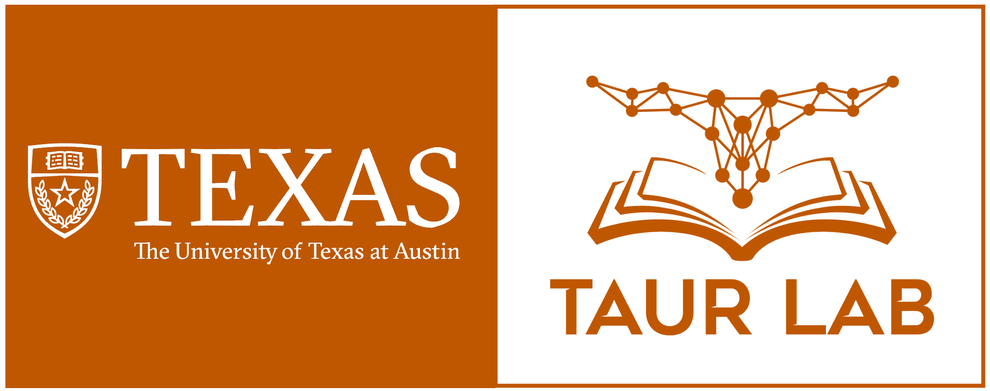
Neural Syntactic Preordering for Controlled Paraphrase Generation



Tanya Goyal and Greg Durrett

ACL 2020

Diversity in Paraphrase Generation

Input Sentence

If the Mumbai Indians win this match, they will reach the final.

seq2seq paraphrase model

Generated Output

*If Mumbai Indians win, they will **proceed** to the final.*

*If Mumbai Indians win, they will **reach** the finals.*

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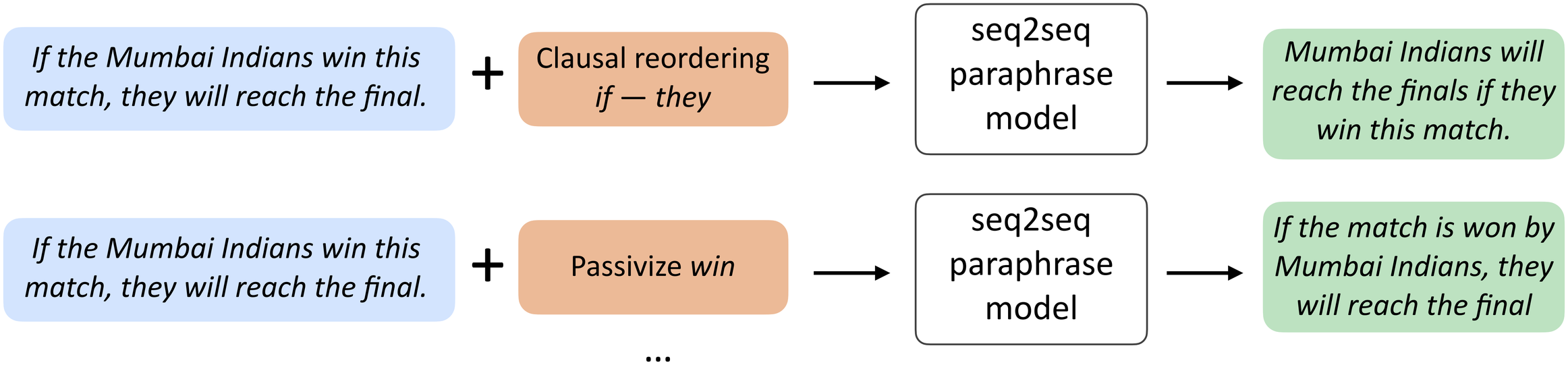
→ *Clausal reordering if — they* → *Mumbai Indians will reach the finals if they win this match.*

→ Passivize win → *If the match is won by Mumbai Indians, they will reach the final*

Controllable Paraphrase Generation

Can we **explicitly tell** our seq2seq model to follow these desired structures?
By controlling its behavior, we can achieve diversity!



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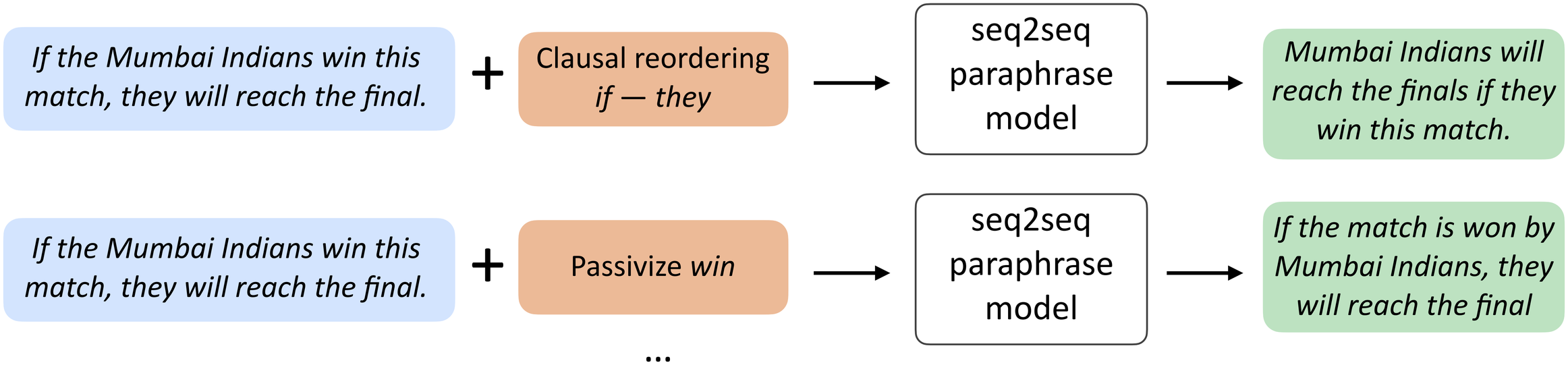

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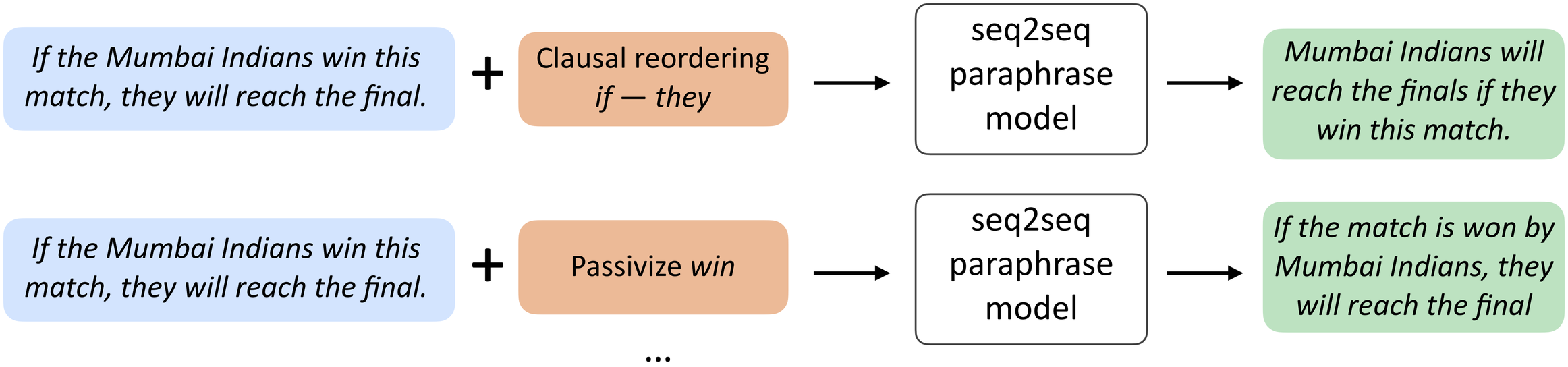

How do we specify structure that the generation conditions on?

How do we enumerate the different paraphrasing possibilities?

Prior Work

Syntactic Template-based (Iyyer et al. 2018)

Exemplar-based (Chen et al. 2019)

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If the Mumbai Indians win this match, they will reach the final. + *S (NP VP)* → *Mumbai Indians will reach the finals if they win this match.*

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Limitation: Requires appropriate exemplar as input, cannot generate these automatically.

How do we specify desired target structure?

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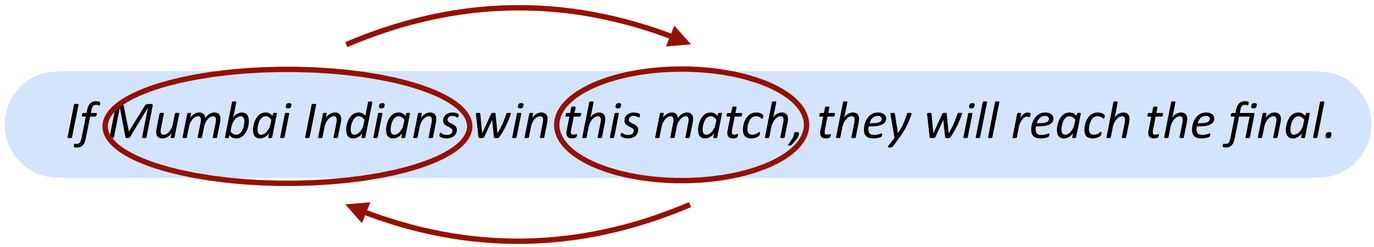

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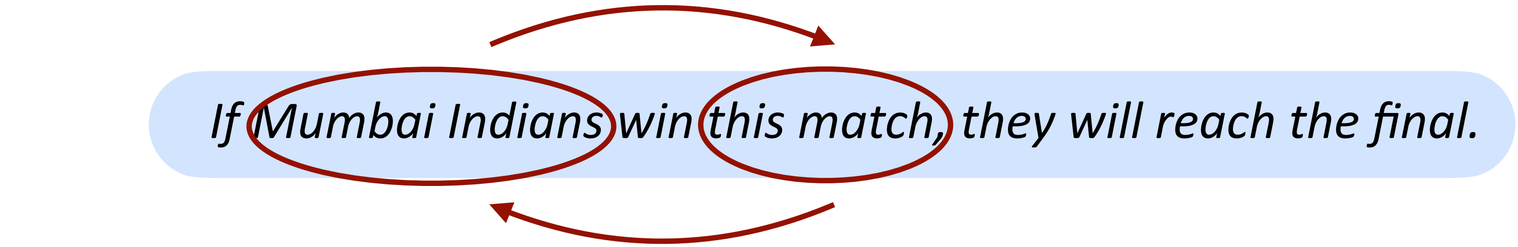

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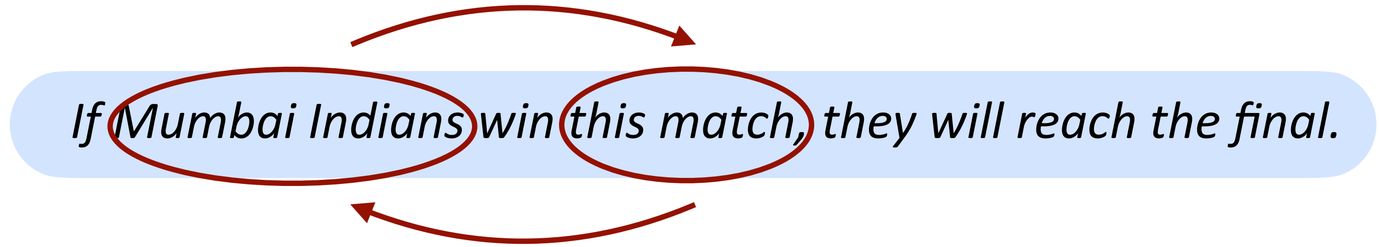

If | *this match* | *win* | *Mumbai Indians* | *they will reach the final.*

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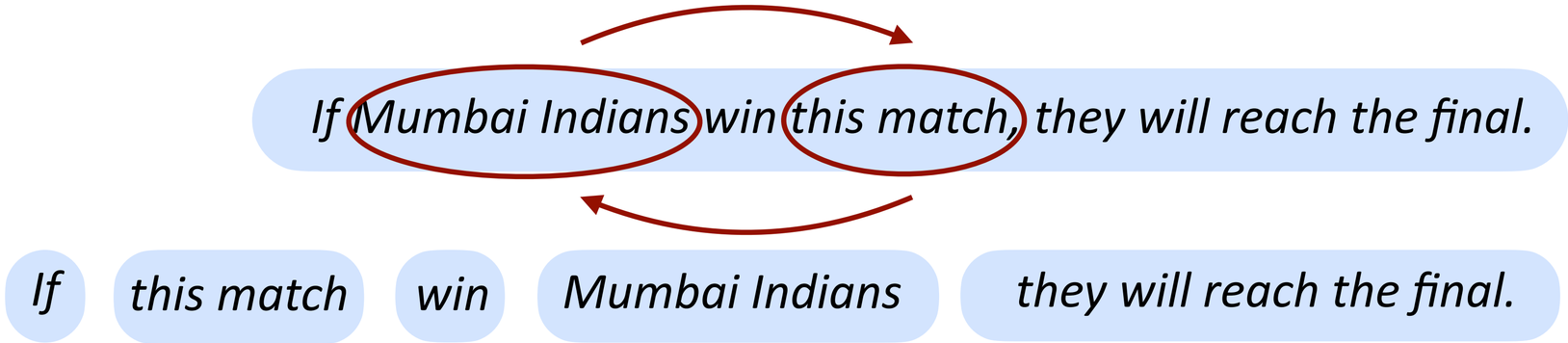

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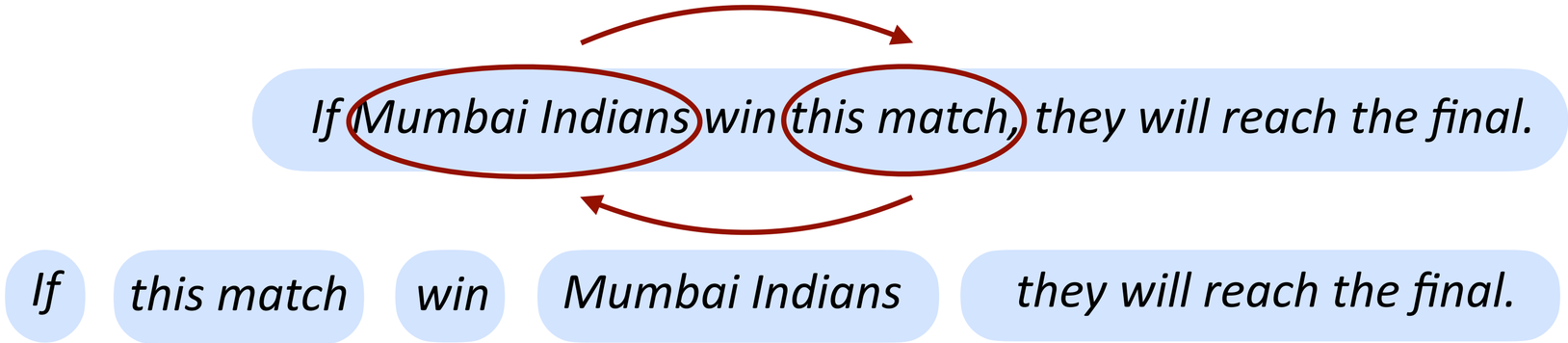

