

Ling 566  
Oct 14, 2008  
How the Grammar Works

# Overview

- What we're trying to do
- The pieces of our grammar
- Two extended examples
- Reflection on what we've done, what we still have to do

# What We're Trying To Do

- Objectives
  - Develop a theory of knowledge of language
  - Represent linguistic information explicitly enough to distinguish well-formed from ill-formed expressions
  - Be parsimonious, capturing linguistically significant generalizations.
- Why Formalize?
  - To formulate testable predictions
  - To check for consistency
  - To make it possible to get a computer to do it for us

# How We Construct Sentences

- The Components of Our Grammar
  - Grammar rules
  - Lexical entries
  - Principles
  - Type hierarchy (very preliminary, so far)
  - Initial symbol (S, for now)
- We combine constraints from these components.

*Q: What says we have to combine them?*

**A:** The definition of well-formed structure

# An Example

*A cat slept.*

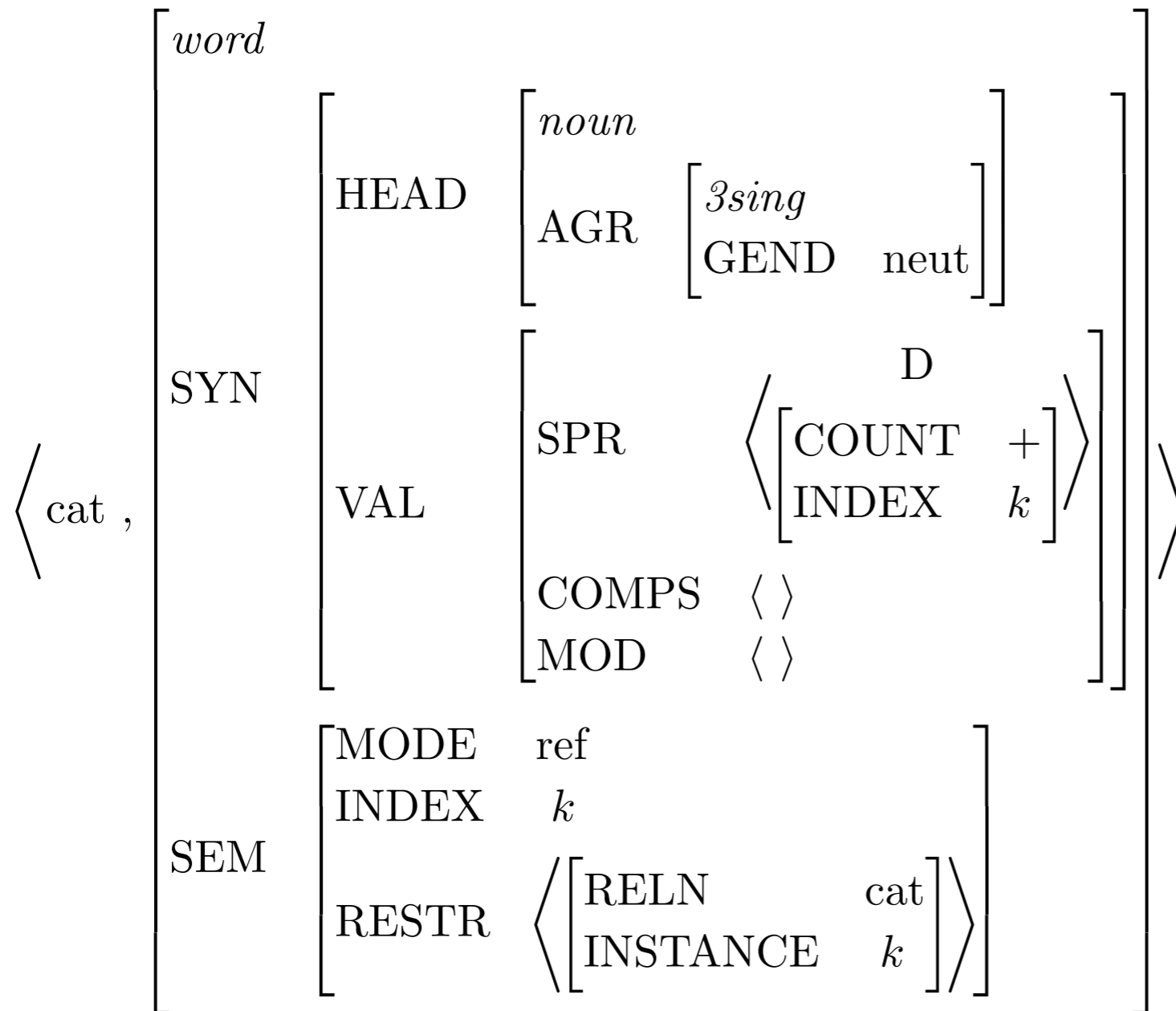
- Can we build this with our tools?
- Given the constraints our grammar puts on well-formed sentences, is this one?

# Lexical Entry for *a*

$\langle a, \rangle$	$\left[ \begin{array}{l} \text{word} \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right]$	$\left[ \begin{array}{l} \text{SYN} \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right]$	$\left[ \begin{array}{l} \text{HEAD} \\ \\ \text{VAL} \\ \\ \text{MODE} \\ \text{INDEX} \\ \text{RESTR} \end{array} \right]$	$\left[ \begin{array}{l} \text{det} \\ \text{AGR} \\ \text{COUNT} \\ \\ \text{COMPS} \\ \text{SPR} \\ \text{MOD} \\ \\ \text{none} \\ j \\ \left\langle \left[ \begin{array}{l} \text{RELN} \\ \text{BV} \end{array} \right] \right\rangle \end{array} \right]$	$\left[ \begin{array}{l} \\ \\ 3sing \\ + \\ \langle \rangle \\ \langle \rangle \\ \langle \rangle \\ \\ \\ a \\ j \end{array} \right]$	$\rangle$
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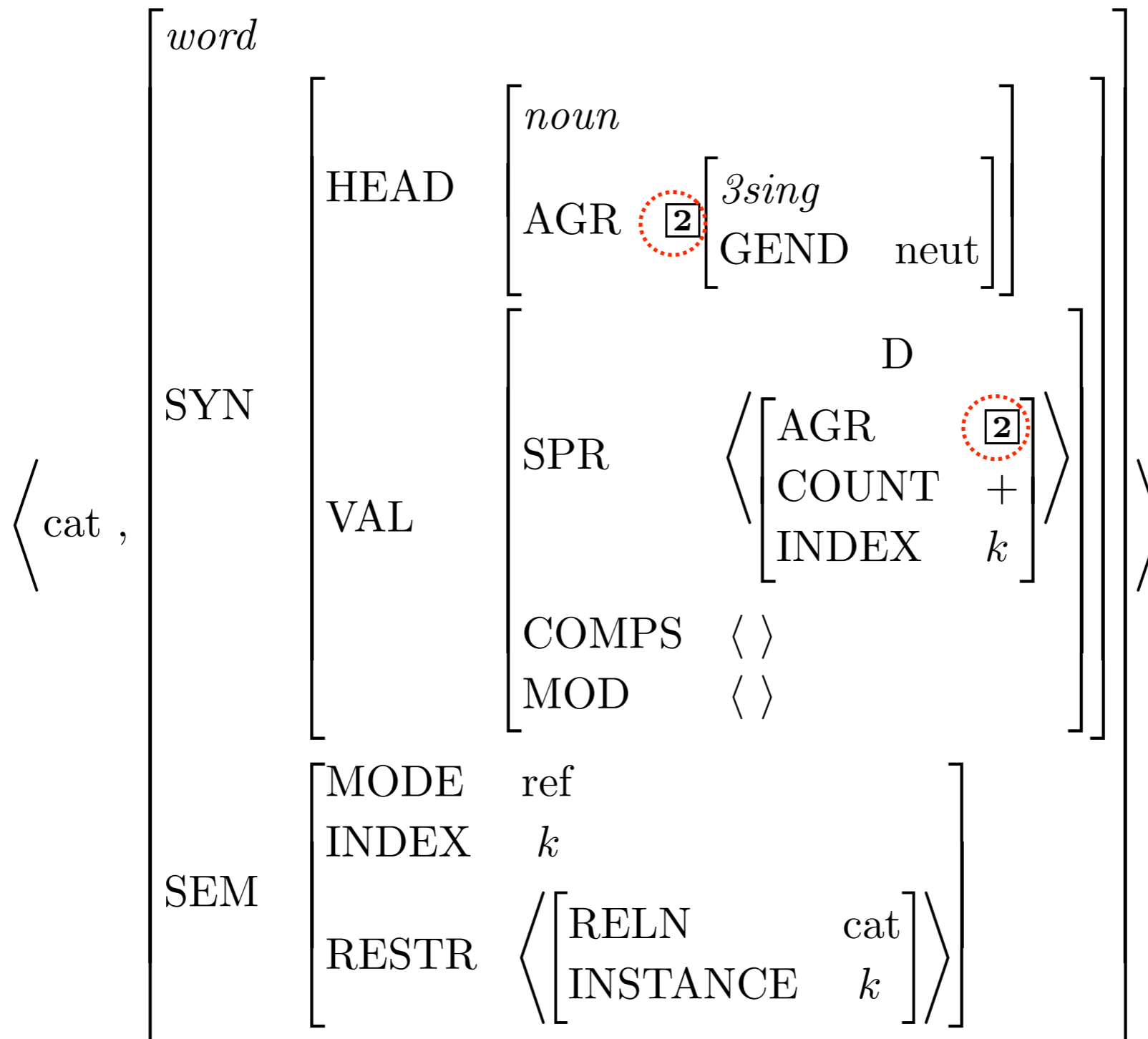
- Is this a fully specified description?
- What features are unspecified?
- How many word structures can this entry license?

# Lexical Entry for *cat*



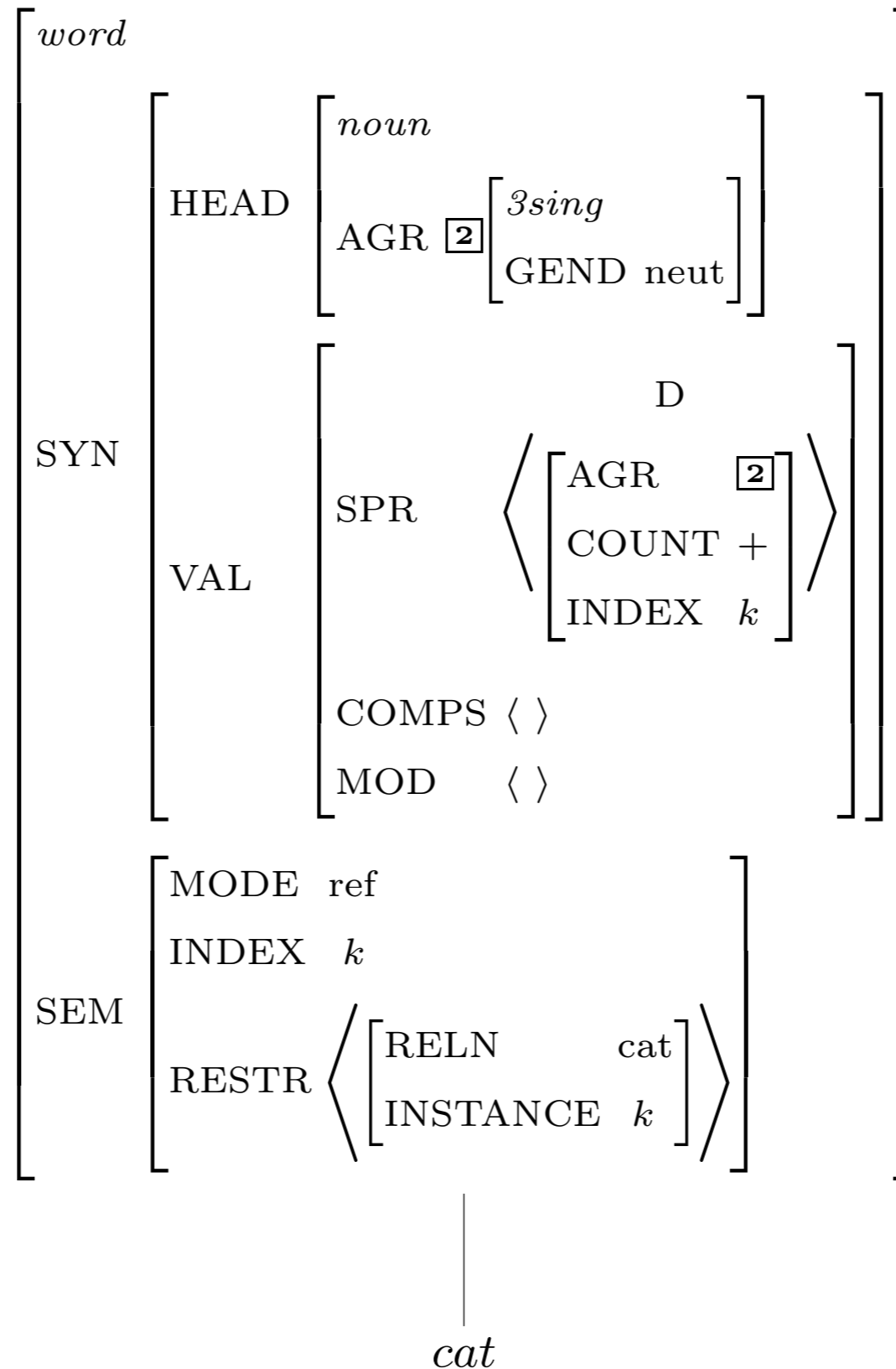
- Which feature paths are abbreviated?
- Is this a fully specified description?
- What features are unspecified?
- How many word structures can this entry license?

