

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.



Results

Q1. Are MP and PRP rated differently in similarity?

	MP		PRP	
	MEAN (SD)	Median	MEAN (SD)	Median
Hearing non-signers	4.67 (1.69)	5	3.23 (1.61)	3
Hearing beginner signers	4.72 (1.76)	5	2.91 (1.72)	3
Hearing proficient signers	4.27 (1.85)	5	2.46 (1.64)	2

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) Prosodic Model

Root node



Figure 1. Slide of the SIGN-HUB comprehension task

Why?

- Late SL learners and native signers differ in the phonological processing (Hall, Ferreira & Mayberry, 2012).
- In signers with specific language impairments (SLI) proficiency in different areas of language is affected (Mason et al., 2010).

But

- Literature does not provide a a proper model to identify minimal pairs in SLs (Morgan 2017)
- As in spoken languages, it is necessary to consider that two phonetic units can be distinct in a greater or lesser degree (Monçao et al. 2006)

Research goals

Show the reliability of the criteria we used to select minimal pairs and phonologically related signs as phonological distractors in the material created for the SIGN-HUB task.





Figure 3. Distribution of ratings in MP and PRP (Deaf participants only)

All groups rated as more similar MP than PRP

- Hearing non-signers (β =1.39, SE=0.21, z=6.63, p<.001)
- Hearing beginner signers (β =1.70, SE=0.25, z=6.76, p<.001)
- Hearing proficient signers (β =1.63, SE=0.21, z=7.77, p<.001)
- Deaf non-native signers (β =1.75, SE=0.23, z=7.54, p<.001)

PRP: about 50% of ratings = 1 (see Figure 3) MP: more spread distribution

Q2. In MP, is the similarity affected by the parameter that is changing (movement, handshape, location)?

Group	Handshape		Location		Movement	
	Mean(SD)	Median	Mean(SD)	Median	Mean(SD)	Median
Hearing non-signers	4.76 (1.68)	5	4.81 (1.67)	5	4.58 (1.70)	5
Hearing beginner signers	4.54 (1.89)	5	4.86 (1.73)	5	4.74 (1.75)	5
Hearing proficient signers	4.21 (1.80)	4	4.81 (1.73)	5	4.08 (1.87)	4
Deaf non-native signers	3.62 (2.09)	3.5	4.13 (2.01)	4	3.84 (1.97)	4



- Theoretically based criteria need to be established to guarantee a certain degree of contrast
- 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 PRS).

We conducted an articulatory similarity test from a perceptual point of view.

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:
 - o 71 minimal pairs (MP):
 - 38 for movement
 - 17 for handshape
 - 16 for location
 - 54 phonologically related pairs (PRP):
 - 35 with 2 different parameters
 19 with 3 different parameters



Figure 4. Distribution of ratings in MP for handshape, location and movement (Deaf participants only)

No statistically significant difference in the parameter that is changing.

Q3. In PRP, is the similarity affected by the number of parameters that are changing (2 or 3)?

Group	2 para	meters	3 parameters		
	Mean(SD)	Median	Mean(SD)	Median	
Hearing non- signers	3.36 (1.60)	3	2.99 (1.59)	3	
Hearing beginner signers	3.03 (1.73)	3	2.67 (1.67)	2	
Hearing proficient signers	2.63 (1.68)	2	2.14 (1.51)	2	
Deaf non-native signers	2.46 (1.72)	2	2.09 (1.52)	1	

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

- onlarging the sample
 - enlarging the sample
 - including native signers as participants
 - including control items and 1 congruent condition

References

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- On-line questionnaire
- Participants were invited to rate, from 1 to 7, how similar was each pair of signs after watching each pair of videos.

Data analysis

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





Figure 5. Distribution of ratings in PRP changing for 2 or 3 parameters (Deaf participants only)

No statistically significant difference between 2/3 parameters.

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