# Language contact & attitudes to mouthing among deaf and hard-of-hearing users of ASL in the United States

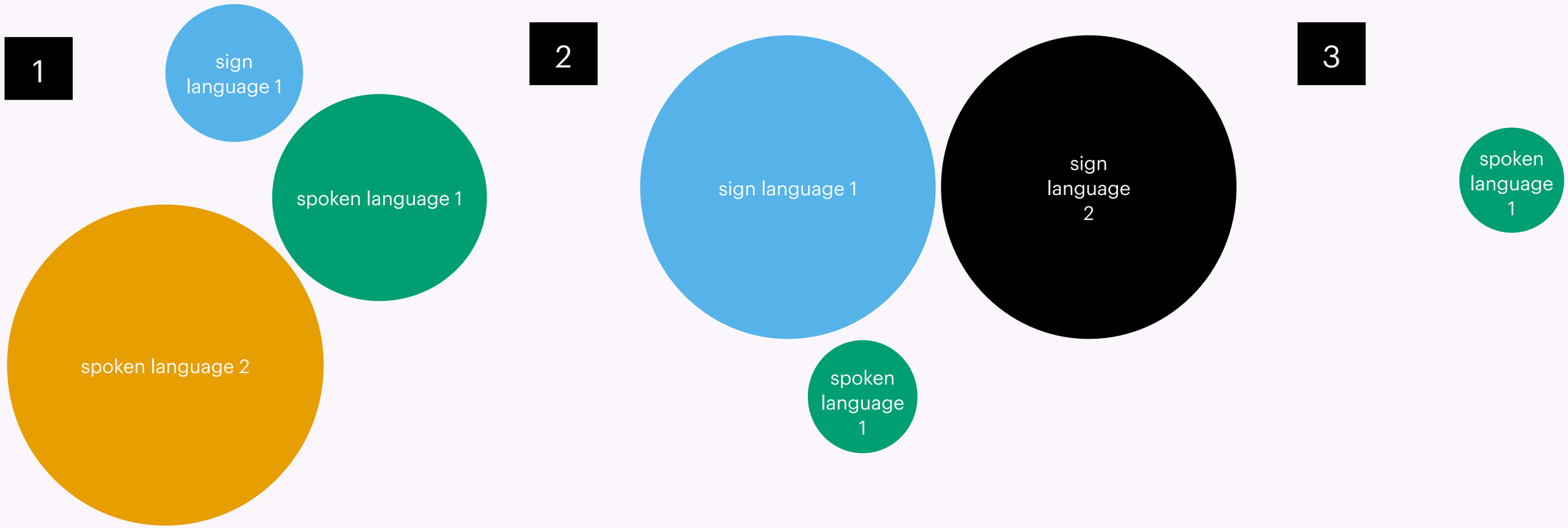
**Felicia Bisnath | Høgskulen på Vestlandet**

SiLC Seminar (April 2025)

# DHH language acquisition is heterogeneous

(Hall & De Anda 2021 and references within)

- varying levels of access to spoken and sign language during childhood



# Sign language users have multimodal multilingual semiotic repertoires

(Gumperz 1972; Kusters et al. 2017)

pictures

writing
letter shapes
spelling

gestures
face
hands
body

speech
sound
mouth movements

signing

...

# Language users view different semiotic resources as having different levels of prestige

pictures

writing
letter shapes
spelling

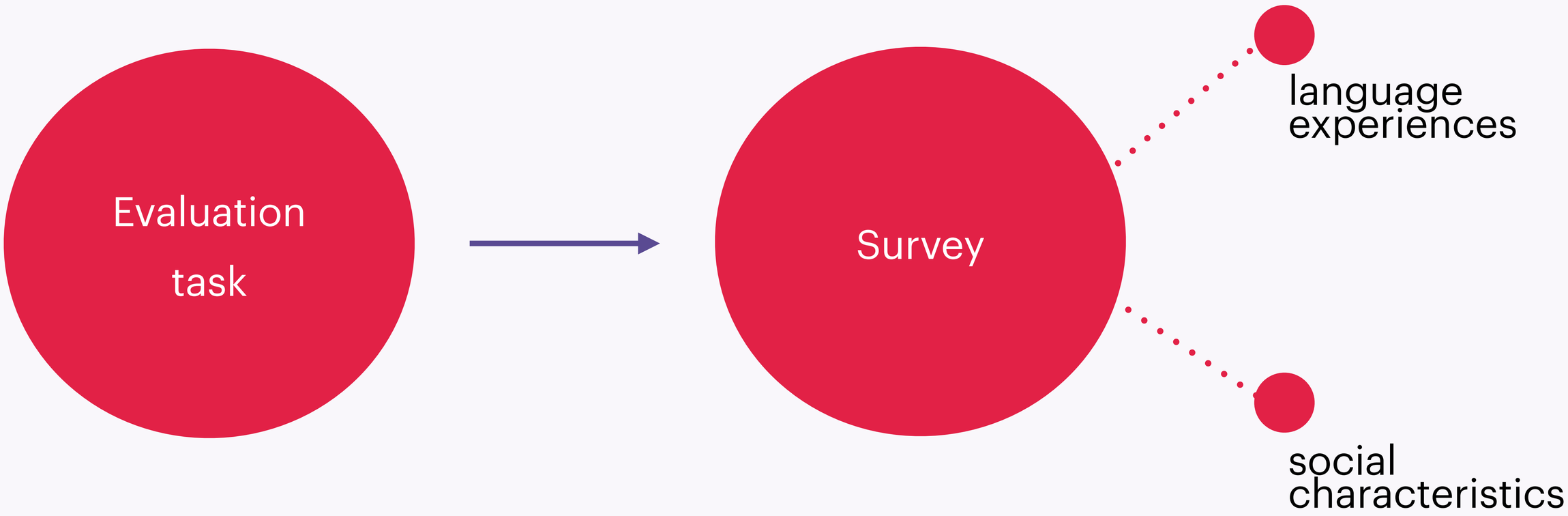
gestures
face
hands
body

speech
sound
mouth movements

signing

...

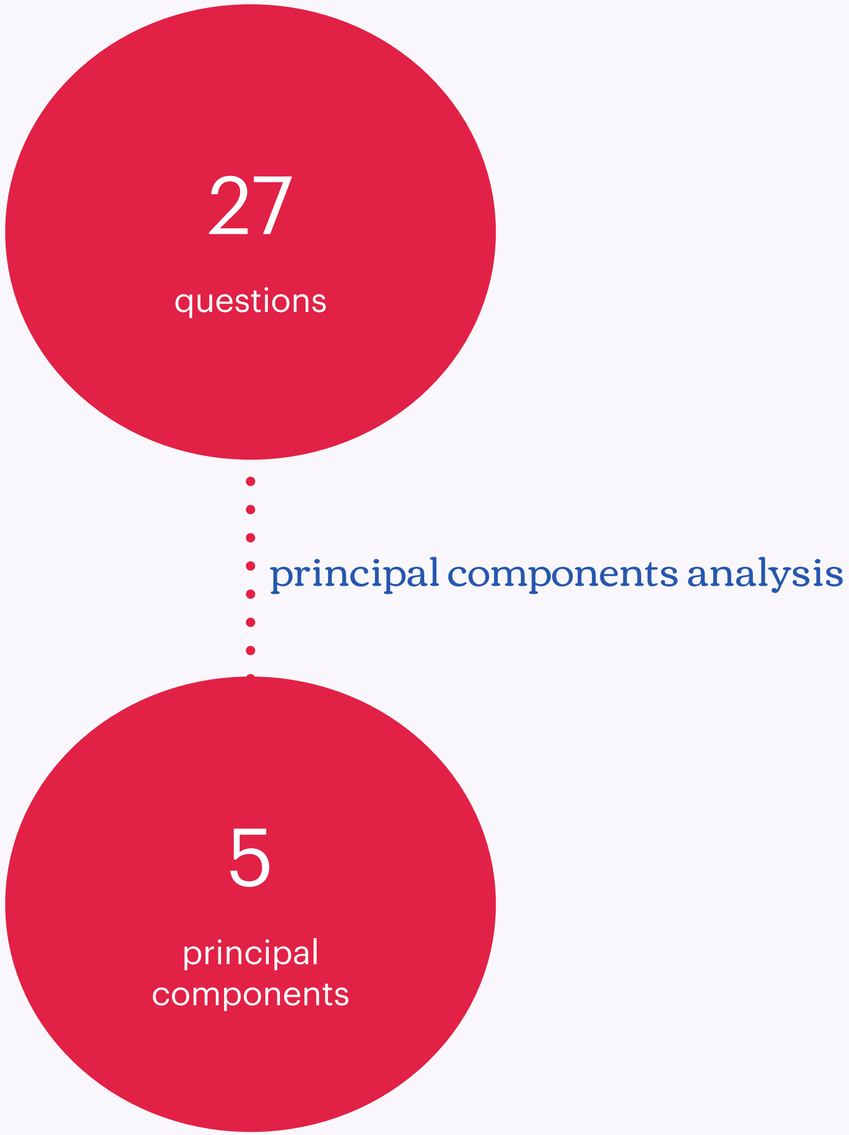
# Method Overview



(ASL-English) **Language contact among ASL users in the United States**

# Characterising language experience

- Frequency of use of ASL, English and ASL-English mixing at 3 time periods (0-100 scale):
  - Before school
  - During school
  - In a typical week