# Effect of Principles: the SHAC

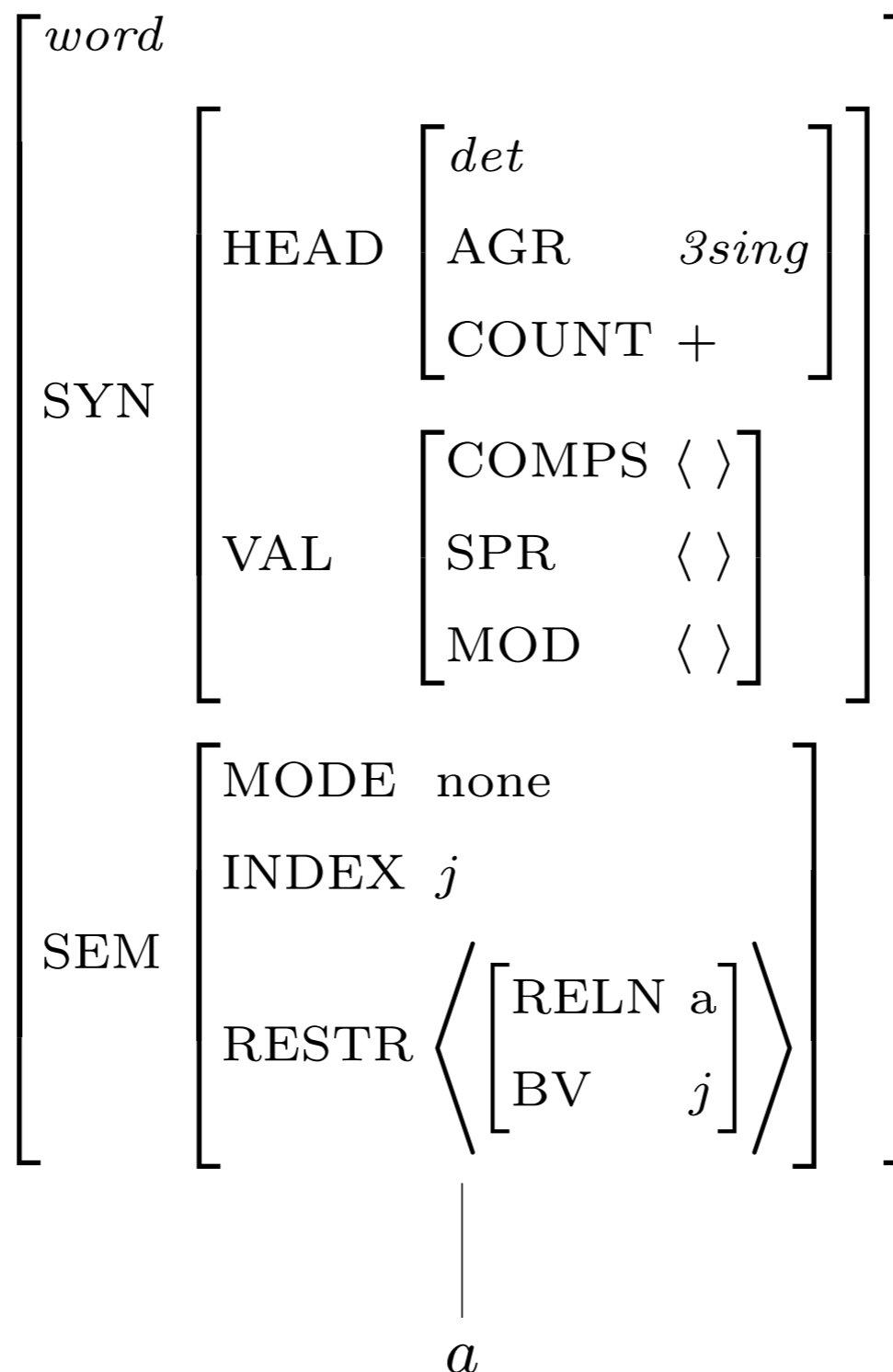




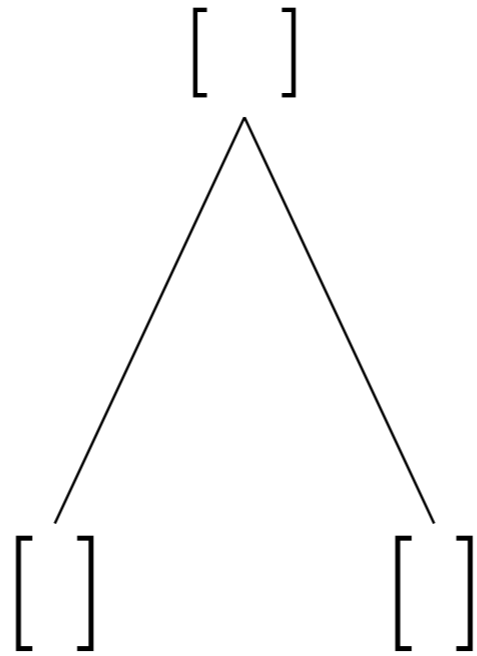
# Description of Word Structures for *cat*



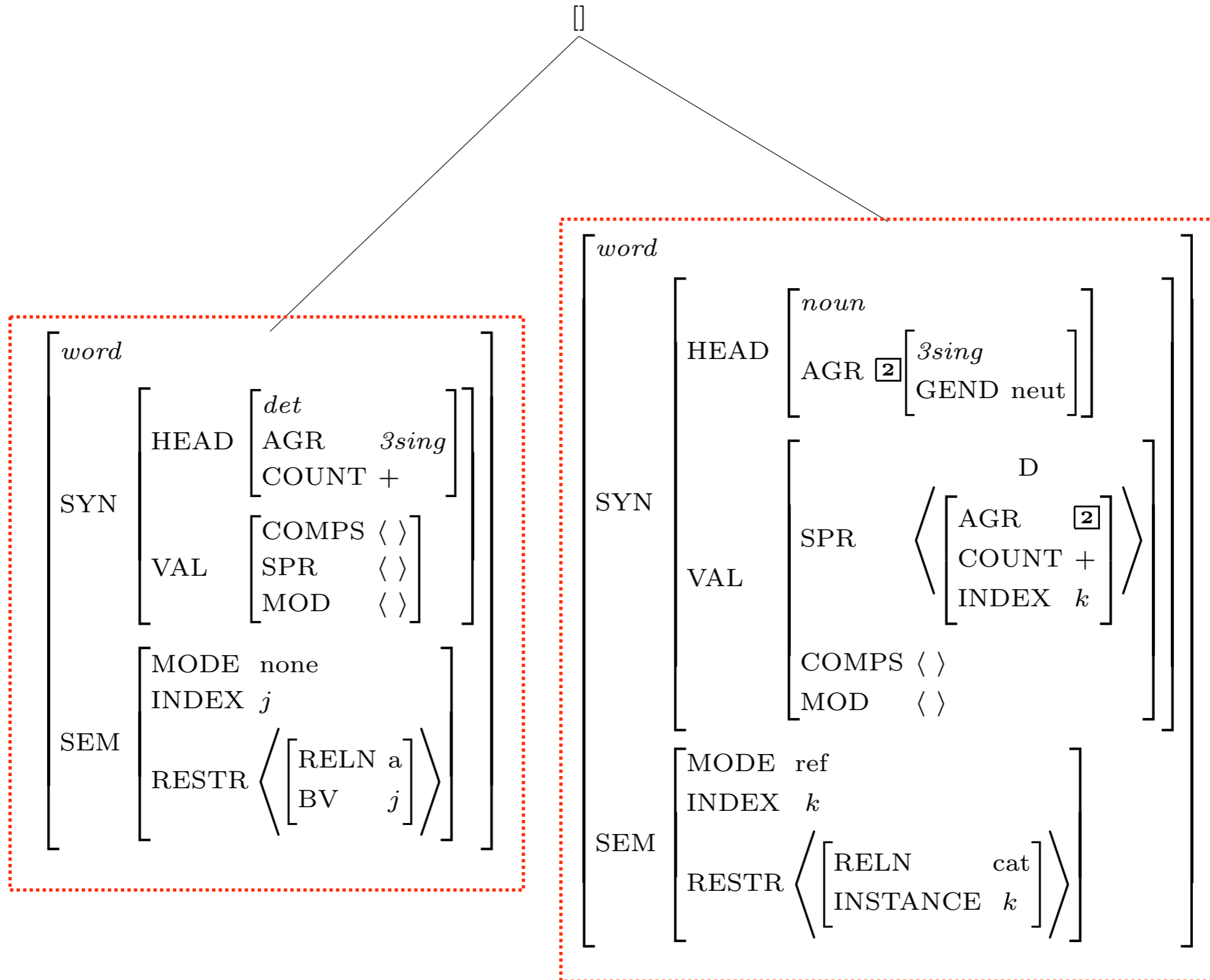
# Description of Word Structures for *a*



