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Avatars for Sign Languages Best Practice from the Perspective of Deaf Users

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Abstract. This paper presents recommendations for the use of Sign Language Avatars that are based on the view of deaf users and deaf and hearing experts. It focuses on three areas: Linguistic aspects of sign language avatars, the aspect of translational competence and ethical issues when deploying avatars. In each of the three areas, criticism and ideas that deaf sign language users stated in focus group discussions are summarized, followed by concrete best practice recommendations that are firmly rooted in our qualitative data.

Keywords: Avatars, Sign Language, Linguistic Accessibility.

1 Background

1.1 Sign Languages and Signing Communities

Most sign languages of the world have a fragile legal status and suffer societal invisibility [1]. Considering that they are fully-fledged, natural languages that have been around for as long as deaf people have been communicating, it seems paradoxical that their power and indispensable role are continuously doubted, to this day – mostly in the fields of education and medicine [2].

Complete linguistic accessibility is only achieved when a natural, high-quality, fully fledged sign language is used. For their entire lives, deaf sign language users rely on dependable and continuous access to professional translation/interpretation services. Without professional and sufficient translation services, their participation in education, society and general social life is not possible (as long as majority members are not sign language competent). Thus, both research and policies have been engaged in finding and creating accessibility for sign language users. One very important effect is the professionalization of the entire field of sign language interpreting [3]. Other attempts that sought both cheap and fast technical 'solutions' were "not always welcomed by Sign Language Communities" [1, and see also 4].

1.2 Sign Language Avatar Research

Avatars that display signed languages can contribute to more accessibility for deaf sign language users. However, when animated avatars are deployed in place of professional human interpreters this is regarded very critically from different perspectives. In that effect, the World Union of the Deaf, together with the World Association of Sign Language Interpreters, issued a statement on signing avatars [5], as well as the Austrian Association of Applied Linguistics [6] and the Austrian Federation of the Deaf with the Austrian Sign Language Interpreters and Translators Association [7].

Research in the field rarely asks deaf users to share their opinions and perceptions and openly discuss possible long-term effects, one recent exception being [8]. Indeed, most research focuses on the technical details and when users are included, on appearance and on legibility of signing avatars but it does not tap into deaf peoples' personal experiences and preferences regarding avatars in general. The huge majority of research so far is conducted either in the form online questionnaires or in lab settings. (Moreover, we noticed that non-signing hearing people and their perception and beliefs about signing avatars are completely absent from research.) And even scarcer are studies where a text that is signed by avatars is compared to a video of the same text translated and presented by professional sign language interpreters.

2 Our Study: Methodology and Data

The data collection for our study took place in two consecutive phases: Focus group discussions and then expert interviews.

2.1 Focus Group Discussions

We conducted 10 focus group interviews, four with hearing participants in German and six with deaf participants in Austrian Sign Language, ÖGS (total: 34 participants between 20 and 85 years of age). In this paper, only the deaf view is presented.

Stimulus Material. On all occasions, the same stimulus material in OGS and German was used. The stimuli were specifically put together for these focus groups and consisted of four twin video pairs that each featured an avatar¹⁴ and a professional deaf interpreter. A detailed description of the stimulus material and how it was used is available at https://avatar-bestpractice.univie.ac.at/en/about-the-project/.

Deaf Participants. We conducted six focus groups with a total of 23 deaf participants (13 female, 10 male). They all volunteered to participate, were genuinely interested in the topic and received no compensation. The age groups 20-30, 30-40, 40-60 and above 70 were represented with 4 to 8 people each. The oldest participant was 85 years of age. Regarding their linguistic biography, two participants acquired ÖGS as their first language from their deaf parents. 17 participants use ÖGS in their daily life. And three

¹⁴ Source: SIMAX, see https://vimeo.com/simaxavatar

participants grew up with another sign language than ÖGS, one of them only learned ÖGS a few years ago.

All six groups were moderated by a deaf, signing psychologist, Paulina Sarbinowska. Moderating was her only role and function in this project so she could truly occupy a completely neutral role.

