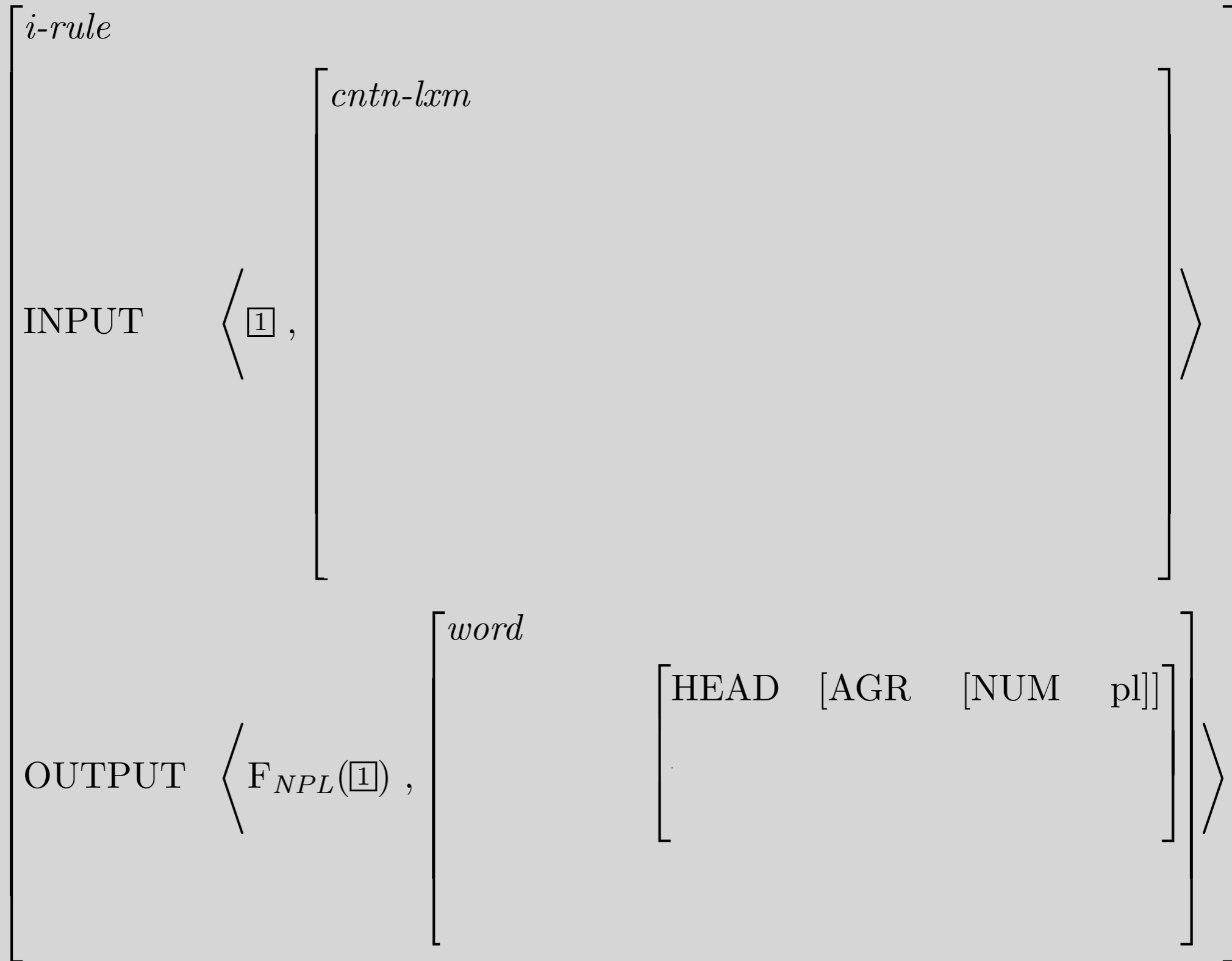
$$i\text{-rule} : \left[\begin{array}{l} \text{INPUT} \quad \left\langle X, \left[\begin{array}{l} \textit{lexeme} \\ \text{SYN} \quad \boxed{3} \\ \text{ARG-ST} \quad \boxed{A} \end{array} \right] \right\rangle \\ \text{OUTPUT} \quad \left\langle Y, \left[\begin{array}{l} \textit{word} \\ \text{SYN} \quad \boxed{3} \\ \text{ARG-ST} \quad \boxed{A} \end{array} \right] \right\rangle \end{array} \right]$$

$$d\text{-rule} : \left[\begin{array}{l} \text{INPUT} \quad \left\langle X, \left[\begin{array}{l} \textit{lexeme} \\ \text{SYN} \quad / \boxed{3} \end{array} \right] \right\rangle \\ \text{OUTPUT} \quad \left\langle Y, \left[\begin{array}{l} \textit{lexeme} \\ \text{SYN} \quad / \boxed{3} \end{array} \right] \right\rangle \end{array} \right]$$