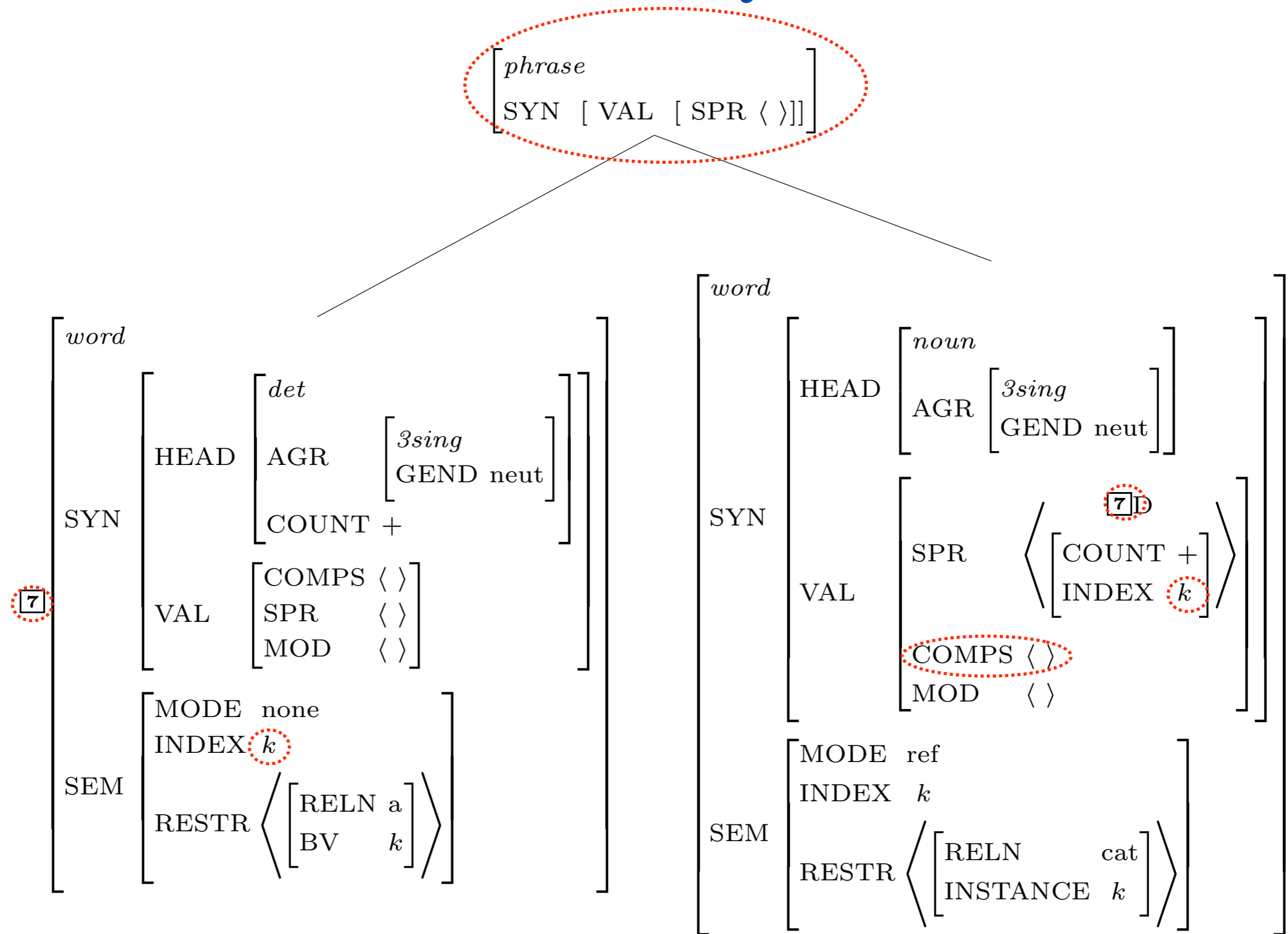
# Building a Phrase



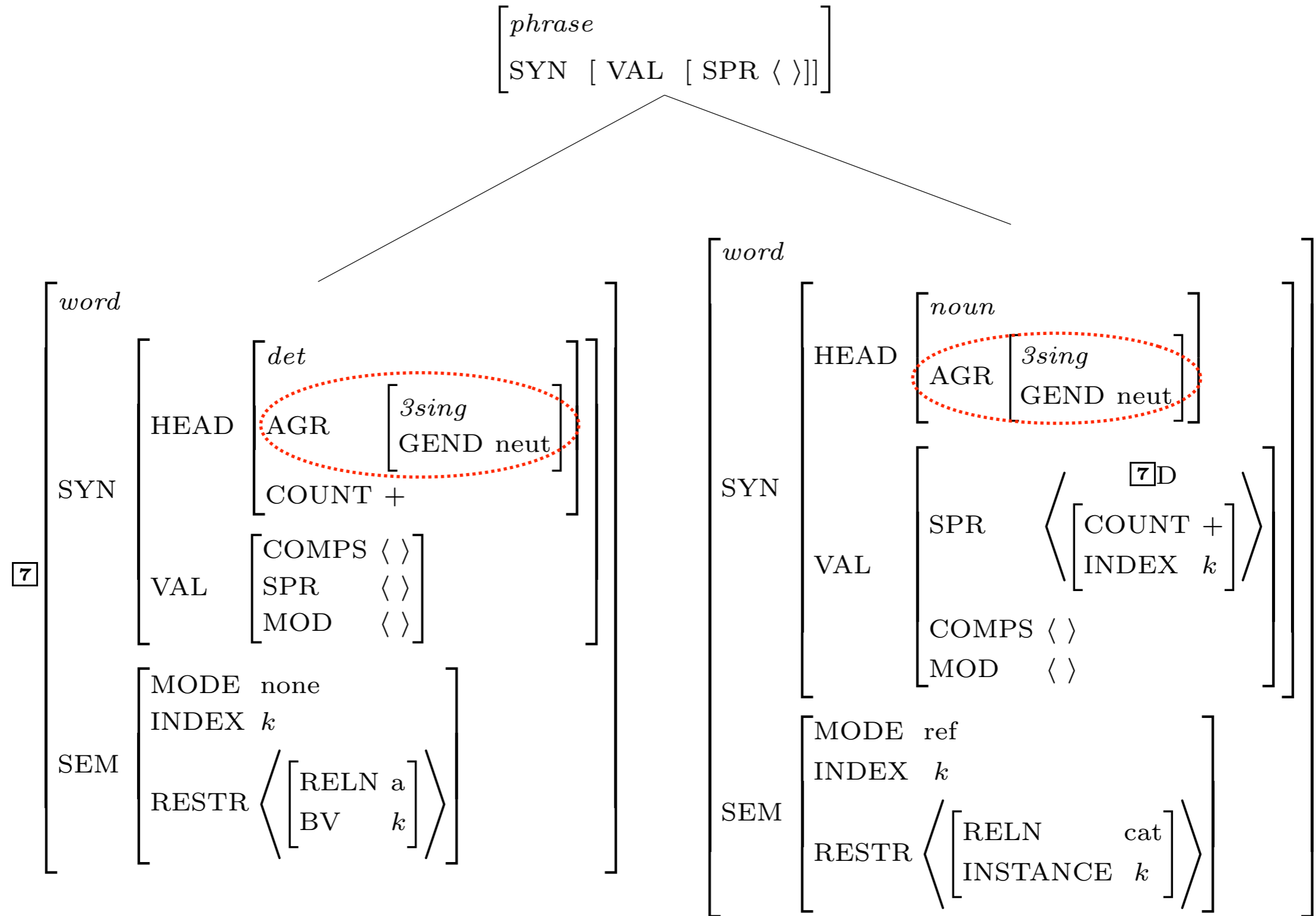
# Constraints Contributed by Daughter Subtrees



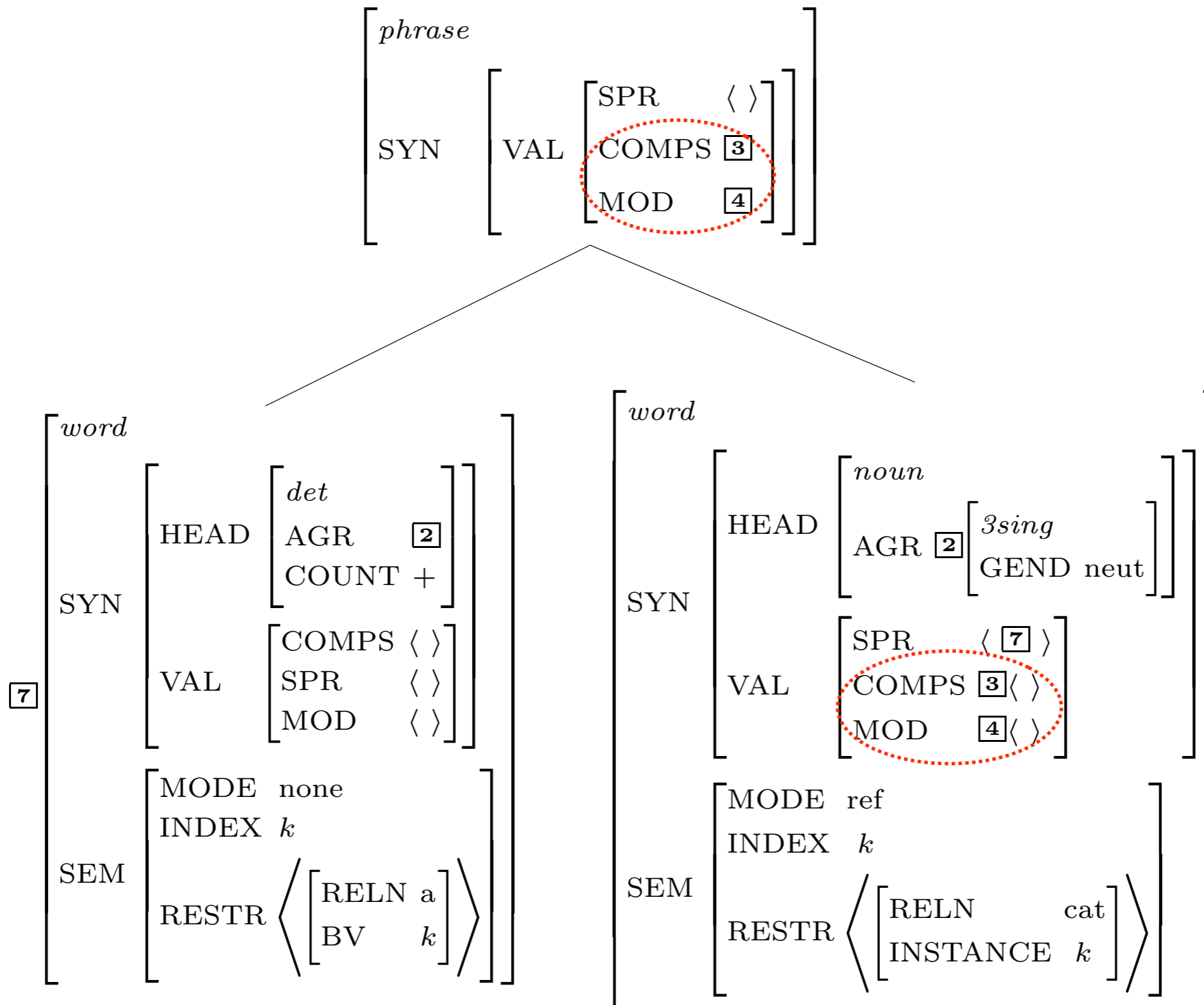
# Constraints Contributed by the Grammar Rule



