Ling 566
Oct 19, 2017

Review

Overview

- Homework tips
- SPR and COMPS
- Common mistakes
- Review answer to 4B (HW2)
- Analogies to other systems you might know
- Reading questions

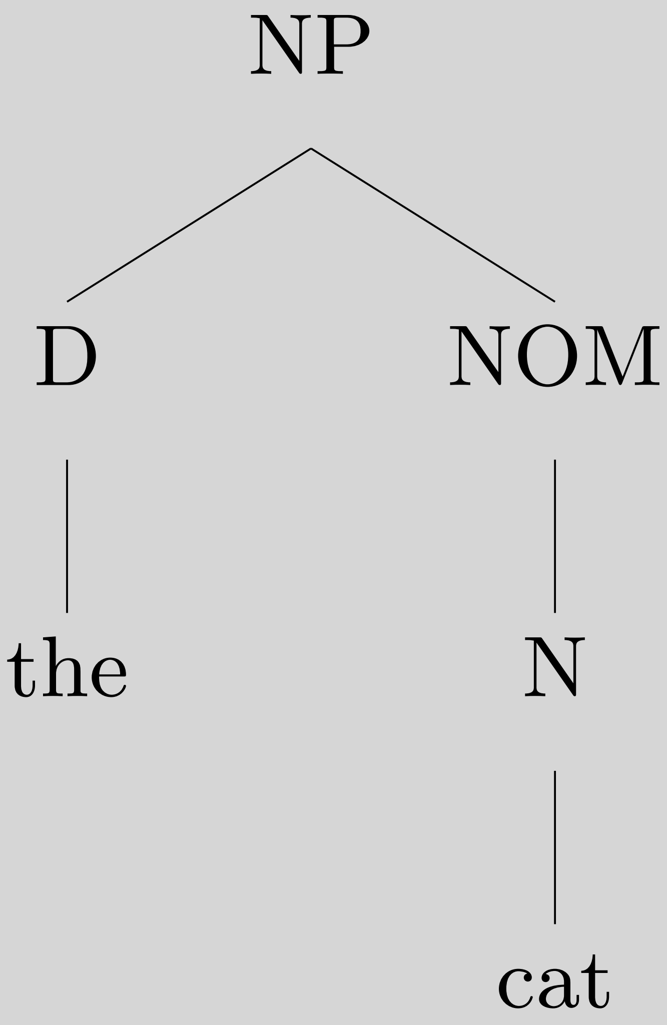
Homework tips/requests

- Type whenever possible
- Answer each part of each question separately
- Be sure to answer each part of each question, and follow the directions!
- Look over the problems early and ask questions
- Check your work
- Monitor Canvas discussions
- WORK TOGETHER

SPR value on AP/PP?

- Kim grew fond of baseball.
- Kim and Sandy ate lunch in the park.
- Kim and Sandy are in the park.

Which grammar does this tree go with?



What’s wrong with this?

$$\left\langle \text{out}, \begin{bmatrix} \textit{word} & \\ \text{HEAD} & \textit{prep} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \text{VP}\ \rangle \\ \text{COMPS} & \langle\ (\text{PP} \mid \text{NP})\ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

What’s wrong with this?

$$\left\langle \text{out}, \begin{bmatrix} \textit{word} & \\ \text{HEAD} & \textit{prep} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ (\text{NP})\ (\text{PP})\ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

What’s wrong with this?

$$\left\langle \text{out}, \begin{bmatrix} \textit{word} & \\ \text{HEAD} & \textit{prep} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\, \rangle \\ \text{COMPS} & (\ \text{NP} \mid \text{PP}\ ) \end{bmatrix} \end{bmatrix} \right\rangle$$

What’s wrong with this?

$$\left\langle \text{grew}, \begin{bmatrix} \textit{word} & \\ \text{HEAD} & \begin{bmatrix} \textit{verb} & \\ \text{AGR} & \textit{3sing} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \text{NP}\ \rangle \\ \text{COMPS} & \langle\ \text{AP}\ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

What’s wrong with this?

$$\left\langle \text{out}, \begin{bmatrix} \textit{word} & \\ \text{HEAD} & \textit{preposition} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ (\ \text{NP} \mid \text{PP}\ )\ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

What's wrong with this?

$$\left\langle \text{there}, \begin{bmatrix} \textit{phrase} & \\ \text{HEAD} & \textit{prep} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

