# Differences in Interactional Attitudes in Native and Second Language Conversations: Quantitative Analyses of Multimodal Three-Party Corpus

**Seiichi Yamamoto (seyamamo@mail.doshisha.ac.jp)**
Department of Information Systems Design, 1-3 Miyakodani, Tatara, Kyotanabe-shi, Kyoto, 610-0321, Japan

**Keiko Taguchi (dun0153@mail4.doshisha.ac.jp)**
Department of Information Systems Design, 1-3 Miyakodani, Tatara, Kyotanabe-shi, Kyoto, 610-0321, Japan

**Ichiro Umata (umata@nict.go.jp)**
National Institute of Information and Communications Technology, 2-2-2 Hikaridai, Seika-cho, Soraku-gun, Kyoto, 619-0288, Japan

**Kosuke Kabashima (dtl0724@mail4.doshisha.ac.jp)**
Department of Information Systems Design, 1-3 Miyakodani, Tatara, Kyotanabe-shi, Kyoto, 610-0321, Japan

**Masafumi Nishida (mnishida@mail.doshisha.ac.jp)**
Department of Information Systems Design, 1-3 Miyakodani, Tatara, Kyotanabe-shi, Kyoto, 610-0321, Japan

## Abstract

Quantitative analyses and the analyses of a questionnaire were conducted to examine the relations between participants' communicative activities and their interactional attitudes in conversations both in their native and second languages. The two categories of conversations revealed different gaze patterns that reflected the differences in difficulties they had with communication and grounding patterns. The participants were less conscious of their own gazes in conversation in their second language than those in their native language probably because of the difficulties and mental pressure they felt.

**Keywords:** Second language conversation; Language expertise; Utterance; Gaze; Grounding; Communication

## Introduction

As modern society has become more global, the importance of conversations in a second language has been increasing more than ever before. People are traveling around the world either on business or for pleasure due to progress in transportation systems and advanced Internet technologies that connect areas that have different linguistic backgrounds. Organizations are increasingly forming teams with members whose mother tongues are not the same, and sometimes co-workers and collaborators from different countries are connected via the Internet. Second language conversations are commonly observed in daily life, and the expertise of conversational participants often ranges from low to high. An urgent issue today is to support mutual understanding in these conversations.

Language use is a form of joint action that is carried out by groups of people who act in coordination. Their joint action involves not only verbal but also non-verbal activities to achieve a common "grounding" process, i.e., to form the basis of mutual understanding (Clark & Brennan 1991, Clark 1996). There have been quantitative studies that have reported that eye gazes play an important role in monitoring understanding by communication partners of the content of conversation and contributions made to the performance of collaborative tasks (Boyle, Anderson, & Newlands 1994, Clark & Krych 2004).

Grounding is also an important process in second languages. There have been studies that have regarded "nativeness" as "expertise" and compared the grounding process between differing levels of language expertise (Kasper 2004, Hosoda 2006). Hosoda reported that participants' disfluencies or linguistic errors were usually not treated as problems with interactions, but they were oriented to differences in linguistic expertise by repair (a) when one speaker invited the other's repair, and (b) when mutual understanding was jeopardized unless one party repaired the other. Eye gazes and facial expressions play an important role in monitoring both partners' understanding in the repair process. These studies have, however, been qualitative and there have been few quantitative analyses of the relation between the grounding process and non-verbal activities in second language conversations.

Veinott et al. (1999) found that non-native speaker pairs benefited from video in route guiding tasks in the field of computer supported collaborative work (CSCW), whereas native speaker pairs did not. They argued that this was

because video helped the non-native pairs to negotiate a common ground whereas it did not do so for the native pairs. Their study revealed that video images of the conversation partners helped them to establish mutual understanding in their second language conversations, although it was still not clear which element in the video information contributed to establishing the common ground.