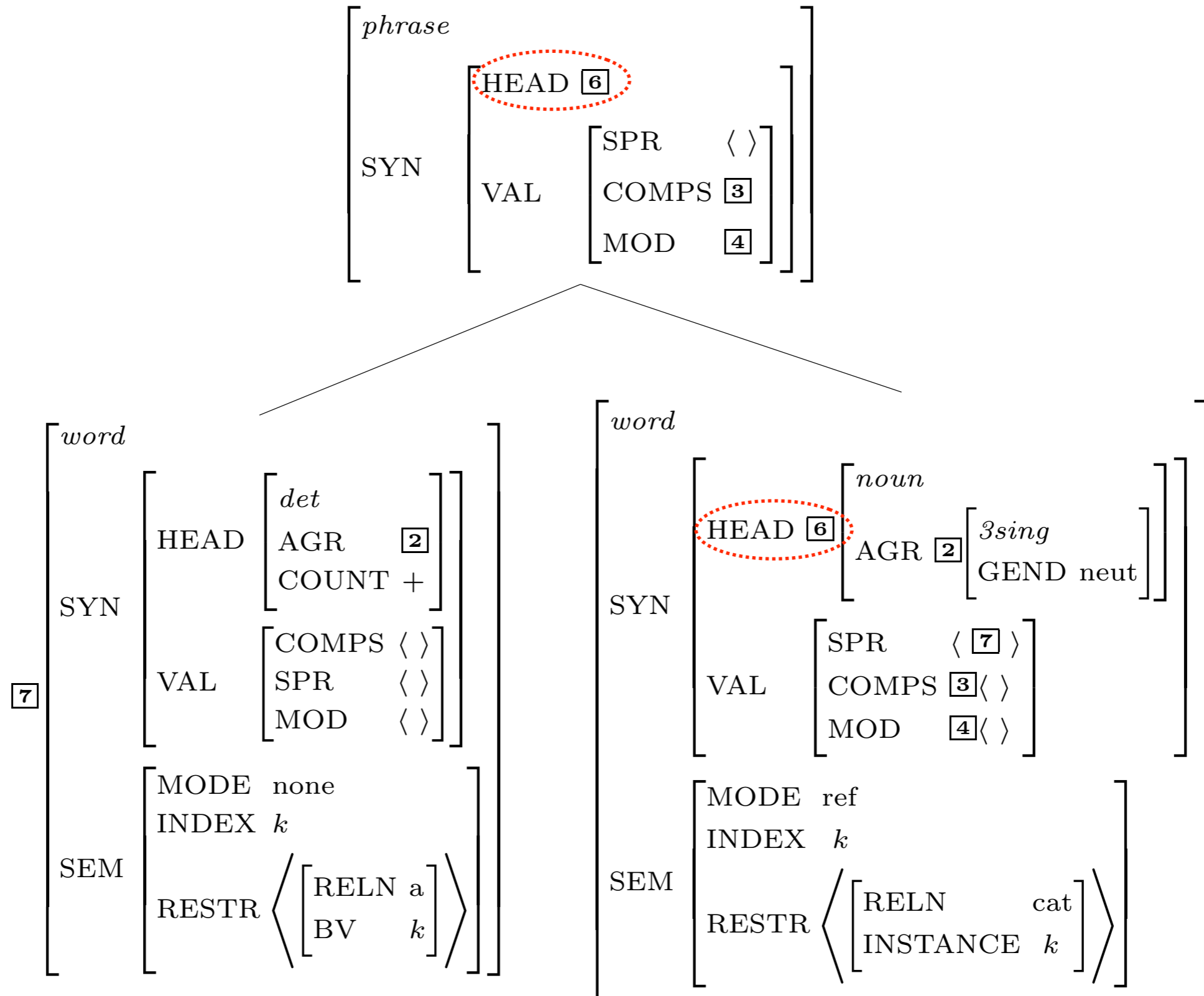
# A Constraint Involving the SHAC



# Effects of the Valence Principle

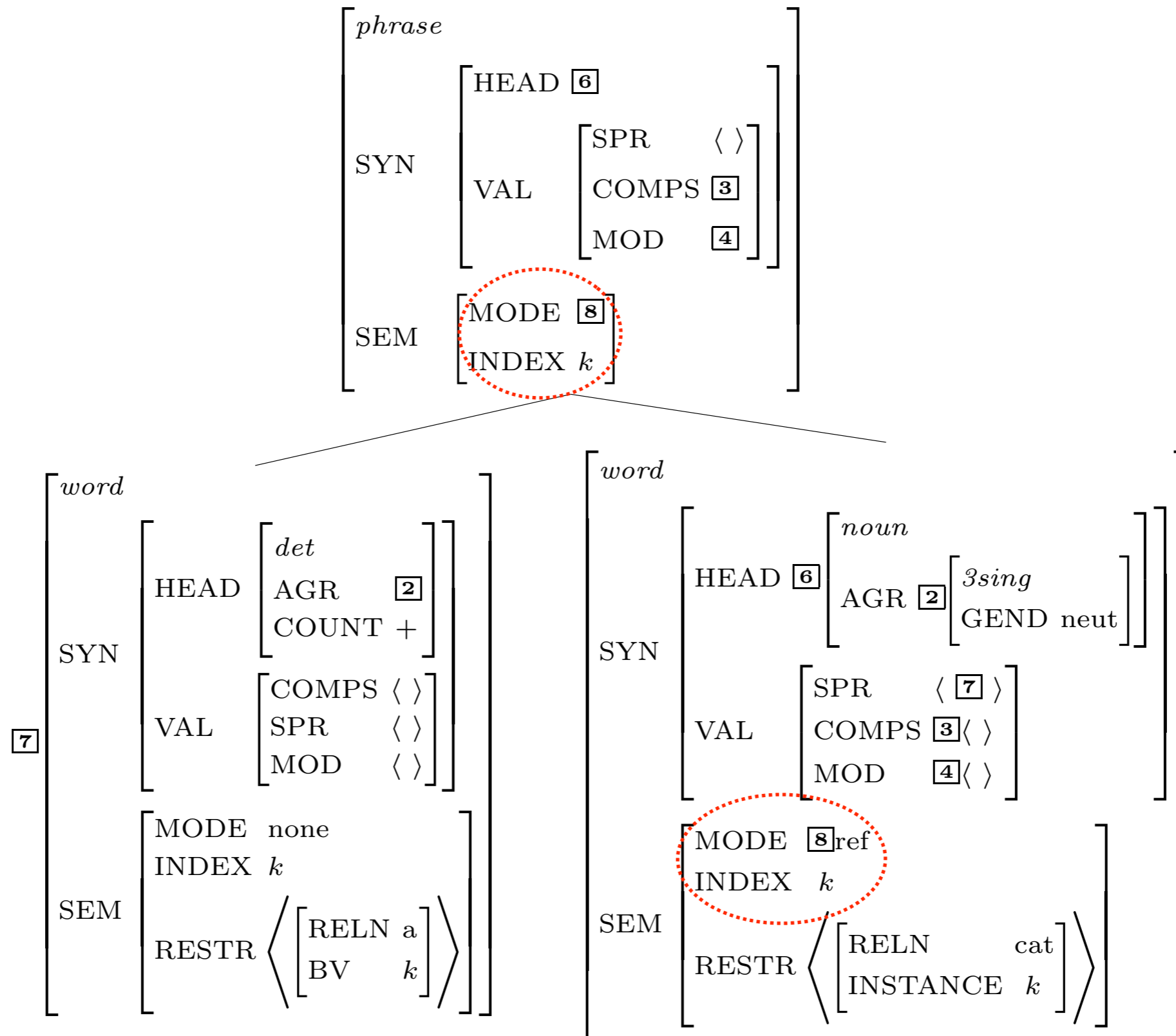


# Effects of the Head Feature Principle

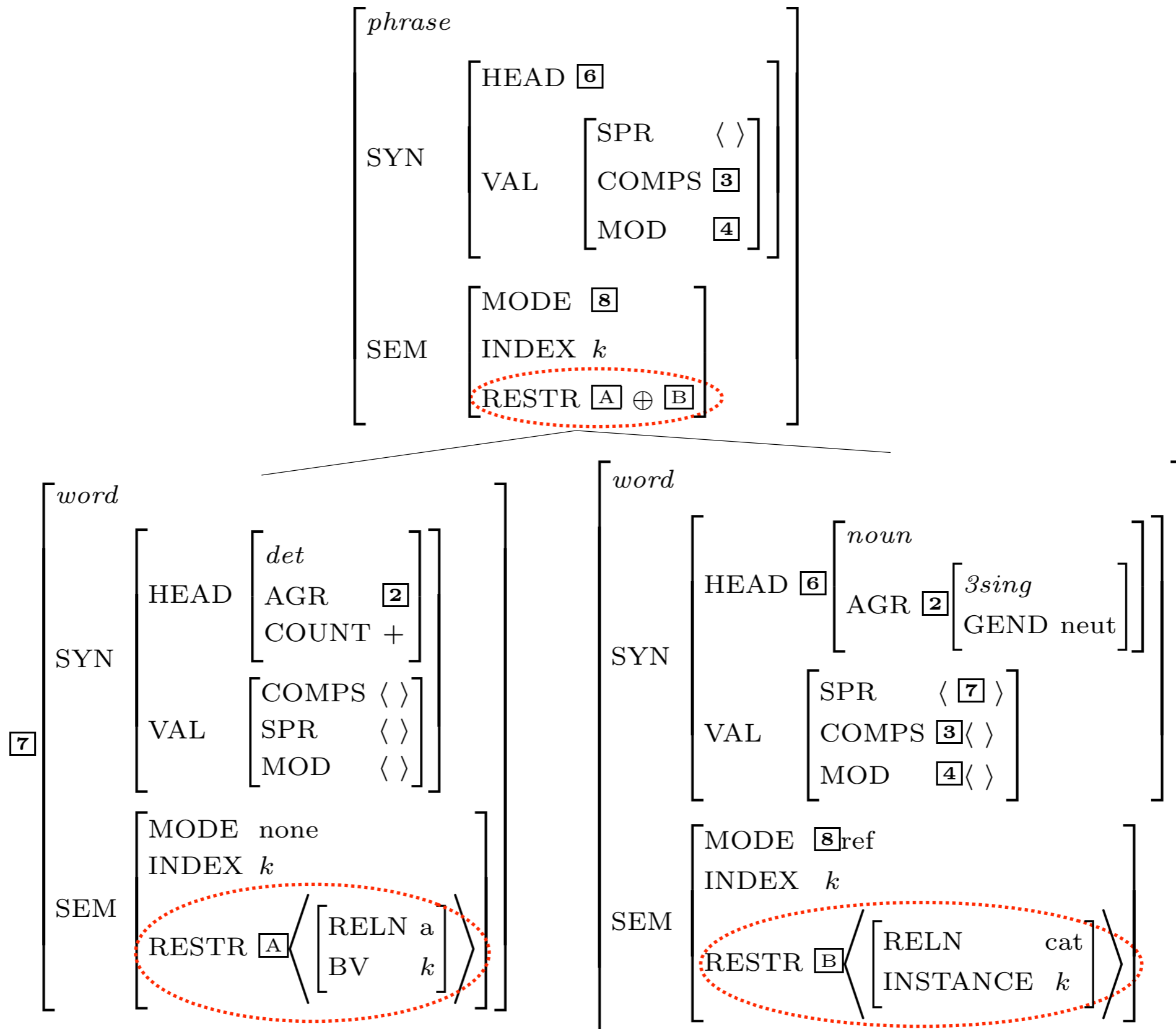




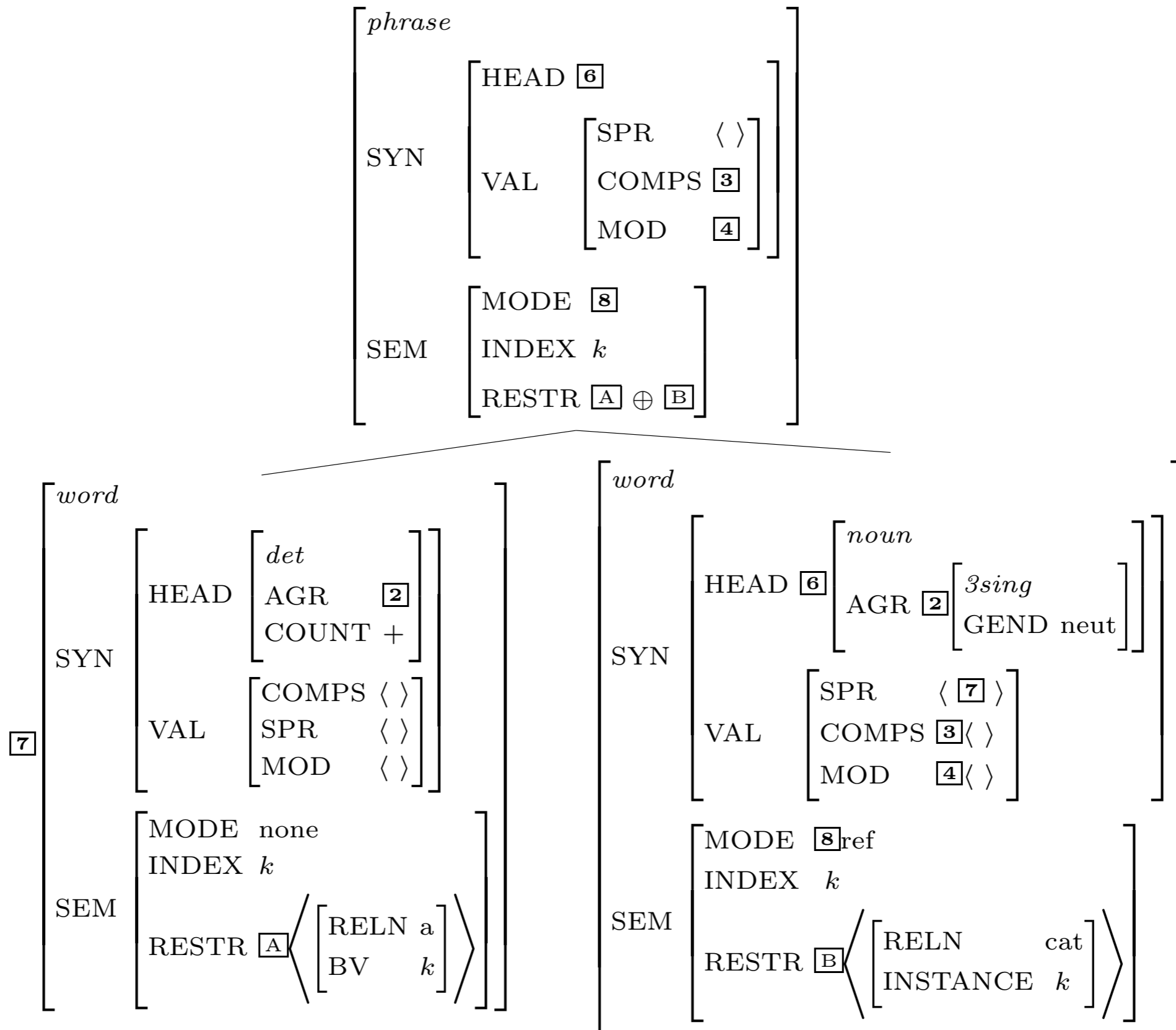
# Effects of the Semantic Inheritance Principle



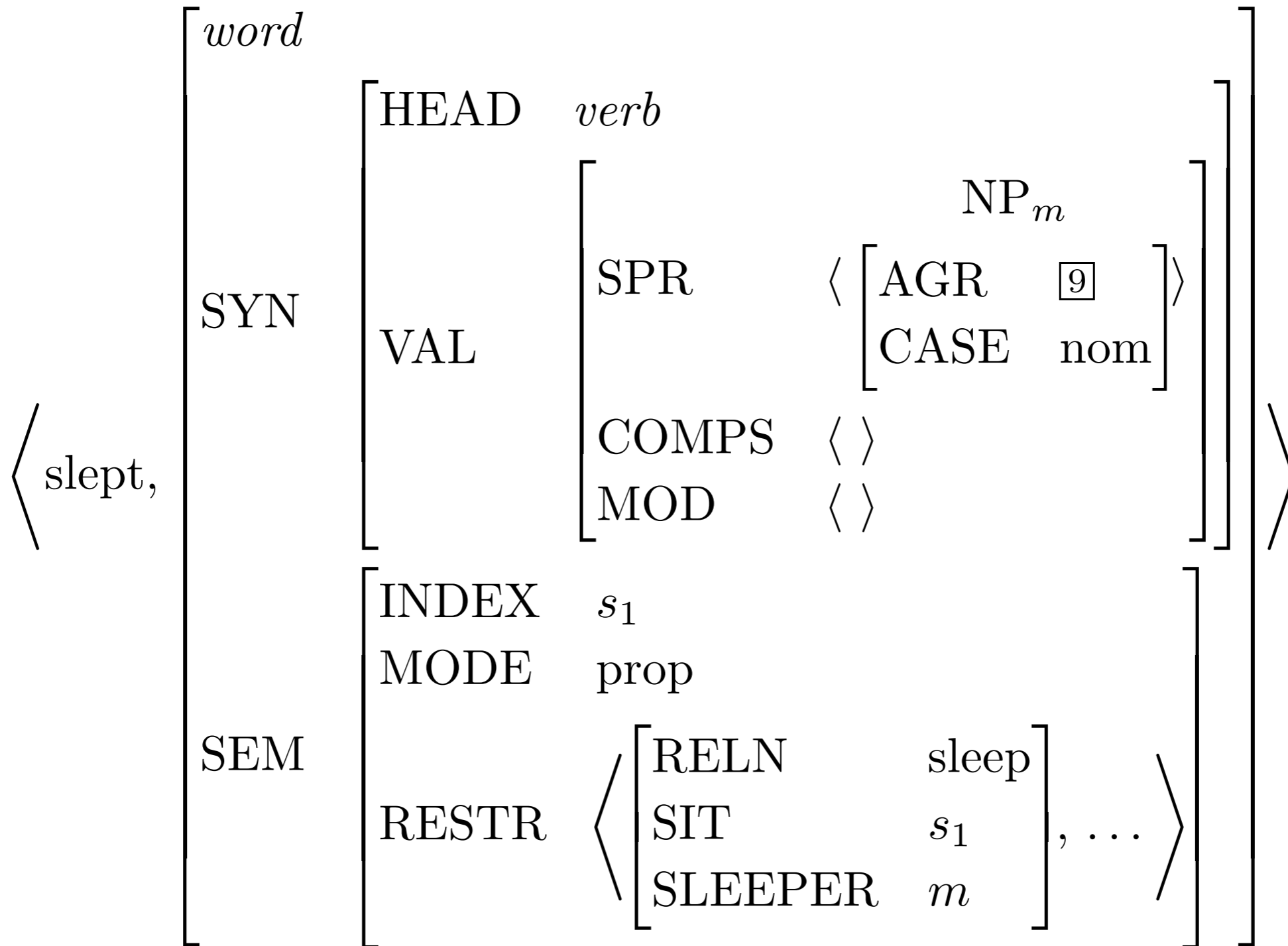
# Effects of the Semantic Compositionality Principle



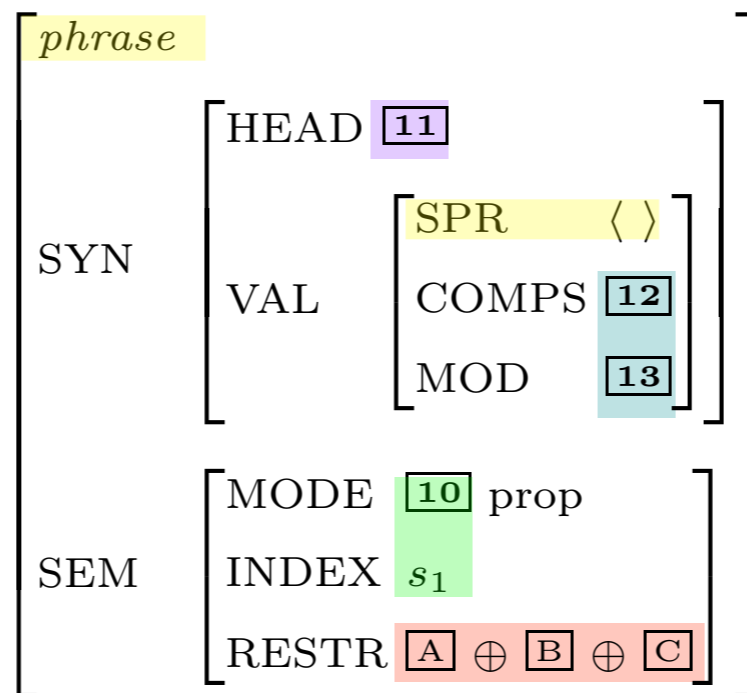
# Is the Mother Node Now Completely Specified?