Tags & lists

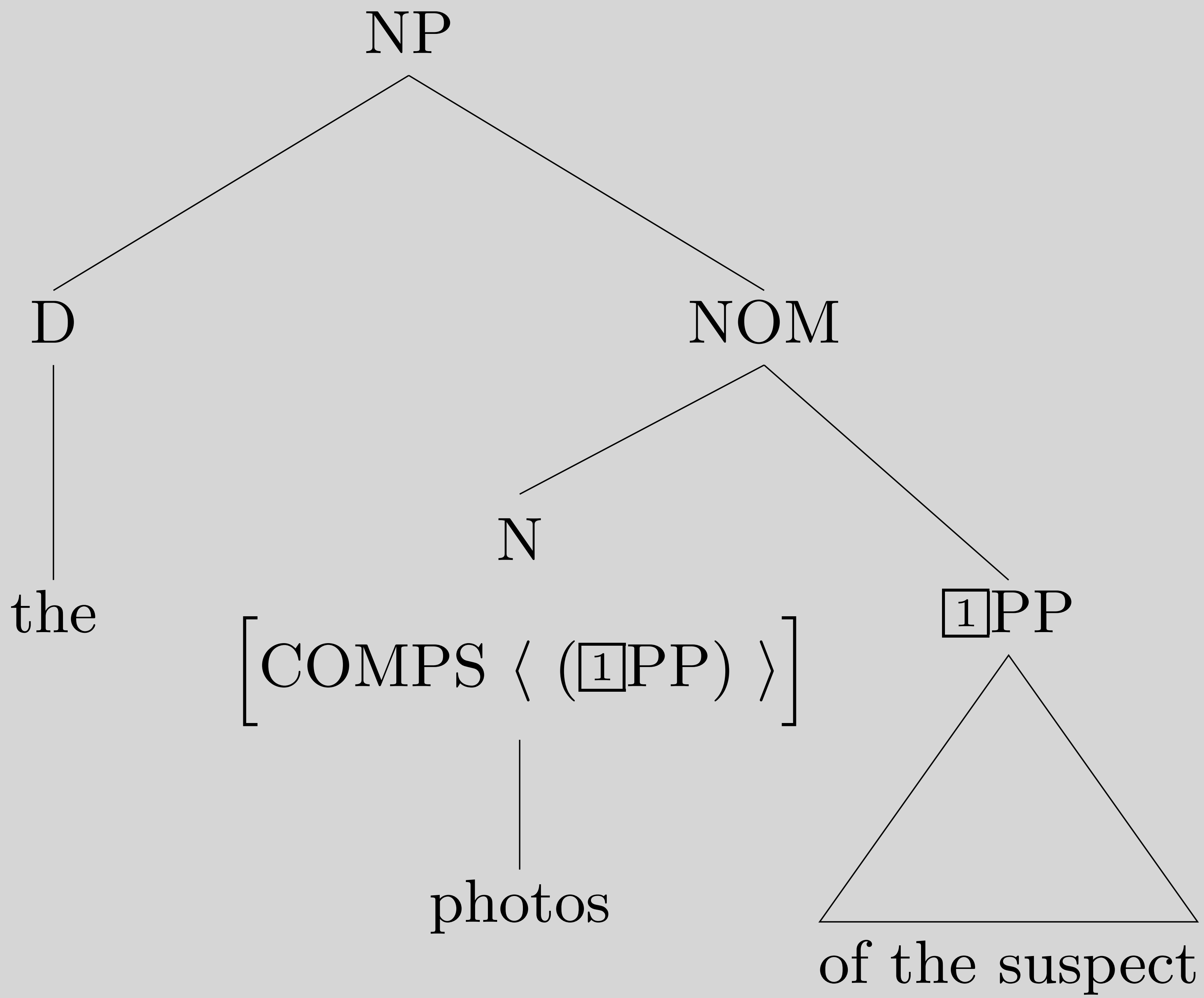
- What's the difference between these two?

$$\begin{bmatrix}\text{SPR} & \boxed{1}\langle\ \text{NP}\ \rangle\end{bmatrix}$$

