

# Grounding Sign Language Representation Learning in Phonology

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## Problem Statement

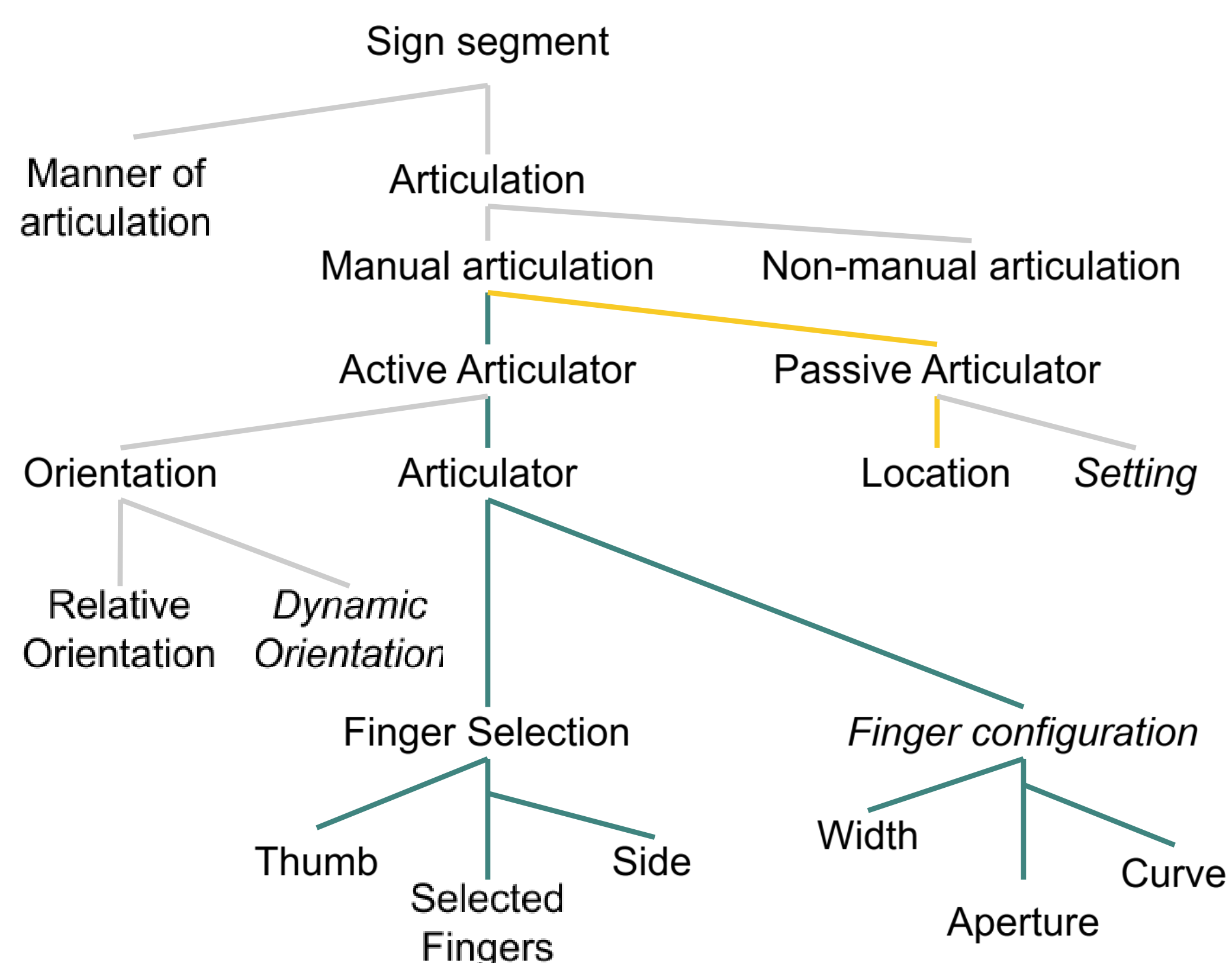
Currently, AI models for sign language rely on glosses. This results in **language specific systems** – limiting generalisability across sign languages.