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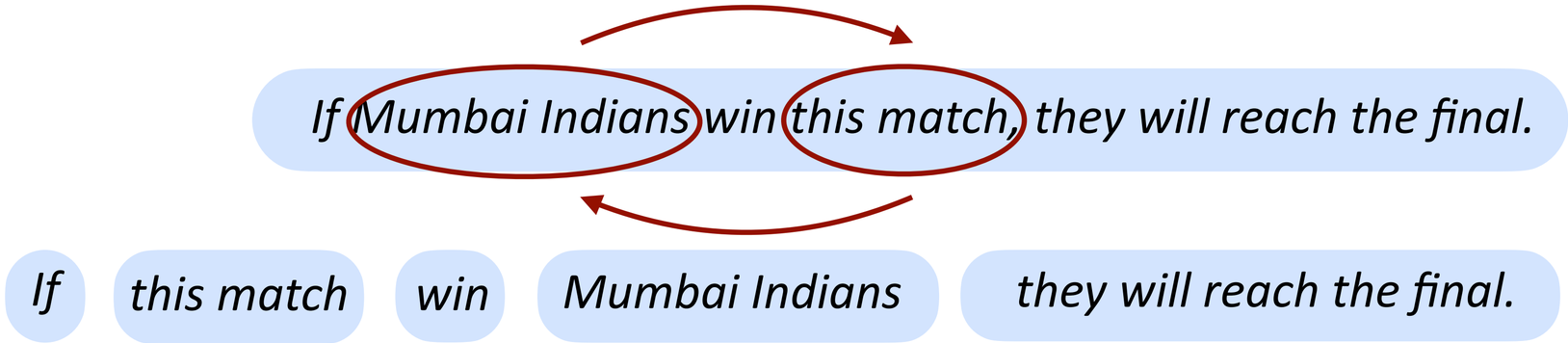

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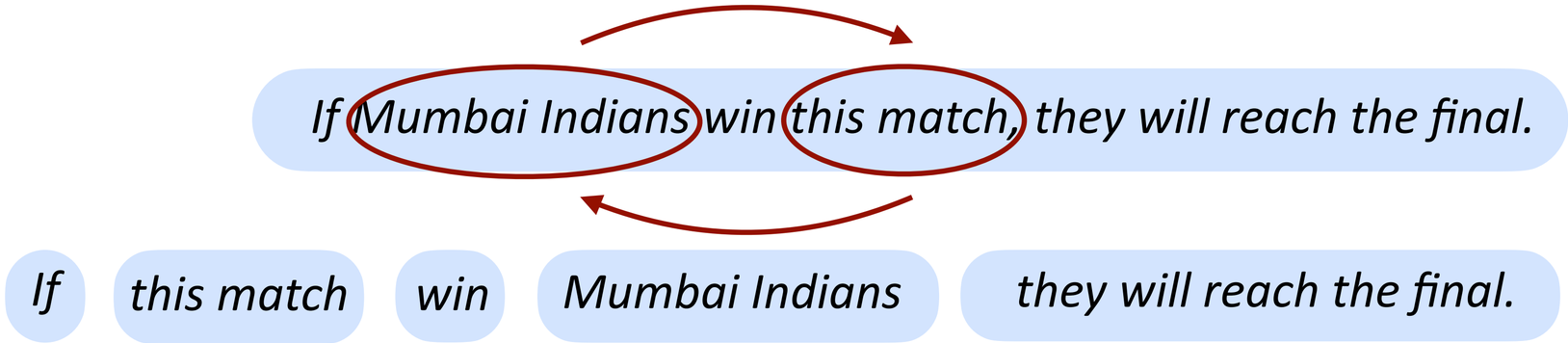

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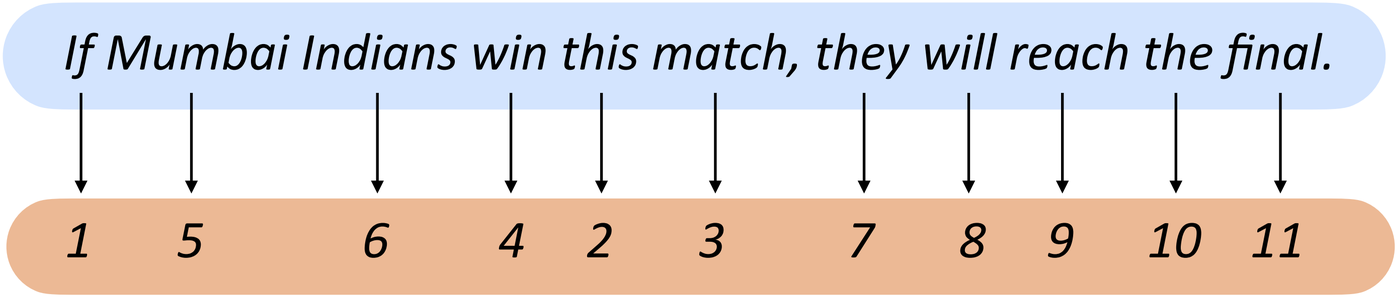

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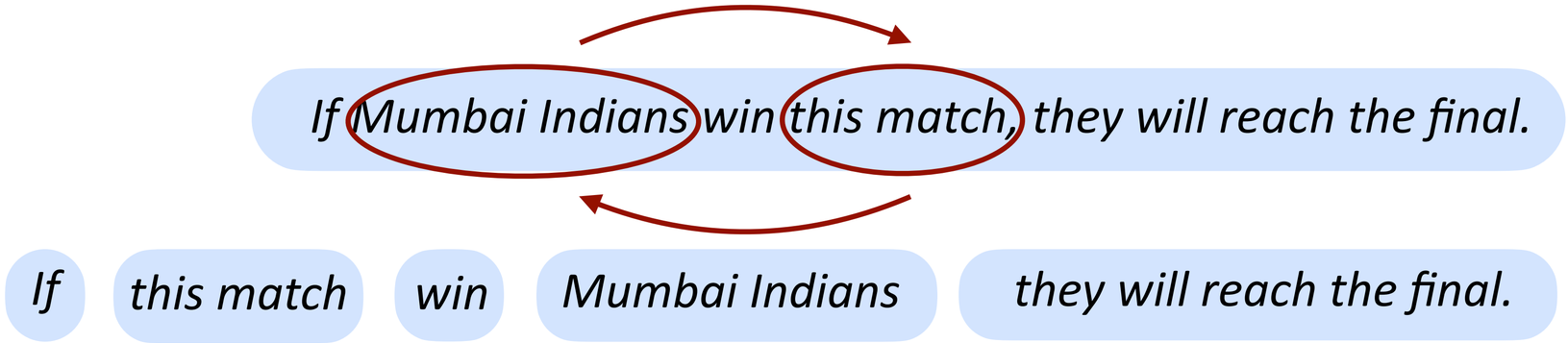

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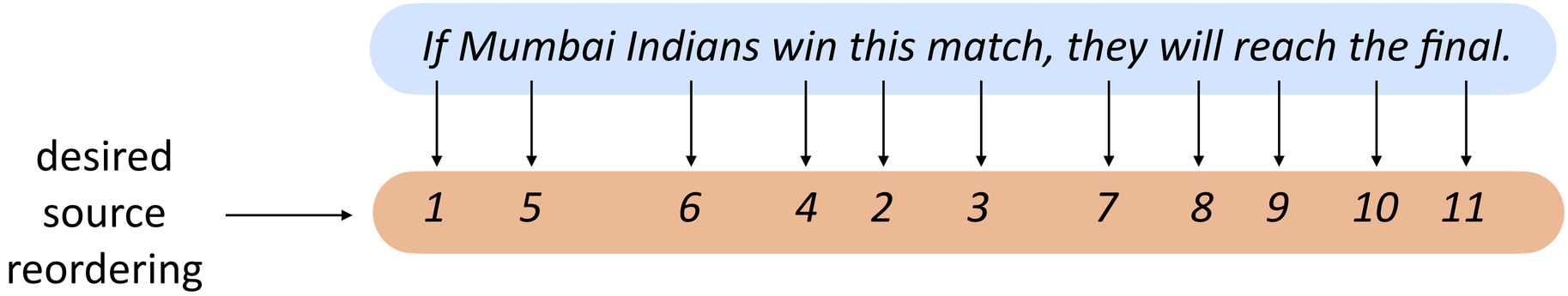

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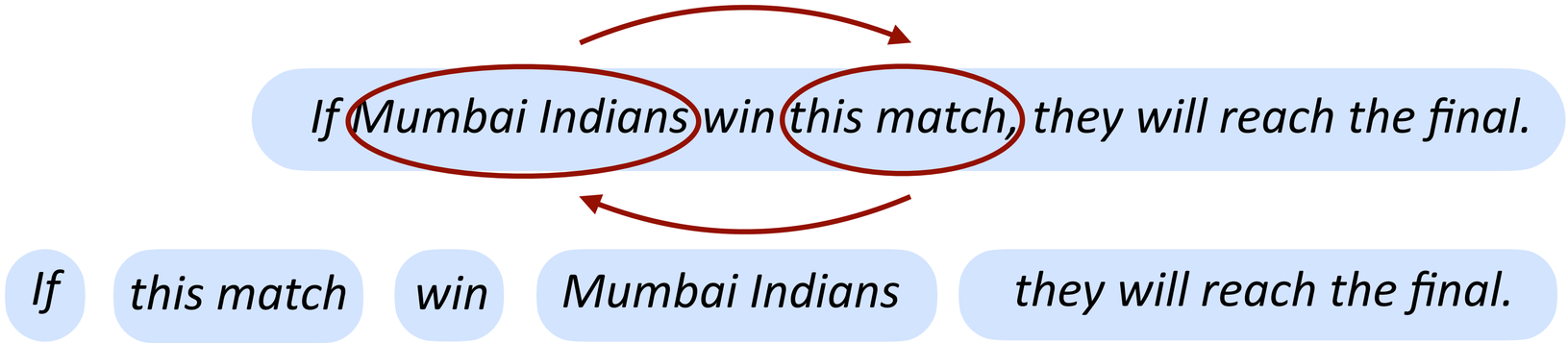

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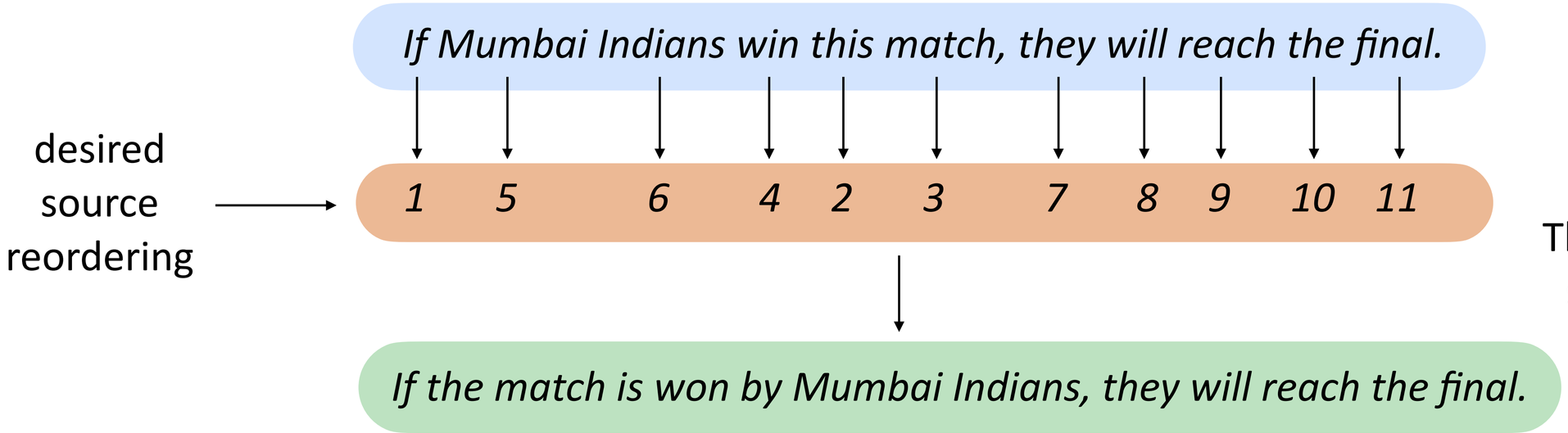

The model needs to perform some rewriting to smooth over the transformations.

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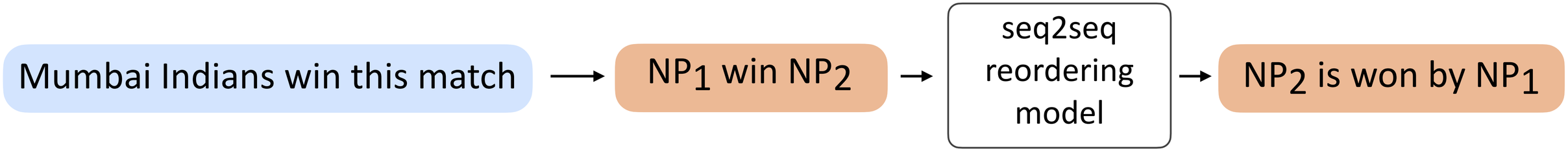

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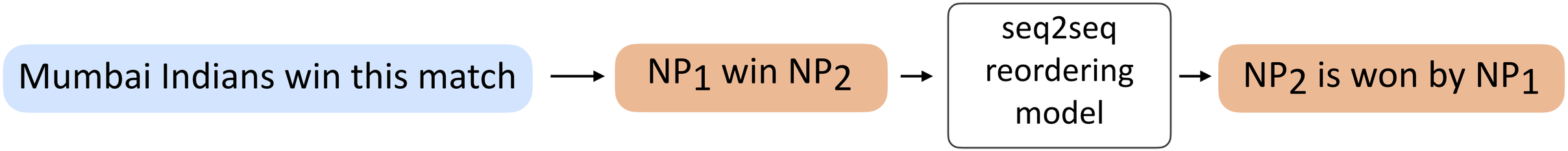

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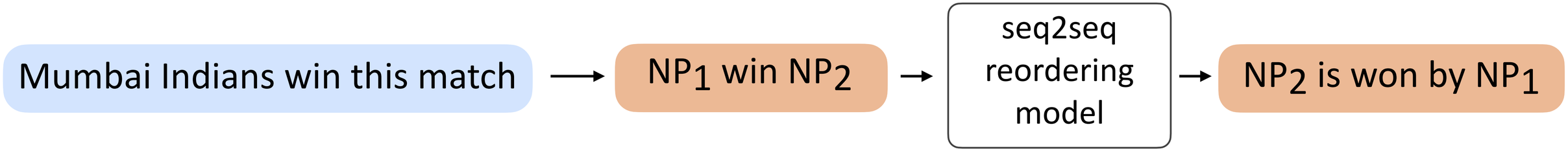