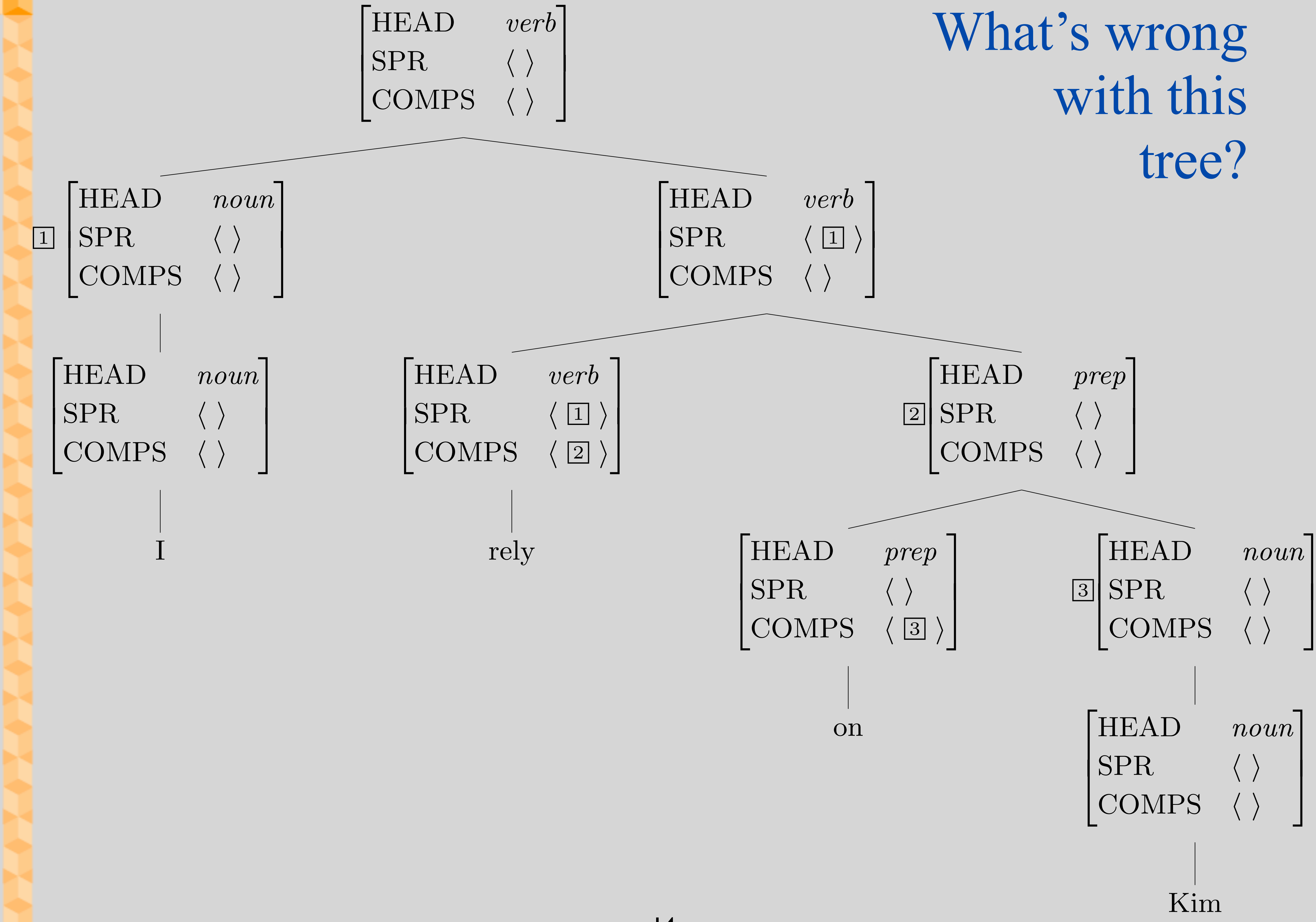
$$\begin{bmatrix}\text{SPR} & \langle\ \boxed{1}\text{NP}\ \rangle\end{bmatrix}$$

- When does it matter?

