# Exploring the heterogeneity of DHH language experiences in ASL users in the US outside of nativeness

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Theoretical Issues in Sign Language Research (TISLR15)

# DHH language acquisition is heterogeneous

- Hall & De Anda (2021) and references within
- varying levels of access to spoken and sign language during childhood

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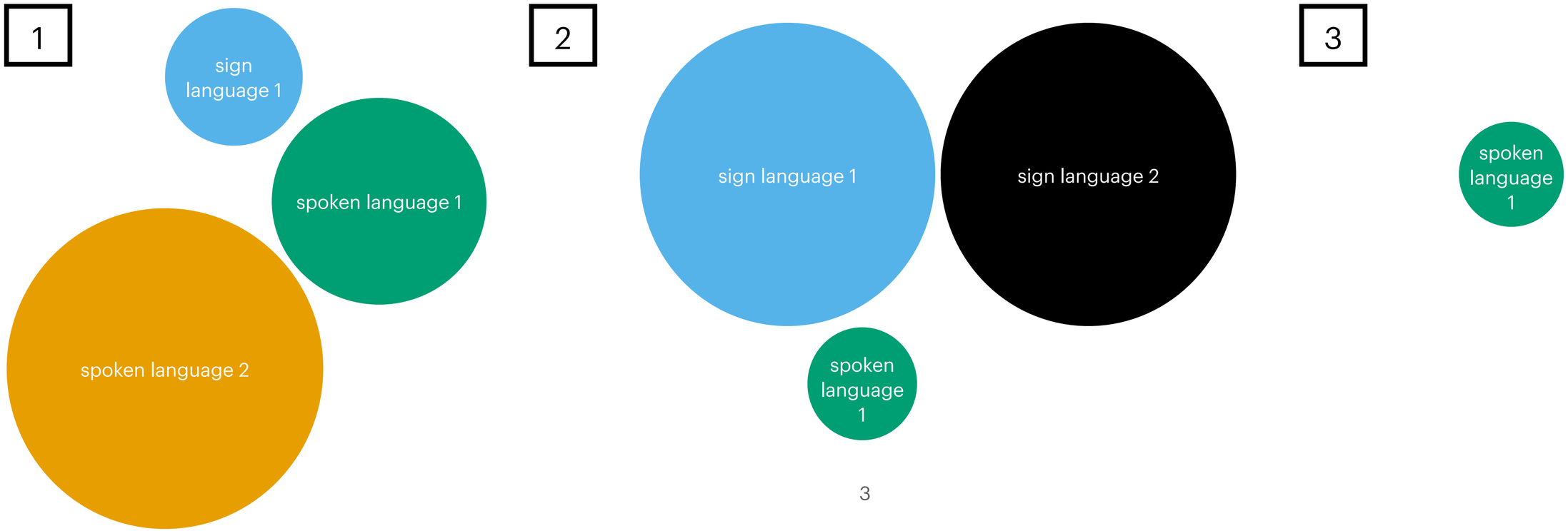

# Sign language users have multimodal multilingual semiotic repertoires

(Kusters et al. 2017)

pictures

writing
letter shapes
spelling

gestures
face
hands
body

speech
sound
mouth movements

signing

…

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can be associated with multiple languages

# Nativeness in sign language linguistics

- the native signer construct
  - early* age-of-acquisition of X sign language
    - *not consistently defined, birth, by age 3, by age 8 etc.
  - deaf parent(s)
    - sometimes the only criterion (Novogrodsky et al. 2017)
  - participation in deaf community for a certain length of time (Mathur & Rathmann 2006)

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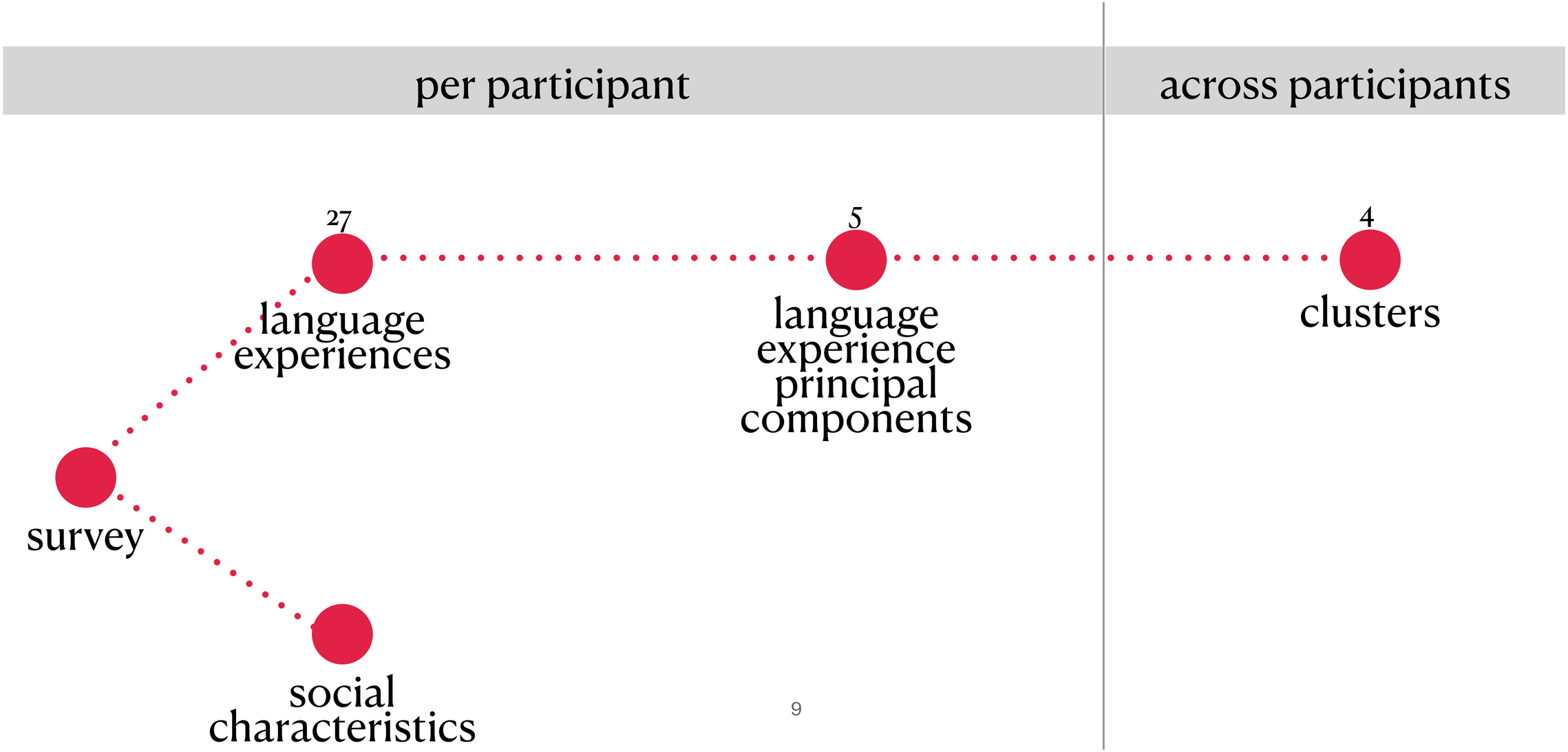
  - participation in deaf community for a certain length of time (Mathur & Rathmann 2006)
- characteristics of signers classed as native sometimes not reported (e.g. Cecchetto et al. 2006; Tyrone & Mauk 2010, Hirshorn et al. 2013)
- native vs. non-native has been problematised in linguistics (e.g. Birkeland et al. 2024)
- some signing communities do not have any signers who would count as native (Costello et al. 2006)
- does not consider actual (sign) language usage (Tomasello 2001; Bybee 2006)

