Tactile Japanese Sign Language and Finger Braille: An Example of Data Collection for Minority Languages in Japan

Mayumi Bono[1&2], Rui Sakaida[1], Ryosaku Makino[3], Tomohiro Okada[2], Kouhei Kikuchi[2], Mio Cibulka[4], Louisa Willoughby[5], Shimako Iwasaki[5], and Satoshi Fukushima[6]

[1] National Institute of Informatics, [2] SOKENDAI (The Graduate University of Advanced Studies), [3] Waseda University, [4] Lund University, [5] Monash University, [6] The University of Tokyo

[1] 2-1-2 Hitotsubashi, Chiyoda-ku, Tokyo 101-8430 JAPAN, [2] Shonan Village, Hayama, Kanagawa 240-0193 JAPAN, [3] 2-579-15 Mikajima, Tokorozawa city, Saitama 359-1192 JAPAN, [4] Helgonabacken 12, SE-223 62 Lund SWEDEN, [5] Victoria 3800 AUSTRALIA, [6] 4-6-1 Komaba, Meguro-ku, Tokyo 153-8904 JAPAN

{bono, lui, tokada-deaf}@nii.ac.jp, rmakino@aoni.waseda.jp, kikuchi_kouhei@soken.ac.jp, Cibulka@posteo.de, {louisa.willoughby, shimako.iwasaki}@monash.edu, fukusima@rcast.u-tokyo.ac.jp

Abstract

We recorded data on deafblind people in Japan. In this filming project, we found that Japanese deafblind people use different communication methods, tactile Japanese sign language and finger braille, depending on their hearing ability and eyesight. Tactile sign language is normally used by those who were born deaf or lost their hearing at an early age and then lost their sight after acquiring a sign language. These people are known as deaf-based deafblind (D-deafblind). Finger braille is popular in Japan, but largely unknown elsewhere. It is normally used by those who were born blind or lost their sight at an early age and subsequently lost their hearing after learning how to produce speech using their throat and mouth. These people are known as blind-based deafblind (B-deafblind hereafter). This paper introduces our filming project; the ways of data collection, translation and annotation. In addition, we show our preliminary observations using our data sets to clarify the important fact that we should collect their interactions at this moment. The data show how their interactions have already become established and sophisticated in their communities. We discuss how our filming project will contribute to the deafblind community in Japan.

Keywords: Tactile Japanese Sign Language (Tactile JSL), Finger Braille, minority language, data collection

1. Introduction

This paper introduces our data-collection project and preliminary observations on two minority languages used in Japan: tactile Japanese sign language and finger braille. Tactile sign language is normally used by those who were born deaf or lost their hearing at an early age and then lost their sight after acquiring a sign language. These people are known as deaf-based deafblind (D-deafblind hereafter). Finger braille is popular in Japan, but largely unknown elsewhere. It is normally used by those who were born blind or lost their sight at an early age and subsequently lost their hearing after learning how to produce speech using their throat and mouth. We call these people blind-based deafblind (B-deafblind hereafter).

2. Background

Based on a survey conducted every 5 years by the Ministry Health, Labor, and Welfare, there are an estimated 23,000 deafblind people in Japan. The Tokyo Deafblind Club (Tokyo *mourousha tomo no kai*, a certified non-profit organization)[1], which provides social services such as dispatching interpreters and volunteers, reported that there were 840 deafblind people with disability certificates in Tokyo in 2012. However, only 10% of them were registered as members of the club.

2.1 Tactile Japanese Sign Language (Tactile JSL)

Tactile sign language enables deafblind people to communicate through touching. To communicate with others after losing their sight, most D-deafblind people convert from visual sign language to tactile sign language. In one standard method, the deafblind signer's hands are positioned under the recipient's hands when signing (Fig. 1).

Mesch (2001) suggested that deafblind users of tactile Swedish sign language use different hand configurations for tactile reception depending on whether the interaction is primarily monologic or dialogic. In the dialogic position, the signer receives signs with his/her right hand under the interlocutor's left hand, while the interlocutor receives signs with his/her right hand under the signer's left hand. In this crossed situation, it is possible for both to be signers and to take turns, and to speak smoothly. In Japan, however, deafblind people rarely use the dialogic position to converse with other deafblind people. Of course, it is possible for very experienced tactile JSL signers and people who are born deafblind to use the left hand to receive information from an interpreter's right hand.

