Tactile sign language corpora: capture and annotation issues.

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Abstract

Sign language, being a visual-gestural language, can also be used tactually among or with deaf people who become blind. When this language is shared between people who are totally blind, non-manual features of signs are totally neutralised, resulting into a purely kinesthetic-gestural variant of sign language. This tactile modality of reception leads to adjustments impacting sign language pragmatics, as well as sign order and to a lesser extent, the way signs are formed. We aim to explore these phenomena by carrying out a systematic analysis of tactile sign language corpora.
Such a corpus has been filmed in 2006, involving six French deafblind informants, all of them using tactile sign language as their primary means of communication. A total of 14 hours of spontaneous discussions, free conversations or elicited data were captured by up to three digital cameras.
In order thoroughly to analyse our corpus, we need the help of a reliable annotation tool. After trying a couple of them, we decided to select Anvil, for its visual layout and flexibility, as well as its temporal granularity. We need a partition annotation system which allows us to create, rename or reorder tracks freely even while annotating. The first steps of our annotation will take us on the lanes of conversational analysis, using a mix of glosses and pragmatic occurrences, eventually to lead us on the more sinuous paths of a syntactic micro-analysis.

1. Tactile sign language

1.1. The Deafblind community and its sign language

Sign languages being visual-gestural languages, it obviously requires sight to be perceived. Nevertheless, some deaf signers may undergo a partial or total loss of sight, leading to an inability to use sign language efficiently. Most of these people suffer from Usher Syndrome Type 1 (a congenital profound deafness combined with an evolutive visual impairment due to retinitis pigmentosa), which means that their visual field gradually becomes tubular and eventually shrinks totally in the most severe cases. Other conditions may lead to deafblindness, which explains the heterogeneity of the people who use sign language tactually. By becoming blind, they do not lose their expressive skills, but need to adapt their reception modality of signs by placing their hands on the signers' hands in order to feel the manual characteristics of the signs. Touch doesn't allow to receive the same amount of information as sight does. It is a proximo-sensibility and it cannot convey as much information simultaneously. The tactile broadband, or rather "narrowband" requires a sequential and slow exploration of objects and above all a mental integration work to reconstruct the object image from all its properties gathered via tactile and kinesthetic inputs (Hatwell, 2000). The specificity of the tactile perceptive field has some significant consequences when it comes to receiving sign language. Firstly, conversation in tactile sign language can only occur between two people (very rarely three, trilogues being quite awkward).Secondly, unlikely visual sign language whose expression and reception use two different channels, in tactile sign language, hands have to carry out both functions. And lastly, all non-manual features such as eye gaze and facial expressions become totally irrelevant when sign language is received by touch. Informal and professional interactions with tactile signers showed us that their communication is as efficient as the one we may notice among deaf-sighted signers, which means that deafblind people developed a set of adaptive strategies. Their tactile modality of reception leads to adjustments affecting sign language pragmatics, as well as sign order and to a lesser extent, the way signs are formed. We aim to explore these phenomena by carrying out a systematic analysis of sign language corpora.

1.2. State of the art

Only very few documents describing tactile sign language are available. Two major linguistic studies were conducted in Sweden and in the USA, and we found a more in fields which are more or less related to linguistics. Johanna Mesch achieved a PhD dissertation about turn-taking and questions in conversations of deafblind

signers. For the purpose of her research, she captured dialogues in Swedish and Finnish Sign Languages involving deaf and deafblind signers and only deafblind signers, whom she asked to converse freely. She focused on reception styles (how hands are placed on the signers'), the way turn-taking is ruled and back-channel feedback on one hand, and on the other hand she analysed every question occurrences and their contexts (Mesch, 2000).
Steven Collins and Karen Petronio led a contrastive study between visual and tactile forms of American Sign Language. They filmed free conversations between deafblind people and analysed the phonological, morphological and syntactic changes caused by the tactile receptive modality (Colins & Petronio, 1998)

2. Corpus collection

2.1. "Pre-corpus"

