Monolingual and Bilingual Language Acquisition in Language Models

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Motivation

- Children can simultaneously acquire multiple languages.
- With approximately the same vocabulary size across languages.
- Children acquiring one language outperform children acquiring two languages on monolingual language understanding evaluations.
  - **Expressed as a <3-month lag at age 2;1 (increases with age)**

⭐ **Can we model this rate of language development using Monolingually and Bilingually developing language models?**

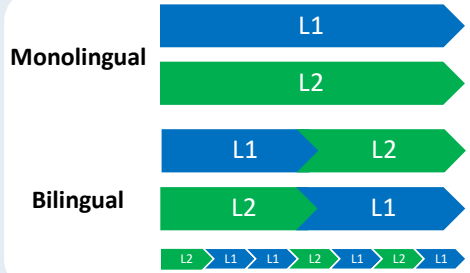
Languages and Ordering

For two languages L1 and L2, we run the following simulation types for the pretraining step:

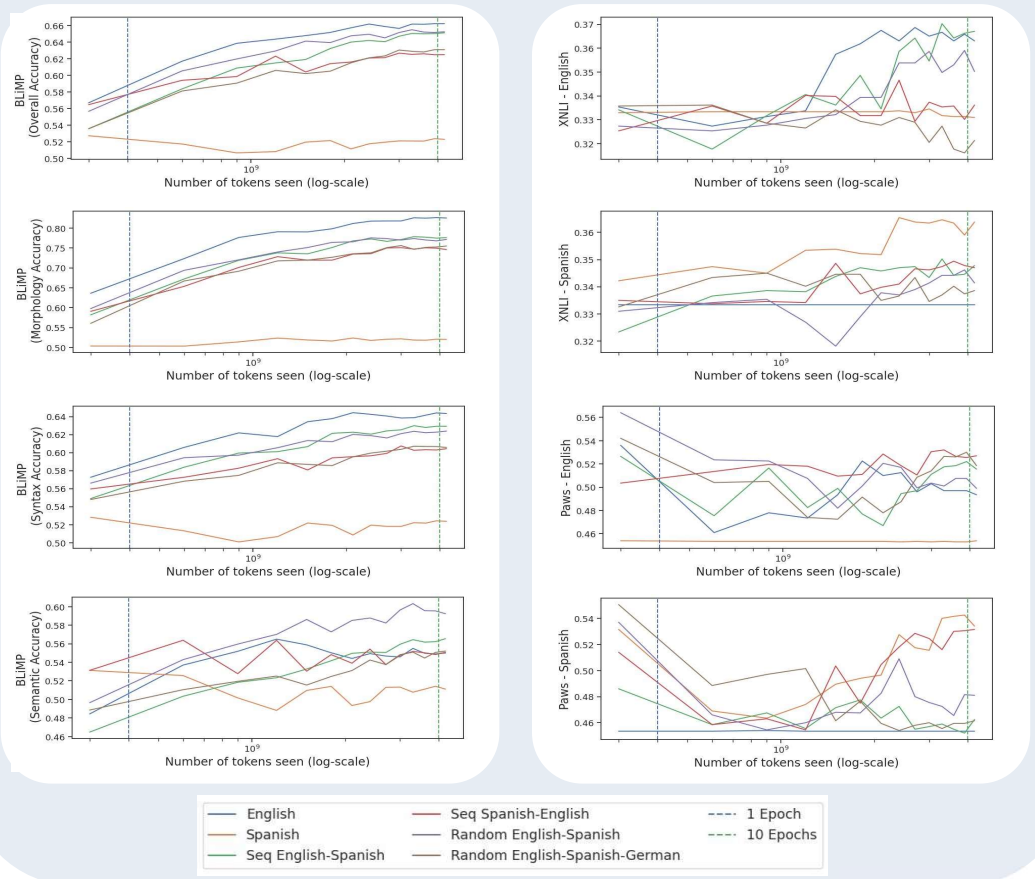
Language Model

BabyLlama

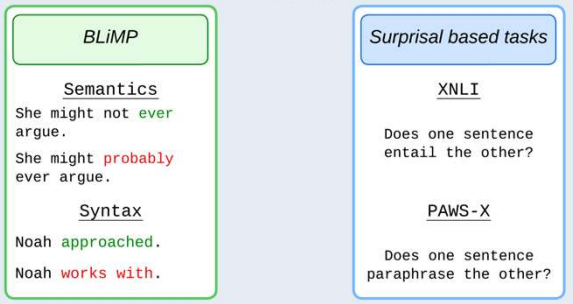
Parameters: 16 Mil
Vocab Size: 16000 tokens
Sequence Len: 256



Results



Evaluation



⭐ **Use English-only tasks**

⭐ ***Simple Multi-lingual tasks***

Key Takeaways

Baby models can be used to understand Monolingual and Bilingual language acquisition in humans.

Performance
Monolingual > Bilingual > Trilingual models.

Ordering effects are hard to evaluate in a multi-epoch training setup.

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