## Research Questions

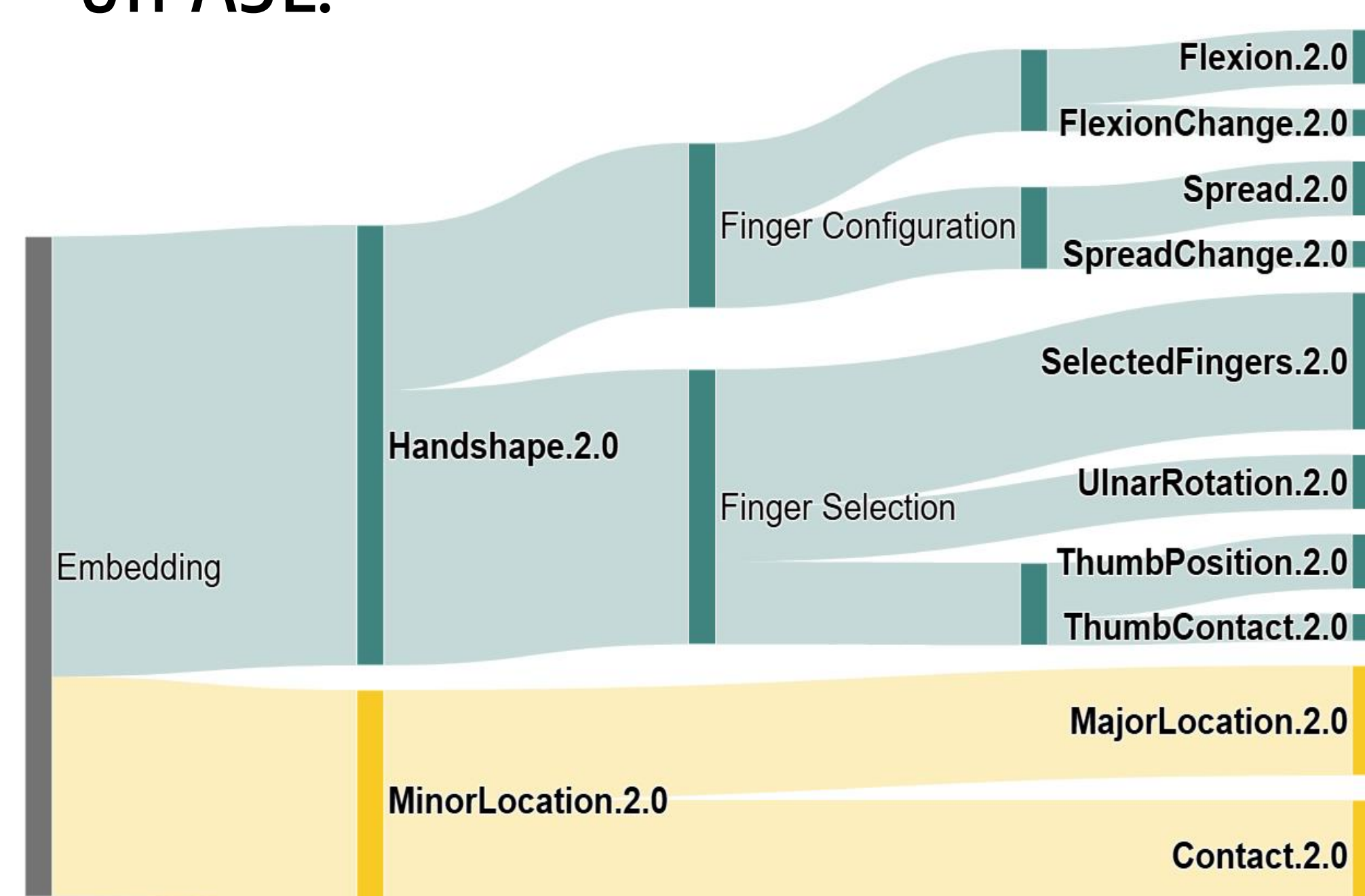
- How can we **encode sub-lexical phonological structure** into AI models for sign language?
- Can phonological structure be **evaluated cross-lingually from representations, without any retraining?**

