

AACL - 2023

Phylogeny-Inspired Adaptation of Multilingual Models to New Languages

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Going beyond the top-100 languages



Getting a LM for a new language

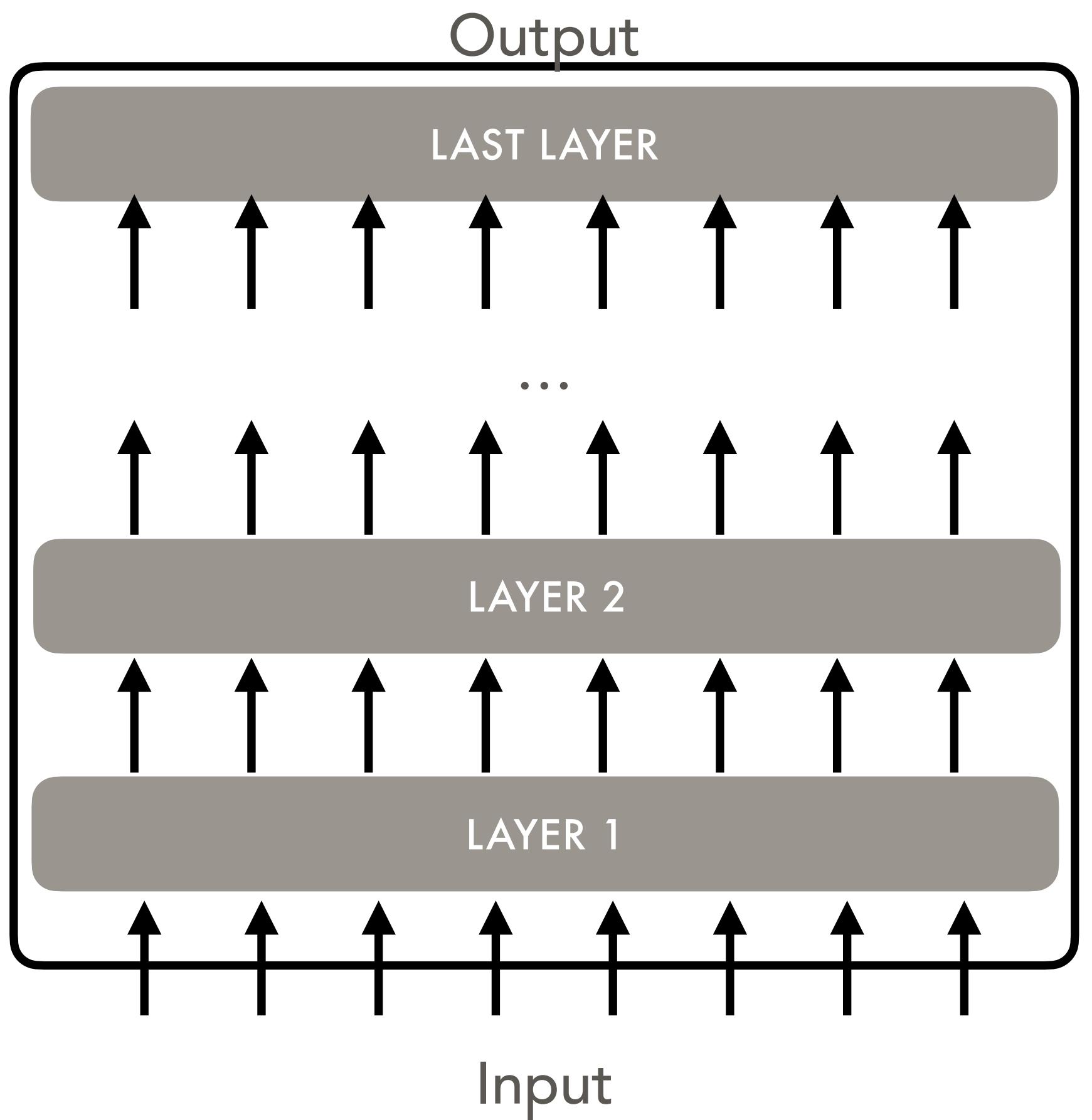
Option A: Train (a monolingual) one from scratch

Option B: Just use mBERT (zero-shot)