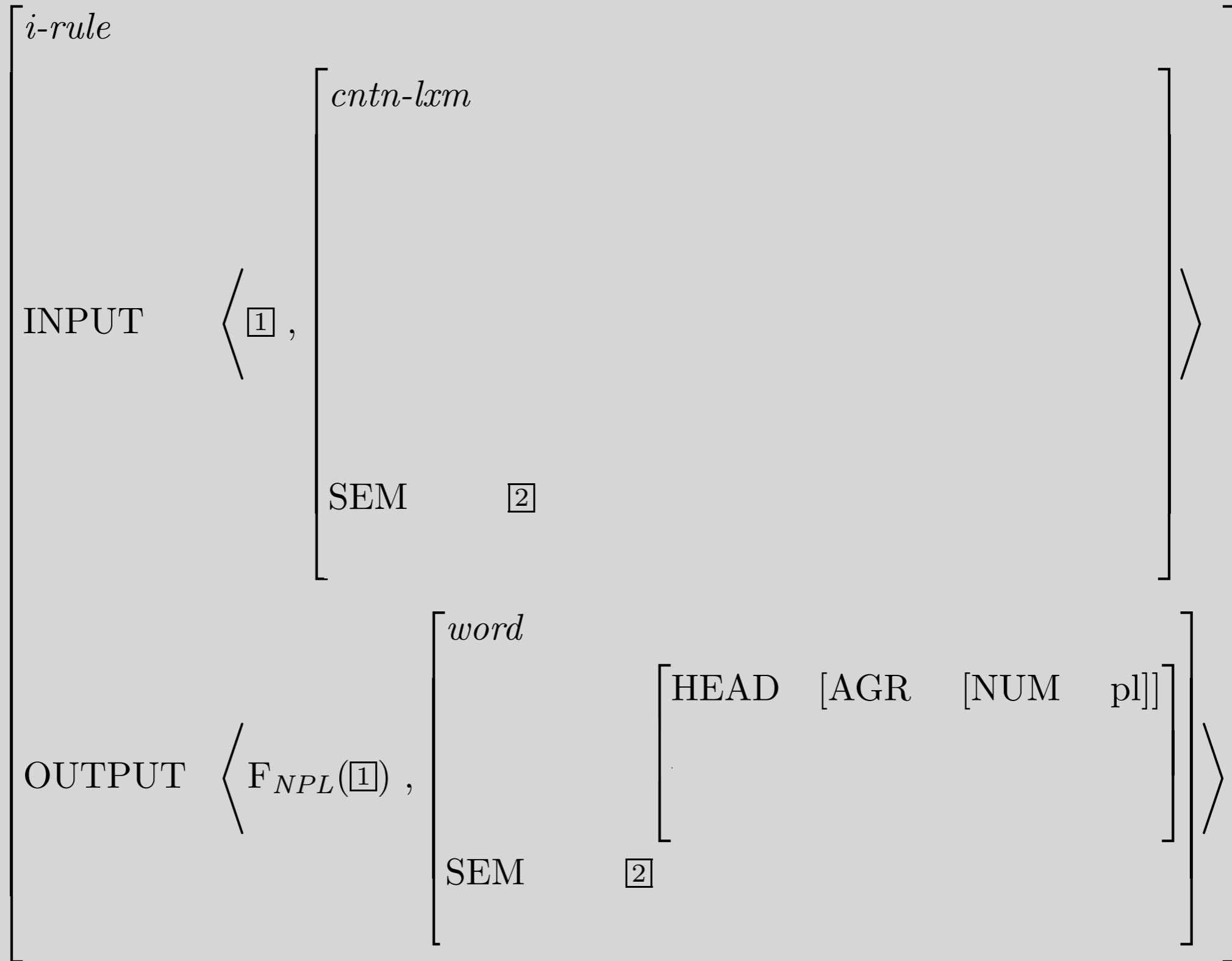
Plural Noun LR



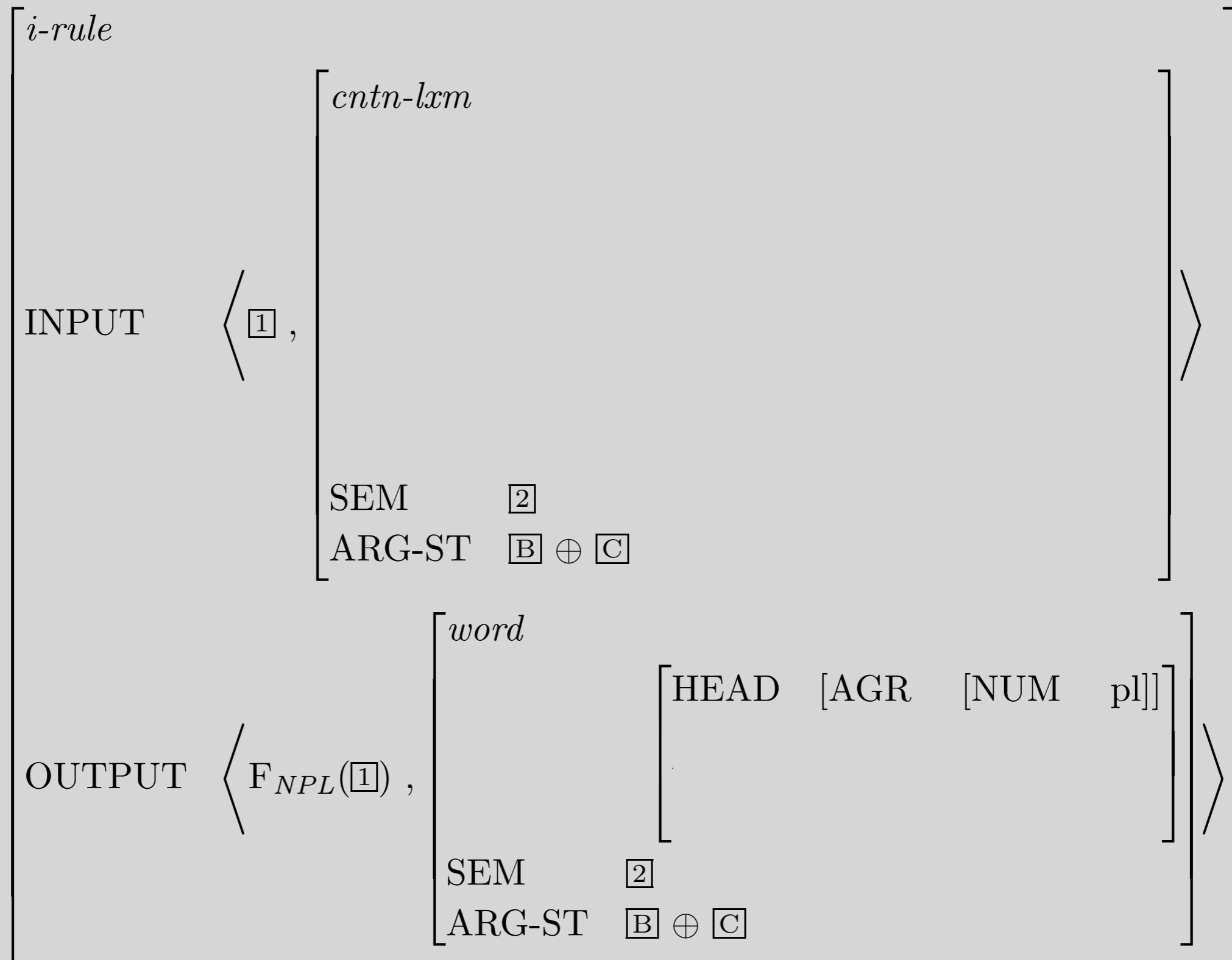
Plural Noun LR with Inherited Constraints