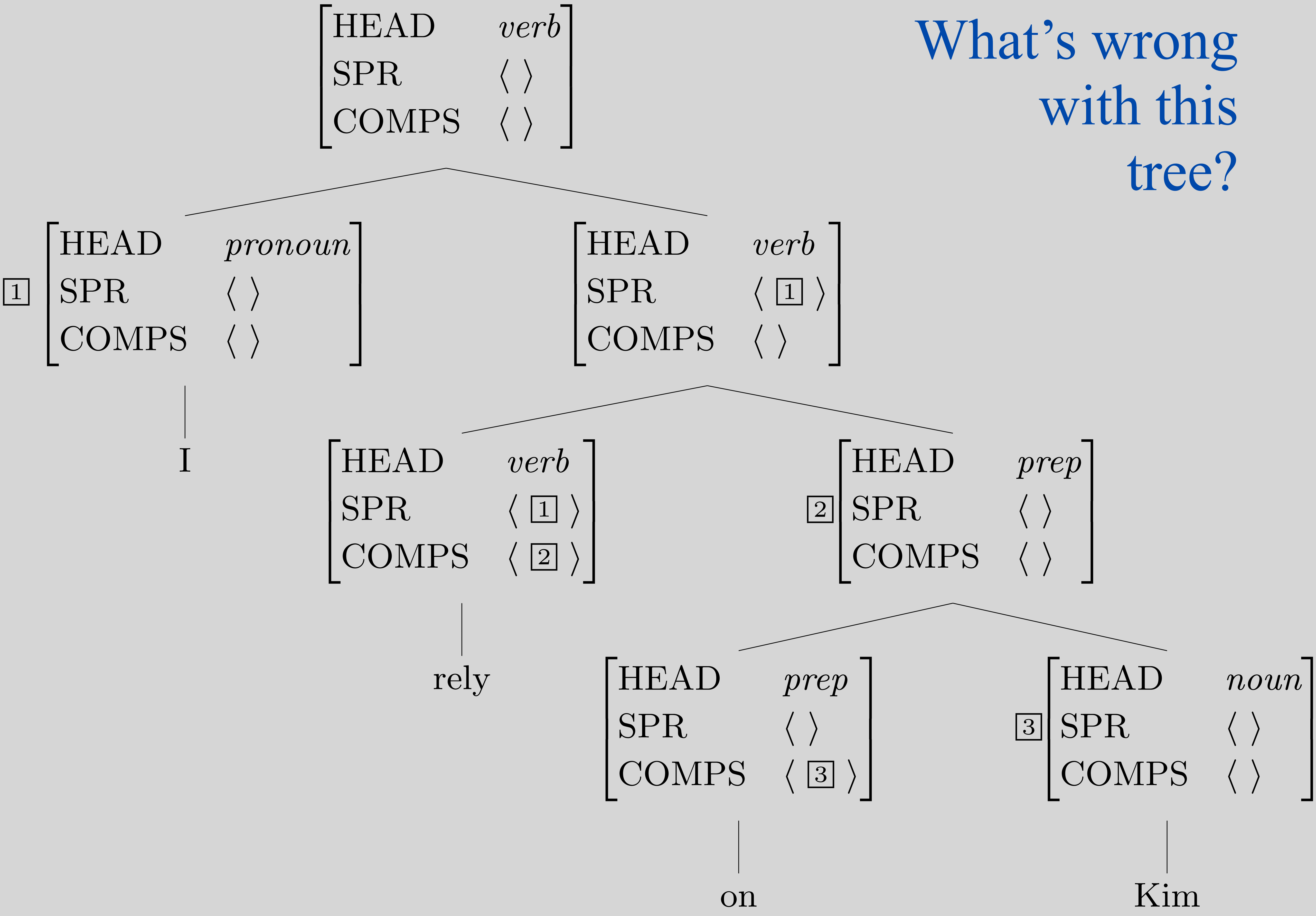
What’s wrong with this tree?



What's wrong with this tree?



What's wrong with this tree?



$$\begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

$$\boxed{1}\begin{bmatrix} \text{HEAD} & \textit{pronoun} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \qquad \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SPR} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

I

$$\begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SPR} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle \boxed{2} \rangle \end{bmatrix} \qquad \boxed{2}\begin{bmatrix} \text{HEAD} & \textit{prep} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