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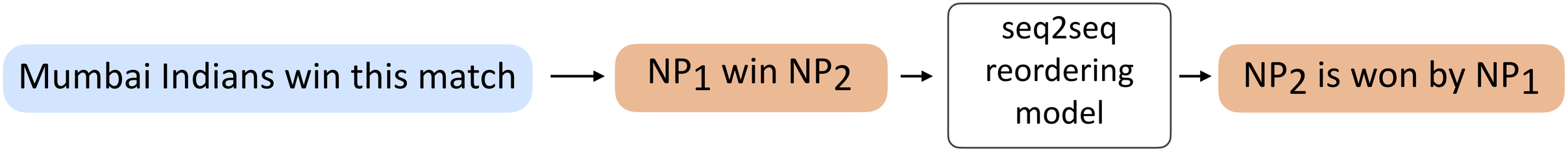

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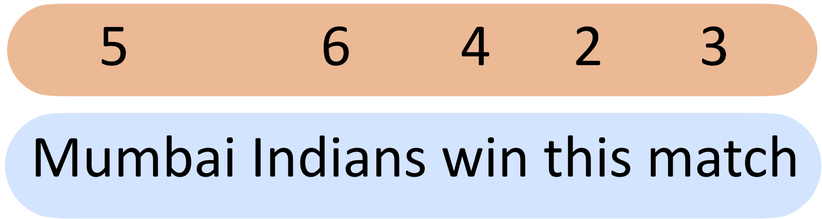

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⋮

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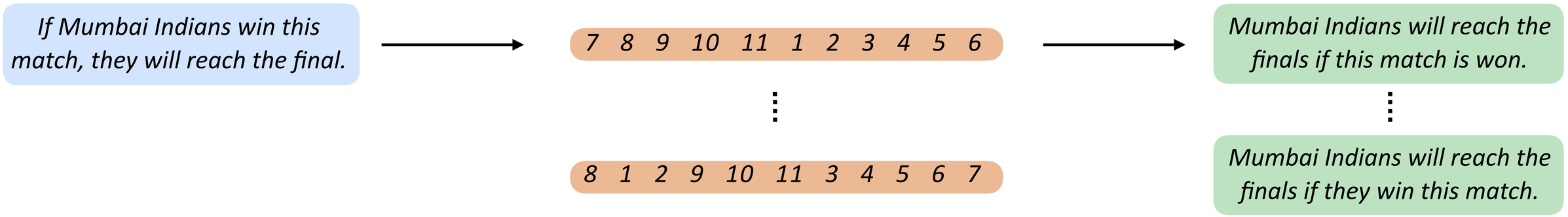
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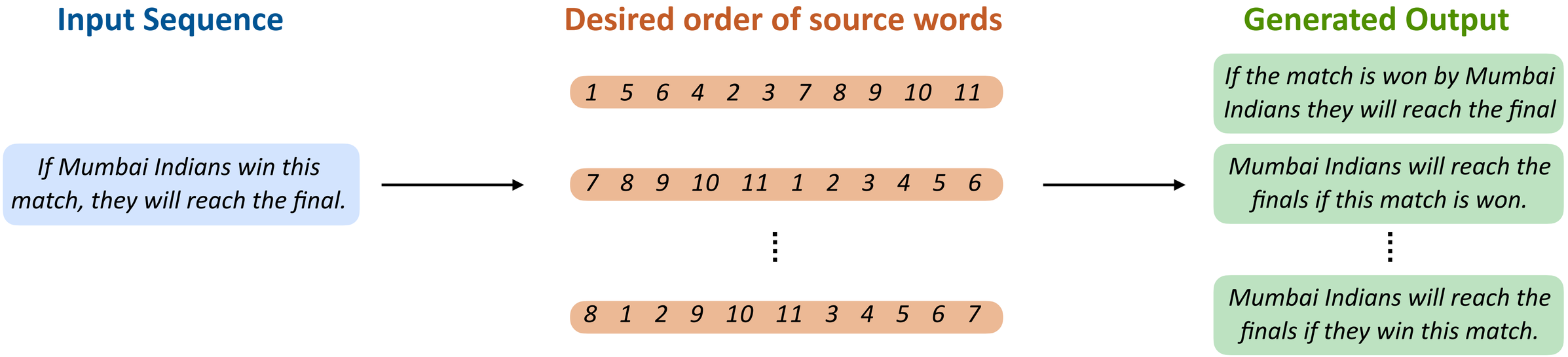

SOW: Source Order reWriting

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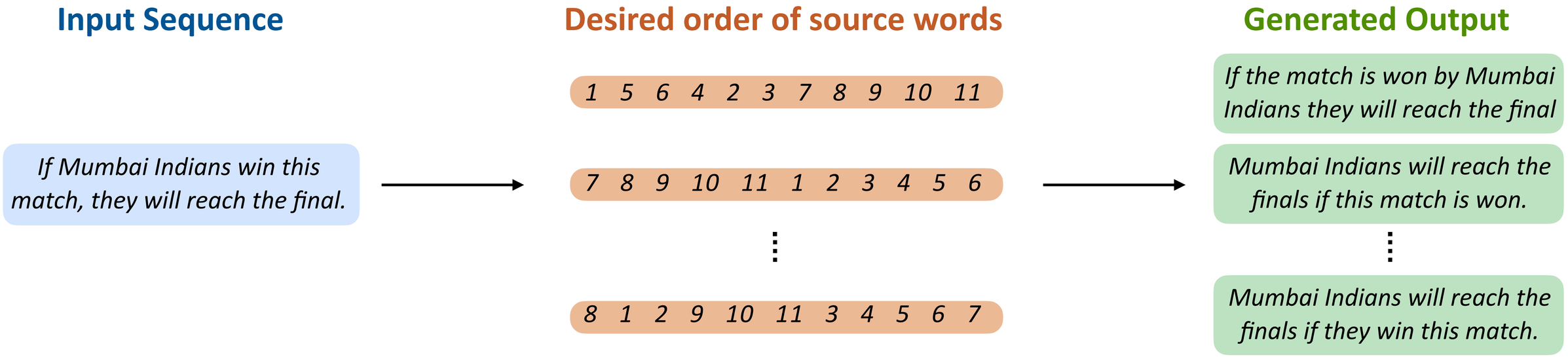

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REAP: Rearrangement Aware Paraphrasing

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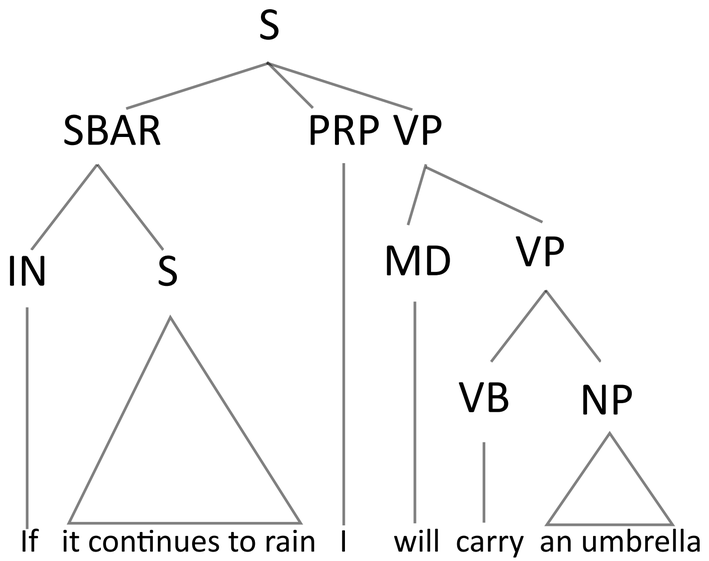

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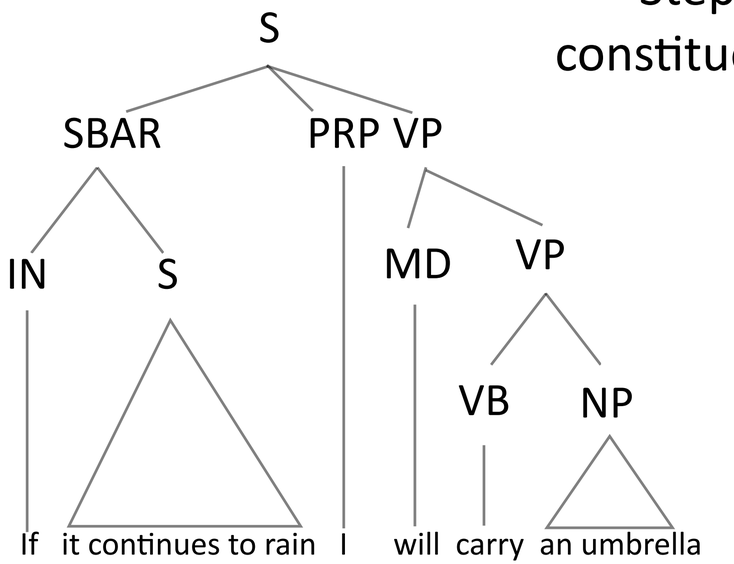

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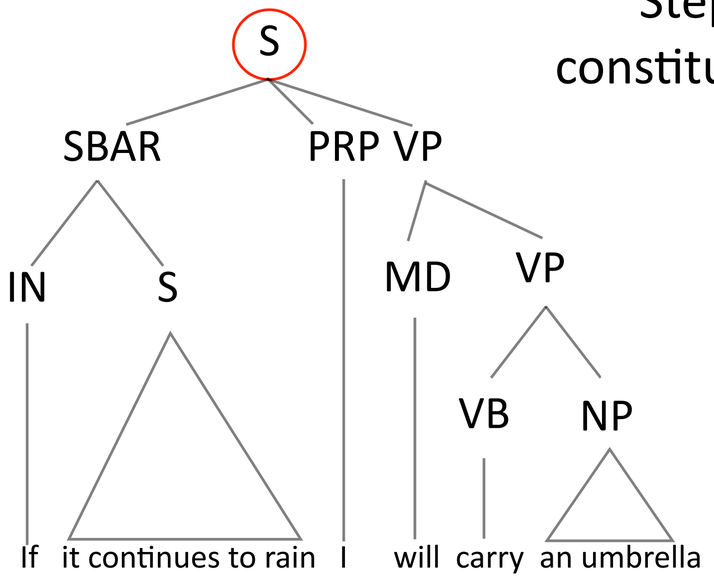

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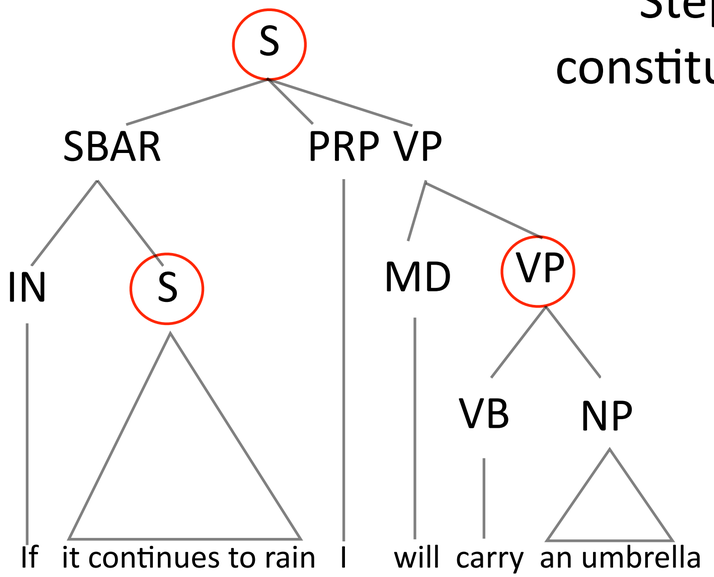

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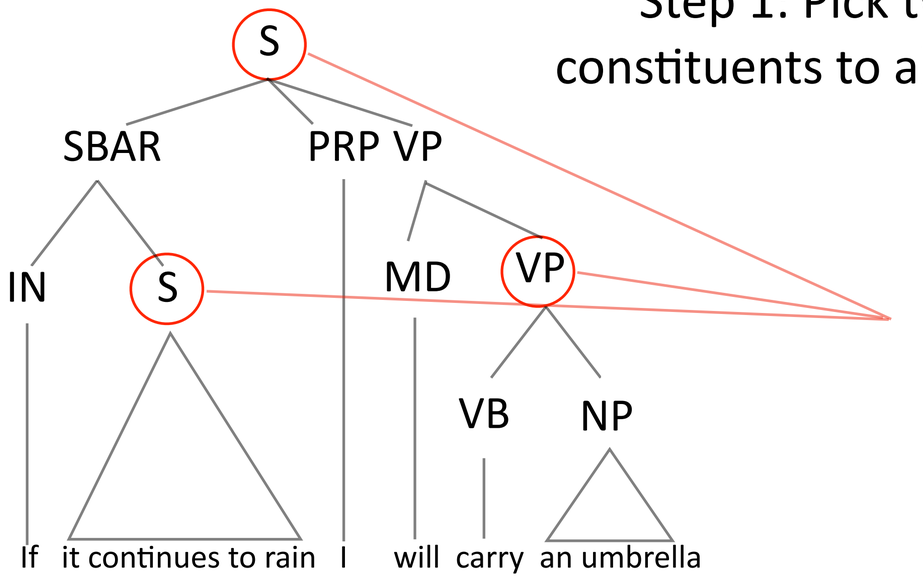

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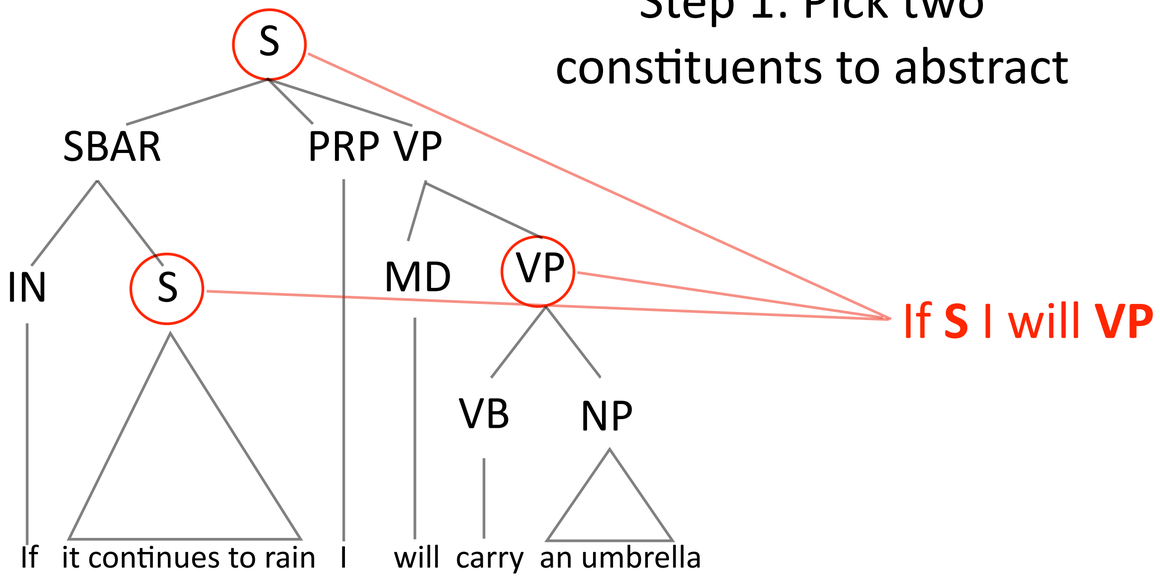