We need to collect tactile JSL data, including situations involving D-deafblind people, to compare their diverse

Figure 1: An image of Tactile JSL dialogue

[1] http://www.tokyo-db.or.jp/

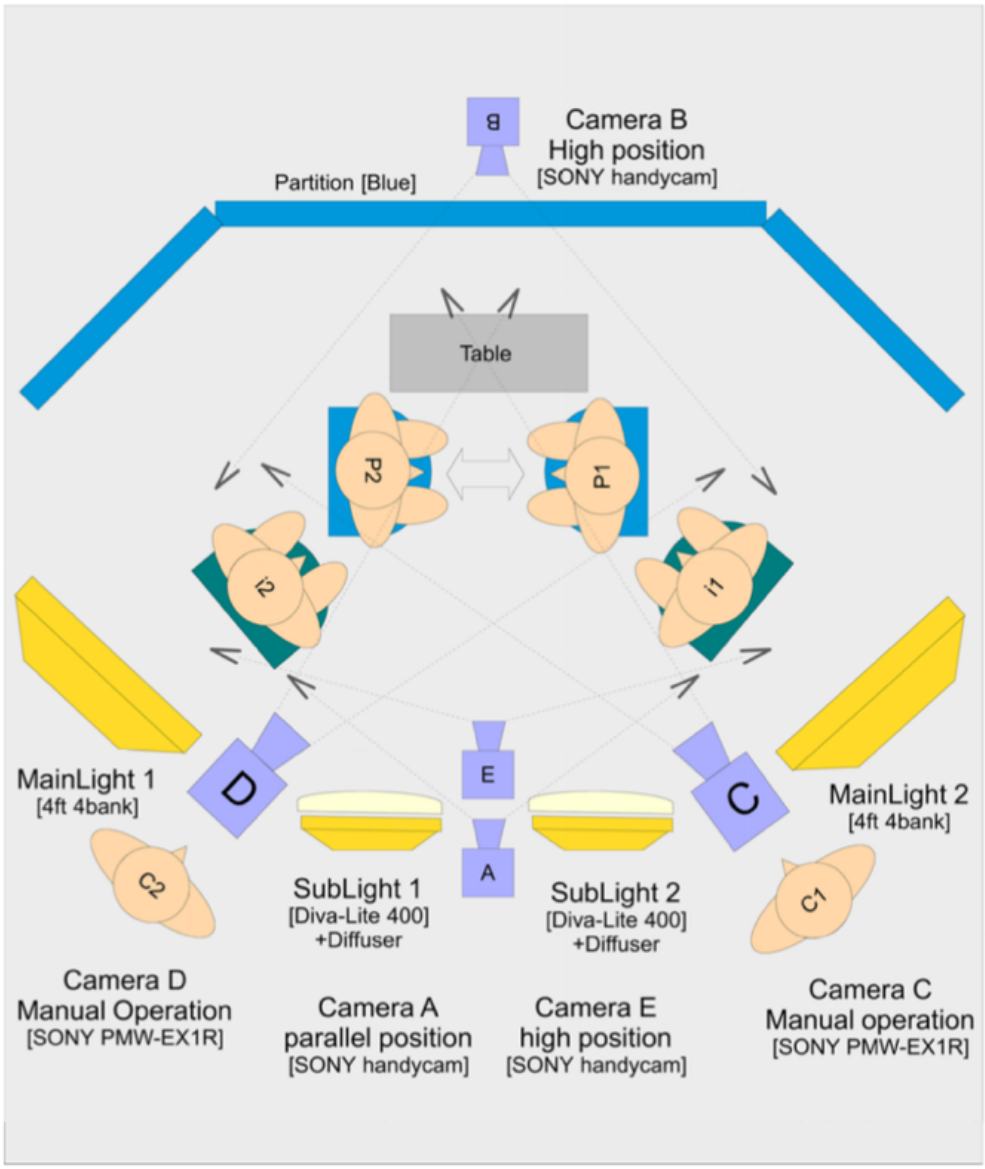
Figure 2: An image of a Finger Braille interaction via interpretation

methods of communication with those used in other countries.

2.2 Finger Braille

Finger braille was developed by Prof. Fukushima (B-deafblind) and his mother. Finger braille users and interpreters tap the index, middle, and ring fingers of both hands of the B-deafblind person, like tapping on a braille typewriter in a mora-by-mora manner.

The interpreter sits beside the deafblind person so that he/she can place his/her hands in the same direction as the hands of the deafblind person (Fig. 2). Prof. Fukushima reported that highly skilled interpreters not only tap the fingers to indicate letters but also represent the speaker's stance and attitude with the tapping pressure and rate.