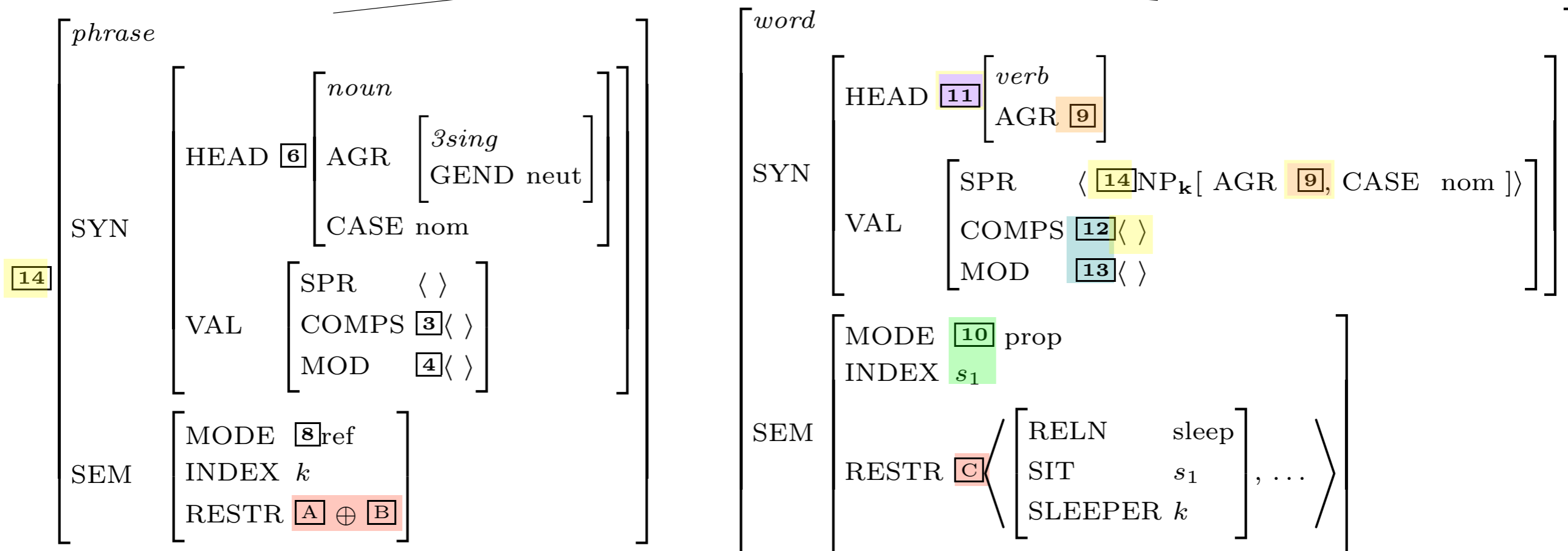
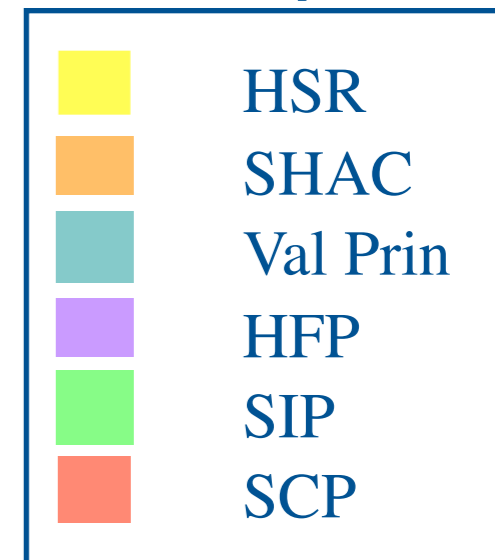
# Lexical Entry for *slept*



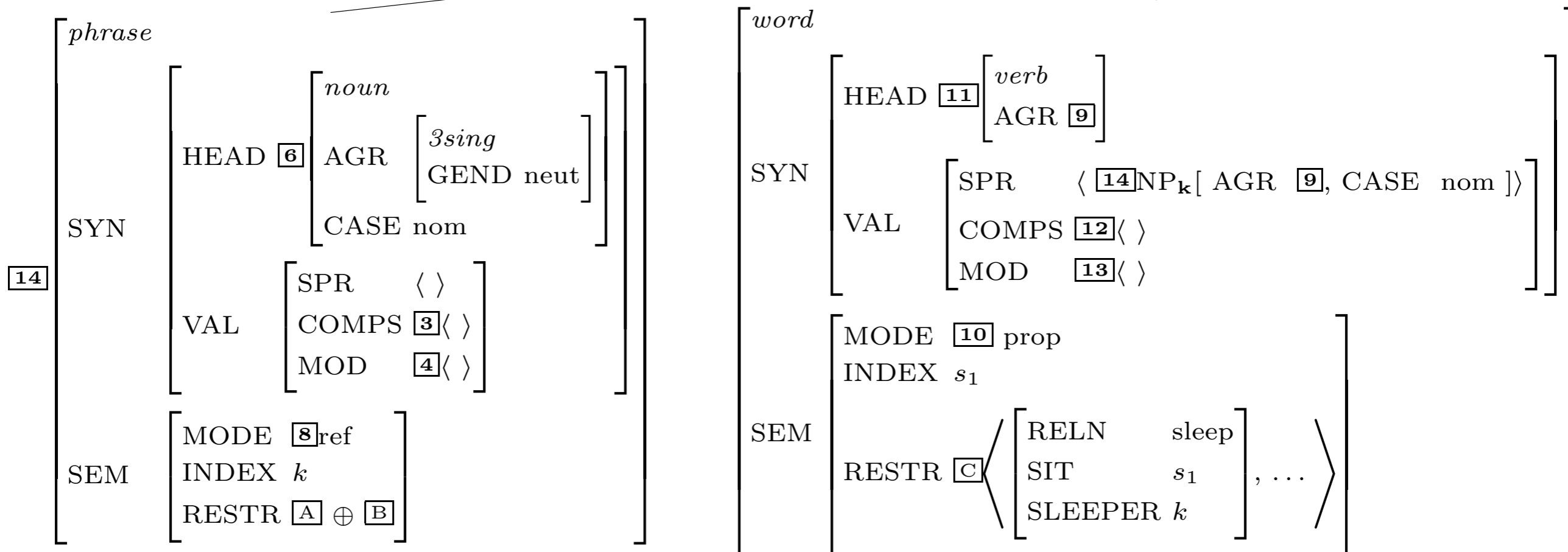
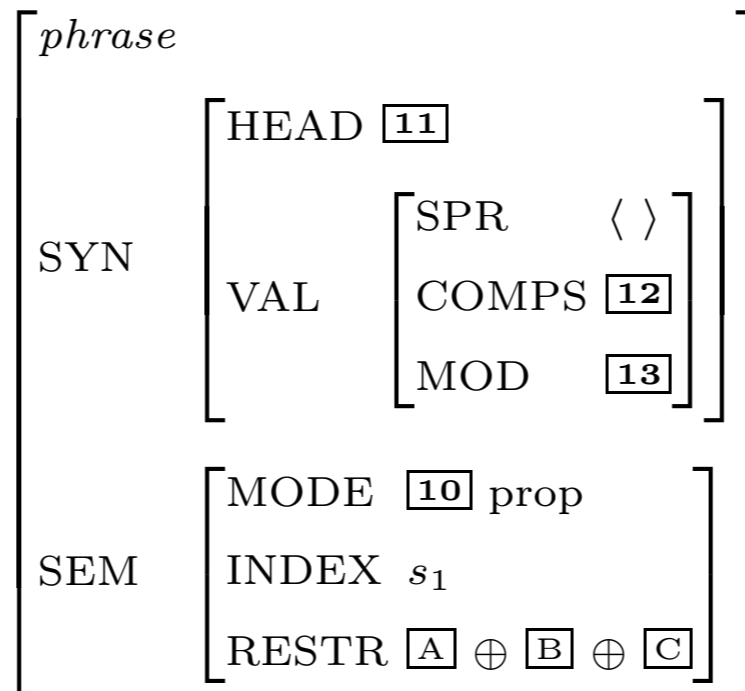
# Another Head-Specifier Phrase



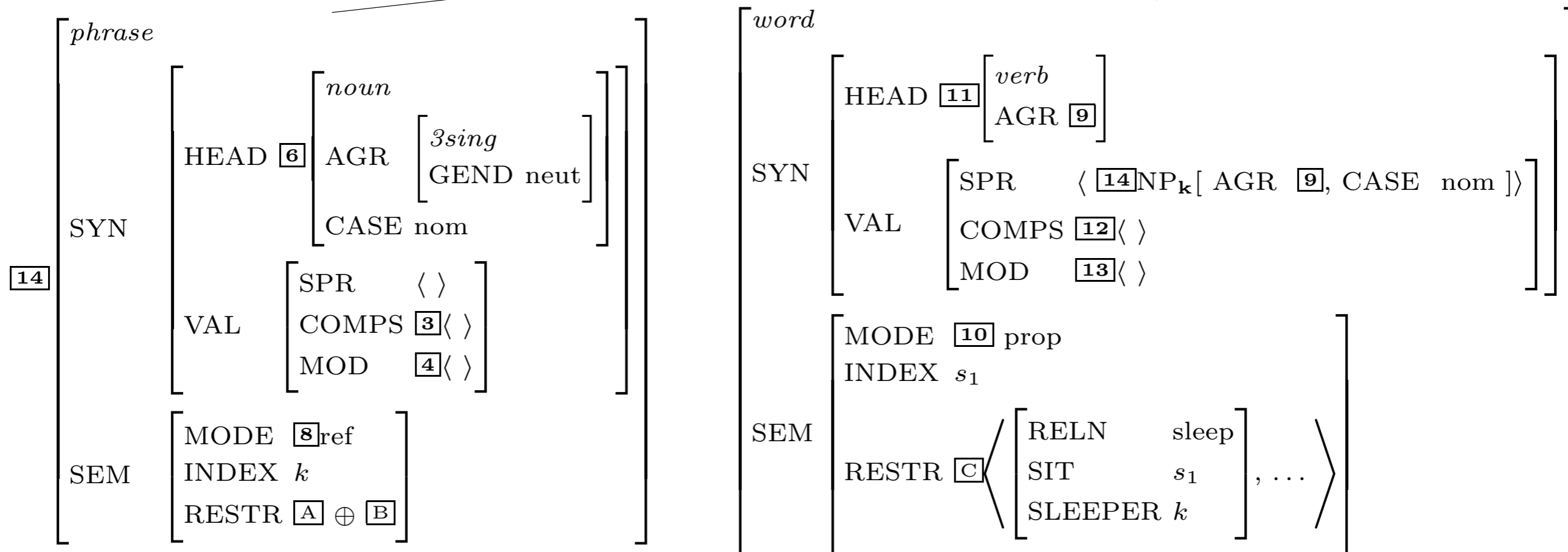
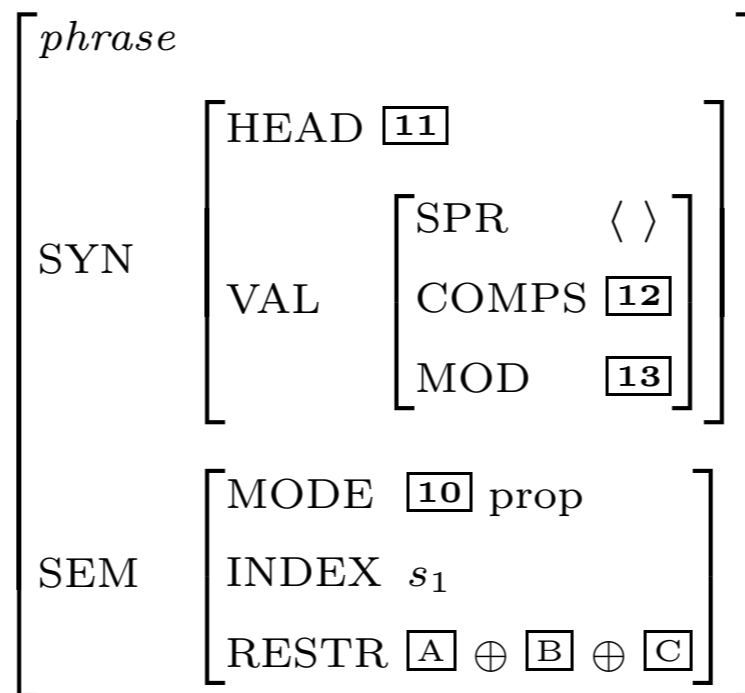
## Key