# Research question

# How do DHH signers classified as native and non-native pattern in their experiences with ASL and English?

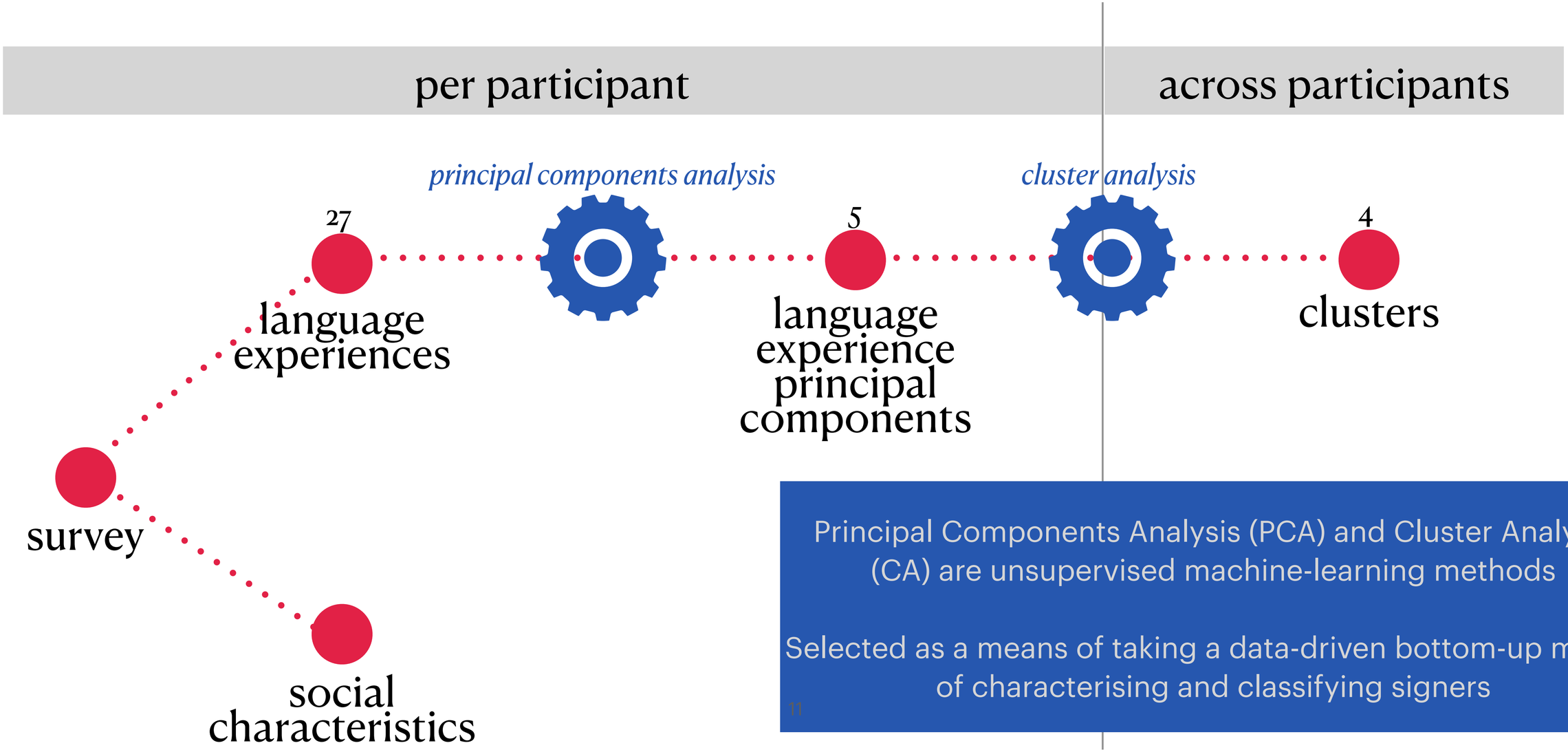
# Method


per participant
across participants
27
language experiences
5
language experience principal components
4
clusters
survey
social characteristics