Only very scarce video of tactile French Sign Language being available, and none of them being suitable for a linguistic study, we had to test our first analysis on an original corpus. We seized the opportunity of a national gathering of deafblind people in Paris to film tactile communication involving deafblind signers. We aimed to film totally free conversation, in order to capture spontaneous strategies. Using only one shoulder camera, we could hardly master the environment while filming, which led to a forty-minute capture, but barely analysable for several reasons. Light conditions were very poor and exiguity of the places did not allow us to film the signers correctly. We tried to film everything instead of focusing on relevant moments, which resulted into a mixture of unfinished conversations, often interrupted by other people. Although we planned only to film dialogues between deafblind people, we ended up with most of our corpus involving deafblind and deaf-sighted people. We faced another unexpected difficulty when we started to analyse our data: while it is possible to show a video to deaf-sighted informants when we need their feedback regarding signs we are uncertain about, it is totally impossible with deafblind informants. This situation leaves us with data we hope to clarify with the help of sighted signers who are used to interact with the deafblind community. This unsuccessful experience provided us with great lessons to apply when filming the corpus currently use for our PhD dissertation and which I will now describe more deeply.

2.2. Corpus general settings

In 2006, six deafblind informants gathered for a week end of activities and socialisation in Poitiers, thanks to the support of CRESAM (Experimental Resources Centre for Children and Adults who are Deaf-Partially Sighted and Deafblind) who helped us with funding as well as a team of 8 volunteers (professional educators and interpreters used to work with deafblind people). We organised a program of visits for the participants in order to motivate them and be able to express themselves about shared and not shared experiences. We split the group into two sub-groups, one visiting a brewery while the other one was remaining at the centre, discussing for the purpose of our research, the first group came back to the centre while the other group went to visit a nut oil manufacture. Then they told each other about their visit. The day after, the whole group was taken to the village market place, where they bought a few souvenirs and food. Once back to the centre, they discussed about what their experience at the market. The remaining of the corpus consists in free conversation, either in the laboratory, or during informal moments, after the meals.

2.3. Deafblind informants

Two women and four men, aged from 27 to 70 years old took part in our study. They are all legally deafblind, though two of them have some light and shapes perception. They all use tactile sign language everyday as their primary means of communication. They were all born profoundly deaf or very hard of hearing and gradually lost their sight between ages 12 and 37. While in the previous studies, nearly all the informants had Usher Syndrome type one, we deliberately chose to film deafblind people with other conditions (congenitally deaf and partially sighted, congenitally deaf and glaucoma in childhood), in order to respect the heterogeneity of profiles in the deafblind community. We know it may be a supplementary difficulty in our analysis, but we did really want to stick to the reality of tactile sign language users. Regarding communication, our informants learnt LSF (French Sign Language) between ages 4 and 37, without formal teaching, by socialising with deafblind peers or with hearing and deaf professionals. Among our informants, one person learnt tactile LSF directly, at age 37, without any prior knowledge of LSF in its visual form. Since they became deafblind, they use tactile LSF as their preferred face-to-face means of communication. For their written way of communicating, two are very comfortable with French that read Braille grade 1 and 2, one uses French in Braille grade 1, one can still read French in very big and bold fonts, and one doesn't know any French but uses pictograms based on LSF. Two of our informants are able to use speech when interacting with hearing people, one of them being used to speak and sign simultaneously, even when addressing a deafblind person.

2.4. Data capture

For conversational purposes, signers ideally sit or stand facing each other with the receiver's hands covering the signers', thereby hindering capture and visibility. After many attempts, we preferred to film in-vitro dyads with

three cameras (one focusing on each signer and one filming from above) as well as a few triads (one camera focusing on each signer). Nevertheless, we filmed part of our corpus with only one or two camera, depending on how many deafblind informants were conversing simultaneously, especially during informal moments and free conversation sessions.

Figure 1 : One camera on two signers

Figure 2 : Two cameras, one on each signer

Figure 3 : Two cameras,
one front view and one rear view

Figure 4 : Triad, three cameras,
one on each signer

Mesch (2000) considers that the ideal capture setting involves 3 cameras, yet, we used several configurations in order to test their efficiency.

Figure 5: Optimal cameras position:
one on each signer, one filming from above

While video seems to be the ideal medium to store a visual language, we wondered about the storage of a tactile form of sign language. Should we use digital gloves, motion capture device or even functional magnetic resonance imagery? Even though such modern technologies would be available and affordable, it would be too intrusive, if not invasive to be used on people who need their full sensory broadband, already narrowed by deafblindness, in order to communicate efficiently.