# Is this description fully specified?



# Does the top node satisfy the initial symbol?

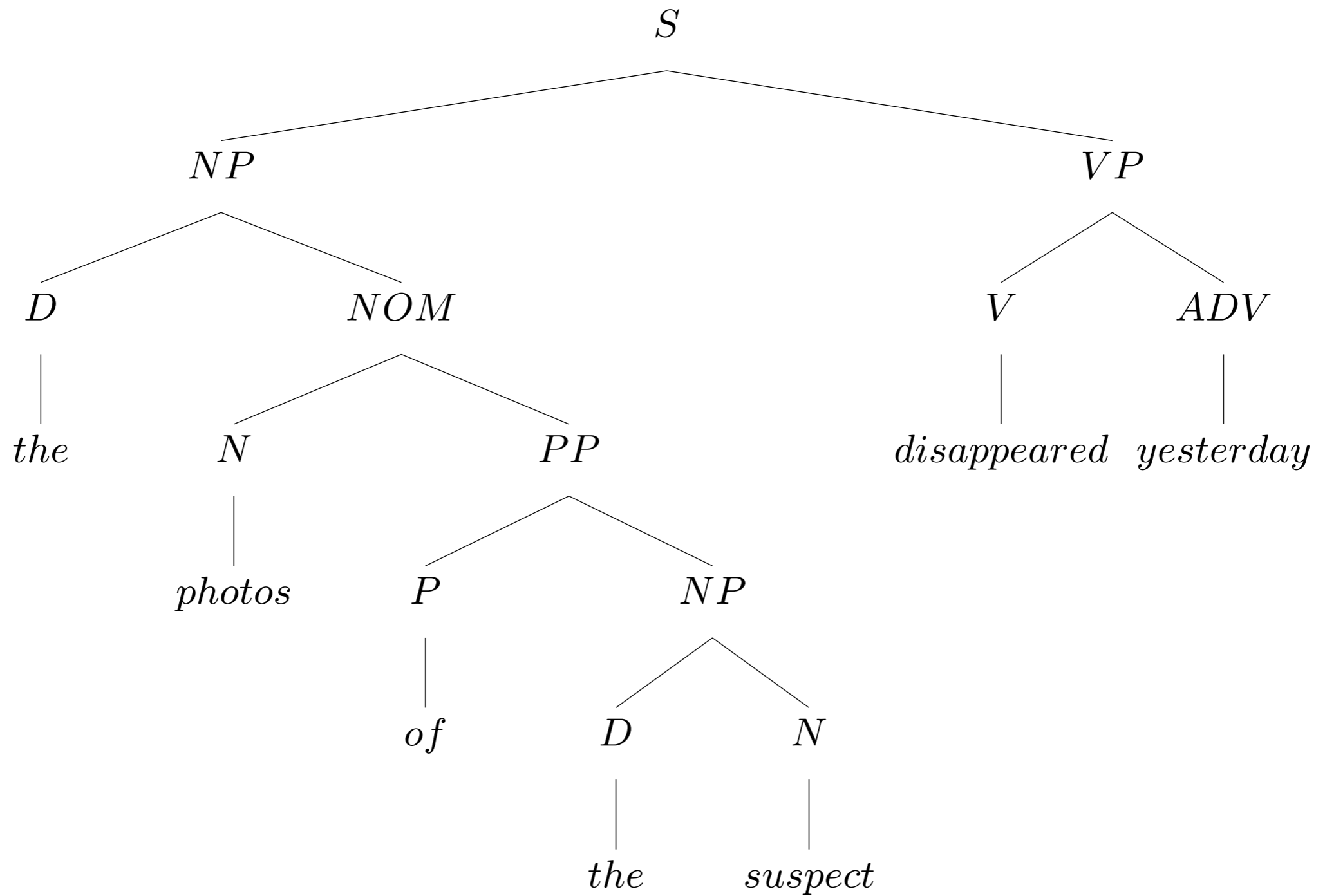


# RESTR of the S node

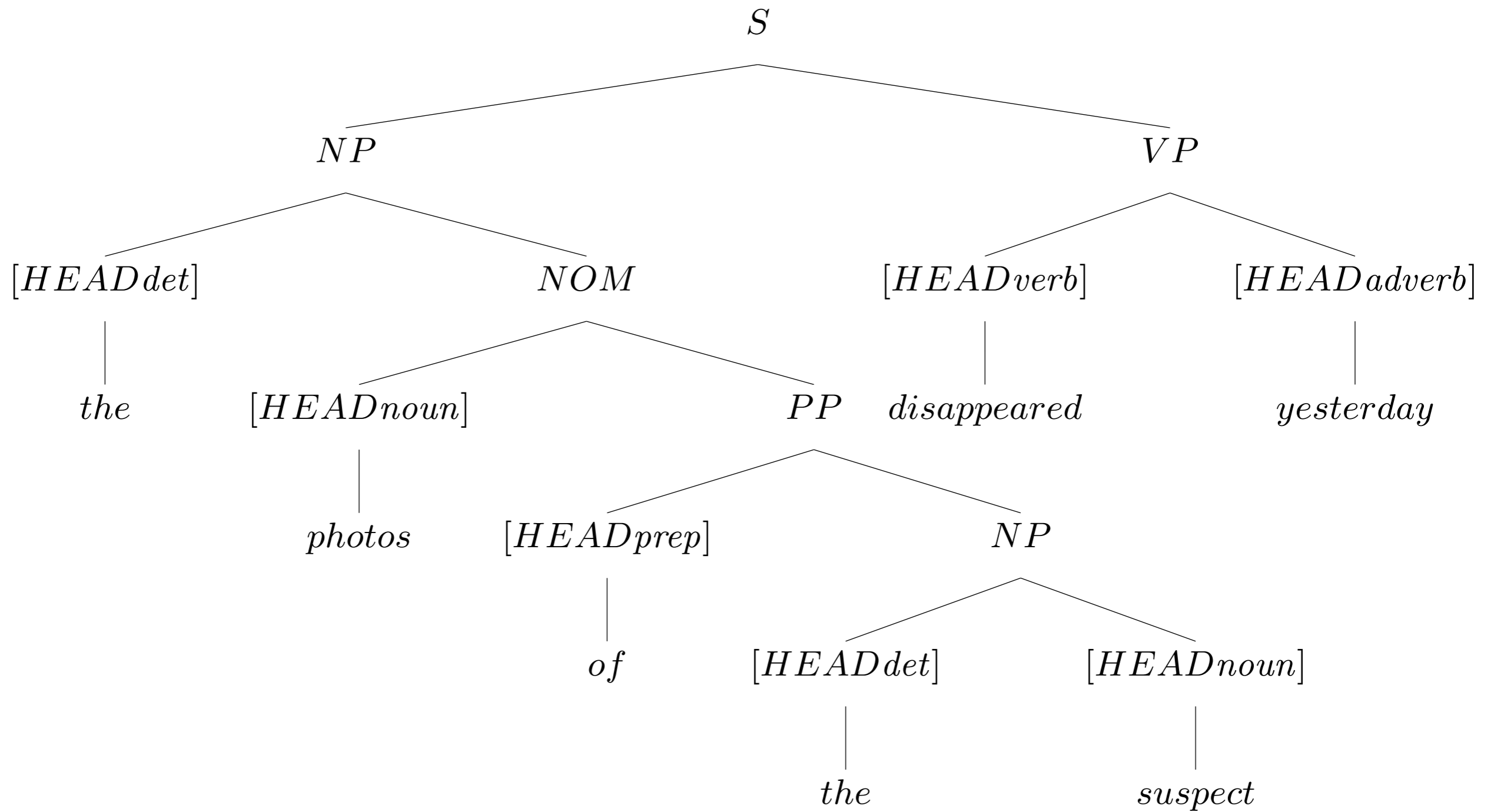
$$\left\langle \begin{bmatrix} \text{RELN} & a \\ \text{BV} & k \end{bmatrix}, \begin{bmatrix} \text{RELN} & \text{cat} \\ \text{INST} & k \end{bmatrix}, \begin{bmatrix} \text{RELN} & \text{sleep} \\ \text{SIT} & s_1 \\ \text{SLEEPER} & k \end{bmatrix}, \dots \right\rangle$$