Previous research has suggested some differences in conversational features between a mother tongue and a second language. The duration as a percentage when other participants are observing the speaker in English as a second language is longer than that in Japanese as a mother tongue (Kabashima, Nishida, Jokinen, Yamamoto 2012; Yamasaki, Furukawa, Nishida, Jokinen, Yamamoto 2012). Even though these results are consistent with Hosoda's observations and suggest an interesting feature of second language communications, it is still not clear how this feature interacts with other communicative features.

The main aim of this study was to examine the relations between participants' communicative activities and their interactional attitudes in conversations both in their native and second languages. We conducted quantitative analyses to study the differences in communicative behaviors in second and native language conversations. We also analyzed a questionnaire to examine the interactional attitudes of the participants. We integrated the results of the two analyses to examine the differences in communication processes in native and second language conversations.

## Data Collection

We collected data in a mother tongue and in a second language from conversations by the same interlocutors.

### Participants

A total of twenty-four university students (14 females and 10 males: eight groups) between the ages of 18 and 24 participated in the experiment, and each conversational group consisted of three participants who did not know another. They were Japanese university students who had acquired Japanese as their mother tongue and had learned English as a second language. Their communication levels in English were measured based on the Test of English for International Communication (TOEIC). We recruited participants to cover wide range of expertise in English. Their scores ranged from 450 to 890, and the average was 591 (990 being the highest score that could be attained). Each participant was ranked into three degrees of expertise according to the order of his/her English expertise based on the TOEIC score within the group.

### Experimental Setup

Three participants sat in a triangular formation around one table. Each participant sat in the same position for all four trials. The three participants sat 1.5 m apart. Three sets of NAC EMR-9 eye trackers and headsets with microphones were used to record the eye gazes and voices of all three participants (Figure 1). The viewing angle of the EMR-9 was $62^{o}$ and the sampling rate was 60 fps. The participants talked about two types of predetermined themes in English as a second language and in Japanese as their mother tongue (e.g., each group participated in four conversations).

Figure 1: Experimental Setup

### Procedure

The conversational topic was assigned before each trial and there were two types of themes. The first was free-flowing in which they chatted naturally on foods they liked or disliked. The second was goal-oriented in which they collaboratively decided what to take with them on trips to uninhabited islands or mountains. We randomly arranged the order of the topics of conversation to cancel out the effect of order. We also randomly arranged the order of the languages used in the conversations.

The eye trackers were calibrated and participants started to converse after instructions on the experiment were explained. Each group had conversations of four different topics on free-flowing and goal-oriented themes in Japanese and in English. Each conversation lasted for 6 min.

The participants filled in a questionnaire after each conversation. Consequently, the subjects in each group participated in four conversations and filled out four questionnaires. We then analyzed the data from the free flowing conversations in Japanese and in English. The total numbers of utterances were 1858 in English and 2059 in Japanese, and gaze events were 2360 in English and 2727 in Japanese, respectively.

### Annotations

One of the authors manually annotated the time spans for utterances and gazes at other participants to integrate the utterance and eye gaze data. The eye gaze data of two participants were not recorded because of trouble they had with the equipment, and they were excluded from the analyses. We used the EUDICO Linguistic Annotator (ELAN) developed by the Max Planck Institute (Fig.2) as the annotation tool.

### Questionnaire

We asked the participants to fill in the questionnaire to analyze their interactional attitudes in each conversation. The questionnaire consisted of 29 items and each of them was ranked on a Likert scale from one to seven. Each

question was categorized into communicational features such as participants' gazing activities, their feelings toward other participants, their interest in the topic of conversation, their conversational skills in English, and their evaluation of the conversation content. The progress of the trials can affect the familiarity. We conducted ANOVA on the values obtained from questions on evaluating their familiarity to other participants to check if there are any differences in the values among the trials. The results did not revealed significant differences on the evaluation of familiarity with the progress of trials. The results suggest that, in this experiment, familiarity to other participants were not affected by the progress of the trial.

