True friends or false friends?
Lexical similarity for predicting cross-signing success

Carl (Calle) Börstell
Onno Crasborn
Lori Whynot

Communication across languages

• Two people meet.
  They don’t know each other.
  They don’t have a shared language.

How do they communicate?

Communication across languages

• If they do speak the same language...
  No problem!

Communication across languages

• If they speak the different languages...
  Problematic!
Communication across languages

- If they speak the **similar** languages...

  It depends!

<table>
<thead>
<tr>
<th>True friends &amp; false friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some word forms are similar across languages...</td>
</tr>
<tr>
<td>- If they mean the same thing...</td>
</tr>
<tr>
<td>= TRUE FRIENDS!</td>
</tr>
<tr>
<td>teckenspråk 'sign language'</td>
</tr>
<tr>
<td>- If they mean different things...</td>
</tr>
<tr>
<td>= FALSE FRIENDS</td>
</tr>
<tr>
<td>rolig 'funny'</td>
</tr>
</tbody>
</table>

We can communicate across some languages, like Swedish and Norwegian

... but what about sign languages?

Cross-signing

- Previous research points to communication across different languages being possible – **cross-signing**

  ... even when the two sign languages are unrelated!

Supalla & Webb 1995; Zeshan 2015; Byun et al. 2018, inter alia
**True or false friends?**

- If you see a sign from another SL:
  - You know the sign
    - L2 knowledge
  - The meaning is the same in your SL
    - True friend
  - The meaning is different in your SL
    - False friend

---

**Can we use true/false friends to measure linguistic distance?**

... If so, does it predict cross-signing success between those languages?

---

**Example: Comparing signs for ‘no’**

<table>
<thead>
<tr>
<th>NGT</th>
<th>CSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRIKA-B</td>
<td>AFRICA-A</td>
</tr>
<tr>
<td>One-handed, mouth, ...</td>
<td>Two-handed, neutral space, ...</td>
</tr>
</tbody>
</table>

**Global signbank**

**Phonological properties**

- Home
- Datasets
- Sign
- About
- Feedback
- Search gloss

- CSL_Shanghai
- NTG
- NTS
- BTS
- LSL
Example: Comparing signs for ‘no’

<table>
<thead>
<tr>
<th>No of hands</th>
<th>Handshape</th>
<th>Location</th>
<th>Mov. direction</th>
<th>Repeated mov.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGT</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSL</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: Comparing signs for ‘no’

<table>
<thead>
<tr>
<th>No of hands</th>
<th>Handshape</th>
<th>Location</th>
<th>Mov. direction</th>
<th>Repeated mov.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGT</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSL</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: Comparing signs for ‘no’

<table>
<thead>
<tr>
<th>No of hands</th>
<th>Handshape</th>
<th>Location</th>
<th>Mov. direction</th>
<th>Repeated mov.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGT</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td>Ipsilateral</td>
<td></td>
</tr>
<tr>
<td>CSL</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td>Ipsilateral</td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Example: Comparing signs for ‘no’

<table>
<thead>
<tr>
<th></th>
<th>No of hands</th>
<th>Handshape</th>
<th>Location</th>
<th>Mov. direction</th>
<th>Repeated mov.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGT</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td>Ipsilateral</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>CSL</td>
<td>1</td>
<td>B</td>
<td>Neutral</td>
<td>Ipsilateral</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4/5</td>
</tr>
</tbody>
</table>

Phonological properties in Signbank

- Handedness
- Strong Hand
- Weak Hand
- Handshape Change
- Relation between Articulators
- Location
- Relative Orientation: Movement

Languages in Global Signbank

- Sign Language of the Netherlands (NGT) • 3,531 coded signs
- Shanghai Chinese Sign Language (CSL) • 568 coded signs
- International Sign (IS) • 200 coded signs
Finding our friends

A short Python script →

1. Compare all FORMS – every sign in both datasets
2. Compare matched MEANINGS – only meaning-matched signs

Comparing signs, part 1
From FORM to MEANING

Finding our friends

• Comparing NGT and Shanghai CSL
• Script gives us 30 sign pairs that have identical forms in both languages
• A manual check proves that
  • 12 pairs are true friends
  • 18 are false friends
Finding our friends

• Comparing NGT and IS
  • Script gives us 10 sign pairs that have identical forms in both languages
  • A manual check proves that
    • 6 pairs are true friends
    • 4 are false friends

Finding our friends

• Comparing CSL and IS
  • Script gives us 0 sign pairs that have identical forms in both languages
  • But the two datasets are small (568 signs ~ 200 signs)

Interim findings: true/false friends

• Our method helps us identify true/false friends across languages of Global Signbank semi-automatically
  • The number of friends found depends on size of datasets (languages)
  • Are NGT~IS closer than NGT~CSL? Too little data!