# The most variation is occurring along these dimensions

Principal Components Analysis (72% variance, rotated)

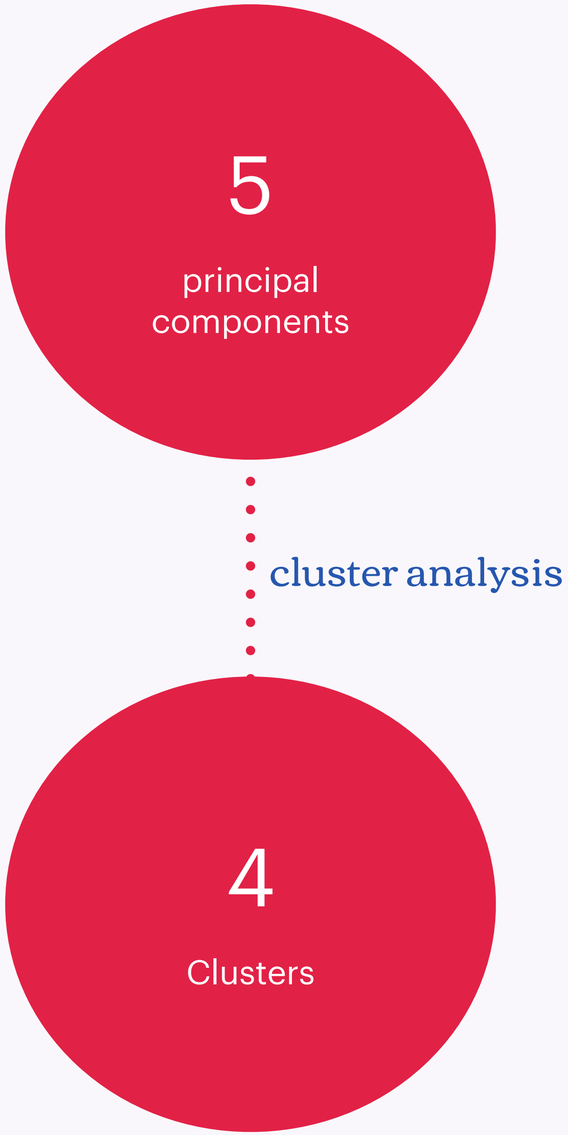
- [PC1] WRITTEN ENG INPUT + OUTPUT
- [PC2] SPOKEN ENG INPUT
- [PC3] ASL-ENG MIXING INPUT + OUTPUT
- [PC4] ASL INPUT + OUTPUT BEFORE SCHOOL
- [PC5] SPOKEN ENG OUTPUT

decreasing percentage of variance
i.e. signers vary most on PC1

# Emergent approach to categorising signers

- Hierarchical agglomerative cluster analysis
  *(distance=Pearson, linkage=average, k=4)*

- 269 participants after outlier removal (Mahalanobis distance)



# Native signer is an ideology in sign language linguistics

(Birkeland et al. 2024)

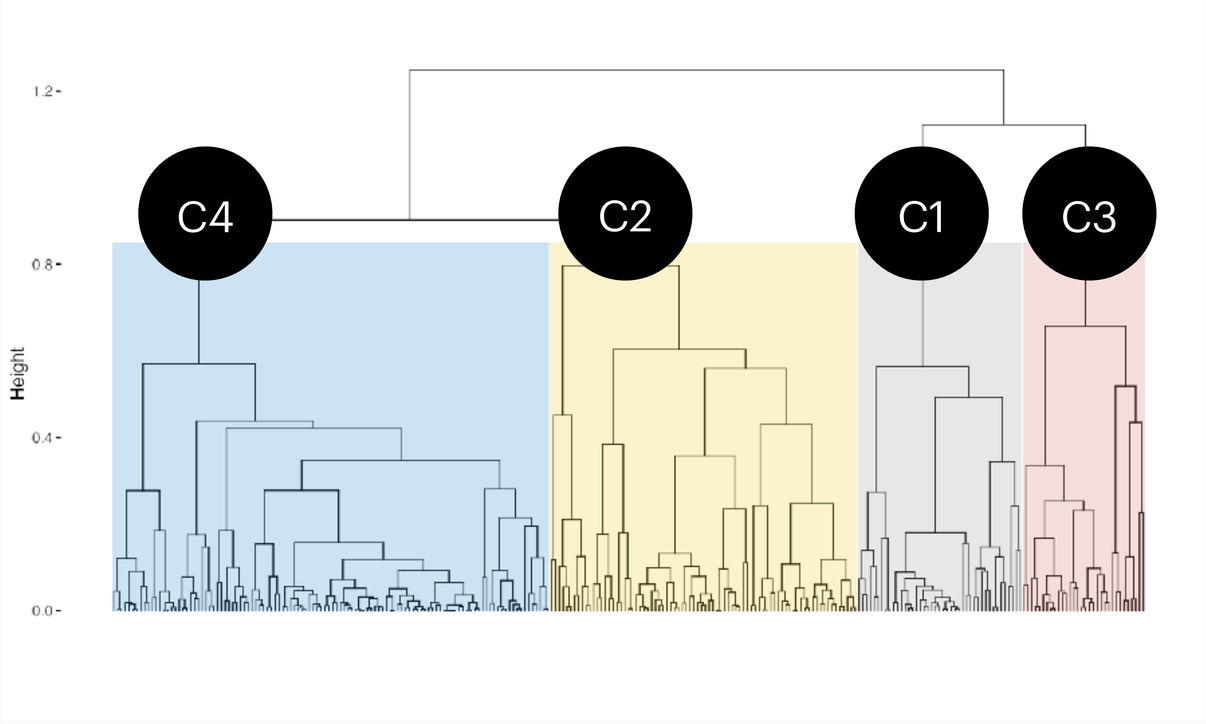
- Nativeness is a shibboleth of legitimacy in sign language linguistics
- Native signers are inconsistently defined but definitions typically require:
  - at least one deaf parent
  - early sign language acquisition, but the actual value of “early” varies broadly (Zorzi et al. 2022)