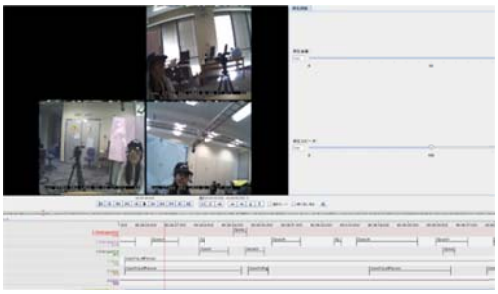

Figure 2: Annotation Screen Shot

## Analyses

We used two methods in the analyses; the first involved quantitative analysis of communicative activities such as utterances and gazes, and the second involved analyzing a questionnaire on the participants' interactional attitudes. The correlations between the quantitative data and the values obtained from evaluating the questionnaire were also analyzed to study the relations between the participants' communicative activities and their interactional attitudes in conversations both in their native and second language.

### Analysis 1: Utterances and Gazes

First, we compared the total duration of the utterances between the Japanese and English language conversations to check the difficulty in communicating in the second language. The total duration of the utterances was expected to be longer in Japanese than in English. A paired *t*-test indicated a significant difference between conversations in Japanese as a native language and those in English as a second language ($t = 4.848$, $p<.01$, Japanese: *av*.= 110222 msec, *SD* = 39178 msec; English *av*.= 79185 msec, *SD* = 6347). They talked more in conversations in their native language than in those in their second language.

Gazing activities during utterances were also compared between conversations in Japanese and those in English. We compared (1) how long the speaker was observed by other participants (ratio being observed), and (2) how long the speaker observed other participants (ratio observing).

The average for the *ratio being observed* is defined as:

$$Average\ of\ Ratio\ Being\ Observed = \frac{\sum_{i=1}^{n} DPOS(i)}{\sum_{i=1}^{n} D(i)} \times 100(\%)$$

Here, $D(i)$ is the duration of the $i$-th utterance and $DPOS(i)$ is the duration when other participants are observing the speaker in the $i$-th utterance.

The average for ratio observing is defined as:

$$Average\ of\ Ratio\ Observing = \frac{\sum_{i=1}^{n} DSOP(i)}{\sum_{i=1}^{n} D(i)} \times 100(\%)$$

Here, $DSOP(i)$ is the duration when the speaker is observing other participants in the $i$-th utterance.

Previous research has suggested that the speaker is observed more in their second language conversations than in those in their native language, and that the difference in second language expertise affects the communication style (Kabashima, Nishida, Jokinen, Yamamoto 2012; Yamasaki, Furukawa, Nishida, Jokinen, & Yamamoto 2012). These predictions are consistent with observations of the repair process in second language conversations (Hosoda 2006).

Under the hypotheses that the speakers were observed more in conversations in their second language than in their native language and that language expertise affected gazing activities, we conducted 2 x 3 ANOVA with the language difference being within subject factors and with expertise rank in English being between subject factors. The results revealed significant main effect both on language differences ($F_{(1, 19)} = 24.823$, $p < .01$) and on the expertise ranking in the second language ($F_{(2, 19)} = 3.625$, $p < .05$), and no interactions were observed. Fisher's LSD test indicated significant differences between the 1st and 3rd ranks ($p < .05$).

The average and the SD values of the *ratio being observed* for each rank are listed in the table below.

| Expertise Rank | Condition | av. | No. of the samples | SD |
|---|---|---|---|---|
| 1 | Native Language | 73.33 | 7 participants | 11.299 |
| | Second language | 82.77 | 7 participants | 3.946 |
| 2 | Native Language | 78.77 | 7 participants | 8.257 |
| | Second language | 85.09 | 7 participants | 1.764 |
| 3 | Native Language | 81.29 | 8 participants | 2.663 |
| | Second language | 88.48 | 8 participants | 3.151 |

Table 1: Average values for *ratio being observed*

The results indicate that the speakers were observed more in conversations in their second language than in those in their native language, and speakers with low levels of expertise in their second language tended to be observed more than speakers with high levels of expertise.