Comparing signs, part 2

From MEANING to FORM
Lexical similarity

- Linking specific CONCEPTS, we can measure how similar two languages are.
- A script automatically matches sign glosses to the 3,431 concepts in the Concepticon database:
  1. CONTEMPTIBLE
  2. DUST
  3. BRAVE
  4. COURTYARD
  5. GAZELLE
  ...

List et al. 2019

Lexical similarity script

Signbank

NGT

Comparison

Concepticon

‘no’

Lexicostatistics

Previous methods
- Only basic form parameters:
  - Handshape
  - Location
  - Movement
  - Orientation
- 3/4 or 2/3 counts as “similar”

Our methods
- Looks at more detailed phonological properties
- Automatically with a computer; uniform database
- Gives a more precise score (0–1)


Lexical similarity

- Very few signs are true friends or near friends.
Lexical similarity: matches

- Looking at the top form-similar matched concepts, we find:
  - Numbers: ZERO, ONE, TWO, ...
  - Body-parts: FACE, ARM, EAR
  - Gestures(?): GOOD, NO, MONEY

- We need more data!

### Concepts and Scores

<table>
<thead>
<tr>
<th>Concept</th>
<th>Pair</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD</td>
<td>CSL-NGT</td>
<td>3.00</td>
</tr>
<tr>
<td>HAPPY</td>
<td>CSL-NGT</td>
<td>3.00</td>
</tr>
<tr>
<td>ELECTRICITY</td>
<td>CSL-NGT</td>
<td>0.89</td>
</tr>
<tr>
<td>NO</td>
<td>CSL-NGT</td>
<td>0.88</td>
</tr>
<tr>
<td>GOOD</td>
<td>IS-NGT</td>
<td>0.86</td>
</tr>
<tr>
<td>FACE</td>
<td>CSL-NGT</td>
<td>0.86</td>
</tr>
<tr>
<td>GOOD</td>
<td>IS-IS</td>
<td>0.86</td>
</tr>
<tr>
<td>MONEY</td>
<td>CSL-IS</td>
<td>0.83</td>
</tr>
<tr>
<td>ONE</td>
<td>CSL-IS</td>
<td>0.83</td>
</tr>
<tr>
<td>FOUR</td>
<td>CSL-IS</td>
<td>0.83</td>
</tr>
<tr>
<td>ZERO</td>
<td>CSL-IS</td>
<td>0.83</td>
</tr>
<tr>
<td>TWO</td>
<td>CSL-IS</td>
<td>0.83</td>
</tr>
<tr>
<td>COLD</td>
<td>CSL-NGT</td>
<td>0.78</td>
</tr>
<tr>
<td>ARM</td>
<td>CSL-NGT</td>
<td>0.78</td>
</tr>
<tr>
<td>EAT</td>
<td>CSL-NGT</td>
<td>0.75</td>
</tr>
<tr>
<td>WHAT</td>
<td>CSL-NGT</td>
<td>0.75</td>
</tr>
</tbody>
</table>

### Conclusions

- A two-part method for comparing lexical similarity across languages of Global Signbank

- Both methods suggest that CSL is more distinct from NGT and IS

- Supports recent cross-linguistic work on phonology of Western vs. Eastern SLs – but our datasets are still small

- We will use these metrics in our research on communicative success in cross-signing

---

**Thank you!**

This study was funded by the Netherlands Organisation for Scientific Research (NWO) grant number 277-70-014.

We would like to acknowledge the rest of our team, Tashi Bradford, Aurélia Nana Gasa Gonge, Maya de Wit, and Merel van Zuilen. A special thanks to Anique Schüller and Neil Ray for annotating specific Signbank data for this study.

---

**References**