# Language experience questions

- 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

# Method




Principal Components Analysis (PCA) and Cluster Analysis (CA) are unsupervised machine-learning methods

Selected as a means of taking a data-driven bottom-up means of characterising and classifying signers

# Participants

## n=269

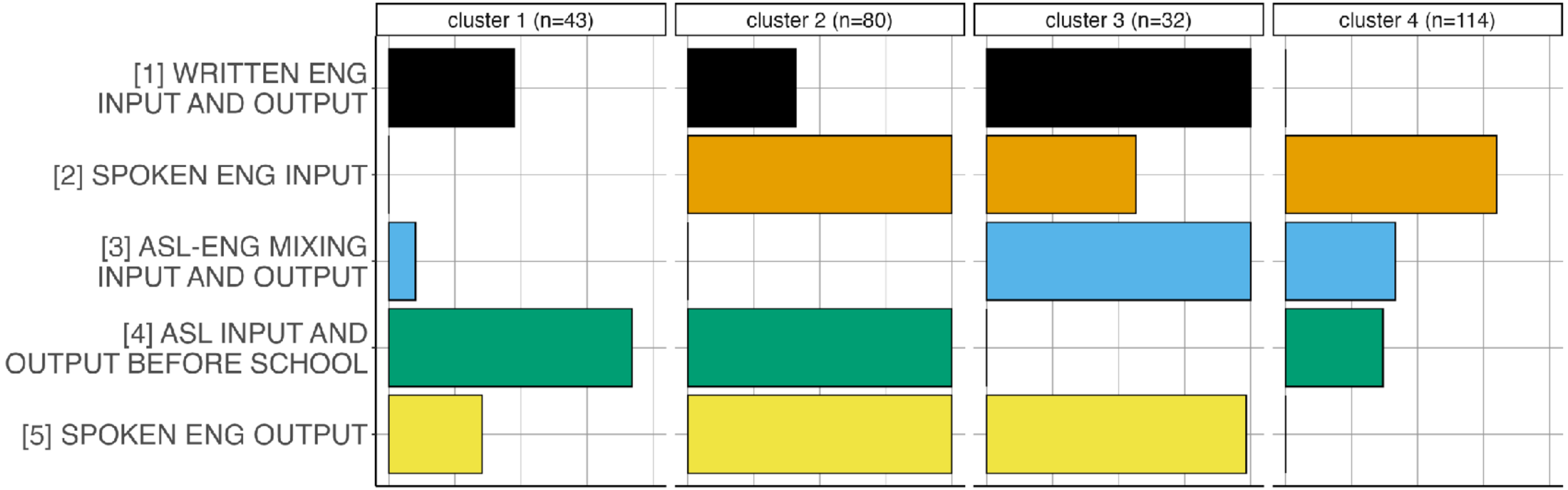
| Characteristic | Description |
|---|---|
| DEAF IDENTITY | **deaf only** (46.1%), **hard-of-hearing** (34.2%), both (11.5%), missing (8.2%) |
| DEAF FAMILY | **yes** (46.1%), **no** (53.9%) |
| HIGHEST DEGREE | **bachelor** (49.1%), **high school diploma** (38.3%), advanced (11.5%), missing (1.1%) |
| 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 |