<Camera data>
Size: HQ1280/59.94p
W: 3200K
F: T2 / F1.9-2.4
Gain: 0db
SHT: 1/100

Participant : P1, P2
Interpreter : i1, i2
Cameraman : C1, C2

Figure 3: The positions of the cameras and lights

No study has focused on tactile finger interactions from the perspectives of linguistics and communication. We need to collect finger braille interaction data, including interpreting situations, to determine how individuals convey information in a dialogue through finger tapping.

3. Data

In this section, we introduce the filming procedure, dataset, camera settings, and the number of subjects.
Our study was approved by the ethics committee of the National Institute of Informatics.

3.1 Filming: Tactile JSL Interaction

To collect tactile JSL interactions, we filmed individuals in (1) experimental and (2) natural settings.

3.1.1 Experimental Setting

For the experimental setting, we built a temporary studio at the National Museum of Emerging Science and Innovation (Miraikan), Odaiba, Tokyo (Figs. 3). We used four cameras: two professional cameras (SONY-PMW-EX1R) on tripods that were operated manually to detect the hand movements and two SONY Handycams on tripods set at high angles to detect spatial orientation and locational information, such as sitting position and distance between individuals. We simultaneously recorded the interpreters' spoken words to make it easier for the annotators to find and tag interesting parts in the dialogues. We used four professional lighting devices: two main lights (4 feet, bank of four) and two sub-lights (Diva-Lite 400 and diffuser).
We filmed the deafblind dialogues of two pairs of subjects: pair A was a male–female pair and pair B was a male–male pair. All of the individuals were familiar with each other. They had been introduced to our project by the Tokyo Deafblind Club. The total length of the recordings was 1 hours and 21 minutes. These recordings are suitable for observing the organization of the turn-taking system (Sacks *et al*., 1974) in tactile JSL.

3.1.2 Naturally-occurring Conversations

The Tokyo Deafblind Club hosts several events to encourage social relationships among deafblind people, interpreters, and volunteers. These include sightseeing, gardening lessons, and gymnastics. In July 2015, the club visited the National Diet Building in Tokyo. Because we could not get permission to film inside the building, we filmed their interactions after the sightseeing tour outside the Diet using two SONY Handycams.
The group included 10 deafblind people, 20 interpreters, and some of the club staff. We filmed various conversations, mainly those including deafblind people in conversation with deafblind, deaf, narrow-viewed deaf, and hearing individuals via an interpreter (Fig. 4). When we noticed a deafblind person starting to chat with somebody, we started filming all of the participants from one angle. The total length of the recordings was approximately 17 minutes. These recordings are suitable for observing the organization of the F-formation system (Kendon, 1990) in tactile JSL, tactile JSL via an interpreter, and tactile JSL leaners.

Figure 4: An image of data collection outside the National Diet Building, Tokyo.

3.2 Filming: Finger Braille Interaction

We filmed tactile JSL interactions in (1) interviews and (2) natural settings.

3.2.1 Interview Settings

We had the opportunity to film finger braille dialogue via interpretation in January 2015 when we were writing an article for the Information-Processing Society of Japan. The dialogue was an interview in which the first author of this paper interviewed Prof. Satoshi Fukushima, who is B-deafblind and developed finger braille with his mother and the finger braille interpretation method with his friends. He positioned two highly skilled interpreters on either side of him, while the interviewer sat in front of him (Fig. 2). The interview lasted almost 3 hours and covered many topics, focusing on his daily communication with others, email, chatting, and dealing with the Japanese government to ask for support for the deafblind community. The recording was 2 hours and 18 minutes long and is suitable for observing the organization of the turn-taking system (Sacks *et al*., 1974) in finger braille interaction via interpreters.

3.2.2 Naturally-occurring Conversations

The Tokyo Deafblind Club held a communication-exchange event in Tokyo in November 2017 (Fig. 5). The purpose of this event was to exchange methods of communication, such as tactile JSL, finger braille, hand writing, and small-size signing via a narrow view, to encourage peoples' understanding of each other. Ten deafblind people, 20 interpreters, four guests (our project members), and some of the club staff attended this event.
The deafblind people with interpreters were divided into two groups: five waiting groups and five visiting groups. Five tables were placed in a circle in a room. The members of the waiting groups sat on the outer sides of the tables, while the members of the visiting groups sat on the inner sides of the tables. The groups then chatted for 10 minutes. After each chat, the visiting groups moved to the next table. Including a 10-minute break, the event took 60 minutes.

Figure 5: An image of data collection during a communication-exchange event organized by the Tokyo Deafblind Club.

