Testing similarity to confirm the use of minimal pairs and phonologically related signs as phonological distractors in a comprehension task

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Introduction

Within the SIGN-HUB Project we developed a lexical comprehension test in LSC with minimal pairs (MP) and phonologically-related pairs (PRP) as distractors.

Methods and Materials

Participants:

- 40 adult participants from Catalonia:
  - 20 hearing LSC signers (10 proficient, 10 beginners)
  - 10 hearing non-signers
  - 10 Deaf non-native LSC signers

Procedure:

- 125 pairs of signs in a video format:
  - 71 minimal pairs (MP): 38 for movement, 17 for handshape, and 16 for location
  - 54 phonologically related pairs (PRP):
    - 35 with 2 different parameters
    - 19 with 3 different parameters
  - On-line questionnaire
  - Participants were invited to rate, from 1 to 7, how similar each pair of signs after watching each video pairs.

Data analysis

Cumulative link mixed models (Dependent variable: ratings; Random intercepts for sub; and items; Random slopes for sub.)

Results

G1. Are MP and PRP rated differently in similarity?

<table>
<thead>
<tr>
<th>Group</th>
<th>MP</th>
<th>PRP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Median</td>
</tr>
<tr>
<td>Hearing non-signers</td>
<td>4.67 (1.69)</td>
<td>3.23 (1.63)</td>
</tr>
<tr>
<td>Hearing beginner signers</td>
<td>4.72 (1.76)</td>
<td>2.91 (1.72)</td>
</tr>
<tr>
<td>Hearing proficient signers</td>
<td>4.27 (1.85)</td>
<td>2.46 (1.64)</td>
</tr>
<tr>
<td>Deaf non-native signers</td>
<td>3.85 (2.01)</td>
<td>2.33 (1.66)</td>
</tr>
</tbody>
</table>

All groups rated as more similar MP than PRP:
- Hearing non-signers (p=0.001)
- Hearing beginner signers (p=0.001)
- Hearing proficient signers (p=0.001)
- Deaf non-native signers (p=0.001)

PRP: about 60% of ratings = 1 (see Figure 3) MP: more spread distribution

G2. In MP, is the similarity affected by the parameter that is changing (movement, handshape, location)?

<table>
<thead>
<tr>
<th>Group</th>
<th>Handshape</th>
<th>Location</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Median</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Hearing non-signers</td>
<td>4.76 (1.68)</td>
<td>4.81 (1.67)</td>
<td>4.58 (1.70)</td>
</tr>
<tr>
<td>Hearing beginner signers</td>
<td>4.54 (1.89)</td>
<td>4.86 (1.73)</td>
<td>4.74 (1.75)</td>
</tr>
<tr>
<td>Hearing proficient signers</td>
<td>4.21 (1.80)</td>
<td>4.81 (1.73)</td>
<td>4.08 (1.87)</td>
</tr>
<tr>
<td>Deaf non-native signers</td>
<td>3.62 (2.09)</td>
<td>4.13 (2.01)</td>
<td>3.84 (1.97)</td>
</tr>
</tbody>
</table>

No statistically significant difference in the parameter that is changing.

G3. In PRP, is the similarity affected by the number of parameters that are changing (2 or 3)?

<table>
<thead>
<tr>
<th>Group</th>
<th>2 parameters</th>
<th>3 parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Median</td>
</tr>
<tr>
<td>Hearing non-signers</td>
<td>3.86 (1.62)</td>
<td>2.99 (1.59)</td>
</tr>
<tr>
<td>Hearing beginner signers</td>
<td>3.03 (1.73)</td>
<td>2.67 (1.67)</td>
</tr>
<tr>
<td>Hearing proficient signers</td>
<td>2.63 (1.68)</td>
<td>2.14 (1.51)</td>
</tr>
<tr>
<td>Deaf non-native signers</td>
<td>2.46 (1.72)</td>
<td>2.09 (1.52)</td>
</tr>
</tbody>
</table>

No statistically significant difference between 2/3 parameters.

Discussion & conclusions

The criteria used to select minimal pairs are supported by the difference in the similarity rated between MP and PRP:
- In our case, the criteria were based on Brentari’s (1998).

Prosocial Model

- In our case, the criteria were based on Brentari’s (1998).

- The resulting minimal pairs are a good tool for testing phonological processing in sign language users.
- The reliability of the criteria established to detect minimal pairs can be useful to determine the existence of distinct phonemes in LSC

However:

Our results suggest that the phonological distinction between signs can be evaluated in terms of similarity (MP vs PRP).

Interestingly:

The perceived higher similarity in MP than in PRP holds true not only in proficient signers, but also in (hearing) beginner and non-signers.

This is the first time that a similarity test has been conducted in LSC research.

A follow up study is needed:

- the study should be replicated
- enlarging the sample
- including native signers as participants
- including control items and 1 congruent condition

References


For further information about the project please visit our website at www.sign-hub.eu

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