Ling 566
Oct 22, 2020

Catch-up, Review

Overview

- Leftover RQs
- Homework tips
- Common mistakes
- Analogies to other systems you might know
- Open questions

Reading Questions

- How can this theory of syntax has been/can be applied in computational settings. More specifically, comparing this to syntactic formalisms such CFG and semantic formalisms such as WordNet, this theory that are we covering seems to have lexical entries with a lot more information than those formalisms.

- In practice, what are some of the advantages of this theory over more established formalisms?

- With more information (ie features), I would not be surprised if it can parse sentences more precisely (ie not overgeneralize) based on lexical entries. However, another important aspect might be recall - how well can unseen sentences be parsed?

- Finally, the number of features seems to mean that annotation might be relatively more difficult than something like the Penn Tree Bank. How is this challenge handled?

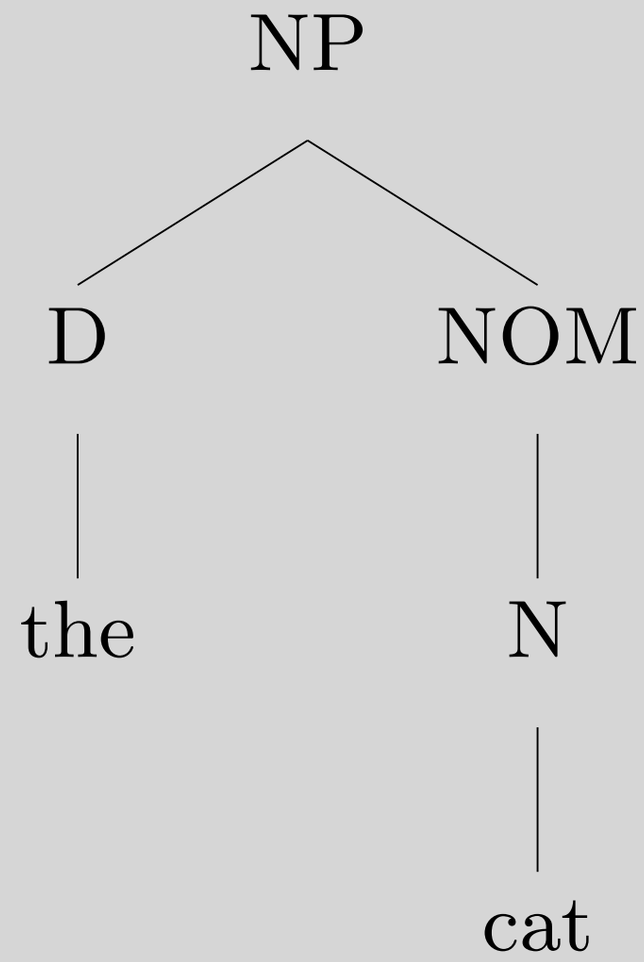
Reading Questions

- How does the Semantic Compositionality Principle work in context heavy language like Japanese in which some of the lexical entries with the necessary RESTR values are not present in the sentence? Does the top node contain the sum of its daughters as well as its imaginary daughters?

Homework tips/requests

- Type whenever possible
  - (no photos of whiteboards)
- 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

Which grammar does this tree go with?



What's wrong with this?

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

What's wrong with this?

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

What's wrong with this?

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

What's wrong with this?

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

What's wrong with this?