Heterogeneity in DHH language experience is washed out by native vs. non-native

# Cluster Evaluation

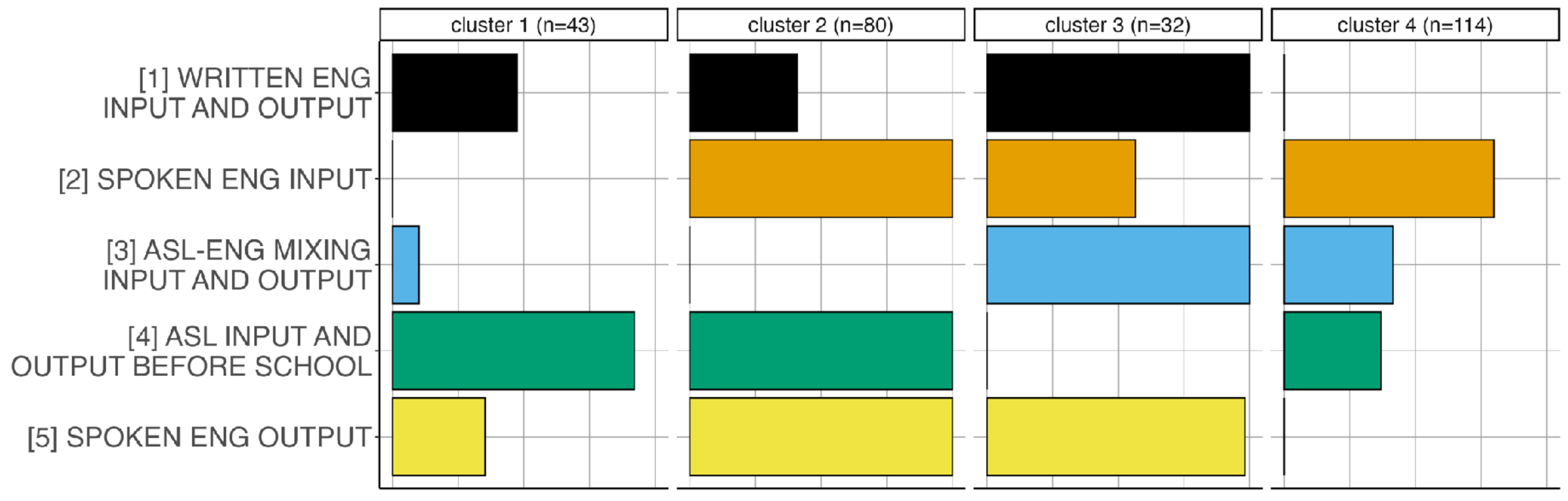
Internal Metrics

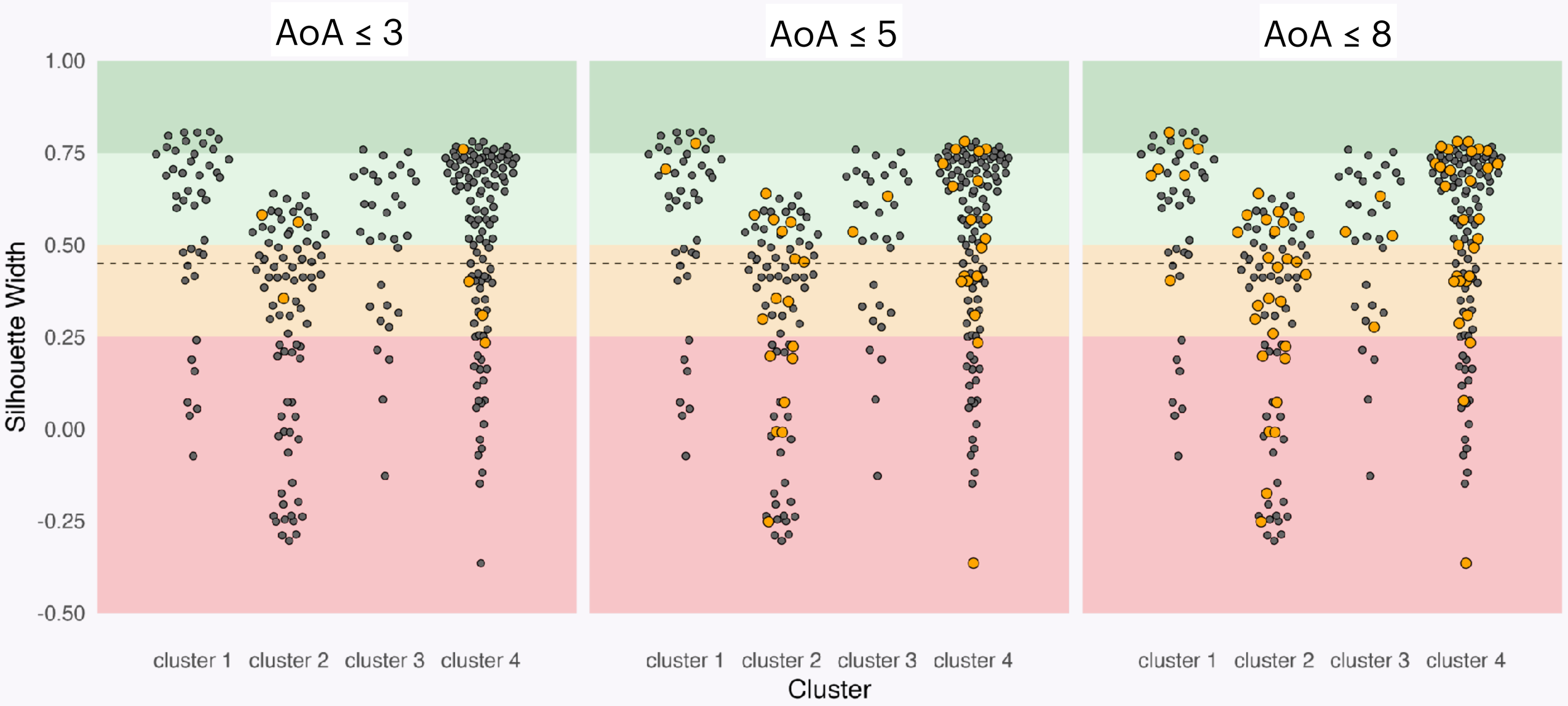
- Cophenetic coefficient **0.70** 👍🏾
  - how well the cluster solution preserves the structure of the original data
- Dunn’s Index **0.02** 👎🏾
  - how compact clusters are
  - sensitive to clusters of different sizes
- Average silhouette width **0.42** 👍🏾
  - similarity of cluster members to each other and difference from members of other clusters



# Clusters/Language experience types

269 participants, outliers removed



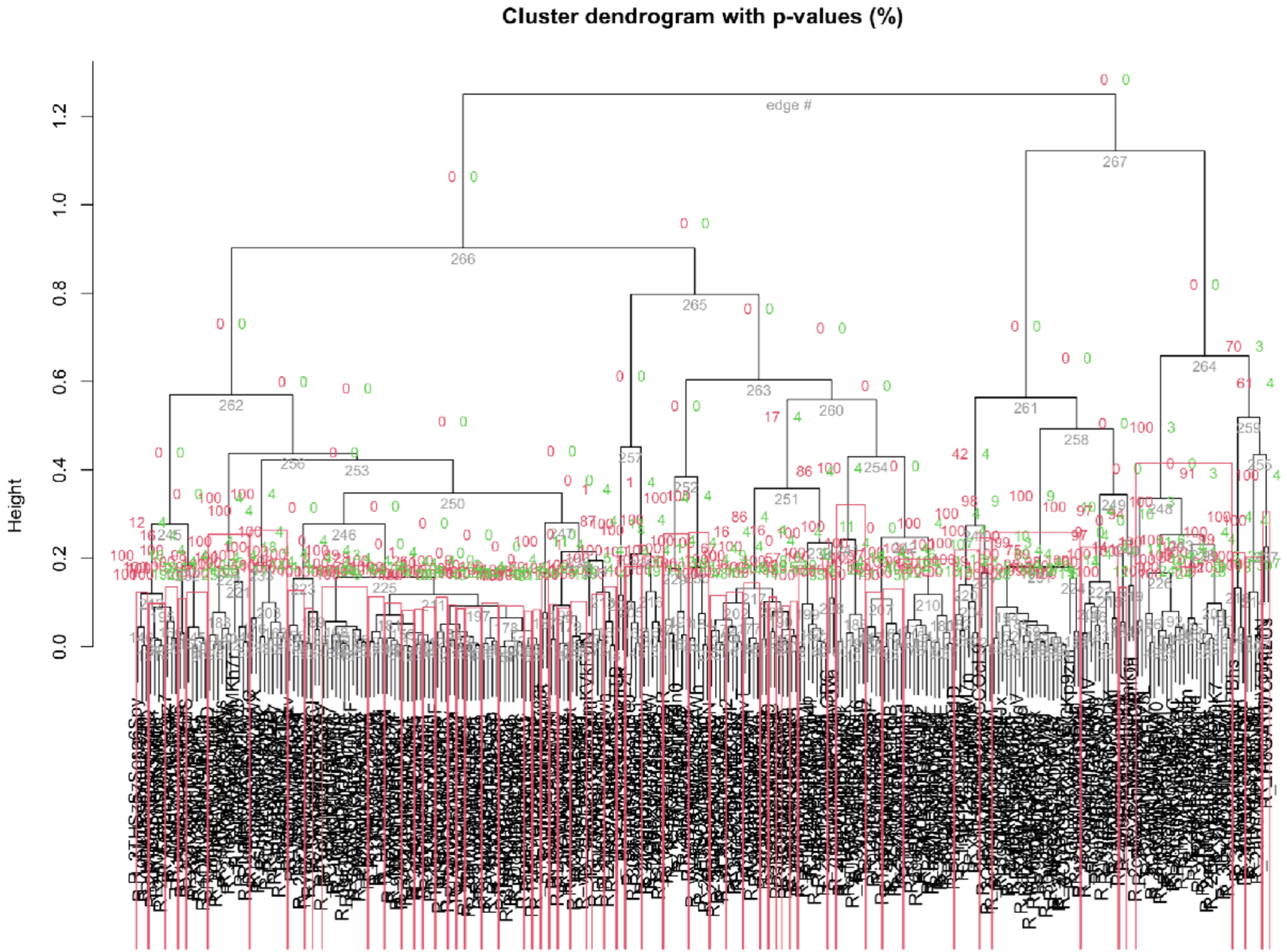



"Native" signers (●) have different language experiences & pattern with "non-native" (●) signers

in progress

# Clustering with p-values

- `pvclust` (Suzuki et al. 2019)
- Red rectangles mark clusters that likely exist (do not arise from sampling error) and may be reliably observed if we increase the number of observations



