

Fig 1: Theoretical performance gains from single-source to instance-based parser selection on 20 unseen test languages.

Motivation

1. Current methods of cross-lingual parser transfer focus on predicting the best parser globally (**single-source**)
2. **Observation:** Different source parsers are the best choice for different target sentences
3. We propose a novel cross-lingual transfer paradigm: instance-level parser selection (**instance-based**)
4. **Proof of concept:** Delexicalized Parser Transfer, assumed gold UPOS [1] tags (42 Train and 20 unseen Test languages)

- [1] Nivre et al. 2018. Universal Dependencies 2.3.  
 [2] Lin et al. 2019. Choosing transfer languages for cross-lingual learning. In Proceedings of ACL, pages 3125–3135.  
 [3] Rosa et al. 2015. KLcpo - a language similarity measure for delexicalized parser transfer. In Proceedings of ACL, pages 243–249.

## Instance-level Parser Selection

- **Instance-Level Parser Selection (ILPS):** Predict single strongest parser and decode sequence
- Treebank-level parser transfer: Aggregate individual predictions into **Single Best Parser Selection Selection (SBPS<sub>ILPS</sub>)**

## Baselines

- **Multi-source Parser (MSP):** train one parser model on concatenation of all training treebanks
- Treebank-level parser selection based on...
  - ...**cosine similarity** between **syntax vectors (L2V-SBPS)** [2]
  - ...**Kullback-Leibler divergence (KL-SBPS)** between UPOS trigram distributions [3]
- **Ensembles (ENS-X):** Reparsing, i.e., select more than one parser

