Evaluating a Swiss German Sign Language Avatar among the Deaf Community

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Overview

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Our project (I)

- *Trainslate* ('train'+'translate')... or *train's late* ;-)
- System that automatically translates German train announcements of the Swiss Federal Railways into Swiss German Sign Language (*Deutschschweizerische Gebärdensprache*, DSGS)
- Project team: one hearing and two Deaf researchers

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Our project (II)

- Sample input:
  'The RegioExpress to Olten, scheduled to leave at 6:41, has been cancelled due to a technical problem with the locomotive.'
- Output: avatar that signs the train announcements in real time on a mobile phone → JASigning (Elliott et al., 2001, 2008, 2010; Glauert and Elliott, 2011; Jennings et al., 2010; Kennaway et al., 2007)

Figure : JASigning avatar character Anna

Comparison of our approach with Segouat (2010)

- Approach of Segouat (2010): most suitable for standardized data
- Our approach: no templates or pre-built avatar animations during the actual translation step
- Our research interest: sign language machine translation → goal: build a translation system that may later be extended to other domains with more lexical and syntactic variation
- Output of our system: good quality expected → not representative of overall performance of sign language machine translation

JASigning

- Input: signs notated in the Hamburg Notation System for Sign Languages (HamNoSys) (Prillwitz et al., 1989)
- HamNoSys XML representation: Signing Gesture Markup Language (SiGML) (Elliott et al., 2000)
- SiGML code may also contain information about non-manual features

```
<hamgestural_sign gloss="LAUTSPRECHER">
  <sign_nonmanual>
    <mouthing_tier>
      <mouth_picture picture="laUtSprEC@r"/>
    </mouthing_tier>
  </sign_nonmanual>
  <sign_manual>
    <handconfig ceeopening="slack" handshape="ceeall"
    mainbend="bent"/>
    <handconfig extfidir="u"/>
    <handconfig palmor="l"/>
    <location_bodyarm contact="close" location="head"
    second_location="ear"
    second_side="right_beside" side="right_beside"/>
    <rpt_motion repetition="fromstart">
      <tgt_motion>
        <changeposture/>
        <handconfig handshape="pinchall" mainbend="bent"/>
      </tgt_motion>
    </rpt_motion>
  </sign_manual>
</hamgestural_sign>
```

Figure : SiGML code for the sign LAUTSPRECHER ('LOUDSPEAKER') in DSGS

Overview

Related work: Segouat (2010)

- System that converts French train announcements into French Sign Language (*Langue des Signes Française*, LSF) avatar animations and displays them on a monitor in a train station
- Parallel data consisting of written French announcements and LSF avatar animations, both as templates with slots
- Slots: e.g., names of train stations, types of trains, reasons for delays

Study setting

ID	Age	Sex
1	22	F
2	39	M
3	42	M
4	49	F
5	51	F
6	58	M
7	69	M

- Sign-language-only setting
- Moderator: Deaf project member
- 7 participants (native signers of the language they evaluated)
- 9 announcements projected onto a screen → use of fingerspelling, rhetorical questions, indexical signs, lists of signs, . . .

Related work: Kipp et al. (2011b)

- Focus group (8 native signers of DGS)
- Online survey (N=317)
- 6 avatars signing content in different sign languages (ASL, BSL, Finnish SL, DGS, IS)

Overview

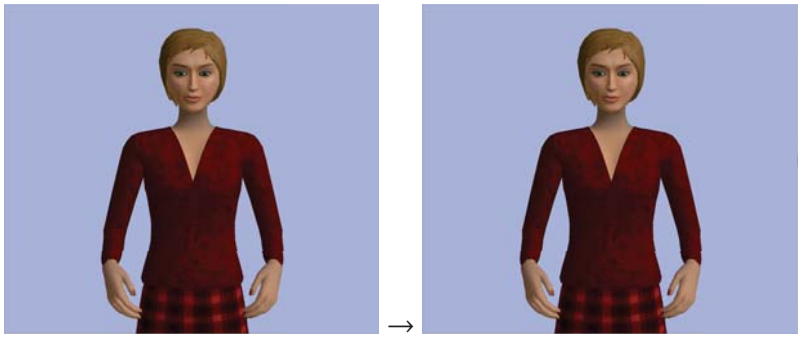
Our study

- Aim: evaluate the quality of the avatar animations generated from our notations at an early stage (before developing machine translation system and mobile phone application)
- Focus group
- No comprehensive evaluation

Study results and improvements (III)

- Speed of mouthings

  Example: MÜNCHENBUCHSEE (place name)