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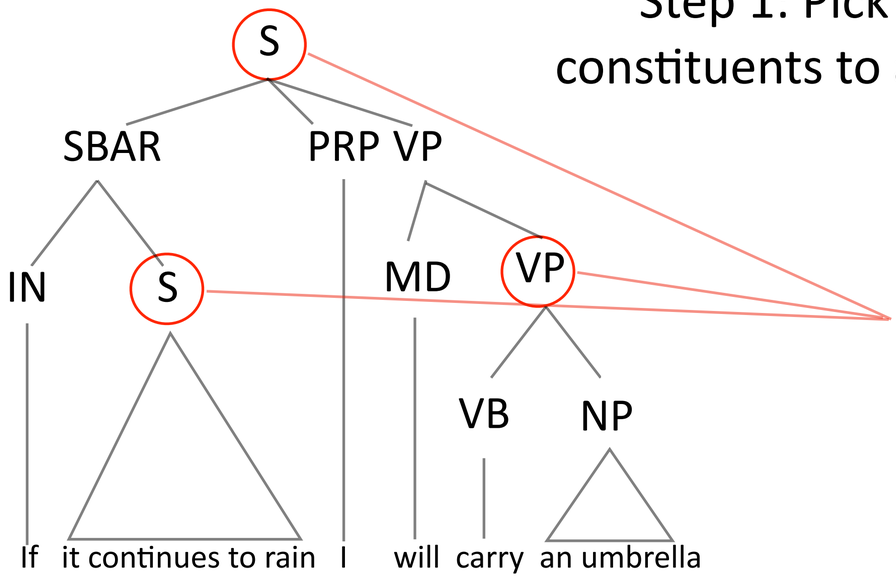

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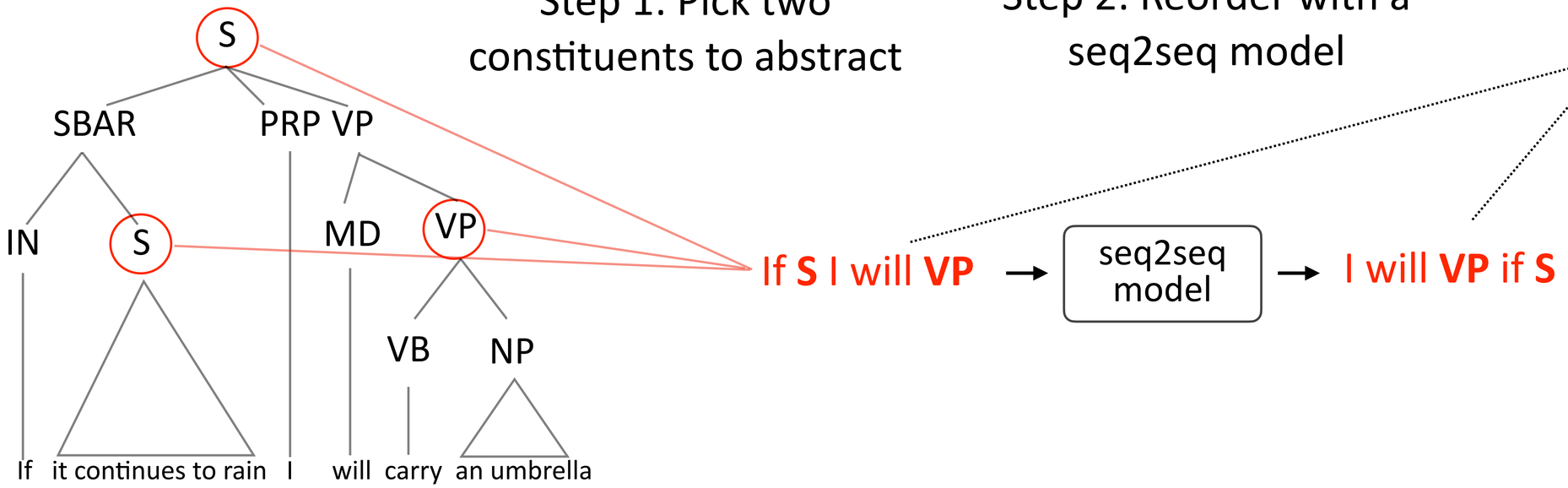

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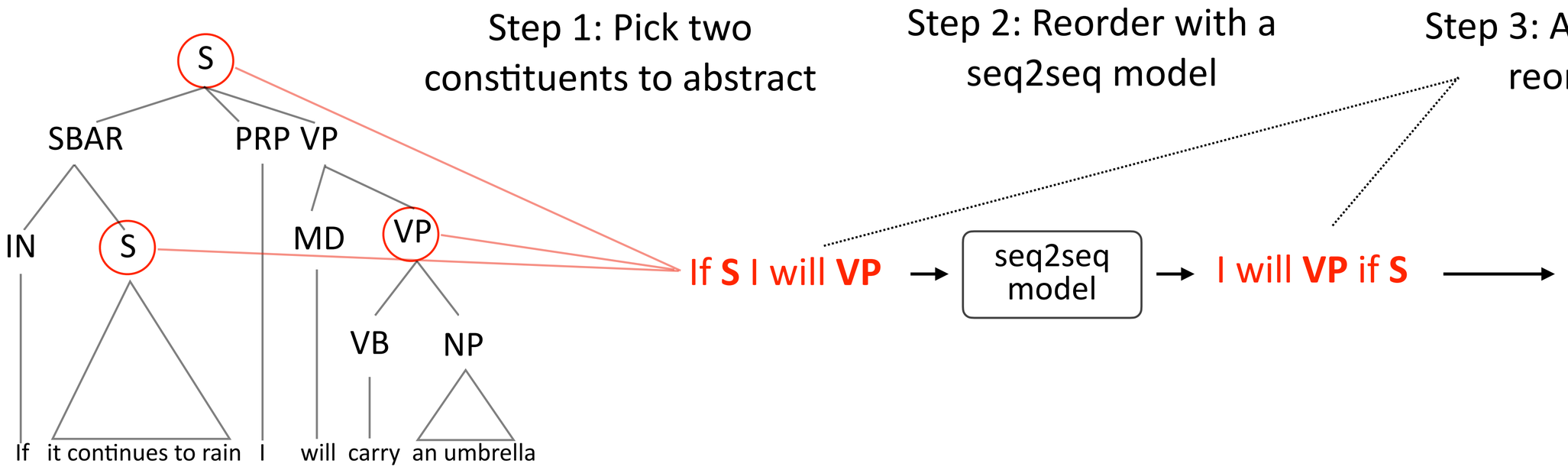

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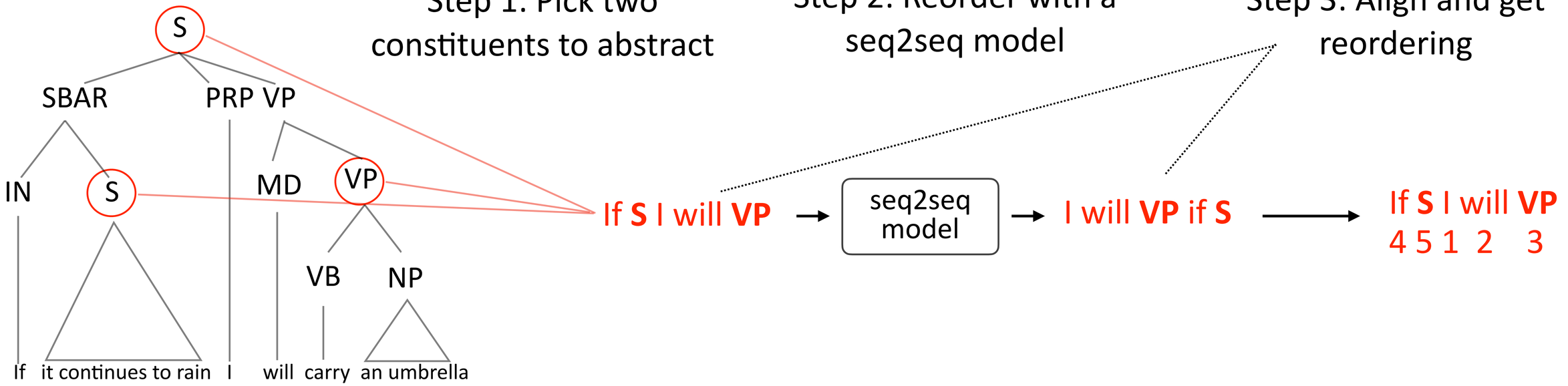

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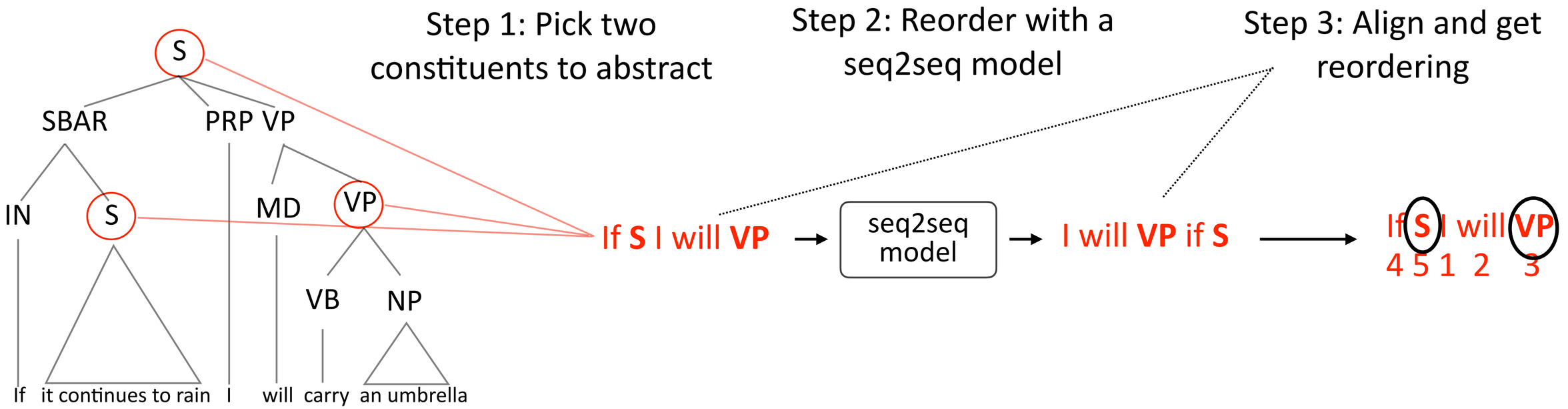

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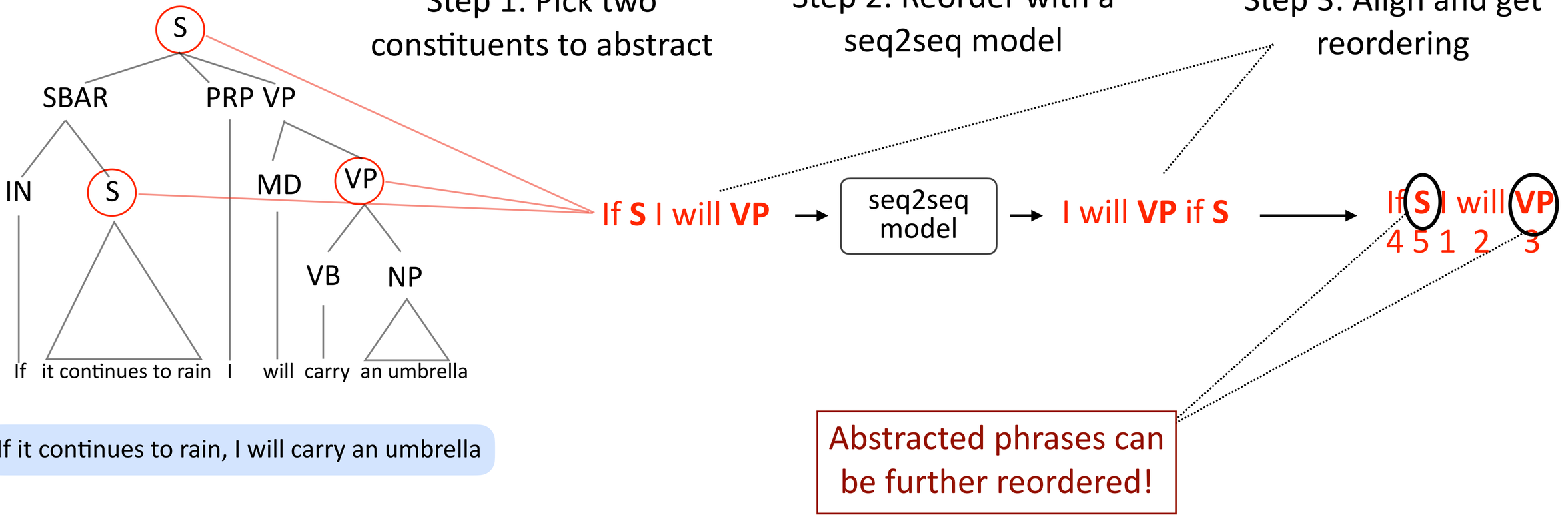