Methodology & Baselines

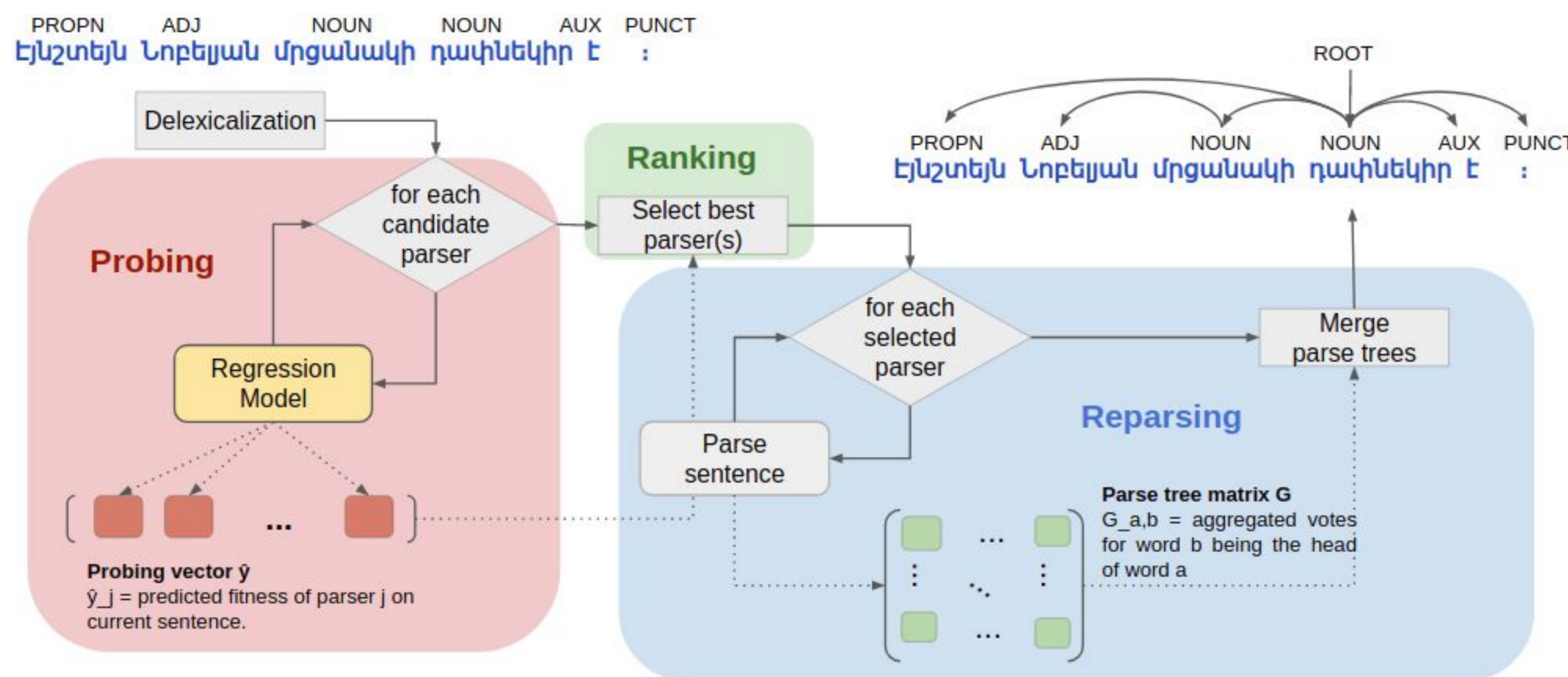


Fig. 2: **ILPS Framework:** (1) **Probing:** ILPS model predicts parser accuracies; (2) **Ranking:** Rank parsers w.r.t. predicted accuracy and select top k parsers; (3) **Reparing:** Induce final tree by merging individual trees produced by two or more parsers

## Single-parser selection (left)

- **ILPS** > **KL-/L2V-SBPS** on 13 and 14 out of 20 languages
- **SBPS<sub>ILPS</sub>** > **ILPS** & **KL-/L2V-SBPS** on 17 and 16 languages
- Neither model outperforms multi-source parser (**MSP**)

## Ensemble evaluation (right)

- Allowing to select more than one parser (**ENS-SBPS<sub>ILPS</sub>**) outperforms **MSP**
- Both ensembles (**ENS-ILPS**, **ENS-SBPS<sub>ILPS</sub>**) outperform
  - oracle baseline using all parsers (**ENS-OR-ALL**)
  - single parser oracle baseline (**OR-SBPS**)
- There are still large potentials w.r.t. best possible result

Results

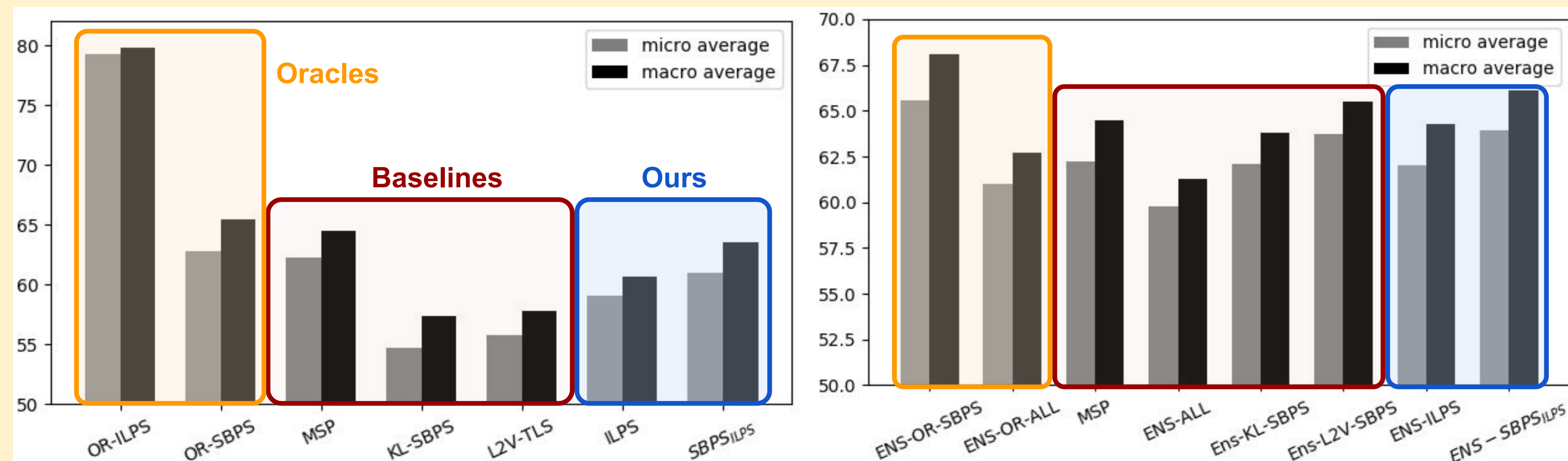


Fig. 3: Single-parser selection results (left) and ensemble results (right) in terms of Unlabeled Assignment Score, AVG over 20 test languages