Sapienza
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EuroSense: Automatic Harvesting of Multilingual Sense Annotations from Parallel Text

http://lcl.uniroma1.it/eurosense

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What is it?

- **EuroSense** is a multilingual **sense-annotated resource**, automatically built via the joint disambiguation of the **Europarl** parallel corpus **[2]** in **21** languages, with almost **123 million** sense annotations for over **155 thousand** distinct concepts and entities, drawn from the multilingual sense inventory of **BabelNet** [4].
- **EuroSense**'s disambiguation pipeline is designed to exploit at best the **cross-language complementarities** of the parallel corpus, without relying on word alignments against a pivot language.

OPUS

BabelNet

Babelfy

The tools

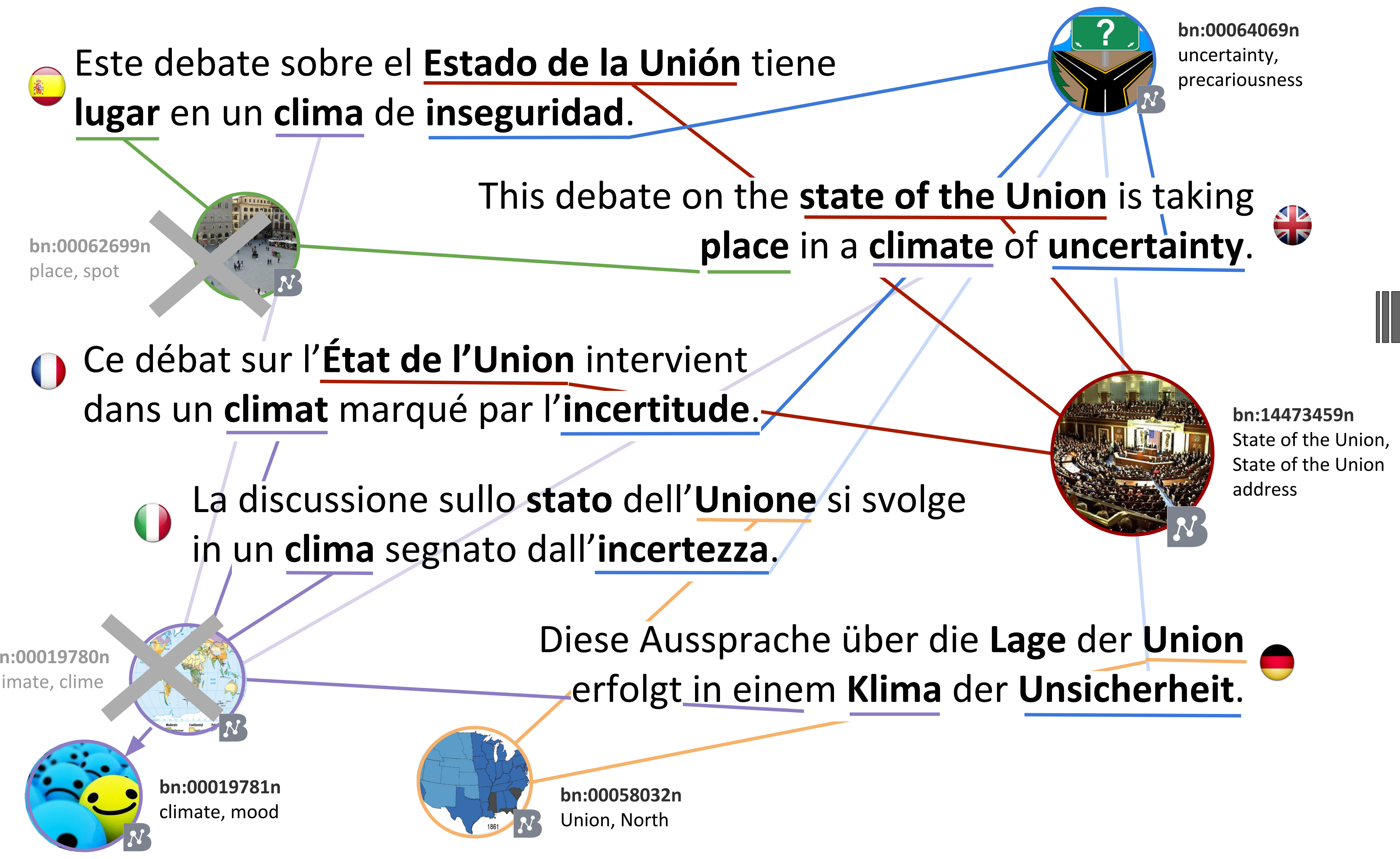
- **Babelfy [3]** is a state-of-the-art graph-based multilingual **disambiguation and entity linking system** powered by BabelNet
  http://babelfy.org
- **Nasari [1]** is a **language-independent vector representation** of concepts and entities from BabelNet and WIkipedia,
  http://lcl.uniroma1.it/nasari