in progress

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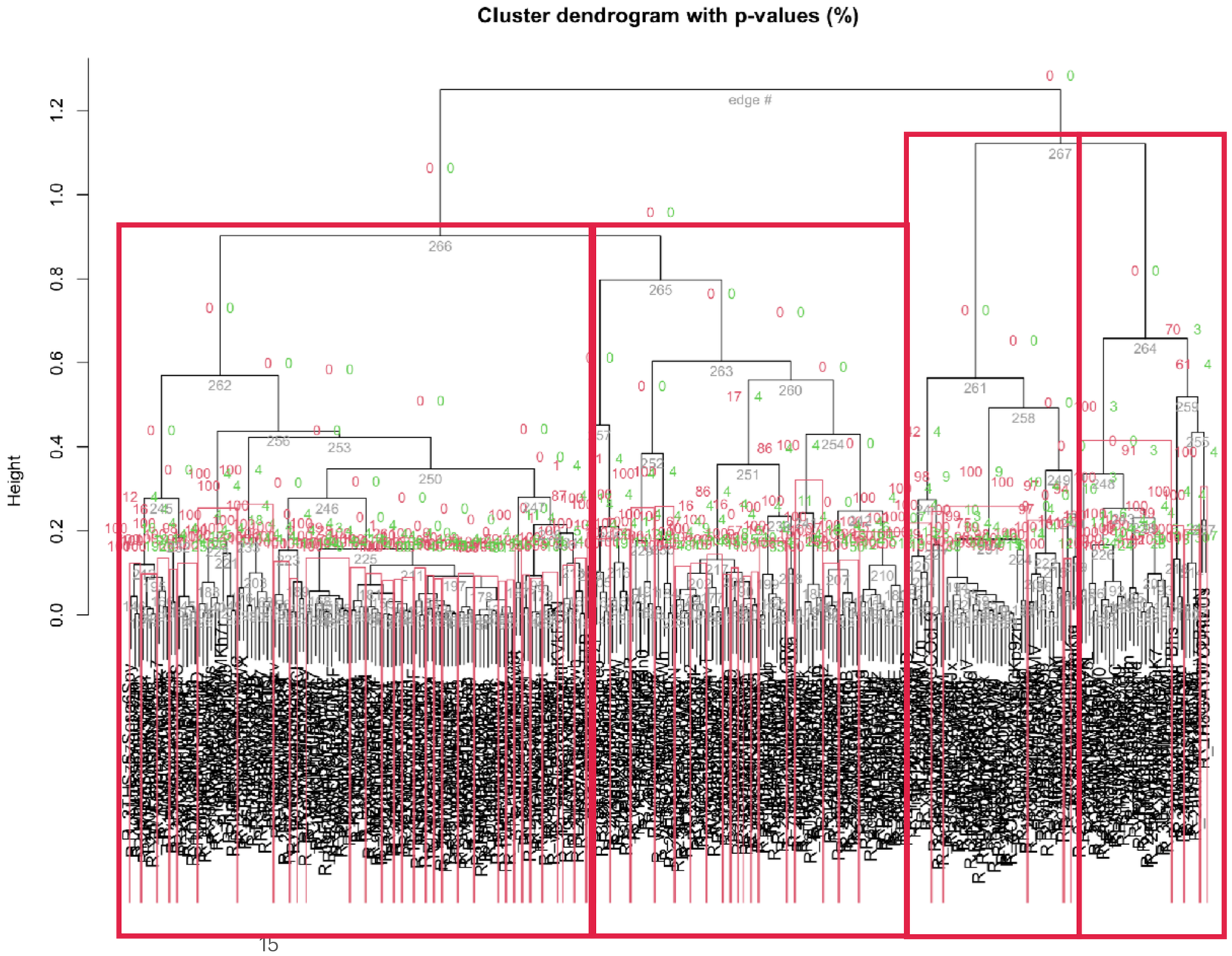

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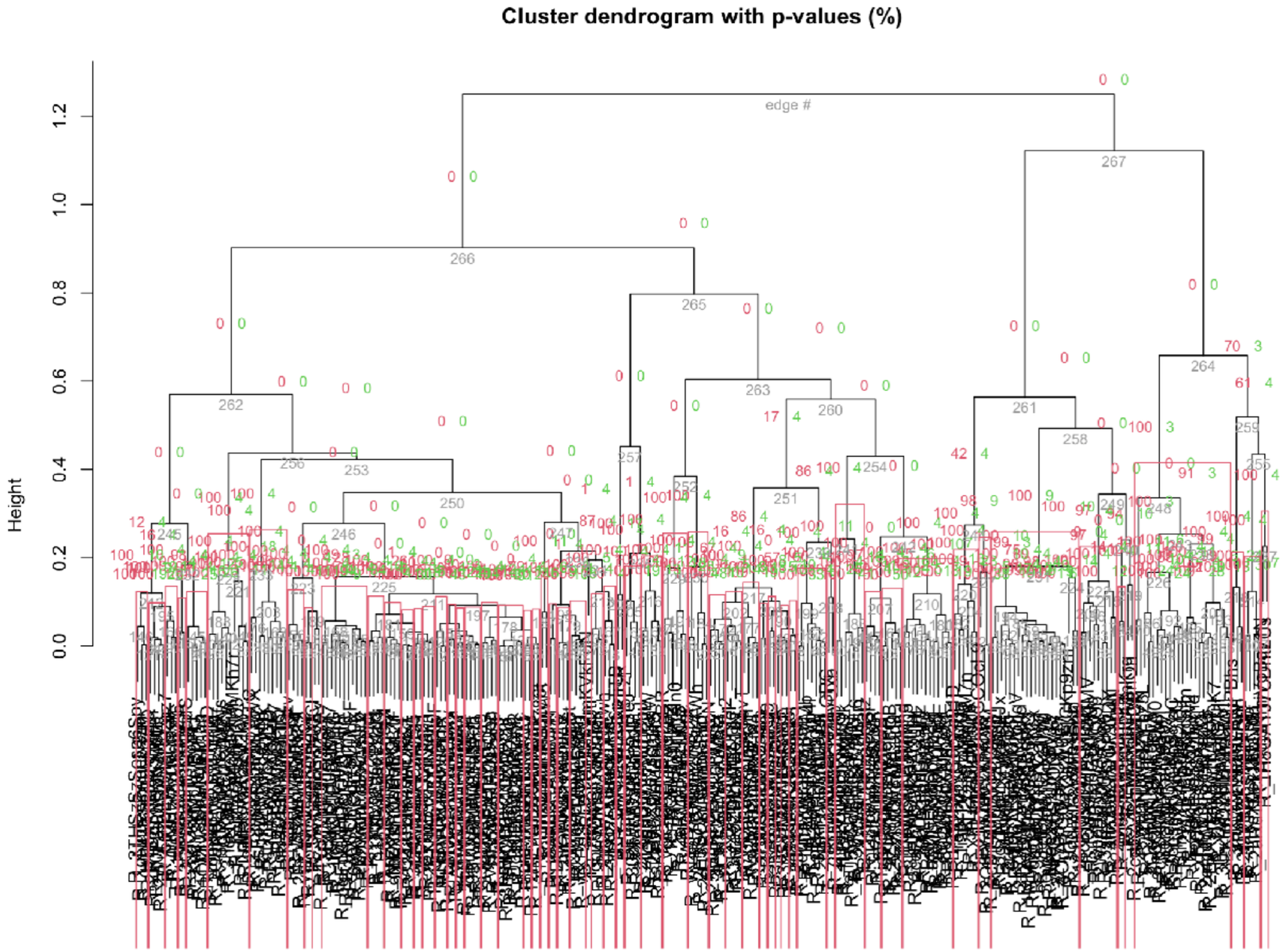
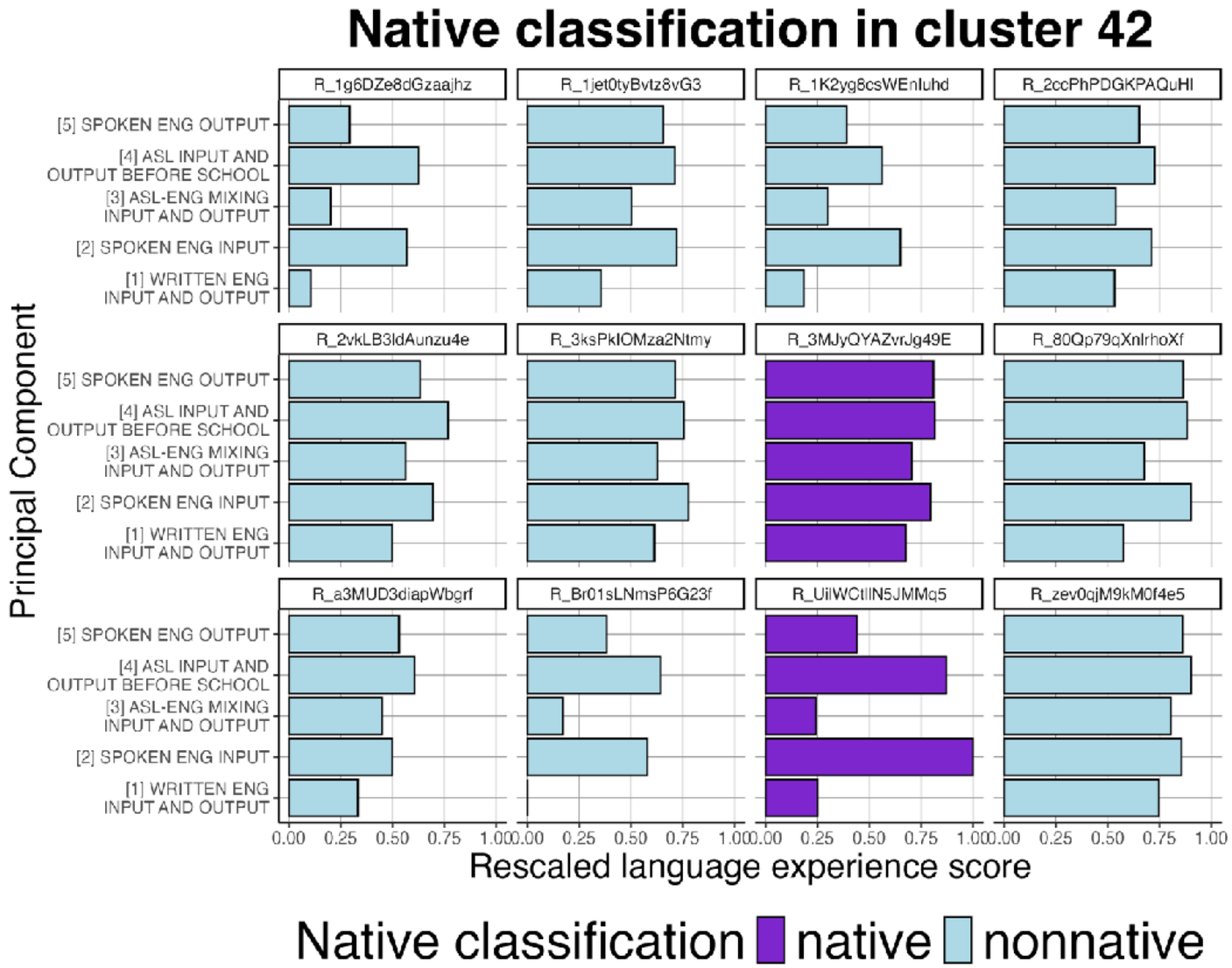
# Clustering with p-values