We filmed their interactions using four SONY Handycams operated manually with a monopod. The recordings totaled 6 hours and 17 minutes. These recordings are suitable for observing the organization of the turn-taking system (Sacks *et al*., 1974), including learners of both tactile JSL and finger braille, and via interpreters.

4. Translation and Annotation

We have started to translate the data into Japanese on ELAN,[2] except for the films made in November 2017.

4.1 Tactile JSL

4.1.1 Three Kinds of Translation by Interpreters

We asked some highly skilled, very experienced sign language interpreters (hearing) to translate the data into Japanese idiomatic translation, English idiomatic translation and Japanese word-order translation on text format (Fig. 6, upper left). The idiomatic translation (IT) serves as ideal forms of sentences as language. The word-order translation (WOT) serves to maintain the original word order of sign language. At this level, the text in translation is very consciously written in a grammatically inaccurate manner of Japanese. By keeping this kind of translation, we could always show how much signed language differs from spoken language.

4.1.2 Basic Annotation on ELAN by Deaf Signers

Then, experienced Deaf interpreters put the translations and the information of hand positions on ELAN (Fig.6, right). In this phase, they checked the meanings of the signing, which were put by interpreters (hearing), and put the correct timing of the signing on ELAN format. They also corrected some mistranslations by interpreters.
Furthermore, they annotated the current signer's hand position such as 'both inside (both hand inside), both outside (both hand outside) to frequency of hand position they use in interaction. In Tactile JSL, the dialogue position (Mesch, 2001) is not so often used. If we found them, we put, rh-outside (right hand outside) and so on. At this moment, we have found only one case of rh-inside in our data set.

4.1.3 Focused Annotation: Hand Movement

For the cases for which we had already identified some focal points for analysis, we added specific annotations to the excerpts, such as Gesture Units (McNeill, 1992; Kita *et al*., 1998), gaze direction, and hand position, using Conversation Analysis (CA) style transcription. One of our original points was to establish a physical and hand movement unit smaller than Gloss, called a Movement Unit. We applied the concept of the gesture unit (GU) proposed by Kendon (1972, 1980) to annotate the beginning and end points of signed turns. The GU is the interval between successive rests of the limbs, rest positions, or home positions. A GU consists of one or several gesture phrases. A gesture phrase is what we intuitively call a "gesture," and it, in turn, consists of up to five phases: preparation (optional), stroke (obligatory in the sense that a gesture is not said to occur in the absence of a stroke), retraction (optional), and pre- and post-stroke hold phases (optional).
When analyzing overlapping communications in conversations, it is important to note the timing of the expressions of both the signer and recipient. In signed conversations, articulation involves hand signs that appear in front of the participants; this process of articulation is comparable to the visible lip movements made by those involved in spoken conversations. Using this methodology, we can observe how participants engage in an articulation phase in which signers move their hands to the signing space from the home position as a signal for the start of turn-taking in interactions.

4.2 Finger Braille

4.2.1 Basic Annotation on ELAN

By using interview data mentioned in 3.2.1, we asked a highly skilled and very experienced annotator for spoken language to annotate temporal relationship between interviewer's speech (Bono, the first author) and interviewee's speech (Prof. Satoshi Fukushima, B-deafblind) on ELAN in Japanese, Roman-alphabet style of Japanese, and English idiomatic translation (Fig. 7).

4.2.2 Focused Annotation: Interpretation and Laughing

Then, we annotated the three conditions of interpreters' finger movements such as, *holding, interpreting* and *conveying laughter/nod* (Fig. 7). Holding means the condition in which interpreters' fingers are maintained over B-deafblind person's fingers during silence in dialogue or B-deafblind person's speech. Interpreting means the condition in which interpreters' fingers are tapping on B-deafblind person's fingers to convey interlocutor's speech in a mora-by-mora fashion. Conveying laughter/nod means the condition in which interpreters' fingers are moving in a specific way to represent the current speaker is laughing or the speech including voice quality of laughing.

[2] https://tla.mpi.nl/tools/tla-tools/elan/

01> Both Inside

(WOT-jp) 遊びに行く、行く、行きました。私の趣味なんだけど。

(IT-jp) いろいろなところに行きましたよ。趣味なんです。

(IT-en) I went to a lot of places. It's my hobby.

02> Both Outside

(WOT-jp) あなたは日本と海外のどちらですか？

(IT-jp) 国内と海外、どちらに行かれますか？

(IT-en) Inside Japan or overseas, where did you go?

01> Both Inside

(WOT-jp) 日本、日本だけ。

(IT-jp) もっぱら国内です。

(IT-en) Only inside Japan.