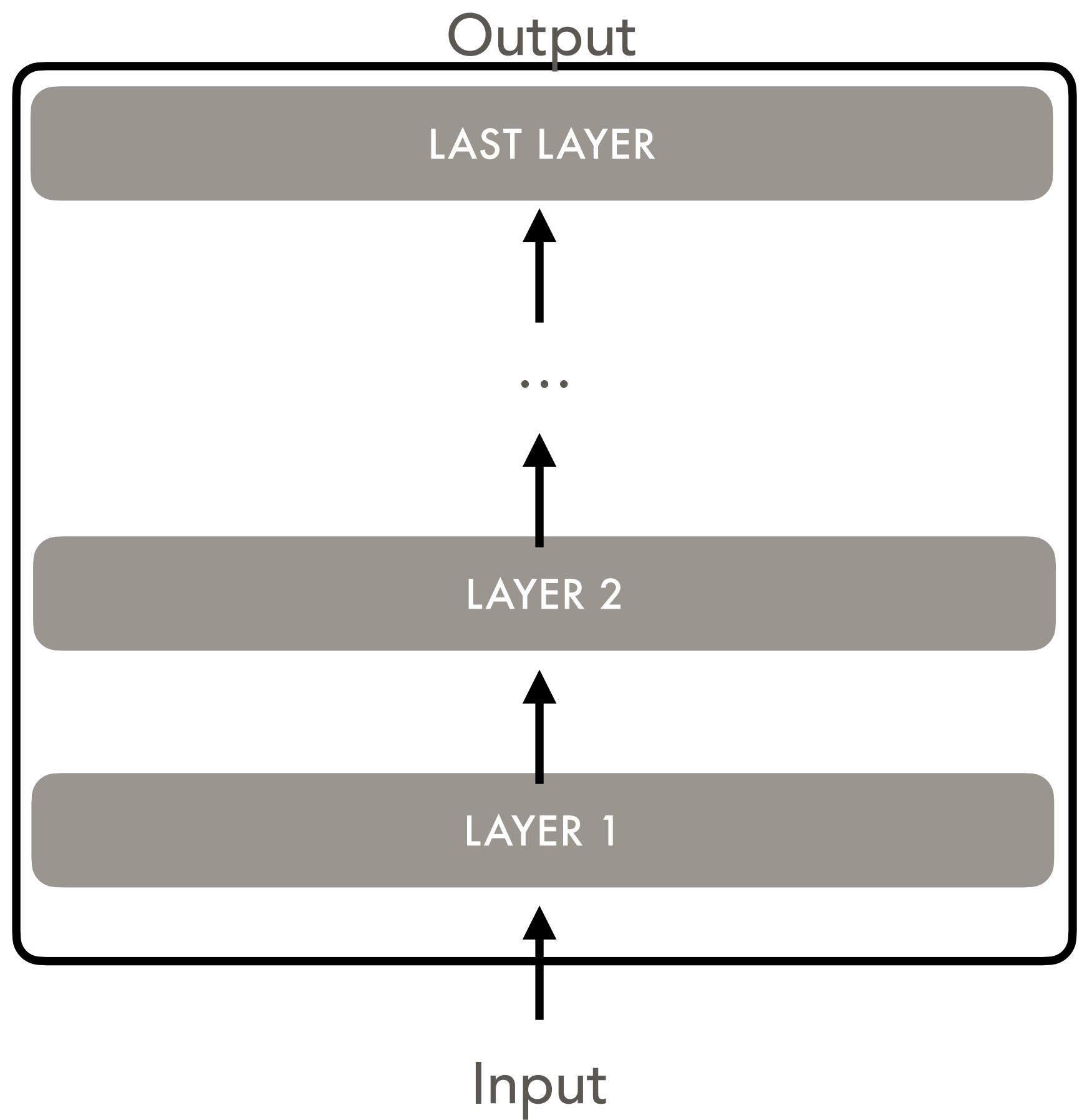
Option C: Continue training mBERT with same unsupervised objective

Option D: Adapters (*Pfeiffer et al. 2020*)