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

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

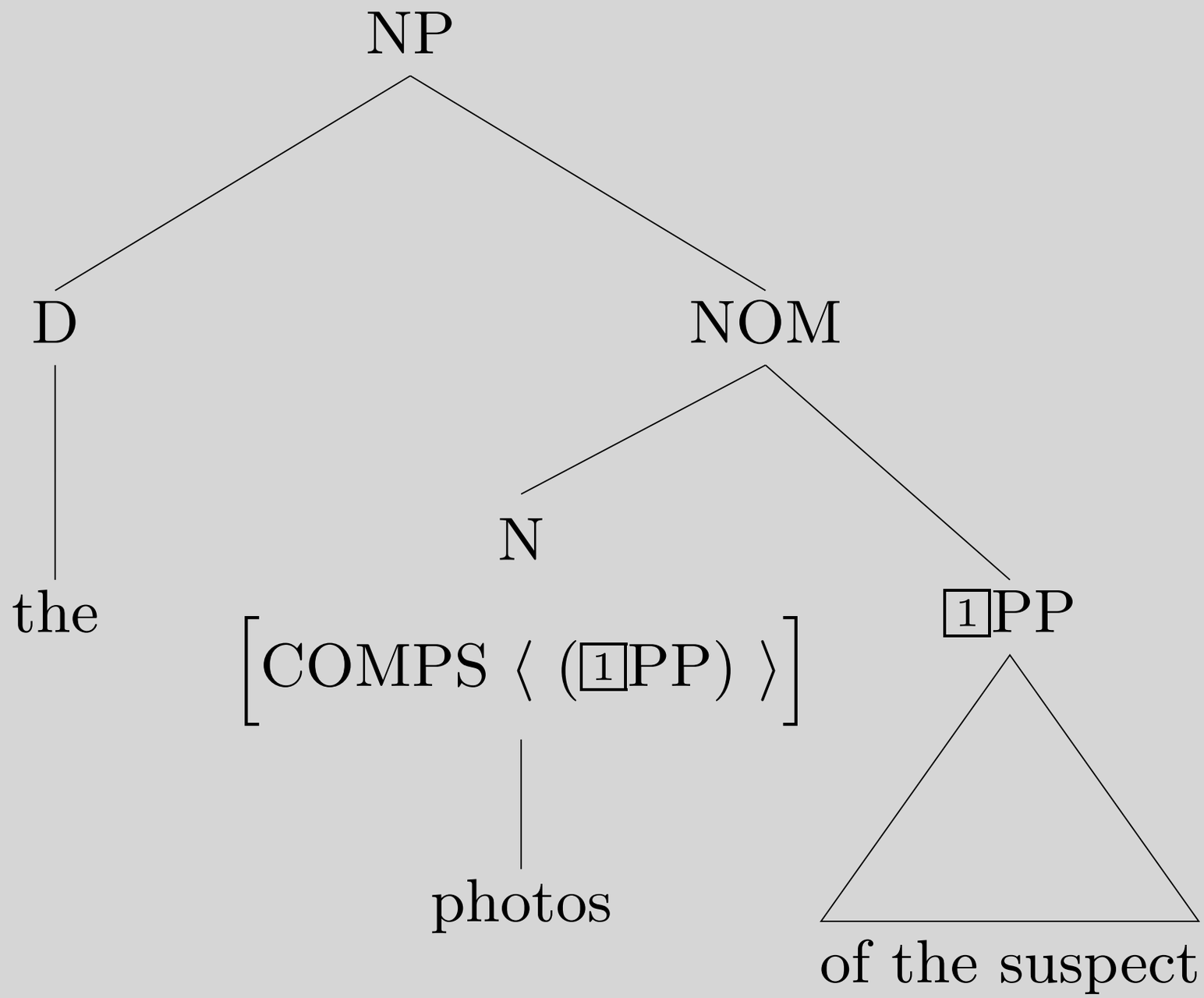
- What's the difference between these two?