02> Both Outside

(WOT-jp) (とんとん)

(IT-jp) そうですか。

(IT-en) (Tapping) I see.

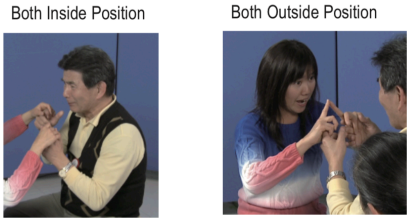
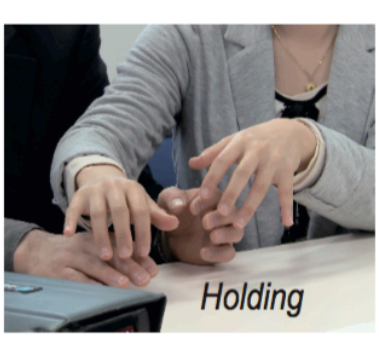


Figure 6: Three kinds of translation (left) and basic annotation of tactile JSL dialogue on ELAN (right).



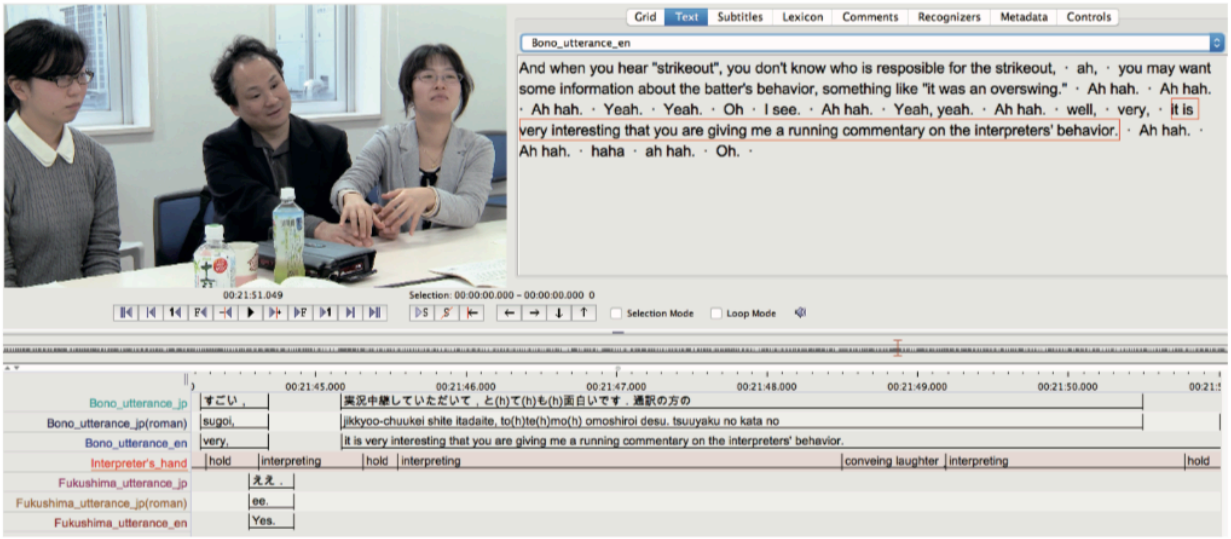


Figure 7: Basic annotation and focused annotation of finger braille interaction on ELAN.