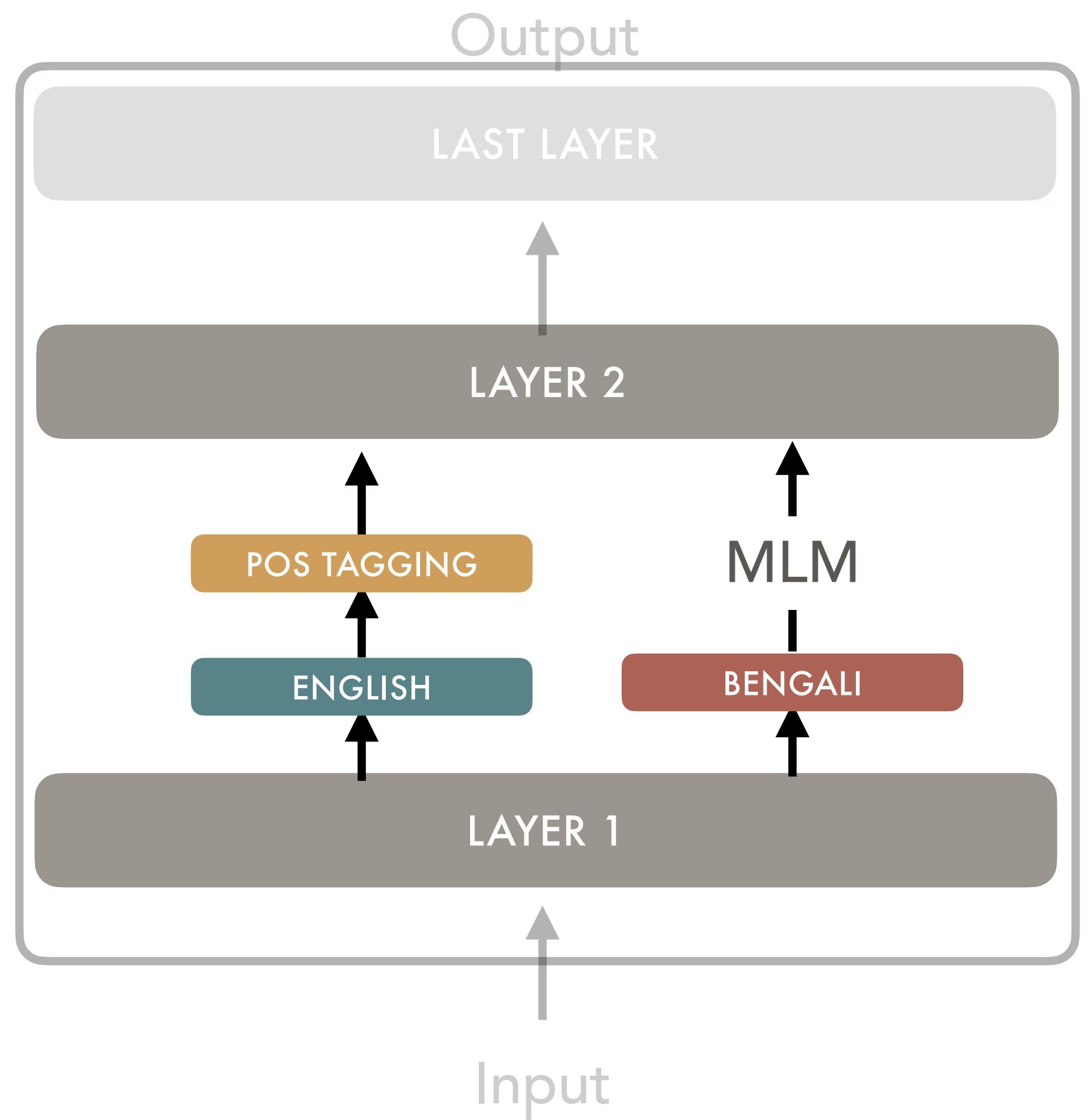
Revisiting Adapters



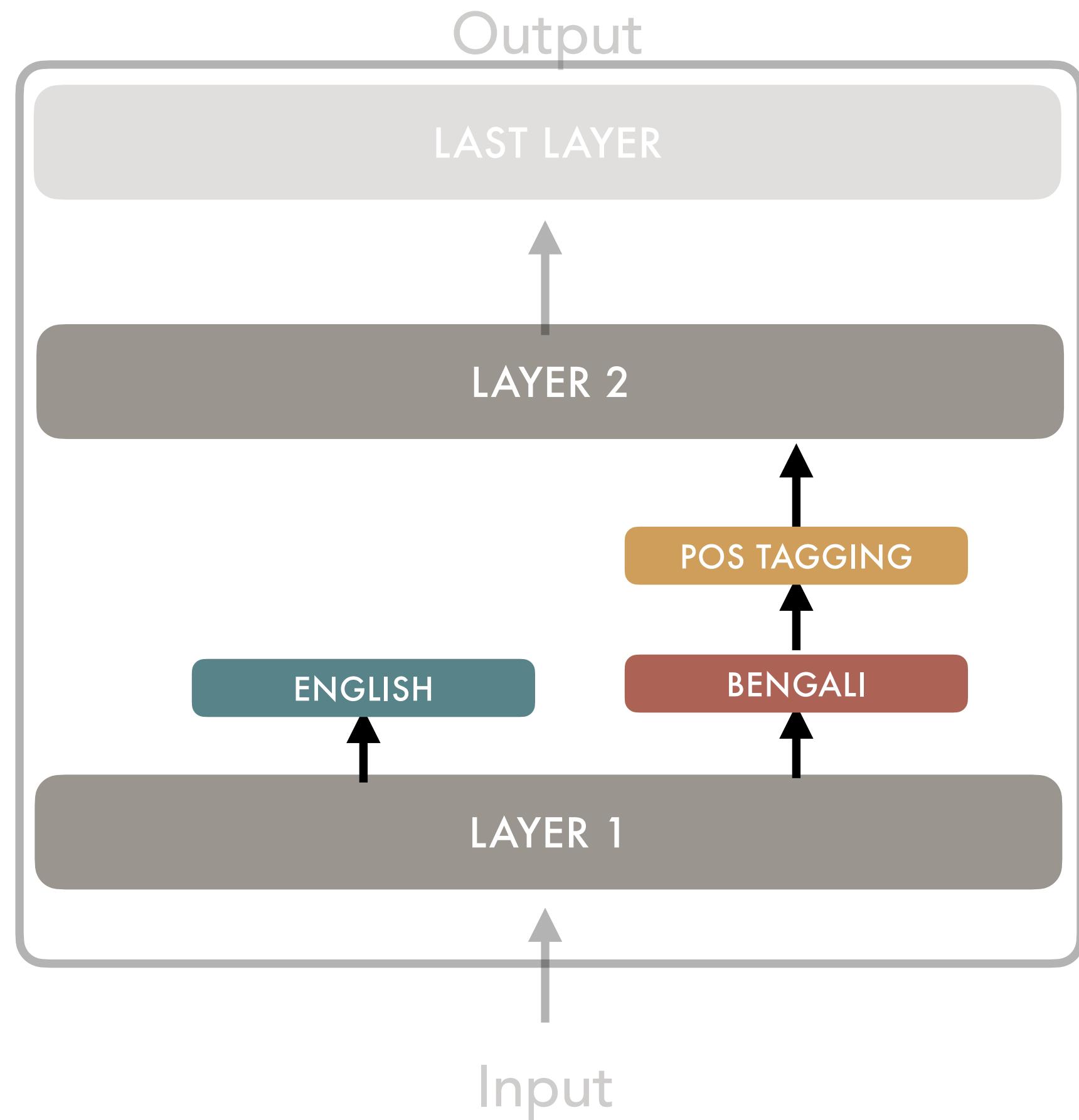
Revisiting Adapters



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Revisiting Adapters



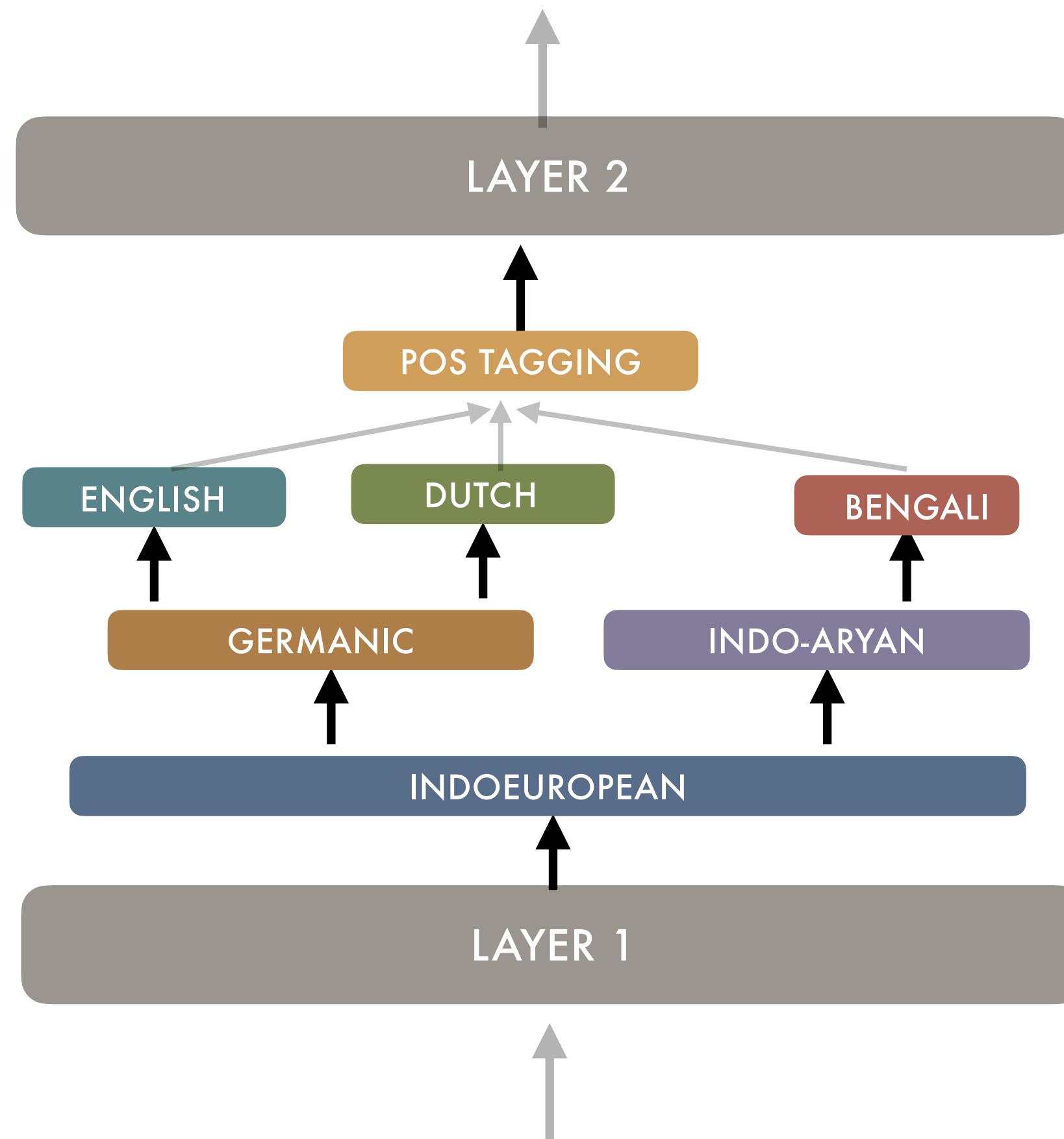
Easy zero-shot adaptation to new languages at a low cost (additional parameters)

