# Crowdsourcing elicitation data for semantic typologies

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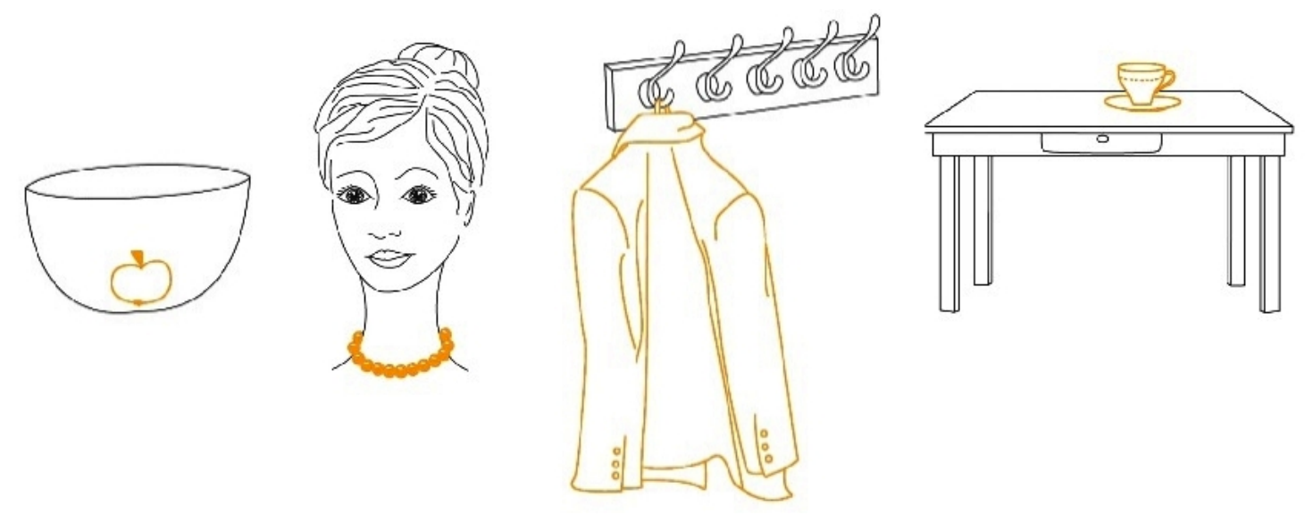
## Background and objective

- Semantic typology: Using crosslinguistic similarity/variation in how concepts are expressed to understand cognitive underpinnings of semantics.
- Requires semantic elicitation: descriptions of non-linguistic stimuli in a semantic domain.
- Tedious process, hence: **can we obtain semantic elicitation data of a similar quality with crowdsourcing**?

## Case: topological spatial markers

- How do langages mark topological spatial relations (*on*, *in*, *under*)?
- Fieldwork elicitation for 9 languages (**LM data**; [1]), using the 71 BowPed stimuli [2].
- *Where is the* HIGHLIGHTED OBJECT*?*