### Analysis 2: Comparison of Values from Questionnaire

The values from evaluating each item on the questionnaire were compared for Japanese and English to examine the differences in the participants' interactional attitudes in conversations in their native and second languages. The results suggest they had greater difficulty

and were more stressed in their second language conversations as we had predicted. The items that exhibited significant differences in the t-test[1] were in the following table. Here a single asterisk * in the tables denotes $p < .05$ and a double asterisk ** denotes $p < .01$, respectively.

**Evaluation of Expertise:**

The participants evaluated their expertise and their partners' expertise higher in their native language conversations as follows.

- Evaluate your speaking expertise.

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 4.63 | 1.245 | 23 | 6.323** |
| English | 24 | 2.67 | 1.404 | 23 | |

- Evaluate your partner's English speaking expertise.
  - Toward higher ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.63 | 0.97 | 23 | 3.760** |
| English | 24 | 4.54 | 1.615 | 23 | |

  - Toward lower ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.29 | 1.083 | 23 | 3.680** |
| English | 24 | 4.21 | 1.532 | 23 | |

  - Do you think he/she could understand your discourse?
  - Toward higher ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.67 | 1.239 | 23 | 2.220** |
| English | 24 | 5.17 | 1.308 | 23 | |

  - Toward lower ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.83 | 1.239 | 23 | 3.423** |
| English | 24 | 5.08 | 1.176 | 23 | |

**Feelings toward Partners:**

The participants were more nervous and felt more pressure from their partners in their second language conversations. They felt their partners concentrated more in second language conversations. These results suggest the participant felt more stress in second language conversations.

- Did you get nervous when you spoke?

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 2.50 | 1.504 | 23 | -5.249** |
| English | 24 | 4.33 | 1.606 | 23 | |

- Do you think your partner got nervous when he/she spoke?
  - Toward higher ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 2.38 | 1.408 | 23 | 5.675** |
| English | 24 | 4.13 | 1.296 | 23 | |

  - Toward lower ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 2.58 | 1.381 | 23 | -5.625** |
| English | 24 | 4.54 | 1.381 | 23 | |

- Did you feel pressure from them?
  - Toward higher ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 1.92 | 1.018 | 23 | -2.230* |
| English | 24 | 2.58 | 1.742 | 23 | |

  - Toward lower ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 1.88 | 1.191 | 23 | -3.093** |
| English | 24 | 2.58 | 1.640 | 23 | |

- Do you think your partner concentrated on your discourse?
  - Toward higher ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.25 | .989 | 23 | -3.391** |
| English | 24 | 5.92 | .881 | 23 | |

  - Toward lower ranked partners

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.29 | 1.233 | 23 | -2.077** |
| English | 24 | 5.79 | .884 | 23 | |

**Evaluations of Conversation**

The participants felt that they were more active and that the conversation warmed up and became more enjoyable in their native language conversations. They also felt that they could talk as they usually did in their native language.

- Do you think you could talk actively?

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.08 | 1.139 | 23 | 3.709** |
| English | 24 | 3.75 | 1.452 | 23 | |

- Did the conversation warm up?

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.50 | .978 | 23 | 4.331** |
| English | 24 | 4.13 | 1.191 | 23 | |

- Did you enjoy the conversation?

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.33 | .963 | 23 | 2.077* |
| English | 24 | 4.83 | 1.167 | 23 | |

- Did you think that you could talk as you usually do?

| | *N* | *av.* | *SD* | *df* | *t* |
|---|---|---|---|---|---|
| Japanese | 24 | 5.46 | 1.179 | 23 | 5.438** |
| English | 24 | 3.21 | 1.641 | 23 | |

[1] There were only 24 participants and it is not clear if these values were normally distributed. However, exactly the same list of items also revealed significant differences in Wilcoxon's signed rank test, and the results can be considered to be sufficiently stable.

## Analysis 3: Correlations between Gazing Activities and Values from Questionnaire

These results indicate that the participants gazing activities and interactional attitudes differed in conversations in their native and second languages, as had been predicted. We conducted Spearman's correlation analysis on their gazing activities and their interactional attitudes that were contained in the questionnaire data. The items that exhibited significant correlation are shown with the correlation values (Spearman's ρ) in the following tables. A single asterisk * denotes $p < .05$ and a double asterisk denotes $p < .01$on the tables.