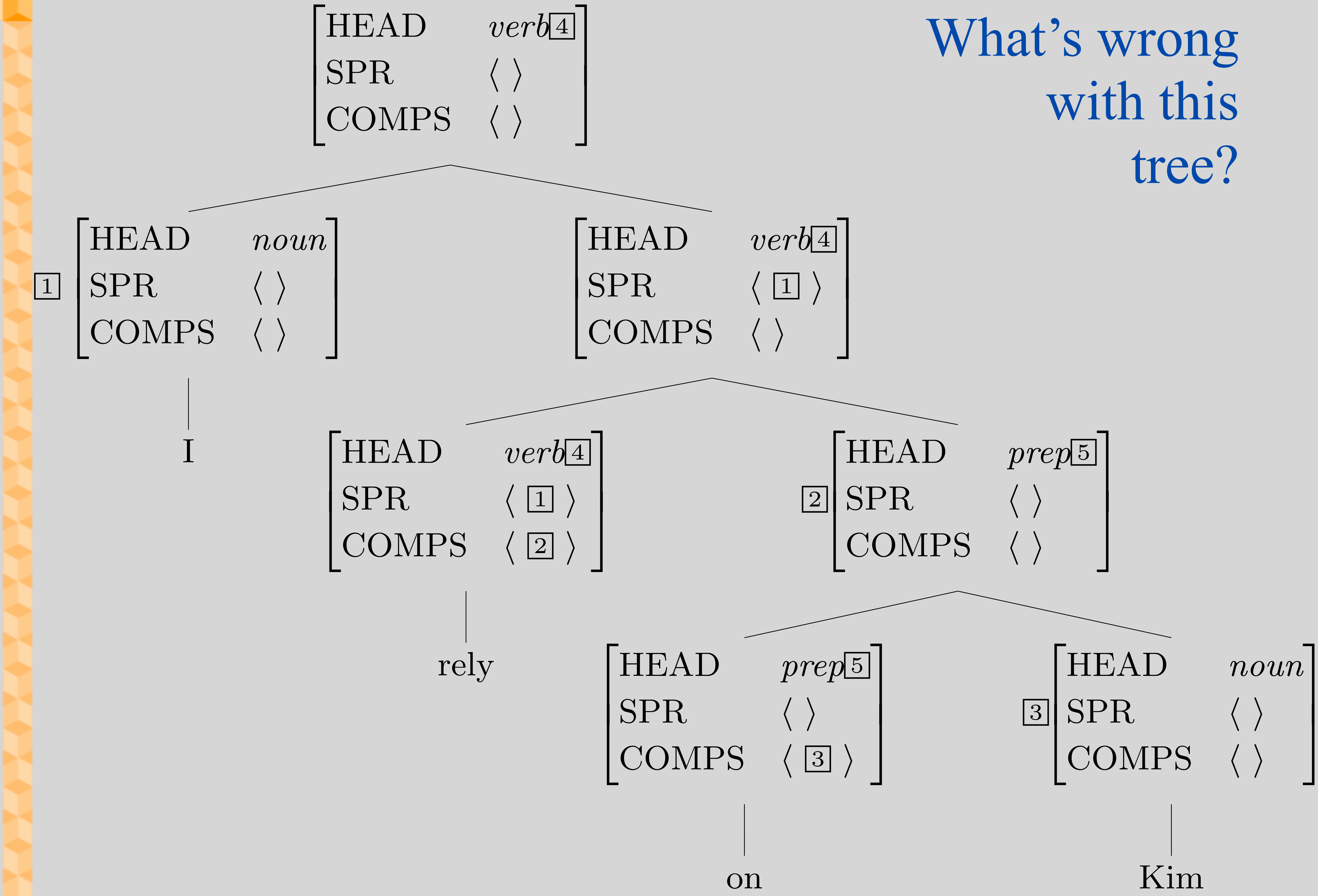
rely

$$\begin{bmatrix} \text{HEAD} & \textit{prep} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle \boxed{3} \rangle \end{bmatrix} \qquad \boxed{3}\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