(a) Four examples from the BowPed stimuli

## Method

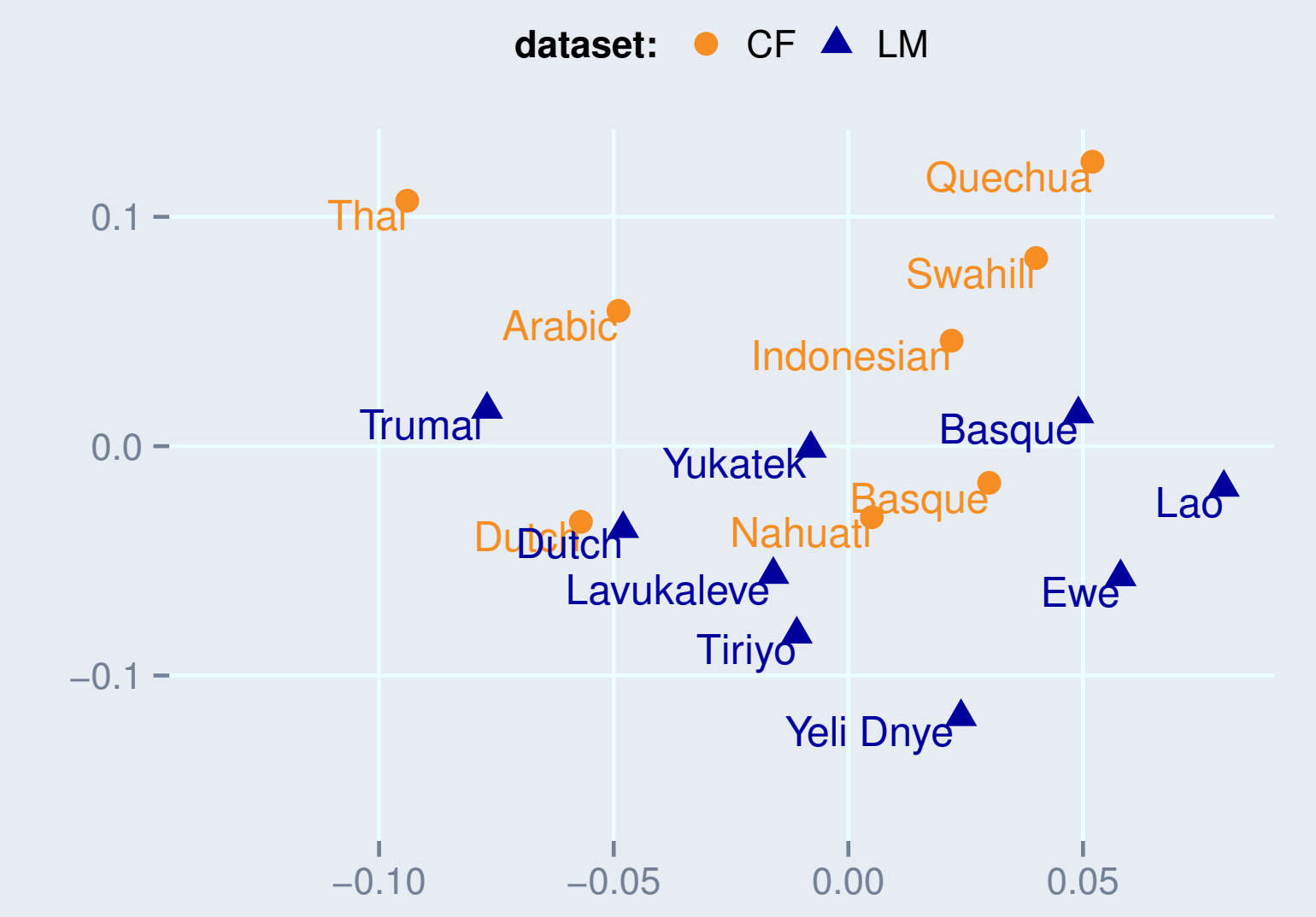
- Using Crowdflower: For 8 unrelated languages, 15 participants described the BowPed stimuli.
- Instruction: *Describe the situation in your native language.*
- Responses coded in 5 categories:

| class | description | Arabic | Basque | Dutch | Indonesian | Nahuatl | Quechua | Swahili | Thai |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Contains a spatial marker | 60 | 13 | 79 | 58 | 11 | 15 | 70 | 62 |
| 2 | Non-spatial expression | 4 | 2 | 1 | 0 | 3 | 2 | 5 | 7 |
| 3 | Reversal of Figure-Ground | 9 | 2 | 5 | 1 | 2 | 1 | 7 | 4 |
| 4 | Other invalid responses | 25 | 82 | 15 | 41 | 83 | 80 | 17 | 25 |
| 5 | Coder uncertain | 1 | 1 | 0 | 0 | 1 | 3 | 1 | 1 |

- Quality control is **difficult**.
- Only using data coded as 1 (**CF data**).

## Result #1: comparable between-language variation

- Is the **between-language similarity** in CF similar to that in LM?
- Compare how similarly any pair of languages in CF and LM verbalize the situations.
- $\text{Dutch}_{\text{LM}}$ is close to $\text{Dutch}_{\text{CF}}$, $\text{Basque}_{\text{LM}}$ reasonably close to $\text{Basque}_{\text{CF}}$.
- **Spread** over the MDS space for CF is **comparable** to LM (figure b).



(b) Between-language distances (MDS solution)

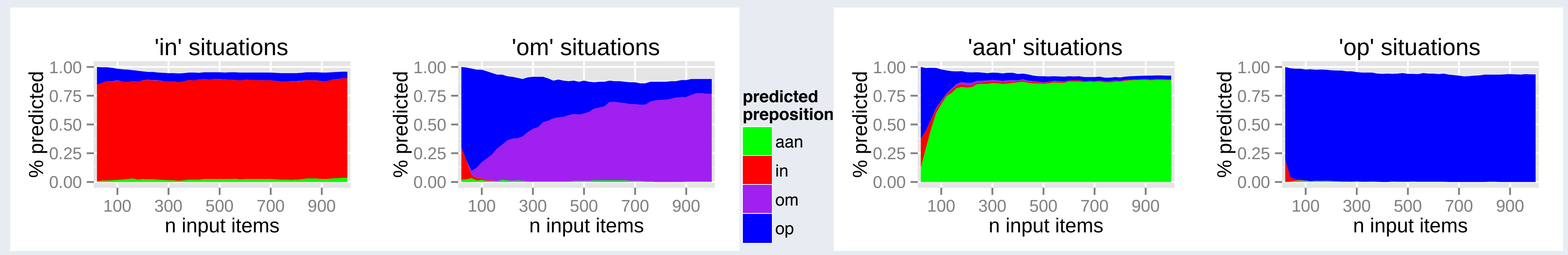
## Result #2: replication of Beekhuizen, Fazly & Stevenson (2014)