**Consciousness of Gazing Activities:**

The values obtained from evaluating gazing activities had high correlations with gaze durations in Japanese conversations although they did not in English conversations. These results indicate that the participants were conscious of their gazing activities in conversations in their native language, whereas they were not in their second language.

Japanese:

| Ratio Observing | ρ |
|---|---|
| <-> Did you watch his/her face as a whole? | .511* |
| <-> Did you watch his/her eyes? | .588** |

## Analysis 4: Correlations of Items on Questionnaire

There were several interesting differences in the results from Spearman's correlation analysis of the items in the questionnaire for the Japanese and English conversations as listed below.

**Difference in Interactional Attitudes**

The speakers' evaluations of their ability to concentrate were correlated with their evaluations of gazing at the listeners' upper body, face, and eyes in English, but only with their evaluations of gazing at the listener's eyes in Japanese. This suggest that speakers were paying attention to wider areas of their partners' body when they concentrated during second language conversations, whereas they were only paying attention to the eyes of their partners in native language conversations. .

English:

| Did you concentrate on your utterances? | ρ |
|---|---|
| <-> Did you watch the listener's upper body as a whole? | .485* |
| <-> Did you watch his/her face as a whole? | .537** |
| <-> Did you watch his/her eyes? | .605** |

Japanese:

| Did you concentrate on your utterances? | ρ |
|---|---|
| <-> Did you watch his/her eyes? | .417* |

**Feelings toward Other Participants**

The participants evaluations of their understanding of their partners' discourse were correlated with those of their positive feelings toward their partners in English conversations, whereas there were no such correlations in Japanese conversations. The participants tended to have positive feelings toward their partners when they could understand what their partners said in second language conversations, but just understanding their partners' discourse was not enough for the participants to have positive feelings toward their partners in native language conversations.

English:

| Do you think you could understand his/her discourse? | | ρ |
|---|---|---|
| <-> Did you have a sense of closeness to your partner? | Toward higher ranked partners: | .639** |
| | Toward lower ranked partners: | .549** |
| <-> Did you become interested in him/her? | Toward higher ranked partners: | .523** |
| | Toward lower ranked partners: | .532** |

The participants' evaluations of pressure from their partners had a correlation with their evaluations of their own nervousness when they spoke in English conversations but not in Japanese conversations. This suggested that pressure from their partners led directly to the speakers' nervousness in second language conversations, but not in native language conversations.

English:

| Did you feel pressure from them? | | ρ |
|---|---|---|
| <-> Did you get nervous when you spoke? | Toward higher ranked partners: | .419* |
| | Toward lower ranked partners: | .460* |

## Discussion

Thus far, we have compared the utterances, gazes, and interactional attitudes of participants in native and second language conversations. Quantitative analyses were conducted on utterance and gaze data in Analysis 1. The shorter total duration in English conversations suggested difficulties the participants had in their second language conversations. Preliminary analysis using one-fourth of this corpus denoted that the average number of filled pauses and percentage of turn-hold after pause were more than double in English in comparison with those in Japanese (Yamasaki, Furukawa, Nishida, Jokinen, Yamamoto 2012). These results also suggested difficulties the participants had in their second language conversations.

The speakers were observed by listeners more in their second language conversations than in their native language

conversations. The speakers with lower levels of linguistic expertise were gazed more than those with higher levels of linguistic expertise in their second language conversations. These results are consistent with observations by Hosoda (Hosoda 2006), and they indicate that such gazing patterns represent one of the interactional features unique to second language conversations. The listeners made more use of visual information from the speaker to help further understanding in conversations in their second language than that in their native language, and it is likely that speakers with low levels of expertise need more gazes from their partner to help their repair process in grounding activities in second language conversations.