- It seems like the evidence is better for many smaller clusters
- 56 reliable clusters from 269-member sample
  - 5 have at least 10 participants
  - many have 2 participants



in progress

# Signers classified as native still pattern with those classified as non-native (AoA by 5)

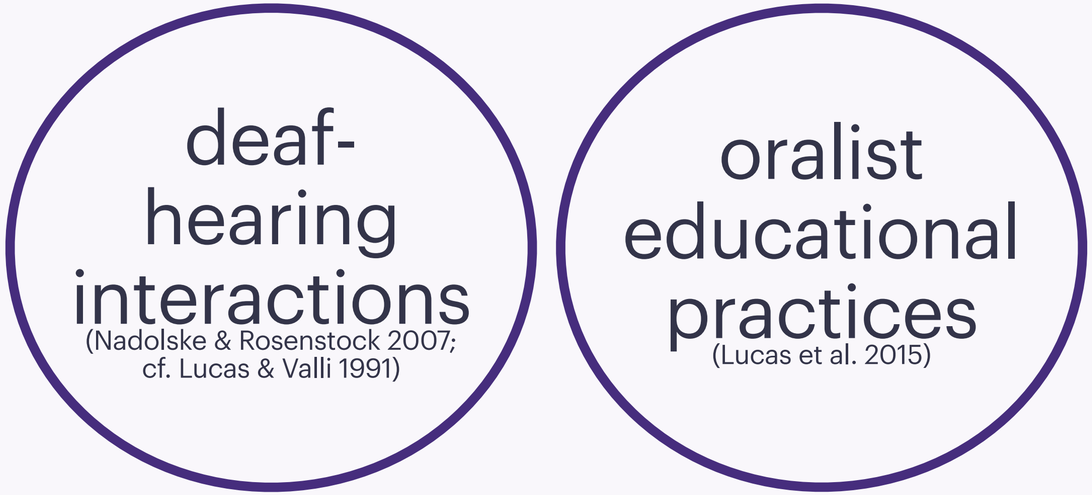


# Exploring **variation in attitudes to Mouthing in ASL**

# Mouthing

Mouth patterns accompanying signing that resemble spoken language words

Associated with spoken language practices and hearing



Attitudes to mouthing vary

(Davis 1989; Nadolske & Rosenstock 2007; Hill 2012)

Attitudes vary based on social characteristics of evaluators

(Regan 2021; Fuse et al. 2024)

# Research Question

Based on Hill (2012)

How do social characteristics correlate with attitudes to English mouthing in ASL?

1. aesthetics of signing

PURE

BEAUTIFUL

SMOOTH

2. signer identity

VERY (CULTURALLY) DEAF

DEAF COMMUNITY LEADER

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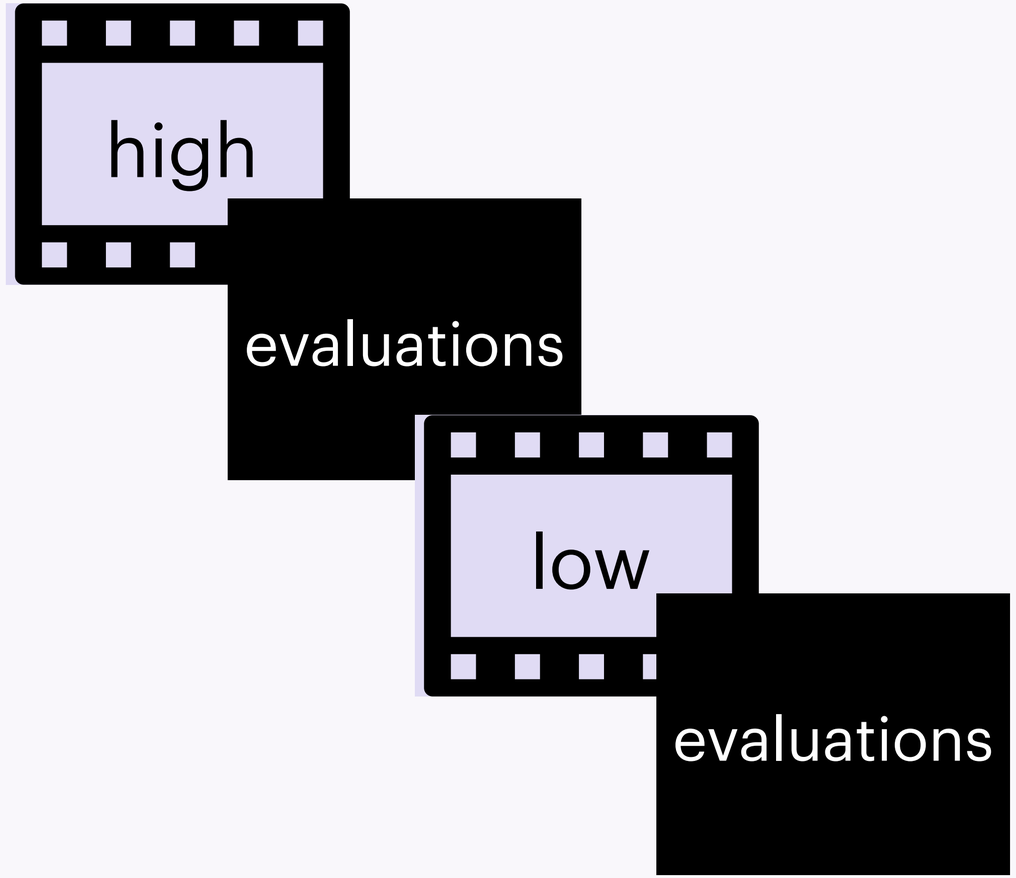
**Social Characteristics**

1. Age*
2. Age-of-acquisition of ASL*
3. Gender identity
4. Deaf identity
5. Ethnic identity
6. Highest degree
7. Growing up with deaf family
8. Region
9. Schooling
10. Experience with ASL, English and ASL-English mixing principal components*

*continuous variable

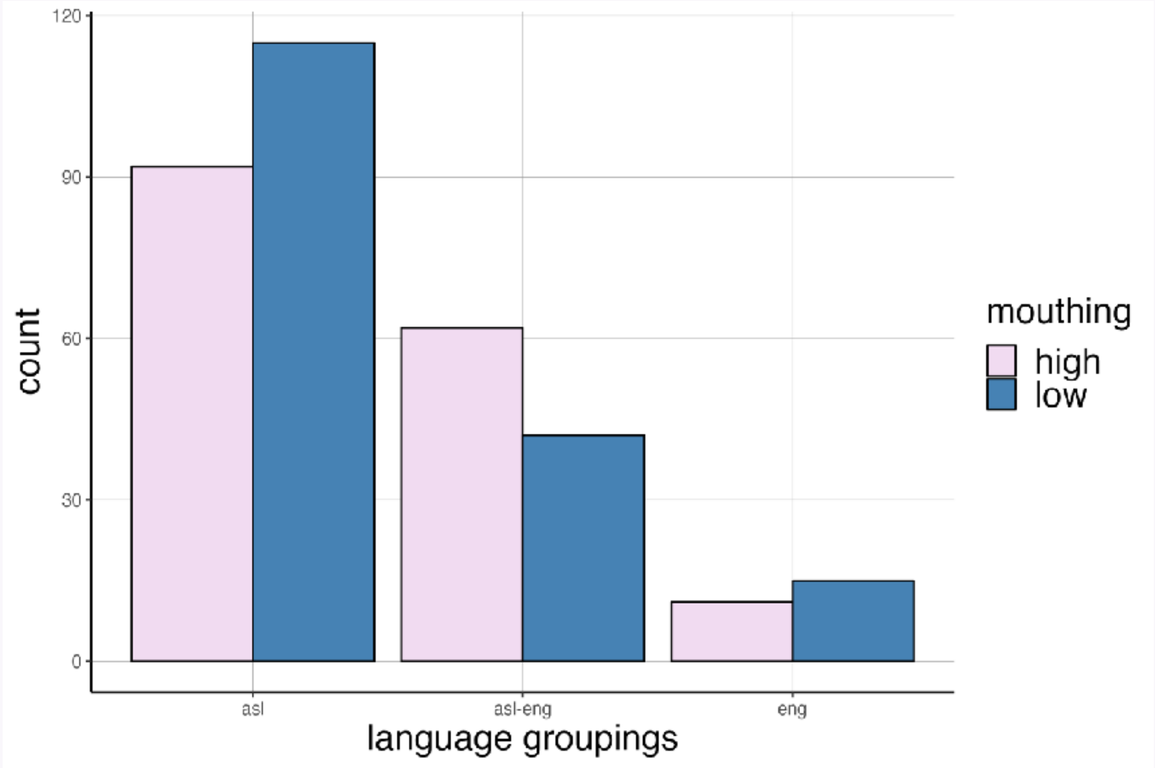
# Adapted Matched Guise Task

- **Genre**: informational, semi-formal
- **Mouthing**: high, low
- **Counterbalanced** for signer, topic, and order across 8 lists
- Online