Avoids catastrophic forgetting

Performance comparable to full-model fine-tuning

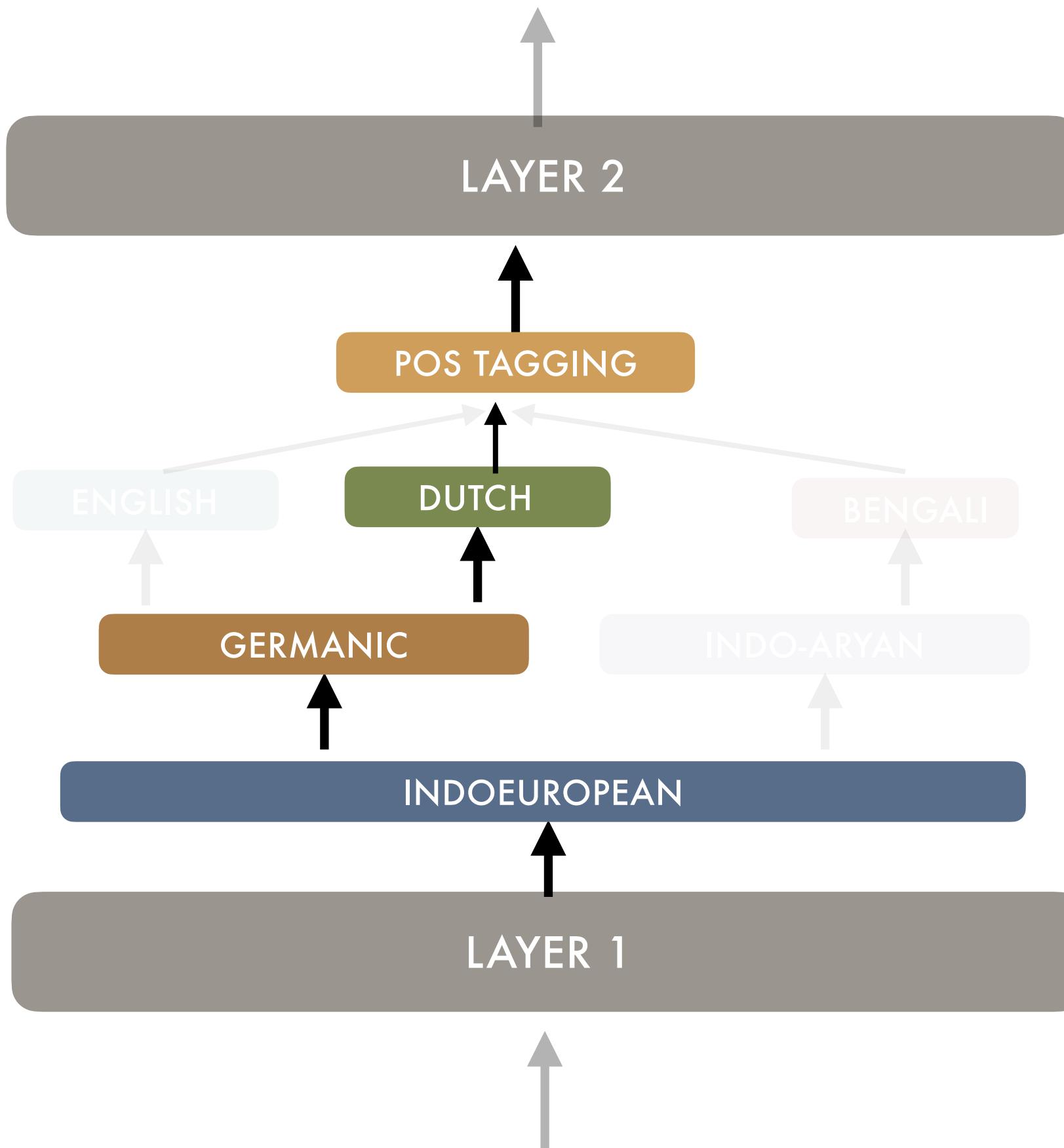
Can we do better?