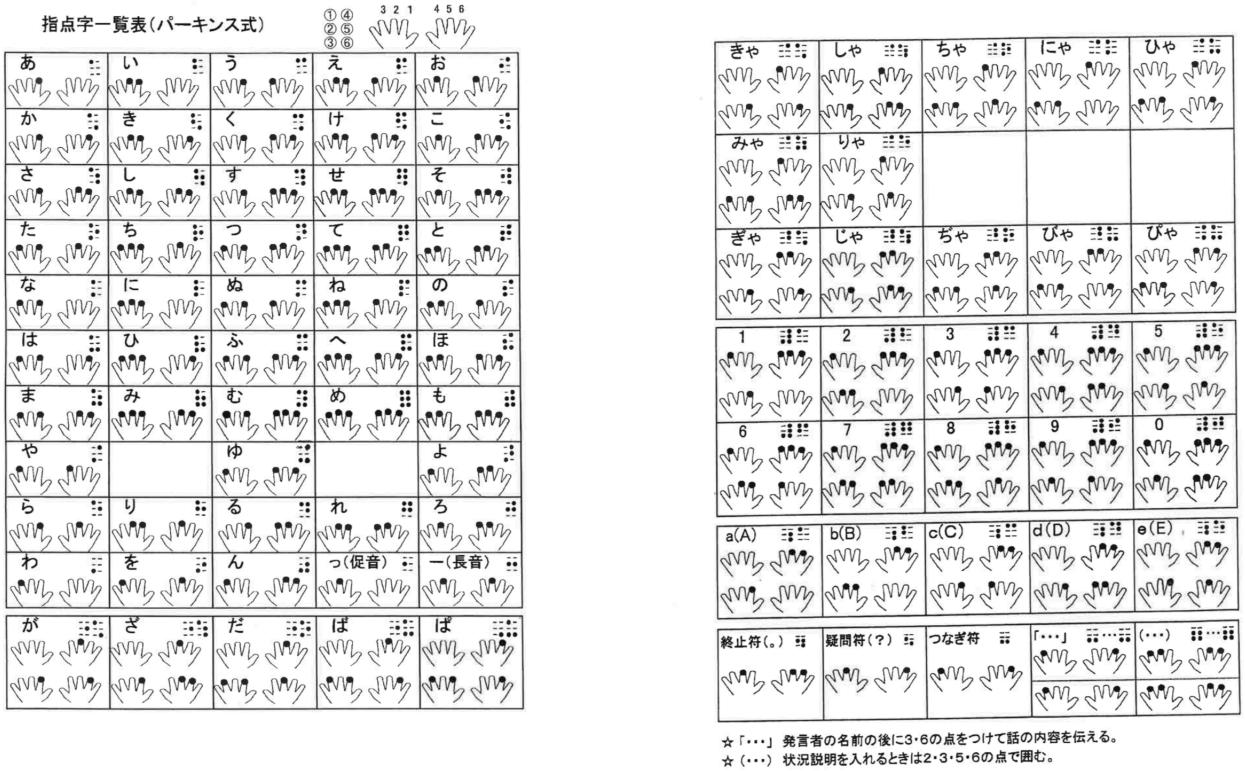


Figure 8: Table of tapping combination of finger braille provided by Ms. Setsuko Sugiura and Mr.Yuji Tako (The Tokyo Deafblind Club).

4.2.3 Focused Annotation: Tapping in Mora-by-mora Fashion

Currently, we are trying to annotate interpreters' finger tapping movements in a mora-by-mora fashion using the table of tapping combination of finger braille provided by Ms. Setsuko Sugiura and Mr.Yuji Tako (The Tokyo Deafblind Club) (Fig.8)[3]. However, standard high-vision cameras have a limited ability to capture these rapid and complicated movements by fingers. If we could annotate these micro-movements, we could observe how finger braille users caught the signals, such as a part of final particle and interactive features by which participants could anticipate the turn-ending comes, to take next turn in dialogue.

5. Examples of Analysis

5.1 Tactile Japanese Sign Language

First, we focused on tapping in tactile JSL interactions. Mesch (2001) examined tapping feedback in tactile sign language interactions. Based on these observations, we tried to identify some of the original features of tactile JSL.

Visual JSL signers have a lexical form of feedback that uses finger tapping movements repeated twice to represent a clear response, such as 'I know' or 'I agree' (Fig. 9, left) (Bono *et al*., 2014).

As shown in Fig. 9 (middle), a deafblind signer with 2 years of experience as a tactile JSL signer taps the interlocutor's hands using the index fingers and thumbs of both hands twice, and again in the recipient position.

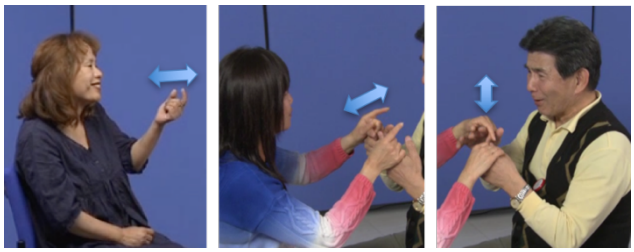


Figure 9: Comparison of finger tapping feedback between visual JSL and tactile JSL

As shown in Fig. 9 (right), a deafblind signer with 16 years of experience as a tactile JSL signer taps the interlocutor's hand using three fingers of the right hand twice, in the speaker position. We are currently analyzing these kinds of tapping feedback to observe the process by which an individual transforms from visual JSL to tactile JSL.

5.2 Finger Braille

In this subsection, observing our experimental-setting data of finger braille interaction between Prof. Fukushima and Bono, we describe how finger braille interpreters convey interlocutor's nonverbal behaviors to the deafblind. As for vocal or signed interpretation, interpreters are not necessarily expected to convey interlocutor's nonverbal behaviors, since the recipient have access to them vocally and/or visually. However, regarding finger braille interpretation, it is crucial for the interpreters to convey interlocutor's nonverbal behaviors when relevant.