# 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

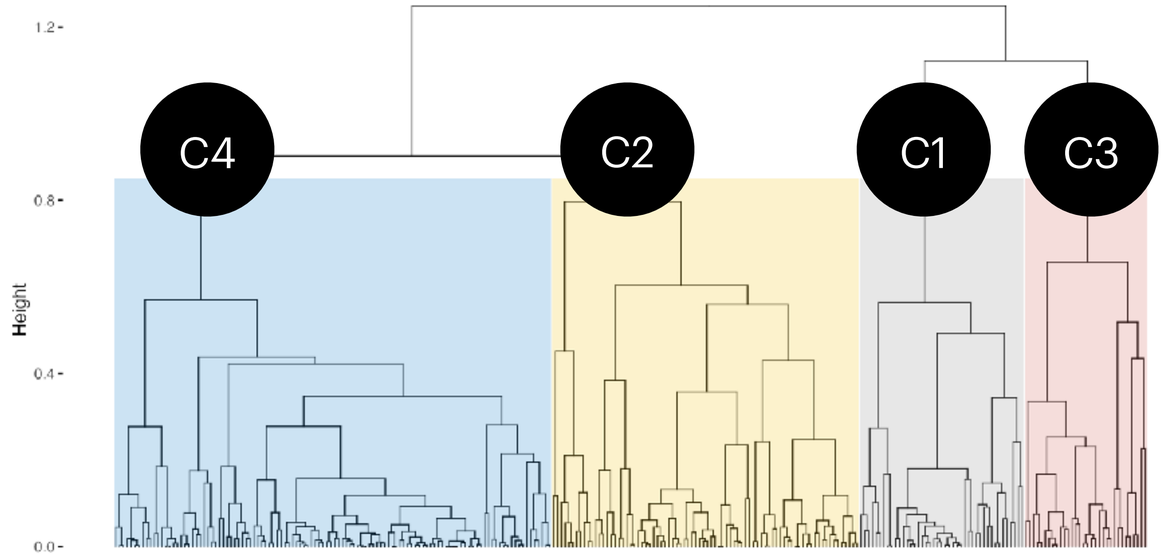
# Clusters/Language experience types



# Cluster Evaluation

## Internal Metrics

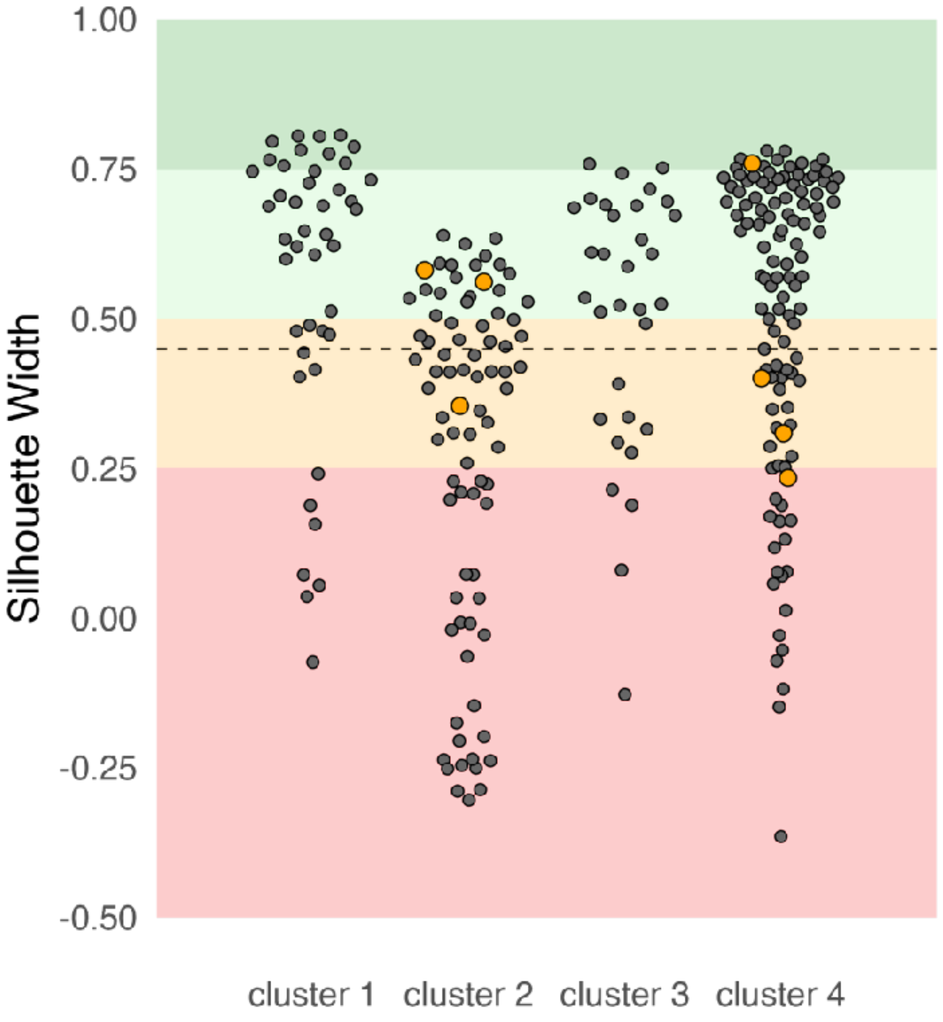
- Cophenetic coefficient **0.70** 👍🏾
  - how well the cluster solution preserves the structure of the original data
- Dunn’s Index **0.02** 👎🏾
  - how compact clusters are
  - sensitive to clusters of different sizes
- Average silhouette width **0.42** 👍🏾
  - similarity of cluster members to each other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



