

Possibilities of Projecting Signer's Face and Body in Supporting Sign Language Group Communication

Pedro Couteiro[†] and Shin Takahashi[‡]

[†]College of International Studies, University of Tsukuba, Japan

[‡]Department of Computer Science, University of Tsukuba, Japan

INTRODUCTION

Sign languages rely on a clear view of signers' face and hands for effective communication. While a small number of signers can address it through circular formations, communicating in larger numbers can be challenging.

Through in-loco observation and experiments, this study has investigated the issues that surround sign language group talks and identified specific patterns that may hinder communication, such as poor visual access to the signer right next to oneself and troubles on correctly identifying the signer in turn.

Later, an approach that uses mobile devices as individual cameras and projects the signer in turn upper body to a screen was devised. Conducted experiments have shown that while the participants were not satisfied with using the screen as the main tool for communication, they found it useful for identifying the signer in turn when needed.

RELATED WORK

Regarding sign language communication through video, Tran et al. [5] have shown that even low transmission parameters such as 10 frames per second and 60 kbps are enough to preserve American Sign Language intelligibility, suggesting that video support can be useful even under limited resources, such as the mobile environment.

It has been said [1] that sign languages show an increased amount of overlap, what could be an obstacle for our proposed support, since only one signer is displayed at a time. However, there is also evidence [2] [4] that even if overlap may occur, sign languages speakers orient themselves to one-at-a-time communication.

Lastly, Kikuchi and Bono [3] have conducted a study regarding tele-communication support for group sign talk, in a setting where two groups were set apart from each other and used a screen for communication, providing us with insight into the time lags that may occur in such environments.

METHODOLOGY

In-Loco Observations

Field observations have been performed at a university sign language circle. Members are mostly students, ranging from Deaf individuals who have Japanese Sign Language as their first language to students who started studying sign language at the university. The observed meetings had an attendance oscillating between 15 and 20 people. Observations were done regarding turn-taking strategies, eventual communication issues and room arrangement.

Experiment

An experiment was performed with 5 sign language speakers. The experiment consisted of two turns of 15 minutes talk. In the first turn, participants were instructed to talk in sign language without any support. In the second turn, one device was placed in front of each participant to capture their image while a screen positioned in front of them displayed the image of the signer in turn. Each participant's device displayed only their own image, so they had to recur to the screen to see other participants. As shown in Figure 1, participants were instructed to sit in a row for both turns, to simulate the positioning they would take if it were a bigger group. For both turns, the participants chose topics from a list and talked freely without any intervention. 3 of the participants were hearing impaired and all the 5 considered themselves advanced sign language speakers and could keep conversation without spoken aid. By the end, each participant answered to a questionnaire and attended a short interview.

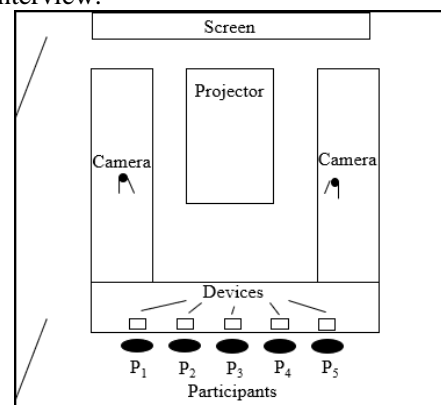


Figure 1. Experiment Arrangement

RESULTS AND DISCUSSION

Issues in Sign Language Group Talk

It was observed and further confirmed through the interviews that participants found especially hard communicating with people sitting right next to them. While signers have an unobstructed view of the person by their side, they must look at it from the side. This affects especially the view they have from the signers' face, which contains relevant information such as expression and gaze direction. Also, participants tend to rotate themselves while talking to face the majority of the group or their current target. While the rotation of a participant far away in the group does not produce much effect, in the case of a participant by one's side even a small degree to the opposite direction can dramatically obstruct visual access. The results of this difficulty were observed both in the questionnaires, where most of the participants chose the person right next to them as the hardest one to see, and in the experiment, where participants often had to recur to shoulder tapping when they wanted to take the turn from the person by their side.

Efficient turn managing also showed to be an issue. Participants expressed they had trouble moving their gaze around when the conversation was being led by two persons located on opposite directions from them. While participants showed to be used to this pattern and adopted strategies such as moving their gaze to the next expected speaker's direction as soon as one's sentence finishes, this had the side effect of making some participants face the wrong direction when an unexpected turn-taking was performed. This pattern can be seen on Figure 2, where P₅ (sitting to the left of P₄, outside the picture) and P₁ (Figures 2a and 2b) are leading the conversation. As soon as P₁ starts lowering his arms, P₃ faces the opposite direction, waiting for P₅'s response (Figure 2c). However, P₁ unexpectedly goes on with his utterance, leaving P₂ and P₃ looking to the wrong direction (Figure 2d). Participants also expressed they lost parts of the conversation because they were momentarily facing the wrong direction.

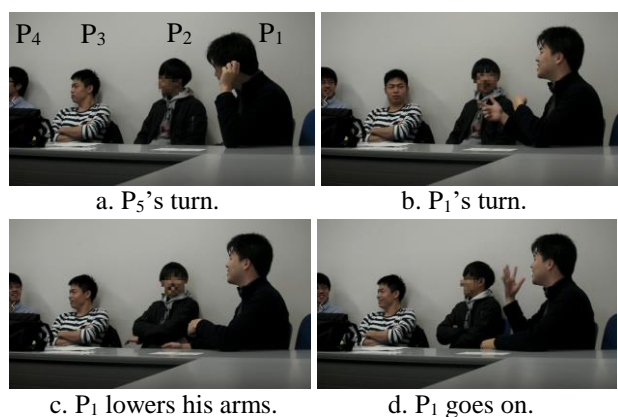


Figure 2. Unexpected turn makes participants lose signing.

Screen Projection Support

Participants did not opt for using the screen as their main tool for communication for most of the time, preferring to look to other participants directly. When asked, they said they wanted to see other participants' reactions and feedback, instead of only the image of the signer in turn.

However, participants did use quick glances to the screen to identify the signer in turn in moments they realized they were facing the wrong direction, and one of the participants expressed he found the provided support "useful for finding who was signing". This suggests that even if directly projecting the signer in turn was not efficient for supporting group talk, there is room for support that provides signers with information regarding who is signing at the moment to avoid signing loss.

CONCLUSION

We have identified two main issues signers face when communicating in groups: poor visual access to persons sitting by their side, and inefficient turn management, that leads to eventual signing loss. While participants did not find our support useful as a tool for their conversation, they found it helpful for identifying who the signer in turn is, what provides insight on what support technology should be developed next.

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