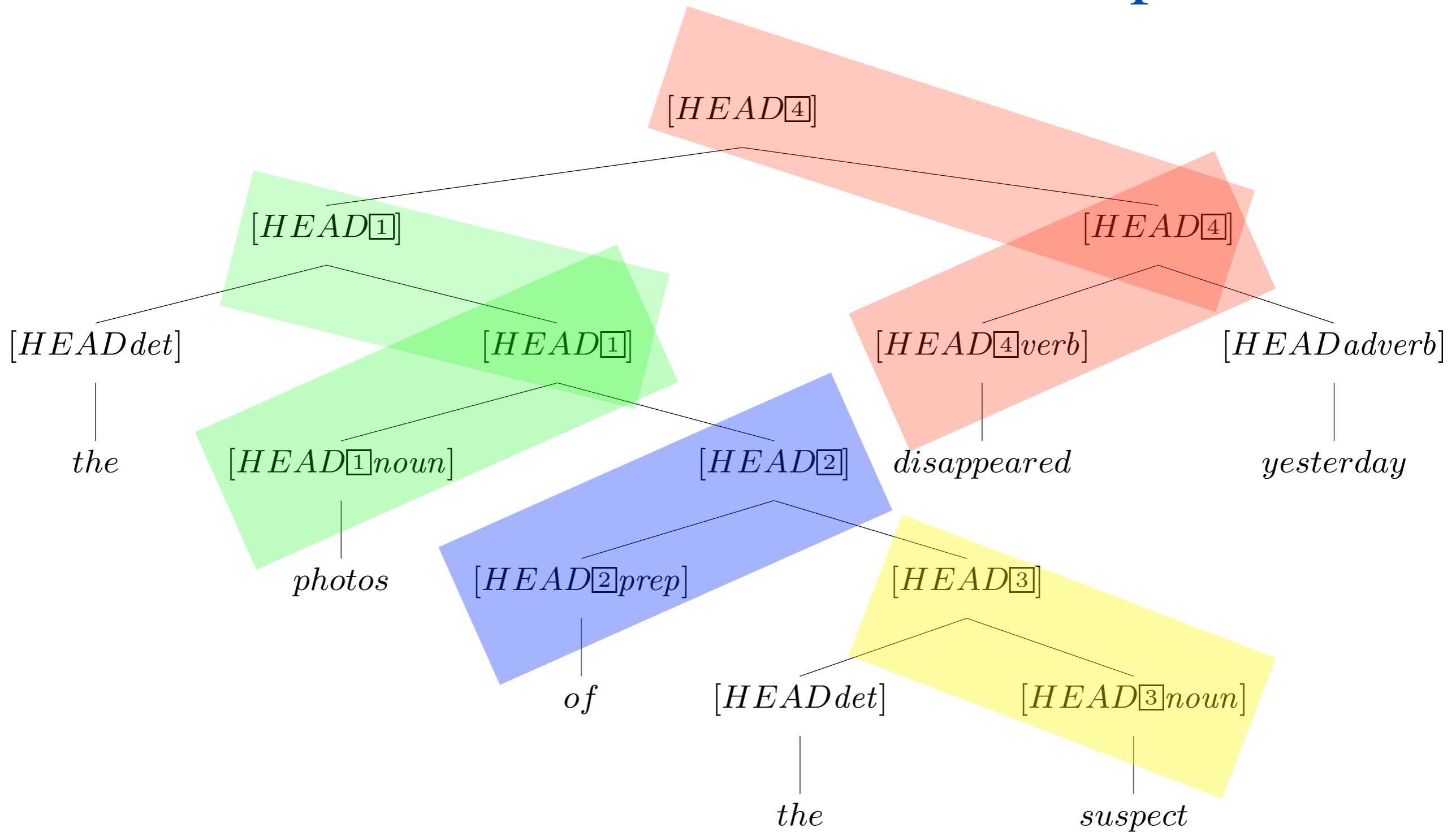
# Another Example



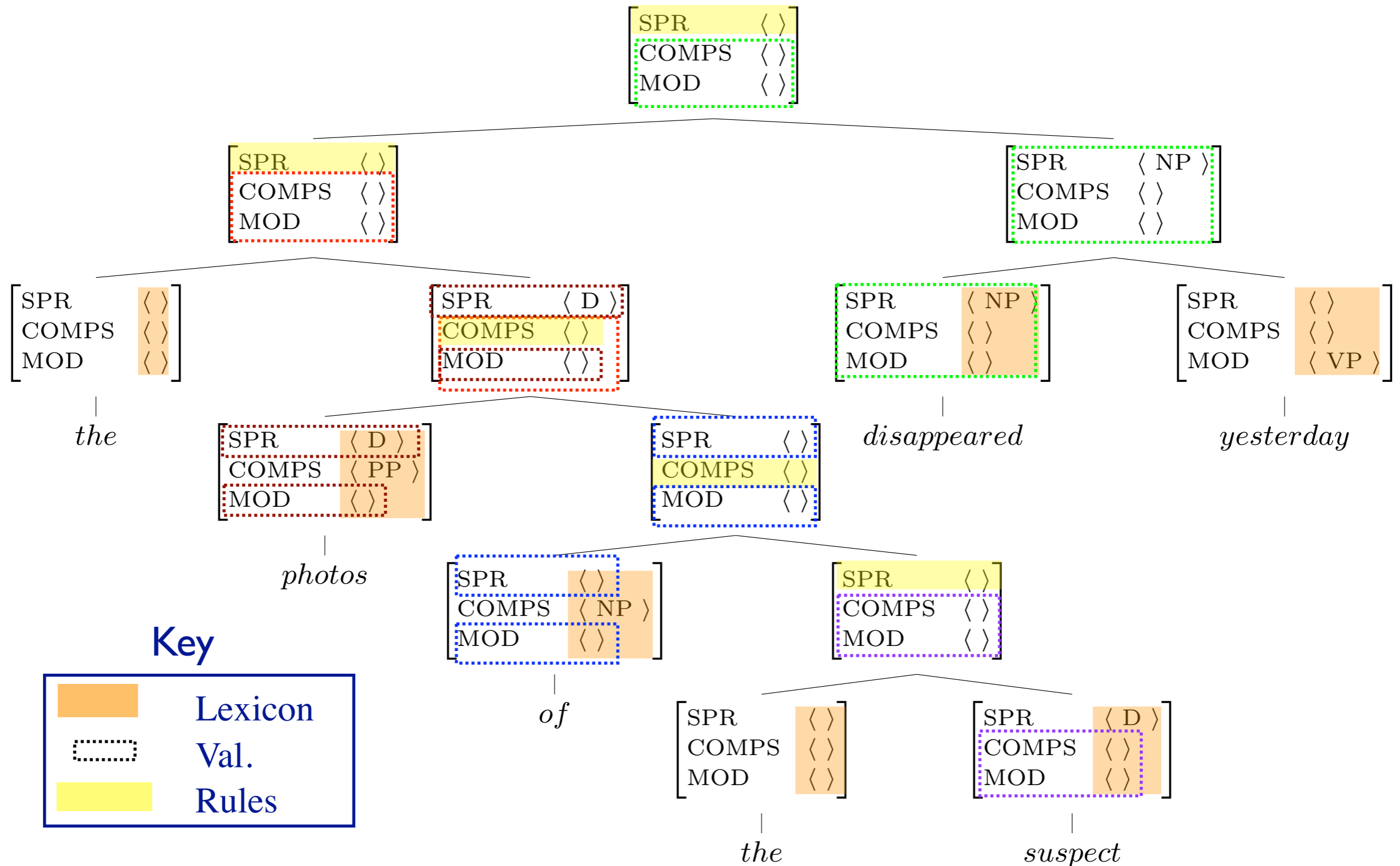
# Head Features from Lexical Entries



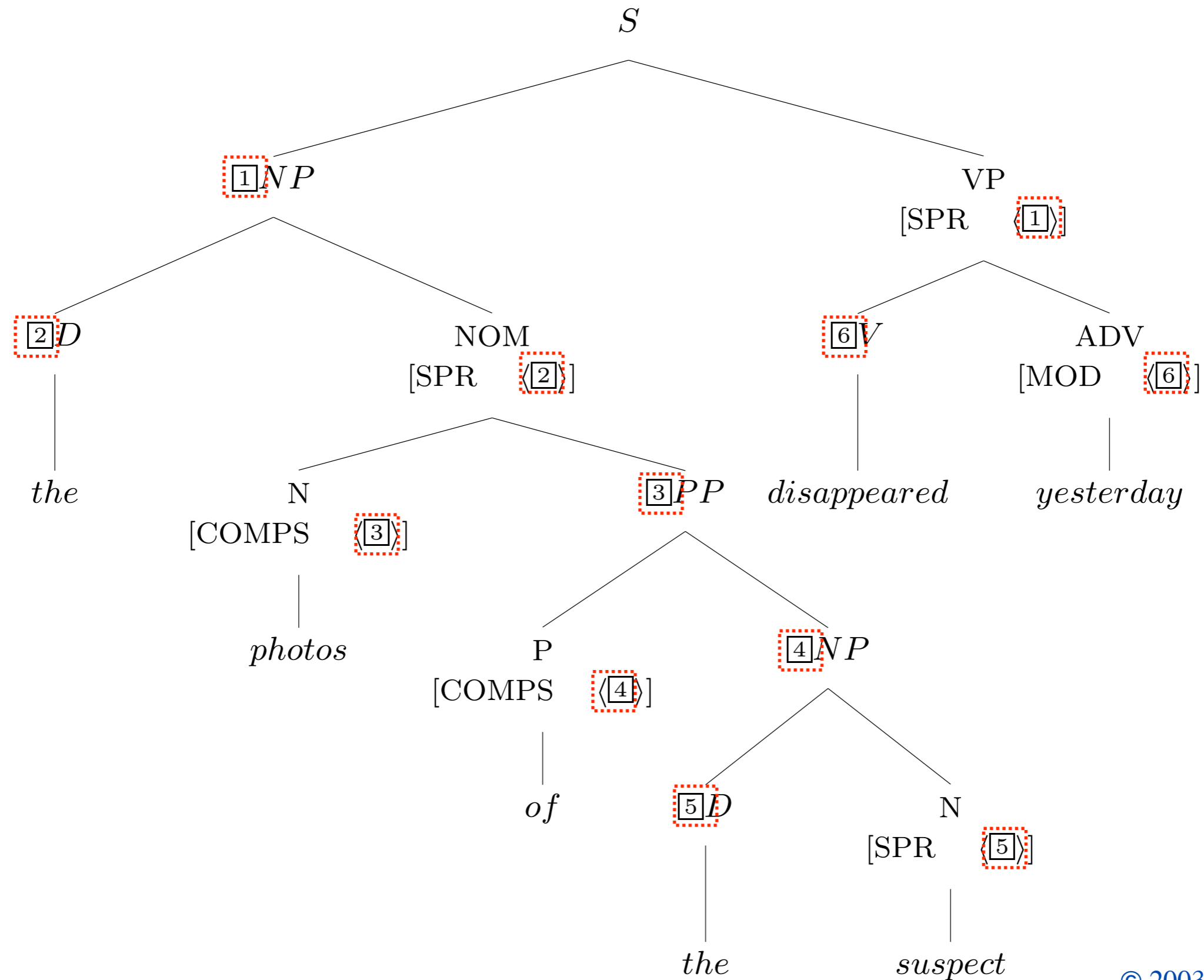
# Head Features from Lexical Entries, plus HFP



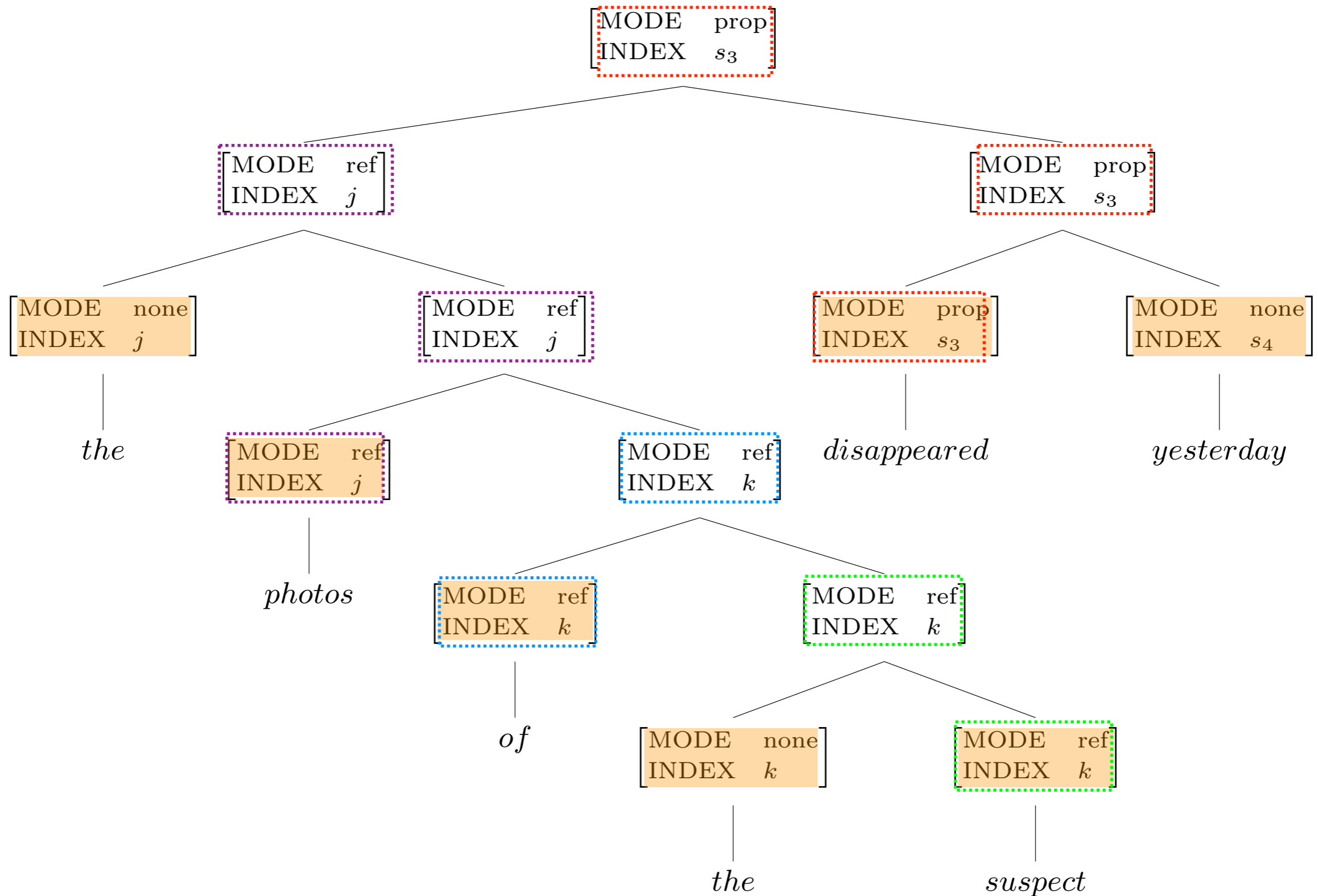
# Valence Features: Lexicon, Rules, and the Valence Principle