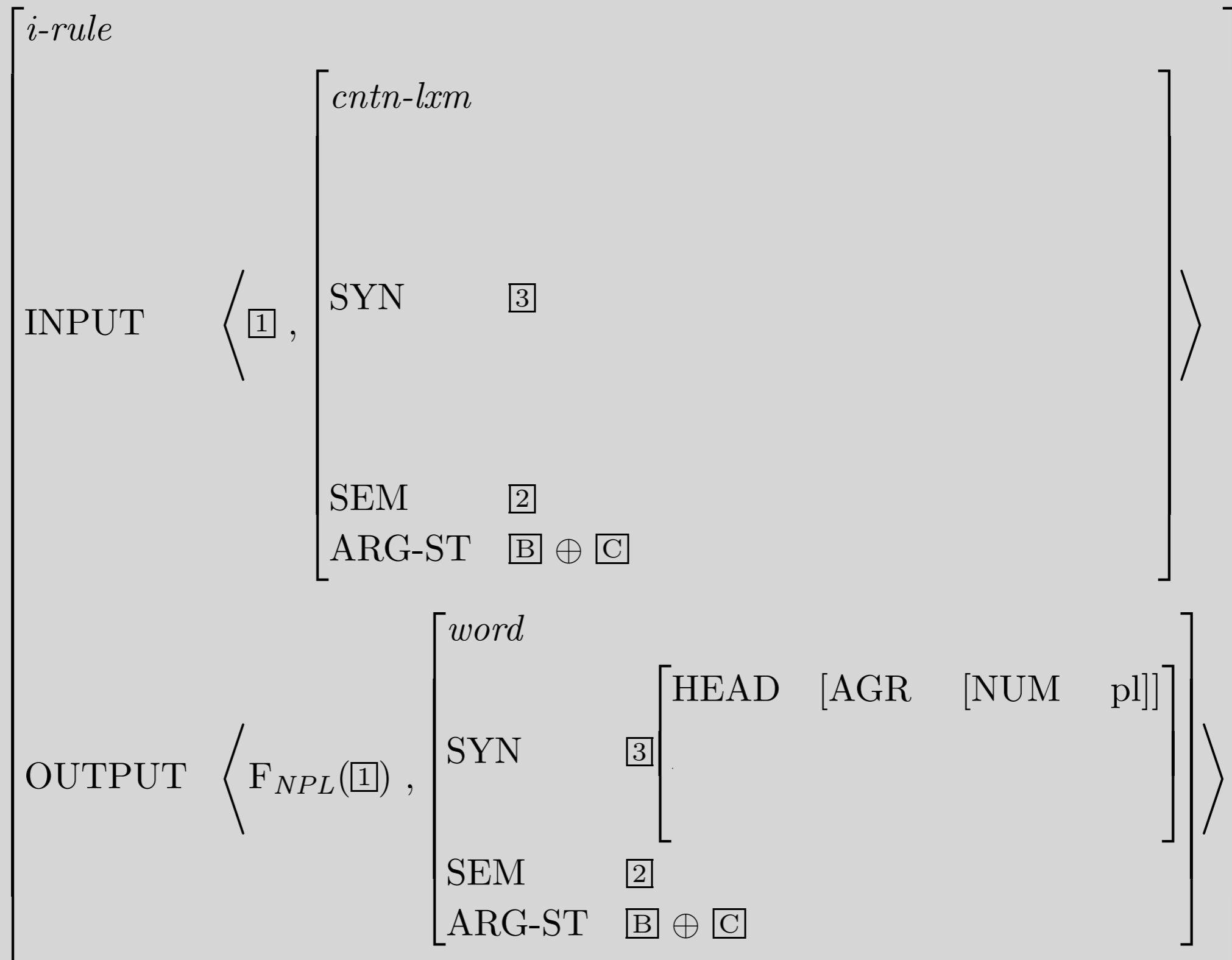
Plural Noun LR with Inherited Constraints



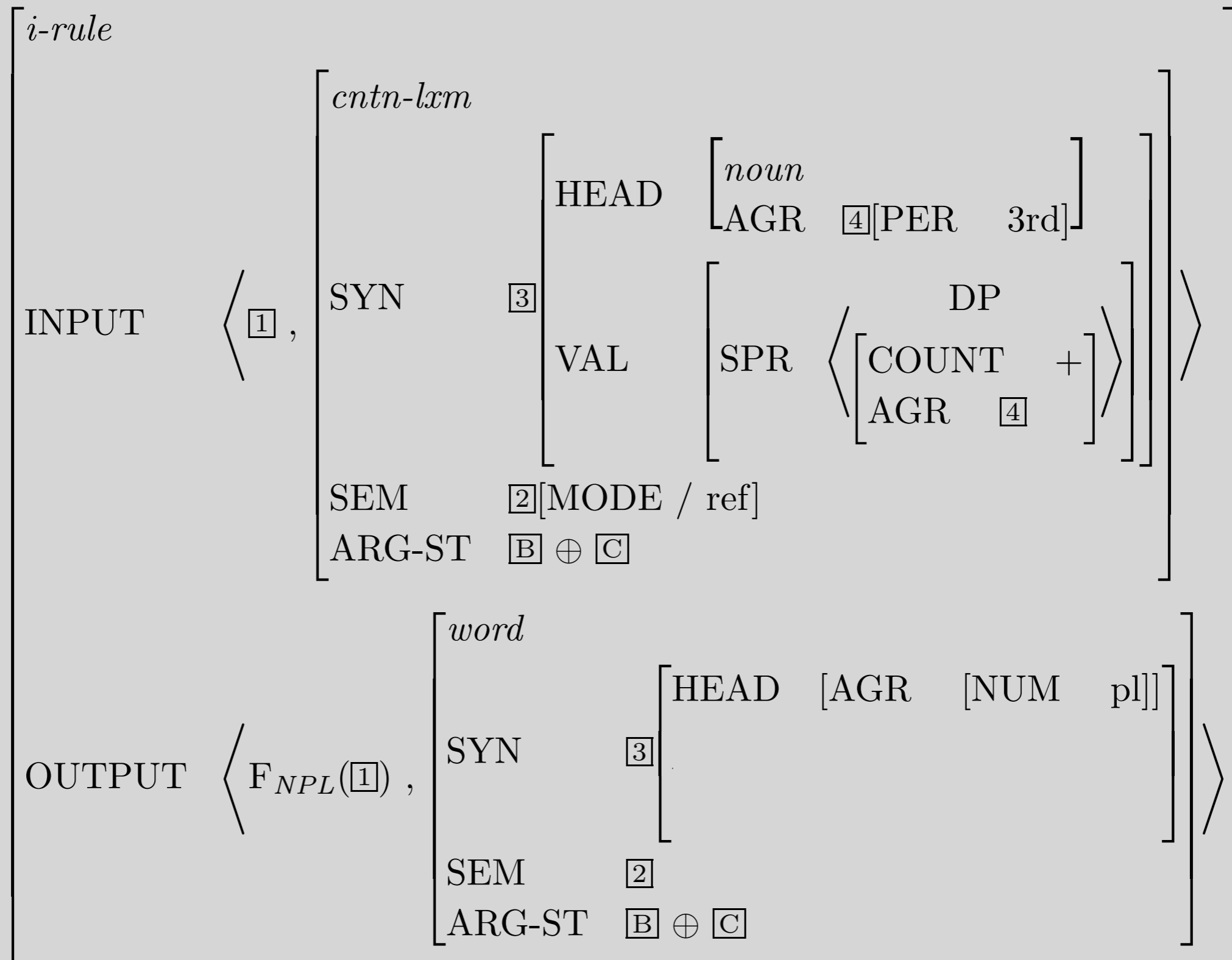
Plural Noun LR with Inherited Constraints