Analysis. All discussions were filmed with three and on one occasion two cameras, then transcribed/translated into German and analyzed. Analysis included isolating all statements, comments and ideas relevant for the topic. These were then thematically grouped, summarized and stylistically unified, resulting in approx. 10 pages of our Draft Best Practice Protocol on the Use of Sign Language Avatars.

2.2 Expert Interviews

This draft was distributed to 10 experts who had agreed to be interviewed. The experts were researchers from the fields of linguistics, computer science, computer linguistics, visual arts, translation studies as well as a deaf community representative, an accessibility advisor and the CEO of a company that develops and commercially markets avatars:

- Sarah Ebling, University of Zurich, Switzerland.
- Nadja Grbić, Department of Translation Studies, University of Graz, Austria.
- Thomas Hanke, Universität Hamburg, Germany.
- Helene Jarmer, president of the Austrian Association of the Deaf.
- Hernisa Kacorri, University of Maryland, College Park.
- Melissa Malzkuhn, Director of Motion Light Lab, Gallaudet University, USA.
- Christian Pichler, Austria.
- Antti Raike, Aalto University, Finland.
- Georg Tschare, founder and CEO Sign Time GmbH, Austria.
- Rosalee Wolfe, Institute for Language and Speech Processing ATHENARC, Athens, Greece.

The expert interviews were conducted in German, ÖGS, English, and American Sign Language and proved to be extremely fruitful.¹⁵ We then reviewed all comments individually and integrated them into one text, thus merging 10 commented versions of the text into one final version of our Best Practice Protocol on the Use of Sign Language Avatars¹⁶.

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¹⁵ We would like to thank the experts for the many constructive conversations and their valuable contributions in this collaborative process!

¹⁶ The entire Protocol can be accessed in four languages: https://avatar-bestpractice.univie.ac.at.

3 Findings

In this section, we present our qualitative findings in three thematic fields that emerged from the focus group discussions: linguistic, translational and ethical aspects of avatars for sign languages.

3.1 Linguistic Aspects of Avatars

The avatar deployed in the present research project was not understood by all deaf focus group participants. They criticized lacking facial expressions, imprecise coordination of manual and non-manual components of a sign, missing phrase melody, jerky, hard, mechanical, wooden, robotic, somnolent, unnatural, incomplete signs and missing transitions between them. Furthermore, a lack of mobility of the upper body, shoulders, cheeks, and a lack of or unclear mouthings and also mouth gestures were reported.

In all focus groups it was noted that the avatar "closely follows the German syntax", which was described as unpleasant, tiring, not mature, as a "gimmick", "nice experiment" and even as a "botch-up". The resulting lack of comprehensibility of the avatar demanded maximal cognitive attention and caused viewers to have to "try" or "strain" very hard to follow, calling it a "struggle".

It was also noted that the content provided by the avatar would only be fully comprehensible if viewers simultaneously read captions. However, this carried the challenge of constantly switching languages between written German and Austrian Sign Language (ÖGS). This is in line with the results of the prototype study on SIMAX's avatar which posed follow-up content questions and documented only 52% correct answers by the 247 participants [9].

Our focus group participants criticized that this kind of avatar was completely incomprehensible for people who do not have ÖGS as a first language (people who learned ÖGS later in life, people from migration or refugee backgrounds), as well as senior citizens and people with little formal education and little German competence. It was also criticized that these avatars did not present children with good linguistic role models. (Experts remarked that studies clearly show how Alexa, Siri etc. have an effect on hearing users and their linguistic behaviour.)

Participants demanded full intelligibility of signing avatars used in public and further clarified that they considered it unacceptable to be "informed" by prematurely released (i.e., not fully intelligible) avatars in important areas of everyday life. They discussed the prospect that an avatar could be a facilitator in everyday life by, for example, providing a signed "rough translation" of any text. This would be especially helpful for deaf people with low literacy skills.