### Background

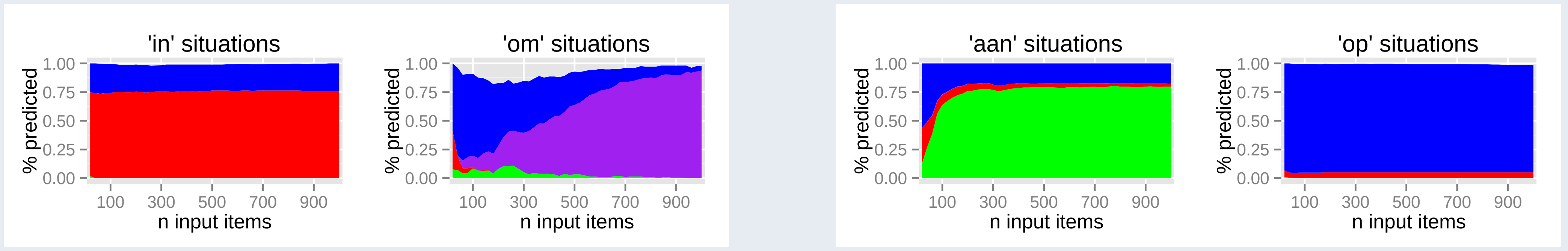
- **Typological Prevalence Hypothesis**: crosslinguistically more common semantic groupings are cognitively more 'natural' and therefore easier to learn [3].
- **Observed**: Dutch children overgeneralize *op* 'surface support' to *aan* 'tenuous support' and to *om* 'surrounding (support)' but not vice versa.
- **Rationale**: meaning of *op* is crosslinguistically more common than that of *aan* and *om*, hence asymmetry in overgeneralization.

### Simulation of error pattern and replication

- Modeled with PCA over LM data and Gaussian Naive Bayes learner over that space [4].
- Result: **simulation** of error pattern (see figures c-d).
- Due to lay-out of space (PCA), frequency (*op* > *aan*, *om*).
- **Replication with CF data**. Same method: similar results.



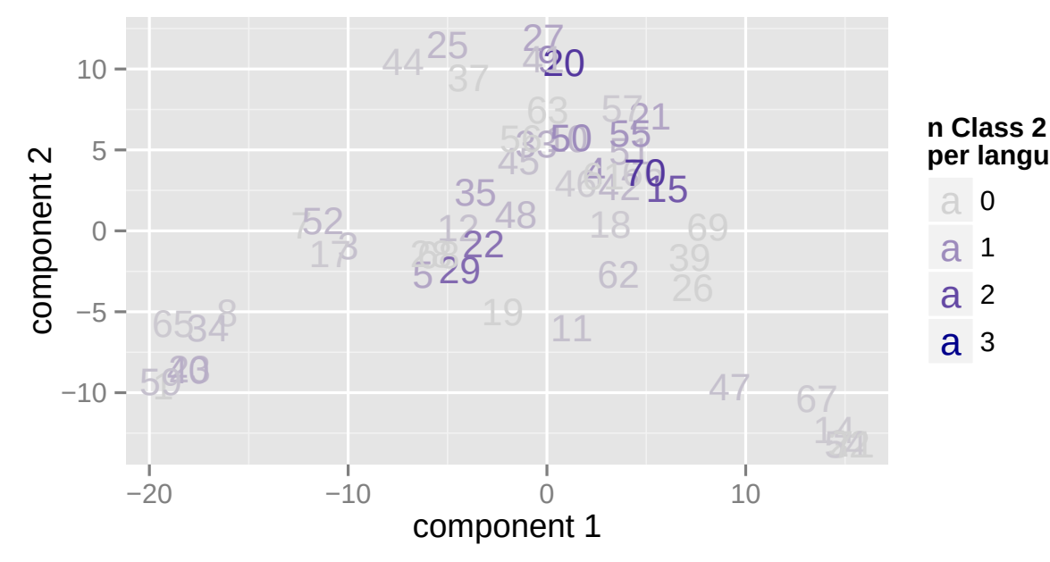
(c) Error pattern on the basis of LM data