## Methodology

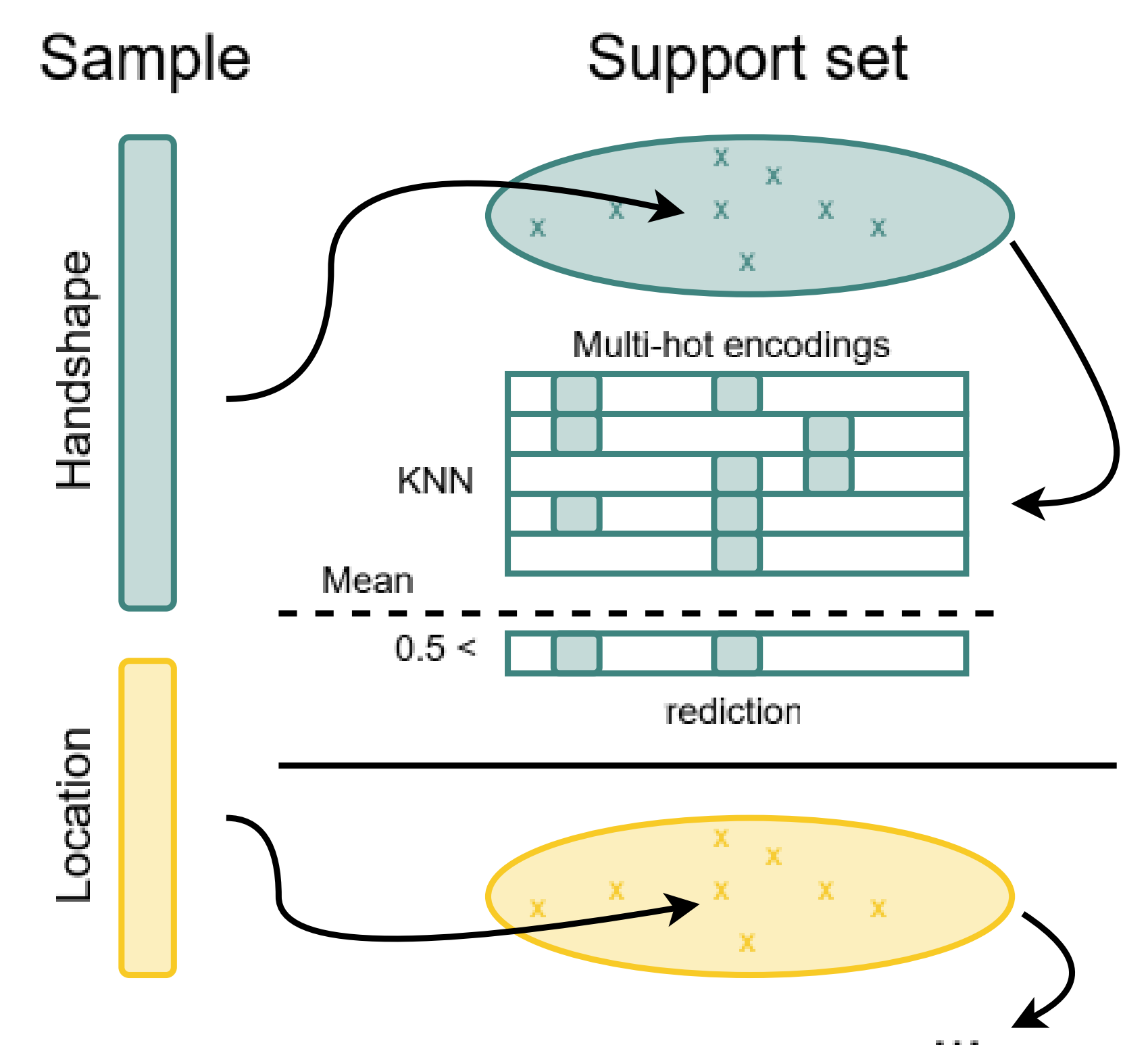
As linguistic foundation, we selected the **Dependency Model** – a hierarchical phonological model describing VGT.



We partitioned representations based on the **hierarchical structure by using phonological pretraining on ASL**.



We tested if signs form **cross-lingual phonological clusters without any additional training**.



## Results

We **cross-validate** our phonological search method for **handshape and location on the VGT Dictionary**. Precision and recall are compared across cluster sizes for the proposed network and a gloss-based baseline.

## Conclusions

- Explicitly training the model on phonology alone isn't enough – separating **distinct features is critical**
- We found **clear, parameter-specific groupings** in the model
- The network organises phonology like a structural map, **yielding stable phonological representations**