Follow Phylogeny for Parameter Sharing



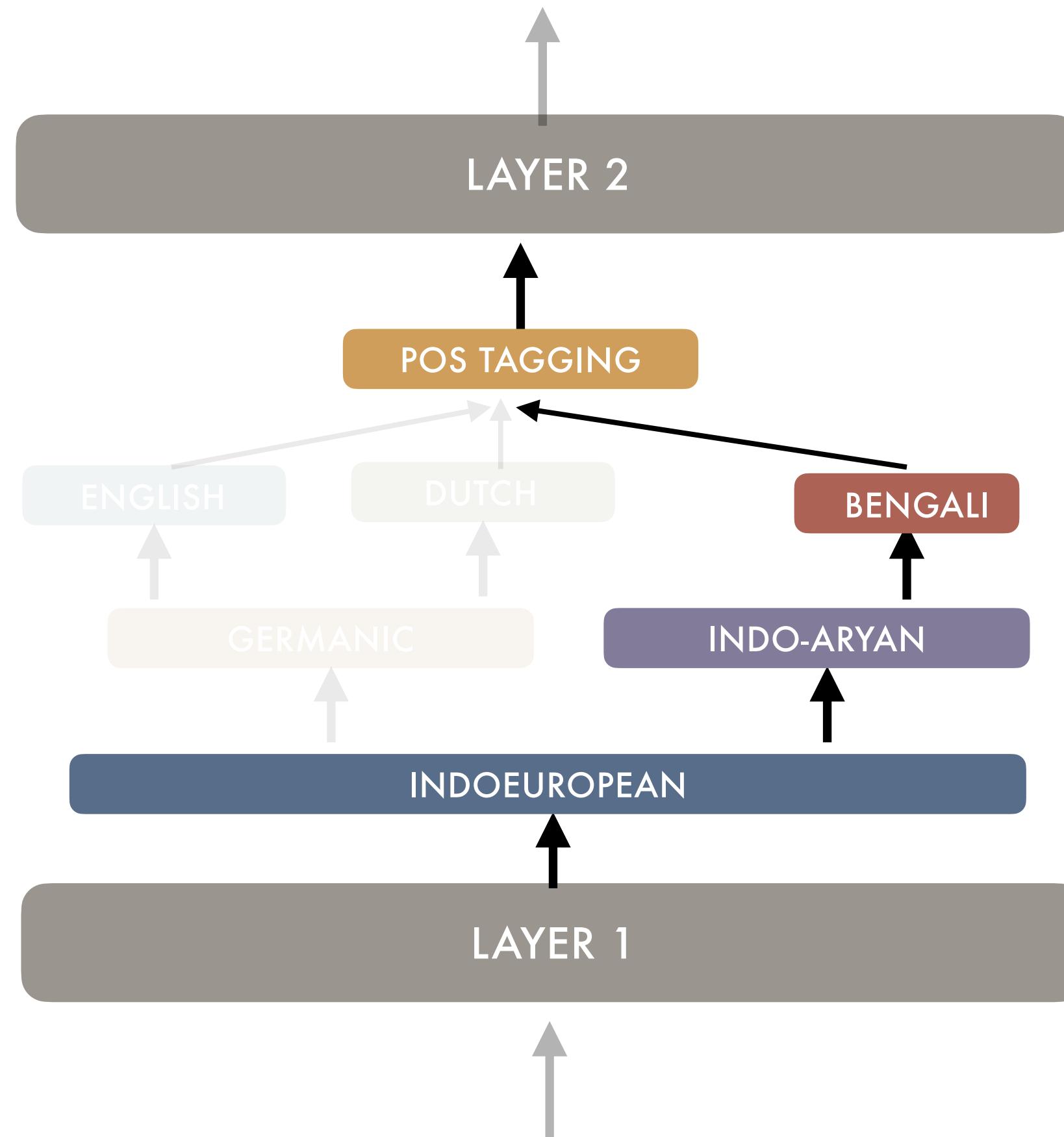
Follow Phylogeny for Parameter Sharing

For Dutch input

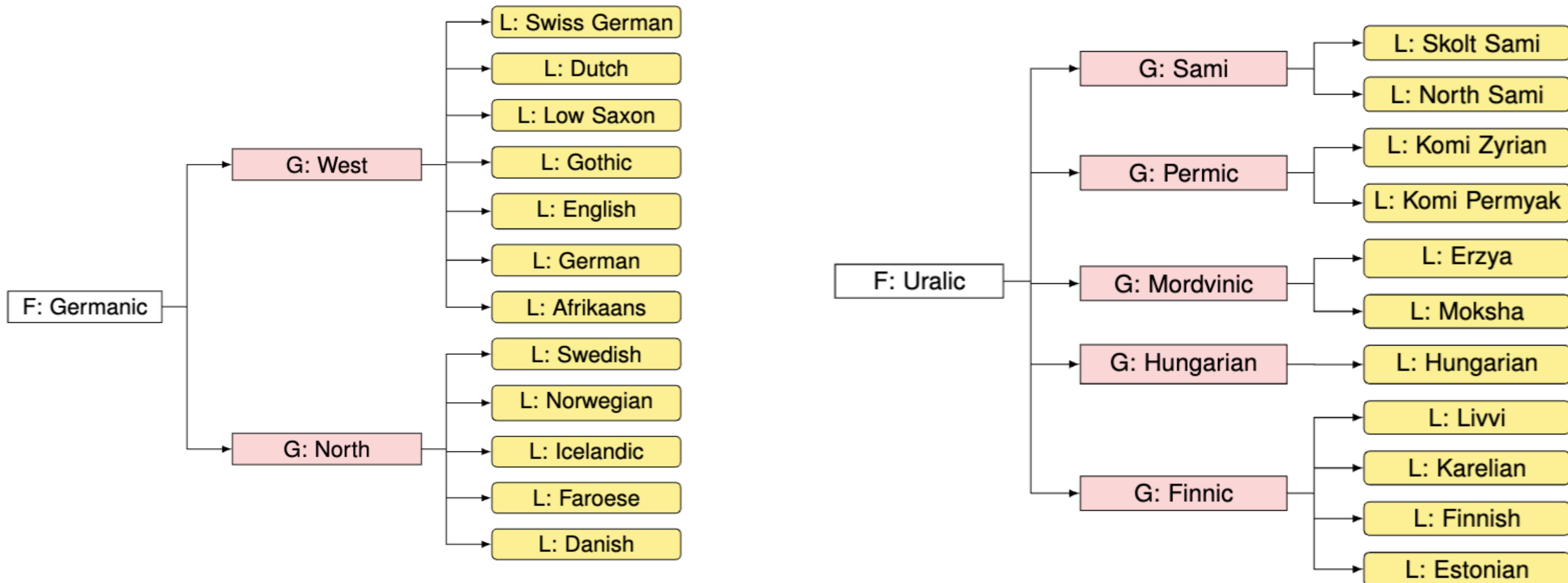


Follow Phylogeny for Parameter Sharing

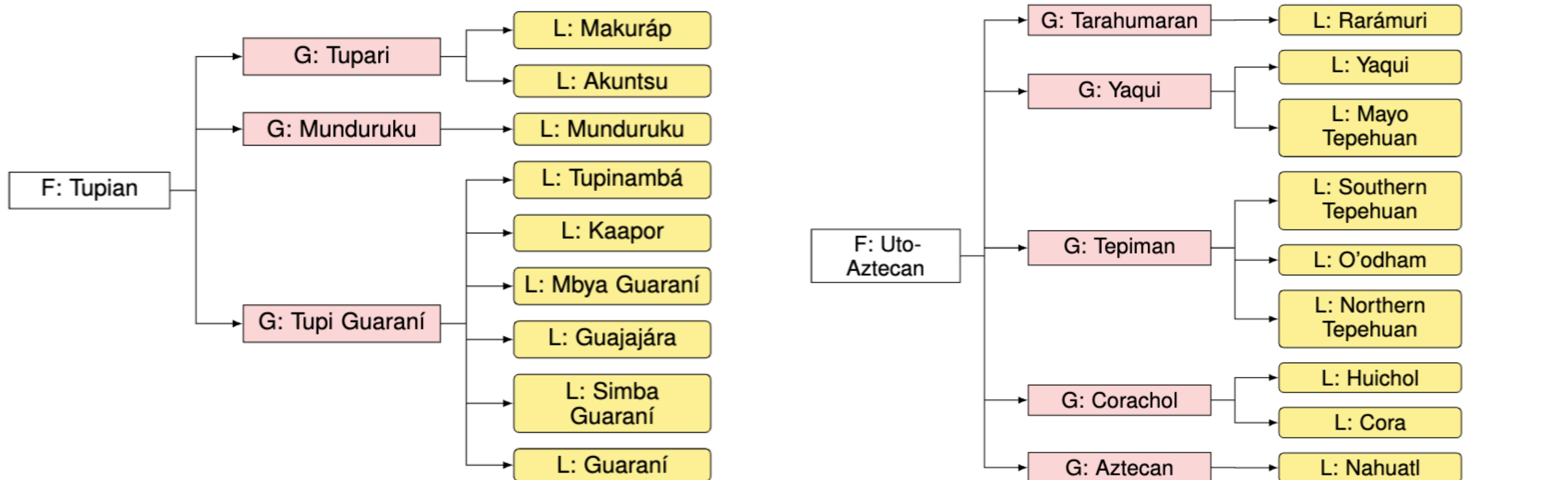
For Bengali input



Experimental setup

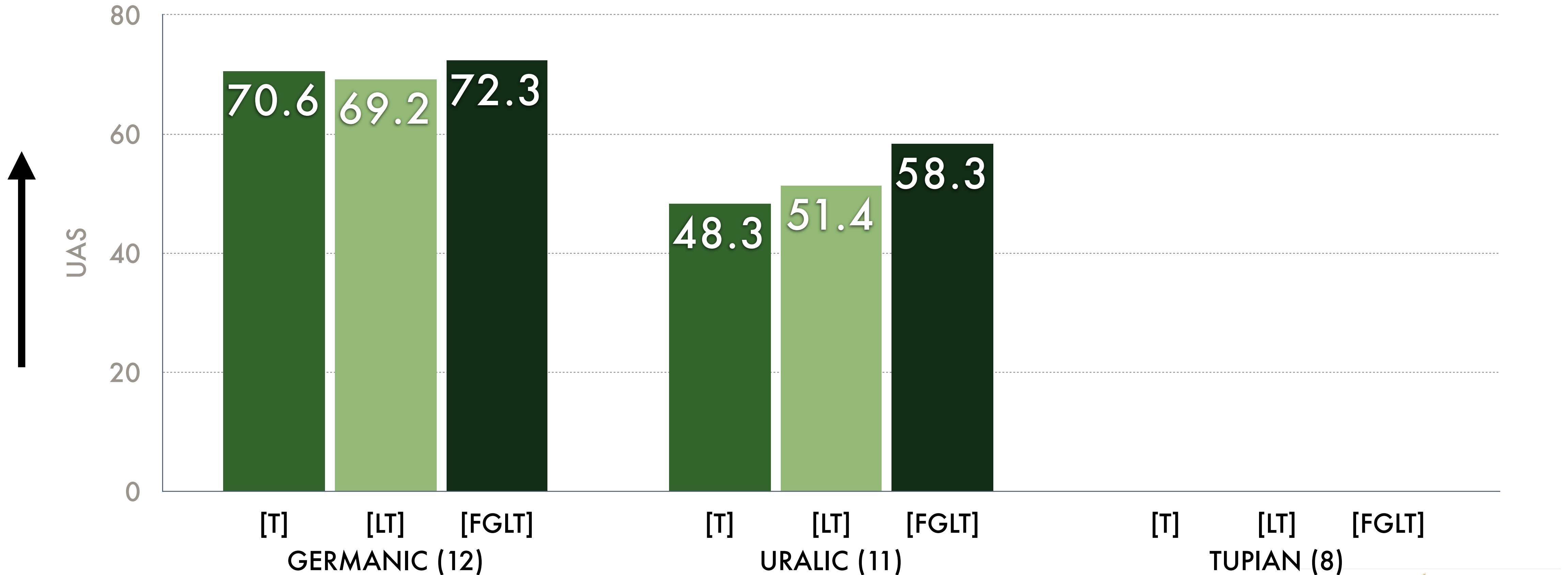


Experimental setup



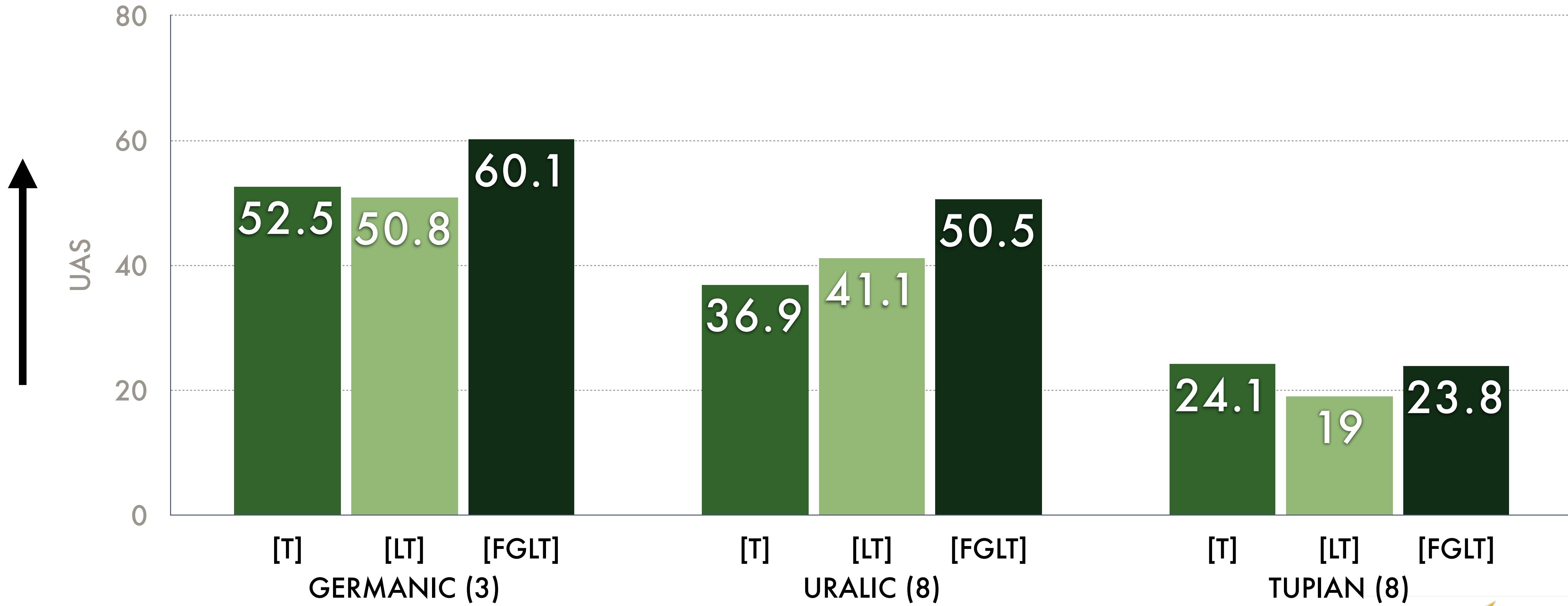
Results