[3] http://www.tokyo-db.or.jp/wp-content/uploads/2012/10/03679a8282b7c97a65c07ca3ed8620da.pdf

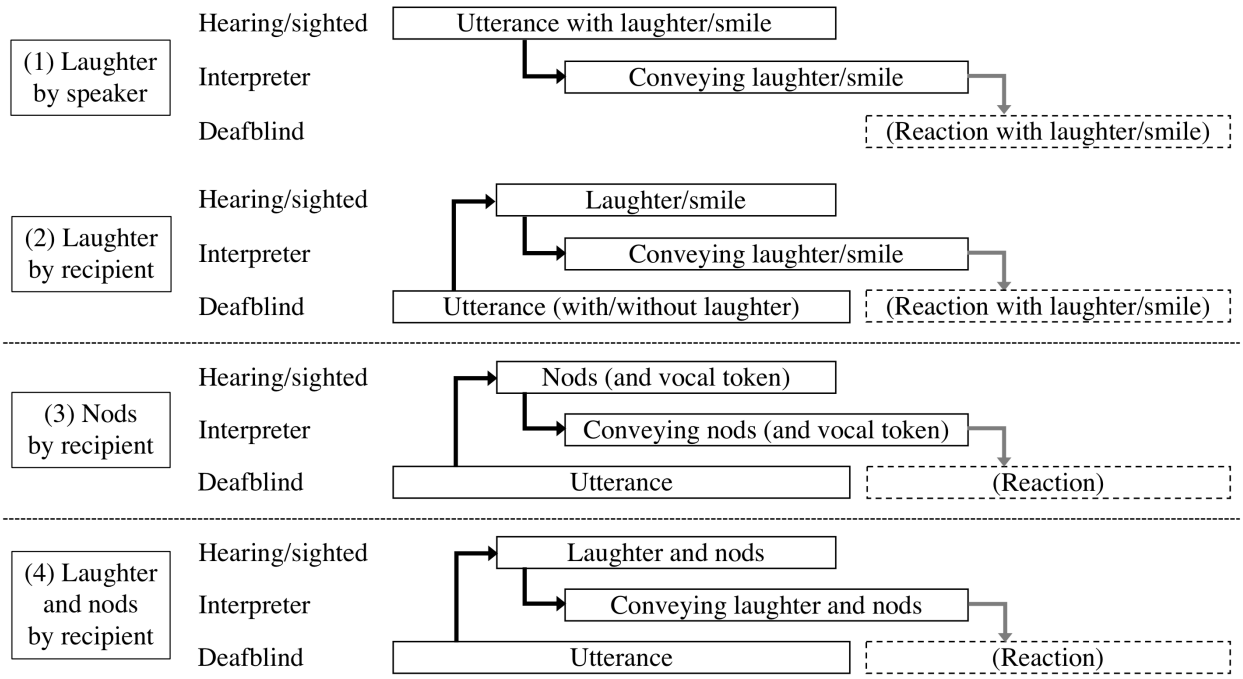


Figure 10: The ways laughter and nods are conveyed in finger braille interpretation.

In particular, finger braille interpreters often convey laughter or nods produced by the hearing/sighted, simultaneously tapping several of the recipients' fingers, several times for laughter, and once or twice for nods. We preliminarily collected and observed several examples in which the interpreters conveyed Bono's nods and/or laughter to Prof. Fukushima. Our tentative observations (Fig. 10) are as follows: Firstly, as for laughter, Bono's laughs within her utterance were frequently conveyed, and sometimes Prof. Fukushima laughed too responding to her (Fig. 10, (1)). In addition, Bono's laughs or smile with slight breath, responding to Fukushima's utterance, were also conveyed (Fig. 10, (2)). Secondly, concerning nods, even when Bono nodded without any vocal utterances, interpreters conveyed her nods to Prof. Fukushima (Fig. 10, (3)). More interestingly, when Bono nodded and slightly later produced a vocal token *un* ("Yeah."), the interpreter conveyed the nods as soon as they started to be produced, that is, before the beginning of *un*. Lastly, when Bono produced both nods and laughter, the interpreter conveyed both of them (Fig. 10, (4)).