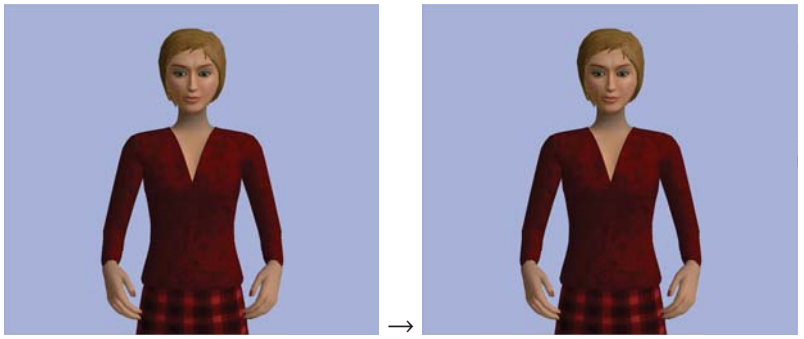
Study results and improvements (I)

- Color of avatar's clothing and background

Study results and improvements (IV)

- Speed of fingerspelling

  Example: ARTH-GOLDAU (place name)



Study results and improvements (II)

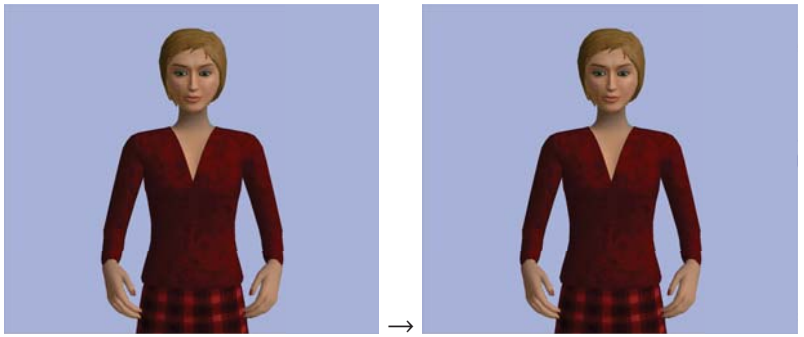
- End position of signed announcements

  Final posture →

Study results and improvements (VII)

- Format of time specifications (II)

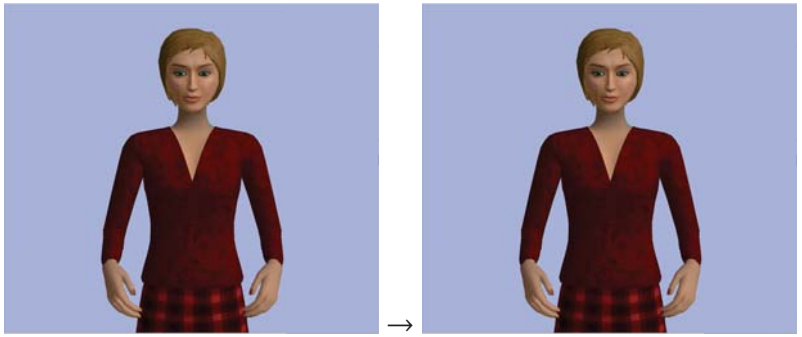
  Example: 13:00 (1 p.m.)



Study results and improvements (V)

- Lists of place name signs

  Example: ORT (‘place’) ARTH-GOLDAU BELLINZONA LUGANO (place names)



Study results: Remaining issues

- Default direction of eyegaze

→ ?

- Some non-manuals precede the manual components of a sign
  Example: IX_oben_rechts (‘IX_upper_right’)

- Synchronization of manual and non-manual components of a sign

Study results and improvements (VI)

- Format of time specifications (I)

  UHR <STUNDEN> PUNKT <MINUTEN> (‘CLOCK <HOUR NUMBER> DOT <MINUTE NUMBER>’)
  Example: UHR 13 PUNKT 00 (‘CLOCK 13 DOT 00’)

  →

  <STUNDEN> UHR <MINUTEN> (‘<HOUR NUMBER> CLOCK <MINUTE NUMBER>’)
  Example: 13 UHR 00 (‘13 CLOCK 00’)

Outlook

- This paper: *acceptance* of DSGS avatar → next step: *comprehensibility*
  → Huenerfauth et al. (2007): "There appears to be a difference between a respondent's *perceived* understanding and her *actual* understanding of an animation." → include comprehension task in the evaluation
  → Kipp et al. (2011a)
- Final stage of project: online survey to assess overall acceptance *and* comprehensibility of the DSGS avatar

Overview

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. . . and many thanks to:

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Conclusion

- Evaluation of an avatar for Swiss German Sign Language (DSGS) among members of the Deaf community who use this language
- Evaluation data from a focus group with 7 Deaf signers
- Aspects improved:
  - Color of the avatar's clothing and the background
  - End position of signed announcements
  - Speed of mouthings and fingerspelling
  - Handling of lists of signs
  - Format of time specifications
  - . . .
- Remaining issues:
  - Default direction of eyegaze
  - Some non-manuals precede the manual components of a sign
  - Synchronization of manual and non-manual components

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