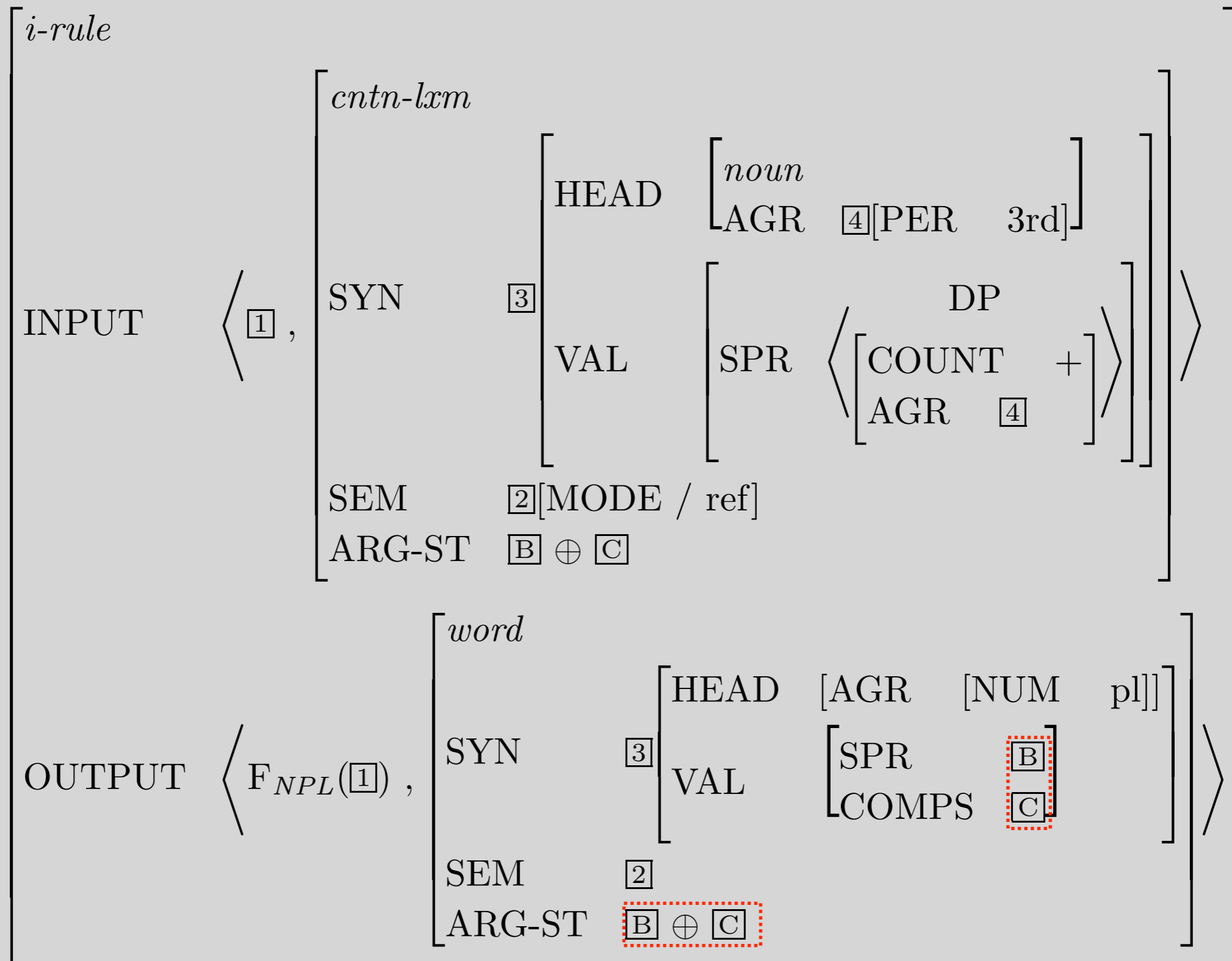
Plural Noun LR with Inherited Constraints



Plural Noun LR with Inherited Constraints



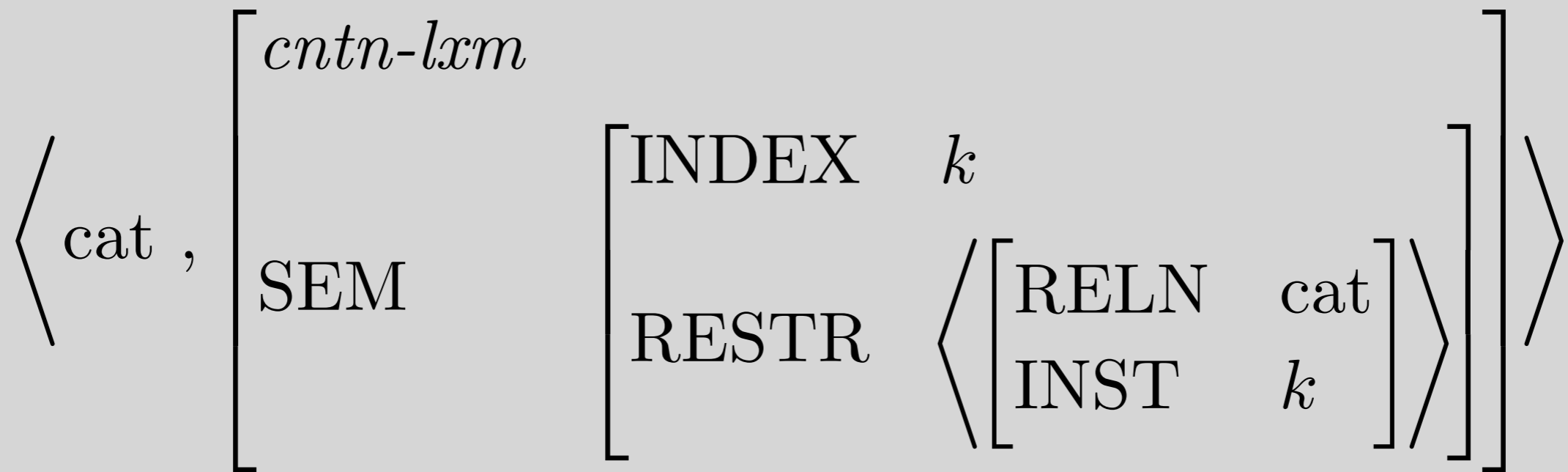
Plural Noun LR with Inherited Constraints