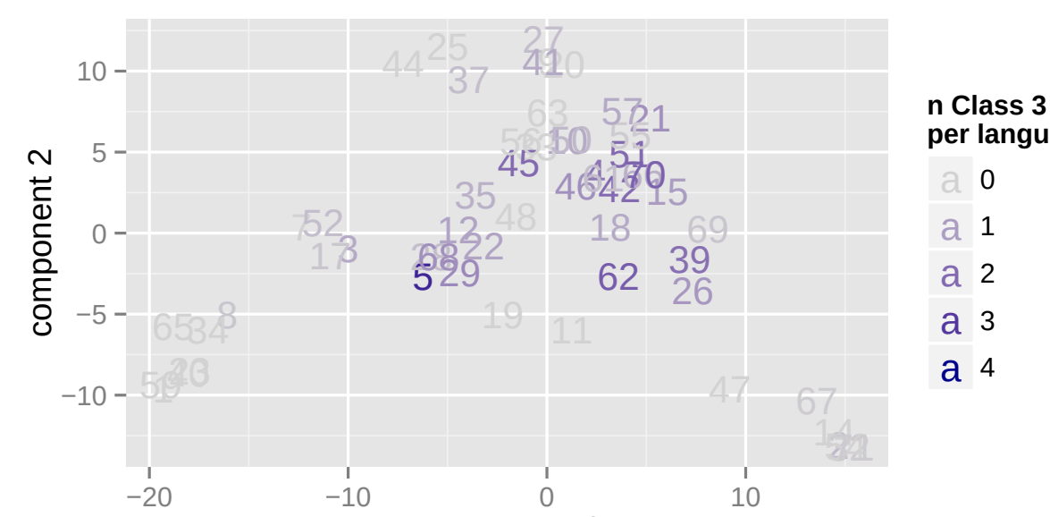
(d) Error pattern on the basis of CF data

## Further findings

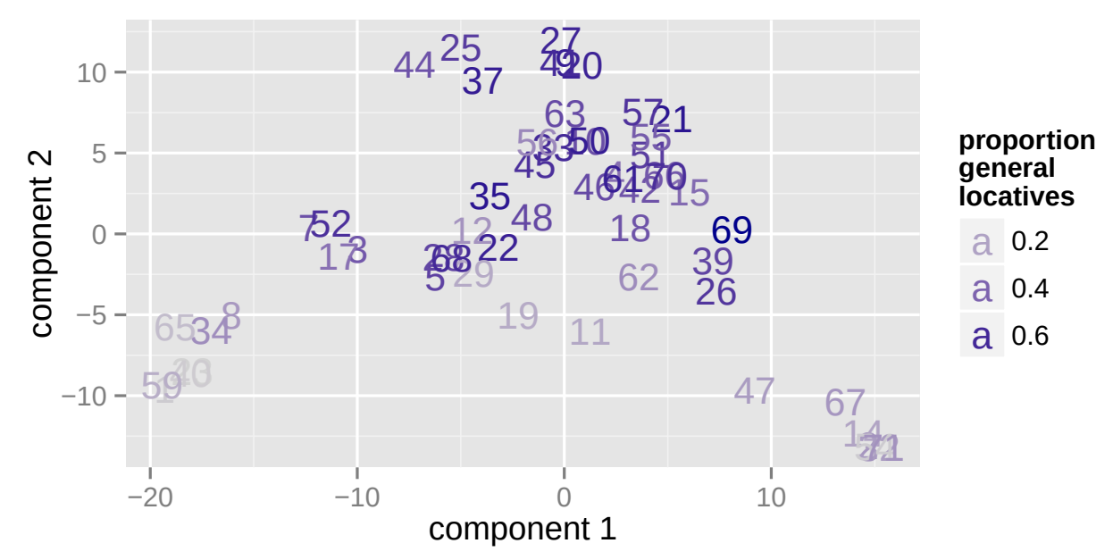
- Free elicitation in crowdsourcing: **different responses** from LM
  - **Non-spatial responses**: 'coat hung by hook'
  - **Fig.-ground reversal**: 'foot in shoe' (for 'shoe on foot')
  - **General locative markers** (left out in LM)
- Mostly in central region of PCA space – where languages vary most.



(e) Non-spatial



(f) F-G reversal



(g) General locative

## Conclusion / Summary

- Goal: explore crowdsourcing for easy gathering of crosslinguistic elicitations for semantic typology.
- Crowdsourced vs. fieldwork data:
  - Shows similar levels of diversity.
  - Replicates cognitive modeling results.
  - Contains alternative expressions of content that further reveal properties of the semantic space
- A viable method despite some problems with quality control.

**Data** https://github.com/dnrb/cogsci15

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## References

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