$$\left[\text{SPR} \quad \boxed{1}\langle\ \text{NP}\ \rangle\right]$$

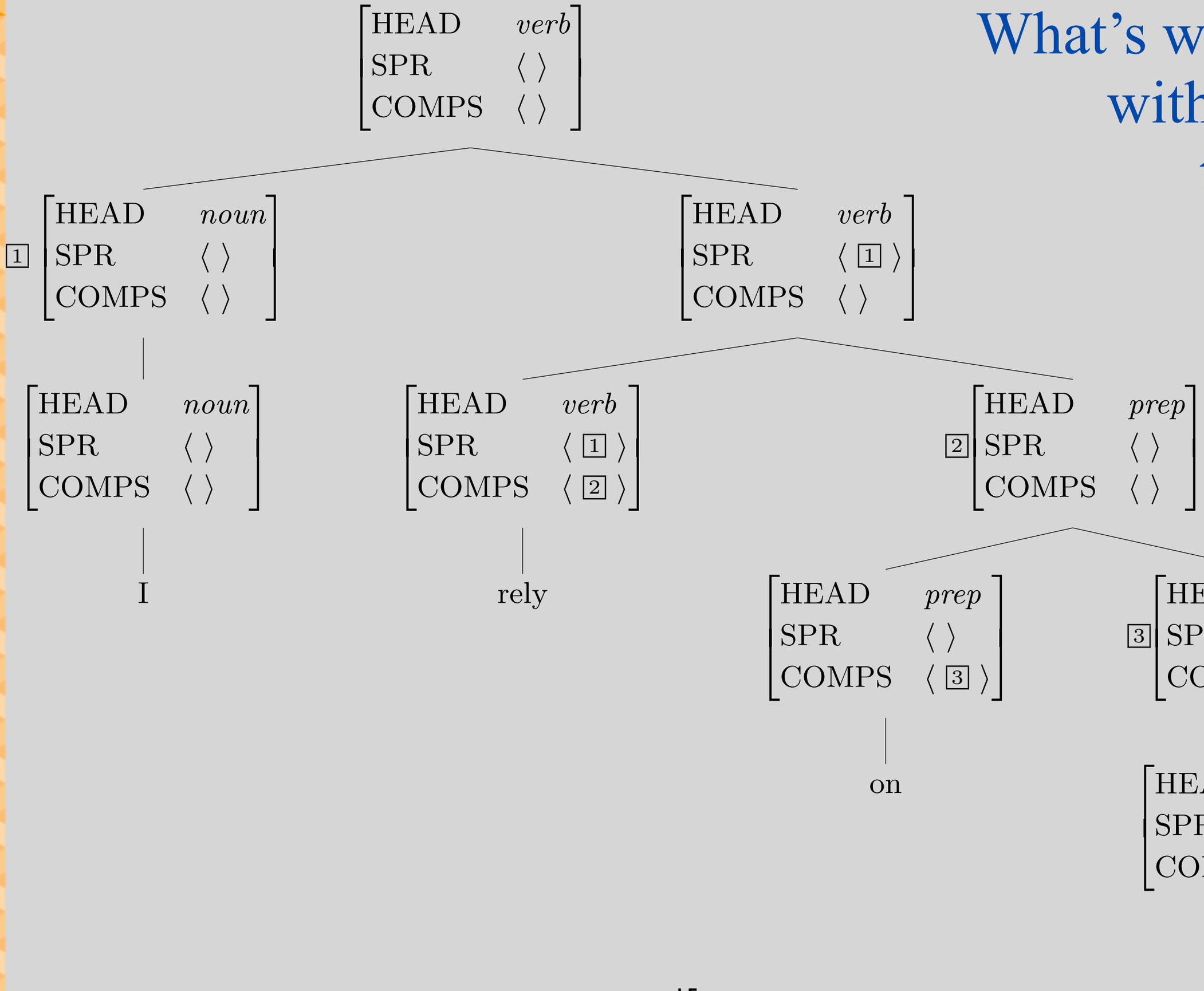
$$\left[\text{SPR} \quad \langle\ \boxed{1}\text{NP}\ \rangle\right]$$

- When does it matter?