Finally, all participants were sure that in the future the quality of avatars would improve significantly and that then they could possibly serve as a valid supplement to interpreters. That would mean more flexibility and independence for deaf people in their everyday life. The question was also discussed whether Artificial Intelligence could contribute to avatars producing authentic, appropriately signed language.

According to one participant, avatars would be "a dream" if there were no qualitative and linguistic differences between the performance of human interpreters and of avatars. Experts remarked that the path to fulfilling this dream may be complicated, non-linear and maybe even ugly.

3.2 Translational Competence and Quality

Many deaf people distrust the quality of avatar translations because, unlike with human interpreters, it is unclear who provided the translation and to which professional code of conduct that person is committed. It would increase viewers' confidence in any longer, complex text signed by an avatar if it were disclosed who did and reviewed the translational work (human-machine, machine-human). It should be clear what language skills or interpreter training and affiliations that person has.

In our focus groups, it was often demanded that commercial avatar products (i.e., videos with an avatar) that are sold and used publicly, should only be released after a thorough quality control by specialists.

Note: Both hearing and deaf focus groups did not differentiate between the quality of translation and the quality of animation/performance. Mostly it was discussed what was seen, and not the quality of the translation.

3.3 Ethical Issues

It was emphasized in the discussions that in terms of participation, deaf interpreters, animators, project managers, as well as the entire deaf community need to be involved in the development and production of avatars. Members of the deaf community should not only serve as study participants or providers of feedback. On the one hand, participants assumed that hearing people were "delighted" with and fascinated by signing avatars. On the other hand, they know that hearing non-signers usually have no competence to assess the intelligibility and the linguistic and translational quality of signing avatars. Furthermore, hearing people usually are so unfamiliar with deaf everyday life that they cannot genuinely understand the needs of deaf people.

It was stressed that not only clients/customers, but also sponsors should coordinate their decisions about avatar projects with the self-advocacy associations of deaf people. Experts remarked that this would also build knowledge within the deaf community about the realities of research and the complicated processes of acquiring funding.

According to the participants it is preferable that "not solely economic interests" are pursued. Trustworthy, seminal research and - in the case of commercial companies close cooperation with universities and research groups were called for. It would also be desirable for the various researchers and developers in the field of avatars to exchange ideas and learn from each other in a non-commercial setting. This could help raise the quality of avatars to a truly satisfactory level instead of "everyone doing their own thing", as one participant put it. Experts remarked that there was a certain tension between the wish to calmly and cooperatively develop an appropriate quality in sign language avatars and the demand of the market which usually seeks "fast and cheap" solutions. In addition, experts deemed it desirable that research leads to high quality while commercial providers of avatars can conduct their business. Nevertheless, the situation of sign language avatar development cannot be compared with the development of speech synthesis, where in the beginning lesser quality was seen as acceptable and users experienced and accompanied gradual improvements. Since sign languages are minority languages there is the danger that they are negatively influenced (and perceived!) by the spread of bad language data. Experts furthermore remarked that when using language data, the question of ownership and also representation always arises: Who is a good linguistic model? To whom do the data ultimately belong?

Participants remarked that avatar development was one of the few areas where deaf people shall be prioritized for employment. It causes great discomfort when people without sign language expertise determine the quality and use of avatars while they cannot communicate directly with their deaf co-workers.

Furthermore, it was also pointed out that the financial argument (presumably, avatars are cheaper than interpreters) must not be the most important one. Avatars could mislead to the illusion that "everything is now done" for deaf people. However, whether an avatar actually does contribute to more accessibility can only be assessed and decided by deaf sign language users.

Experts remarked that deaf sign language using staff should always be involved in the development and production of signing avatars and should become specialists in these processes so that they can constructively accompany and guide it.

4 Best Practice Recommendations

The following recommendations are firmly rooted in our qualitative data; deaf focus group participants and deaf and hearing experts are the source.