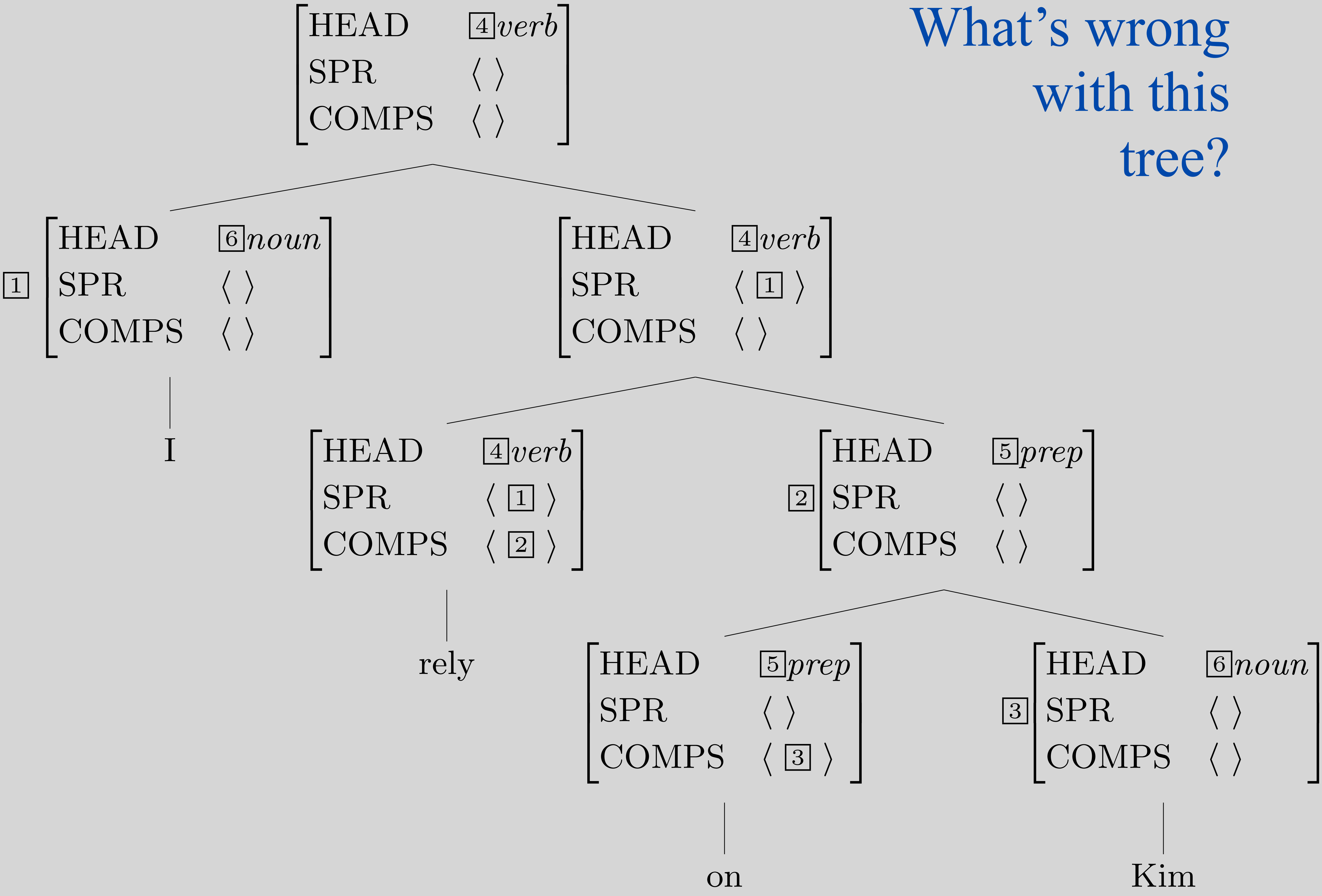
on

Kim

What's wrong with this tree?



What’s wrong with this tree?



$$\begin{bmatrix} \text{HEAD} & \boxed{4}\,\textit{verb} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

$$\boxed{1}\begin{bmatrix} \text{HEAD} & \boxed{6}\,\textit{noun} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \qquad \begin{bmatrix} \text{HEAD} & \boxed{4}\,\textit{verb} \\ \text{SPR} & \langle\ \boxed{1}\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

I

$$\begin{bmatrix} \text{HEAD} & \boxed{4}\,\textit{verb} \\ \text{SPR} & \langle\ \boxed{1}\ \rangle \\ \text{COMPS} & \langle\ \boxed{2}\ \rangle \end{bmatrix} \qquad \boxed{2}\begin{bmatrix} \text{HEAD} & \boxed{5}\,\textit{prep} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