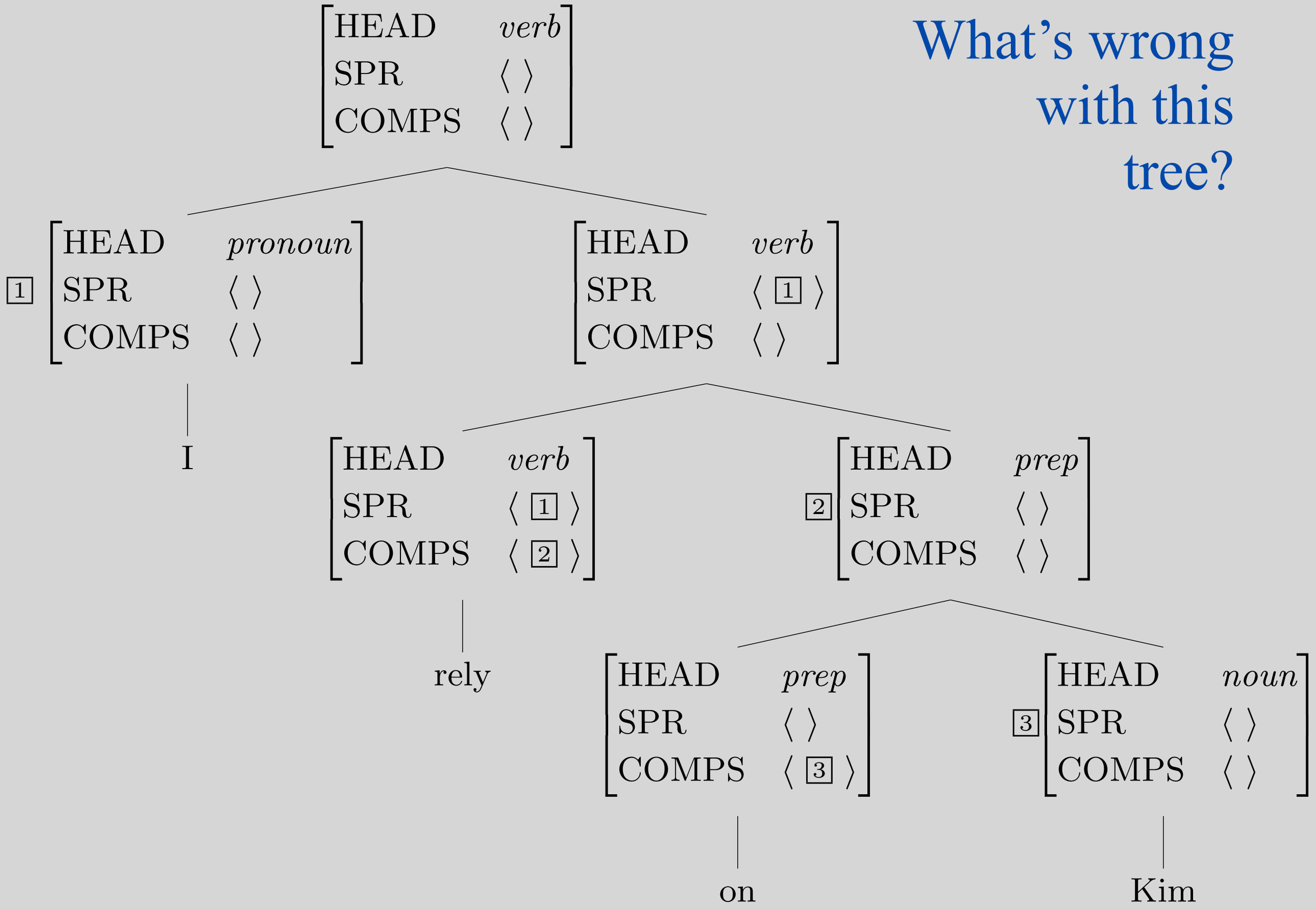
What's wrong with this tree?



What's wrong with this tree?



What's wrong with this tree?