# Low mouthing is associated with ASL & high mouthing with ASL-English mixing

Mouthing category and language label are not independent ($X^2$= 6.87, *df* = 2, *p*-value = .03)




| | observed | | expected | |
|---|---|---|---|---|
| | high | low | high | low |
| asl | 92 | 115 | 101 | 106 |
| asl+eng | 62 | 42 | 51 | 53 |
| eng | 11 | 15 | 13 | 13 |

# Analysis

134 participants

In R Studio

Separate robust mixed effect models for **each** social characteristic with `robustlmm` (Koller 2016)

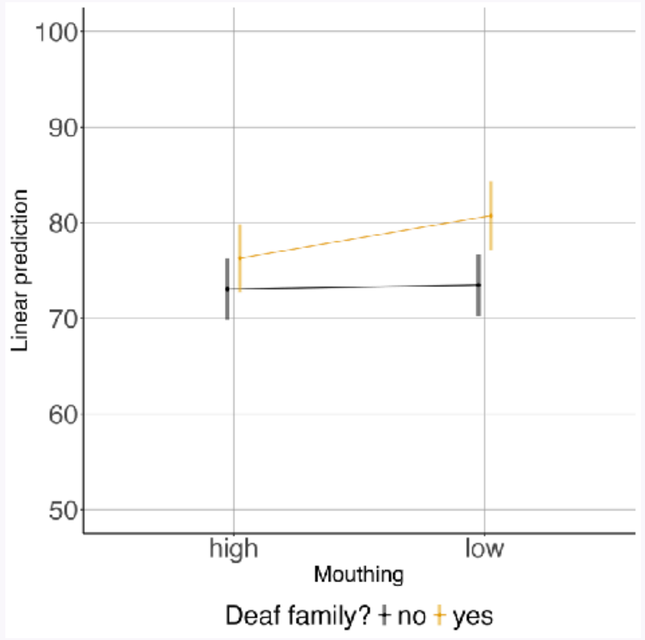
Bootstrapping for confidence intervals with `confintROB` (Mason et al. 2024)

```
rating ~ mouthing*social_characteristic +

(1|list) + (1|list:participant)
```

# Evaluation of signing aesthetics

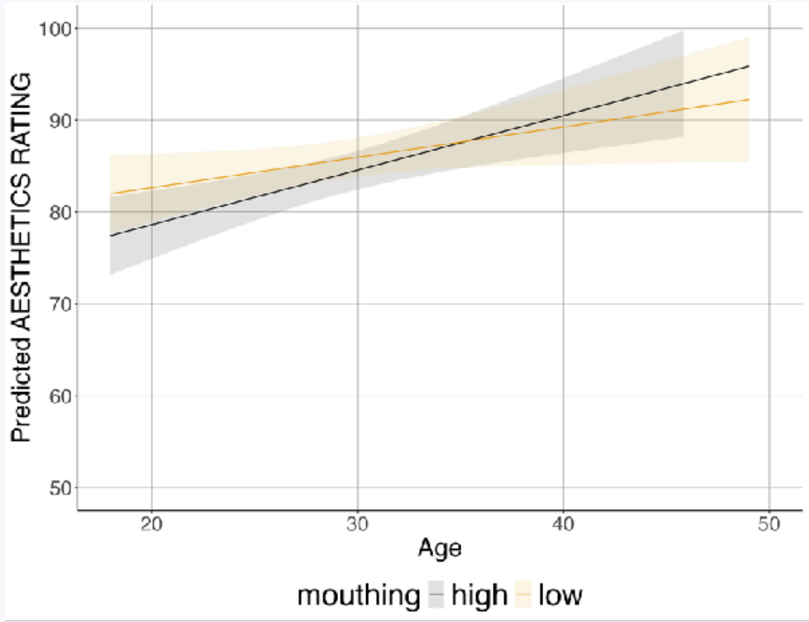
## DEAF FAMILY




estimate =3.7, 95% CI [1.4, 6.03]

Signers with deaf family rate low mouthing higher than signers without

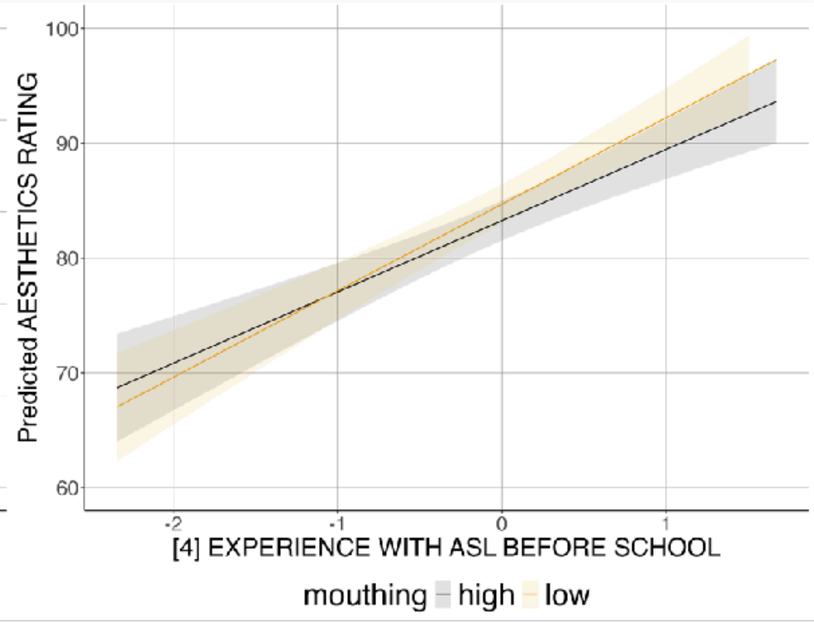
## AGE




estimate =-0.3 95% CI [-0.44, -0.08]

As age increases, rating of high mouthing increases

## ASL BEFORE SCHOOL

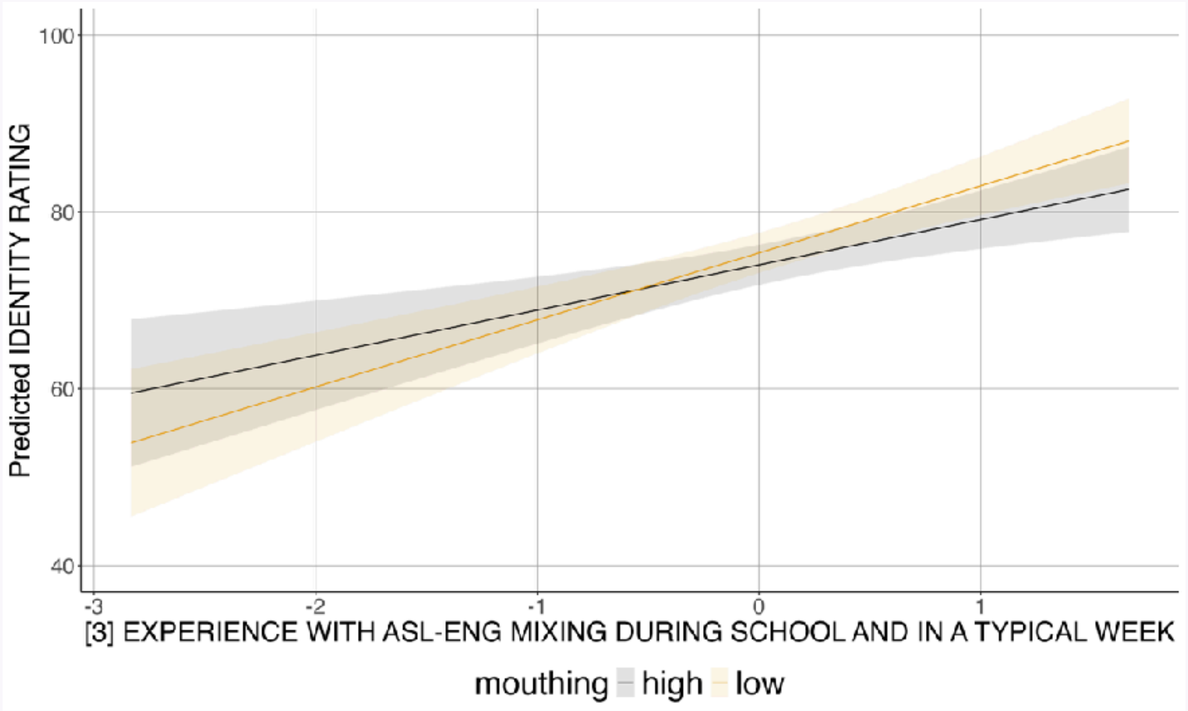



estimate =1.3 95% CI [0.04, 2.62]