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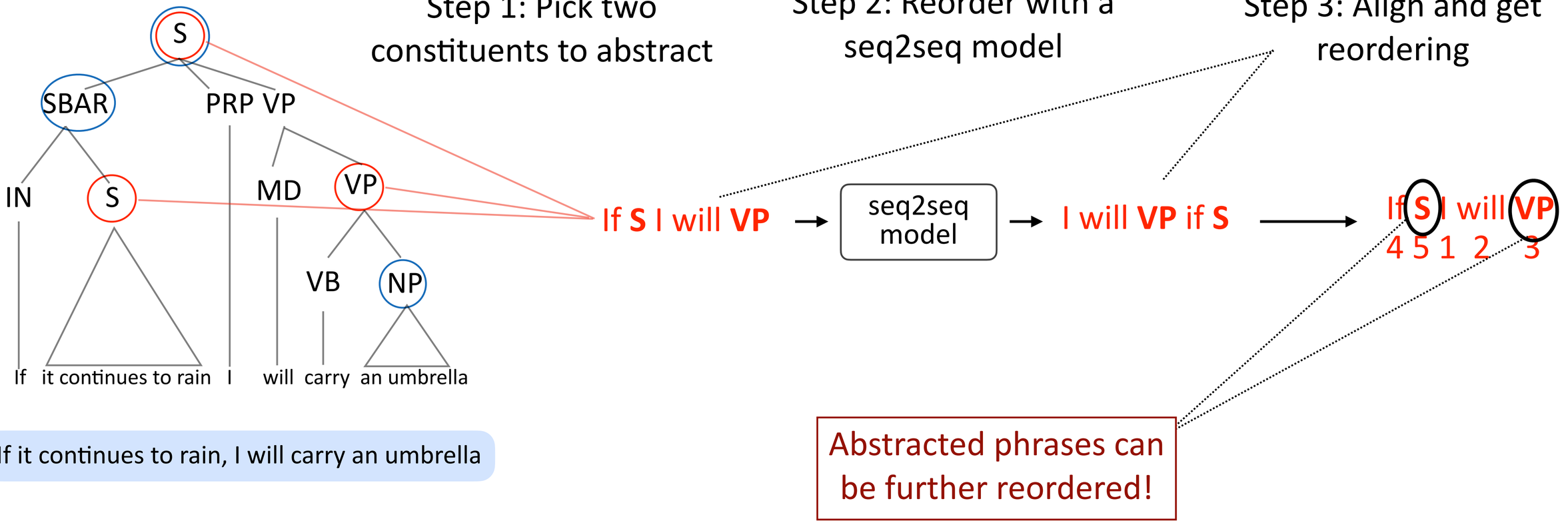

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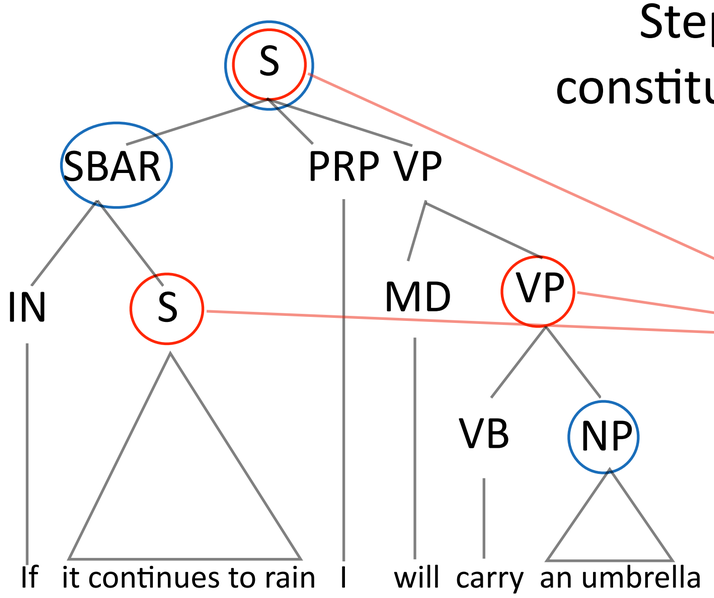

If it continues to rain, I will carry an umbrella

Step 1: Pick two constituents to abstract

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If **S** I will **VP** → seq2seq model → I will **VP** if **S** → If **S** I will **VP** (4 5 1 2 3)

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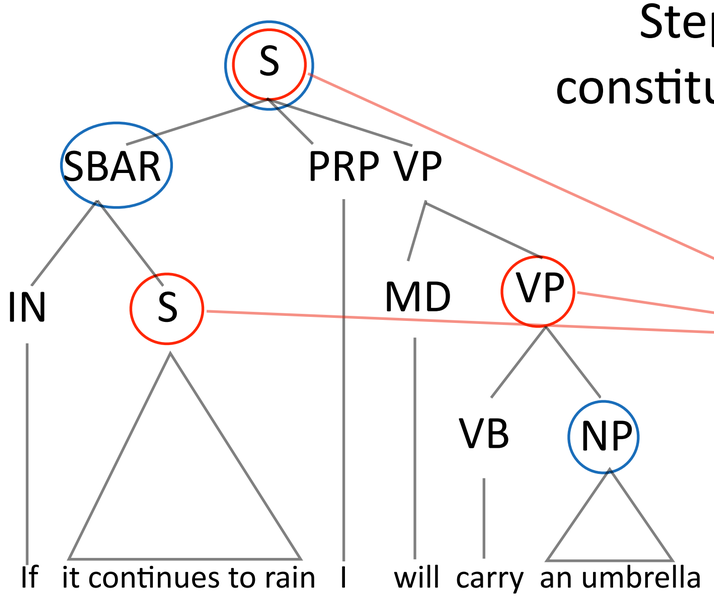

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Output of the SOW model

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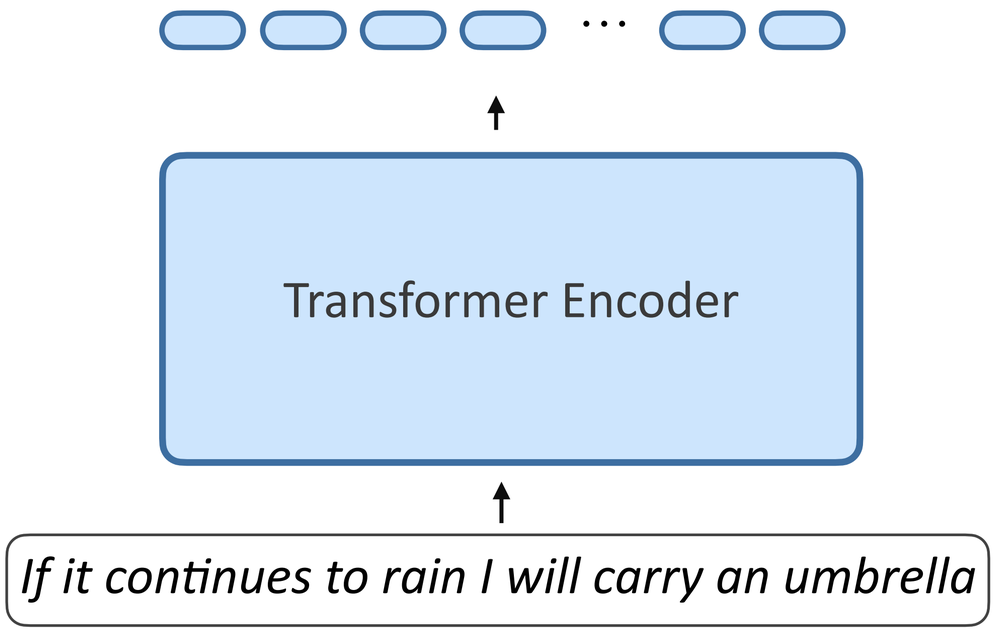

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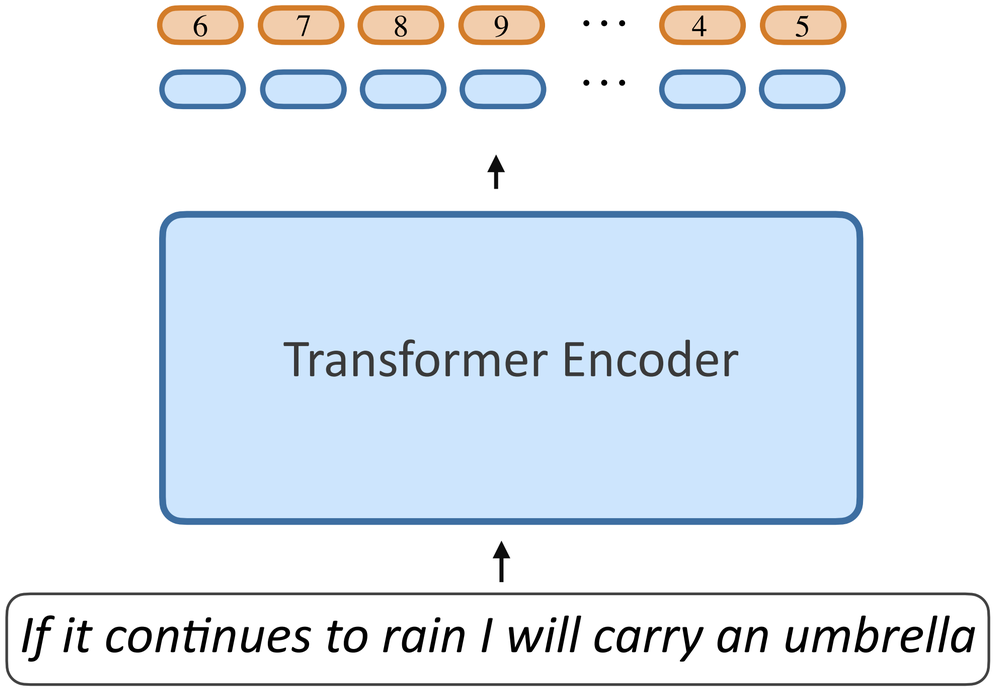

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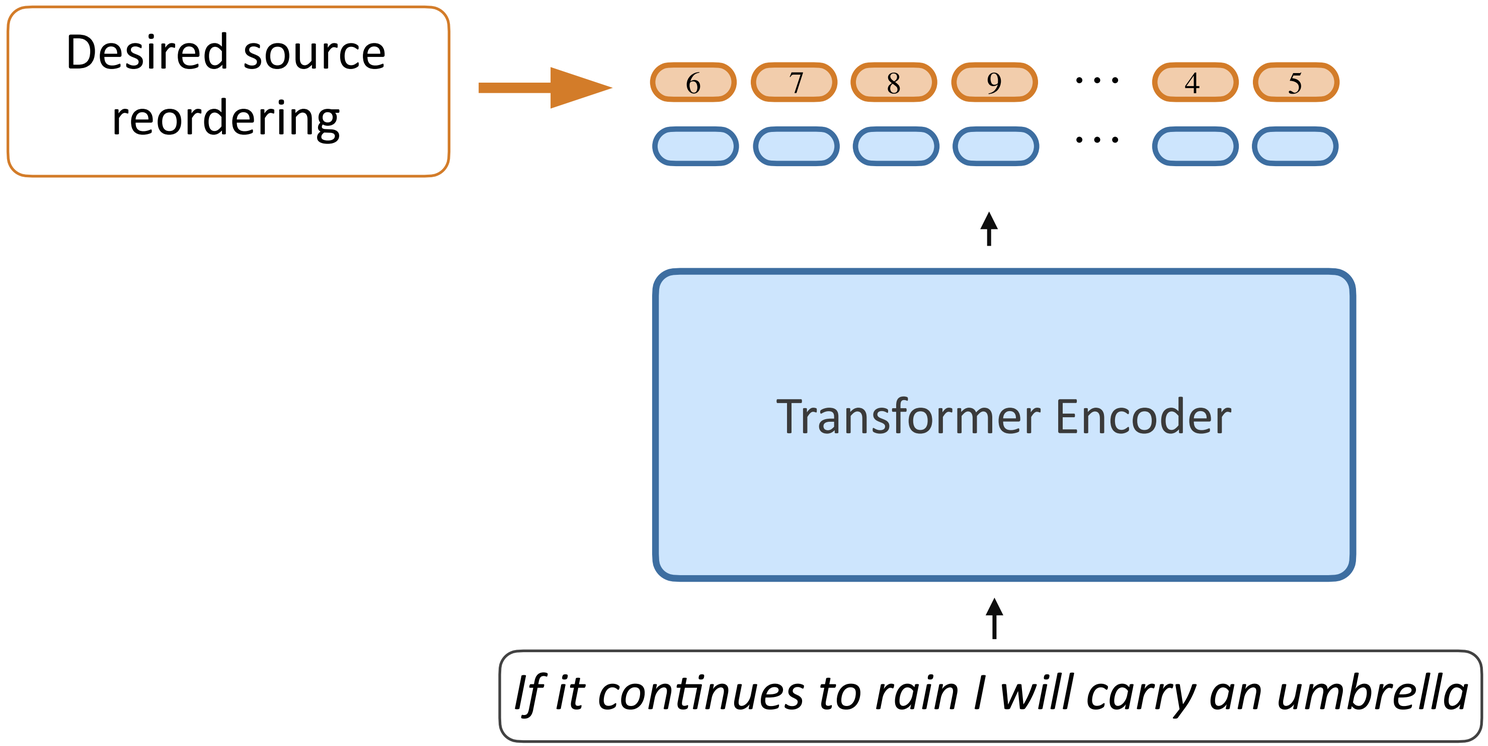

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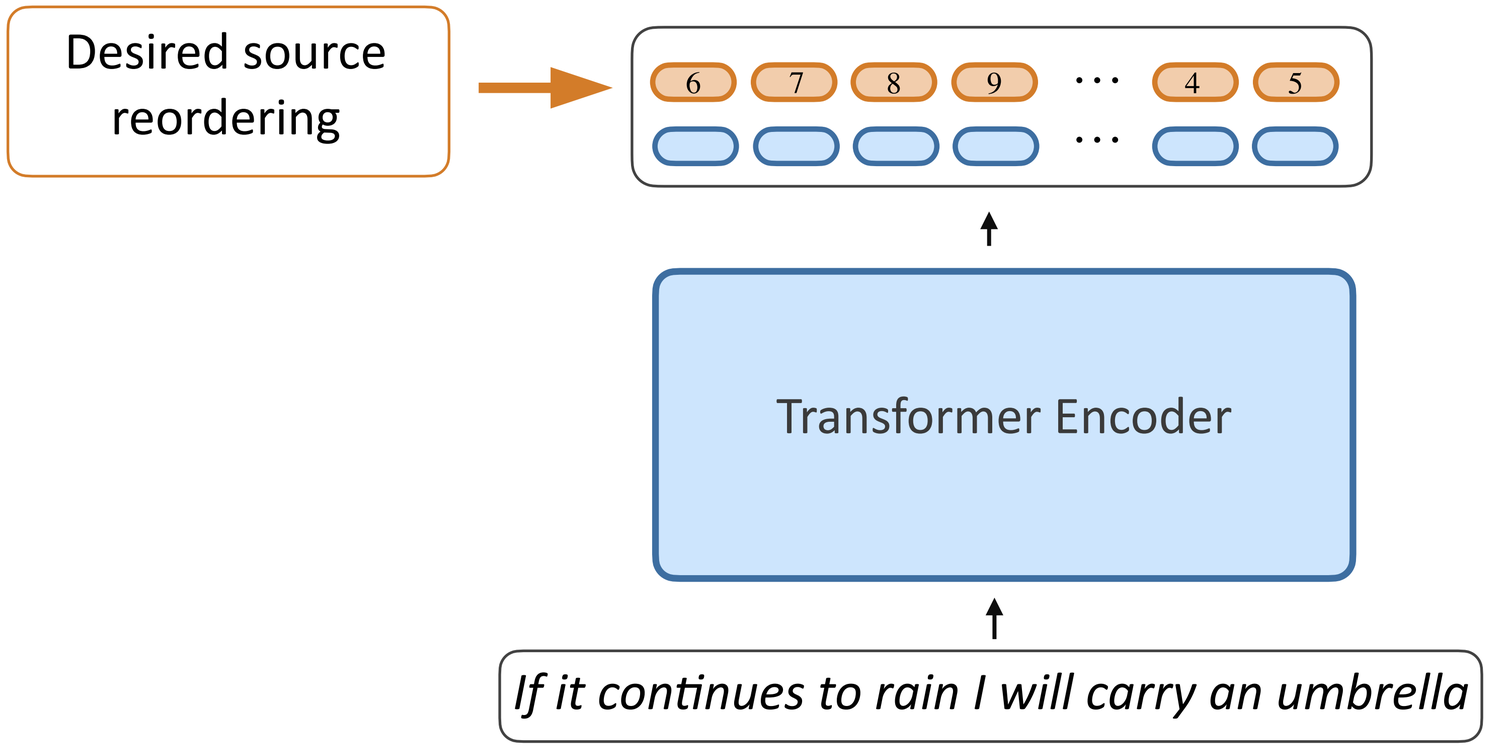