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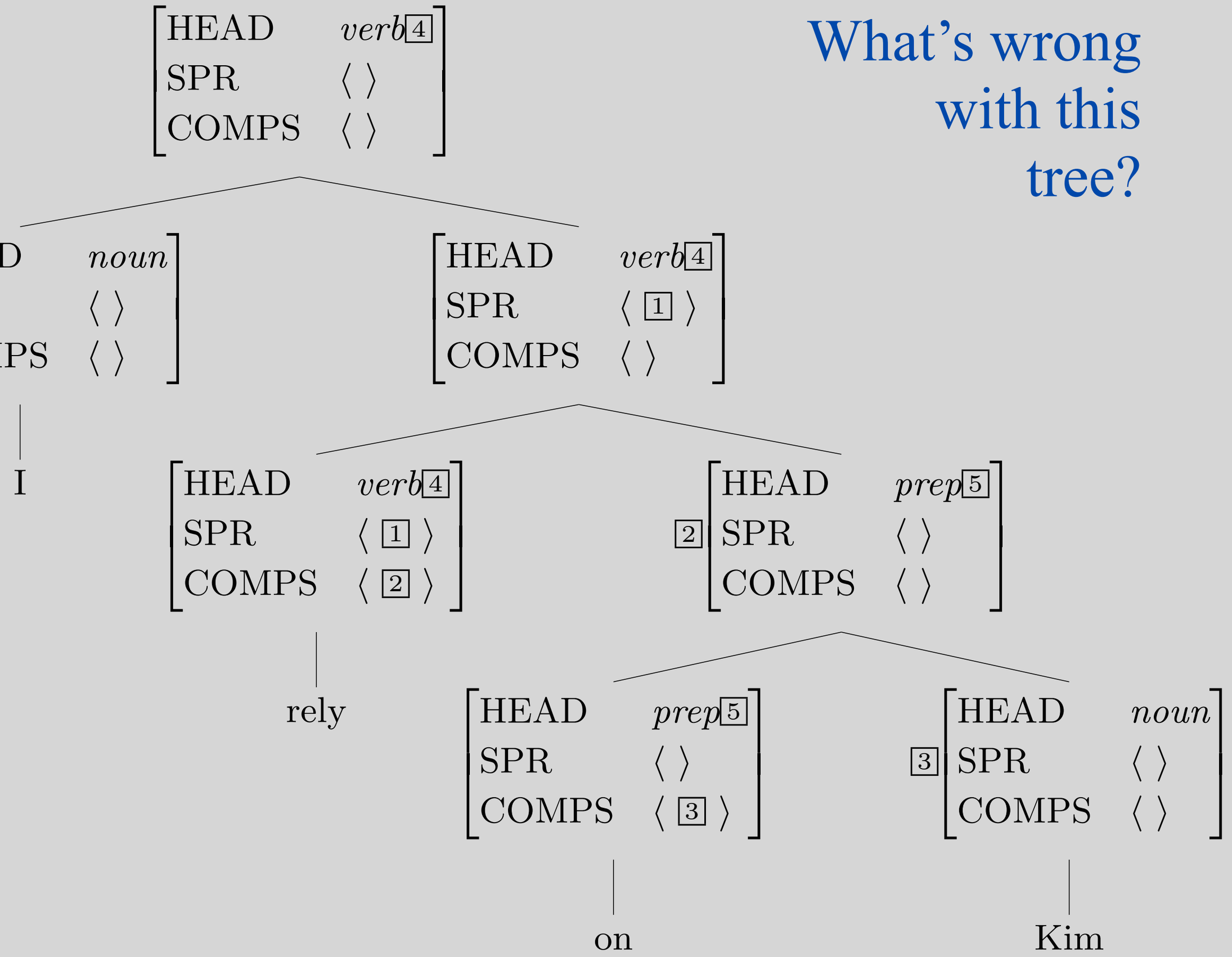