Even when the deafblind is a speaker, finger braille interpreters continues to pay attention to the behaviors of the hearing/sighted hearer, and they convey his/her responses, not only their vocal backchannels but also silently produced nods or smiles. On the other hand, when the deafblind is a “hearer”, interpreters conveys laughter which the speaker produces, as well as his/her utterances in a mora-by-mora fashion. Under the specific circumstance, finger braille interpreters must be embodied messengers of the speaker, conveying not only linguistically uttered but also bodily expressed messages (cf. Goffman, 1963).

6. Discussion

We found that interaction methods have already become highly established and sophisticated in the deafblind communities.

We have collected several kinds of data on deafblind people in Japan. Through this filming project, we have noticed that the Japanese deafblind people we have observed use different methods of communication, depending on the users’ hearing ability and eyesight. As Prof. Satoshi Fukushima, one of the board members of the Tokyo Deafblind Club, insists, we should provide diverse and attentive services, such as training for specialists in tactile JSL and finger braille, that are suitable for the individual needs of deafblind people in their daily communication. There is a tendency for Japanese deafblind people and their communities to respect the communication methods of others, rather than simply standardizing and simplifying their own communication methods.

However, the Japanese deafblind community has not opened up to the World sufficiently. Because it is difficult for Western countries to access written Japanese homepages and documents, deafblind people and their supporters cannot present their activities and thoughts to the World. This situation results in Japanese-specific conditions within the deafblind community, which includes the aforementioned difficulty in communicating their everyday lives to other countries.

In fact, there are some interesting social movements related to tactile sign language in other countries, such as the Pro-tactile movement in Seattle reported by Edwards (2014). It is also difficult for the Japanese deafblind community to access these world-wide social movements. We strongly believe that our filming project provides a good opportunity for them to share their everyday lives with the spoken language community and to connect with other communities in other countries. In particular, finger

braille interaction, which was created in Japan, will be made available to B-deafblind people in other countries, bringing with it a strong impact on communication.

7. Conclusions and Future work

This paper introduced our project of filming a deafblind community in Japan. Currently, we are planning to analyze our data from the viewpoints of comparative linguistics studies of visual JSL and tactile JSL, and of spoken Japanese and finger braille.

We have noticed that standard high-vision cameras have a limited ability to capture hand movements in the speaker's position in tactile JSL interaction, where the speaker's hand is located under the recipient's hand. We have already conducted several trials of filming tactile JSL using 360-degree cameras. We hope to collaborate with visual processing engineers when translating and annotating the data.

8. Acknowledgments

This research project was partially supported by KAKENHI (No. 17KT0065), 2017-2019, 'Multimodal Research on Sign Language, Tactile Sign Language and Finger Braille in Interaction: A Bilingual and Bimodal Study of the Influence of Spoken Language', PI: Mayumi Bono, Grant-in-Aid for Scientific Research (B), Generative Research Fields: Orality and Society. The professional cameras and lighting devices were operated by Rakuda Studio.[4]

9. References

Bono, M, Kikuchi, K, Cibulka, P, and Osugi, Y. (2014) Colloquial corpus of Japanese Sign Language: A design of language resources for observing sign language conversations. *Proc. of the 9th Language Resources and Evaluation Conference*, pp. 1898–1904.

Edwards, T. (2014) From compensation to integration: Effects of the pro-tactile movement on the sublexical structure of Tactile American Sign Language, *Journal of Pragmatics*, 69, 22-41.

Goffman, E. (1963) Behavior in Public Places: Notes on the Organization of Gatherings. New York: Free Press.

Kendon, A. (1972) Some relationships between body motion and speech. In Siegman, Aron W. & Pope, Benjamin (Eds.), *Studies in dyadic communication*. 177-210. New York: Pergamon Press.

Kendon, A. (1980) Gesticulation and speech: Two aspects of the process of utterance. In Key, Mary R. (Ed.), *The relation between verbal and nonverbal communication*. The Hague: Mouton.

Kendon, A. (1990) *Conducting Interaction: Patterns of Behavior in Focused Encounters,* Cambridge University Press.

Kita S, van Gijn I., van der Hulst H. (1998). Movement phases in signs and co-speech gestures, and their transcription by human coders. *Lecture Notes in Computer Science*, 1371/1998. Springer Berlin / Heidelberg.

McNeill, D. (1992). *Hand and Mind.* University of Chicago Press, Chicago.

Mesch, J. 2001. *Tactile Sign Language: Turn taking and question in signed conversations of deaf-blind people*. Hamburg: Signum.

Sacks H., Schegloff E., Jefferson G. (1974) A simplest systematics for the organization of turn-taking in conversation. *Language* 50 696–735.

[4] http://www.rakudastudio.com/