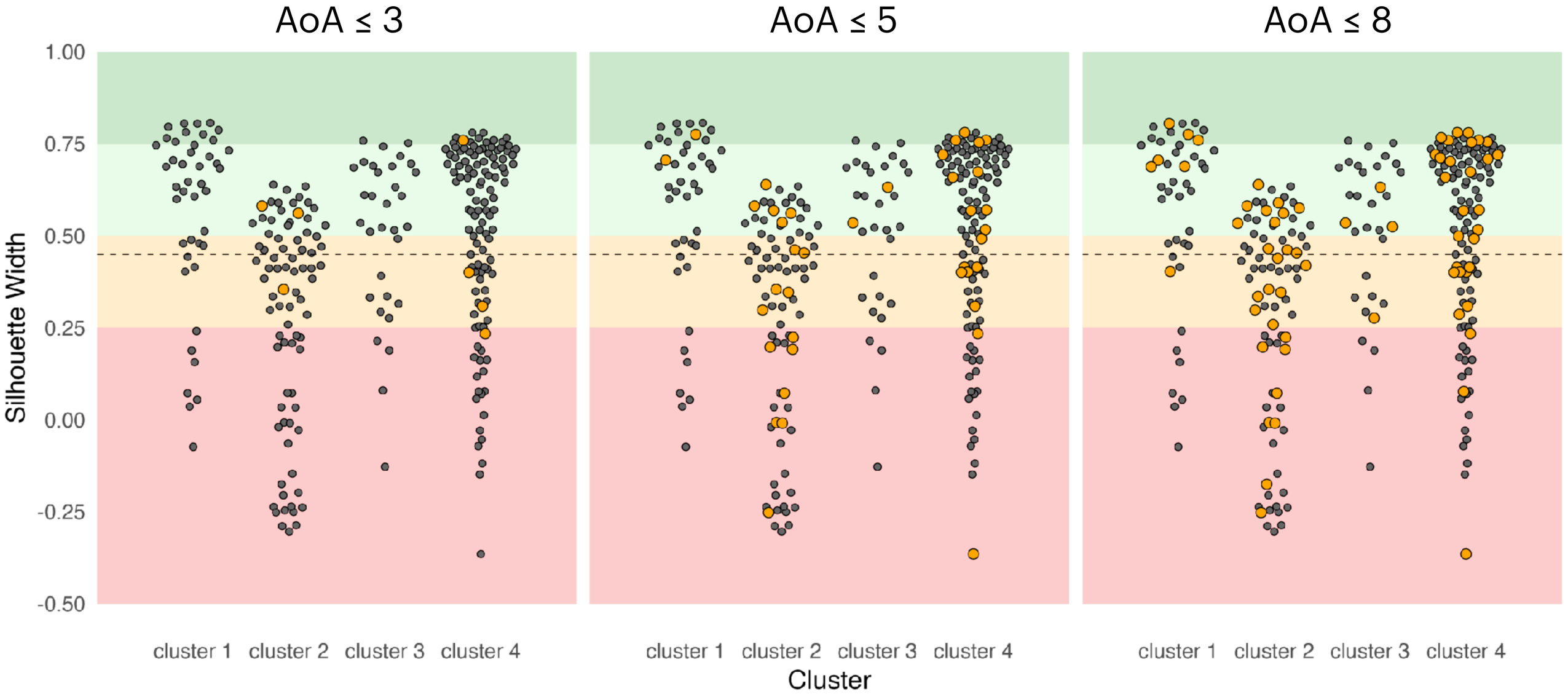
# Characterisation of a native signer

- Answered **yes** to binary question, “Did you grow up with deaf family at home?”
  - less strict than some definitions which require a deaf parent, but more accommodating of different kinds of family situations and language learning from other family members (Horton 2020, Haviland 2020)
- Age-of-acquisition of ASL cut-offs
  - ≦ 3 (Mayberry 1993; Mathur & Rathmann 2006; Freel et al. 2011)
  - ≦ 5
  - ≦ 8 (Lindeberg 2022)

