Prosody in German Sign Language

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Workshop on Prosody and Meaning
Outline

Introduction
  Sign Languages
  Nonmanual Features

Prosody in Sign Languages

Prosodic Structuring in DGS
  Data
  Results

Semantics and Compositionality of Nonmanuals

Conclusions and Outlook
Sign Languages

- Sign languages use the visual-manual modality
- Signs are produced by manual articulators (hands and arms) and nonmanual (upper body, head and face) articulators
- Layering of manual and nonmanual means
- Simultaneous 4-dimensional languages
- Compensation of slow production time on sentence level
German Sign Language

- DGS (Deutsche Gebaerdensprache)
- 80.000 deaf people in Germany
- Since 2002 DGS is officially recognized as a minority language
Nonmanuals are relevant for sign language grammar

- Lexical functions (THIN, SAD, RECENTLY)
- Morphological functions (adverbs, aspectual marking)
- Morpho-syntactic functions (agreement)
- Syntactic functions (sentence types, topicalization, subordination, direct speech, etc.)
Visual Prosody - State of the Art

- Israeli Sign Language  
  (Nespor and Sandler 1999, Sandler 2009)

- American Sign Language  

- Sign Language of the Netherlands  
  (Crasborn and van der Kooij 2004)
Visual Prosody

Prosodic Hierarchy

Phonological Utterance - Intonational Phrase - Phonological Phrase - Phonological Word - Syllable
(cf. Nespor and Vogel 1986)
Prosody and Syntax

**Syntactic Analysis:** nonmanuals as instantiation of syntactic features
- nonmanuals spread along the c-command domain of the triggering feature
- nonmanuals triggered by Spec-head relations

**Prosodic Analysis:** nonmanual as intonational markings
- evidence for nonisomorphism between syntactic and prosodic alignment
- different nonmanuals for same ‘feature’
- pragmatic context dependency
Nonisomorphism of prosodic and syntactic constituency

\[ \text{TOMORROW MAN}_{3a} IP \ [\text{RPRO}_{3a} \ TIE \ BUY]_{IP} \ [\text{CONFERENCE}_{3b} \ GO-TO_{3b}]_{IP} \]

'Tomorrow the man who is buying a tie will go to a conference.'
(cf. Pfau and Quer in press)

\[ \text{TIM IX}_{3} IP \ [\text{FLOWER}]_{F} IP \ [\text{WATER \ ONLY}]_{IP} \]

'Tim watered only the FLOWER_{F}.'
Data and Informants

- 8 DGS native signers
- Video sessions of about 2 hours each
- 2 Camcorders: Torso and Face
- Modal Meaning task to elicit sentences in specific contexts
- Picture Stories to elicit focus particles
Data Set

- Elan Synchronisation and Annotation of Videos
- Data: 240 short dialogs and contexts and 24 picture stories
- Qualitative investigation
- Statistical analysis of eye blinks and other cues of intonational and phonological phrase boundaries
Prosody in DGS

- **rhythm**
  - pauses, holds/frozen signs, lengthening, eye blinks, signing rate, head nods, reduplication, gestures

- **prominence**
  - head movement, eyebrow movement, eye aperture, tense signing, lengthening and enlarging signs

- **intonation**
  - eyebrow movement, eye aperture, eye gaze, frown, facial expression, mouth gestures, head movement
Prosody in DGS

Figure: Annotation of different tiers

[COFFIE FOR BRING_{CL,THIN-OBJ}}_{IP} [IX3 BE-LAZY READ]_{IP} : [SUDDENLY]_{IP} [FLASH]_{IP}

b   b   b   w--------   b   b
hn   hn

bl-b-----------

c-------------la-----------------

GLOSS
eye blinks
head nods
eyebrows
body
facial expr.
mouth

o-------------tt-----------------
Prosody in DGS

READ:
body lean, face

: 
blink, nod

SUDDENLY:
wide eyes

FLASH:
furrowed brows

Figure: Domain and Edge Markers
Domain markers

Domain markers spread along prosodic constituents with consistent alignment and general change and phrase boundaries

- facial nonmanuals
- head movements
- body movements
Edge Markers

Edge markers indicate the edge of a prosodic phrase (PP and IP)

- eye blinks
- head nods
- pauses
- repetition of sign
- holds, phrase final lengthening
# Eye Blinks and Prosodic Breaks

<table>
<thead>
<tr>
<th>Types of blinks</th>
<th>Number</th>
<th>Percentage</th>
<th>Duration in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP blinks</td>
<td>469</td>
<td>37.64%</td>
<td>194.95</td>
</tr>
<tr>
<td>PhP blinks</td>
<td>208</td>
<td>16.69%</td>
<td>172.55</td>
</tr>
<tr>
<td>sentence initial blinks</td>
<td>175</td>
<td>14.04%</td>
<td>180.89</td>
</tr>
<tr>
<td><strong>sum</strong></td>
<td><strong>852</strong></td>
<td><strong>68.38%</strong></td>
<td><strong>186.59</strong></td>
</tr>
</tbody>
</table>
Blinks and IP boundaries

- **1246** instances of eye blinks
- Prosodic versus non-prosodic blinks: always **70%/30%**
- **603** Intonational Phrase Boundaries
- **78.8%** of all IPs were indicated by an eye blink
- **94.7%** of all IPs were marked by either blinks or other obvious cues
Form and Function

- IP boundaries were marked by combinations of markers
- PP boundaries were less strongly marked
- Sign language always have more articulatory channels available
- combinations and rankings of means are found
- complex interplay between prosodic markers instead of 1:1 form and function relation
Intonational meaning of Nonmanuals

- In ISL, some nonmanuals have been analyzed as having inherent meanings that can be combined to derive complex meanings
- Compositional approach to intonational meaning in ISL (cf. Dachkovsky 2005, Dachkovsky and Sandler 2008)
- Examples in ISL
  - Raised Eye Brows: Continuation Dependency (similar to high edge tone in spoken languages)
  - Squint: Low Accessibility, Shared Information
Squint in DGS

- Systematic use of **squint** found for ‘**Reference to Common Knowledge**’
- Very similar to the analysis of squint in ISL
- Low Accessibility, Shared Information
- Combinations with other meaningful nonmanuals build complex meanings
Squint in DGS
Squint in DGS

Compositionality of Squint and wh-interrogative marking

Figure: Regular wh-interrogative and wh-interrogative with squint
Wide Eyes in DGS

- Use of **wide eyes** in modal contexts for ‘**Unexpectedness**’
- Wide eyes indicate unexpectedness either in declaratives and in interrogatives
- Similar to surprise and exclamative intonation for example
Wide Eyes in DGS

Example of compositionality of wide eyes with other nonmanuals in interrogatives

raised brows, wide eyes surprise

raised brows, wide eyes, frown surprise + scepticism
Other nonmanuals in DGS

- Raised eye brows: continuation
- Frown: scepticism and doubt
- Head nod: affirmativity
- Head tilt: inclusion and addressee oriented issues
Conclusions

- Prosody does not necessarily need to be linked to vocal articulation
- Prosodic structuring in DGS is similar to that of spoken languages and other sign languages such as ISL
- Intonational phrases are marked by various manual and nonmanual means (interplay)
- Data points towards an intonational meaning analysis of nonmanuals
Outlook

- Cross-linguistic research: the same data set exists for NGT and Irish SL
- Initial results indicate similar meaning relations to the above analyzed nonmanuals
- Sign languages may lead to a reconsideration or confirmation of spoken language analyses
THANKS

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