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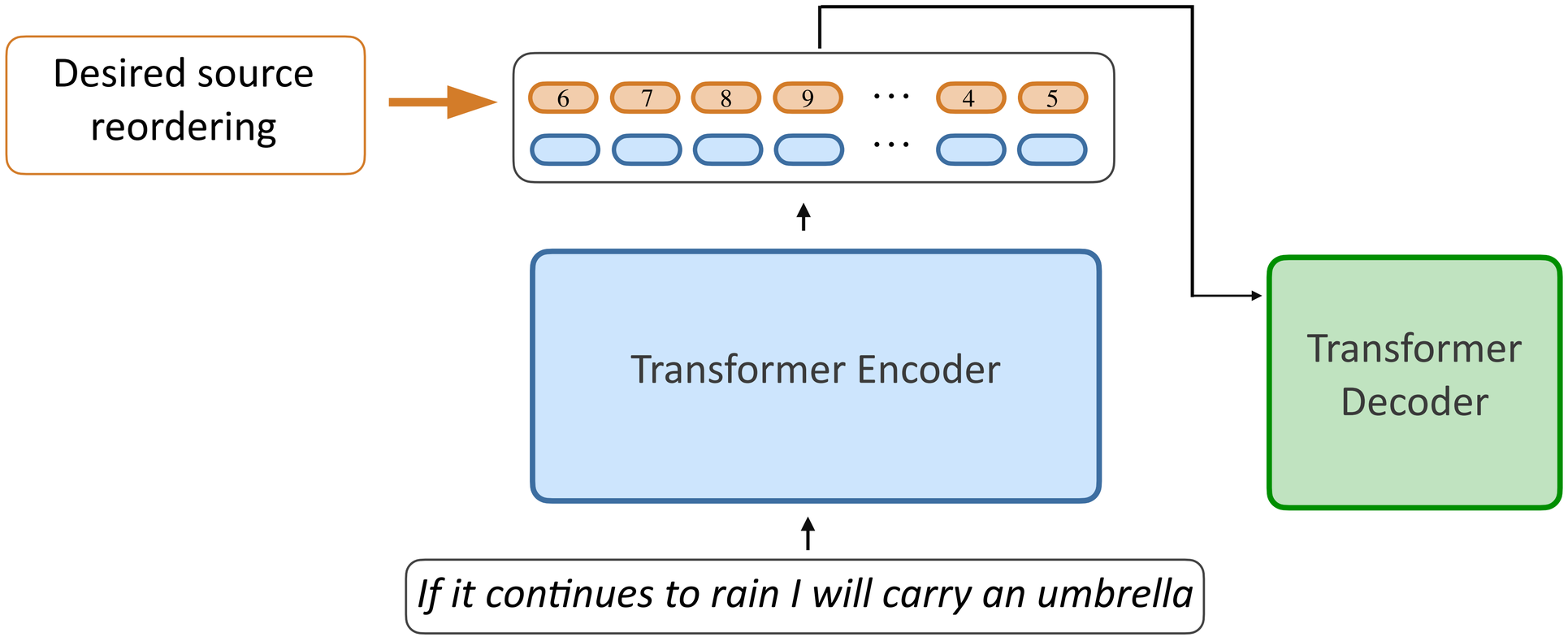

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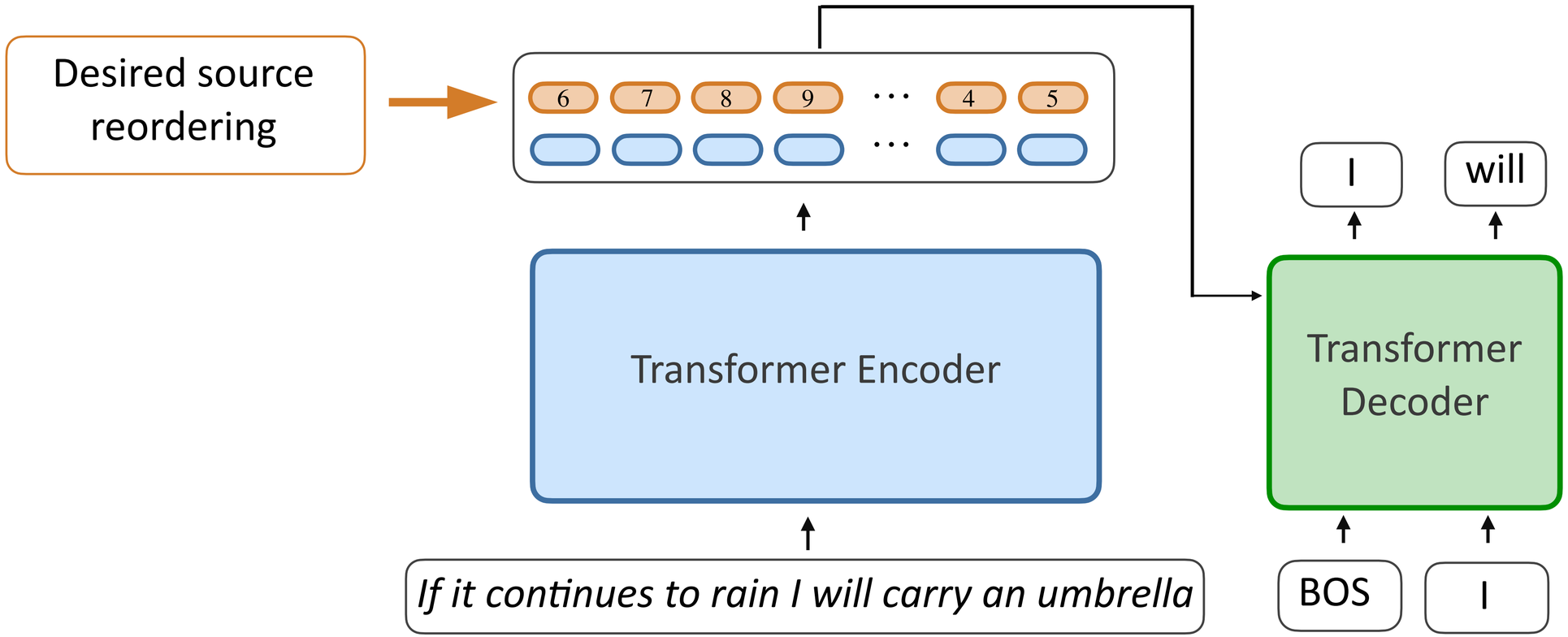

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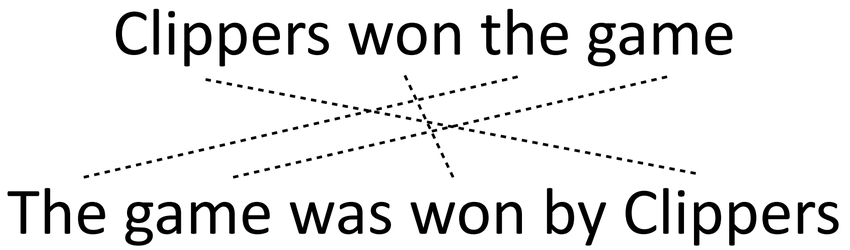

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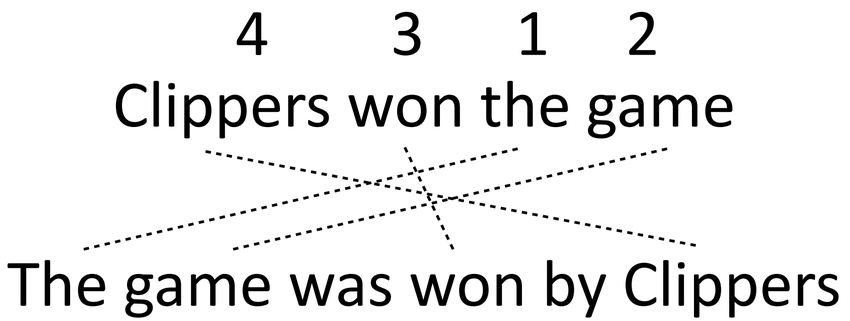

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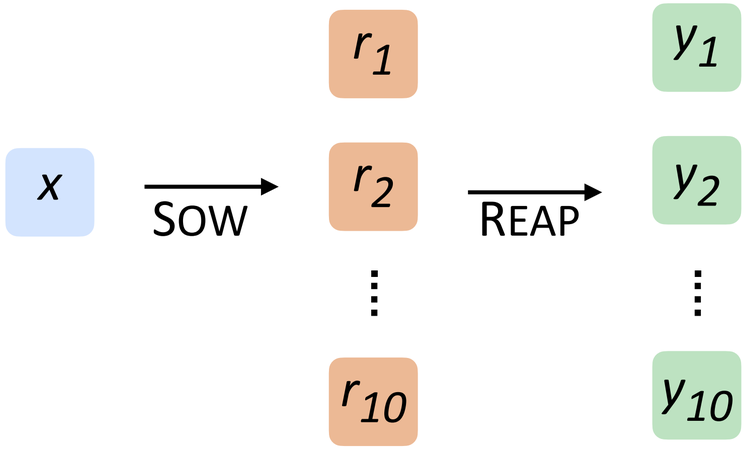

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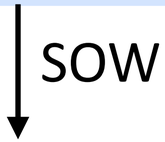

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PP

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VP *Despite recognition in European legislation, it has proved difficult to implement the right of consumer associations to representation.*

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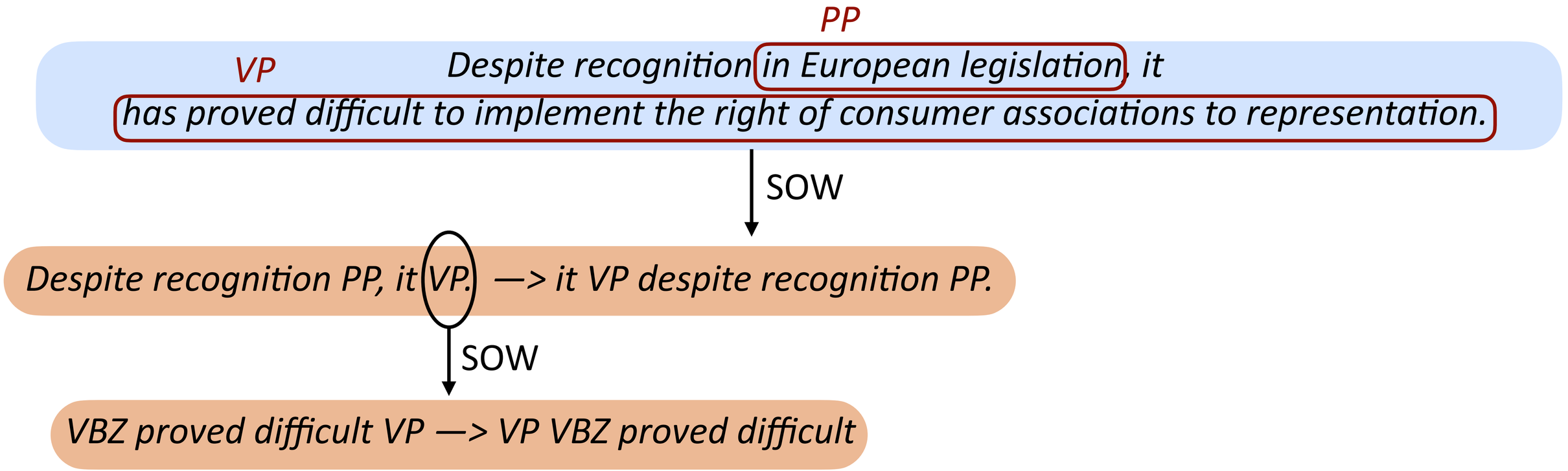

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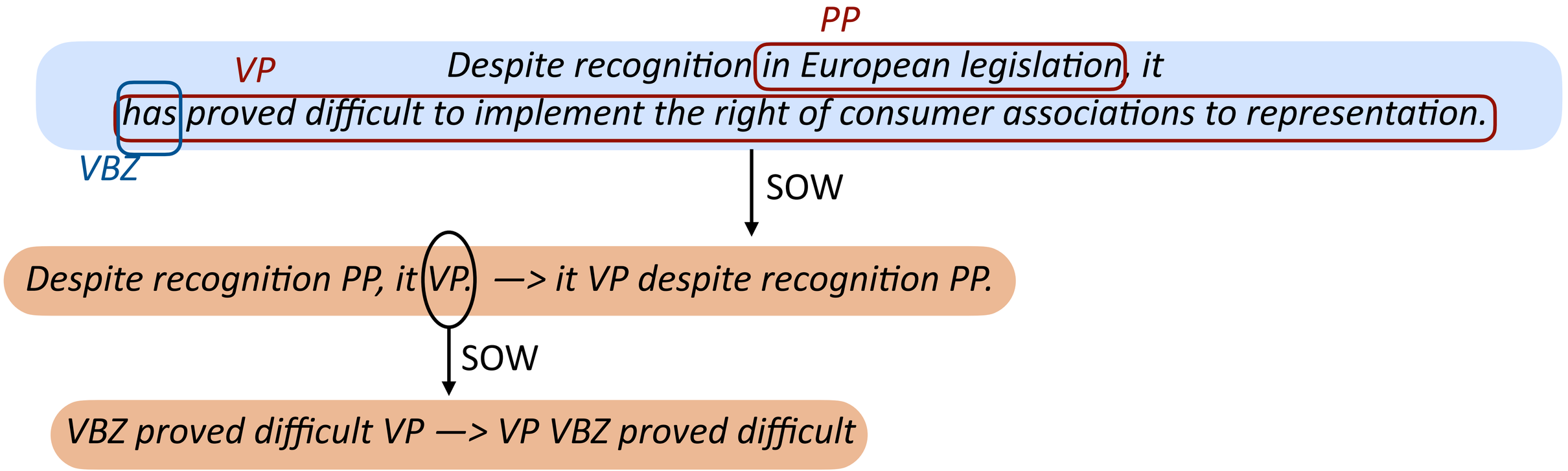