A comparison of the values obtained from the questionnaire also revealed difficulties the participants had in their second language conversations in Analysis 2. They evaluated their linguistic expertise to be lower in their second language conversations and they felt more pressure from their partners, and were more nervous. They were not able to conduct conversations as they usually did, and the conversations did not warm up as much as those in their native language.

The difficulties in second language conversations seemed to have affected their management of conversational activities. The results obtained from correlation analysis in Analysis 3 of the participants' gazes and their self evaluations of their own gazes indicated that the participants were not conscious of their gazing activities in conversations in their second language, whereas they were in their native language. This suggests that difficulties in second language communication made the participants concentrate too much on managing conversations to be conscious of their own communicative activities.

Analysis of correlation in the items on the questionnaire in Analysis 4 revealed differing interactional attitudes in native and second language conversations. The speakers seemed to make use of visual cues from wider areas of the listeners' upper bodies when they concentrated more on their second language conversations than those in their native language where they only made use of visual cues from the listeners' eyes.

Another interesting finding from Analysis 4 was that understanding what a conversation partner said was likely to lead to positive evaluation of the partner in conversations in the second language whereas no such tendencies were observed in conversations in the native language. This suggests that understanding the partners' utterances is already considered to be an achievement in second language conversations whereas just understanding what the partners say is not enough to have positive feelings toward them.

## Conclusion

We examined the relations between participants' communicative activities and their interactional attitudes both in native and second language conversations. Quantitative analyses and analyses of a questionnaire revealed that the participants had more difficulties in their second language conversations than those in their native language, and they demonstrated different interactional attitudes in the two categories of conversations. .

Speakers were observed more by listeners in conversations in their second language than those in their native language, and speakers with lower levels of expertise were observed more in second language conversations which probably reflected more frequent repair processes.

The participants were less conscious of their gazing activities in conversations in their second language than those in their native language probably because of the difficulties and pressures they felt in their second language conversations. We trust these findings will contribute further to supporting second language communications and second language learning.

## Acknowledgments

This research was supported in part by a grant from the Japan Society for the Promotion of Science (JSPS) (No.22520598). The authors would like to thank Professor Kristiina Jokinen of the University of Helsinki and Professor Mariko Sugawara of Doshisha University for their suggestions and the various discussions we had with them.

## References

Boyle, E., Anderson, A., & Newlands, A. (1994). The Effect of Visibility on Dialogue and Performance in a Cooperative Problem Solving Task, *Language and Speech Journal*, pp. 1-20.

Clark, H. H. & Brennan, S. A. (1991). Grounding in Communication, in: L. B. Resnick, J. M. Levine, and S. D. Teasley (Eds.), *Perspectives on Socially Shared Cognition* (pp. 222-233), APA Books, Washington.

Clark, H. H. (1996). *Using Language*, Cambridge University Press, Cambridge..

Clark, H. H. & Krych, M. A. (2004). Speaking While Monitoring Addressees for Understanding, *Journal of Memory and Language*, p. 6281.

Hosoda, Y. (2006). Repair and Relevance of Differential Language Expertise, *Applied Linguistics,* 27, pp. 25-20.

Kabashima, K., Nishida, M., Jokinen, K. & Yamamoto, S. (2012). Multimodal Corpus of Conversations in Mother Tongue and Second Language by Same Interlocutors, *Proceedings of 4th Workshop on Eye Gaze in Intelligent Human Machine Interaction.*

Kasper, G. (2004). Participant Orientations in Conversation-for-Learning, *The Modern Language Journal,* vol. 88, pp. 551–567.

Veinott, E., Olson, J., Olson, G., and Fu, X. (1999). Video helps Remote Work: Speakers Who Need to Negotiate Common Ground Benefit from Seeing Each Other, *Proceedings of the Conference on Computer Human Interaction. CHI'99*, ACM Press, PA, USA, pp. 302-309.

Yamasaki, S., Furukawa, H., Nishida, M., Jokinen, K., and Yamamoto, S. (2012). Multimodal Corpus of Multi-party Conversations in Second Language, *Proceedings of LREC2012*.