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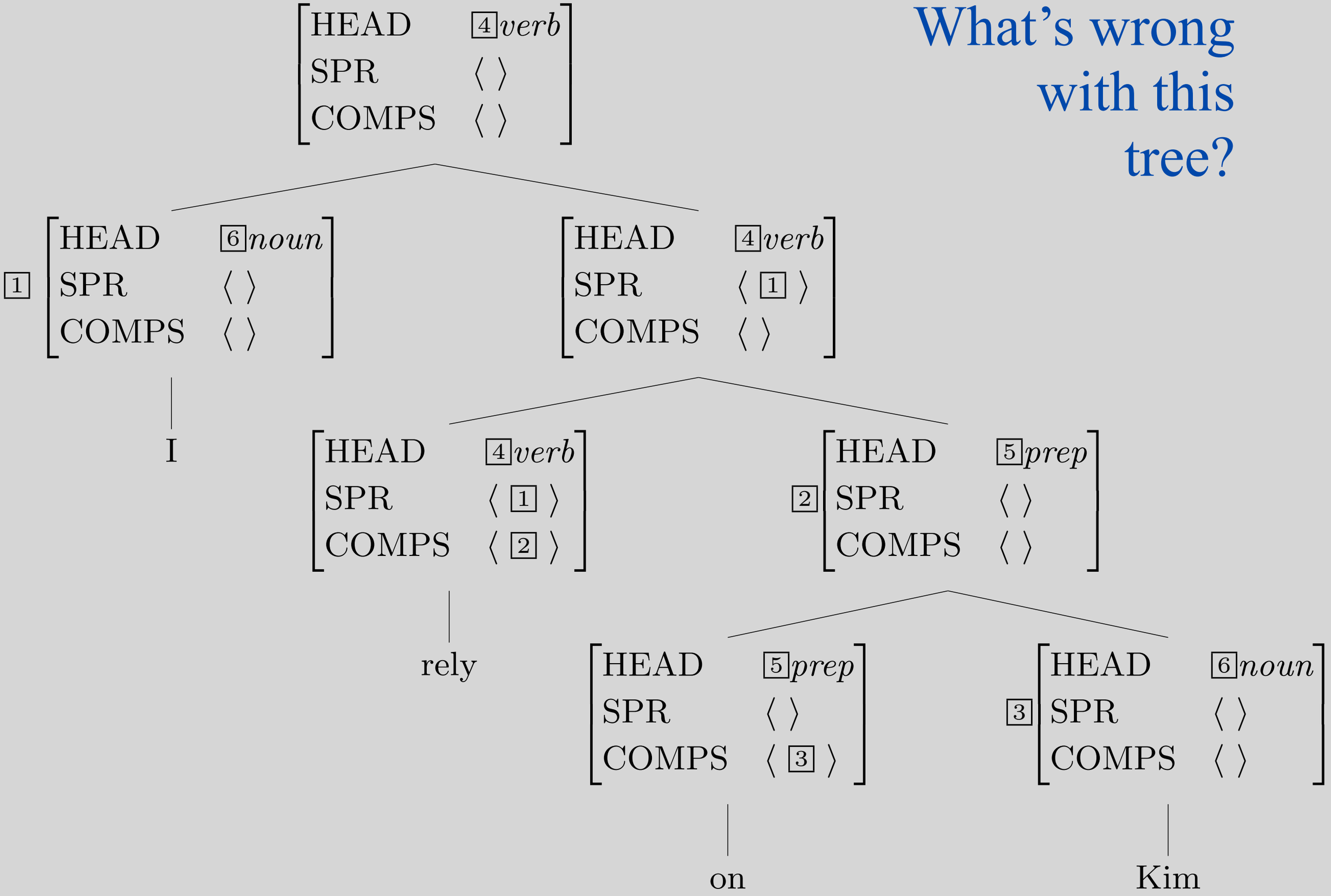