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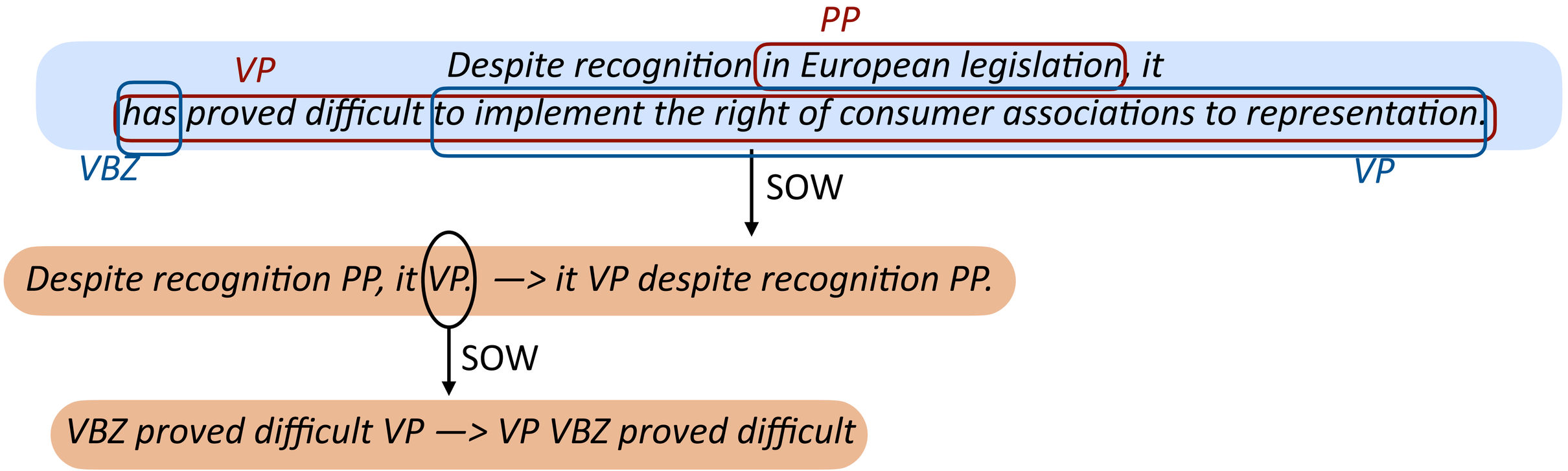

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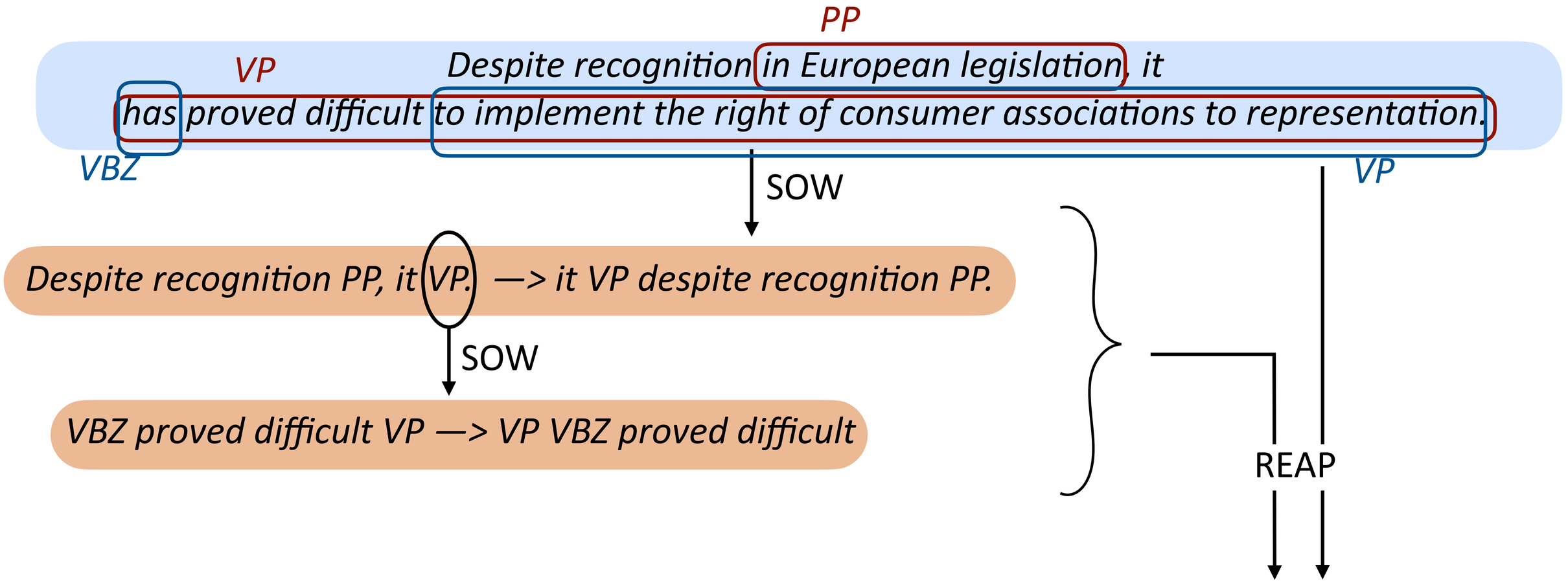

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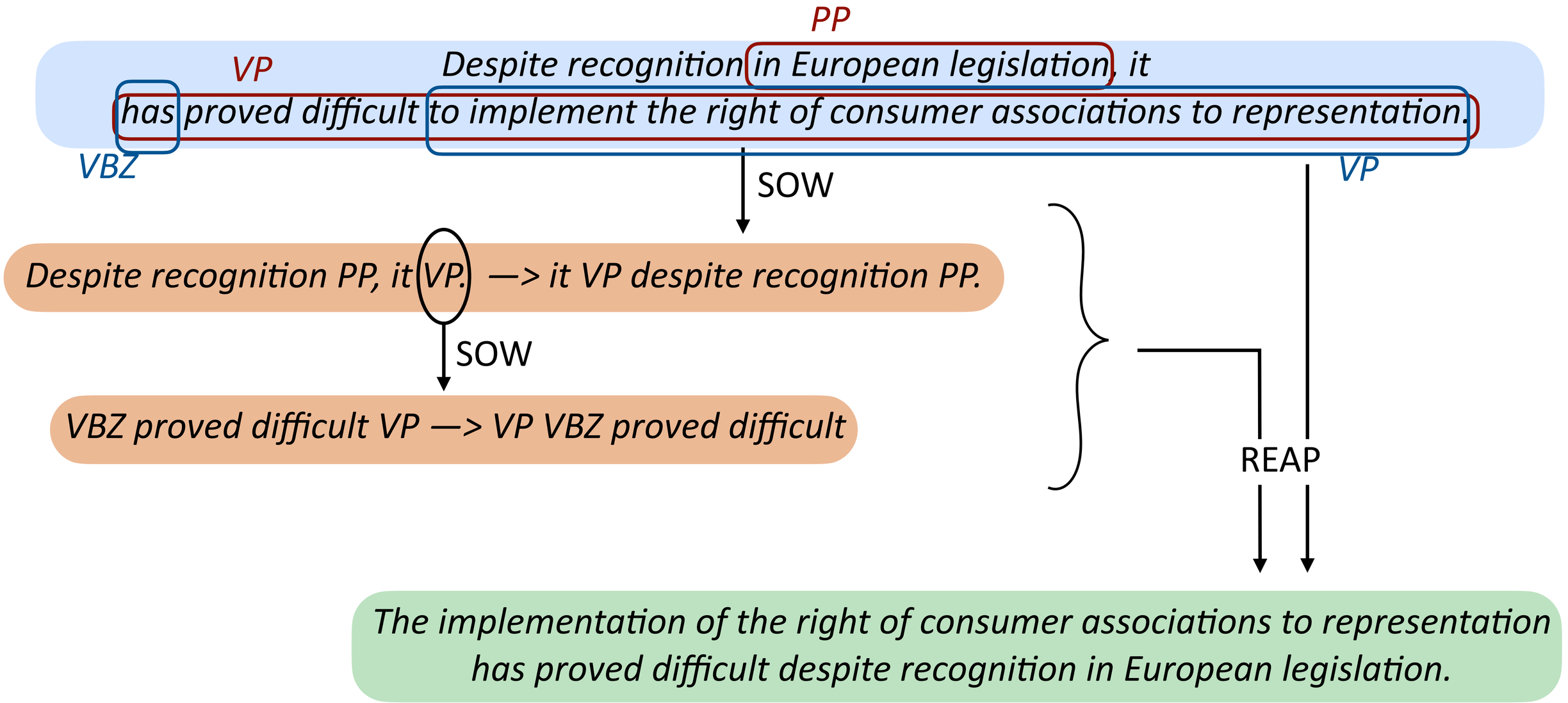

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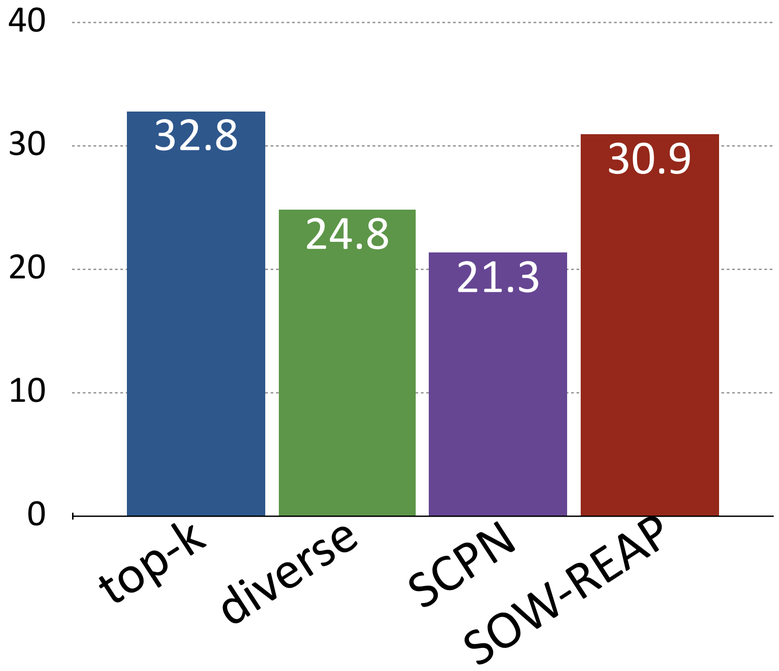

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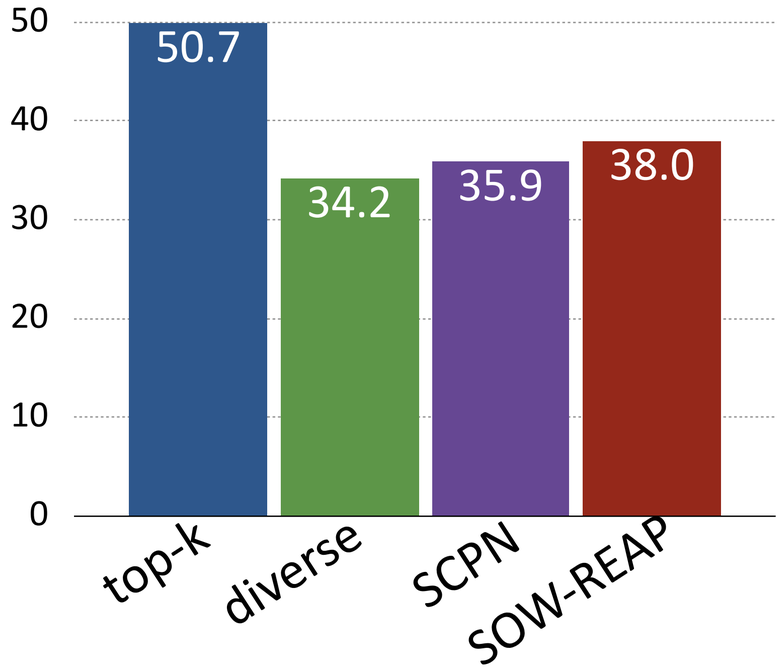

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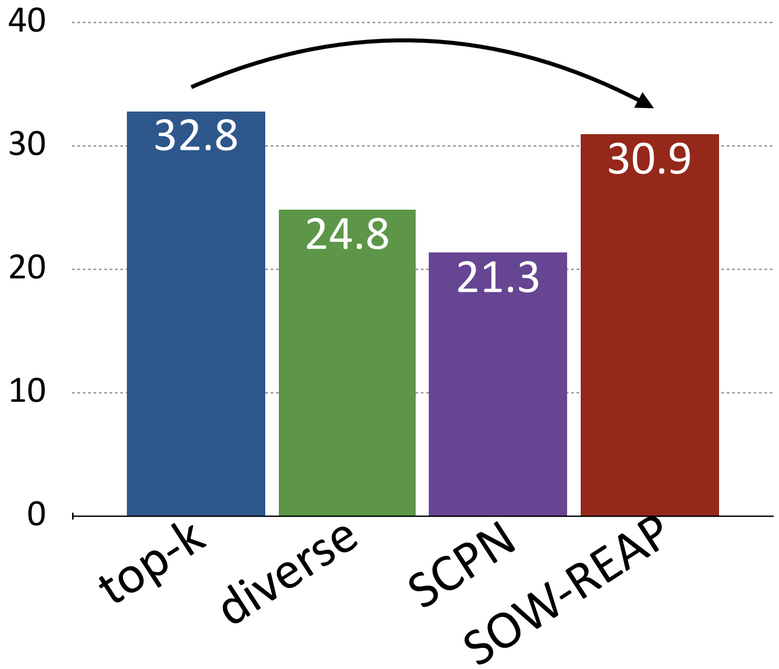

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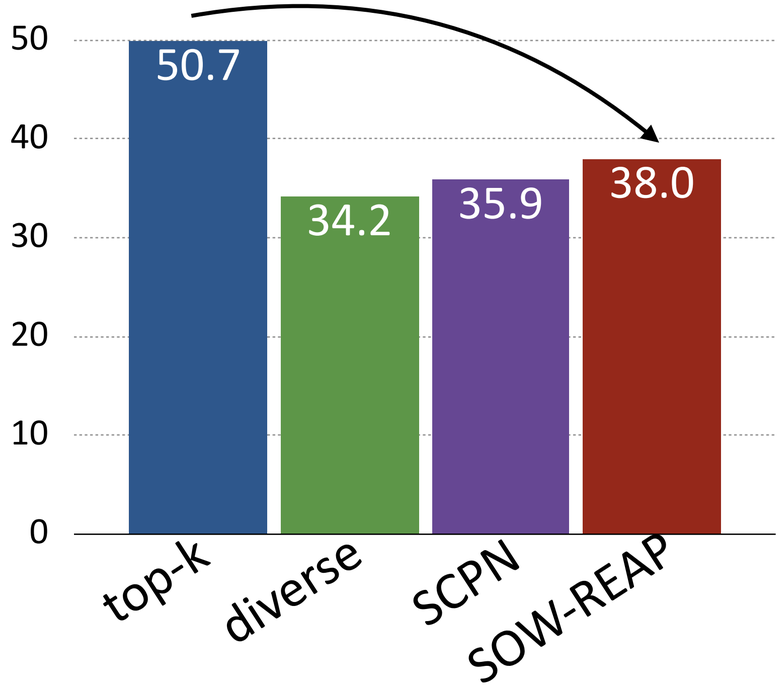