## AoA ≤ 3

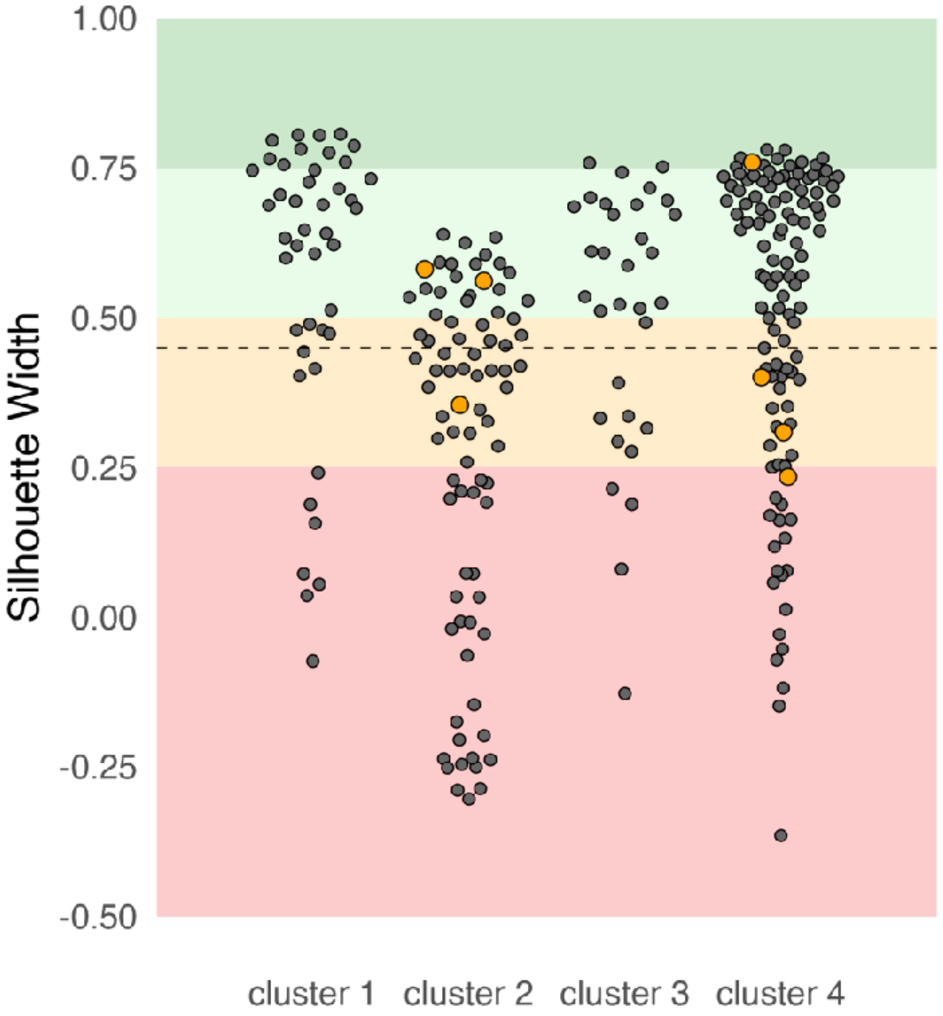


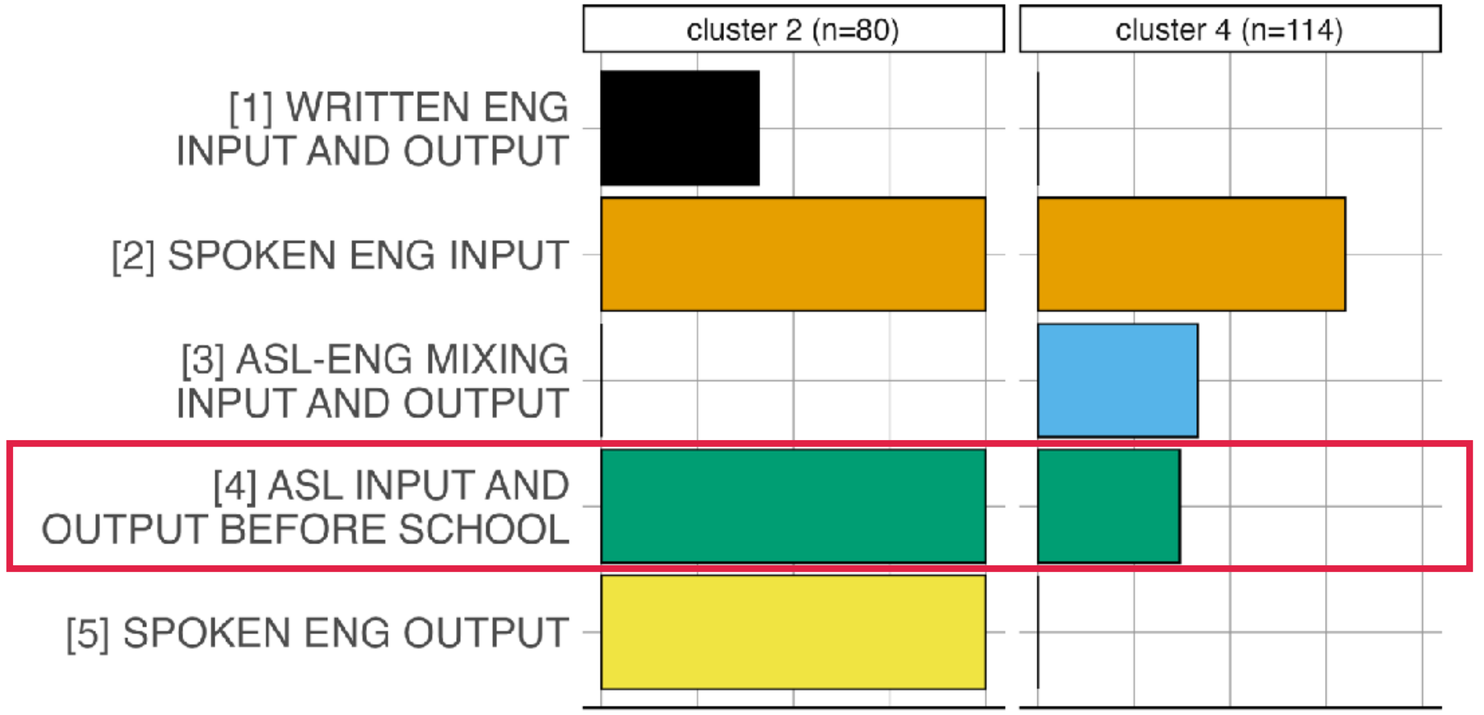

- age-of-acquisition of ASL ≦ 3
- no. of dots = no. of participants
- orange dot = native, grey dot = non-native
- *y*-axis = cluster membership
- *x*-axis = silhouette coefficient
  - higher score = better
    - red bg = bad,
    - orange bg = ok
    - green bg = good
    - dashed line = median silhouette score




Signers classified as native fall into different clusters, or language experience types