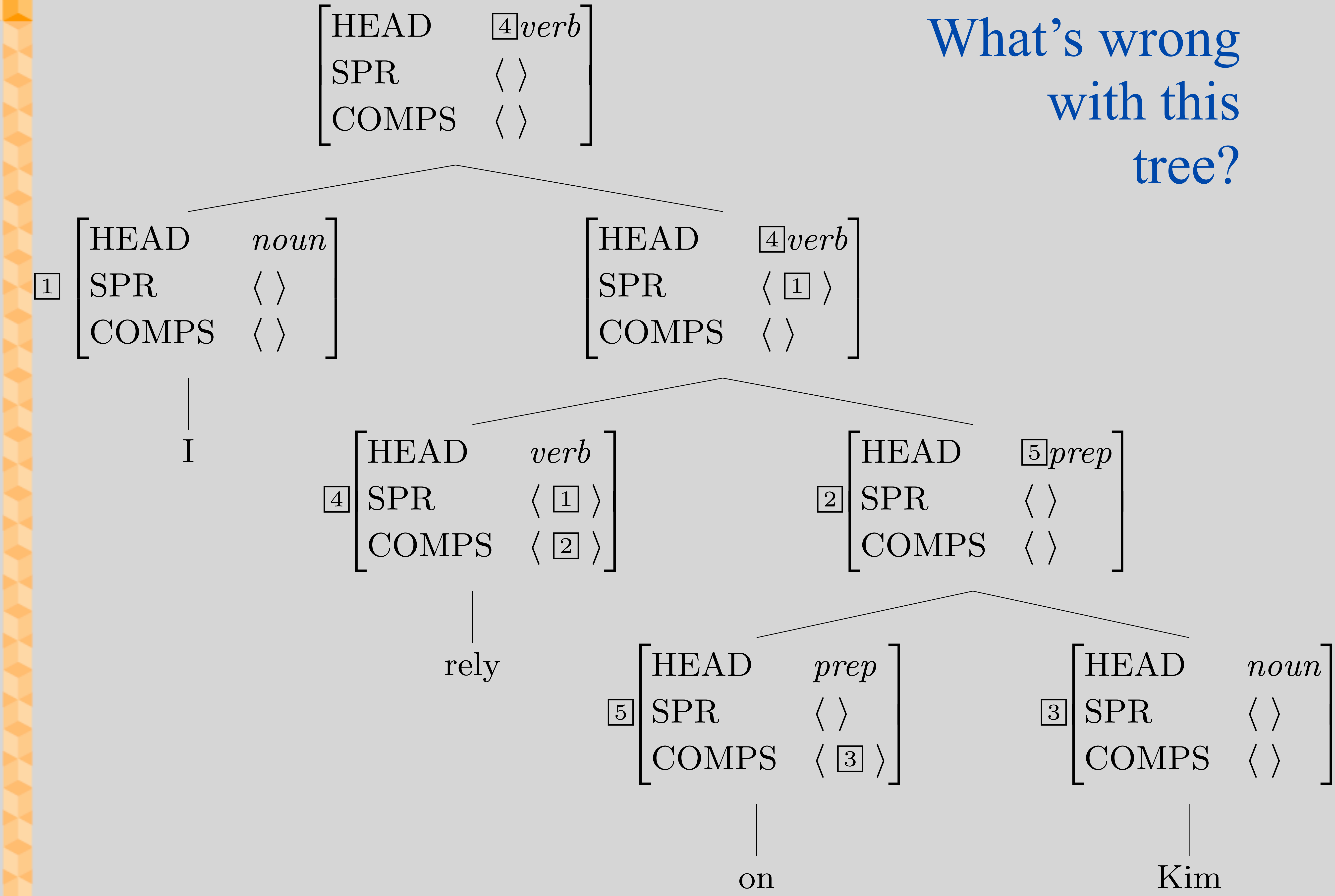
rely

$$\begin{bmatrix} \text{HEAD} & \boxed{5}\,\textit{prep} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \boxed{3}\ \rangle \end{bmatrix} \qquad \boxed{3}\begin{bmatrix} \text{HEAD} & \boxed{6}\,\textit{noun} \\ \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix}$$

on

Kim

What's wrong with this tree?



What’s wrong with this?

$$\left\langle \text{hundred}\ , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \textit{number} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \left\langle \begin{bmatrix}\text{HEAD} & \textit{number}\\ \text{INDEX} & j\end{bmatrix}\right\rangle \\ \text{COMPS} & \left\langle \begin{bmatrix}\text{HEAD} & \textit{number}\\ \text{INDEX} & k\end{bmatrix}\right\rangle \end{bmatrix} \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{INDEX} & m \\ \text{MODE} & \textit{ref} \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textit{hund-number} \\ \text{MULTIPLIER} & j \\ \text{ADDEND} & k \\ \text{HUND-VALUE} & m \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

And this?

$$\left\langle \text{hundred}\ , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \textit{number} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \left\langle \begin{bmatrix} \text{HEAD} & \textit{number} \end{bmatrix} \right\rangle \\ \text{COMPS} & \left\langle \begin{bmatrix} \text{HEAD} & \textit{number} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{INDEX} & i \\ \text{MODE} & \textit{ref} \\ \text{RESTR} & \left\langle \begin{array}{l} \begin{bmatrix} \text{RELN} & \textit{times} \\ \text{RESULT} & k \\ \text{FACTOR1} & l \\ \text{FACTOR2} & m \end{bmatrix} , \begin{bmatrix} \text{RELN} & \textit{constant} \\ \text{INST} & m \\ \text{VALUE} & \textit{100} \end{bmatrix} , \\ \begin{bmatrix} \text{RELN} & \textit{plus} \\ \text{RESULT} & i \\ \text{TERM1} & j \\ \text{TERM2} & k \end{bmatrix} \end{array} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