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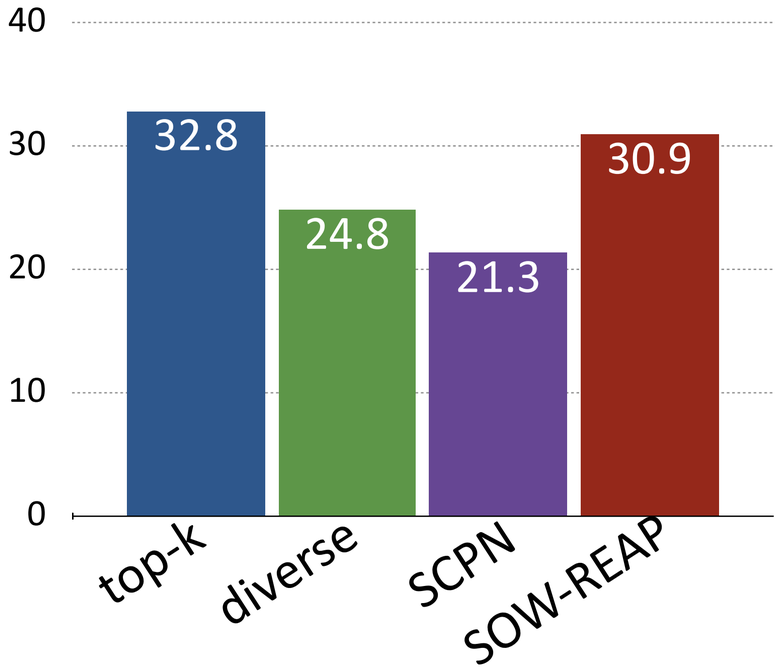

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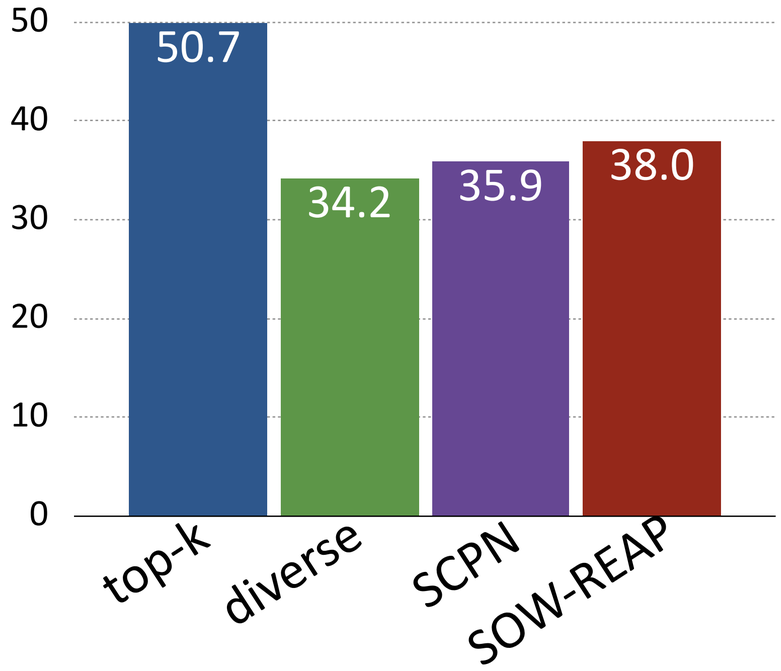

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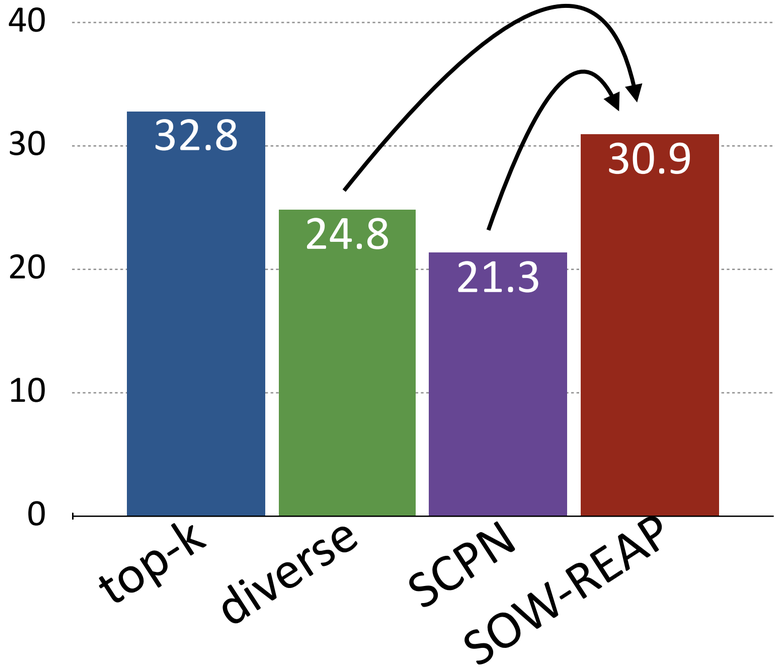

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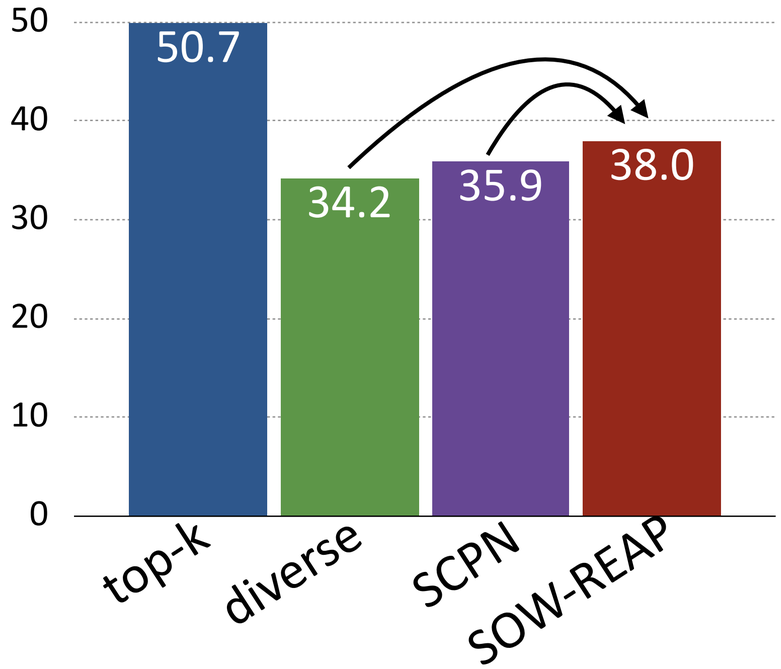

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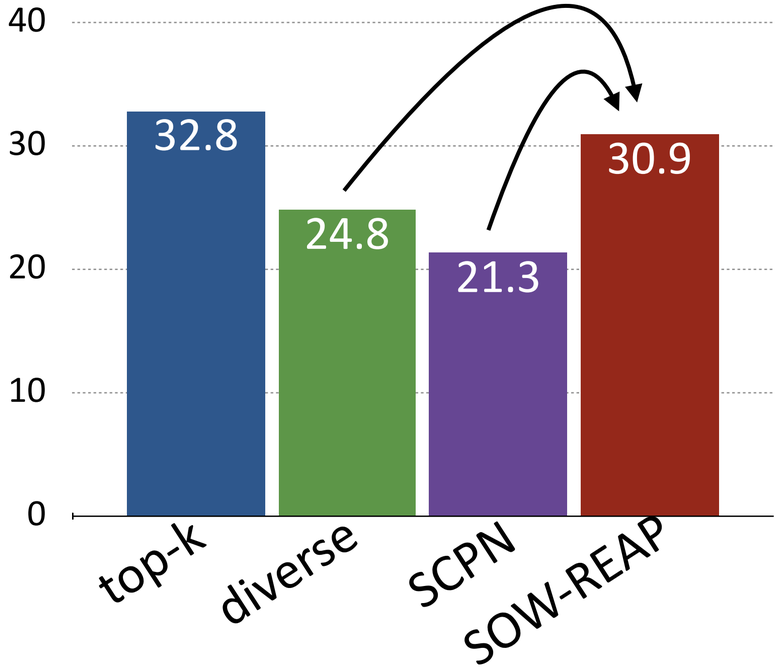

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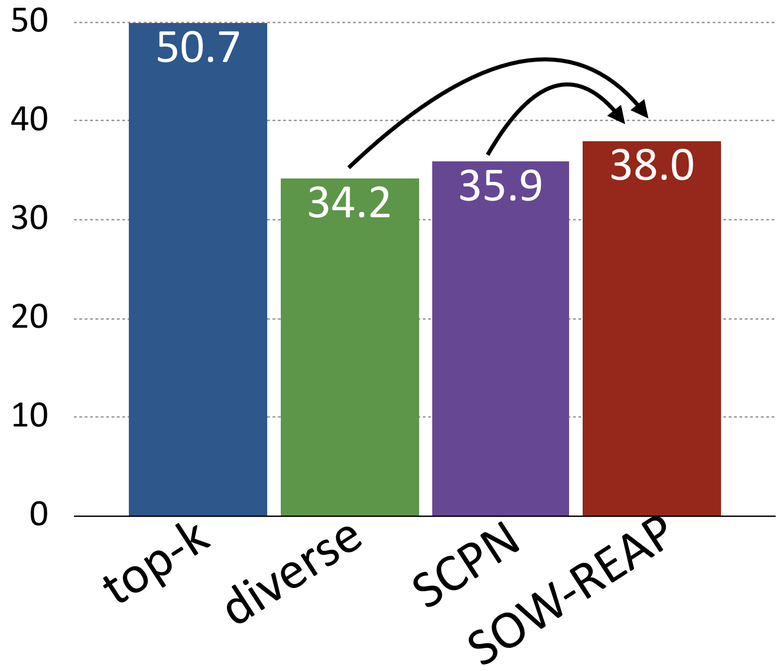

SOW-REAP achieves a better quality-diversity tradeoff compared to baselines!

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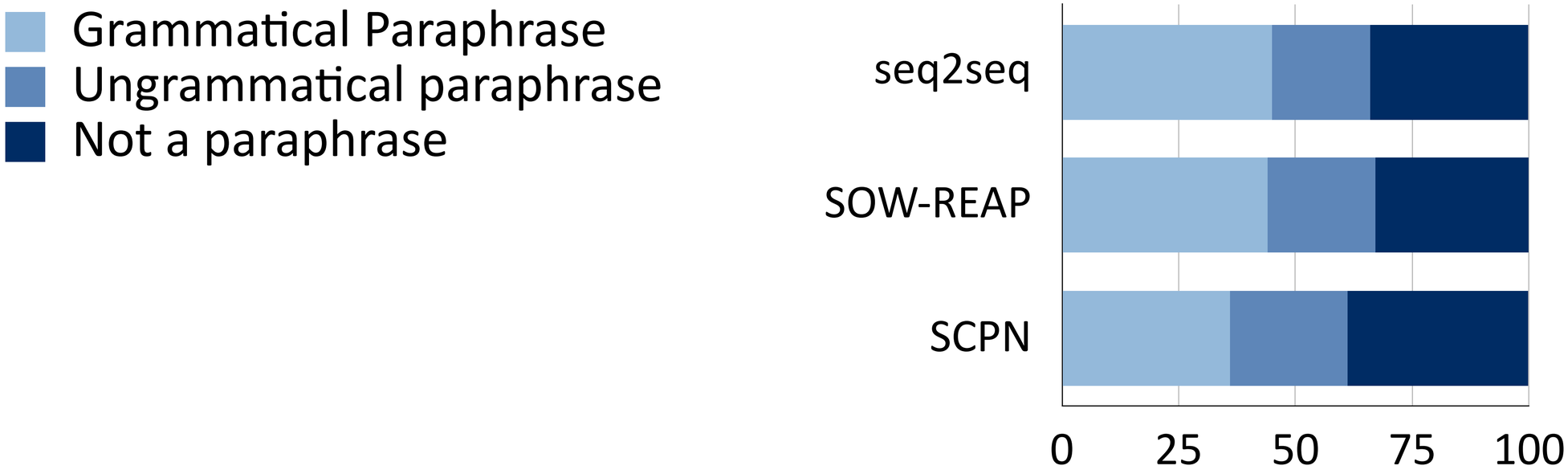

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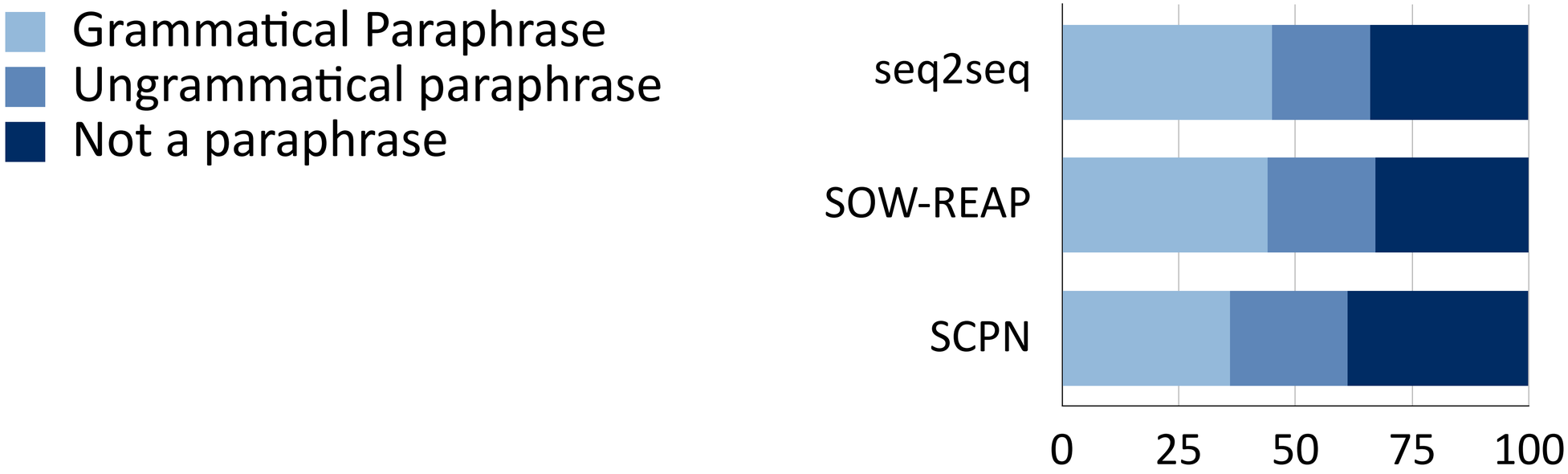

- Quality of ours is **as high as** the basic seq2seq model

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