4.1 Linguistic Aspects

- The linguistic quality of signing avatars depends on the degree of proximity to the human range of movement. Avatars whose primary focus is on the arms, do not provide the means to appropriately and intelligibly display a signed language. In the animation process, the torso, pelvis, shoulders (individually and together), all parts of the face, including the eyes (direction of gaze), and the entire head must be moved completely and appropriately.
- Signing avatars only deliver high quality linguistic performance if they offer diversity in style and register, as well as linguistic variants within a text. Attention should be paid to diversity within the production team (especially in motion capture technology but also in machine translation).
- 3. In avatars, special attention must be paid to a precise (frame exact), harmonious interplay of manual and non-manual components of a sign.
- 4. It is recommended that avatar videos (for example in the area of public transport) also feature pictograms, such as images of buses, platform numbers, and trains.
- 5. The intelligibility of signing avatars must be granted for all deaf sign language users who depend on the conveyed information. This includes persons with little formal

education, or who did not acquire a sign language as their first language, diverse age groups etc.¹⁷

6. Avatars are no substitute for captions because captions are needed by all people with hearing impairments who are not sign language competent.

4.2 Aspects of Translation Competence

- Texts presented by avatars must undergo quality control before they are published/ released. This quality control should be conducted by deaf, bilingual specialists, preferably native signers, who are highly competent in both languages (the source language of the text and the language the avatar signs) and who have translation skills and knowledge.
- 2. It would be conceivable to establish an independent, deaf-led quality control centre where companies can submit their avatars or individual texts presented by avatars to be certified and released by a panel.
- If the quality control concerns a computer-generated or partially computerized translation, these specialists must be trained and qualified interpreters.
- 4. An empirically developed set of criteria for quality control of avatar translations is urgently needed (the norm DIN EN ISO 17100 is not sufficient). This generally applicable quality management (for movability, fine motor skills of the animation, ease of perception and translation quality, just to name a few examples) would enable not only developers but also customers and sponsors to assess the product in question.

4.3 Ethical Aspects

- Sign languages originate from deaf communities and have been preserved by deaf people even in the most hostile conditions. Deaf people helped the language to flourish even under great pressure. The deaf communities of the world wish to see their languages treated with respect. This includes that economic interests are not placed above the protection and preservation of sign languages.
- 2. Deaf people should never have to choose between avatars and human interpreters. Avatars are not a substitute for human interpreters, they may be an addition.
- 3. Deaf people must guide the decision where avatars can be appropriately deployed.
- 4. Deaf people must lead in the creation of sign language avatars, the translation process, and in the quality control (pre- and post-editing) prior to the delivery of an avatar video to the customer.
- 5. If avatar developers are actually concerned about quality rather than only about profit, they need to cooperate with each other and with the self-advocacy associations of deaf communities.
- 6. Avatars should be developed and researched in interdisciplinary teams: co-operations are required between visual studies, 3-D animation, linguistics (not only

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¹⁷ Only about 10% of deaf children have deaf parents and thus access to a fully-fledged and fully accessible language. Most deaf people acquire or learn their sign language late and not from their primary caregivers.

computer linguistics) as well as translation studies. Otherwise, avatars will remain gimmicks.

- 7. The principle Nothing about us without us also applies to the field of sign language avatars. Therefore, the deaf sign language users' perspective (not the perspective of them) should always be central in public relations, in business communication and in marketing.
- 8. The cost issue must not be the only or the most important decision criterion. Desirable accessibility is a matter of quality; decisions can be taken pragmatically, but still with regard to quality. If an offer is "cheaper" but is neither acceptable for, nor desired by deaf sign language users, then cost saving was prioritized over human/citizens' rights and true accessibility.
- 9. When public funds are awarded to the development or deployment of signing avatars, the actual needs, desires and perspectives of deaf communities should be the guide.

4.4 Conclusion

Avatars should not be presented, seen or marketed as a "solution" to the "communication problems" of deaf sign language users. Their value is in added entertainment. Deploying sign language avatars must not create disadvantages for deaf people. Avatars should be deployed responsibly in the interests of deaf sign language users. Currently, sign language avatars are by no means an adequate replacement for human interpreters. As long as comprehensibility of avatars does not match those of human signers, avatars should always be used in conjunction with captioning.

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