How about this?

$$\left\langle \text{hundred}\ ,\ \left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \textit{number} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & l \end{array}\right] \right\rangle \\
\text{COMPS} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & j \end{array}\right] \right\rangle
\end{array}\right]
\end{array}\right] \\
\text{SEM} & \left[\begin{array}{ll}
\text{INDEX} & m \\
\text{MODE} & \textit{ref} \\
\text{RESTR} & \left\langle \begin{array}{l}
\left[\begin{array}{ll} \text{RELN} & \textit{times} \\ \text{RESULT} & k \\ \text{FACTOR1} & l \\ \text{FACTOR2} & m \end{array}\right] , \left[\begin{array}{ll} \text{RELN} & \textit{constant} \\ \text{INST} & m \\ \text{VALUE} & \textit{100} \end{array}\right] , \\
\left[\begin{array}{ll} \text{RELN} & \textit{plus} \\ \text{RESULT} & i \\ \text{TERM1} & j \\ \text{TERM2} & k \end{array}\right]
\end{array} \right\rangle
\end{array}\right]
\end{array}\right] \right\rangle$$

Better version

$$\left\langle \text{hundred}\ ,\ \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & l \end{array}\right] \right\rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & j \end{array}\right] \right\rangle \end{array}\right] \end{array}\right] \\ \text{SEM} & \left[\begin{array}{ll} \text{INDEX} & i \\ \text{MODE} & \textit{ref} \\ \text{RESTR} & \left\langle \begin{array}{l} \left[\begin{array}{ll} \text{RELN} & \textit{times} \\ \text{RESULT} & k \\ \text{FACTOR1} & l \\ \text{FACTOR2} & m \end{array}\right], \left[\begin{array}{ll} \text{RELN} & \textit{constant} \\ \text{INST} & m \\ \text{VALUE} & \textit{100} \end{array}\right], \\ \left[\begin{array}{ll} \text{RELN} & \textit{plus} \\ \text{RESULT} & i \\ \text{TERM1} & j \\ \text{TERM2} & k \end{array}\right] \end{array} \right\rangle \end{array}\right] \end{array}\right] \right\rangle$$

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Type hierarchy analogies

- How is this formalism like OOP?
- How is it different?
- How is the type hierarchy like an ontology?
- How is it different?
- How is this formalism like the MP's formalism?
- How is it different?

Reading Questions: 10/12

- While defining lexicon and grammar structures seems complex, defining meanings for every relationship type seems impossibly hard. It also seems brittle, as language and meaning are ever changing. I’d be interested to know if machine learning can be used to automatically update or create these lexicons, and even update the syntax and semantics with the given syntax rules and structure as a starting part. In other words, are these lexicons and semantic relationships necessarily provided manually?

Reading Questions: 10/10

- Out POS tagging itself is prone to errors. How well do these rules built on POS tags then fare?

Reading Questions: 10/5

- Is this grammar still order-independent?
- How do we choose which features to include?
- Which notion of inheritance (HFP in trees or inheritance in the type hierarchy) is more like OOP?

Reading Questions: 10/5

- Relationships between each branch under the type hierarchy as is shown in (69): Do they exclude each other, or overlap with another, or inherit some features from another? Noun, verb and determiner are under *agr-pos* because three of them take the feature AGR. Then, is *agr-cat* under *feat-strutc* because each sentence or phrase takes this feature? If so, why not include pos under *agr-cat*?

Reading Questions: 10/3

- The statement on P.40 that "there are verbs that only appear in other environments; for example, some verbs require following PPs or Ss" makes me wonder whether it is possible to generalize thorough rules to represent natural language. It appears to me that there are too many possible combinations of constituents to generalize. There are many cases in which certain verbs with similar meanings can not be interchanged. Second language learners as myself often come up with grammatically correct expressions that sounds weird to native speakers. And native speakers often find it difficult to explain the reason. I think this is because language is often used by chunk, and I think it is far more complicated than what CFG or Transformational Grammar can generalize.