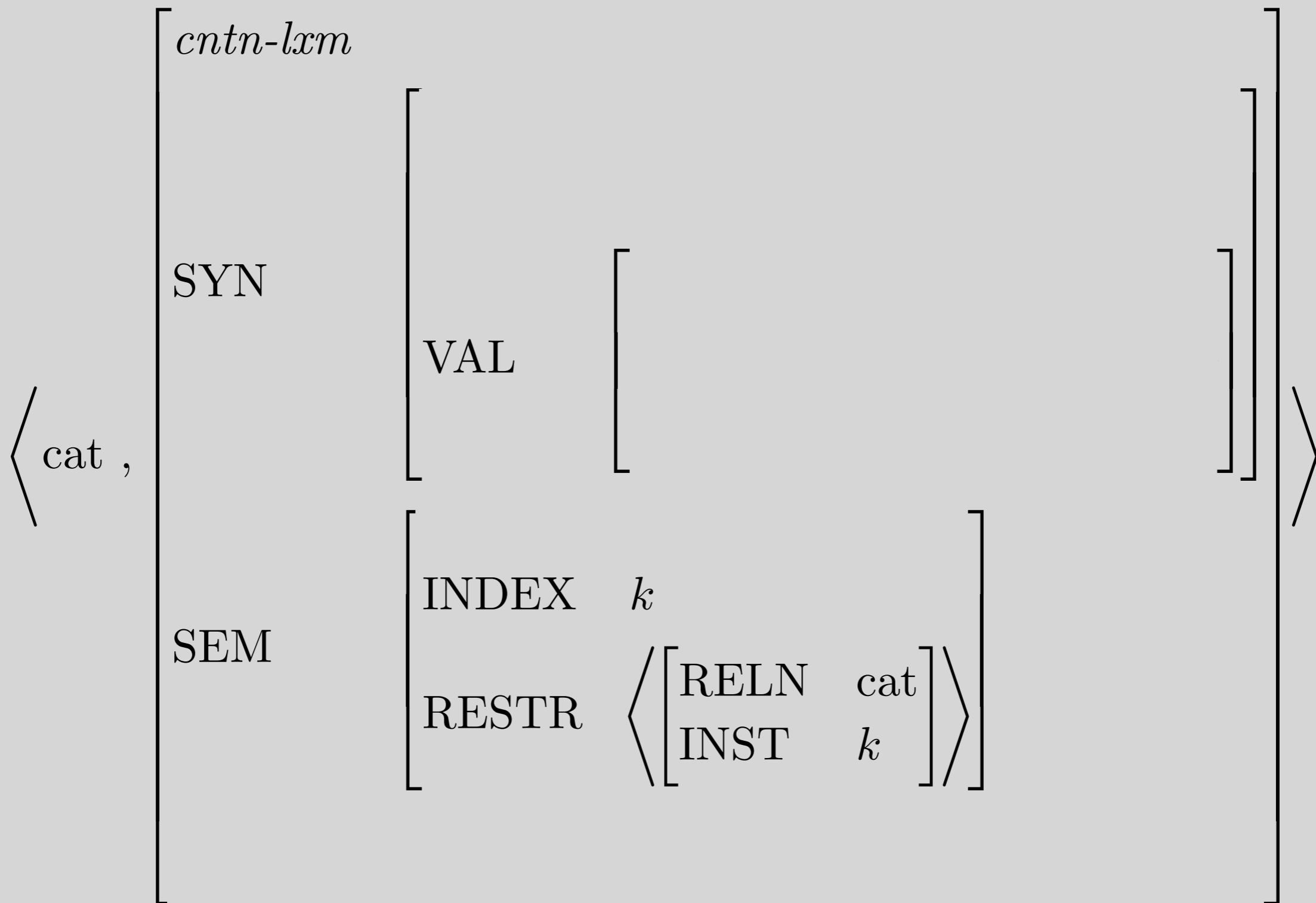
Practicalities - Applying Lexical Rules

- INPUT is a family of lexical sequences.
- OUTPUT is another family of lexical sequences.
 - ...usually a smaller family
 - ...usually a disjoint one
- The only differences between the families are those stipulated in the rule (or the rule's type).
- Similarities are handled by the constraints on *l-rule* and its subtypes.
- If we've written the LRs correctly, nothing is left underconstrained.