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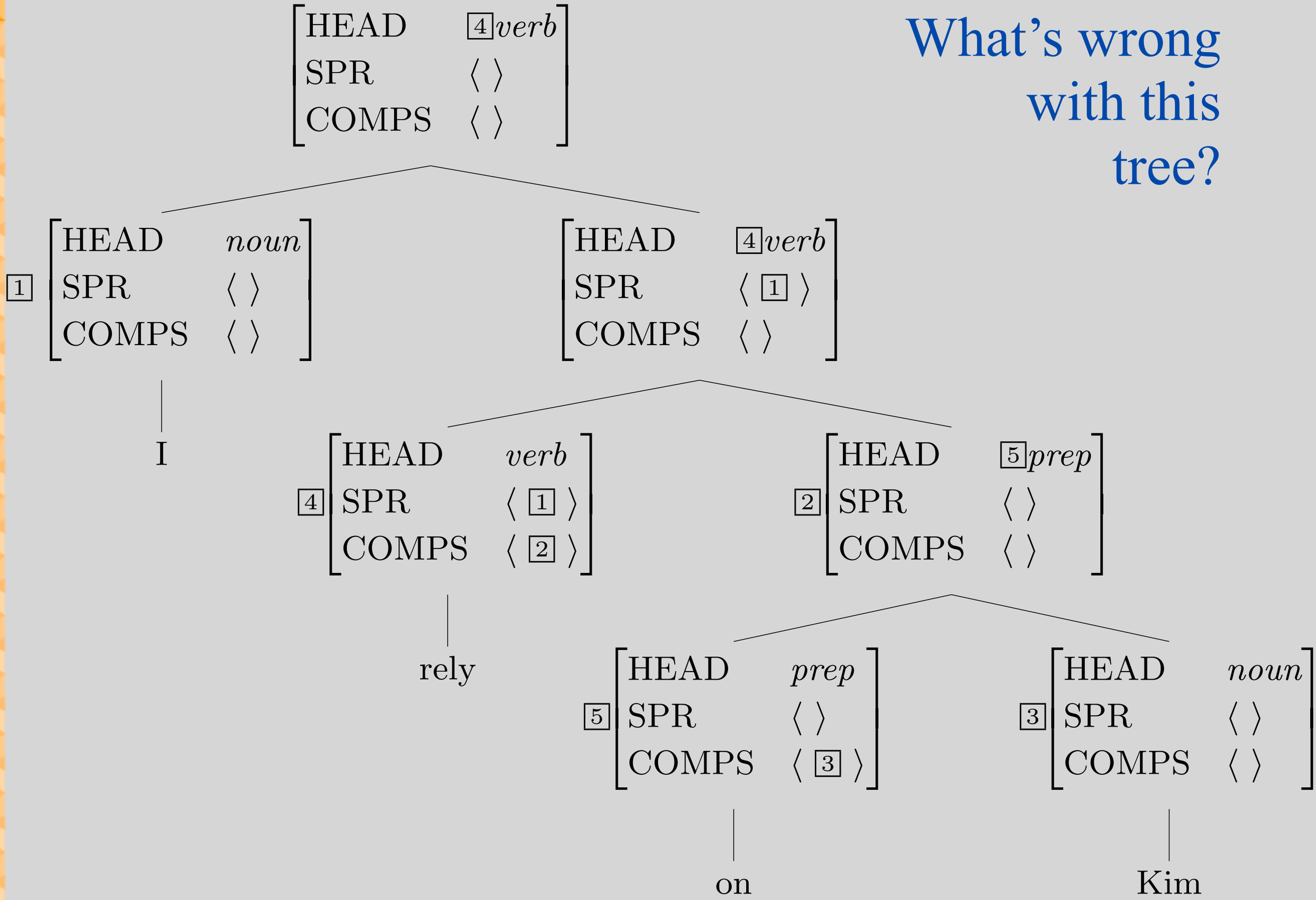

What's wrong with this?

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

And this?

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

How about this?

$$\left\langle \text{hundred} , \left[\text{SYN} \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & l \end{array} \right] \right\rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{number} \\ \text{INDEX} & j \end{array} \right] \right\rangle \end{array} \right] \end{array} \right] \right. \right.$$

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

Better version

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

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.

Type hierarchy analogies

- (P1) How is this formalism like OOP?
- How is it different?
- (P2) How is the type hierarchy like an ontology?
- How is it different?
- (P3) How is this formalism like the MP's formalism?
- How is it different?