DEPENDENCY PARSING



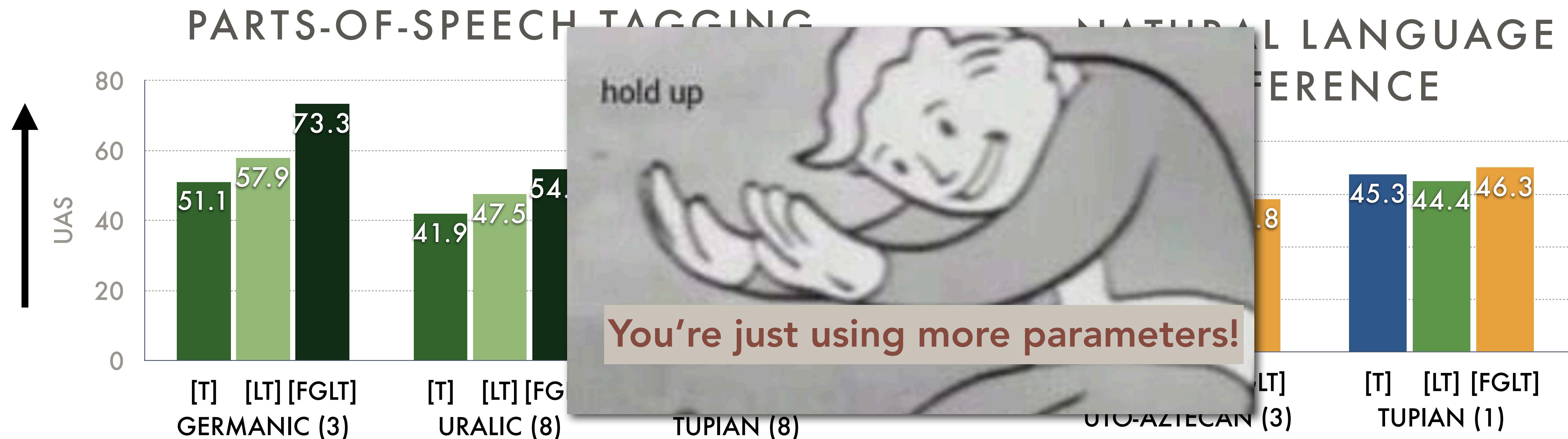
Results on unseen languages

DEPEDENCY PARSING



Much larger improvements for *new, unseen languages*

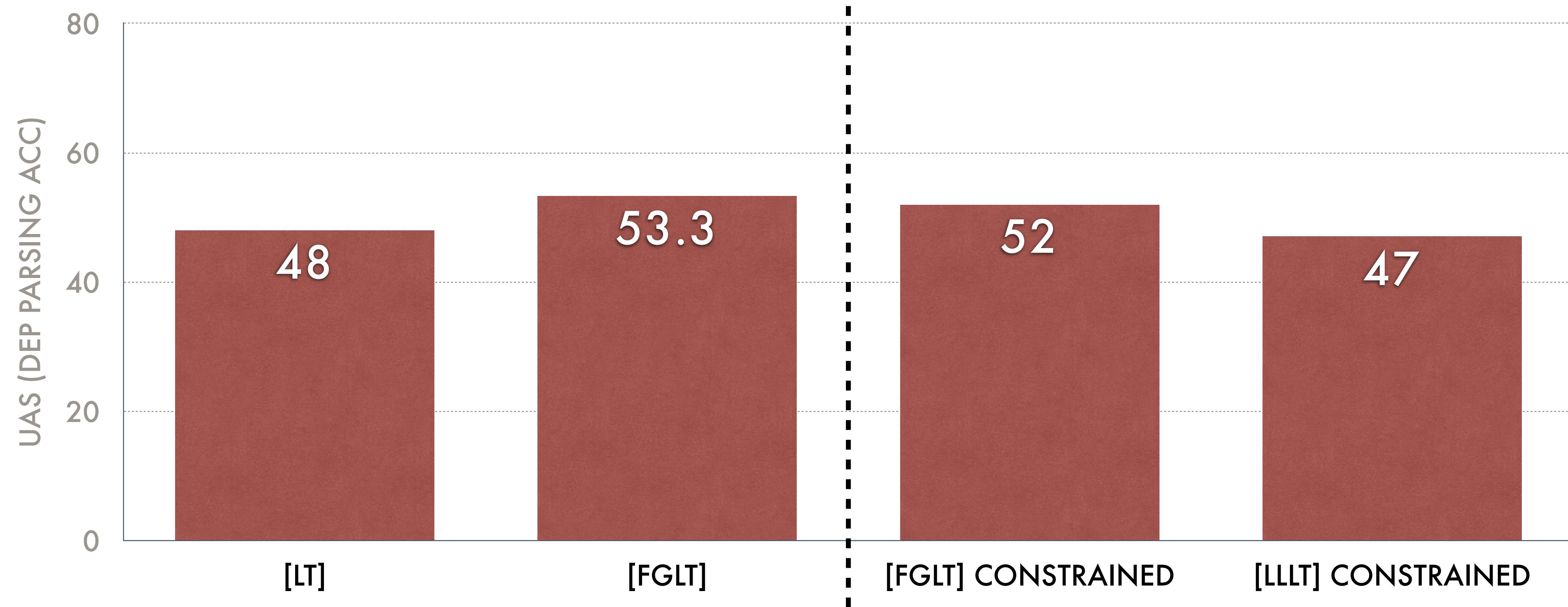
Results on unseen languages



Much larger improvements for *new, unseen languages*

Ablations: Parameters

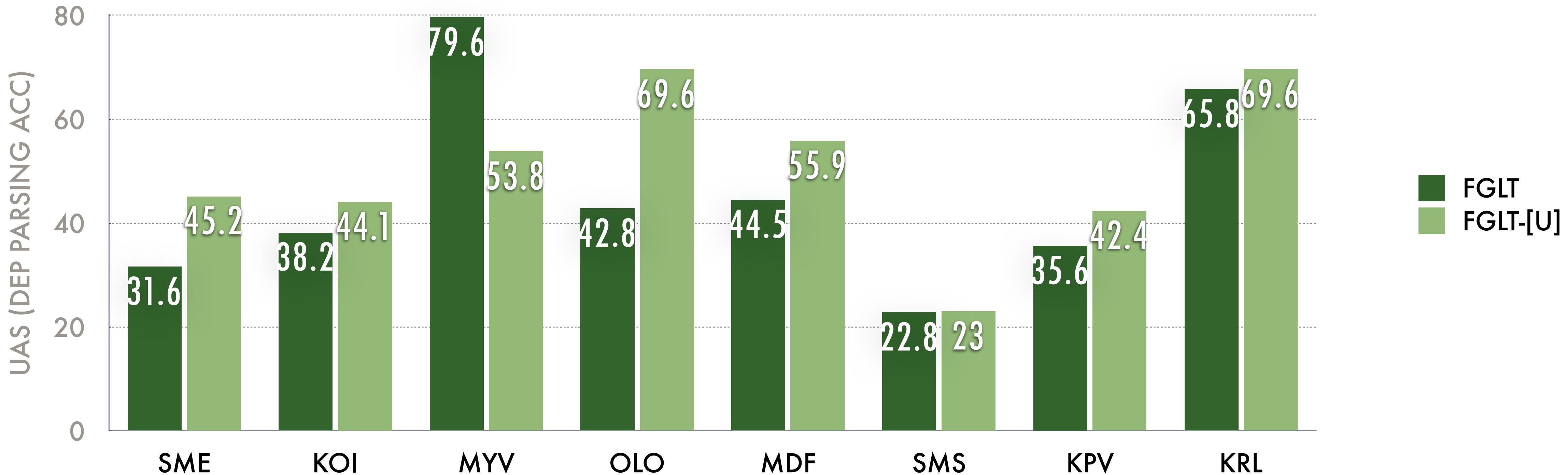
DEPENDENCY PARSING ON URALIC LANGS



Even constraining to the same number of parameters, still improvements!
Is it language sharing or network depth?

Ablations: Upsampling

DEPENDENCY PARSING ON URALIC LANGS



Upsampling by simple repeating sentences does better

- Adapter-based approach to leverage language phylogenetic information for better cross-lingual adaptation.
- Exact same parameter count but smaller adapters with parameter sharing across related language improves performance in true-zero-resource scenarios.



A photograph of the George Mason University campus. In the foreground, there's a large, green, leafy hedge. In the middle ground, two students are walking up a set of stone steps. In the background, there's a modern building with a glass facade and a prominent white cylindrical observatory tower with a dark dome. The sky is overcast.

Thank you!



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