2.5. Type of data and annotation issues

At the end of the week end, we managed to collect a total of about 14 hours of videotaped conversations:

- Free conversations: in-vitro, imposed dyads (or triads), sitting face to face, time being controlled or not. (7h40min)
- Elicited data: in-vitro, imposed dyads, imposed subjects of conversation (talking about what they respectively visited or what they both experienced), time being controlled. (3h45min)
- Spontaneous conversations: in-vivo, sitting or standing, free choice of the dyads, no imposed subject of conversation, no control of time (3h50min)

We decided to capture a mix of in-vivo and in-vitro conversations in order to observe spontaneous conversational strategies in the first case and gathering more analysable data in the latter, thanks to a good mastering of our filming environment in the laboratory.

Figure 6: In-vivo conversation, after a meal,
filmed with one camera

Figure 7: In-vitro data, filmed with 1,2 or 3 cameras in the laboratory

In order thoroughly to analyse our corpus, we need the help of a reliable annotation tool. After trying to understand and to use a couple of them, we decided to chose Anvil, for its visual layout and flexibility, as well as its granularity regarding time slots. I immediately knew that we would not need a parametric transcription as signs rarely change from visual to tactile sign language. Nevertheless, we chose a partition annotation system which allows us to create, rename or reorder tracks freely even while annotating. We are currently testing Anvil for our corpus annotation, and hope to have chose the appropriate tool. We are still open to other systems if they prove to offer more advantages than Anvil for our corpus.

3. Macro and micro analysis or tactile LSF

3.1. Conversational analysis

One of tactile sign language's specificity is that it can only be used between two persons and very rarely three, but leading to an awkward and unbalanced communication. This dialogical constraint leads to conversational styles that are quite unique. While in any visual sign languages turn-taking is managed by visual clues, they become irrelevant with deafblind people and must be replaced by clues given by signers' hands vertical and horizontal positions and in the signing space. Regarding backchannel feedback, it does also exist among deafblind signers and is very important for the consistence of the conversation. It consists in an ingenuous system of fingers' tapping and pressing on the signers' hands as well as a kind of tactile nod. Another element we want to study through our corpus is the way deafblind people "listen" to tactile sign language: one hand, two hands symmetrically or asymmetrically? We haven't been able to find any research about conversational description applied to LSF, and only a very few concerning other national sign languages, which is why we will apply the Kerbrat-Orrechioni (1996) model of conversational analysis, designed for vocal languages.

3.2. Signing without non-manual features?

Another dimension of tactile sign language we wish to explore is the way tactile modality impacts the language structures where non-manual features are necessary. When deafblind people talk, these non-manual features become totally irrelevant as their reception of sign language is purely tactile, ore more precisely kinesthetic. We aim to deal with this issue through contrastive methods: by comparing occurrences in tactile LSF and with the way they would be expressed by sighted signers. We will mainly focus on three topics: clauses types, space and iconicity. We already noticed that when a non-manual feature is necessary in visual LSF, there is always an alternative strategy in its tactile form, be it lexical or not. For example, the addition of other signs can lift up ambiguity, or of a tactile component like an increased muscular tension. Regarding iconicity and role shifting, according to Christian Cuxac's theory (2000), they are the core of sign language and they can be spotted by changes in eye gaze. As eye gaze is irrelevant for deafblind signers, how can they mark these structures boundaries? Do they still use these structures even if they cannot use eye gaze and facial expression?

4. Perspectives

Tactile LSF has to be rather linear because it cannot use multi-channel signs and it is received by a sequential sense of touch. But it doesn't make tactile LSF become a kind of signed French. By this research, we aim to show that deafblind signers developed a very clever variant of their national sign language, adapting its structure to the constraints of touch and inability to use non-manual features. Our corpus will be primordial to deal with these issues : that is why we need to opt for a powerful and reliable annotation system to be able to analyse tactile LSF with the best granularity.

5. References

COLINS Steven & PETRONIO Karen (1998), *What happens in tactile ASL ?* in Pinky Extension & Eye Gaze – Language Use in Deaf Community, editor Ceil Lucas, Gallaudet University Press, Washington DC, pp 18-37.

CUXAC Christian (2000), *La Langue des Signes Française (LSF) : les voies de l'iconicité* in Faits de Langues n°15/16, editions Ophrys, Paris

HATWELL Yvette (2000), *Toucher pour Connaître, Psychologie Cognitive de la Perception Tactile Manuelle*, PUF, Paris.

KERBRAT-ORECCHIONI Catherine (1996), *La Conversation*, Seuil, Paris.

MESCH Johanna (2000), *Tactile Sign Language, Turn Taking in Signed Conversations of Deaf-Blind People*, International studies on sign language and communication of the deaf, volume 38.