As experience with ASL before school increases, rating of low mouthing increases

# Evaluation of deaf identity

## ASL-ENGLISH MIXING




estimate 2.5, 95% CI [0.29, 4.66]

The more experience with ASL-English mixing reported, the higher the rating of low mouthing

# Takeaways

- A data-driven bottom-up (but not atheoretical!), semiotic repertoires approach identified 4 types of language experience among ASL users in the US

- Show that **nativeness** as a theoretical construct in sign language linguistics is not useful by showing that signers classified as native and non-native report similar language experience

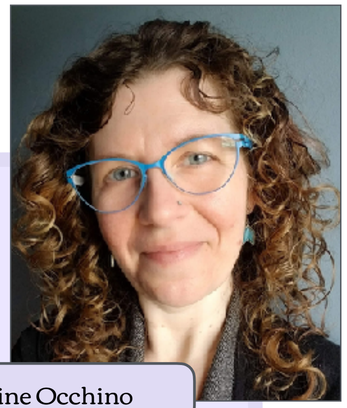
# Takeaways

- Signers with different social characteristics have different attitudes to mouthing correlating with DEAF FAMILY, AGE, ASL USE BEFORE SCHOOL, and ASL-ENGLISH MIXING
- Other social characteristics likely relevant but need to be measured at another level of granularity → **holistic characterisation is a next step** (e.g. Hall & DeAnda 2020)

- Sign language researchers should aim to **characterise the social characteristics and language experience of participants more explicitly, accurately** and **holistically** to understand sign language use

Savithry Namboodiripad

Joseph C. Hill



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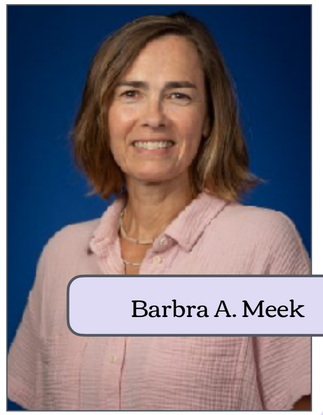

Barbra A. Meek

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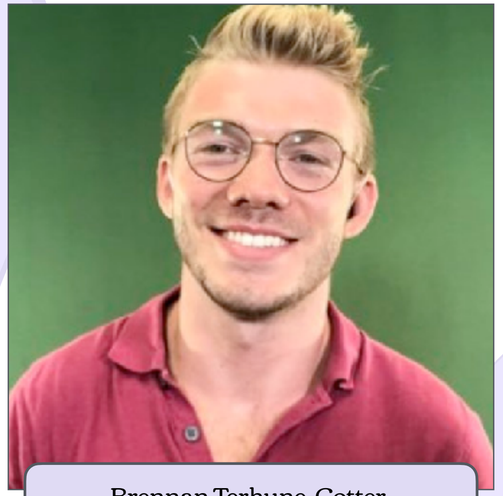

Brennan Terhune-Cotter

River Frank

## Deaf collaborators

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# More on this project

**Dissertation**

University of Michigan

https://deepblue.lib.umich.edu/handle/2027.42/196097


https://osf.io/truqk/

**Dissertation Abstract**

In *Sign Language & Linguistics*

https://doi.org/10.1075/sll.00091.bis

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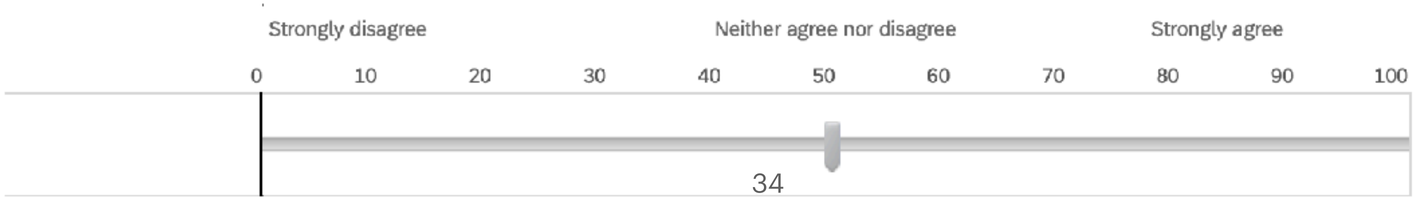
# Cluster Analysis Participants

n=269

| Characteristic | Description |
|---|---|
| DEAF IDENTITY | **deaf only** (46.1%), **hard-of-hearing** (34.2%), both (11.5%), missing (8.2%) |
| DEAF FAMILY | **yes** (46.1%), **no** (53.9%) |
| HIGHEST DEGREE | **bachelor** (49.1%), **high school diploma** (38.3%), advanced (11.5%), missing (1.1%) |
| GENDER | **male** (61.7%), **female** (36.8%), non-binary/third (1.5%) |
| REGION | **south** (27.1%), **midwest** (24.5%), west (23.8%), northeast (21.2%), missing (3.3%) |
| ETHNIC IDENTITY | **white** (47.9%), **Black/African American** (42.3%), Asian (1.9%), American Indian/Alaska Native (0.7%), other (7.2%) |
| AGE | Mean = 29.8, SD = 6.3 |
| AOA | Mean = 8.9, SD = 4.8 |

# Example question

The signing in the video you just saw looks beautiful. How much do you agree?

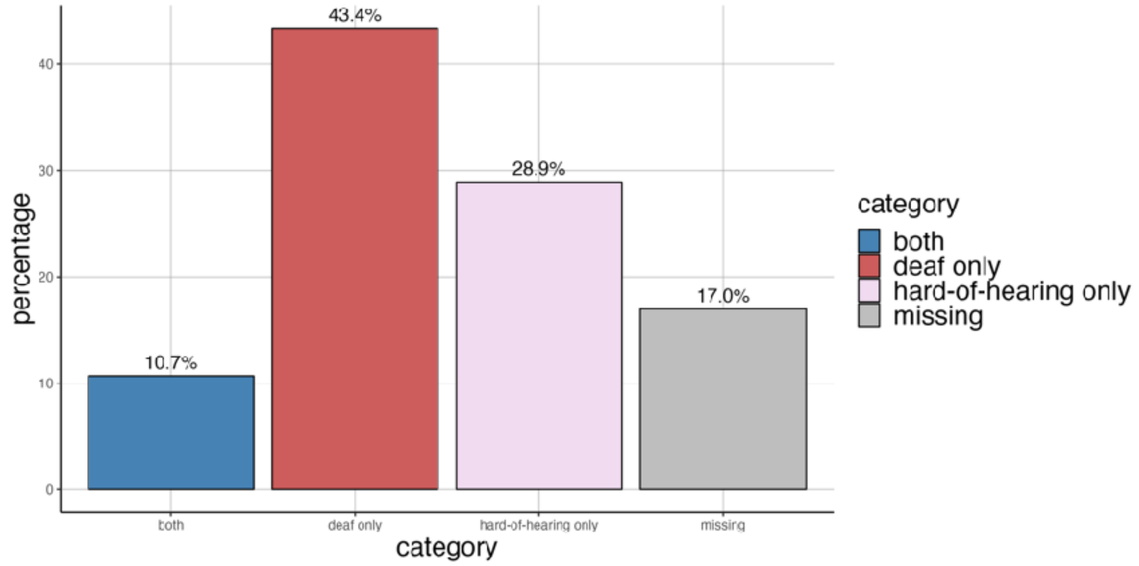


# Evaluation of mouthing task Stimuli

# MGT Participants

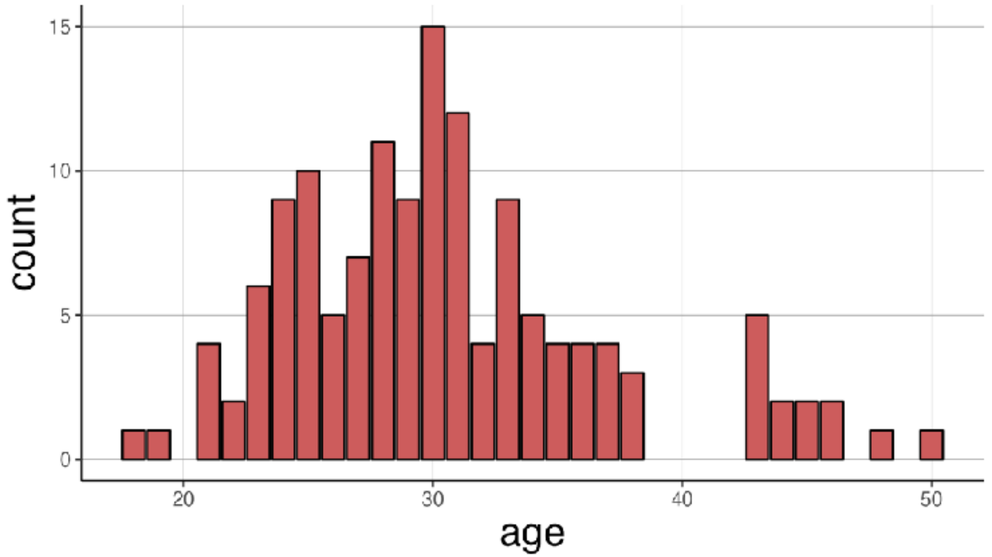
N = 134, Exclusion criteria: Did not know signers producing stimuli