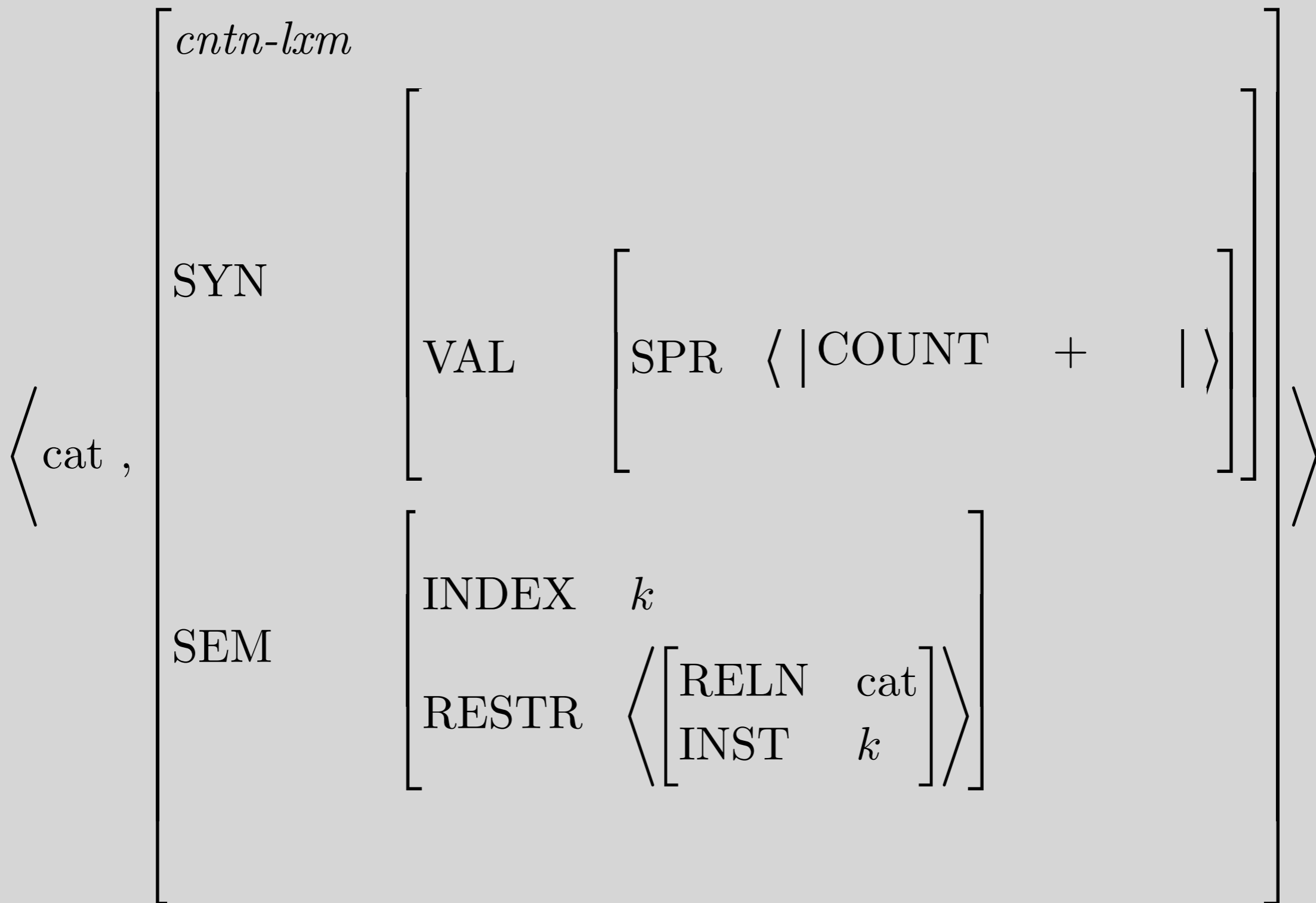
Example: Lexical Entry for *cat*



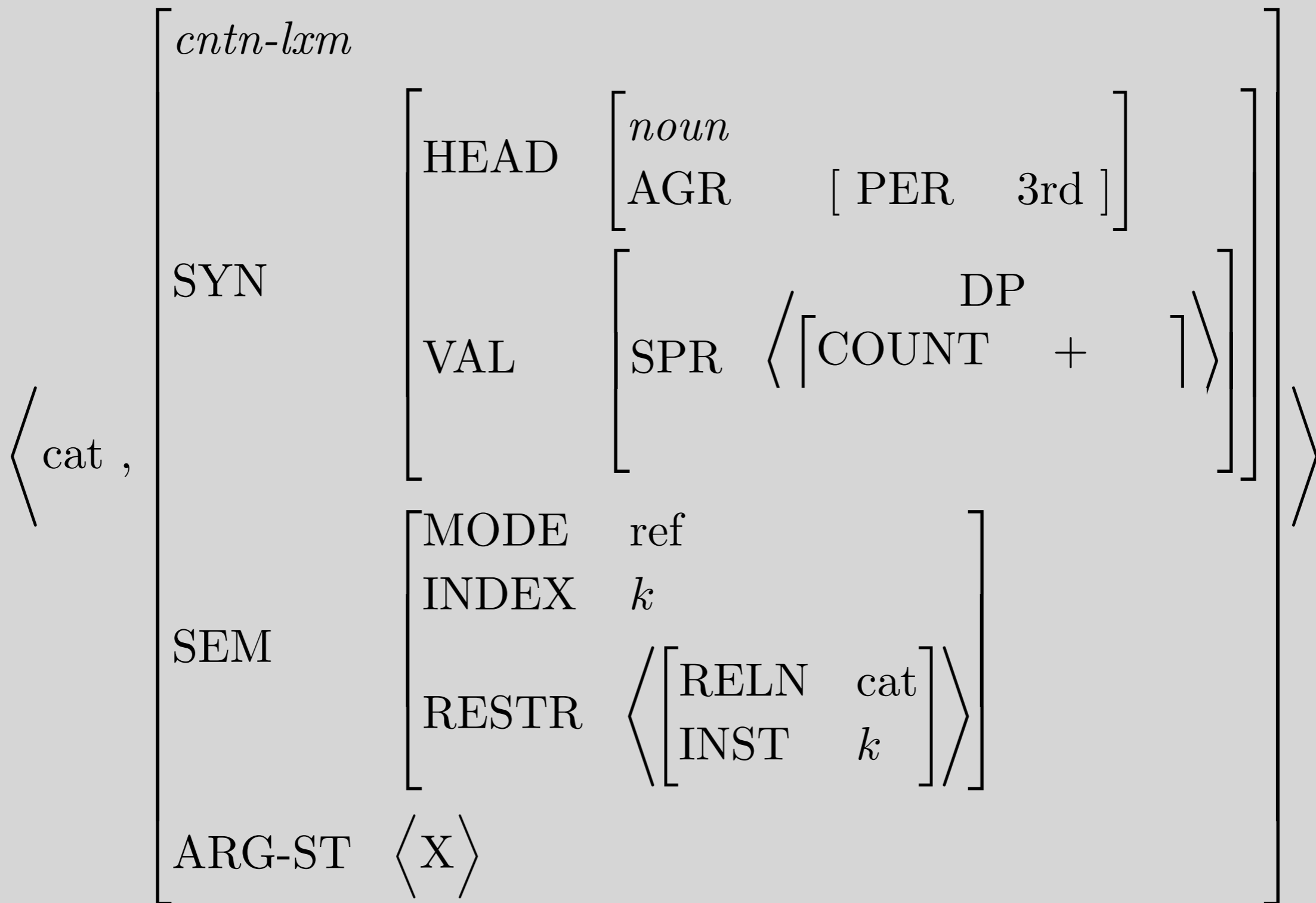
Example: *cat*, with inheritance



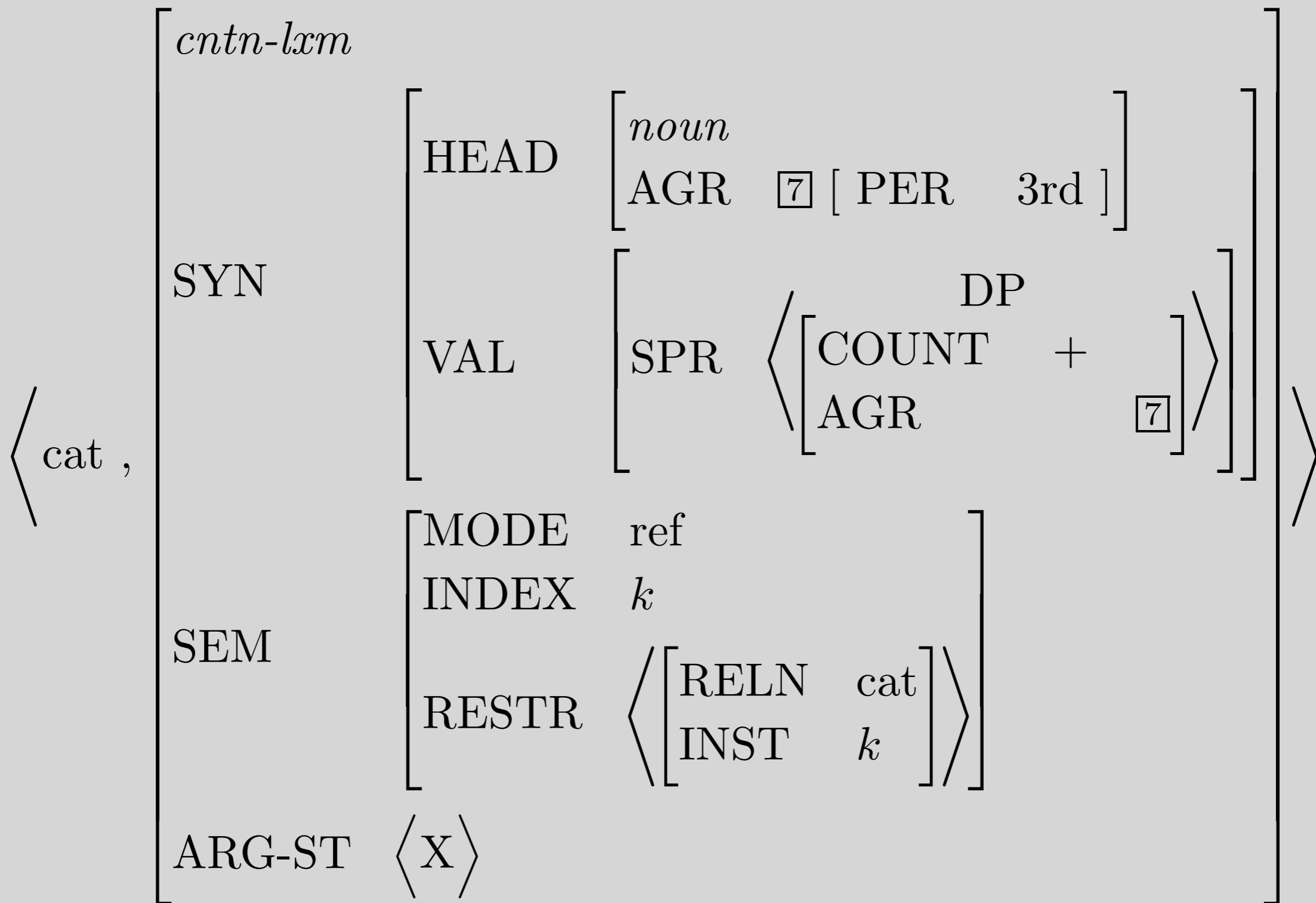
Example: *cat*, with inheritance



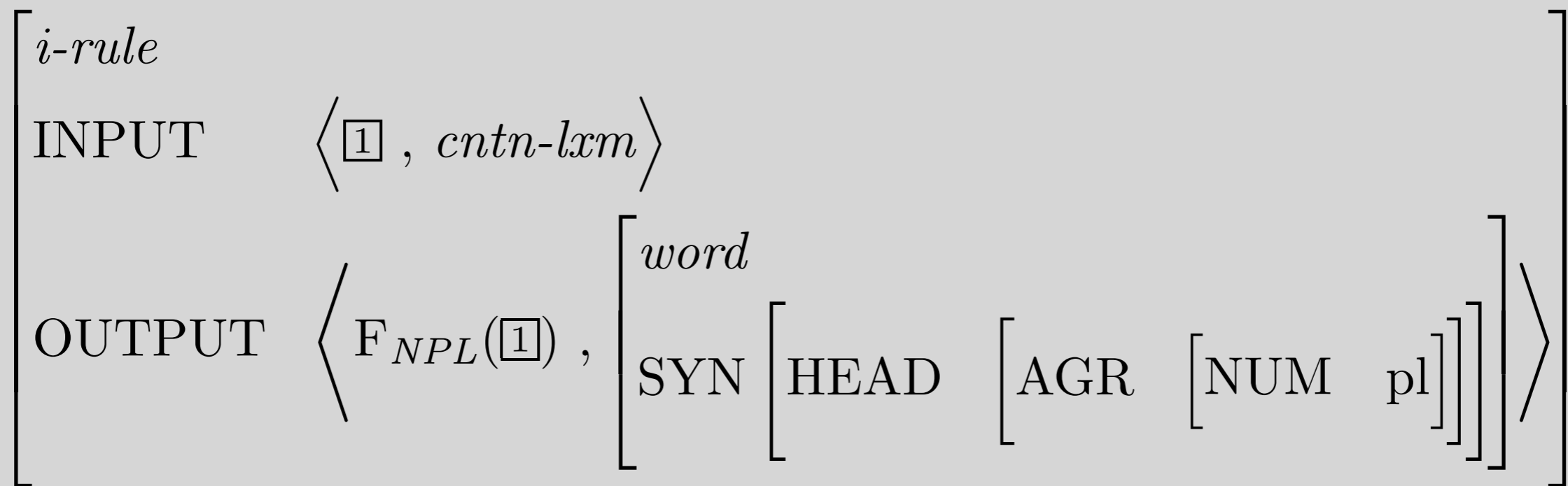
Example: *cat*, with inheritance



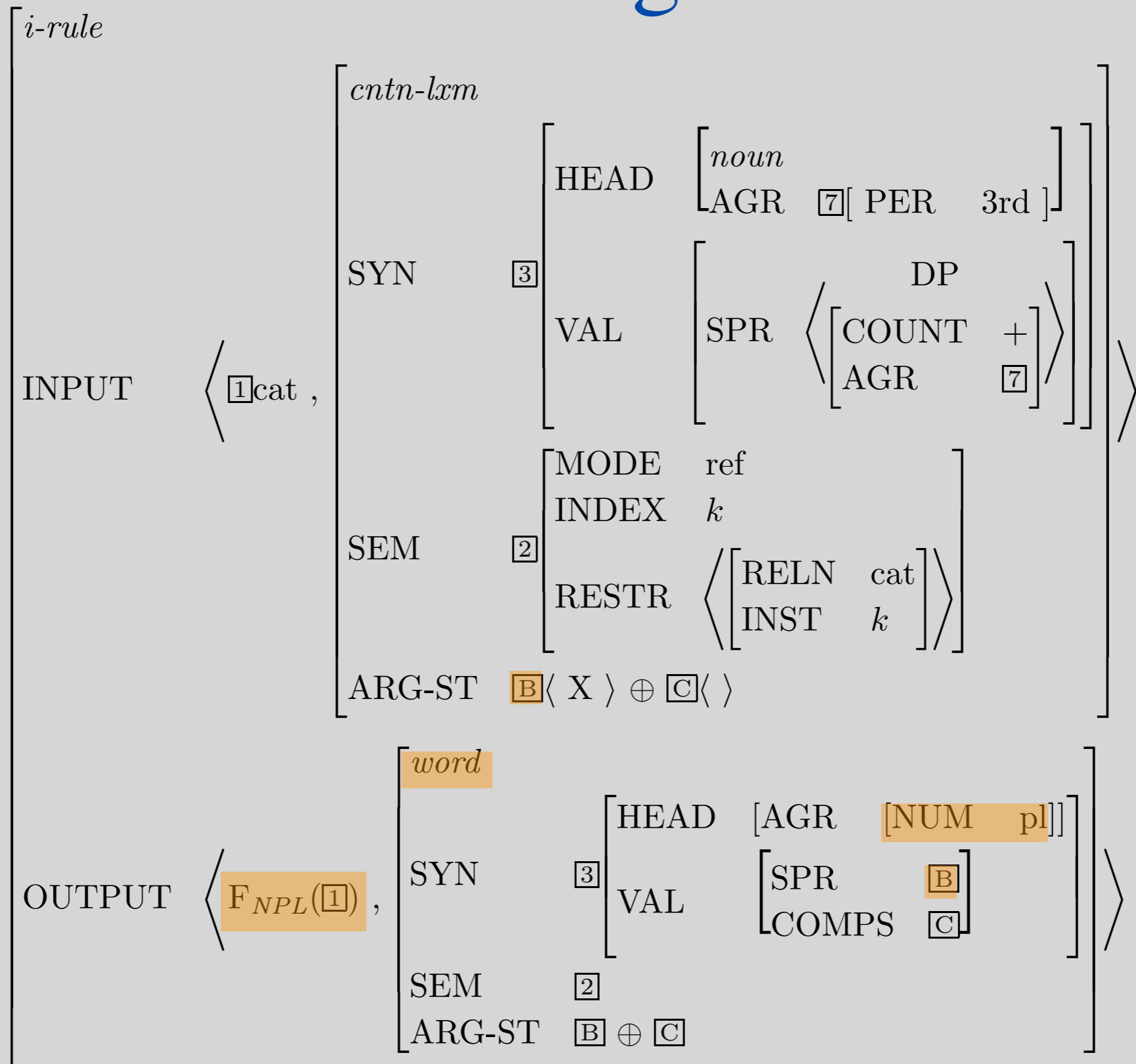
Example: *cat*, with inheritance



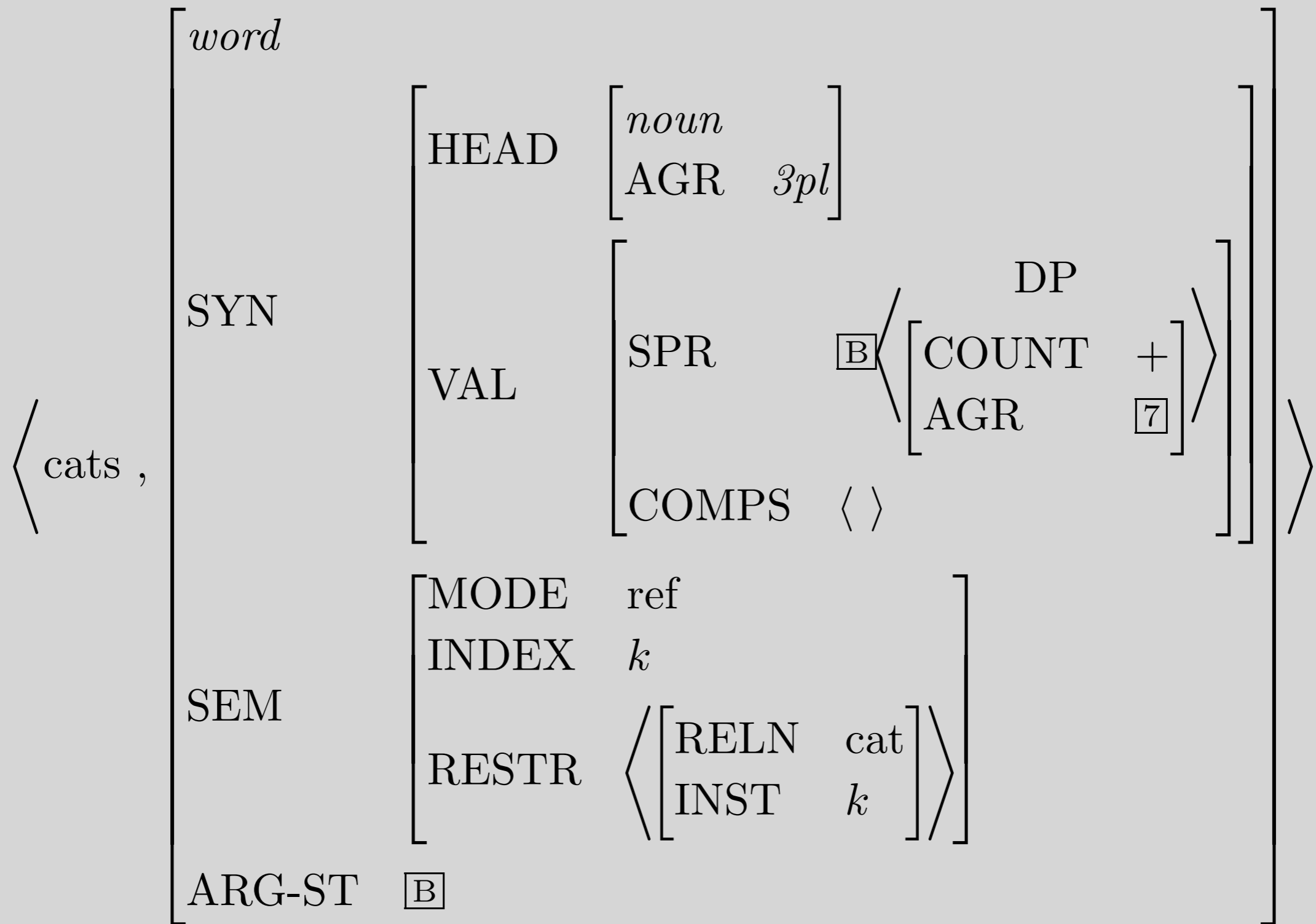
Plural Noun LR



Licensing *cats*



cats: The (family of) Lexical Sequence_(s)



Practicalities -- Writing Lexical Rules

- Determine the type of the LR.
- Determine the class of possible inputs.
- Determine what should change.
 - If INPUT and OUTPUT values are identified (by default or otherwise) and only OUTPUT value is mentioned, then...
information is added.

(Lexical sequences incompatible with that value are not possible inputs)
 - If INPUT and OUTPUT values are identified by default, but different values are given on the INPUT and OUTPUT of the rule, then...
information is changed.
 - If INPUT and OUTPUT values are identified by an inviolable constraint, but different values are given on the INPUT and OUTPUT of the rule, then...
there is no well-formed output

Constant lexemes

- What kinds of words are constant lexemes in our grammar?
- Why do we need a rule for these words?
- What would be an alternative analysis?

Constant Lexeme LR

<i>i-rule</i>	
INPUT	$\langle \boxed{1}, \textit{const-lxm} \rangle$
OUTPUT	$\left[\text{FIRST } \boxed{1} \right]$

- What keeps this from applying to, say, verb lexemes?
- Why is this an *i-rule*?

ARG-ST & ARP

- Given the ARP, what do we need to specify about the valence properties of words?
- Why isn't the ARP a constraint on the type *lexeme*?

The Feature FORM

- Different inflected forms of verbs show up in different syntactic environments. Examples?