Stage 1: Multilingual Disambiguation

- **Multilingual preprocessing (tokenipart-of-speech tagging, lemmatization)** with TreeTagger + Babelfy's preprocessing pipeline;
- For each sentence, gather all its available translations together in a **multilingual text;**
- **Multilingual disambiguation** using Babelfy's **densest subgraph** algorithm in such a way that it favors sense assignments that are consistent across languages.

$$\text{coherence}(d) = \frac{\#\ \text{connections}_d}{\sum_{i \in D} \#\ \text{connections}_i}$$

Coherence Score


Este debate sobre el **Estado de la Unión** tiene **lugar** en un **clima** de **inseguridad**.

This debate on the **state of the Union** is taking **place** in a **climate** of **uncertainty**.

Ce débat sur l'**État de l'Union** intervient dans un **climat** marqué par l'**incertitude**.

La discussione sullo **stato** dell'**Unione** si svolge in un **clima** segnato dall'**incertezza**.

Diese Aussprache über die **Lage** der **Union** erfolgt in einem **Klima** der **Unsicherheit**.

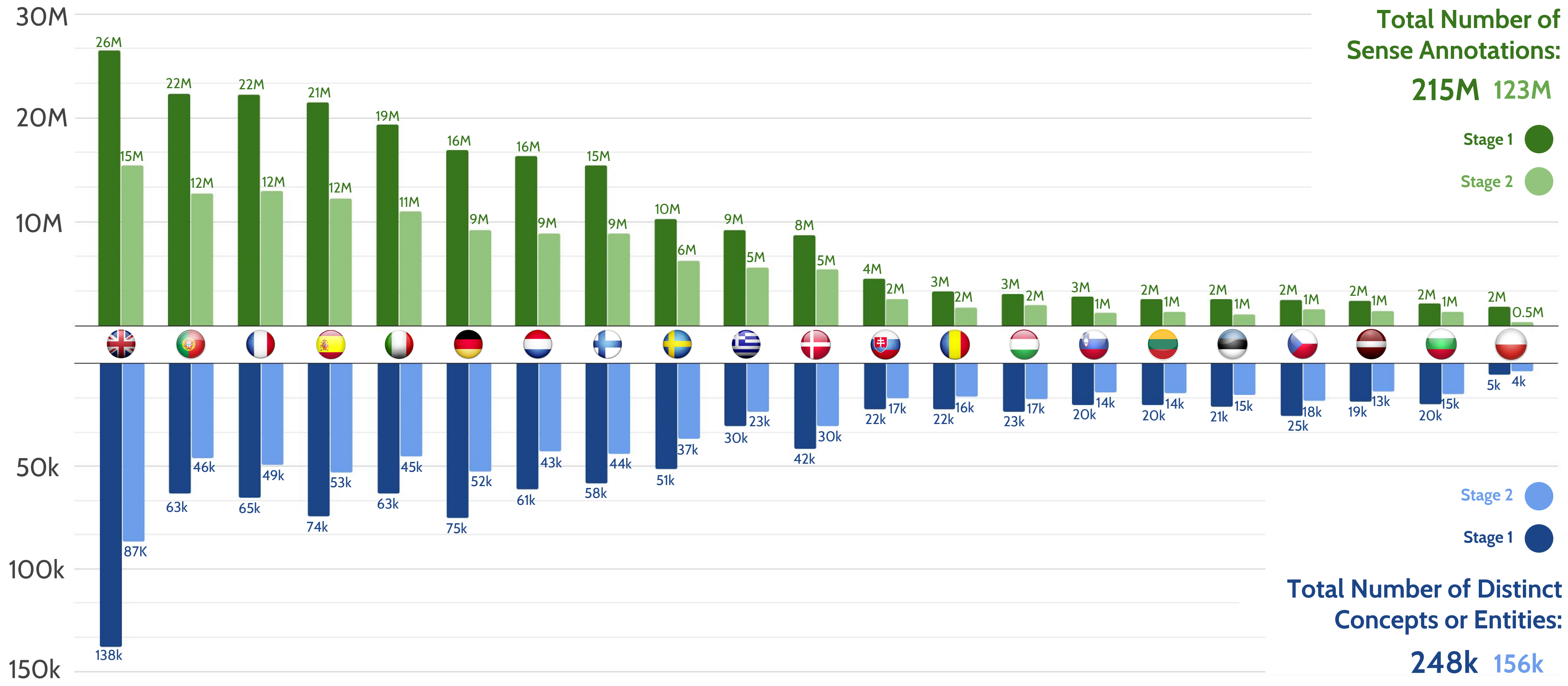
Stage 2: Similarity-based Refinement

- For each sentence, identify a subset **D** of **high-confidence disambiguations** (using the coherence score) from stage 1;
- Take the **Nasari vectors** associated with the disambiguations in **D** and compute the **centroid of D**;
- **Re-disambiguate** the mentions associated with the remaining disambiguations with the sense $\hat{s}$ having the **closest Nasari vector to the centroid**:

$$\hat{s} = \underset{s \in S_w}{\operatorname{argmax}}\ cos\left(\frac{\sum_{d \in D} \vec{d}}{|D|}, \vec{s}\right)$$