**DEAF IDENTITY**




mainly identifying as deaf and hard-of-hearing

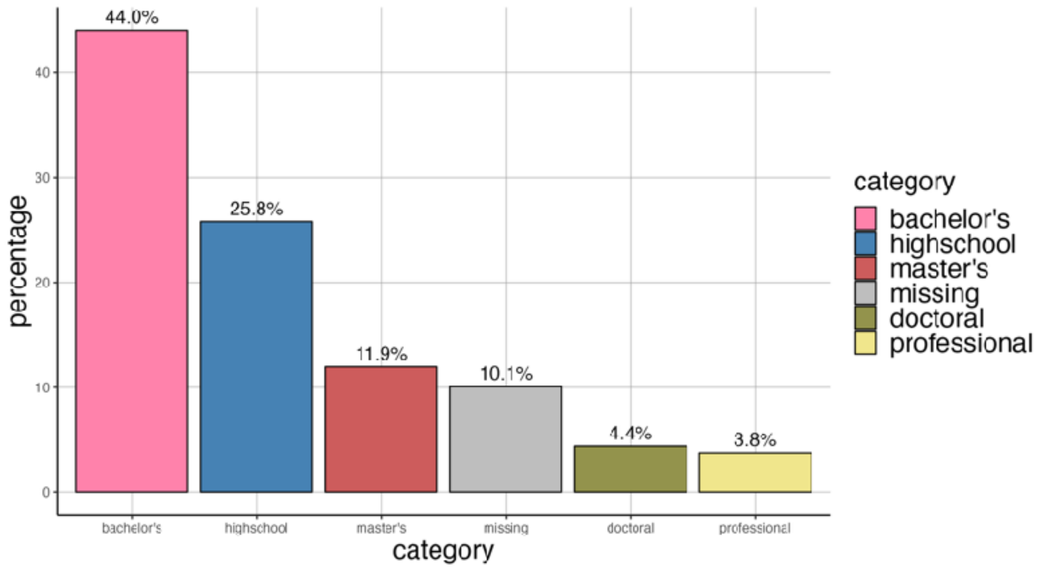
**AGE**




most between 20 and 40

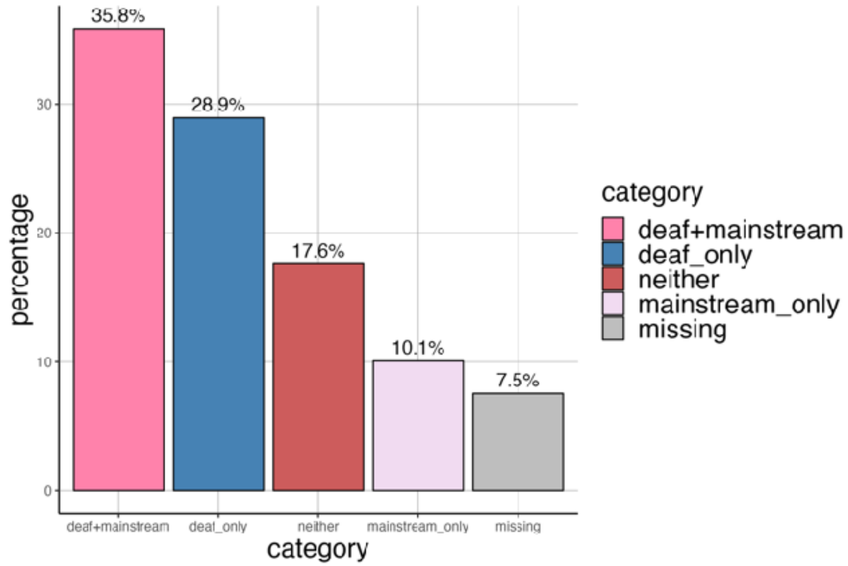
# MGT Participants

## HIGHEST DEGREE




mainly Bachelor’s degree and high school diploma

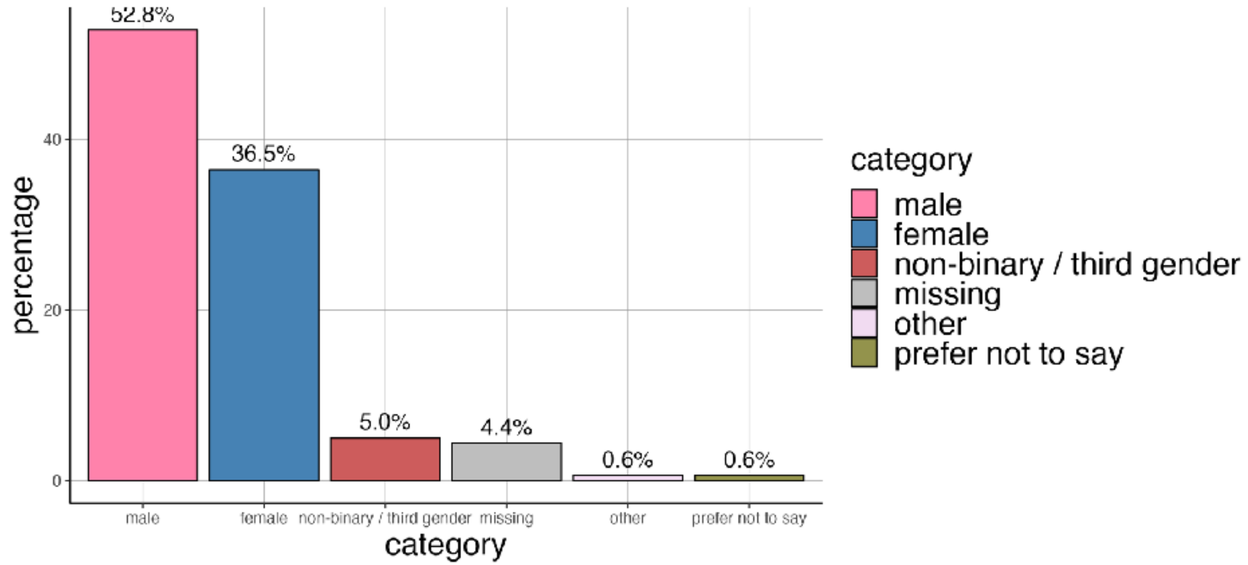
## SCHOOLING




most went to deaf+mainstream schools or deaf only schools

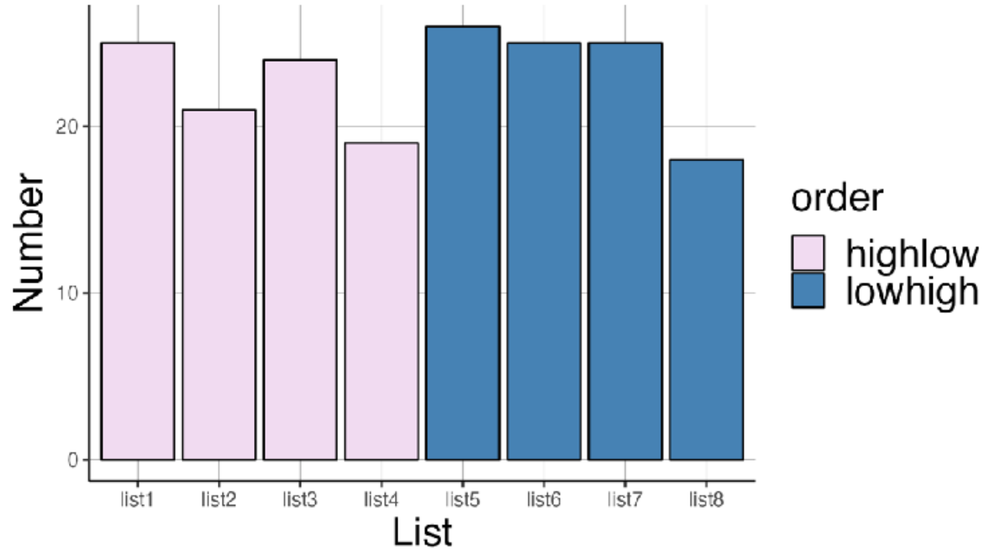
# MGT Participants

## GENDER




primarily male-identifying

## LIST DISTRIBUTION




generally evenly distributed

# Attitudes to mouthing vary

not part of
“real” ASL
(Nadolske & Rosenstock 2007)

mouthing “too much”, annoying, noticeable mouthing is a negative of Mixed signing
(Hill 2012)

English-ASL interpreters perceived by deaf signers as using mouthing appropriately
(Davis 1989)

“nice and clear”, appropriate
(Hill 2012)

# People with different social characteristics have different attitudes to the same phenomena

- **More educated** people rate Russian- and Southern American-accented English **higher for intelligibility, comprehensibility and accentedness** than those will less education (Fuse et al. 2024)

- **More educated** people rate [ch] in Andalusian Spanish as more **indicative of higher socioeconomic level and urbanness** than people with less education (Regan 2021)