- These different forms are syntactically distinguished by the feature FORM, as assigned by lexical rules.
- FORM is also useful in our analyses of coordination and PP selection.

How do we rule these out?

- *Kim eat pizza.
- *Kim seems to eats pizza.
- *Dana helped Leslie [pack and moved].
- *Kim relies for Sandy.
- *Dana walked and Kim.

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- Reading Questions

Reading Questions

- lexeme
- lexical entry
- lexical rule
- lexical rule instantiation
- lexical sequence
- word structure

Reading Questions

- What's the difference between a lexical entry and a lexical sequence? They look similar when written out.
- "The objects that satisfy lexical rules are **LEXICAL RULE INSTANTIATIONS**. Lexical rule instantiations are fully specified feature structures. They are not, however, models of words or sentences." I am confused on why the **OUTPUT** of a lexical rule should not be considered a model of a word, or at least a feature structure that represents a family of words.

Reading Questions

- In example (74), we have a lexical sequence that doesn't give rise to any words, followed by the sentence: "such lexical sequences of course need to be barred from licensing bizarre trees, and this work is done by the lexical rules." Is this the main takeaway of the relationship between lexical sequences and lexical rules?

Reading Questions

- It is stated on p. 259 (8.7.4) that "lexical rules do not change or operate on lexical sequences" but "relate lexical sequences to other lexical sequences". Does this mean that lexical rules would be something like mapping functions between lexical items / sequences that are already stored in the lexicon? Does this apply only to inflectional rules or derivational rules as well, with the only difference being mapping lexeme to words or lexemes to lexemes?

Reading Questions

- lexeme
- lexical entry
- lexical rule
- lexical rule instantiation