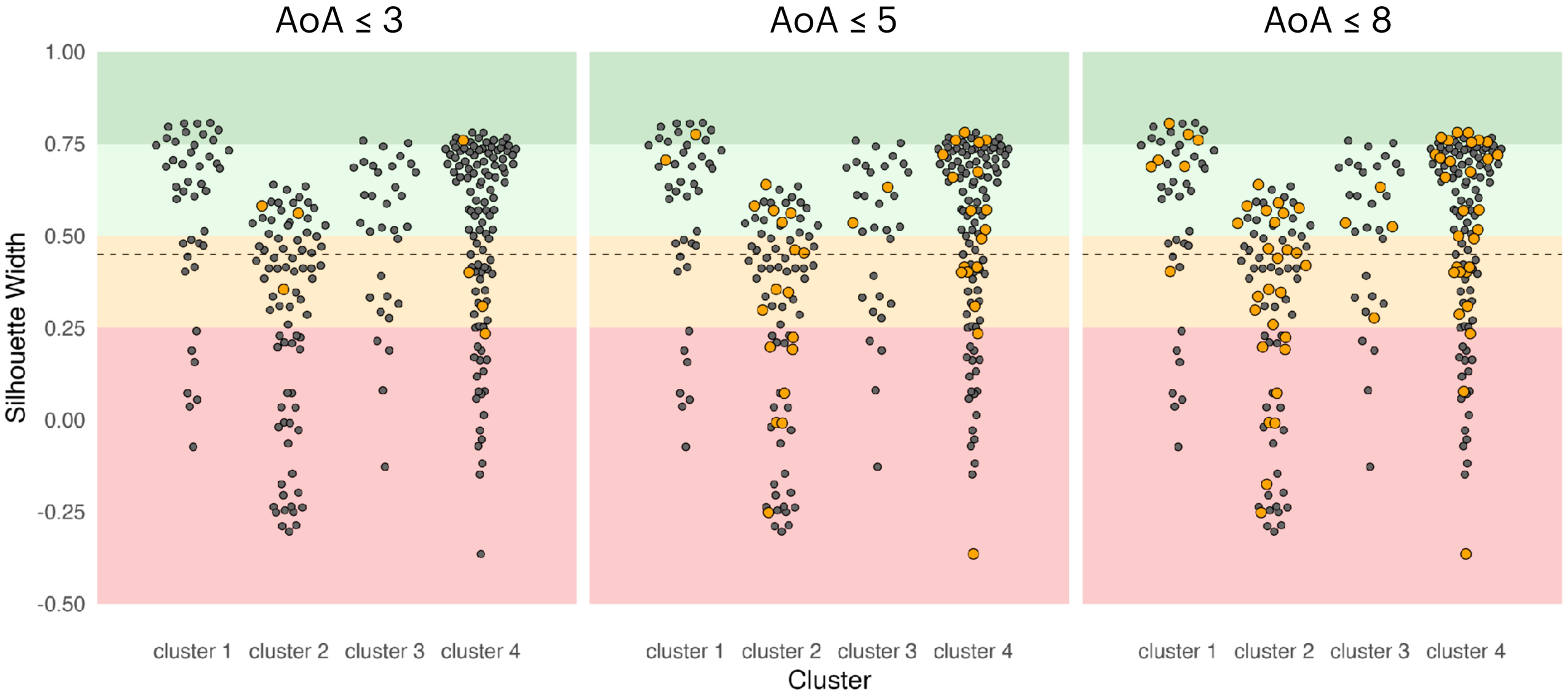
AoA ≤ 3



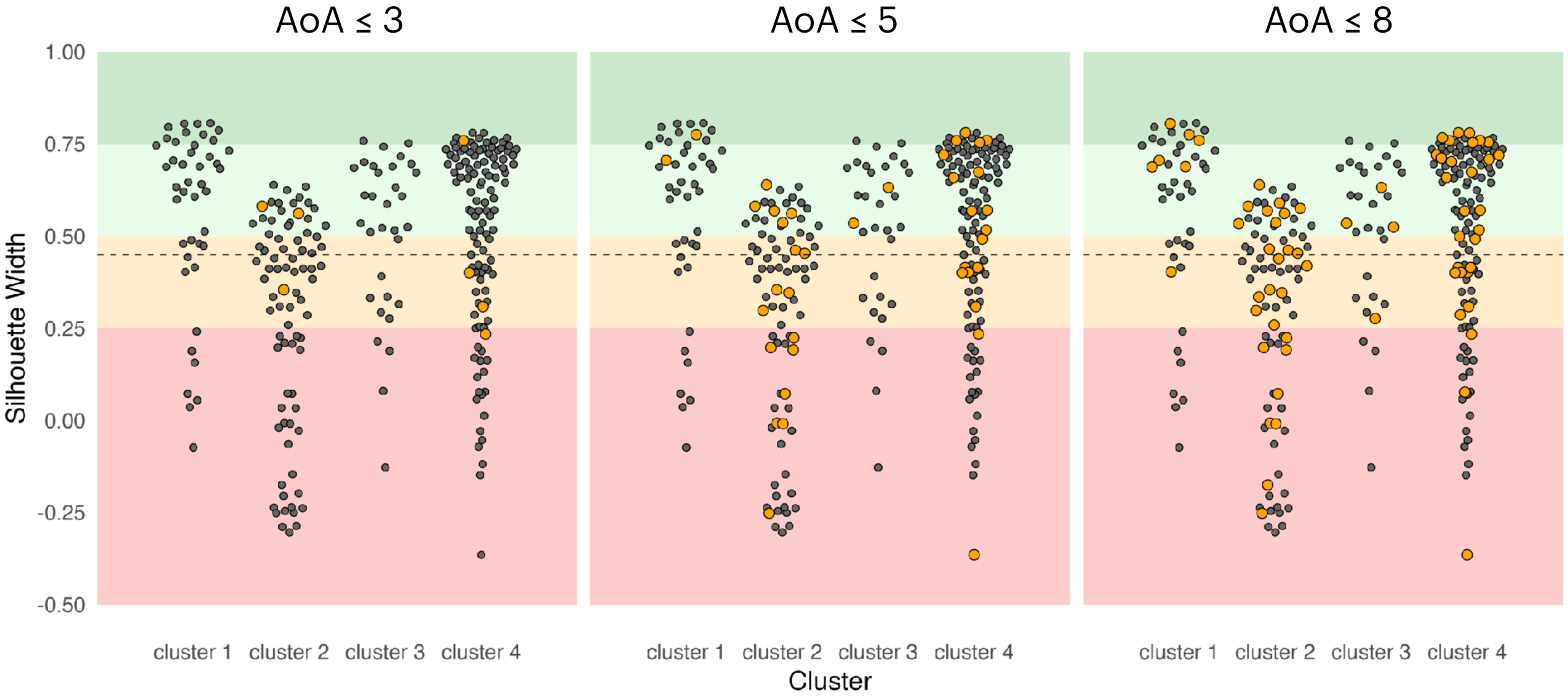




Signers who began acquiring ASL by age 3 report their experience with ASL before formal education differently

→ **signers classified as native do not necessarily have the same childhood experience with ASL**

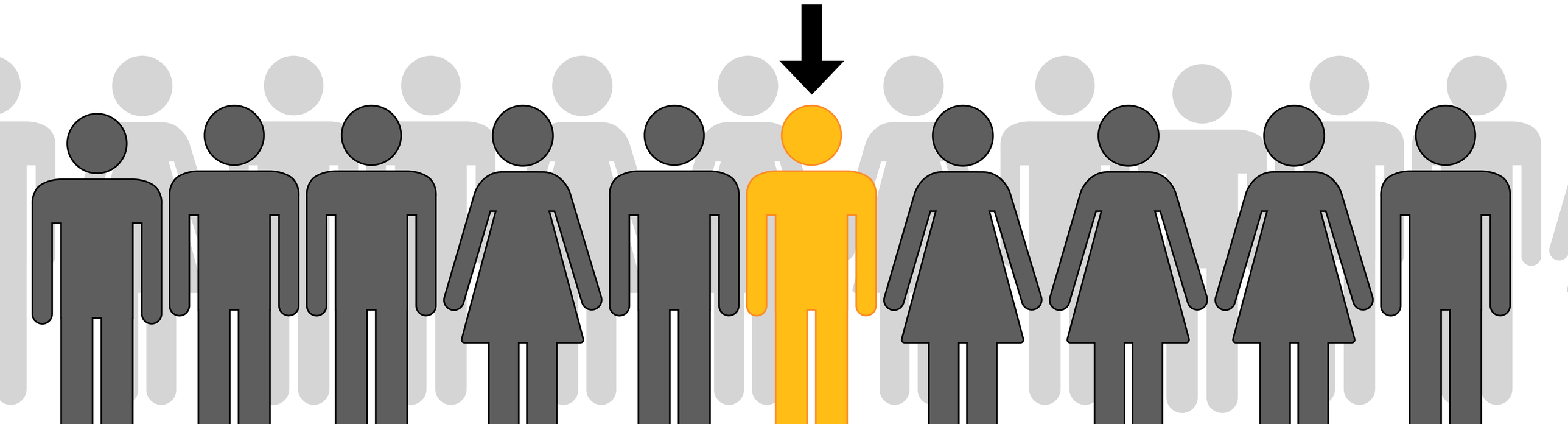



Signers classified as native pattern with signers classified as non-native across definitions of native → **native vs. non-native dichotomy is not necessarily capturing different experiences**