Similarity Score

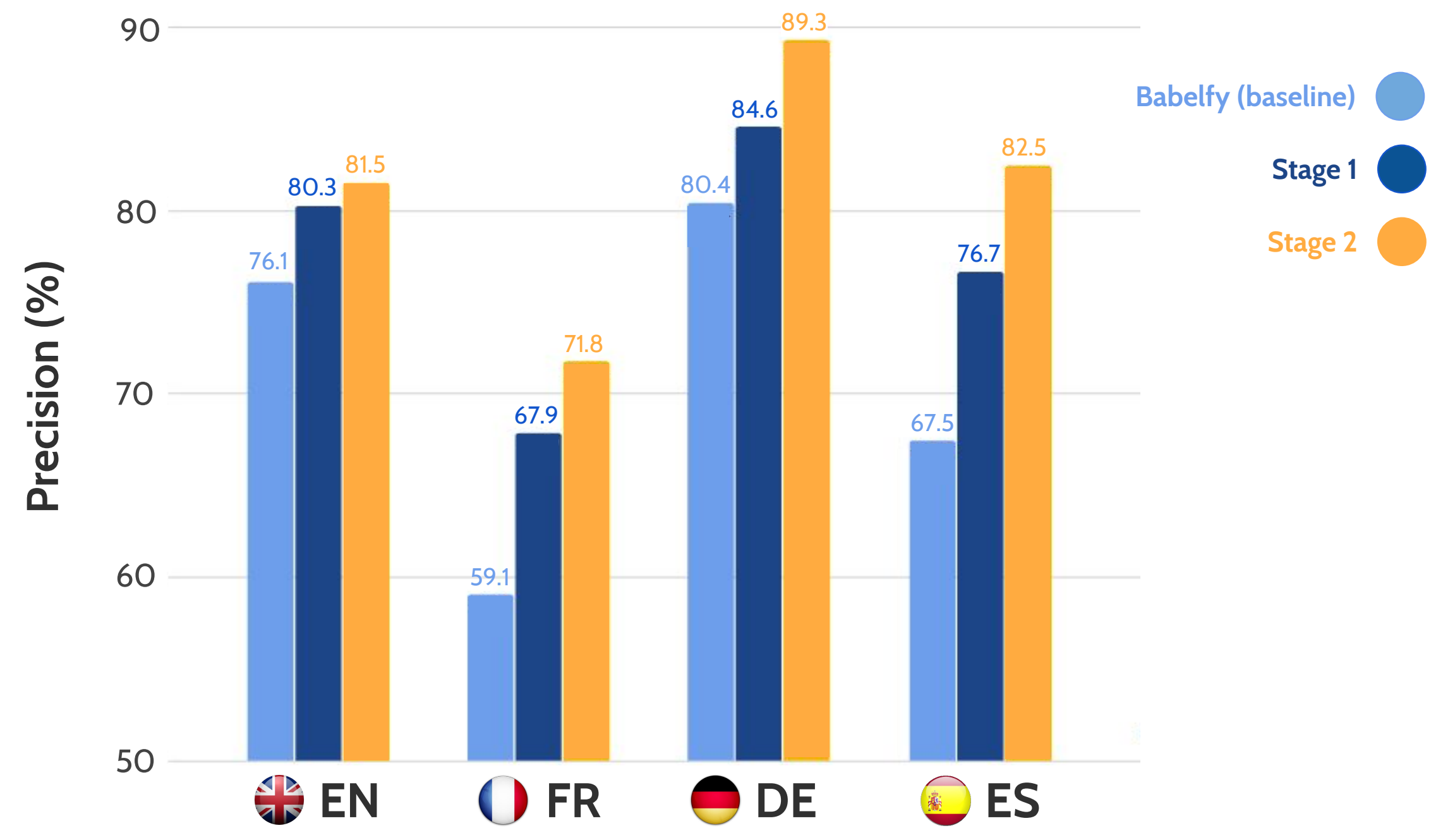
EuroSense: Statistics by Language



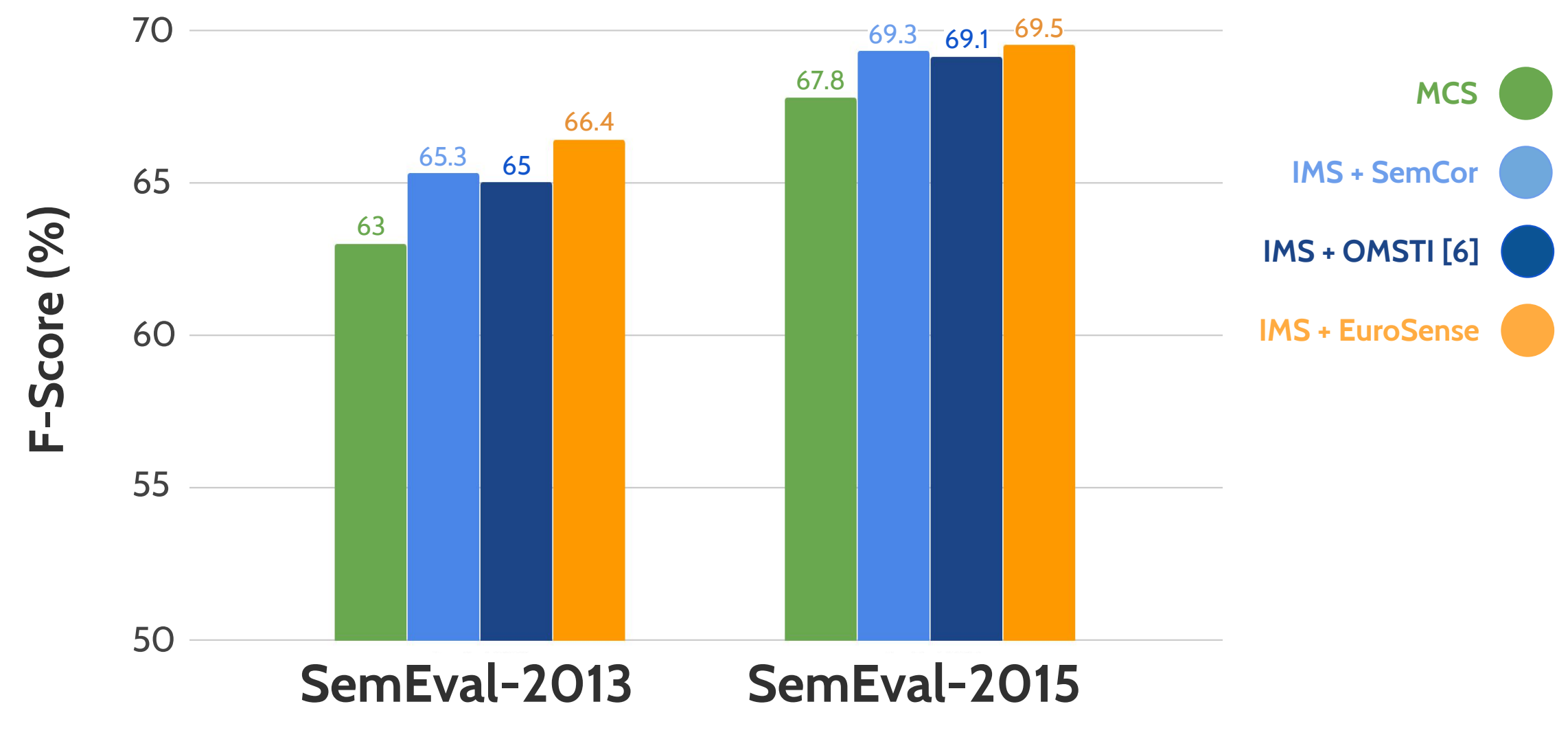
Total Number of Sense Annotations:
215M 123M

Total Number of Distinct Concepts or Entities:
248k 156k

Experimental Evaluation



- **Intrinsic Evaluation: Annotation Quality**
  4 languages, 2 human judges per language, 50 random sentences for each configuration (baseline, stage 1, stage 2)



- **Extrinsic Evaluation: Word Sense Disambiguation**
  EuroSense's English sense annotations as training set for a supervised WSD system: It Makes Sense (IMS) **[5]**

References

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