- lexical sequence
- word structure

Reading Questions

- What is this new F thing appearing in the output of the lexical rules? Looking back I see that it is called a "morphological function", but why do we need to include it in the output - what is it representing and what is its purpose in the lexical rule?
- What is the relationship between lexical rules and morphology segmentation/paradigms?

Reading Questions

- On page 263, the book states that participles are a subclass of const-lxm and, therefore, will undergo no more morphological changes. Why, then, do we need to use derivational rules to get another lexical sequence instead of using an inflectional rule to get the word?
- The derivational rules remind me of derivational morphology that we talked about slightly in Ling 570. How are they related? And how are lexemes and morphemes different?

Reading Questions

- Given the constraints FORM now adds to coordination structures- is there a mechanism in the scope of this textbook or otherwise in HPSG to deem grammatical/ justify coordinated constituents of different types? There just never seems to be a satisfying coordination model.

Reading Questions

- How does the introduction of lexical rules differ from having non-branching rules for the two types of lexical rules? Would that be possible?
- I do not understand why we cannot see lexical rules as processes/tools of generating correct forms/new words. It seems to me that lexemes are abstract concepts that could not directly appear in sentences or trees, so we need lexical rules to "cast" these lexemes to expressible words. What is incorrect with this understanding? How should we interpret the purpose of having lexical rules?

Notes on the book

- Pages 585-608: Index
- For next time, you don't need to worry about the “squiggly bits” (p.288-mid p.291; pick up from “Structures Defined by the Grammar”)