Signers classified as native are a small proportion of all DHH signers

**by prioritising nativeness we are not describing the majority of DHH sign language use**



# Takeaways & Recommendations

- native vs. non-native does not characterise coherent types of language experience/semiotic repertoires
- be more specific and explicit in describing language experience
- include more kinds of DHH experiences in sign language research

# Thanks

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# Dissertation

**“Attitudes to ASL-English Language Contact among Deaf and Hard-of-Hearing Users of ASL in the United States”**

https://dx.doi.org/10.7302/25033

Dissertation abstract to be published in Sign Language & Linguistics

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# References


Birkeland, Anne, Adeli Block, Justin T Craft, Yourdanis Sedarous, Sky Wang, Alexis Wu & Savithry Namboodiripad. 2024. Rejecting nativeness to produce a more accurate and just Linguistics. *Language*. Linguistic Society of America 100(3). e156–e194.

Bybee, Joan L. 2006. From Usage to Grammar: The Mind's Response to Repetition. *Language* 82(4). 711–733. https://doi.org/10.1353/lan.2006.0186.

Cecchetto, Carlo, Carlo Geraci & Sandro Zucchi. 2006. Strategies of relativization in Italian sign language. *Natural Language & Linguistic Theory*. Springer 24. 945–975.

Costello, Brendan, Javier Fernández & Alazne Landa. 2006. The non-(existent) native signer: sign language research in a small deaf population. In Ronice Müller De Quadros & Arara Azul (eds.), *Sign languages: spinning and unraveling the past, present and future*. Florianopolis, Brazil. https://d1wqtxts1xzle7.cloudfront.net/4095139/7.pdf?response-content-disposition=inline%3B+filename%3DThe_non-_existent_native_signer_Sign_lan.pdf&Expires=1595520009&Signature=Ep5S-M8VyQ-B-M85Zuk40MxphwkmJjVeWn~KeWumbSWwJLA0c3oCT57ksSx6fJBcEMwUWEPpPeV6TdxabfkDLmFUqm3aKpXjJD369DdIsiVbkgFN2G7oIK2S6eSEaxrnTkSJuT-vyAQJqdSBZxND4HY5I2Z9u5-k6LUlIMcAmSRKuZSfxa5yDGaiZi7IVuDEeBQmdBUPCbOoqwKJfn3chbwy5okiRWrmwmXuQutSha7LFx6wygSuEbDlupNeBH~Dwae0Fyeei2Zlx56R9QM4CPN4dhSMszxkamJxGtN6WgvBV8aqK9BP4IUmy3kHwllHnU-nrE-71vUK3LIdR7F1BQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA. (23 July, 2020).

Freel, Brittany L, M Diane Clark, Melissa L Anderson, Gizelle L Gilbert, Millicent M Musyoka & Peter C Hauser. 2011. Deaf individuals' bilingual abilities: American Sign Language proficiency, reading skills, and family characteristics.

Hall, Matthew L. & Stephanie De Anda. 2021. Measuring "Language Access Profiles" in Deaf and Hard-of-Hearing Children With the DHH Language Exposure Assessment Tool. *Journal of Speech, Language, and Hearing Research* 64(1). 134–158. https://doi.org/10.1044/2020_JSLHR-20-00439.

Haviland, John B. 2020. Zinacantec family homesign (or "Z"). *Emerging sign languages of the Americas*. DeGruyter, Ishara Press Berlin 393–400.

Hirshorn, Elizabeth A, Matthew WG Dye, Peter Hauser, Ted R Supalla & Daphne Bavelier. 2015. The contribution of phonological knowledge, memory, and language background to reading comprehension in deaf populations. *Frontiers in psychology*. Frontiers Media SA 6. 1153.

Horton, Laura. 2020. Representational strategies in shared homesign systems from Nebaj, Guatemala. *Emerging sign languages of the Americas*. De Gruyter Mouton Boston 97–154.

Kusters, Annelies, Massimiliano Spotti, Ruth Swanwick & Elina Tapio. 2017. Beyond languages, beyond modalities: transforming the study of semiotic repertoires. *International Journal of Multilingualism* 14(3). 219–232. https://doi.org/10.1080/14790718.2017.1321651.

Lindeberg, Dag Johan. 2022. *Language dominance and language variation in American Sign Language*. University of Texas at Austin PhD.

Mathur, Gaurav & Christian Rathmann. 2006. Variability in verbal agreement forms across four signed languages. *Laboratory phonology* 8. 289–316.

Mayberry, Rachel I. 1993. First-language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech, Language, and Hearing Research*. ASHA 36(6). 1258–1270.

Novogrodsky, Rama, Jon Henner, Catherine Caldwell-Harris & Robert Hoffmeister. 2017. The development of sensitivity to grammatical violations in American Sign Language: Native versus nonnative signers. *Language Learning*. Wiley Online Library 67(4). 791–818.

Tomasello, Michael. 2001. First steps toward a usage-based theory of language acquisition. Walter de Gruyter GmbH & Co. KG Berlin, Germany.

Tyrone, Martha E & Claude E Mauk. 2010. Sign lowering and phonetic reduction in American Sign Language. *Journal of Phonetics*. Elsevier 38(2). 317–328.