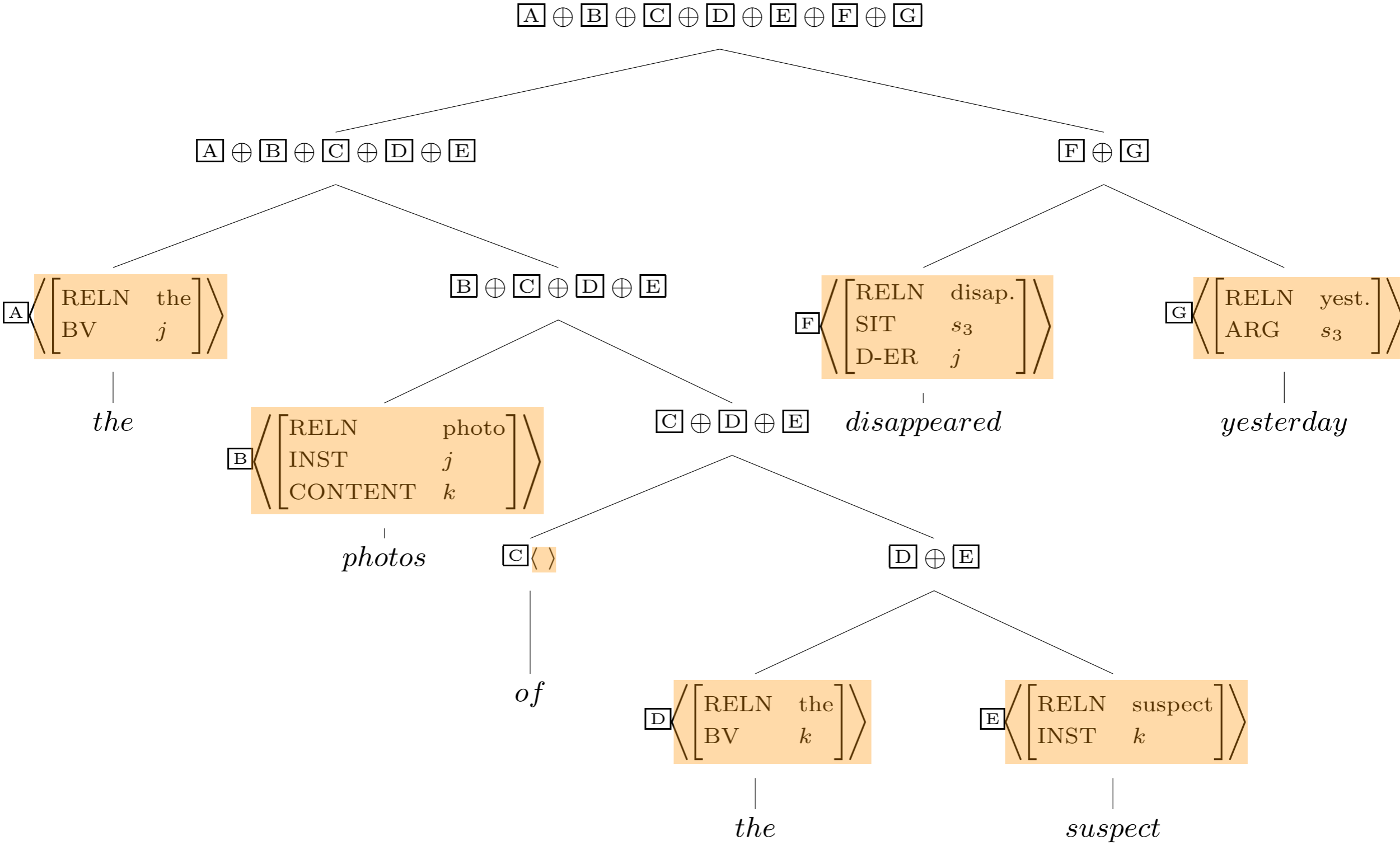
# Required Identities: Grammar Rules



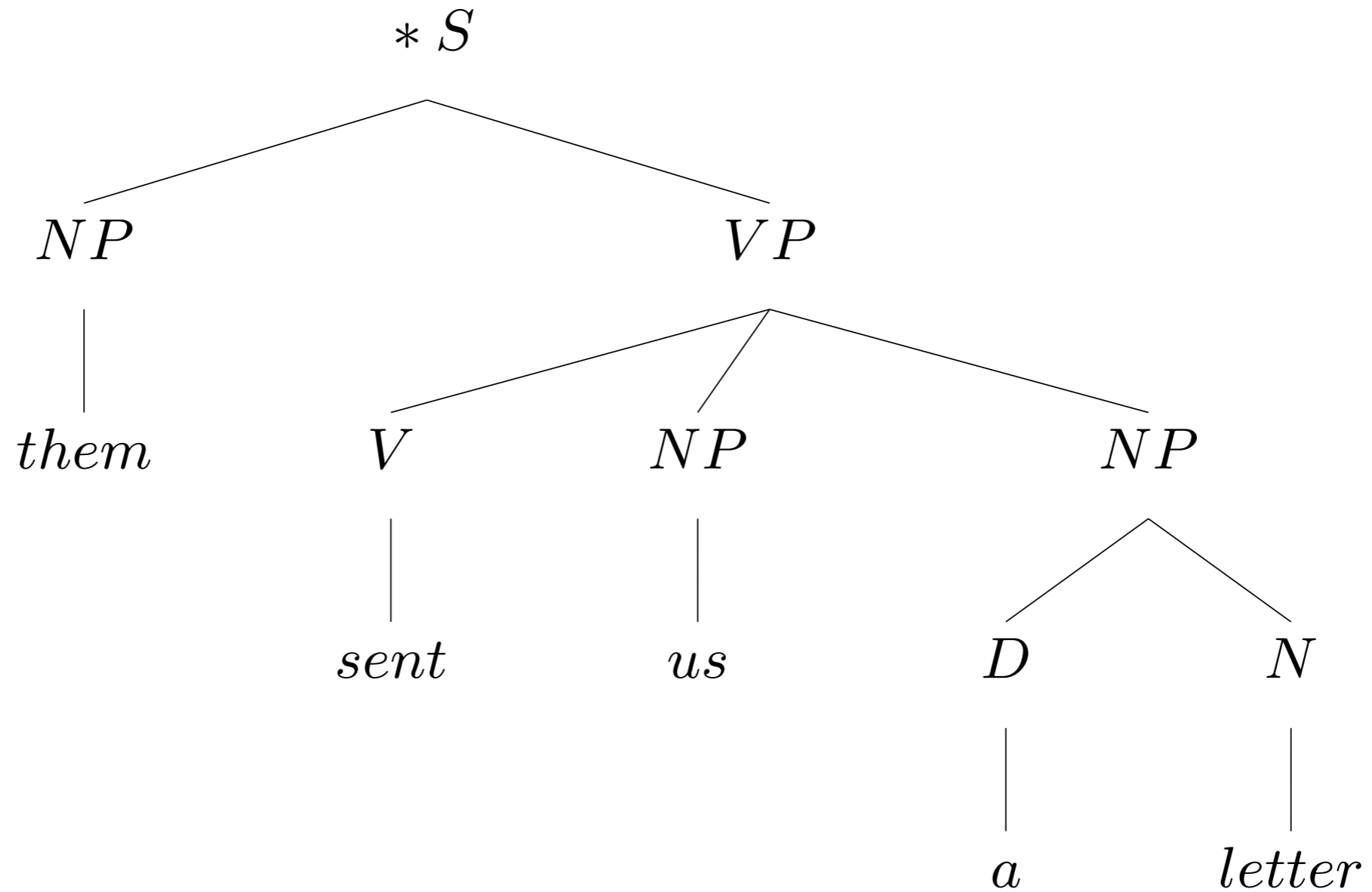
# Two Semantic Features: the Lexicon & SIP



# RESTR Values and the SCP



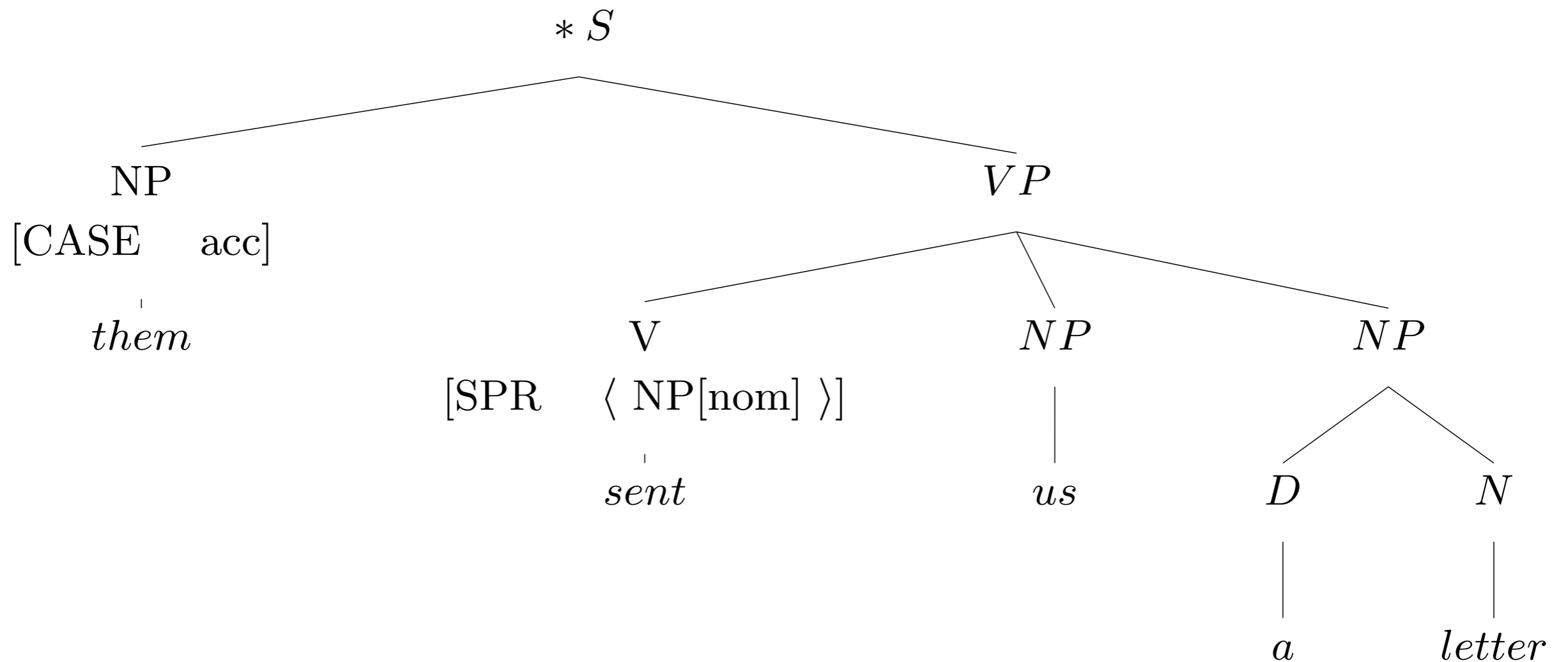
# An Ungrammatical Example



What's wrong with this sentence?



# An Ungrammatical Example

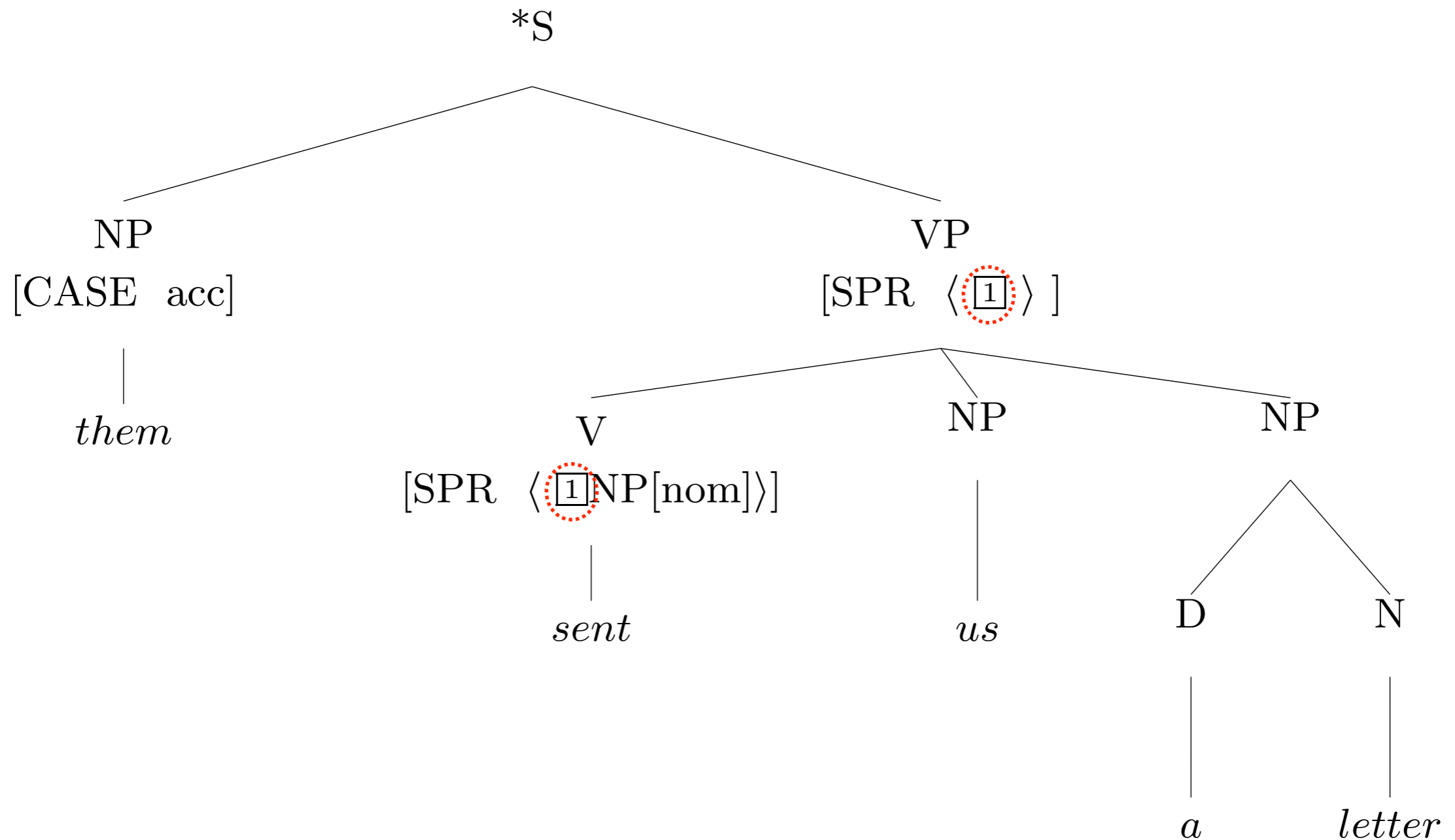


What's wrong with this sentence?

So what?

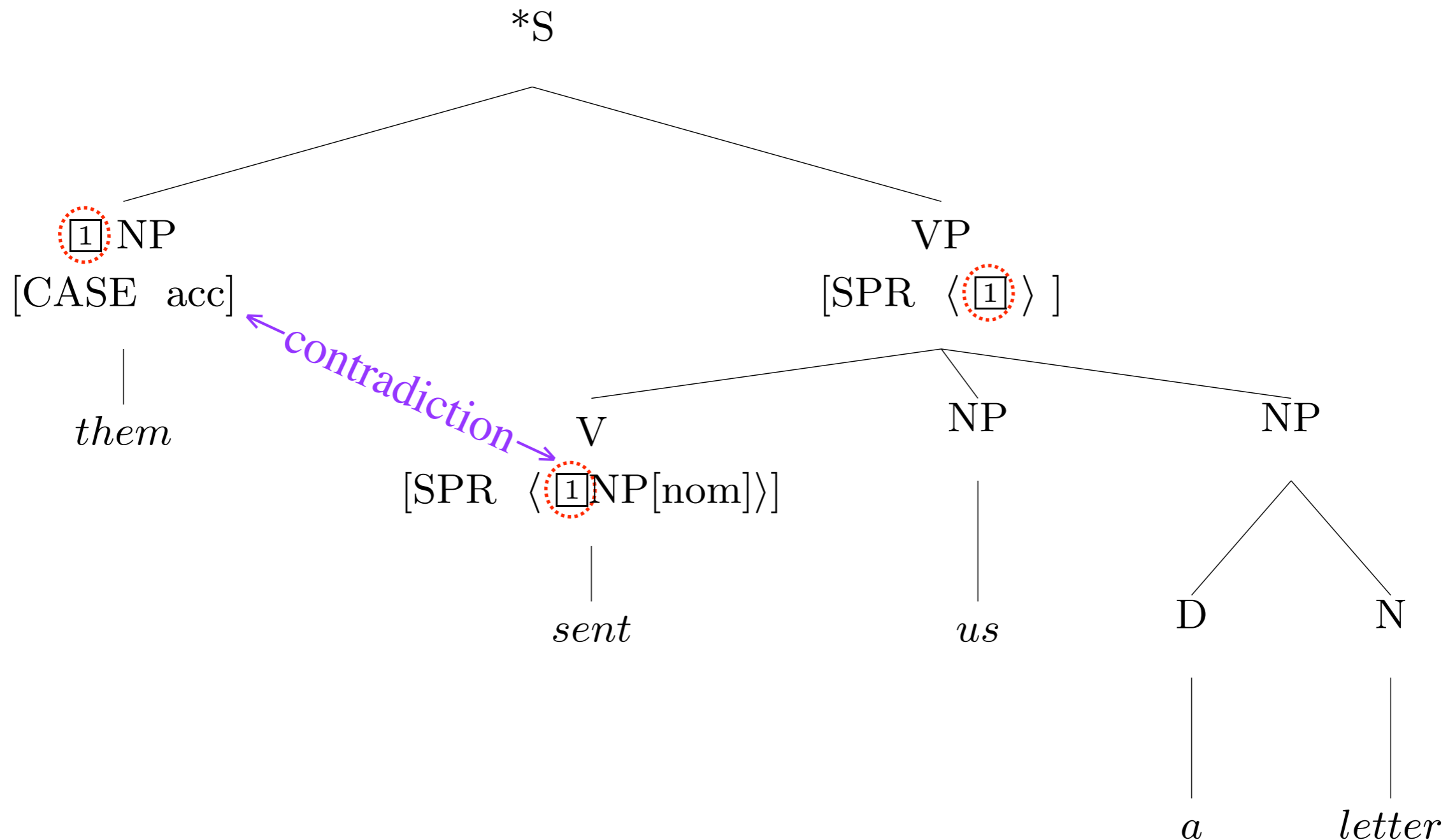
# An Ungrammatical Example

## The Valence Principle



# An Ungrammatical Example

## Head Specifier Rule



# Exercise in Critical Thinking

- Our grammar has come a long way since Ch 2, as we've added ways of representing different kinds of information:
  - generalizations across categories
  - semantics
  - particular linguistic phenomena: valence, agreement, modification
- What else might we add? What facts about language are as yet unrepresented in our model?

# Overview

- What we're trying to do
- The pieces of our grammar
- Two extended examples
- Reflection on what we've done, what we still have to do
- Next time: Review